Mobile Governance for Small Island Developing States – Strategy Knowledge Base

Final Version

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Acknowledgements

Executive Summary

This report is the first of three main deliverables produced by the project "Developing M-Governance Strategy for Vanuatu and Commonwealth m-Governance Toolkit":

1. Mobile Governance for Small Island Developing States – Strategy Knowledge Base
    (Henning and Janowski, 2014)
2. Mobile Governance for Small Island Developing States – Toolkit
    (Estevez and Janowski, 2014)
3. Mobile Governance for Vanuatu – Strategy and Implementation Plan
    (Henning, Janowski, Zoughbi and Estevez, 2014)

In particular, the current report (1) presents:

o   The state of MGOV research and the major research findings including conceptualizations, evolution, impact, drivers, barriers, user adoption, applications and policies;
o   The state of practice in the use of ICT and MGOV to contribute to national development through country experiences by India, Mauritius, Micronesia, Singapore and Malta; and
o   The MGOV4D strategy knowledge base containing a set of strategies adopted by India, Mauritius, Micronesia, Singapore and Malta as broadly representative of the goals and conditions for MGOV4D implementation present in the SIDS country group.

The second report presents a toolkit that guides the development of tailor-made strategies for Small Island Developing States (SIDS), based on the knowledge base (1), and the third report contains the MGOV strategy for Vanuatu, which was developed through the toolkit (2) by applying the SIDS strategy knowledge base (1).

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Abbreviations

AC	Absorptive Capacity and Adoption
ADB	Asia Development Bank
API	Application Programming Interface
B2B	Business to Business
BS	Businesses-Focused Setup Projects
CRP	Comprehensive Reform Program
CTO	Commonwealth Telecommunications Organization
DD	Design and Development
DM	Delivery Mechanisms
DIT	Department of Information Technology
EGOV	Electronic Governance
ES	External Stakeholders
FSM	Federated States of Micronesia
G2B	Government to Business
GIS	Geographic Information System
GOV	Governance
GOV4D	Governance for Development
HC	Human Capacity
ICT	Information and Communication Technology
ICT4D	ICT for Development
ID	Identity
IDA	Singapore Infocomm Development Agency
IN	Intelligent Nation
INF	ICT Infrastructure
IOP	Interoperability
IT	Information Technology
ITU	International Telecommunication Union
IVR	Interactive Voice Response
KDP	Kiribati Development Plan
KPA	Key Policy Area
L	Leadership
MGOV	Mobile Governance
MGOV4D	Mobile Governance for Development
M-ICT	Mobile ICT
M-ICT4D	Mobile ICT for Development
MMS	Multimedia Messaging Service
MSDG	Mobile Service Delivery Gateway
NGO	Non-governmental Organization
NSDS	Nauru Sustainable Development Strategy
OECD	Organization for Economic Co-operation and Development
OGCIO	Office of the Government Chief Information Officer

PAA   Priorities and Action Agenda
REDI   Rural Economic Development Initiatives
SD   Sustainable Development
SDK   Software Development Kit
SIDS   Small Island Developing States
SIM   Subscriber Identity Module
SME   Small- and Medium-Size Enterprise
SMS   Short Message Service
SP   Strategy and Policy Framework
SS   Security Safeguards
STK   SIM Toolkit
UN   United Nations
UNDP   United Nations Development Programme
UNPAN   United Nations Public Administration Network
UNU   United Nations University
UNU-IIST   UNU International Institute for Software Technology
USSD   Unstructured Supplementary Service Data
WAP   Wireless Application Protocol

1. Introduction

The current report constitutes the first main deliverable of the project "Developing M-Governance Strategy for Vanuatu and Commonwealth m-Governance Toolkit" and is focused on the development of MGOV/ICT Strategy Knowledge Base for Small Island Developing States.

The project was established as follows:

o The Commonwealth Connects Steering Committee decided in January 2013 to develop an MGOV strategy for a Commonwealth small state, and based on this experience and the knowledge produced, to build a toolkit that could guide similar efforts in other Commonwealth small states.

o The Commonwealth Telecommunications Organization (CTO) was mandated to develop the project, with Vanuatu selected as the target state for strategy development, and Small Island Developing States (SIDS) as the target country group for the toolkit.

o CTO developed the Terms of Reference for the project (Commonwealth Telecommunications Organization, 2013) and in September 2013 contracted the United Nations University through its Center for Electronic Governance to carry out it out.

This report documents the systematic process of developing the MGOV/ICT Strategy Knowledge Based for SIDS. In line with this objective, the report has three goals:

1. To establish the state of MGOV research and discover major research findings in the area;
2. Relying on the research findings (1), review policy initiatives and experiences by selected countries with broadly similar development goals and MGOV/ICT implementation conditions to the SIDS, thus establishing the state of practice in the use of ICT and MGOV to contribute to national development; and
3. Relying on the research (1) and policy (2) findings, to develop the MGOV4D strategy knowledge base and to populate it with the strategies adopted by the countries with broadly similar development goals and MGOV/ICT implementation conditions to SIDS.

MGOV refers in this report to mobile-enabled governance in general, including concrete implementations of mobile technologies in public administration and governance, while MGOV4D refers to MGOV deployment that serves larger public policy and development goals.

In the remainder of this report, Sections 2 to 4 fulfill the goals (1), (2) and (3) respectively, and Section 9 provides some conclusions.

2.   MGOV State of the Art

This section provides a review of the state of the art in Mobile Governance (MGOV) and develops a conceptual framework for MGOV that could serve as a basis for strategy formation. Based on a previously developed structured assessment framework (Estevez & Janowski, 2013), the section reports on a systematic review of key studies and reports in the field of MGOV.

The rest of the section is structured as follows. Section 2.1 describes the methodology used for data collection and assessment. Based on this methodology, Section 2.2 analyses existing MGOV research and policy literature and Section 2.3 establishes the state of the art in MGOV. Relying on the findings of the previous sections, Section 2.4 constructs the MGOV conceptual framework. Finally, Section 2.5 provides some concluding remarks.

2.1.   Methodology

This section describes the methodology applied for collecting and assessing data to be used in the remainder of this section. The methodology comprises construction of the necessary frameworks for assessing the MGOV field, collection of the relevant research and policy literature, the analysis of such literature, and the synthesis of the findings into state of the art and conceptual framework. Adapted from (Estevez & Janowski 2013), the methodology is depicted in self-explanatory Figure 1.
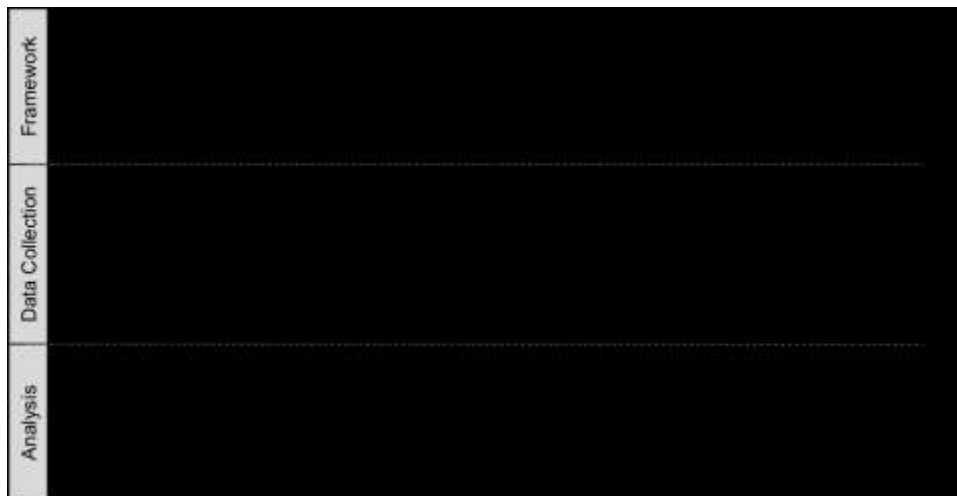
Figure 1: MGOV state of the art – methodology

In the rest of this section, Section 2.1.1 describes research domains comprising the MGOV field and the assessment framework, Section 2.1.2 describes the method used for data collection including identifying the relevant literature, and Section 2.1.3 describes the steps for analyzing and synthesizing the data into state of the art and conceptual framework.

2.1.1. Framework Development

In order to define the area of investigation, the first step was to identify the key domains that jointly define the MGOV field. Three primary domains – Mobile ICT (M-ICT), Governance (GOV) and Development (D); and three secondary domains obtained by the intersections of the primary domains – Governance for Development (MGOV4D), Mobile Governance (MGOV) and Mobile ICT for Development (M-ICT4D) were identified. These primary and secondary domains are depicted in Figure 2 (Estevez & Janowski, 2013). The arrows in the figure link solution domains to the corresponding problem domains i.e. Governance is regarded as a solution domain to Development-related problems, while Mobile ICT is regarded as a solution domain to both Governance- and Development-related problems. Among the secondary domains, MGOV4D is of central interest in subsequent analysis.
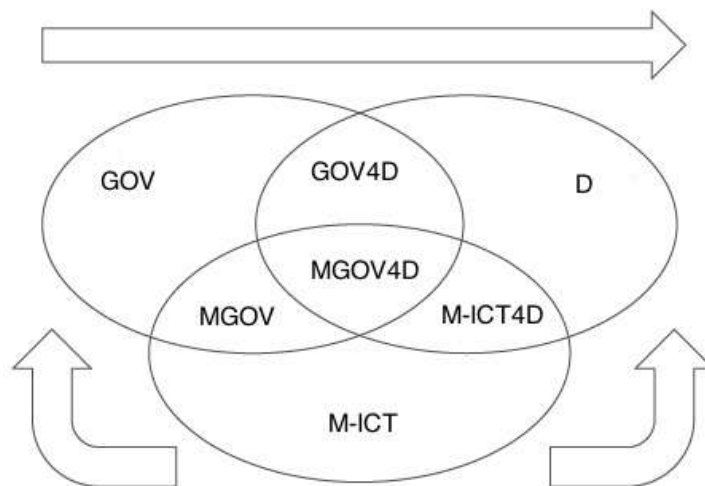
Figure 2: MGOV state of the art – research domains

After defining the primary and secondary domains, the next step was to construct an assessment framework for identifying and analyzing the publications that cover these domains. To this end, an adapted version of the assessment framework earlier applied to carry out state of the art analysis of a related Electronic Governance for Sustainable Development (EGOV4SD) field (Estevez & Janowski, 2013) was applied. EGOV4SD is a particular instance of Policy-Driven Electronic Governance defined in (Janowski, 2014).

The assessment framework consists of the five constructs as follows:

o *Problem* – This construct refers to the problem area addressed by a publication. It is measured along three dimensions: governance – includes the issues of government, interactions, customers and society; mobile ICT – includes the issues of mobile technology; and development – includes economic, environmental, social and institutional issues.

- o *Method* – This construct refers to the method of data collection and analysis applied in a publication. It is measured through five values: qualitative method, quantitative method, mixed method, theory review and no discernible method.

- o *Data* – This construct refers to the data source and data collection method applied in the publication. The former is measured through two values – primary and secondary. The latter is measured through six values – questionnaire, interview, document analysis, web content evaluation, literature review and case study.

- o *Results* – This construct refers to theoretical and practical contributions made by the publication. The former is measured through theoretical model, schema, conceptual framework, typology and other values, while the latter is measured through policy evaluation, indicators and targets, policy recommendations and other values.

- o *Publication Type* – This construct indicates whether the publication under review is of academic (e.g. book, journal or conference paper) or practical (e.g. report) nature.

The assessment framework is depicted in Figure 3, adapted from (Estevez & Janowski 2013).
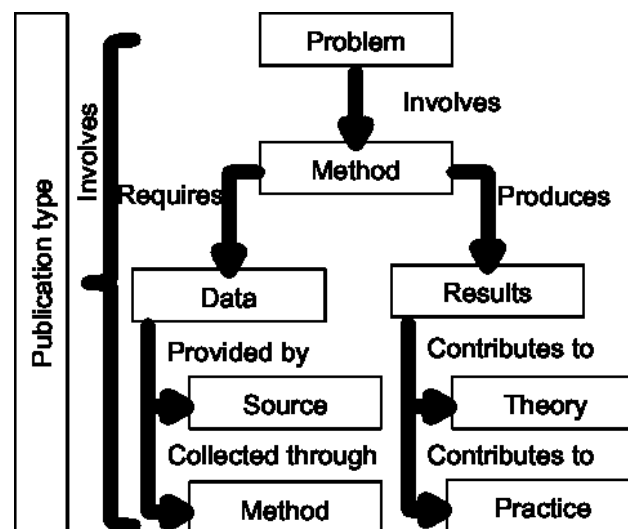
Figure 3: MGOV state of the art – assessment framework

2.1.2. Data Collection

Based on the framework, a number of relevant keywords were identified to carry out a literature search, and transformed into three groups of keywords:

1. "mobile government", "m-government", "m-gov", "mgov"
2. "mobile governance", "m-governance", "m-gov", "mgov"

3. "develop*"

These keywords were subsequently combined into two search strings by combining each of the groups 1 and 2 with the group 3, and applied to three academic databases – Thomson/Reuters Web of Science, Scopus and Google Scholar – and to the Google search engine.

Several criteria were applied to limit the results to those publications that were most relevant to the current report:

o *Time frame* – Only the publications produced during the last ten years were taken into account, with preference on the latest publications. This limitation is justified by the age of MGOV as a research domain. For example, the oldest EGOV-related conference series – Annual International Conference on Digital Government Research will have its 15th edition in 2014, with few instances of the combination of mobile technologies and EGOV (MGOV) happening in the literature as demonstrated by the research review later in this section.
o *Publication types* – Both academic publications – journal articles, conference papers and books, and practice-oriented publications – reports and policy guidelines were included.
o *Thematic relevance* – Only those publications that relate to Mobile ICT and at least one of the Governance or Development dimensions, thus covering the MGOV, M-ICT4D, and MGOV4D domains were selected. Under this criterion, the combination of Governance and Development (GOV4D) was excluded since it concerns a large body of literature which is not of direct relevance to this study.

This procedure identified 35 publications in total that were subsequently analyzed and synthesized according to the steps discussed next.

2.1.3. Analysis and Synthesis

The analysis and synthesis of the selected publications comprised three separate but interconnected steps: 1) analysis of selected publications, 2) defining the state of the art in MGOV research and practice and 3) defining conceptual framework for MGOV.

The documentation of the selected publications was based on the assessment framework described in Section 2.1.1. Each publication was assessed along the constructs defined by the assessment framework, and the values obtained for each construct (multiple values allowed) were consolidated in a spreadsheet for later analysis. In addition, the key findings from each publication were summarized. The results of this step are documented in Section 2.2.

As the next step, the state of the art in MGOV was established based on the documentation and assessment of the selected literature. It involved identification of the key themes and aspects of MGOV investigated in the literature, consolidation of the findings for each of these themes, and policy recommendations put forward in the literature. The results of this step are documented in Section 2.3.

The last step was to define a conceptual framework for MGOV – key domains, their dimensions and relationships – based on the state of the art in MGOV. The results of this step are documented in Section 2.4.

2.2. MGOV Literature Analysis

This section documents the results of the MGOV literature analysis carried out following the methodology described in Section 2.1. Following the assessment framework from Section 2.1.1, the following sections provide the results of analysis for each construct defined by the assessment framework: problem (Section 2.2.1), method (Section 2.2.2), data (Section 2.2.3), result (Section 2.2.4) and publication type (Section 2.2.5).

2.2.1. Construct 1 – Problem

Among 35 selected publications, the most common problem domains studied are Mobile ICT (35) and Governance (31), followed by Development (18). This is depicted in Figure 4. However, it should be taken into account that the selection procedure purposely identified publications that address more than one dimension.
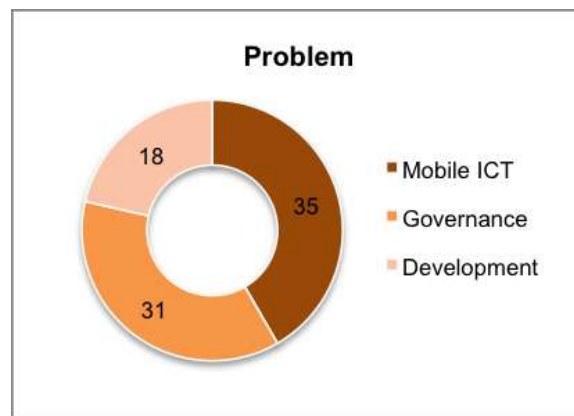
Figure 4: MGOV state of the art – analysis of Problem construct for simple domains

Considering the coverage of the secondary (combined) domains, the most-studied combination is MGOV i.e. Mobile ICT plus Governance with 17 instances, followed closely by MGOV4D i.e. all three domains combined with 14 records, followed by M-ICT4D i.e. Mobile ICT plus Development with only 4 instances. This is depicted in Figure 5.
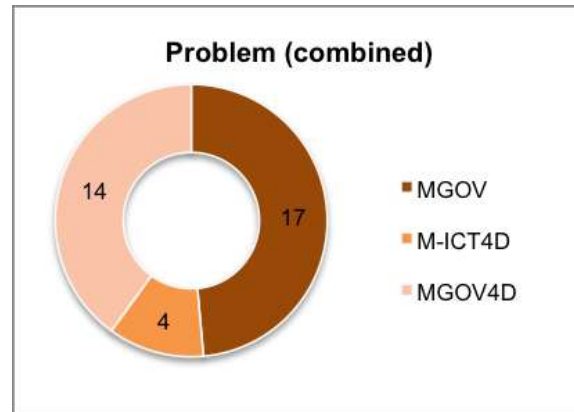
Figure 5: MGOV state of the art – analysis of Problem construct for combined domains

2.2.2. Construct 2 – Method

With regard to the research method used by selected publication, a high number of studies (19) apply a theoretical approach. This can be explained by most empirical studies featuring a significant theoretical section i.e. literature review, see Section 2.2.3. There is also a larger share of qualitative studies (16) and mixed studies (10) over quantitative studies (9). This may indicate that the field is still in an early stage of development with predominantly exploratory qualitative research rather than confirmatory quantitative research. The fact that several studies (5) do not show any clearly discernible method also points to MGOV being a young field that needs a more solid methodological underpinning. The results are depicted in Figure 6.
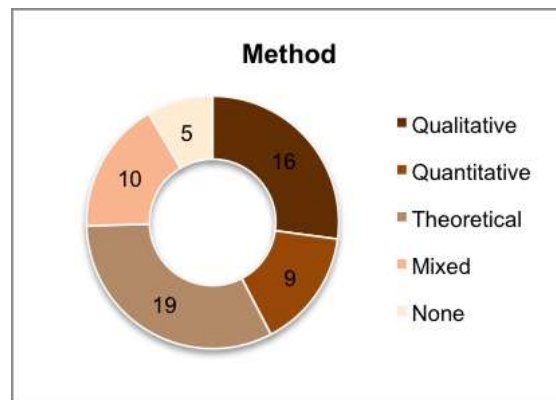
Figure 6: MGOV state of the art – analysis of Method construct

2.2.3. Construct 3 – Data

The strong majority of studies using secondary data (22) support the observation of a young field in need of more empirical work. In addition to literature reviews, the most-used data collection method was case study involving document analysis and interviews. A number of

studies also used questionnaires for data collection. Other methods identified but less used were public statistical datasets and web content analyses. The results are depicted in Figure 7.
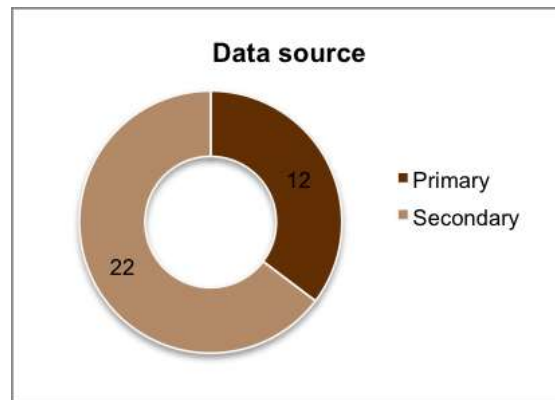
Figure 7: MGOV state of the art – analysis of Data Source construct

2.2.4. Construct 4 – Results

The contribution of the selected publications is predominantly oriented towards practice (23) rather than theory-building (17). This reflects the fact that a majority of the publications in the selected sample are case studies and experience reports that draw conclusions in terms of practice recommendations. The results are depicted in Figure 8.
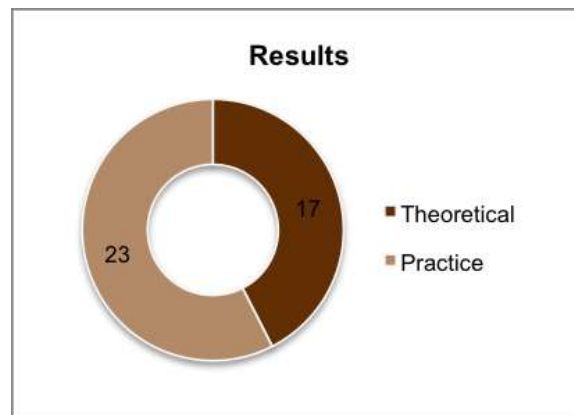
Figure 8: MGOV state of the art – analysis of Results construct

2.2.5. Construct 5 – Publication Type

The analysis of the Publication Type construct among selected publications also displays the characteristics of a recent and fast-developing research field, reflected in the high share of conference papers (13) and the absence of dedicated books. The largest group of publications is formed by journal articles (15) with fewer practice-oriented reports published by international organizations and research institutions (7). These results are depicted in Figure 9.

Publication type

0
7
15
13

- Book (none)
- Journal
- Conference
- Report
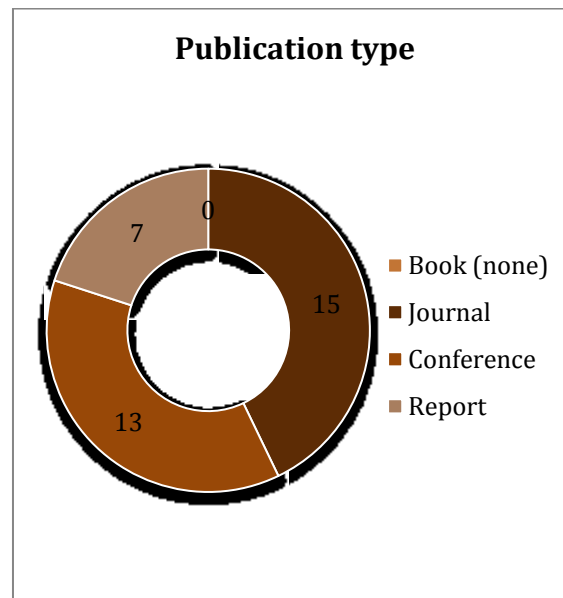
Figure 9: MGOV state of the art – analysis of Publication Type construct

2.3.   MGOV State of the Art

This section describes the state of the art in MGOV based on the MGOV literature analysis documented in Section 2.2. The section proceeds by discussing seven key MGOV themes identified from the literature review and the main findings for each of them: MGOV conceptualizations and definitions (Section 2.3.1), MGOV evolution and literature reviews (Section 2.3.2), MGOV impacts (Section 2.3.3), MGOV drivers and barriers (Section 2.3.4), MGOV user adoption (Section 2.3.5), recommendations for MGOV design (Section 2.3.6) and recommendations for MGOV policy (Section 2.3.7).

2.3.1. Theme 1 – MGOV Conceptualizations and Definitions

Several studies provide conceptualizations and definitions of MGOV. Misuraca (2009) gives a conceptual outline of MGOV. Poblet (2011) situates MGOV conceptually in relation to governance and EGOV. Ojo, Janowski and Awotwi (2013) provides a conceptual framework on the relation between ICT, governance and citizen capabilities, consisting of four constructs: 1) Structure – governance and technology structure; 2) Agency – knowledge, reflexivity and needs; 3) Choice – levels of existence of choice, sense of choice and usage of choice; and 4) Outcomes – measured along selected Millennium Development Goals.

Several publications also provide MGOV typologies:

o   World Bank (2012) defines three MGOV types: 1) Supplement – using mobile tools to "add a channel to existing e-Government services and processes"; 2) Expand – using mobile tools

to "allow conventional services to reach previously un- or underserved constituents"; and 3) Innovate – mobile tools to "develop new services for service delivery and governance".

o Rossel, Finger and Misuraca (2006) classify MGOV activities into four categories: 1) "mobile EGOV for mobile persons"; 2) "mobile services for mobile organizations"; 3) "the mobile state"; and 4) "mobile administration agents and agencies".

o Scholl (2005) provides a two-dimensional model of MGOV applications consisting of: 1) the type of administrative process to which the MGOV application is applied – existing or novel, and 2) the suitability of an MGOV application for the process – whether essential, suitable in an adapted form, or unsuitable.

Scholl (2005) also conceptualizes a three-phase diffusion model for MGOV in order to provide a framework for strategic choice by policy makers regarding the integration of MGOV applications into EGOV strategies: 1) stage 1 concerns 'low-hanging fruit' and add-on uses, 2) stage 2 concerns establishing a more fundamental structure, developing required processes and applications, and redesigning the back-end, and 3) stage 3 concerns the expansion of this basis into vast area coverage.

2.3.2. Theme 2 – MGOV Evolution and Literature Reviews

Several studies also devoted substantial parts to describing the evolution of MGOV from a historical perspective. Some are limited to mobile ICT and ICT4D, for example a global overview of the rise of mobile ICT is given in (Adler & Uppal, 2008). In addition, an evolutionary perspective on ICT4D, including M-ICT4D, is detailed in (World Bank, 2012) and a regional overview of the changing ICT landscape in the Pacific and the central importance of the rise of mobile ICT in this development (M-ICT4D) is described in (Cave, 2012).

Different perspectives on the evolution of MGOV are provided in (Misuraca, 2009), (OECD/ITU, 2011) and (Rossel et al., 2006). Most of them include reviews or descriptions of some illustrative experiences with MGOV. An evolutionary perspective on MGOV that includes experience descriptions from developing countries is given in (Poblet, 2011).

Several of these studies also include assessments of the current state of mobile ICT or MGOV development: (Bhavnani, Chiu, Janakiram, & Silarszky, 2008) conducts a global assessment of the status of the mobile industry in the developed and developing worlds; Cave (2012) presents an assessment of the (mobile) ICT landscape in the Pacific region; and Abanumy and Mayhew (2005) presents the evaluation of specific MGOV applications in Saudi Arabia among other studies of specific country contexts.

Evolutionary perspectives in the selected studies are not only retrospective or current-state assessments, but try to predict the future of MGOV. A vision of the future of MGOV is given in

(OECD/ITU, 2011) and a vision of MGOV including opportunities and risks based on a SWOT analysis is provided in (Palka, Jurisch, Schreiber, Wolf, & Krcmar, 2013).

Some publications also feature MGOV literature reviews (Napoleon & Bhuiyan, 2010) (Palka et al., 2013) and identify a number of common research areas: 1) MGOV concepts and models; 2) infrastructure and security; 3) service delivery and quality improvements; 4) historical evolution of MGOV; 5) measuring effectiveness of MGOV; 6) MGOV future and challenges; 7) policy frameworks; 8) specific mobile services and applications; 9) success factors; 10) user needs and adoption; and 11) general MGOV research. While the analysis in this report partly overlaps with these areas, it also identifies additional issues. This can be explained by the time gap between existing literature reviews and the current report, and the focus of this report on MGOV4D.

2.3.3. Theme 3 – MGOV Impacts

A number of the selected studies discuss the impacts from MGOV, either on a general level or in specific sectors. Several studies make an argument about the potential value of MGOV in developing countries where mobile penetration is higher than the Internet penetration (Abanumy & Mayhew, 2005). Several studies also discuss potential benefits from MGOV (Antovski, 2005) (Bhavnani et al., 2008) (Cave, 2012) (OECD/ITU, 2011).

The key impact areas can be summarized at three levels (Bhavnani et al., 2008):

o *Direct, macro-level economic benefits* – generating GDP, creating jobs both in the mobile sector and the wider economy, productivity increases, tax revenue from mobile operators, higher incomes, lower costs and spill-over opportunities for additional service innovations, e.g. from mobile services in financial institutions.

o *Indirect, micro-level social benefits* – supporting entrepreneurship; reducing information asymmetries and correcting market inefficiencies by means of better information and faster and more flexible communication; mobility and ubiquity including location-based services; saving costs and time by substituting transportation; better access to distribution networks and markets; infrastructure cost savings such as hardware installation; better services, e.g. location-based, timely, customizable and flexible; ease of use including IT skills; and better access to add-on services such as financial services like mobile payments.

o *Intangible benefits* – aiding emergency and disaster relief, enhancing dissemination of locally-generated and locally-relevant educational and health information, promoting social capital and strengthening social cohesion, and improving public governance including support to democracy and greater transparency.

In addition, selected publications also include a number of studies that focus on the impact of MGOV on specific sectors like: agriculture (Ntaliani, Costopoulou, & Karetsos, 2008), (Qiang, Kuek, Dymond, & Esselaar, 2012) and (World Bank, 2012); mHealth (Qiang, Yamamichi,

Hausman, Miller, & Altman, 2012) and (World Bank, 2012); e-participation (Sri, Mei, & Melissa, 2012); emergency (Yun, Park, & Avvari, 2011); finances (World Bank, 2012); entrepreneurship and employment (World Bank, 2012); digital divide (Loo & Ngan, 2012) and (Narayan, 2007).

2.3.4. Theme 4 – MGOV Drivers

Some studies focus on MGOV drivers and success factors particularly (Al-Khamayseh, Lawrence, & Zmijewska, 2006), (Gunadi & Sandy, 2009), (Maumbe & Owei, 2006), (OECD/ITU, 2011), (Patel, I. & White, 2005), (Qiang, Kuek, et al., 2012), (Sri et al., 2012) and (World Bank, 2012). The key success factors identified in these studies are summarized below:

o *Coherent MGOV framework and strategy* – appropriate laws, regulation and politics including liberalization of the telecom sector; favorable organization structures, business processes and culture; effective leadership and strategy including good governance; effective project and change management; existing MGOV best practice models; good financial and budgetary management; and existing impact assessments and cost-benefit analyses especially for non-commercial applications.

o *Solid infrastructure and infrastructure management* – general and mobile ICT infrastructure, e.g. electricity, wide cell phone coverage and dedicated mobile technology platforms; defined standards and data exchange protocols; protection of privacy and security; competition among mobile operators and service providers; sound content development infrastructure, e.g. high-quality user-friendly applications; dedicated MGOV portal; affordable service development cost; and human capacity for infrastructure management.

o *Effective innovation system* – interaction and partnership with the private sector, service providers, research and educational institutions, civil society and end-users; and absorptive capacity i.e. end-users' willingness and capability to pay and use MGOV services, determined by the population size of the target market and mobile penetration; MGOV awareness, human capital and IT literacy; access cost and equality of access, and effective demand and user acceptance.

2.3.5. Theme 5 – MGOV Barriers

Several of the studies also identify key organizational, legal, infrastructure and demand-side challenges faced by MGOV initiatives, particularly (Al-Hujran, 2012), (El-Kiki & Lawrence, 2007), (Maumbe & Owei, 2006), (Misuraca, 2009), (Ojo et al., 2013), (Patel, I. & White, 2005), (Qiang, Kuek, et al., 2012), (Qiang, Yamamichi, et al., 2012) and (World Bank, 2012):

o *Organizational challenges* – governance challenges including lack of accountability and transparency, lack of openness and participation, and insufficient monitoring and evaluation; leadership challenges including lack of vision, absence of best-practice MGOV models, lack of coordination and duplication of efforts; economic and financial challenges

including lack of sustainable business models – sound financial plans, financing gap between piloting and scaling up stages of service development; lack of resources; and inadequate pricing for services due to lack of competition among mobile providers. Additional organizational barriers, especially applicable to SIDS, include lack of economies of scale, migration of skilled human resources abroad and to the private sector, and severe lack of capacity and financial resources to develop and sustain MGOV.

o *Legal challenges* – lack of enabling legal MGOV framework due to, e.g. lack of liberalization and competition legislation in the telecom market, and lack of privacy legislation.

o *Infrastructural challenges* – lack of network coverage and insufficient bandwidth; insufficient mobile device capabilities; lack of interoperability between systems, services and applications; lack of scalability of service designs; application quality, e.g. usability, reliability, and lack of demand-driven and user-centric design; and lack of security.

o *Demand-side challenges* – small size of mobile ICT market and target population, e.g. due to low mobile penetration; lack of MGOV service awareness; IT literacy challenges; high access cost of mobile services; and lack of user acceptance. In Vanuatu in particular, a lack of basic literacy and numeracy in a large portion of the rural population is a major challenge on the demand side. Additional cultural challenges that could impede MGOV implementation in many SIDS include kinship relationships and preference to face-to-face communications.

2.3.6. Theme 6 – MGOV User Adoption

The adoption and acceptance of MGOV services by the end-users is a prominent subject of inquiry among selected publications particularly (Abdelghaffar & Magdy, 2012), (Althunibat, Azan, & Ashaari, 2011), (Hung, Chang, & Kuo, 2013), (OECD/ITU, 2011) and (Antovski, 2005). These studies mostly concern models that identify and test various adoption factors.

The following common influence factors were identified by these studies:

o awareness of MGOV and available MGOV services
o social and cultural influences such as adoption behavior and pressure to adopt from peers
o perceived usefulness of MGOV services, determined by service quality
o compatibility of MGOV services with user needs and lifestyles
o perceived ease of use and usability of MGOV services including accessibility, e.g. cost of service or accessibility for the disabled
o self-efficacy i.e. the perceived ability to use MGOV services
o trust in government in general as well as perceived risks of MGOV services, e.g. regarding reliability, privacy and security
o interactivity and availability of face-to-face interactions with governments
o facilitating conditions including external support received for using MGOV services, e.g. financial support or training and education activities

2.3.7. Theme 7 – MGOV Application Design Recommendations

Several of the selected publications provide recommendations about the design of successful MGOV applications. Not surprisingly, the studies in this area are closely connected to the barriers and drivers discussed in the Sections 2.3.4 and 2.3.5.

For instance, (Ntaliani et al., 2008) provides a three-step descriptive framework for identifying appropriate and cost-effective MGOV services, particularly for the agricultural sector: 1) identify and describe relevant usage scenarios to identify potential services; 2) identify and describe potential technical solutions for these services; and 3) conduct technological and socio-economic evaluation of these solutions.

Several studies provide guidance regarding the development of appropriate business models for MGOV application, and identify a range of issues that sustainable MGOV business models should take into account:

o *Technological design issues* – A useful overview of technology options for MGOV is provided in (OECD/ITU, 2011). Foghlú (2005) identifies three emerging issues and provides recommendations related to the MGOV infrastructure: 1) related to the ownership of the infrastructure, Open Access Networks is a cost-effective and efficient solution; 2) due to the large and growing number of mobile devices, MGOV infrastructure should build on IPv6 rather than IPv4; and 3) regarding middleware, "light-weight" approaches used in internet services are useful in terms of flexibility for mobile service development.

o *Participatory service design* – Several studies promote participatory approaches to designing and testing MGOV services through early stakeholder engagement. Qiang et al. (2012) describes MGOV application ecosystem by identifying the key stakeholders: mobile network operators, government departments and end-users. It argues for the importance of a platform function (e.g. app store) to facilitate transactions, and promotes highly-localized content and local content support for mobile applications particularly in the sectors such as agriculture. Yun et al. (2011) provides several lessons for how MGOV innovations can be developed under "open innovation" frameworks, and recommends: 1) to carefully consider patterns of diffusion and impact of technological innovations, 2) to consider the role of users in technological innovation and its public value, and 3) that open innovation processes can be a useful strategy for developing MGOV applications.

o *Ensuring a critical mass* – Reuver, Stein and Hampe (2013) recommend that ensuring a critical mass of users is a key requirement for many MGOV services, especially community-based services that are built upon network effects and awareness of existing services.

o *Identifying the right partners* – As partnerships are an essential component of a sustainable MGOV ecosystem, Reuver et al. (2013) recommends identifying suitable, capable and reliable partners for developing and administering MGOV services.

o *Embedding of MGOV services* – Reuver et al. (2013) argues for taking care to determine how to embed a new MGOV service into existing or new organizations.

o *Division of investments* – Reuver et al. (2013) argues for considering how costs and benefits are distributed among parties. Securing sufficient revenue is a challenge for most apps and Qiang, Kuek, et al. (2012) identifies four possibly overlapping pricing models for revenue generation: 1) non-chargeable model, 2) transaction-based model, 3) embedded services model and 4) freemium model. The last refers to a pricing model whereby a product or service is provided free of charge except enabling certain non-free features or functionality. The authors observe that most applications rely on government or donor funding, and identify possible strategies for closing the financing gap: 1) development funds created by donors, 2) pooling funds from a range of sources, 3) universal service funds and 4) public-private partnerships.

o *Enabling multi-channeling* – In developing country contexts it is particularly important to consider equitable service delivery to include those without access to the required mobile technology thus preventing digital exclusion (Reuver et al., 2013).

2.3.8. Theme 8 – MGOV Policy Framework Recommendations

Studies in this area identify both general principles and recommendations for action.

Antovski (2005) argues for the public sector MGOV framework to be principle-driven, and suggests five principles: 1) interoperability, 2) security, 3) openness, 4) flexibility and 5) scalability. According to Qiang et al. (2012), an MGOV framework must be built on the principles of: 1) user-centricity and needs, 2) scalability and sustainability, 3) multiplying the impact of successful applications and 4) proper monitoring and evaluation. World Bank (2012) argues that a key principle for MGOV policy should be an alignment with broader national development programs and strategies.

Key areas that any MGOV strategy should address are identified in (Adler & Uppal, 2008), (El-Kiki & Lawrence, 2007), (Maumbe & Owei, 2006), (Ojo et al., 2013), (Patel, I. & White, 2005), (Rossel et al., 2006), (Scholl, 2005) and (World Bank, 2012). These are:

o *Institutions* – The key issues that must be addressed in this area are the development of government and regulatory institutions, particularly: 1) structural arrangements i.e. by which actors and institutions various functions are carried out and 2) statutory framework, instrument design and adjustment (McMillan, 2010). In addition, MGOV institutional development must ensure shared responsibility in service delivery (World Bank, 2012).

o *Legal and regulatory framework* – McMillan (2010) specifies a range of legislative and regulatory areas that must be addressed for MGOV strategy. These are: 1) governance

arrangements including accountability and oversight, 2) information sharing, 3) formal service obligations, 4) service delivery standards, 5) powers of service providers, 6) mobile contracts, 7) consumer safeguards including privacy and security, 8) financial transaction security, 9) defined roles of intermediary service providers, 10) dispute resolution and enforcement mechanisms, 11) arrangement of cross-jurisdictional issues and 12) taxation implications. In order to address these areas, McMillan (2010) recommends following OECD guidelines for regulatory quality and performance. A key consideration in this area should be to align legislation and regulation with larger policy and strategy frameworks, e.g. development strategies and service delivery frameworks (Ojo et al., 2013) and (World Bank, 2012). Adler and Uppal (2008) encourages the development of "light-touch regulation" that refrains from reducing competition and stifling innovation. A detailed comparative analysis of different types of regulatory strategies and telecommunications policies is given in (Howard & Mazaheri, 2009) and (Loo & Ngan, 2012).

o *Financial framework* – Qiang et al. 2012 argues that it is essential that leaders fully consider the importance of strategic financing and intervention, e.g. subsidies. To this end, it is important that they identify financial sustainability gaps (World Bank, 2012) and design appropriate funding frameworks (El-Kiki & Lawrence, 2007). They also need to promote efficiencies in resource allocation and management (World Bank, 2012).

o *Research support* – Maumbe and Owei (2006) argues that a sustainable MGOV framework should focus on innovation and continuous research support. To this end, policy makers should enable innovation in particular through partnerships with research institutions, the private sector and civil society (World Bank, 2012).

o *Infrastructure* – An MGOV policy framework must include a strategy to secure that the necessary technology and connectivity are available (Maumbe & Owei, 2006). To this end, the strategy must define the required technology, services and data standards (World Bank, 2012). World Bank (2012) provides analytical tool to help examine performance indicators for countries' mobile sectors. Important preconditions for enabling infrastructure development are: active sharing of network infrastructure (World Bank, 2012) (Adler & Uppal, 2008), making the infrastructure interoperable (Qiang, Yamamichi, et al., 2012); and making mobile technology accessible and affordable (World Bank, 2012). An MGOV infrastructure should also connect to existing EGOV infrastructure. Narayan (2007) provides a hub-and-spoke model by which MGOV can supplement EGOV strategies.

o *Delivery mechanisms* – Functioning delivery mechanisms and mobile channels are a key prerequisite for sustainable MGOV services. To this end, several recommendations are given: 1) facilitating mobile payments (World Bank, 2012), 2) supporting the creation of content and its use in local languages (World Bank, 2012), 3) promoting efficient delivery processes (World Bank, 2012), 3) aligning and linking MGOV service delivery with the larger service delivery framework (Ojo et al., 2013) and 4) decentralizing the delivery of mobile

services to ensure that they are available at the local level and guarantee equitable access across all segments of society (Ojo et al., 2013).

o *Stakeholder management* – An MGOV strategy should include mechanisms to engage stakeholders including end-users, private sector stakeholders such as service providers, and NGOs (Maumbe & Owei, 2006) (Narayan, 2007). To this end, the strategy should identify and encourage opportunities for partnership, for instance for establishing PPPs (World Bank, 2012) (Ojo et al., 2013). Recommendations are made in particular with regard to engaging end-users (World Bank, 2012) (Ojo et al., 2013) as it is important to raise awareness of the services and mobilize and empower users to use them. Hung et al. (2013) provides a set of recommendations to enhance user acceptance of MGOV services: 1) use appropriate indicators for monitoring effectiveness and for marketing planning; 2) develop communication plans to enhance users' attitude by demonstrating productivity outcomes and responding effectively to users' concerns and requests, providing timely and user-friendly guidance and advice, and increasing peer influence and mass media advertising; 3) develop strategies to advance users' digital skills and resources; 4) acknowledge the vulnerable environment of mobile devices and demonstrate that risks of data security are effectively addressed; 5) consider accessibility of MGOV services for the end-users including affordability and special needs of those who might be excluded from some MGOV benefits.

o *Human resource capacity* – Several publications argue that an MGOV framework should include a strategy for developing human resource capacity and training (Narayan, 2007) and (Qiang, Yamamichi, et al., 2012). The key steps to this end are: 1) identifying the shortcomings in human capacity (World Bank, 2012), 2) training government officials on MGOV strategy and implementation (World Bank, 2012) (Ojo et al., 2013) and 3) mobilizing local government officials to partner with their local communities in designing and implementing local content (Ojo et al., 2013).

2.3.9. Theme 9 – MGOV4D Websites: Platforms, Portals and Practice Cases

The search also identified a number of platforms, portals and websites that are relevant to defining the state of the art in MGOV. The following is a non-exhaustive list of such platforms, portals and websites that illustrate informative practice cases, together with brief descriptions:

o Mobile Gov Blog – the blog maintained by the Office of Citizen Services and Innovative Technologies, part of the US General Services Administration, dedicated to keeping agencies working on MGOV updated on current MGOV trends and developments (US General Services Administration, 2013a)
o Mobile Gov Wiki – Wiki tool maintained by the Office of Citizen Services and Innovative Technologies, US General Services Administration, dedicated to helping agencies build and implement their mobile strategies, including articles on tools and examples of MGOV experiences by different agencies (US General Services Administration, 2013b)

- o www.egov4dev.org, MGOV section – the website dedicated to ICT4D with a special section on MGOV, containing various online resources and solutions, maintained by the Institute for Development Policy and Management at the University of Manchester (Lallana, 2008)

- o www.eldis.org, ICT4D section – the portal on development issues maintained by the Institute for Development Studies, with dedicated resource guide on ICT4D research, policy and practice (ELDIS, 2013)

- o www.zunia.org – the web platform maintained by the Development Gateway for sharing of knowledge resources among development practitioners worldwide, with dedicated sections on ICT and EGOV and with extensive coverage of MGOV (Development Gateway, 2013)

- o Government of Victoria eGovernment Resource Center, MGOV section – Articles and resources about how governments are providing mobile apps to access mobile government services via mobile phones, smartphones and PDAs (Government of Victoria, 2013)

- o UNDP MGOV4D – the website features MGOV initiatives, projects, knowledge products and social media content (United Nations Development Programme (UNDP), 2013)

- o Deloitte Going Mobile website features MGOV reports and analyses (Deloitte, 2013)

- o Apps.usa.gov – the directory of US Government mobile applications (US Government, 2013)

- o Fairfax County – an overview website to the MGOV apps of the Fairfax county (Virginia, USA) (Fairfax County, 2013)

- o Hong Kong S.A.R. Government – the directory of mobile government websites and mobile applications (Hong Kong S.A.R. Government, 2013)

- o mGov@SG – Singapore one-stop government mobile site allows individuals and businesses to search for, identify, and access mobile services provided by the Singapore Government (Singapore eGov, 2011)

- o Seoul Municipal Mobile Government Services – One stop portal m.seoul.go.kr for municipal mobile services including real-time public transport, road traffic information, job and event announcements, public tenders and others (Kim, Suk Kyoung, 2010)
- o Estonia Mobile-ID – A service http://mobiil.id.ee/ that allows citizens to use mobile phones as a form of secure electronic ID, applies specialized Mobile-ID SIM cards provided by mobile phone operators (Mobile-ID, 2007).

2.4.   MGOV Conceptual Framework

This section synthesizes a conceptual model for MGOV. Based on the MGOV state of the art outlined in Section 2.3, we can identify four key dimensions of MGOV: institutions, innovation system, infrastructure, and services and applications, all contributing to development impact.

These dimensions are described as follows:

o *MGOV Institutions* – The institutional basis for MGOV is formed by the following elements: 1) Strategy – the goals and purpose set for MGOV and the mechanisms and approaches specified to achieve them; 2) Policy framework – legal and regulatory frameworks as well as financial and budgetary frameworks for MGOV; 3) Human Capacity – the capacity present among the public administration to develop and implement MGOV strategy; and 4) Leadership – management capacity to implement MGOV strategy.

o *MGOV Innovation System* – This dimension describes the ecosystem for delivery and usage of the MGOV services including: 1) external stakeholders – the engagement and partnership with external stakeholders from the private sector, research institutions and civil society; and 2) absorptive capacity and adoption – the development of the demand side for MGOV services that form the intention and ability of the end-users to adopt MGOV services.

o *MGOV Infrastructure* – This dimension includes technological foundation for MGOV services formed by: 1) ICT infrastructure – ICT infrastructure underpinning the mobile infrastructure; 2) Mobile Infrastructure – technologies enabling mobile services such as network coverage; 3) Interoperability – availability of standards to ensure the ability to exchange information and processes between systems and services; and 4) Security Safeguards – mechanisms to safeguard information security and privacy of the end-users.

o *MGOV services and applications* – This dimension comprises: 1) design and development – the process of designing and implementing MGOV software and content and 2) delivery mechanisms – the delivery and quality of MGOV services through intended channels including their embedding in wider e-service delivery frameworks.

Each MGOV dimension builds upon preceding dimensions, and altogether determine MGOV development impact at the national, provincial, local and individual levels, contributing to economic, environmental, social and institutional dimensions of development. The dimensions, their elements and the relationships between them are summarized in Figure 10.
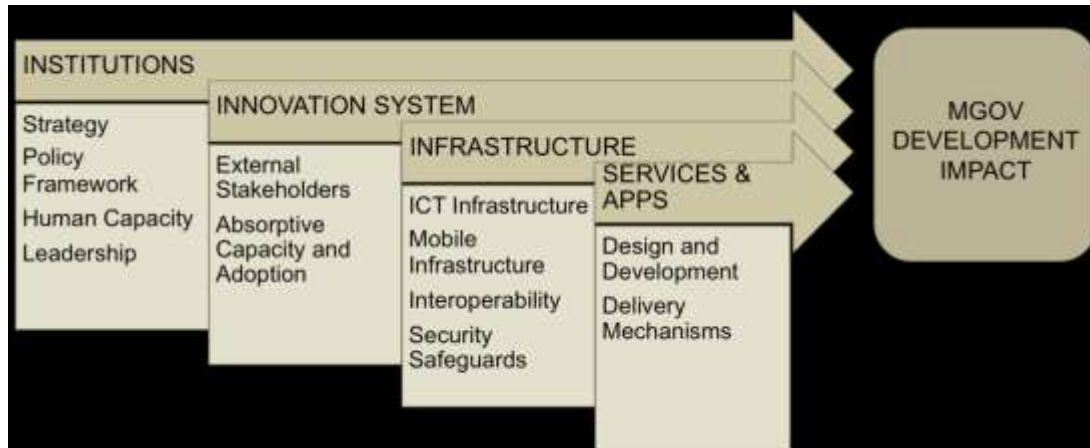
Figure 10: MGOV conceptual framework

2.5. Summary

This section identified theoretical foundations of the MGOV concept, established the state of the art and key research themes in the MGOV field based on the systematic literature review, and constructed a conceptual framework for MGOV.

The framework could be used to evaluate existing MGOV policies and to guide the development of specific MGOV policy frameworks. It therefore can serve as a theoretically well-grounded foundation for the assessment of existing MGOV strategies, and for the development of the MGOV strategy for Vanuatu (described later in this report) and for the development of the MGOV Commonwealth toolkit (described in the accompanying report).

3.   Connecting MGOV and National Development

Based on a systematic review of selected national development and ICT strategies from the countries relevant to the Commonwealth Small Island Developing States (SIDS), this section identifies the linkages between MGOV and national development strategies.

In the following, Section 3.1 describes the adopted methodology. Section 3.2 discusses selected national development strategies along the four dimensions of the assessment framework and identifies key SIDS development goals for each dimension. Section 3.3 discusses selected ICT strategies along the four dimensions in the MGOV framework in Section 2. Based on the Sections 3.2 and 3.3, Section 3.4 synthesizes the analyzed strategies by creating a mapping between national development and MGOV strategies. Section 3.5 provides some conclusions.

3.1.   Methodology

This section describes the methodology applied in this section. The methodology consists of the selection of a framework for assessing national development and ICT strategies, the collection of the relevant strategies, and the analysis and synthesis of such strategies. See Figure 11. Although the steps are broadly similar to the methodology adopted in Section 2 for assessing the MGOV state of the art (see Figure 1) as they both rely on assessment frameworks to carry out data collection and analysis, the frameworks, data sources and purposes are different.

Figure 11: Connecting development and MGOV strategies – methodology

3.1.1. Framework Development

Two assessment frameworks were applied to carry out the analysis in this section: 1) Prism of Sustainability Model for assessing national development strategies introduced in this section and 2) MGOV4D framework for assessing ICT/MGOV strategies introduced in Section 2.1.1. Both frameworks are applied in strategy analysis and synthesis, as described in Section 3.1.3.

Sustainable Development (SD) relates to "development that satisfies the needs of the present generation without compromising the ability of future generations to meet their own needs" (World Commission on Environment and Development, 1987). Prism of Sustainability is a conceptual SD framework introduced in Valentin and Spangenberg (1999). The framework consists of four dimensions of SD: 1) institutional – social capital, participation and co-decision making; 2) economic – capital and material development; 3) environmental – safeguarding the environment and the natural capital; and 4) social – human capital and social coherence and justice. The model is presented in Figure 12, adopted from Valentin and Spangenberg (1999).
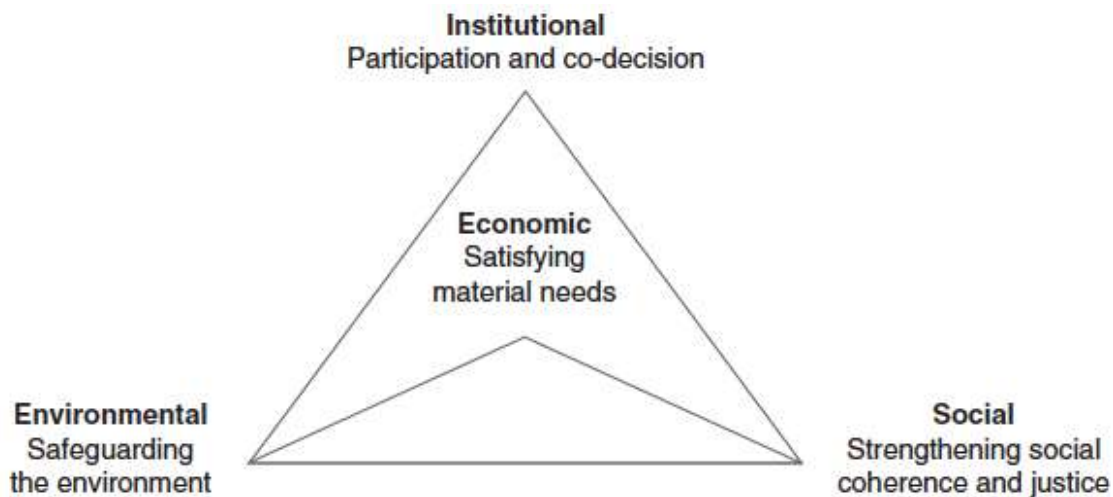
Figure 12: Prism of Sustainability Model

3.1.2. Data Collection

The first step in data collection was to define selection criteria for the strategies to be reviewed including: 1) relevant time frame – only the strategies in place at the time of data collection or published in the last five years were selected and 2) country relevance – the selection focused on the countries with strong socio-economic and geo-political similarities with Vanuatu.

The latter meant that the countries of interest were, in decreasing order of importance: SIDs, other developing countries, Commonwealth countries and countries in the Asia-Pacific region. The main data source for the strategy search was Google search that combined these priorities under the "country" term with the following search string:

[country] national (policy OR strategy OR framework OR plan) AND mobile AND
("mobile governance" OR "mobile government" OR "mgov" OR
"e-government" OR "e-governance" OR "egov" OR "ict")

In addition, a targeted search was carried out on the websites of the EGOV, MGOV or ICT departments of international organizations such as ADB, CTO, ITU, OECD, UNDP, UNPAN and the World Bank, and dedicated EGOV, MGOV or ICT portals such as eldis.org or zunia.org.

The search resulted in the selection of the five national development strategies, all by the Pacific SIDs that are members of the Commonwealth:

1. Vanuatu Priorities and Action Agenda 2006 – 2015
2. Strategy for the Development of Samoa 2012-2016
3. Fiji Roadmap for Democracy and Sustainable Socio-Economic Development 2010 - 2014
4. Kiribati Development Plan 2012 - 2015
5. Nauru National Sustainable Development Strategy 2005 - 2015

The search also identified five national ICT/MGOV strategies. As for most countries MGOV is included in the larger national ICT or EGOV strategy context, the search process identified only one strategy that is exclusively dedicated to MGOV – India. Next to India, the selection identified two strategies from the Commonwealth SIDs – Mauritius and the Federated States of Micronesia (FSM). Since the selection of MGOV strategies is used later in this report to inform MGOV strategy development, it was important to also include the countries recognized for top ICT performance. Hence, Malta and Singapore were selected as Commonwealth island states that are consistently highly ranked in the international EGOV rankings. The ICT/MGOV strategies thus selected are:

1. India Framework for Mobile Governance
2. Mauritius e-Government Strategy 2013-2017
3. Micronesia National ICT and Telecommunications Policy
4. Singapore IN2015 ICT Strategy
5. National ICT Strategy for Malta 2008-2010

3.1.3. Data Analysis and Synthesis

The data analysis and synthesis consisted of the following three steps:

o First, the selected strategies were summarized, reviewed and documented by applying the respective assessment frameworks: the national development strategies were documented along the four dimensions of the SD prism framework introduced in the Section 3.1.1 and the ICT/MGOV strategies were documented along the four dimensions of the MGOV framework introduced in the Section 2.1.1. As far as possible, these summaries are based on the verbatim wording from the original strategy documents.

o   Second, the linkages between respective MGOV and SD dimensions were identified. For each selected ICT/MGOV strategy document, individual strategies were mapped in the matrix form according to the MGOV and SD dimensions.

o   Third, the results from the earlier steps were synthesized across country contexts.

3.2.   National Development Strategies

This section summarizes selected national development strategies by Vanuatu, Samoa, Fiji, Kiribati[1] and Nauru along the four dimensions laid out in the Prim of Sustainability framework: institutional, economic, environmental and social. Thereafter, the section synthesizes the key SIDS development goals for each of these dimensions.

3.2.1. Vanuatu

The Priorities and Action Agenda (PAA) is an update on the first PAA from 2003. It is part of the larger development policy embarked upon in 1997 with the Comprehensive Reform Program (CRP), and integrates and prioritizes the action agendas from the on-going development programs in Vanuatu including the CRP, Business Forum Outcomes and Rural Economic Development Initiatives (REDI). The stated goal of the Vanuatu Strategy is to raise the welfare of the people of Vanuatu. To this end, it specifies three major strategies:

1. Achieving higher and sustainable economic growth to create jobs and raise incomes while conserving resources for future generations;
2. Ensuring macroeconomic stability to create a stable investment climate; and
3. Raising the standards of public service delivery particularly to the rural and outer regions of the country in order to improve access to basic health and primary education services, while lowering the costs of internal trade.

Seven key strategic priority areas are specified in the agenda:

1. Private Sector Development and Employment Creation
2. Macroeconomic Stability and Equitable Growth
3. Good Governance and Public Sector Reform
4. Primary Sector Development, natural resources and the environment
5. Provision of Better Basic Services, especially in the rural areas
6. Education and Human Resource Development
7. Economic Infrastructure and Support Services

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[1] Pronounce "kiri bass", not "kiri batti"

Below we summarize the key strategies of the PAA for each of the four SD dimensions (Government of Vanuatu, 2006):

1. *Institutional* – The key institutional strategy of the PAA is good governance and public sector reform and its elements include providing policy stability, stable institutions and developing a productive public sector.

2. *Economic* – Strategies in the economic dimension include: private sector development and employment creation, e.g. lowering costs of doing business and access to rural financial services; ensuring macroeconomic stability and equitable growth, e.g. reducing debt and improving basic services; primary production development, e.g. raising incomes from agriculture, fishing and forestry; and economic infrastructure and support services, e.g. competitive private sector involvement in utilities and services and cross-sector availability of economic infrastructure and support services.

3. *Environmental* – Key strategies in the environmental dimension include: sound and sustainable environmental management including sustainable management of biodiversity; and disaster management including environmental hazards, risk management and promotion of disaster management know-how and self-help.

4. *Social* – The key strategies in the social dimension are: improving education and human resource development including better access to education and raised quality and relevance of education; and improved health services especially in the rural areas, e.g. improved access to and quality of health services and more effective use of health resources.

3.2.2. Samoa

The seventh edition of the Strategy for Development of Samoa (SDS) presents the central development strategies and priority sectors for the Samoan development in a four-year time frame. It specifies four priority areas together with strategic outcomes and key performance indicators provided for each of them: economic sector, social policies, infrastructure sector and environment. Below, these strategies are summarized for each of the four SD dimensions (Ministry of Finance: Economic Policy and Planning Division, 2012):

1. *Institutional* – The key strategic outcome listed for this dimension is an effective and efficient administration, and strategies to this end include strengthening policy and management capabilities for sustainable agriculture development, raising the efficiency and effectiveness of public services, and strengthening village-level governance.

2. *Economic* – Key strategies in the economic dimension include: achieving macroeconomic stability; re-invigorating agriculture; revitalizing exports; sustainable tourism; enabling environment for business development; efficient, safe and sustainable transport system and networks; and universal access to reliable and affordable ICT services.

3. *Environmental* – Key strategic outcomes listed under the environmental dimension include: achieving environmental sustainability, e.g. sustainable management of natural resources, and strengthening community engagement in the matters of environmental management; climate and disaster resilience, e.g. accurate and timely information and warnings on disasters; environmental production, e.g. development of organic products; and waste management, e.g. e-waste management policy.

4. *Social* – In the social dimension, the key strategic outcomes include: healthy society; access to education, training and learning; community development; social cohesion including safety and stability; and sustainable access to safe drinking water and basic sanitation.

3.2.3. Fiji

The Fiji Roadmap is based on the 2008 "Peoples Charter for Change, Peace and Progress" that was developed based on a nationwide consultation process with the private sector, civil society and within the public sector. The roadmap is a framework for achieving "sustainable democracy, good and just governance, socio-economic development and national unity".

Below, we summarize the strategies prescribed by the roadmap for different SD dimensions (Ministry of National Planning, 2009):

1. *Institutional* – The central objective for institutional development is to strengthen good and just governance. Strategies under this objective includes formulation of a new constitution, electoral reforms, strengthening law and justice, effective, enlightened and accountable leadership, enhanced public sector efficiency, ensuring effectiveness and service delivery, and achieving an integrated development structure at the division level.

2. *Economic* – The main goal under this dimension is to realize economic growth. The strategies to this end include: ensuring macroeconomic stability, export promotion, import substitution, raising investment levels, making more land available for productive and social purposes, as well as enhancing global integration and international relations.

3. *Environmental* – This dimension identifies a number of challenges for environmental sustainability that the strategy addresses including: adequate resourcing of Department of Environment; increased capacity of government agencies to enforce relevant environmental legislations; increased collaboration and coordination between agencies; improved monitoring and research on environmental matters; improved availability of information, education and awareness on the impact of climate change; and shifted emphasis from economic concerns to environmental implications.

4. *Social* – The following strategies are listed under the roadmap with the aim to enhance socio-cultural development: reducing poverty to a negligible level, making Fiji a knowledge-

based society, improving the delivery of health services, developing a common national identity, and building social cohesion.

3.2.4. Kiribati

The Kiribati Development Plan (KDP) is the ninth in the series of national development plans. It is based on stakeholder consultations as well as lessons from previous plans. The current edition of the KDP is following two guiding principles: social protection and gender equity, and results-based management. It specifies several key policy areas (KPAs) for the plan which are summarized below along the four SD dimensions (Government of Kiribati, 2012):

1. *Institutional* – The key policy area of the KDP in this dimension is improving governance. The strategies to this end include: improving government information dissemination and flow, improving capacity building, improving local government capacity, improving rural development services and governance infrastructure, as well as enhancing efficiency in the production of audited public annual accounts.

2. *Economic* – The key policy areas in the economic dimension include: economic growth and poverty reduction including, e.g. improvement of the public finance management system; accelerating private sector development; tailoring vocational training to labor markets; and infrastructure development including, e.g. enhancing the access to internet and fixed and mobile connections in the rural areas, developing professional local capacity in the infrastructure sector, and increasing coverage and maintenance of water and sanitation.

3. *Environmental* – The key policy area in this dimension is environmental sustainability including: enhancing the capacity to adapt and respond to climate change, reducing threats to island biodiversity resources, improving food security and improving water quality.

4. *Social* – The key policy areas in the social dimension are: human resource development such as improving literacy and numeracy and improving quality of the basic and senior secondary education; improving access and inclusiveness of education and providing strong support services to schools; and improving health by reducing maternal morbidity and mortality, reducing the incidence of communicable diseases, and improving health service delivery.

3.2.5. Nauru

The Nauru Sustainable Development Strategy (NSDS) is the first such strategy for the country. The NSDS is a 20-year plan that is centered on the five long-term goals:

1. Stable, trustworthy, fiscally responsible government
2. Provision of enhanced social, infrastructure and utilities services
3. Development of an economy based on multiple sources of revenue
4. Rehabilitation of mined out lands for livelihood sustainability
5. Development of domestic food production

The 2009 revision of the NSDS takes into account the progress made since the first publication of the strategy in 2005 including telecommunications developments. The key strategies from the NSDS are summarized below along the four SD dimension (Nauru Ministry of Finance and Economic Planning: Aid Management Unit/Development Planning and Policy Division, 2009):

1. *Institutional* – The strategies for institutional development include: strengthening and developing institutional capacity in public administration; strengthening governance institutions – parliament, audit, justice, law and order and border control; and developing a transparent and fair land management system.

2. *Economic* – The strategies under the economic dimension include: securing a stable macroeconomic environment conducive to the private sector investment; increasing the level of domestic agricultural production; enhancing the development and sustainable management of the natural resources; industry and business development; development of small-scale sustainable eco-tourism; effective and stable financial system; secure and sustainable energy and water supply; reliable and affordable public transport; and universal and reliable access to internationally-competitive communication services.

3. *Environmental* – The environmental development strategies of the NSDS aim at securing an effective management of waste and pollution, and at securing sustainable use and management of the environment and natural resources.

4. *Social* – The social development strategies cover the areas of: education – improving the quality and broadening the scope and reach of education; health – guaranteeing a healthy and productive population; sports – enhancing quality of life through sports; traditional leadership and culture – safeguarding a healthy, socio-cultural, inclusive, cohesive and self-reliant community; gender equality – equal opportunities and rights of women; youth development; and supporting a robust, vibrant and effective civil society.

3.2.6. Synthesis: Key SIDS Development Goals

Based on the national development strategies surveyed in the previous sections, this section synthesizes the key development goals for the SIDs along the four SD dimensions:

1. *Institutional* – A key emphasis in this dimension is placed on strengthening governance through public sector reform. The first goal is ensuring stable institutions and policies, as well as a solid governance infrastructure at all levels of government including local and village levels. The second goal is building management capabilities and qualified leadership in the public administration. The third goal is productive and effective public administration able to efficiently deliver high-quality public services.

2. *Economic* – This dimension covers the development of the infrastructure for the economy. The first goal is building and maintaining the energy and transport infrastructures, the later serving to overcome the remoteness of the islands states and including the infrastructure

for international and internal transport including ports, airports and roads, as well as reliable ICT services to connect separate islands to each other and to the global markets. The second goal is macroeconomic development and growth. The third goal is private sector and business development through sustainable policies and sound economic institutions including taxation and public financial systems. Connected to this is the fourth goal of overcoming the remoteness of the island economies through integration into global markets and trade development, promoting exports and substituting imports. The fifth goal is primary production development regarding particularly island-specific sectors such as agriculture, fisheries and forestry. Finally, the sixth goal is capitalizing on the unique assets and sectors of SIDS, particularly sustainable tourism.

3. *Environmental* – A central development goal for SIDS is sound environmental management based on data collection, sound policies and inter-administrative collaboration. The first goal is sustainable management of land and natural resources including water, and particularly sustainable management of unique island ecosystems and biodiversity. The second goal is sustainable waste and sewerage management including chemicals and e-waste. The third goal is awareness-creation and community engagement. The fourth goal, due to geographic location and exposure, is effective management of the natural disasters like earthquakes, tsunamis, volcanoes or tropical storms including vulnerability assessment and risk management, disaster preparedness and response capacity through, e.g. self-help and knowledge. Finally, as SIDS are particularly vulnerable to the effects of the climate change, another goal is adapting to climate change through ecosystem-based approaches.

4. *Social* – At the core of the social development goals in SIDS strategies is community development and reduction of social inequalities. This includes building solid social safety nets as well as poverty reduction and gender equality across all social domains. The second goal is education and human resources development, both particularly challenging for SIDS which typically consist of many remote islands. This goal is based on developing appropriate policies, and building human capacities and technologies to improve access to and the quality of education. The third goal is health development based on the policies, technologies and human capacity initiatives aimed at improving the delivery of health services especially in the rural and remote areas characterizing SIDS. The key aspects of such efforts are improved access to basic sanitation and health services. The fourth goal is improving social cohesion and developing socio-cultural, inclusive, cohesive and self-reliant communities. This area is of particular importance to SIDS which are characterized by geographical fragmentation (archipelagos) and rich diversity of local cultures. One area under social cohesion is safety and stability including access to justice, and recognition of custom-based justice and traditional leadership structures. Another area under social cohesion is cultural heritage protection and national identity development.

The key development goals of SIDS are summarized in Table 1 below.

Dimensions

Institutional	Economic	Environmental	Social
o Strengthening governance through public sector reform o Developing management capabilities and qualified public leadership o Productive and effective public administration able to efficiently deliver high-quality public services	o Developing economic infrastructure including energy, transport, ICT, etc. o Macroeconomic development and growth o Private sector and business development o Integration into global markets and trade development o Primary production development o Capitalizing on the unique assets and sectors of SIDs	o Sound environmental management o Sustainable management of land and natural resources o Sustainable waste and sewerage management o Environmental awareness creation and community engagement o Good disaster management o Adaptation to climate change through ecosystem-based approaches	o Community development and reduction of social inequalities o Education and human resources development o Health development to improve health services o Social cohesion and the development of socio-cultural, inclusive, cohesive and self-reliant communities

Table 1: Key SIDs development goals

3.3. National ICT/MGOV Strategies

This section summarizes selected national ICT/MGOV strategies by India, Mauritius, Micronesia, Singapore and Malta along the four dimensions described in the MGOV framework: institutions, innovation system, infrastructure, and services and applications.

3.3.1. India

The Indian Framework for Mobile Governance is the only selected strategy that is exclusively directed at MGOV. Published as a separate strategy but developed as an extension of the National e-Governance Plan for India, the central objective of the framework is to "create a unique infrastructure as well as application development system for m-Governance in the country" (Ministry of Communications & Information Technology: Department of Information Technology, 2012). To this end, the framework specifies four measures: 1) make all government websites mobile-compliant; 2) develop mobile applications for service provision by all government departments and agencies; 3) adopt open standards for mobile applications; and 4) use uniform, pre-designated numbers for mobile services. The framework also presents an implementation plan with concrete strategies.

In the following, the strategy is analyzed along the four dimensions laid out in the MGOV framework (Ministry of Communications & Information Technology: Department of Information Technology, 2012):

o   Institutions

    –   *Human Capacity* – The framework aims at developing human capacity in government by creating a knowledge portal and MGOV knowledge management framework across the government to improve stakeholders' capabilities for providing mobile services.

    –   *Leadership* – Strategies in this category are directed at providing the necessary guidance and assistance to help government departments adopt MGOV services, and to designate the Department of Information Technology (DIT) as the responsible actor.

o   Innovation System

    –   *External Stakeholders* – In order to financially support the development of suitable apps by third parties and start-ups, DIT was directed to create an MGOV Innovation Fund.

    –   *Absorptive Capacity and Adoption* – The framework aims at creating MGOV awareness, particularly in underserved areas. It also aims at making services accessible by ensuring that they remain affordable, for instance by encouraging the use of open source software and open standards in apps development.

o   Infrastructure

    –   *Mobile Infrastructure* – The framework aims at creating a unique MGOV infrastructure. This includes the creation of a mobile service delivery gateway (MSDG) as a shared infrastructure to enable service development, offering shared tools like data collection, helpdesk services, APIs and SDKs. Part of MSDG will be a mobile applications (m-apps) store to enable the mainstreaming and deployment of services. In addition, MSDG will include a mobile payment gateway to enable users to pay for public services, as well as metered account access for fee-based services. Finally, MSDG aims at offering connectivity options for users of MGOV services irrespective of the network operators.

    –   *Interoperability* – The framework aims at securing interoperability across operating systems and devices by building mobile applications based on open standards and open source software. MSDG is designated to safeguard interoperability, for instance by offering suitable APIs to providers with appropriate terms and conditions and by creating a facilitating mechanism to ensure compliance with the standards for mobile applications, and in the implementation of the short and long codes for public service provision across multiple service providers.

- *Security* – MSDG is designated to implement appropriate mechanisms for electronic authentication.

o   Services and Applications

- *Design and Development* – A MGOV application development ecosystem is proposed by the framework to encourage agencies to provide mobile services, to institute the MGOV innovation fund, and to utilize MSDG as a platform for testing, deploying and maintaining MGOV services. The framework prescribes that application design must take into account specific restrictions of mobile devices and interface issues such as bandwidth limitations, micro-browser and micro-screen restrictions, and memory and storage capacities. In addition, mobile services must be available in local languages.

- *Delivery Mechanisms* – The "One Web" approach is the guiding principle for service delivery i.e. making the same information and services available irrespective of the devices or browsers. The framework also calls on the agencies to specify service levels for mobile services. MSDG is the main delivery mechanism for mobile public services and supports various delivery modes, e.g. voice, text (e-mail and SMS), IVR (Interactive Voice Response), WAP (Wireless Application Protocol), GPRS, USSD (Unstructured Supplementary Service Data), SIM Toolkit (STK), Cell Broadcast (CBC), multimedia (MMS), SIM Toolkit (STK)/Dynamic STK and 3G-Video and others (WiFi/WLan etc.).

3.3.2. Mauritius

The e-Government Strategy for Mauritius was developed by the Central Informatics Bureau of the Ministry for ICT, based on the needs survey of citizens, businesses and government as well as the research on global EGOV trends. MGOV is featured as a separate section of the strategy. In the following, the strategies are listed along the MGOV dimensions (Mauritius Ministry of Information and Communication Technology: Central Informatics Bureau, 2013):

o   Institutions

- *Strategy* – plans for formulating and implementing data sharing policy, open source software policy, open government data policy, social media policy, and legal and regulatory committee to review existing legal and regulatory frameworks to sustain various EGOV initiatives.

- *Policy Framework* – encouraging government officials to procure notebooks instead of personal computers to leverage ICT adoption, preparing guidelines and standards for ICT procurement in government, providing incentives to public officials to leverage ICT adoption, and carrying out in-depth study for the creation of an ICT directorate with new specialized posts in ICT for successful implementation of EGOV initiatives.

  – *Human Capacity* – preparing guidelines and standards for ICT procurement in government, providing ICT training to public officials to drive EGOV projects, and carrying out in-depth study for creating ICT directorate with new specialized ICT posts to drive successful implementation of EGOV initiatives.

  – *Leadership* – implementing a business continuity management plans for critical systems, creating a reforms steering council to facilitate approval and funding of EGOV projects, and developing green ICT guidelines.

o Innovation System

  – *External Stakeholders* – No strategies specifically related to external stakeholder engagement were defined.

  – *Absorptive Capacity and Adoption* – creating awareness of government portal and e-services; setting up a help desk to support citizens in the use of the government portal, e-services and m-services; developing EGOV measurement framework; and developing awareness strategies for government portal and e-services for businesses.

o Infrastructure

  – *ICT Infrastructure* – implementing end-to-end e-services including integration of back-end processes with e-services application systems to include e-payment, m-payment and digital signatures so as to facilitate transactions; setting up government service platform and sharing citizen data with government agencies; consolidating government data center initiatives; and extending the government cloud to parastatal bodies.

  – *Mobile Infrastructure* – providing e-services with e-payment and m-payment facilities, and integrating e-payment and m-payment facilities in existing EGOV applications.

  – *Interoperability* – formulating and implementing open source software policy.

  – *Security Safeguards* – implementing measures to make digital certificates affordable, promoting the use of online transactions using digital signatures, and promoting the use of biometrics and card validation services by businesses to validate citizen identity.

o Services and Applications

  – *Design and Development* – implementing new e-services to fulfill citizen needs; promoting e-participation initiatives; implementing e-procurement; democratizing access to government information; assessing the current state of e-services and re-engineering them to highly transactional modes; and specific services such as promoting

the use of online building and land permits with e-payments, implementing SMS-based disaster alerting systems, and others.

- *Delivery Mechanisms* – operating a one-stop shop of government services using the network of Mauritius post and setting up government call centers to provide information on government services.

3.3.3. Micronesia

The National ICT and Telecommunications Policy is the first of its kind to be established in the Federated States of Micronesia (FSM). The overall vision of the policy is to have a "Secure, Efficient, and Affordable ICT to achieve equitable communication for the People of the FSM".

The policy provides a guiding framework for all ICT and telecommunication policies in the FSM. The policy is based on five major goals, each with specific objectives and strategies: 1) achieve accessible, secure and affordable broadband communications for all; 2) strengthen ICT human resources and increase human resource development opportunities through the use of ICT; 3) improve economic growth and sustainable development through ICT; 4) utilize ICT for good governance; and 5) create an enabling ICT environment through policy reform and improvements in legal frameworks.

In the following, the strategies (Government of the Federated States of Micronesia, 2012) are summarized along the four dimensions of the MGOV framework:

o   Institutions

- *Strategy* – contingency plan for international communication in the event of off island satellite failure; developing a health information technology multidisciplinary working group to identify relevant needs and resources; conducting a feasibility study and an output proposal for EGOV in the FSM; developing EGOV strategy and implementation plan; developing mechanisms to seek funding for implementing EGOV strategy; reviewing and updating the national ICT policy and action plan at minimum every two years; developing a government software strategy and encouraging the use of Free and Open Source Software; developing a government ICT contingency plan that includes a secure data center and disaster recovery capabilities; identifying the mechanisms to lower the costs of ICT; developing sectoral energy reduction plans; encouraging the use of energy-efficient technologies; developing a multidisciplinary working group on health ICT to identify relevant needs and resources; and promoting the use of ICT that respects local culture and standards.

- *Policy Framework* – establishing an ICT regulator that is legally, institutionally, and financially independent from the government; amending existing regulations to promote competition in the telecommunications markets, creating independent

regulation of those markets, and ensuring fair network access including open access for all licensees to international connectivity through FSM submarine cable facilities; putting in place non-discriminatory laws, mandates, policies and practices for equal and equitable access to ICT infrastructure and content; establishing policies, regulations and guiding principles for patient information confidentiality; establishing a framework for prioritization of the radio frequency spectrum for emergency communication; defining a policy to ensure that all providers have a process in place for ICT-based waste removal and disposal; defining EGOV policy to mandate sectoral implementation of the EGOV plan; defining ICT policies and implementation plans that are aligned with the national ICT policy; enacting legislations to address the issues of cybercrime, spam, digital evidence, copyright, piracy, right to information, government internet use and universal access policy to achieve ICT access throughout the country; enacting laws to waive levies, customs duties and other taxes imposed on ICT equipment for rural, underserved communities and public service sectors such as health, education or emergency management; and supplying all relevant regulations and legislations, and industry data required for regional performance surveys carried out by international organizations.

–   *Human Capacity* – coordinating local and regional opportunities to provide regular and on-going ICT policy training for decision makers; encouraging all leaders and policy makers to attend ICT awareness workshops and trainings; planning and budgeting for human resource capacity building for the newly established independent ICT regulatory authority office; encouraging public-private partnerships for ICT-related training and human resource development; developing plans for workforce retention of ICT skilled personnel within government; supporting and participating in regional ICT human resource development activities; encouraging the use of regional online distance learning programs; providing ICT career counseling services in high schools; ensuring that the qualified and motivated local staff receive ICT regulation training; and integrating ICT in school curricula.

–   *Leadership* – identifying and tracking ICT indicators to demonstrate effective utilization of ICT to promote tourism; improving assessment of the educational system for data collection and analysis; conducting annual review and periodic testing of disaster management communication systems; conducting assessment of government ICT equipment, services and human resource capacity to develop internal government strategy for implementing ICT; establishing a national ICT unit; assigning oversight of the ICT sector to the department of transportation, communication, and infrastructure; and providing assistance and support to local villages to digitally collect oral records.

o   Innovation System

–   *External Stakeholders* – encouraging public-private partnerships in deploying ICT networks, especially for last-mile connectivity; using ICT to enhance productivity of the local businesses; carrying out ICT-related training and human resource development;

developing plans for workforce retention of ICT-skilled personnel within government; creating the incubator model for small business development that incorporates ICT practices and that promotes rural business development; encouraging the private sector to develop e-money such as mobile money and debit cards to facilitate online payments; coordinating with financial institutions how to utilize ICT to improve the efficiency and value-added services (e.g. loan applications) and to connect to EGOV services; and collaborating with existing community groups such as churches, women groups, seniors, schools, and libraries to provide outreach to their constituents in raising the awareness of the benefits of ICT, and providing opportunities for hands-on training.

– *Absorptive Capacity and Adoption* – collaborating with existing community groups such as churches, women groups, seniors, schools and libraries to provide outreach to their constituents in raising the awareness of the benefits of ICT, and providing opportunities for hands-on training; establishing multipurpose communication tele-centers with affordable technologies and public service telecommunication services for connecting rural and underserved communities; encouraging people to take active part in political decision-making including free and open debates through interactive communication channels facilitated by ICT; and establishing special ICT tariffs for rural communities and targeted communities of users.

o Infrastructure

– *ICT Infrastructure* – improving access to ICT infrastructure and identifying appropriate technical solutions; prioritizing funding opportunities to support the implementation, operation and maintenance of ICT networks, equipment and services; connecting states to the submarine fiber optic cable or adopting alternative forms of international connectivity; establishing a secure data center and disaster recovery capability with back-up power generators; developing appropriate Local Area Networks and Wide Area Networks for all government agencies; and utilizing the FSM ICT Super Highway infrastructure to support tele-medicine and related education and training programs.

– *Mobile Infrastructure* – encouraging the private sector to develop e-money such as mobile money and debit cards to facilitate online payments.

– *Interoperability* – standardizing ICT hardware to be used in all government sectors.

– *Security Safeguards* – establishing cyber legislation to address cybercrime and establishing a safe and secure environment for the use of ICT by children.

o Services and Applications

– *Design and Development* – strengthening administrative functions of the educational system through the use of ICT; developing systems to safeguard employees from

corruption; developing specific services such as the government information portal and the public service applications portal; developing and supporting mobile text messaging and other ICT services to enable farmers to share information on agricultural issues; integrating ICT in the FSM disaster management and recovery plan; utilizing ICT to assist border control, immigration, and customs; utilizing ICT to improve grassroots- and community-based decision-making; promoting the use of ICT to improve collection and distribution of information for agricultural support; utilizing ICT to monitor and regulate fisheries; developing health management information systems for public health surveillance; increasing student opportunities for learning through the use of ICT; and developing and maintaining ICT databases of cultural and historical heritage.

- *Delivery Mechanisms* – implementing systems and services to enable access to the Internet at airports and establishing multipurpose communication tele-centers with affordable technologies and public service telecommunication services for connecting rural and underserved communities.

3.3.4. Singapore

The Singapore's Intelligent Nation 2015 (iN2015) ICT strategy is a 10-year plan initiated in 2005 under the leadership of the Singapore Infocomm Development Agency (IDA) through multi-stakeholder collaboration and consultation.

The strategy incorporates ten areas ranging from Government (iGov2010) to Financial Services, and from Education to Health. Based on the guiding principles of innovation, integration and internationalization, the strategy pursues four goals: 1) spearheading the transformation of the key sectors of the economy, government and society through sophisticated and innovative uses of ICT; 2) establishing ultra-high speed, pervasive, intelligent and trusted ICT infrastructure; 3) developing globally-competitive ICT industry; and 4) developing an ICT-savvy workforce and globally-competitive ICT manpower.

In the following, individual strategies (Singapore Infocomm Development Agency, 2006) are summarized along the four MGOV dimensions:

o   Institutions

- *Strategy* – creating synergy through shared data, processes and systems; embarking on a concerted international branding and marketing of "Made-by-Singapore" ICT products and services; developing Singapore as a games exchange and trusted digital cinema hub; developing digital assets marketplace programme where digital content can be traded seamlessly; and showcasing and promoting EGOV solutions.

- *Policy Framework* – developing the necessary medico-legal framework to enable the provision of integrated healthcare services.

–   *Human Capacity* – establishing the national ICT competency framework to set out skill requirements and corresponding trainings available to various ICT occupations; establishing i-powered public employee programme to enrich public officers' work experience through innovative use of ICT; building a high-quality innovative workforce with cross-disciplinary skills in ICT and finance; providing scholarships to attract top local and foreign students to pursue ICT as a field of study; providing flagship ICT courses, e.g. "fast-track" bachelors and masters programs offered jointly by local and top overseas universities; exchanging talents and building partnership programs to share talent between local and overseas markets; sharing views on how ICT can be used as a strategic tool for competitive advantage; developing necessary ICT competencies for key sectors; and creating enriched, personalized learner-centered environments in educational institutions including the usage of ICT to support pedagogies and education.

–   *Leadership* – providing market intelligence and assistance by IDA to local enterprises that plan to expand overseas and developing a pool of "techno-strategists" well-versed in the technical aspects of ICT as well as in their respective business domains.

o   Innovation System

–   *External Stakeholders* – establishing technology research and development programs aimed at creating technology and resource centers and next-generation content and services; forging strategic partnerships with key companies and research institutions and locating test-bedding, prototyping and research and development centers in Singapore; collaborating with ICT industry; developing capabilities within the ICT industry to support innovation in the financial sector; driving innovation agenda across financial services industry through concerted effort aimed at creating iconic projects; developing the partnership program in sectoral projects to expedite the creation of IP for the enterprises in Singapore and strengthening their branding in the international markets; commencing ICT start-up programs to attract and nurture a vibrant pool of ICT technopreneurs and start-ups; working closely with all parties to concertedly drive the deployment of innovative payment solutions to minimize fragmentation; providing assistance to companies to build adaptive supply chains and to grow their local pool of supply chain expertise; enabling complex manufacturing capabilities; working with relevant agencies to attract high-end shared financial services into Singapore; developing capabilities and research and development agendas within industries on new technologies and models to harness ICT for education and learning; and developing incubator educational institutions that will generate innovation in the use of ICT to support engaged learning.

–   *Absorptive Capacity and Adoption* – establishing the technology adoption program to cover awareness-building, skill development and incentives for ICT adoption; increasing citizen mindshare in e-engagement – attracting participation in online public consultation and feedback; establishing access to all program to increase reach and

richness of e-services; providing free internet access and on-site support at community centers; empowering people with disabilities, from accessibility to creating jobs for the disabled in the ICT sector; and equipping students in need by providing new computers and free one-year dial-up access.

o Infrastructure

  – *ICT Infrastructure* – entrenching world-class status of key supply chain infrastructure; developing the national fiber network that supports new high-bandwidth applications and services; ensuring a quality- and cost-competitive telecommunication infrastructure and connectivity; developing infrastructure to make location information available to service providers; enabling commerce through the next-generation e-payment infrastructure; and building a nation-wide education and learning infrastructure by making broadband infrastructure affordable and accessible to educational institutions.

  – *Mobile Infrastructure* – developing the Wireless Broadband Network that supports new mobile and location-aware services.

  – *Interoperability* – ensuring interoperability in networks, strategic telecommunication services, computing resources and storage systems; promoting the adoption of open standards to extend the potential for the export and growth of cross-border transactions; supporting the creation of new marketplaces for financial products through harmonization of technology standards; and developing standards and enabling interoperability between healthcare services.

  – *Security Safeguards* – developing the National Trust Framework to address identity, security and privacy issues.

o Services and Applications

  – *Design and Development* – delivering proactive, responsive, user-friendly and integrated e-services; driving the creation of value-added services to spur online transactions and bring greater convenience to the end-users; developing insights to enhance e-services to customers; delivering clear and useful information online in a vibrant and interesting manner in order to increase citizens' mindshare in e-engagement; using ICT to create innovative ICT-themed entertainment and experiences; developing specific services such as a digital concierge for visitors to establish Singapore as a supply chain nerve center; enabling integrated healthcare services; developing new learning resources and new ICT-enabled assessment modes; and developing services for the elderly such as the one-stop information portal to cater for the elderly and their caretakers.

  – *Delivery Mechanisms* – No strategies were filed under this category.

3.3.5. Malta

The 2008 National ICT Strategy for Malta is a follow-up on the earlier 2004 ICT strategy. The aim of both strategies is to turn Malta into one of the top ten Information Societies in the world and to develop ICT to support Malta's political, economic and social objectives.

The 2008 strategy puts a special emphasis on improving the quality of life of Maltese citizens, and on correcting social inequality and disadvantages. The main goals of the strategy are: 1) building a robust environment and next-generation infrastructure, 2) building a connected society, 3) developing a smart workforce, 4) enhancing the quality of life of citizens through ICT, 5) re-inventing government through transformation and open government, 6) taking care of e-business and 7) developing a world-leading ICT industry.

In the following, individual strategies (Malta Ministry for Investment, Industry and Information Technology, 2008) are summarized along the four MGOV dimensions:

o   Institutions

   –   *Strategy* – participating in all major international benchmarking surveys by leading organizations in ICT; creating a government Geographic Information System (GIS) framework; deploying a finance-driven ICT within government to derive financial benefits through revenue generation and cost-saving; deploying a pan-European EGOV initiative; deploying the anti-fraud program; deploying the core information systems investment plan; using public procurement as investment driver; establishing a national e-commerce supply chain framework; developing a national e-learning strategy and action plan; and creating a national e-health strategy and action plan.

   –   *Policy Framework* – enacting EGOV legislation; reviewing and transforming the current e-legislation into the next-generation framework; enhancing the legislative framework to address the challenges to e-commerce; enacting legislation and publishing national accessibility standards; establishing a national information security framework; determining a regulatory framework on the deployment of broadband networks; addressing regulatory and fiscal issues in parallel to introducing the necessary infrastructure for mobile micro-payments using e-wallets in the private and public sectors; creating a legislative framework for electronic communications channels; establishing the national guidelines and incentives to make easier the adoption and promotion of telework; and providing fiscal incentives to e-businesses.

   –   *Human Capacity* – building competencies in line ministries and developing a public-private ICT training center in Gozo.

- *Leadership* – building a national contact center in Gozo; establishing an ICT professional body; strengthening corporate ICT governance; and creating a Small- and Medium-Size Enterprise (SME) e-business advisory framework.

o   Innovation System

- *External Stakeholders* – creating a global test-bed facility and marketing it in Malta; attracting major ICT research, intelligence and data monitoring organizations to Malta; establishing strategic partnerships with ICT educational institutions; up-scaling Mitts Ltd. the primary ICT firm that enables EGOV in Malta; supporting the realization of SmartCity Malta through joint endeavors to attract blue-chip players, offering touch-down and incubation facilities to Maltese ICT start-ups; sustaining vertical strategic alliances; creating a national clusters framework; working with digital TV providers to make digital TV a primary delivery channel; integrating the private sector into www.mygov.mt; promoting EGOV research and development; facilitating the setting-up of knowledge based-companies in Malta; partnering with international IT chambers and clusters; offering ICT start-up aid programs; utilizing public procurement as investment driver; facilitating and attracting IT specialists from the overseas; designing educational programs and using innovative marketing to attract students to ICT; setting up Public-Private Partnerships for ICT educational programs; and setting up a business-to-business (B2B) institute aimed at bringing together the key B2B players.

- *Absorptive Capacity/Adoption* – enacting legislation and publishing national accessibility standards; conducting intensive continuous marketing campaigns promoting EGOV usage and take-up; developing and broadcasting ICT awareness programs; establishing the 'first steps' call centers; raising awareness and offering education in digital business; strengthening the foundation for IT accessibility; improving accessibility in government IT operations; deploying fiscal measures to help buy computers; sustaining community technology learning centers; establishing a digital divide response team; offering starter-training for all; promoting assistive technologies; implementing specialized equalizer programs; and offering ICT training for the elderly.

o   Infrastructure

- *ICT Infrastructure* – infrastructure investment; championing the development of the next-generation networks; increasing the number of data and network operations centers; offering incentives to telecom providers to invest in international connectivity; opening up access to the national GIS base-map and layers; accelerating IPv6 readiness; offering smart ID card; offering smart wallets for micro-payments; exploiting broadband for e-businesses; refurbishing computer equipment for disadvantaged groups; and proliferating free WIFI.

- *Mobile Infrastructure* – facilitating mobile payments by addressing regulatory and fiscal issues in parallel to introducing the necessary infrastructure for micro-payments using e-wallets in the private and public sectors.

- *Interoperability* – supporting the proliferation of open standards, and establishing a first-class interoperability framework.

- *Security Safeguards* – setting up an information security strategy agency; strengthening the fight against cybercrime; establishing a national information security framework; establishing a regional information security center; establishing a world-class IP protection program; expanding the e-trust scheme; offering e-ID integration for all; deploying the e-trust scheme for all electronic services; introducing measures to keep children safe on the Internet; and introducing school safety packages.

o Services and Applications

- *Design and Development* – transforming the current government websites into dynamic websites with useful and relevant information, aimed at offering consistent interaction and attractive rich media to enhance public awareness; introducing measures to enable streamlined digitalization of public sector information; empowering citizens through e-participation; putting on-line government information and services in Maltese; offering EGOV shared services; adopting build-operate-transfer model for major information systems; and adopting common and shared document management. Strategies in this category also include development of specific services such as: integrating G2B into www.mygov.mt; deploying national identity management system; deploying e-court platform; disseminating e-passports and Smart ID cards; developing ICT applications to improve road safety and security and to ease traffic congestion; and offering mobile applications for tourist services.

- *Delivery Mechanisms* – making available mobile and digital television service delivery; and making all services available on-line through the www.mygov.mt portal.

3.3.6. Summary

Figure 13 below depicts the number of strategies in different MGOV dimensions for the five country cases analyzed earlier in this section. In addition, the analysis resulted in two important findings concerning the state of practice in the national ICT/MGOV strategies.

First, the search for strategies revealed that MGOV has not yet arrived on most governments' agenda as a key policy item on its own. Only one national strategy (India) out of selected five, and most likely the only one globally, is directly dedicated to MGOV. For other countries, MGOV is typically only addressed as part of a larger ICT or EGOV national policy or strategy framework. However, even if MGOV initiatives already exist in a country, MGOV hardly forms an explicit

part of the official policy or strategy framework. As depicted in Figure 13, except for India, MGOV-specific infrastructure for instance hardly features in other countries' policies.

Secondly, the analysis showed that there is substantial variation across different countries in their emphasis on different MGOV dimensions. Figure 13 shows, for instance, that the policies originating in SIDS such as Mauritius and Micronesia place a strong emphasis on institutional strategies relative to other dimensions, whereas Malta clearly focuses on the innovation system dimension, and Singapore balances the innovation system and services and applications dimensions. The policies in the latter two countries are also targeting the development of applications for specific services. The key conclusion from this finding is that there is no one-size-fits-all template for MGOV strategies, but that each country needs a tailored strategy to fit its particular context including the state of development and the development goals set out for each individual country context. However, there are also common elements like, e.g. regulatory bodies, enterprise architectures and other legal and institutional arrangements that following international best practices we would typically encounter across different national contexts.

Therefore, as the first step, the following section will map the summarized ICT/MGOV strategies to the four dimensions of development defined in Section 3.1.1 and applied in Section 3.2. As the second step, in Section 6 of this report, the most relevant strategies from this pool will be selected and adapted to the specific MGOV context of Vanuatu.
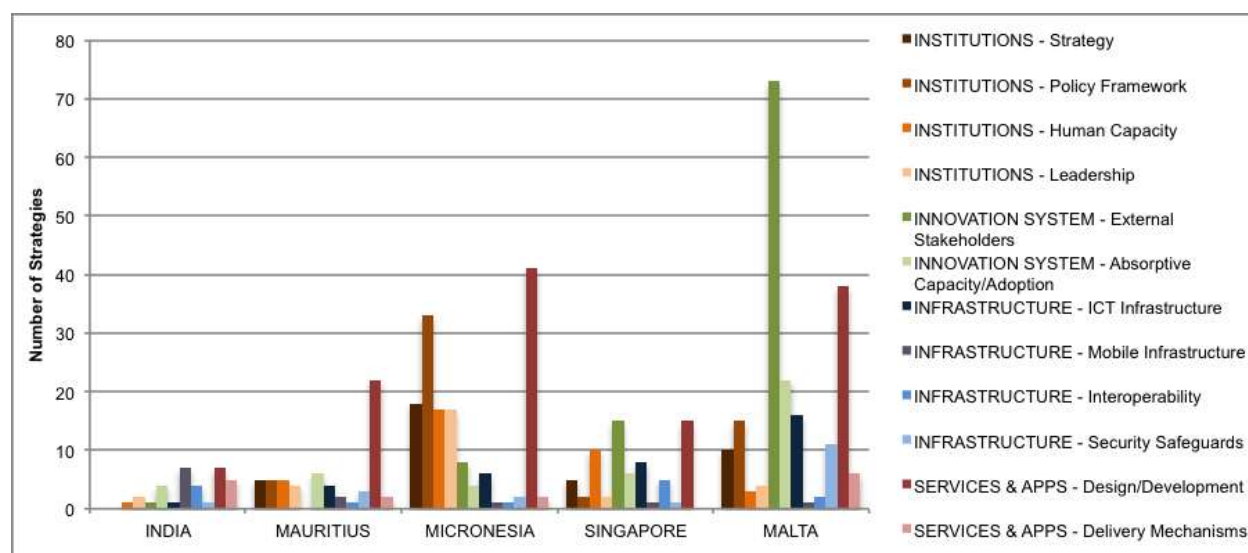
Figure 13: Number of country strategies in different MGOV4D dimensions

3.4. Mapping ICT/MGOV and Development Strategies

This section carries out the analysis of the contribution made by selected national ICT/MGOV strategies, as described in Section 3.3, to the key development goals adopted by SIDS, as summarized in Section 3.2. The analysis results in a mapping between the strategies grouped into the four dimensions of the MGOV framework – institutions, innovation system, infrastructure and services and applications, and the four dimensions of the SD framework – institutional, economic, environmental and social. The following sections describe such mappings for five selected countries with national ICT/MGOV strategies – India (Section 3.4.1), Mauritius (Section 3.4.2), Micronesia (Section 3.4.3), Singapore (Section 3.4.4) and Malta (Section 3.4.5), followed by the synthesis across these countries (Section 3.4.6).

3.4.1. India

Figure 14 shows the number of strategies in the Indian Framework for Mobile Governance (Ministry of Communications & Information Technology: Department of Information Technology, 2012) contributing to different development goals. In addition to the Institutional, Economic, Environmental and Social development goals, the Other dimension includes those strategies that contribute to multiple development goals. According to Figure 14, the Indian MGOV framework places emphasis on institutional development (16 strategies), followed by social development (6 strategies), followed by economic development (2 strategies). Environmental development is not addressed (0 strategies). In the framework, a relatively large number of strategies (9) contribute to multiple development goals.
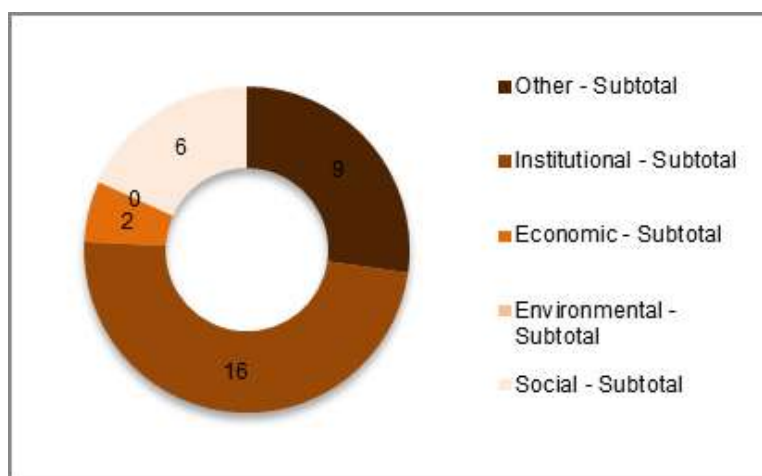
Figure 14: Number of MGOV strategies for SD dimensions – India

Figure 15 shows the contribution of individual MGOV dimensions to different SD goals. In the order to priority, the Indian MGOV framework advances: institutional development mainly through the Infrastructure and Services and Applications dimensions; social development mainly through the Innovation System dimension; and economic development through the

Infrastructure (Mobile Infrastructure) dimension. Environmental development is not advanced by the framework. Other strategies that advance not just one, but multiple development goals belong mainly to the Services and Applications and Infrastructure dimensions. Figure 15 below is a visual representation of the content of Table 2.
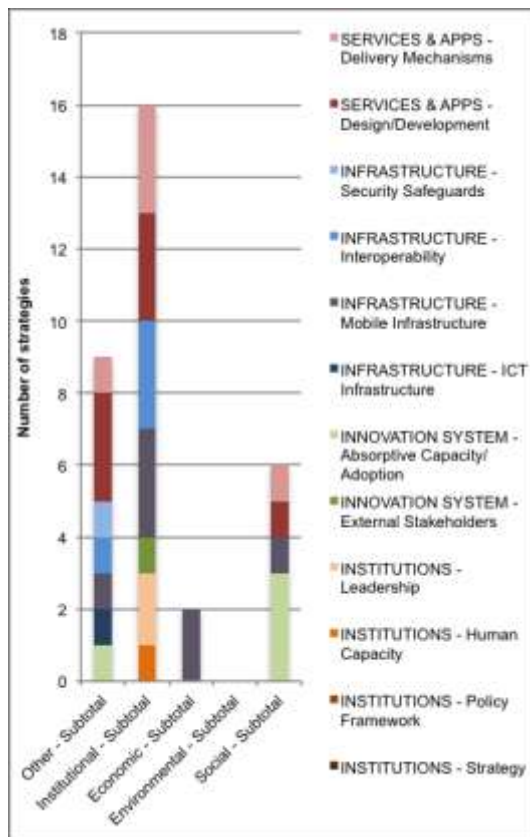
Figure 15: Contribution of MGOV dimensions to SD dimensions – India

SD DIMENSIONS	MGOV DIMENSIONS												
	INSTITUTIONS				INNOVATION SYSTEM		INFRASTRUCTURE				SERVICES APPS		SUM
	Strategy	Policy Framework	Human Capacity	Leadership	External Stakeholders	Absorptive Capacity/ Adoption	ICT Infrastructure	Mobile Infrastructure	Interoperability	Security Safeguards	Design/ Development	Delivery Mechanisms	
INSTITUTIONAL	0	0	1	2	1	0	0	3	3	0	3	3	16
ECONOMIC	0	0	0	0	0	0	0	2	0	0	0	0	2
ENVIRONMENTAL	0	0	0	0	0	0	0	0	0	0	0	0	0
SOCIAL	0	0	0	0	0	3	0	1	0	0	1	1	6

OTHER	0	0	0	0	0	1	1	1	1	1	3	1	9
SUM	0	0	1	2	1	4	1	7	4	1	7	5	33

Table 2: Detailed contribution of MGOV dimensions to SD dimensions – India

3.4.2. Mauritius

Figure 16 shows the number of strategies in the Mauritius EGOV strategy (Mauritius Ministry of Information and Communication Technology: Central Informatics Bureau, 2013) that contribute to different development goals. A majority of the strategies advance institutional development (38), followed by economic development (12), followed by social (3) and environmental (2) development. A small number of strategies (4) contribute to multiple development goals.
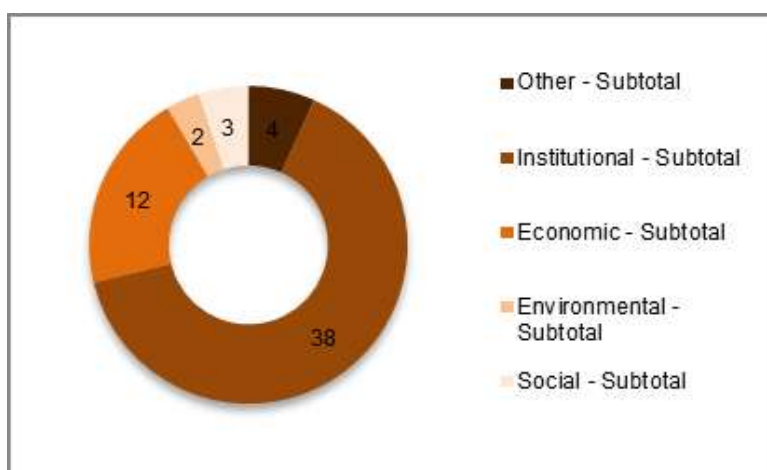
Figure 16: Number of MGOV strategies for SD dimensions – Mauritius

Figure 17 shows the contribution of individual MGOV dimensions to different SD goals. In the order of priority, the Mauritius EGOV Strategy advances: institutional development mainly through the Institutions, and Services and Applications dimensions; economic development mainly through the Services and Applications dimension; social development through the Institutions, Innovation System, and Services and Apps dimension; and environmental development through the Services and Applications dimension. Other strategies that advance multiple development goals belong mainly to the Institution dimensions. Figure 17 is a visual representation of the content of Table 3.
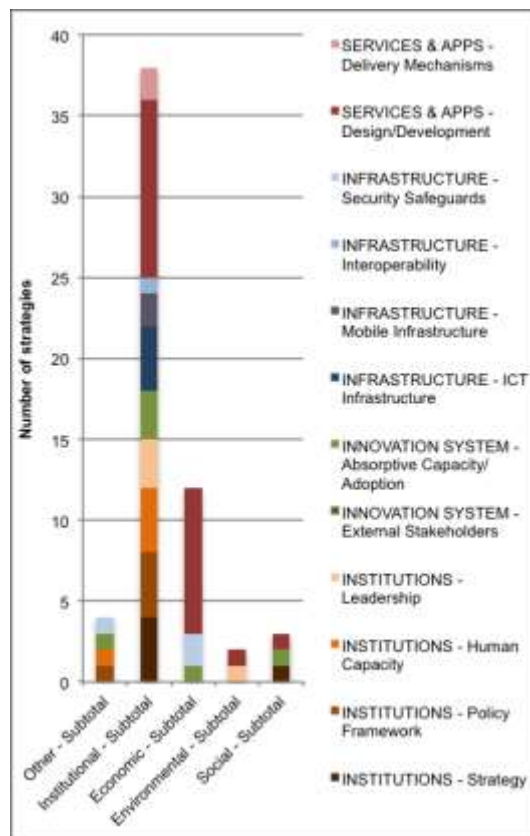
Figure 17: Contribution of MGOV dimensions to SD dimensions – Mauritius

SD DIMENSIONS	MGOV DIMENSIONS												
	INSTITUTIONS				INNOVATION SYSTEM		INFRASTRUCTURE				SERVICES APPS		SUM
	Strategy	Policy Framework	Human Capacity	Leadership	External Stakeholders	Absorptive Capacity/ Adoption	ICT Infrastructure	Mobile Infrastructure	Interoperability	Security Safeguards	Design/ Development	Delivery Mechanisms	
INSTITUTIONAL	3	4	4	3	0	3	4	2	1	0	11	2	37
ECONOMIC	0	0	0	0	0	1	0	0	0	2	9	0	12
ENVIRONMENTAL	0	0	0	1	0	0	0	0	0	0	1	0	2
SOCIAL	1	0	0	0	0	1	0	0	0	0	1	0	3
OTHER	0	1	1	0	0	1	0	0	0	1	0	0	4
SUM	4	5	5	4	0	6	4	2	1	3	22	2	58

Table 3: Detailed contribution of MGOV dimensions to SD dimensions – Mauritius

3.4.3. Micronesia

Figure 18 below shows the number of strategies in the Micronesia National ICT and Telecommunications Policy (Government of the Federated States of Micronesia, 2012) that contribute to different development goals. A majority of the strategies advance institutional development (67), followed by social (43), economic (23) and environmental development (12). A small number of strategies (5) contribute to multiple development goals.
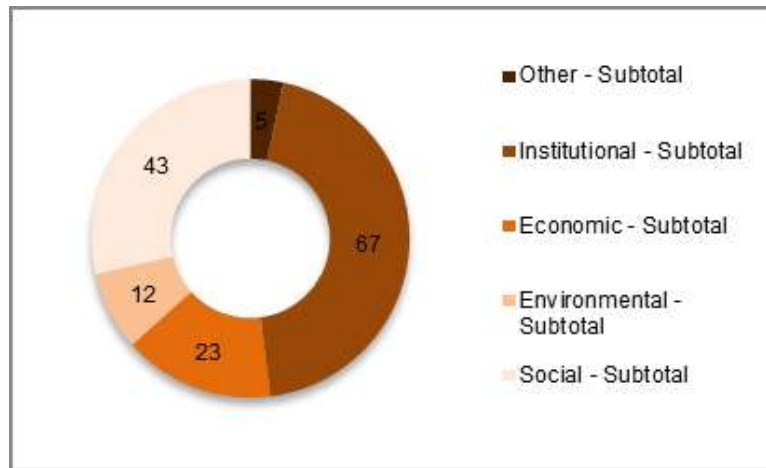
Figure 18: Number of MGOV strategies for SD dimensions – Micronesia

Figure 19 shows the contribution of individual MGOV dimensions to different SD goals. In the order of priority, the Micronesia National ICT and Telecommunications Policy advances: institutional development mainly through the Institutions dimension; social development mainly through the Services and Applications and Institutions dimensions; economic development mainly through the Institutions and Services and Applications dimensions; and environmental development mainly through the Institutions dimension. Other strategies that advance multiple development goals mainly belong to the Innovation System dimension. Figure 19 is a visual representation of the content of Table 4.

Figure 19: Contribution of MGOV dimensions to SD dimensions – Micronesia

SD DIMENSIONS	MGOV DIMENSIONS												
	INSTITUTIONS				INNOVATION SYSTEM		INFRASTRUCTURE				SERVICES APPS		SUM
	Strategy	Policy Framework	Human Capacity	Leadership	External Stakeholders	Absorptive Capacity/ Adoption	ICT Infrastructure	Mobile Infrastructure	Interoperability	Security Safeguards	Design/ Development	Delivery Mechanisms	
INSTITUTIONAL	8	20	13	9	1	1	4	0	1	1	9	0	67
ECONOMIC	2	4	0	3	4	0	0	1	0	0	9	0	23
ENVIRONMENTAL	3	1	0	3	0	0	0	0	0	0	5	0	12
SOCIAL	4	7	4	2	1	3	2	0	0	1	18	1	43
OTHER	1	1	0	0	2	0	0	0	0	0	0	1	5
SUM	18	33	17	17	8	4	6	1	1	2	41	2	150

Table 4: Detailed contribution of MGOV dimensions to SD dimensions – Micronesia

3.4.4. Singapore

Figure 20 below shows the number of strategies in the Singapore iN2015 ICT Strategy (Singapore Infocomm Development Agency, 2006) that contribute to different development goals. A majority of the strategies advance economic development (27), followed by social (18) and institutional development (14). Environmental development is not addressed. A number of strategies (11) contribute to multiple development goals.
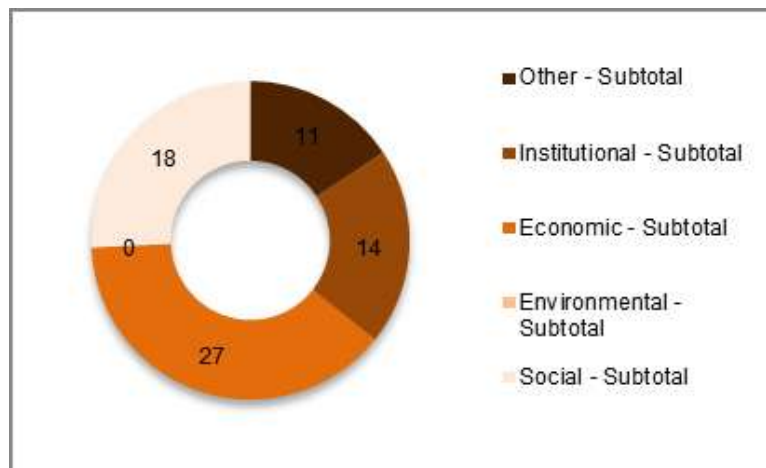
Figure 20: Number of MGOV strategies for SD dimensions – Singapore

Figure 21 shows the contribution of individual MGOV dimensions to different SD goals. In the order of priority, the Singapore iN2015 ICT Strategy advances: economic development mainly through the Institutions, Innovation System and Infrastructure dimensions; social development mainly through the Innovation System and Services and Applications dimensions; and institutional development mainly through the Services and Applications dimensions. Environmental development is not advanced by the strategy. Other strategies that advance multiple development goals mainly belong to the Infrastructure and Innovation System dimensions. Figure 21 is a visual representation of the content of Table 5.
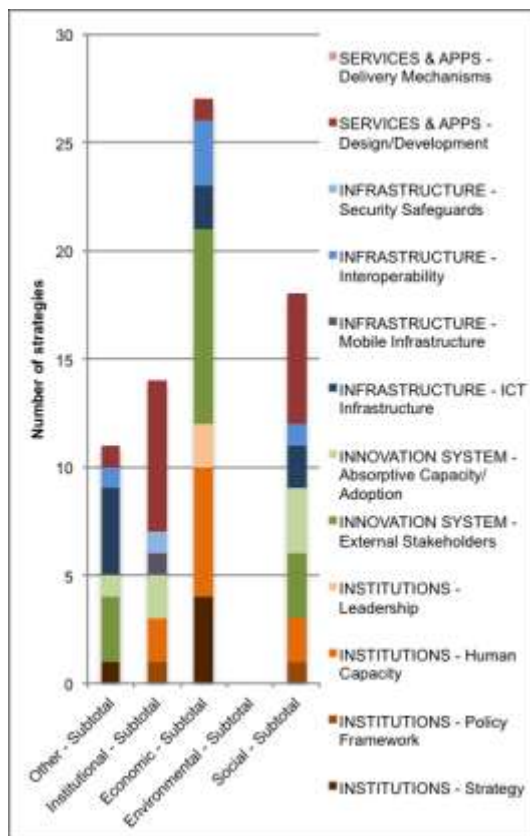
Figure 21: Contribution of MGOV dimensions to SD dimensions – Singapore

| SD DIMENSIONS | MGOV DIMENSIONS | | | | | | | | | | | | SUM |
| | INSTITUTIONS | | | | INNOVATION SYSTEM | | INFRASTRUCTURE | | | | SERVICES APPS | | |
	Strategy	Policy Framework	Human Capacity	Leadership	External Stakeholders	Absorptive Capacity/ Adoption	ICT Infrastructure	Mobile Infrastructure	Interoperability	Security Safeguards	Design/ Development	Delivery Mechanisms	
INSTITUTIONAL	0	1	2	0	0	2	0	1	0	1	7	0	14
ECONOMIC	4	0	6	2	9	0	2	0	3	0	1	0	27
ENVIRONMENTAL	0	0	0	0	0	0	0	0	0	0	0	0	0
SOCIAL	0	1	2	0	3	3	2	0	1	0	6	0	18
OTHER	1	0	0	0	3	1	4	0	1	0	1	0	11
SUM	5	2	10	2	15	6	8	1	5	1	15	0	70

Table 5: Detailed contribution of MGOV dimensions to SD dimensions – Singapore

3.4.5. Malta

Figure 22 shows the number of strategies in the National ICT Strategy of Malta (Malta Ministry for Investment, Industry and Information Technology, 2008) that contribute to different development goals. A majority of the strategies advance institutional (72) and economic (69) development, followed by social development (43). Environmental development is not addressed. A number of strategies (18) contribute to multiple development goals.
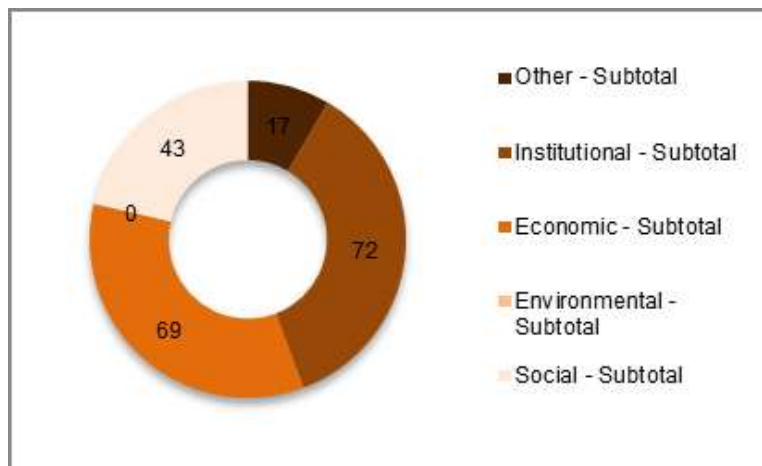
Figure 22: Number of MGOV strategies for SD dimensions – Malta

Figure 23 shows the contribution of individual MGOV dimensions to different SD goals. In the order of priority, the National ICT Strategy of Malta advances: institutional development through the Institutions, Services and Applications, Innovation System and Infrastructure dimensions; and economic and social development mainly through the Innovation System dimension. Environmental development is not advanced by the strategy. Other strategies that advance multiple development goals mainly belong to the Infrastructure and Innovation System dimensions. Figure 23 is a visual representation of the content of Table 6.
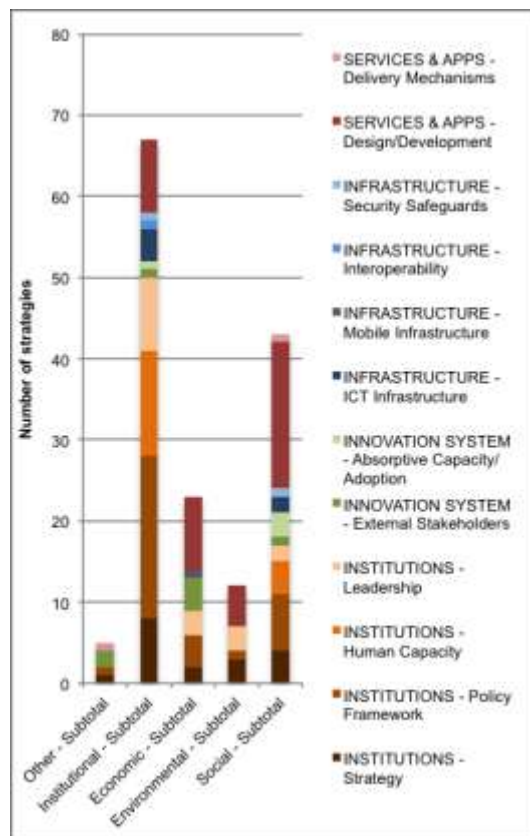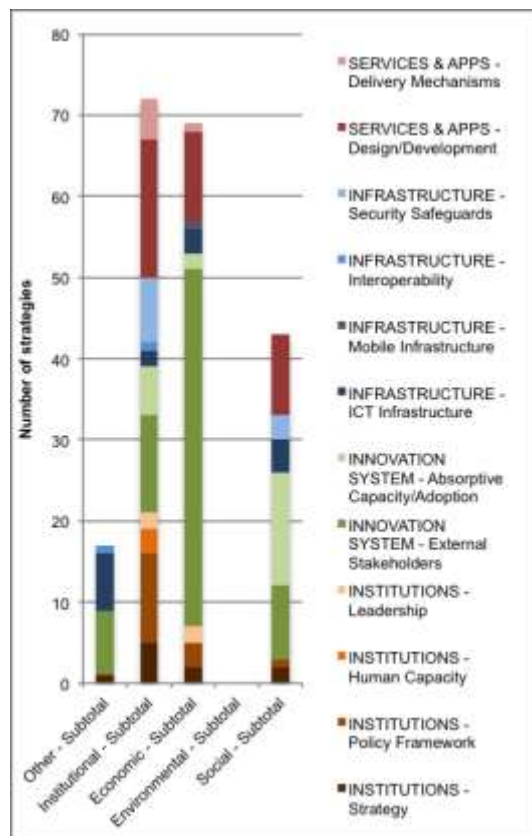
Figure 23: Contribution of MGOV dimensions to SD dimensions – Malta

SD DIMENSIONS	MGOV DIMENSIONS												SUM
	INSTITUTIONS				INNOVATION SYSTEM		INFRASTRUCTURE				SERVICES APPS		
	Strategy	Policy Framework	Human Capacity	Leadership	External Stakeholders	Absorptive Capacity/ Adoption	ICT Infrastructure	Mobile Infrastructure	Interoperability	Security Safeguards	Design/ Development	Delivery Mechanisms	
INSTITUTIONAL	5	11	3	2	12	6	2	0	1	8	17	5	72
ECONOMIC	2	3	0	2	44	2	3	1	0	0	11	1	69
ENVIRONMENTAL	0	0	0	0	0	0	0	0	0	0	0	0	0
SOCIAL	2	1	0	0	9	14	4	0	0	3	10	0	43
OTHER	1	0	0	0	8	0	7	0	1	0	0	0	17
SUM	10	15	3	4	73	22	16	1	2	11	38	6	201

Table 6: Detailed contribution of MGOV dimensions to SD dimensions – Malta

3.4.6. Synthesis

This section synthesizes the contributions by ICT/MGOV strategies to SD goals across all five analyzed countries. For each development goal, the section discusses which MGOV dimensions and sub-dimensions are the biggest contributors to this goal. The section also carries out a brief cross-country comparison. The basis for the synthesis is Figure 24 which shows the aggregation across five country cases of the number of strategies for each development goal.
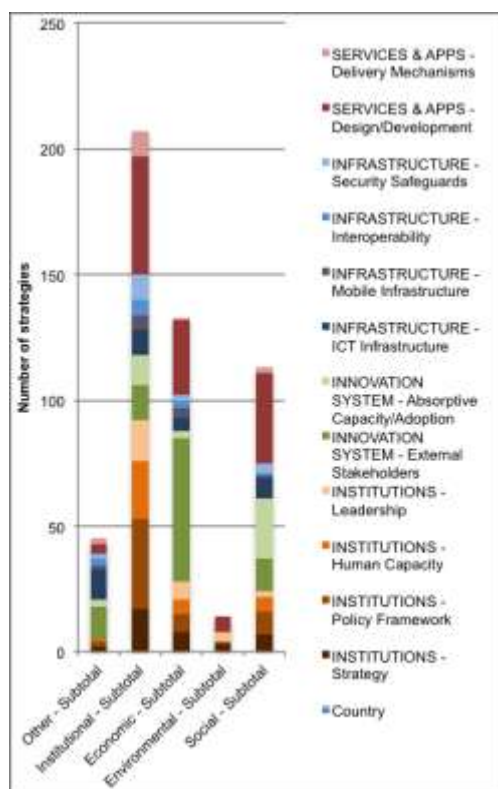
Figure 24: Contribution of MGOV dimensions to SD dimensions for five country cases

Here is the summary for different development goals:

o *Institutional Development* – The figure shows that overall, institutional development is by far the highest priority goal across all analyzed country cases. Not surprisingly, the figure also shows that the strategies in the institutional MGOV dimension form the biggest contribution to this goal, with Policy Framework assuming the biggest share in this dimension. The second-largest contributor to institutional development is Services and Applications particularly Design and Development. The third and fourth-largest contributors are Infrastructure followed closely by Innovation System. For both of them, all sub-categories have a relatively equal relevance. A cross-country comparison of the institutional development dimension confirmed that except for Singapore, institutional development is

the highest priority goal for all strategies. Of particular interest is that the dominance of the institutional dimension over other dimensions is most articulate for SIDS.

o *Economic Development* – This is the second-highest priority goal. The largest contributor to this goal comes from the strategies in the Innovation System dimension, which almost entirely come from the External Stakeholders category. However, Malta contributes an exceptionally high number of strategies in this category, a pattern not reflected by other countries. An interesting observation in cross-country comparison of the economic development goal is a marked discrepancy between developed and developing countries: whilst in the two developed countries (Singapore and Malta) economic development is the highest or second-highest priority development goal, the same goal has a much lower priority for the selected developing countries (India, Mauritius and Micronesia).

o *Social Development* – Social development closely follows economic development in terms of the number of ICT/MGOV strategies addressing this dimension. The two largest contributors to this goal are the Services and Applications and Innovation System dimensions. A large majority of the Services and Applications strategies relates to Design and Development. Concerning the Innovation System dimension, there is a relatively even share of strategies in the External Stakeholders and Absorptive Capacity/Adoption categories. However, in developing countries except Micronesia, a slightly bigger emphasis is on the latter, possibly due to the larger digital gap in these countries. Institutional- and Infrastructure-related strategies form a considerably smaller share of contributions to social development.

o *Environmental Development* – Environmental development is the least addressed among the four development goals. About half of the contributions to this goal are formed by the Institutions dimension, particularly Strategy and Leadership, while another half comprises Services and Applications, Design and Development. A striking observation from the cross-country comparison is that environmental goal is only a concern for SIDS, and not for the remaining (both developed and developing) countries.

o *Multiple Development Dimensions* – A number of strategies are not directly associated with any of the four development goals. The largest contributor to this category is formed by the Infrastructure-related strategies, closely followed by the strategies related to the Innovation System dimension. This is not surprising as both are cross-cutting by nature.

3.5. Summary

Based on the review of the national development and ICT/MGOV strategies, this section has determined how MGOV strategies contribute to development goals. In particular, the section identified the key institutional, economic, environmental and social development goals by selected SIDS, documented relevant ICT/MGOV strategies along the four dimensions of the MGOV framework, and mapped the strategies against the goals.

4.   MGOV4D Strategy Knowledge Base

The aim of this section is to define the strategy knowledge base consisting of those strategies that are of relevance to MGOV in the Commonwealth SIDS. The knowledge base will be populated from the national ICT/MGOV policy documents by India, Mauritius, Micronesia, Singapore and Malta reviewed and analyzed in Section 3. The knowledge base will serve as a pool of potential strategies to select from to match the goals and circumstances of a given country, and to support the development of tailor-made MGOV strategies for such countries. The rest of this section explains the development method of the MGOV4D strategy knowledge base (Section 4.1), outlines the content of the MGOV4D strategy knowledge base obtained by following this method (Section 4.2) and provides some conclusions (Section 4.3).

4.1. Development

The development of the MGOV4D strategy knowledge base was carried out through six steps depicted in Figure 28 and described as follows:

1. The first step was to define the assessment framework to organize the pool of strategies comprising the MGOV4D strategy knowledge base. MGOV framework defined in Section 2.4 and applied in Section 3.3 to organize the set of national ICT/MGOV strategies from India, Mauritius, Micronesia, Singapore and Malta was selected for this role.

2. The second step was to identify the criteria to determine which strategies from the source strategy documents are of relevance to the target countries. To this end, the SIDS development goals introduced in Section 3.2.6 and listed in Table 1 were selected.

3. The third step was to select which strategy documents should serve as sources of individual strategies to populate the MGOV4D strategy knowledge base. The decision was to use all five cases of the national MGOV/ICT strategy documents reviewed in the Section 3.3 of this report: India, Mauritius, Micronesia, Singapore and Malta; all five countries are from the Commonwealth, all but one country are island states, all but one country are from the Asia Pacific region, and the list includes both developing and developed countries.

4. The fourth step was to apply the criteria (2) to the national MGOV/ICT strategy documents (3) to select the strategies for the MGOV4D strategy knowledge base. Where applicable, the wording of individual ICT- or EGOV-related strategies was adapted to the MGOV context. In order to organize the strategy pool, the MGOV framework (1) was applied.

5. The fifth step, because this exercise resulted in a list of largely similar or even identical strategies from various countries, was to remove or consolidate the duplicates to obtain the final set of strategies for the MGOV4D strategy knowledge base.

6. The sixth step was to summarize the resulting strategies.
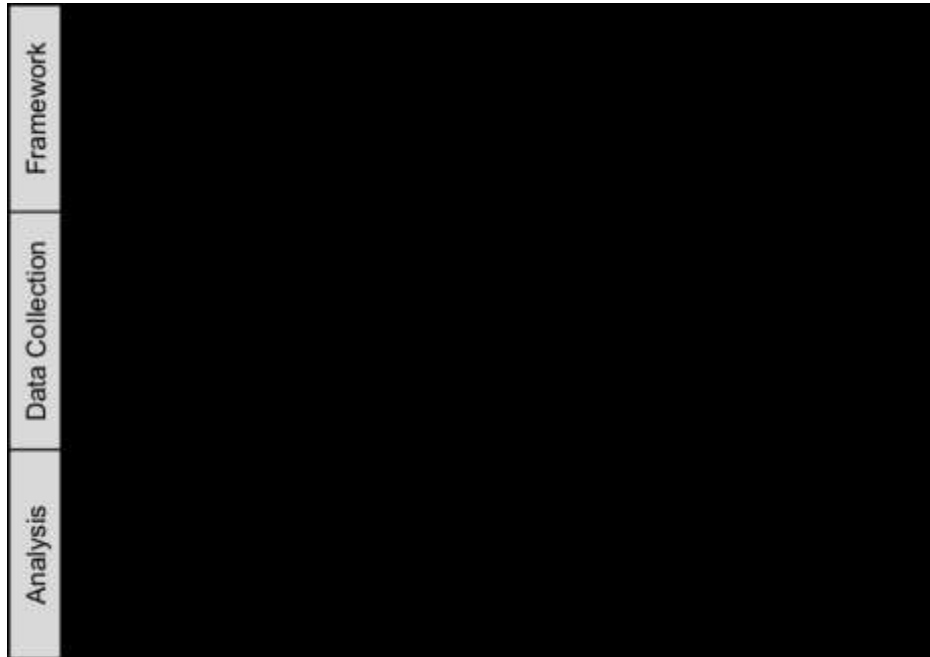
Figure 25: Method for compiling the strategy knowledge base

4.2. Content

This section presents a consolidated pool of MGOV strategies according to the four dimensions of the MGOV framework: Institutions (Section 4.2.1), Innovation System (Section 4.2.2), Infrastructure (Section 4.2.3) and Services and Applications (Section 4.2.4). Each strategy is assigned a unique identifier and a one-sentence description.

4.2.1. Dimension 1 – MGOV Institutions

This section provides the pool of strategies under the first dimension (MGOV Institutions) of the MGOV framework. The strategy pool is organized using the three elements in this dimension: Strategy and Policy Framework (Section 4.2.1.1), Human Capacity (Section 4.2.1.2) and Leadership (Section 4.2.1.3), and individual strategies are identified using the prefixes SP, HC and L respectively.

4.2.1.1. Strategy and Policy Framework (SP)

ID	STRATEGY
SP1	Develop and implement MGOV policy in line with the national ICT policy
SP1.1	Review current legislation and enact MGOV legislation
SP1.2	Mandate MGOV implementation across sectors and provide incentives to public officials to leverage MGOV services
SP1.3	Develop MGOV implementation plan and update it at regular intervals
SP1.4	Conduct a feasibility study and an output proposal on MGOV
SP2	Deploy a financially-driven MGOV program aimed at deriving financial benefits through revenue generation and cost-savings
SP2.1	Develop periodic multi-year MGOV investment plans to gradually replace and/or upgrade the incumbent strategic and legacy systems
SP2.2	Prepare guidelines and standards for the procurement of mobile ICT Systems in government
SP2.3	Develop mechanisms for funding MGOV development
SP2.4	Identify mechanisms to lower costs of mobile ICT
SP2.5	Establish national guidelines and incentives to promote mobile work
SP3	Determine a regulatory framework on the deployment of mobile broadband networks
SP3.1	Enact laws to promote competition in (mobile) telecommunications markets
SP3.2	Create independent regulation of those markets, with powers for the regulator to ensure prompt and fair network interconnection and access to other essential facilities, prevent anticompetitive behavior, and protect the interests of consumers
SP3.3	Include suitable options for reducing the cost of such regulation where that can be done without jeopardizing competitive outcomes
SP3.4	Provide open access to international connectivity on a cost-based and non-discriminatory basis
SP3.5	Supply legislation and industry data required by the ITU and other relevant organizations for regional performance surveys
SP4	Set in place non-discriminatory laws, mandates, policies and practices for equal and equitable access to MGOV infrastructure and services
SP4.1	Enact mobile accessibility legislation and publish national mobile accessibility standards
SP4.2	`Adopt a universal access policy for MGOV access throughout the whole country, to be administered by the regulator by means of mandatory coverage obligations imposed on mobile licensees and targeted subsidies used to support service expansion in the most remote and challenging areas
SP4.3	Develop and adopt laws to waive levies, customs duties and other taxes on mobile ICT equipment for rural, underserved communities and public service sectors such as health, education and emergency management
SP4.4	Mandate the shared use of public service telecommunication services across public

	service sectors
SP5	Formulate and implement an open source software policy
SP6	Develop targeted strategies and action plans for individual key MGOV sectors, e.g. health, education and the environment
SP6.2	Use MGOV as a tool to reduce environmental impacts of government
SP6.2	Develop and implement green MGOV guidelines
SP6.2	Ensure energy-efficient MGOV, conduct an assessment of energy use for MGOV and develop energy reduction plan per sector to encourage the use of technologies that use less power and are more energy efficient
SP6.2c	Use mobile ICT tools to communicate and work together effectively at a distance
SP6.2d	Develop a policy to ensure that all providers and agencies have a process in place for ICT-based waste removal and disposal, and include a front-end recycling fees
SP6.3	Establish policies, regulations, and guiding principles for m-health services
SP6.3a	Provide a framework for information confidentiality related to the use of m-health services
SP7	Develop a policy framework for a national m-commerce supply-chain
SP7.1	Establish fiscal incentives for m-commerce: address regulatory and fiscal issues in parallel to introducing the necessary infrastructure for mobile micro-payments using e-wallets in the private and public sectors
SP7.2	Facilitate mobile payments by addressing regulatory and fiscal issues in parallel to introducing the necessary infrastructure for micro-payments using e-wallets in the private and public sectors
SP7.3	Develop a Digital Assets Marketplace Program where digital content can be traded seamlessly
SP8	Implement a Right to Information Act that incorporates citizens' right to mobile access to information, mandating that public information be available through mobile ICT
SP9	Formulate and implement a social media policy
SP9.1	Showcase and promote MGOV solutions
SP10	Communicate and promote a strategy related to the use of MGOV to respect local culture and standards
SP10.1	Set up a national strategy on cultural heritage preservation through ICT, e.g. utilize UNESCO programs that promote preservation of language and culture
SP11	Enact legislation to facilitate governmental information management and information sharing

Table 7: Possible MGOV strategies – Strategy and Policy Framework

4.2.1.2. Human Capacity (HC)

ID	STRATEGY
HC1	Develop a knowledge portal and a knowledge management framework on MGOV that acts as a platform for awareness generation and dissemination across government
HC2	Provide regular and on-going MGOV policy training for policy makers
HC2.1	Develop a national competency framework, setting out MGOV skill requirements and the corresponding trainings
HC2.2	Coordinate MGOV-related training with local and regional educational institutions and encourage public-private partnership for such trainings
HC2.2a	Develop flagship MGOV courses, e.g. courses offered jointly by the local and top overseas universities
HC2.3	Include e-learning channels and regional online distance learning programs
HC3	Encourage all leaders and policy makers to attend MGOV awareness workshops and trainings
HC4	Develop plans for workforce retention of MGOV-skilled personnel within the government
HC5	Promote trickle-down MGOV knowledge and experience sharing programs in public organizations to share views on how MGOV can be used as a strategic tool
HC6	Support and participate in regional MGOV-related human resource development activities
HC7	Use mobile ICT to support changes in pedagogies in educational institutions
HC7.1	Build capabilities of teachers, school leaders and curriculum planners, e.g. by means of mobile ICT training
HC7.2	Integrate mobile ICT in school curricula
HC7.4	Promote work-study opportunities related to MGOV, e.g. partnerships for sharing of talents between local and overseas institutions

Table 8: Possible MGOV strategies – Human Capacity

4.2.1.3. Leadership (L)

ID	STRATEGY
L1	Assign clear responsibility for the development and monitoring of MGOV policies and setting the overall direction
L1.1	Assign a dedicated body (National MGOV unit) responsible for the overall development and monitoring of MGOV policies, setting the overall direction, leveraging limited government resources and reducing costs, representing the country in regional and international regulatory forums, and overseeing as well as providing support and technical assistance to the range of specialized MGOV bodies

L2	Establish a range of specialized MGOV bodies under the oversight of the national MGOV unit
L2.1	Create a Reforms Steering Council to facilitate approval and funding for MGOV projects
L2.2	Establish a national MGOV contact center
L2.3	Set up a Legal and Regulatory Committee to review existing legal and regulatory frameworks for MGOV
L2.3a	Develop a plan that incorporates the prioritization of radio frequency spectrum for disaster management
L2.4	Develop a sectoral multidisciplinary working group to identify needs and resources for individual m-service sectors, e.g. m-health
L3	Provide the necessary guidance and assistance to government departments and agencies as well as partners from the private sector
L3.1	Provide guidance and assistance to register their services for MGOV
L3.2	Provide the necessary integration support to help government departments adopt MGOV
L3.3	Establish MGOV measurement framework: identify and track MGOV indicators
L3.4	Provide assistance and support to local villages to digitally collect oral records by means of mobile ICT
L3.5	Develop m-commerce advisory framework for SMEs
L3.6	Develop and implement green ICT guidelines for MGOV, covering among others procurement of sustainable MGOV resources
L4	Develop a pool of "MGOV strategists", well-versed in the technical aspects of MGOV as well as in their respective business domains
L5	Conduct an annual review and periodic testing of disaster management communication plans and back-up systems
L6	Ensure sound financial management for MGOV

Table 9: Possible MGOV strategies – Leadership

4.2.2. Dimension 2 – MGOV Innovation System

This section provides the pool of strategies under the second dimension (MGOV Innovation System) of the MGOV framework. The strategies are organized according to the two elements in this dimension: External Stakeholders (Section 4.2.2.1) and Absorptive Capacity and Adoption (Section 4.2.2.2), and individual strategies are identified using the prefixes ES and AC respectively.

4.2.2.1. External Stakeholders (ES)

ID	STRATEGY
ES1	Use the MGOV framework to engage trusted third parties, including local councils, NGOs, professionals, employers, retailers, contractors and public-private partnerships, to deliver agent-driven MGOV.
ES2	Promote private sector integration into MGOV: develop public-private strategies for the use of MGOV to enhance the productivity of local business, the marketability of local goods and services, and the overall efficiency of economic development
ES2.1	Promote collaboration with the mobile ICT industry
ES2.2	Sustain vertical strategic alliances for MGOV education, and technical support to SMEs in MGOV
ES2.3	Work closely with all stakeholders to concertedly drive the deployment of innovative mobile payment solutions
ES2.3a	Encourage the private sector to develop e-money such as mobile money and debit cards to easily make online payments
ES2.3b	Coordinate with banks and lending institutions how to utilize ICT to improve the efficiency and value added services, e.g. loan applications, and connect to MGOV services
ES3	Develop capabilities within the mobile ICT industry to support innovation in the public sector
ES3.1	Support MGOV research and development: create a Mobile Governance Innovation Fund to support the development of suitable applications by government departments and agencies and also by third-party developers
ES3.2	Develop a digital mobile content and media industry
ES3.2a	Attract and nurture a vibrant pool of mobile ICT technopreneurs and start-ups: facilitate and attract mobile ICT specialists from the overseas
ES3.2b	Nurturing mobile ICT entrepreneurial activity: providing fiscal incentives for mobile ICT investment and public procurement as a driver for investment, and for mobile ICT start-up aid programs; create an incubator model for small business development that incorporates MGOV practices and promotes new rural business development, e.g. by bringing together m-businesses with shared interests in a single space; set up a mobile ICT business-to-business (B2B) institute aimed at bringing together all key B2B players, promoting self-regulation and drawing up a code of ethics, best practice, charters and guidelines; set up thematic mobile market places
ES3.3	Develop an MGOV workforce preparation program
ES3.3a	Monitor the supply and demand of MGOV skills
ES3.3b	Design educational programs and use innovative marketing to attract students to mobile ICT, and carry out awareness campaigns about MGOV careers particularly among women
ES3.3c	Develop a mobile ICT training industry including public-private partnerships in developing certified mobile ICT/MGOV specialists, provide investment aid for private

	training providers, attract ICT educators from the overseas, standardize mobile ICT certification
ES3.3d	Develop incubator educational institutions that will generate innovation in the use of mobile ICT to support engaged learning
ES3.3e	Develop a research and development agenda on mobile ICT and models for harnessing mobile ICT in education and learning
ES4	Engage international stakeholders
ES4.1	Develop partnerships with international (mobile) ICT chambers and clusters
ES4.2	Target the Commonwealth for growth and export of m-services, e.g. through international marketing campaign of domestic m-services
ES4.3	Facilitate and attract mobile ICT specialists from the overseas

Table 10: Possible MGOV strategies – External Stakeholders

4.2.2.2. Absorptive Capacity and Adoption (AC)

ID	STRATEGY
AC1	Develop marketing and awareness strategies for MGOV services, especially for people in the underserved areas
AC1.1	Conduct intensive continuous marketing campaign to promote MGOV usage and take-up: develop marketing and awareness strategies for m-services targeting businesses, support widespread m-banking take-up by linking m-banking services with MGOV
AC1.2	Develop and broadcast MGOV-awareness programs, establish the 'first steps' MGOV call center
AC1.3	Work in collaboration with existing community groups such as churches, women groups, seniors, schools and libraries to provide outreach to their constituents in raising the awareness of the benefits of MGOV
AC2	Extend the reach of MGOV services
AC2.1	Implement end-to-end m-services
AC3	Develop affordable mobile ICT and public m-services for connecting rural and underserved communities
AC3.1	Provide fiscal measures to help buy mobile ICT
AC3.1a	Establish special mobile ICT tariffs for rural communities and targeted communities of users
AC3.1b	Subsidize mobile ICT for students
AC3.2	Make the cost of m-services affordable, e.g. by using open standards and open source software to the extent possible to ensure affordability of the content and applications
AC4	Improve accessibility in MGOV operations: Access for All Program
AC4.1	Enact mobile accessibility legislation and publish national mobile accessibility standards

AC4.2	Empower people with disabilities by means of using MGOV to increase accessibility
AC4.3	Establish a digital divide response team covering mobile accessibility
AC5	Provide MGOV training and support
AC5.1	Provide MGOV starter-training for all who need it, particularly among women, teachers, youth, farmers, chiefs, the disabled, the elderly, etc. for example by means of specialized equalizer programs; promote the use of MGOV as assistive technology
AC5.2	Work in collaboration with existing community groups such as churches, women groups, seniors, schools and libraries to provide opportunities for hands-on training
AC5.3	Set up a help desk to help citizens facing problems in the use of MGOV; provide on-site support for all at community centers

Table 11: Possible MGOV strategies – Absorptive Capacity and Adoption

4.2.3. Dimension 3 – MGOV Infrastructure

This section provides the pool of strategies under the third dimension (MGOV Infrastructure) of the MGOV framework. The strategies are organized by three elements in this dimension: ICT Infrastructure (Section 4.2.3.1), Interoperability (Section 4.2.2.2) and Security Safeguards (Section 4.2.2.3), and individual strategies are identified using the prefixes INF, IOP and SS respectively.

4.2.3.1. ICT Infrastructure (INF)

ID	STRATEGY
INF1	Identify appropriate technical solutions and prioritize funding opportunities to support the implementation, operation and maintenance of the general ICT networks, equipment and services
INF1.1	Secure wide and reliable mobile network coverage and bandwidth
INF1.1a	Establish a wireless broadband network that supports new mobile and location-aware services
INF1.2	Provide e-services with e-payment and m-payment facilities, and integrate m-payment facilities in the existing MGOV applications to enable m-commerce
INF1.2a	Establish projects to exploit broadband for m-business and m-commerce
INF1.2b	Introduce the necessary infrastructure for mobile micro-payments using e-wallets in the private and public sectors; encourage the private sector to develop e-money such as mobile money and debit cards to easily make online payments
INF1.2c	Incorporate an integrated mobile payment gateway to enable users to pay for public services electronically
INF1.2d	Provide metered access so that various agencies and partners can account for fee-based services based upon their actual delivery
INF1.3	Create a mobile services delivery gateway to put in place government-wide shared infrastructure and services to enable rapid development, mainstreaming and

	deployment of MGOV
INF1.3a	Create a mobile applications (m-apps) store to facilitate the process of developing and deploying suitable applications
INF1.4	Offer shared tools like data collection, helpdesk services, APIs, SDKs to the agencies that wish to deploy mobile applications
INF2	Ensure accessibility of infrastructure
INF2.1	Provide refurbished equipment for disadvantaged groups
INF2.2	Offer connectivity options for citizens to apply for and receive public services through the mobile devices irrespective of the network operators
INF2.3	Make mobile broadband infrastructure affordable and accessible to educational institutions
INF2.4	Support proliferation of free WIFI
INF3	Develop an MGOV contingency plan that includes a secure data center and disaster recovery capabilities

Table 12: Possible MGOV strategies – ICT Infrastructure

4.2.3.2. Interoperability (IOP)

ID	STRATEGY
IOP1	Develop standardization of mobile ICT hardware to be used in all government sectors
IOP1.1	Develop a first-class interoperability framework to enhance interoperability and information sharing across public services
IOP1.2	Support the creation of new marketplaces for mobile financial products by promoting harmonization of technology standards and adoption of open standards to extend the potential for export/growth of mobile cross-border transactions
IOP1.3	Develop standards and enable interoperability to enable integrated healthcare services
IOP1.4	Create an appropriate facilitating mechanism to ensure compliance with the standards for mobile applications and ensure seamless interoperability of services

Table 13: Possible MGOV strategies – Interoperability

5.2.3.3. Security Safeguards (SS)

ID	STRATEGY
SS1	Establish legislation to address cyber-crime threats to MGOV
SS1.1	Establish a national framework to protect identity, security and privacy that covers MGOV
SS1.2	Promote use of mobile transactions using digital signatures

SS2	Set up an information security strategy agency
SS3	Establish a national mobile information security framework
SS3.1	Establish legislation to address cyber-crime threats to MGOV

Table 14: Possible MGOV strategies – Security Safeguards

4.2.4. Dimension 4 – MGOV Services and Applications

This section provides the pool of strategies under the fourth dimension (MGOV Services and Applications) of the MGOV framework. The strategies are organized according to the two elements in this dimension: Design and Development (Section 4.2.4.1) and Delivery Mechanisms (Section 4.2.4.2), and individual strategies are identified using the prefixes DD and DM respectively.

4.2.4.1. Design and Development (DD)

ID	STRATEGY
DD1	Ensure suitable service and application design strategies
DD1.1	Develop and deploy mobile applications to provide access to public services through mobile devices
DD1.2	Design new MGOV services according to the needs and lifestyles of stakeholders, e.g. citizens, businesses, agencies; establish a "Know Our Customer Better" Program for citizen-centric m-service design, and mobilize local government officials to partner with their communities for design and implementation of content
DD1.3	Develop applications in local languages for various delivery channels
DD1.4	Develop MGOV for people with special needs
DD1.5	Design services that are usable on mobile devices as well as desktop and laptop computers, taking into consideration appropriate end-user interface and wireless device interface issues such as bandwidth limitations, micro-browser and micro-screen restrictions, memory and storage capacities, etc.
DD1.6	Create value-added, proactive, responsive, user-friendly and integrated MGOV services to spur online transactions and bring greater convenience to end-users, bring m-services to a highly transactional mode
DD2	Develop specific MGOV services in education, health, public safety, environment and other sectors and lessen the cost of providing such services to remote and rural communities
DD2.1	Develop MGOV services for institutional development: utilize mobile ICT to provide public access to government information to promote transparency, accountability, participation and the rule of law
DD2.1a	Develop mobile applications to access public digital libraries and archives
DD2.1b	Develop a mobile government information portal and mobile public service

	applications portal
DD2.1c	Utilize mobile ICT for reporting of corruption and official abuses
DD2.1d	Utilize mobile ICT to improve grassroots- and community-based decision-making: promote mobile e-participation initiatives such as online consultation and crowdsourcing on policy drafts and implement feedback through interactive MGOV communication channels
DD2.2	Develop MGOV applications in the educational sector
DD2.2a	Increase student opportunities for mobile learning
DD2.2b	Utilize mobile ICT as a tool to address shortages of qualified teachers
DD2.2c	Strengthen administrative functions of the educational system through use of mobile ICT, e.g. by using mobile ICT as a tool to measure the performance of teachers and students
DD2.2d	Develop mobile learning resources and assessment modes for education
DD2.3	Develop MGOV applications in the health sector
DD2.3a	Develop a portable clinic record
DD2.4	Develop MGOV applications for environmental sustainability
DD2.4a	Integrate mobile ICT into environmental assessments to improve data collection, storage, analysis and management and to ensure faster provision of environmental impact assessments and related decisions
DD2.4b	Support the implementation of mobile ICT systems for improved fishery management for sustainability and food security, as well as monitor and regulate fisheries to avoid over-fishing
DD2.4c	Utilize mobile ICT to educate and raise awareness on the climate change issues and impacts, and improve the programs for mitigation of and adaptation to the climate change impact
DD2.4d	Use mobile ICT to monitor, account and reimburse the recycling of ICT goods
DD2.5	Develop MGOV services for public safety
DD2.6	Encourage the use of mobile ICT as a tool to create more jobs and sustain workforce development
DD2.6a	Promote the use of mobile ICT for teleconferencing as a tool to decrease travel costs and expand participation in meetings, workshops and other opportunities
DD2.7	Develop MGOV applications for businesses and consumers
DD2.7a	Utilize MGOV for consumer protection and advocacy complaints
DD2.7b	Create a mobile B2B platform consisting of common technology protocols, interoperability frameworks, national e-invoicing platform and related electronic clearing houses with the aim to simplify and make cost-effective activities between mobile businesses such as mobile e-tailing based on the export of goods and services
DD2.7c	Develop a G2B online virtual center to promote and facilitate the application of mobile ICT for simpler and smoother interaction between government and businesses
DD2.8	Promote the use of ICT to improve the collection and distribution of information for agricultural support such as weather monitoring, use mobile ICT to obtain

	information on better seed crops and better breeding, inform farmers about prices of products and relative supply and demand
DD2.8a	Develop and support mobile text messaging and other ICT services to enable farmers to share information on agricultural issues such as pest control and to develop a collective marketing approach
DD2.8b	Use mobile ICT to improve the marketing of agricultural goods, e.g. a mobile application to inform about the arrival of passenger and merchant ships for producers to bring products to markets
DD2.9	Develop MGOV services for community development
DD2.9a	Promote on-line communities based on mobile technologies for social networking
DD2.10	Develop MGOV applications in the culture sector
DD2.10a	Develop mobile applications to populate cultural and heritage databases with local stories, songs, crafts, etc. to ensure language and culture perpetuation, e.g. using mobile ICT to record and maintain oral cultural heritage including music and others including music, language, ceremonies, recipes, legends, genealogy, land traditions, stories, etc.
DD2.11	Develop mobile transport and travel portals
DD2.11a	Improve mobile ICT-based monitoring and information systems to provide weather reports for ground, maritime and air transportation
DD2.11b	Develop mobile ICT applications for improving road safety, security and to ease traffic congestion
DD2.11c	Develop mobile applications for tourist services, utilize mobile ICT to market the country as a tourist destination
DD2.12	Utilize mobile ICT to assist in border control, immigration and customs
DD2.13	Build a unified collaborative and messaging system that extends to MGOV services
DD2.14	Develop applications for mobile work in the public service

Table 15: Possible MGOV strategies – Design and Development

4.2.4.2. Delivery Mechanisms (DM)

ID	STRATEGY
DM1	Specify service levels for mobile services
DM2	Ensure that all users are able to access and use mobile-based services, support various delivery channels for development and deployment of mobile-based services
DM2.1	Ensure that service delivery channels include voice, text (e-mail and SMS), IVR (Interactive Voice Response), WAP (Wireless Application Protocol), GPRS, USSD (Unstructured Supplementary Service Data), SIM Toolkit (STK), Cell Broadcast (CBC), multimedia (MMS), SIM Toolkit (STK)/Dynamic STK and 3G-Video and digital television
DM3	Set up a government call center to provide information on MGOV services
DM4	Establish multipurpose communication tele-centers with the use of affordable

	mobile technologies and public m-services for connecting rural and underserved communities

Table 16: Possible MGOV strategies – Delivery Mechanisms

4.3. Summary and Conclusions

This section has compiled a MGOV4D strategy knowledge base, paying particular attention on the needs of the Commonwealth SIDS. The strategies are listed along the four dimensions of the MGOV framework used throughout this report. The knowledge base is meant as the foundation for developing country-specific MGOV strategies. By providing a pool of potentially relevant MGOV strategies that the country can select from according to its goals and conditions, it enables the development of tailor-made national MGOV strategies.

5. Conclusions

This report presented the findings of a literature review regarding the development, adoption and use of mobile technology in public administration and governance – Mobile Governance, and the findings of a policy review concerning how Mobile Governance is and can be used to support national development and public policy goals particularly by four selected small island states – Mauritius, Micronesia, Singapore and Malta – and by India which is currently the only country with clearly elaborated national MGOV strategy. The main outcome of this report is the MGOV/ICT strategy knowledge base that could be used to support the development of tailor-made national MGOV strategy and policy instruments particularly by Small Island Developing State (SIDS). The targeting of SIDs is primarily due to the selection of countries in order to use of their MGOV/ICT policy instruments to populate the knowledge base. However, due to the systematic nature of the knowledge base development process, the same exercise could be repeated for other country groups. In the accompanying two reports produced by this projects, the knowledge base will be used to develop the national MGOV strategy for the Republic of Vanuatu (Henning, Janowski and Zoughbi, 2014) and to underpin the MGOV toolkit to guide SIDS in their efforts to develop national MGOV policy instruments (Estevez and Janowski, 2014).

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