

INNOVATION

BRIDGING THE DIGITAL INNOVATION DIVIDE: A toolkit for strengthening ICT centric ecosystems



Telecommunication Development Sector



Bridging the digital innovation
divide: A toolkit for strengthening
ICT centric ecosystems

This innovation policy toolkit was prepared by the International Telecommunication Union (ITU) Telecommunication Development Bureau (BDT) Innovation Service of the Innovation and Partnership Department.

The development of the toolkit was possible with a project funding from the Ministry of Science, ICT and Future Planning (MSIP), of the Republic of Korea.

ITU would like to also acknowledge the contribution received from the ICT ecosystem stakeholders in several countries who helped build the knowledge database for this report: Albania, Argentina, Kenya, Moldova, Rwanda, and Thailand. These insights were received by conducting more than 14 national workshops, interviewing more than 300 stakeholders, in over 100 entities/institutions/organizations relevant in the ICT innovation ecosystem. ITU would also like to acknowledge the contributions of the UNIDO and UNCTAD staff to the development of the theoretical framework, and extend special thanks to UNIDO for assistance in performing early country reviews.

ISBN:

978-92-61-24831-4 (paper version)

978-92-61-24841-3 (electronic version)

978-92-61-24851-2 (epub)

978-92-61-24861-1 (mobi)



Please consider the environment before printing this report.

© ITU 2017

All rights reserved. No part of this publication may be reproduced, by any means whatsoever, without the prior written permission of ITU.

The International Telecommunication Union (ITU) recognized innovation as one of the main goals at the World Telecommunication Development Conference and the Plenipotentiary Conference held in 2014. Innovation is also highlighted in Goal 9 of the Sustainable Development Goals: *Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation*.



Innovation has three key roles to play for ITU Member States. It allows states to improve public services through innovative ICT solutions and transform their public sectors. It also allows governments, civil society, and the private sector to work together, develop ICT solutions and share them to foster knowledge-sharing and collaboration on social innovation. Finally, innovation is an essential part of a thriving ICT sector, and more broadly a thriving economy, enabling businesses to develop ICT solutions and compete on a global scale by creating jobs, wealth, and economic growth. This can help to bridge the digital and innovation divides, creating a more equal world where more and more people can enjoy the benefits of ICTs.

ITU helps Member States to promote innovation in their own ecosystems. Sustainable, durable innovation comes about when governments not only create an enabling environment for innovation to take place, but also take an active role in catalysing partnerships with innovation stakeholders. To enhance national innovation ecosystems, ITU has undertaken a series of country reviews of ICT-centric innovation ecosystems and made recommendations on how to strengthen them.

This first toolkit for strengthening ICT centric ecosystems shares the knowledge gained and methods used in the country review process, and is meant to help Member States to directly undertake the review process, exploring the needs of key innovation stakeholders and working with them to develop policies, projects and other actions to foster innovation.

Together with the country reviews and other activities, this toolkit will help Member States to strengthen their innovation ecosystems. I look forward to working with our Members to explore and use these tools to their fullest potential.

Brahima Sanou
Director, ITU Telecommunication Development Bureau

Table of Contents

Foreword	iii
Executive Summary	ix
Section 1: Understanding the digital innovation divide	1
1 Introduction	1
1.1 Overview of innovation ecosystems	1
1.1.1 Systems of innovation	2
1.1.2 Building innovation policy	2
1.1.3 Diagnosing the digital innovation divide	2
1.2 Challenges in building ICT-centric innovation ecosystems	6
1.2.1 Innovation inefficiencies	6
1.2.2 Lack of nurturing environment	8
1.2.3 Insufficient collaboration	9
1.3 Building blocks of ICT-centric innovation policy	10
1.3.1 Guiding principles	10
1.3.2 Avoiding bad practice	12
1.3.3 Analytical framework	13
Section 2: Diagnosing the digital innovation divide	15
2 Introduction to conducting a country Review	15
2.1 Toolbox overview	15
2.1.1 Stakeholder mapping tool	15
2.1.2 Ecosystem canvas tool	17
2.1.3 Stakeholder interface canvas tool	21
2.1.4 Qualitative interviewing tool	23
2.1.5 Quantitative interviewing tool	24
2.1.6 Interview validation tool	26
2.1.7 Recommendation and programme design tool	26
2.2 Country review methodology	28
2.2.1 How to conduct a country review	30
2.2.2 Monitoring and evaluation	37
Section 3: Bridging the digital innovation divide	41
3 Case studies, monitoring, and evaluation	41
3.1 Case 1: Exploring the ICT innovation system of country A, a low income, factor driven economy	41
3.1.1 Background	41
3.1.2 State of ICT innovation ecosystem	42
3.1.3 Implications for ecosystem insights	43
3.1.4 Stakeholder interface canvas	44
3.1.5 Priority objectives	45
3.1.6 Recommendations	46
3.2 Case 2: Exploring the ICT innovation system of country B, a middle income, factor-driven economy	47
3.2.1 Background	47

3.3.2 State of ICT innovation ecosystem	48
3.2.3 Implications for ecosystem insights	49
3.2.4 Stakeholder interface canvas	50
3.2.5 Priority policy objectives	51
3.2.6 Recommendations	52
3.3 Common needs and good practice	53
3.3.1 Leadership	53
3.3.2 Resources	54
3.3.3 Talents	55
3.3.4 Nurturing environment	55
3.3.5 Markets	55
4 Closing	56
Key terms and concepts	57
Annex B: Reading List / Bibliography, Theory and Background	60
Annex C: Reading List / Bibliography, Indexes and Data	61

List of tables, figures and boxes

Tables

Table 1: Information input examples for each pillar	19
Table 2: Recommended representatives for stakeholder groups	31
Table 3: International data sources for the pillars of the ecosystem canvas	31

Figures

Figure 1: Technology advancement vs. population reached: a tale of innovation in developed vs. developing countries	3
Figure 2: Stages of development in economies	4
Figure 3: Levels of digitization of different sectors	5
Figure 4: Individuals using the Internet per 100 inhabitants, 2001-2015	6
Figure 5: Innovation efficiency ratios	7
Figure 6: Global Startup Ecosystem Rankings	9
Figure 7: Insights from ecosystem stakeholder groups	10
Figure 8: Policy enabling innovation ecosystems	12
Figure 9: Elements to fostering innovation	12
Figure 10: Overall analysis framework	14
Figure 11: Ecosystem stakeholder groups	16
Figure 12: Stakeholder mapping canvas	16
Figure 13: Ecosystem canvas	18
Figure 14: Colour coded ecosystem canvas	20
Figure 15: Stakeholder interface canvas	22
Figure 16: Colour coded stakeholder interface canvas	23
Figure 17: Blank stakeholder interface canvas	23
Figure 18: Section of the qualitative interviewing tool	24
Figure 19: Beginning of quantitative survey for ecosystem canvas	25
Figure 20: Beginning of quantitative survey for stakeholder interface canvas	25
Figure 21: Highlighting weaknesses on the stakeholder interface canvas	26
Figure 22: Iceberg chart of political objectives	27
Figure 23: Project canvas	27
Figure 24: Country review workflow	29
Figure 25: Country review process	30
Figure 26: Information flow for country reviews	36
Figure 27: Country review process framework	38
Figure 28: Building bridges in innovation ecosystems	39
Figure 29: Colour coded stakeholder interface canvas for country A	44
Figure 30: Colour coded stakeholder interface canvas for country B	50

Boxes

Box 1: ICT-centric innovation	1
Box 2: Innovation efficiencies- A tale from the innovation divide and broken R&D links	7
Box 3: Fostering a nurturing environment- A tale from the innovation divide and two cities	9
Box 4: Synergies and collaboration- A tale from the innovation divide and the stakeholders' journey to build great companies and transform their economy	10
Box 5: Evaluating an entrepreneur's success rate in an ecosystem- can it measure the vibrancy of an ecosystem?	20
Box 6: Changing behaviours of stakeholders – process framework	38
Box 7: Building the right bridge	39
Box 8: Background research – Country A	42
Box 9: Current state – Country A	43

Box 10: Ecosystem insights – Country A	44
Box 11: The stakeholder interface canvas- country A	45
Box 12: Priority objectives- country A	46
Box 13: Recommendations – country A	47
Box 14: Background research – country B	48
Box 15: Current state- country B	49
Box 16: Ecosystem insights – country B	50
Box 17: The Stakeholder interface canvas – country B	51
Box 18: Priority objectives – country B	52
Box 19: Recommendations – country B	53
Box 20: Good practice – innovation agencies	54
Box 21: Good practice – Securities and Exchange Commission, Thailand	54
Box 22: Good practice – start-up Chile	55
Box 23: Good practice – Gearbox/Fab lab, Kenya	55
Box 24: Good practice – Hungary INPUT programme	56

Executive Summary

Purpose and mandate

This toolkit reflects the framework, tools and methodology ITU has developed to analyse information and communications technology (ICT)-centric innovation ecosystems. This information is being shared in order to enable ecosystem stakeholders to analyse their ecosystems, including mapping the stakeholders, reviewing their needs, setting agendas, and developing policy and project recommendations. These processes are provided both as individual tools to allow for single steps to be undertaken, and in the context of a full country review, to allow for a more comprehensive analysis.

The International Telecommunication Union (ITU), especially the Telecommunication Development Bureau (BDT), has been actively fostering ICT led development. In 2014, at the ITU World Telecommunication Development Conference (WTDC) in Dubai, United Arab Emirates, the ITU membership approved a strategic and operational plan for the BDT that includes output 2.3 calling for the strengthening of ITU Member State capacity to integrate ICT innovation in national development agenda. This priority can also be found in Goal 9 of the UN Sustainable Development Goals¹: Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation.

In this context ITU has worked together with other international organizations, global experts, and key stakeholders to develop this toolkit. It stands as one of a series of reports and activities undertaken by ITU, including country reviews conducted by ITU staff, analysing national ICT-centric innovation ecosystems; regional and global events to connect and share knowledge and experience between stakeholders from different ecosystems; and programmes and events to directly foster ecosystems and innovators. The goal of this toolkit is to scale those efforts, taking the work currently being done directly by ITU and allowing our membership and other ecosystem stakeholders to undertake these processes on their own, while staying connected with the global network being developed through ITU work in this field.

Ultimately, the objective of this is to help identify and close the innovation divide that separates those developing and using emerging technology from those who, at best, are reliant on others to develop solutions, and at worst, do not benefit from access to innovation in ICTs. To do so will require the effort and collaboration of the innovation stakeholders to analyse the ecosystem, identify needs, and develop actions. This toolkit provides the framework, tools and methodologies to enable stakeholders to engage in this process.

The digital innovation divide

The framework, tools, and methodology described in this toolkit build on the systems of an innovation model. This model reflects innovation as a complex process, involving a number of actors and the interactions between them. The process of innovation in this model is not linear, but instead like a large number of complex relationships and interactions resembling a natural ecosystem, where stakeholders support one another's progress and development. These ecosystems can be fostered by innovation policy that creates an enabling environment for stakeholders and supports their work.

The concept of the digital innovation divide entails that not all ecosystems are equal, either in terms of the inputs of talent (intellectual and creative), investment, and resources or in terms of their output, whether technological, social, or financial. This means that some communities and ecosystems are developing and benefitting from emerging technology and ICT-centric innovation, while others are reliant on older technologies or see little access to ICTs at all. These can be seen as the continuum of economies as described by Michael Porter, moving from extractive, factor driven economies;

¹ www.un.org/sustainabledevelopment/development-agenda/

through efficiency driven economies, which adopt technologies from other areas; to innovation driven economies. In many cases, different communities or sectors within an economy will exist at different points in this continuum, widening the innovation divide.

The innovation divide stems in part from inefficiencies in the use or allocation of resources in the innovation ecosystem, from a lack of key supports, policies, and other elements of a nurturing environment, as well as a need for further collaboration between stakeholders in order to develop a complete ecosystem through coordinated support activities.

To develop policies to strengthen these areas, a set of guidelines are provided in this report, which suggests that policy experimentation should be used to develop policies, focus should be on creating user centred activities, stakeholders need to have a shared understanding and language, the private sector, and in particular entrepreneurs, need to be seen as the centre of innovation, resources need to be used efficiently, stakeholders need to be brought in as partners with a vested interest in success, and activities should be based on good practices and focused on being replicable, scaleable and sustainable.

Bad practices to be avoided are noted as well. These includes the need to focus on the whole system, rather than simply investing in inputs, and the need to neither under nor over utilize government intervention and ensure a cohesive, integrated regime of policies related to the ecosystem.

Finally, an overview of the methodology is laid out, consisting of key steps to be undertaken:

- 1) Agree upon a desired future.
- 2) Understand the current state.
- 3) Analyse gaps.
- 4) Identify good practices.
- 5) Identify challenges.
- 6) Develop guidelines and recommendations.
- 7) Build programmes.

These steps describe how the process of a country review should flow, and outline how to develop the kinds of policies and projects described.

Conducting a country review

Each component of the country review toolkit is laid out in turn in this section.

The stakeholder mapping tool explains the role of each of the ecosystem stakeholder groups: public sector, private sector, entrepreneurs, entrepreneurial support networks, academia and finance. The roles and interests of the groups are discussed in order to aid in their identification as part of the country review process.

The ecosystem canvas provides an overview of the status of an ecosystem by looking at seven pillars: vision and strategy, policy and regulation, capital and resources, talent and champions, infrastructure and programmes, networks and markets, and culture and community. The health of these pillars will provide an overview of the situation. Along with these, there is the central pillar, identifying the work done specifically to support the ecosystem, rather than the economy more broadly.

The stakeholder interface canvas breaks down the lifecycle of an innovation or business through pre-ideation, ideation, start-up, the valley of death (the high risk period between the launch of a company and when it becomes financially sustainable), and out to become an SME, and finally, scaling and exiting. At each stage, it checks on what each stakeholder group should be or is doing to support

innovators, and how successfully this is being done. This becomes a key tool in identifying gaps in the support of an ecosystem for innovation.

Various tools are presented as ways of gathering data to fill in these canvasses. This can be done through qualitative interviewing, quantitative surveys, or workshops. The data can be aggregated through online forms in order to provide overarching themes and needs that can be acted on.

The recommendation and programme design tools walk the user through the process of using the needs analysis above, good practices, political priorities and outside data to develop programme and policy recommendations to strengthen the ecosystem.

After presenting each piece independently, the country review process is discussed in depth, including step-by-step discussions of workshops and data sources to be considered.

Case studies

After describing the process of the country review, two case studies are presented. They are anonymized as country A and country B for the purposes of the report.

Country A is a low income, factor driven economy. It has a strong strategy and has made significant improvements in terms of infrastructure, international market access and entrepreneurial culture. It still has major gaps. Academia in country A are neither engaged in substantial applied research, nor creating human capital with enough skills or experience to meet the needs of the ecosystem. As in many ecosystems, there is far too little investment at various phases of the innovation lifecycle. The private sector is not doing enough, overall, to support innovation, either. There were other weaknesses, for example entrepreneurial support does not provide a comprehensive enough set of services, and some policy gaps. The report recommended strengthening human capital development, refocusing innovation on domestic issues, development of last mile infrastructure, strengthening support networks for entrepreneurs, improved incorporation of regional markets, revised legal frameworks and the development of an innovation agency or working group on innovation.

Country B is a middle income, factor driven economy. There are efforts at developing a national ecosystem strategy, but it articulates few specific roles for many of the stakeholders in the ecosystem. Entrepreneurial culture, in particular entrepreneurial interest, and support from academia are also lacking to a large degree. The ecosystem as under coordinated, leading to gaps and weaknesses, especially coupled with a lack of trust on the part of many actors. Finally, the domestic market is small, and although regional expansion was seen as a good practice, it wasn't facilitated successfully. The report recommended designation of ICT as a strategic sector; mapping of the ecosystem; strengthening the talent pool; boosting both support networks and entrepreneurial culture to improve investment deal flow; cultivating connections to international markets, investment and support networks; fostering collaboration in the ecosystem; and empowering an institution to create those collaborations.

Conclusion

ITU has received a specific mandate at WTDC-14 to help countries strengthen their capabilities to integrate ICT innovation into national development agendas. The aim of this is to foster ICT entrepreneurship, strengthen ICT firms and their expansion in the converging digital ecosystem, and to help with public sector transformation.

The toolkit is intended to help ITU membership to analyse and develop innovation ecosystems. To facilitate the emergence of dynamic ecosystems, the governments must work closely with six key stakeholders groups, academia, finance, public sector, private sector, entrepreneurs, and support. ITU country reviews provide a digital innovation framework, where they can understand their challenges, opportunities in creating ICT start-ups, in nurturing talent, working hand-in-hand to develop specific guidelines and recommendations, as well as initiatives, programmes, and projects to help create new jobs, and new growth based on the best practices worldwide.

This toolkit is designed to help scale these initiatives and activities. The toolkit, the national workshops, the regional innovation forums, the global innovation track at WSIS, and various global dialogues, offer our membership a global innovation platform, where stakeholders can share, network, be empowered, and take action.

Section 1: Understanding the digital innovation divide

1 Introduction

This publication is designed to give innovation stakeholders working in information and communications technology (ICT) centric innovation ecosystems—those in the public and private sectors, academia, entrepreneurs and the programmes designed to support them, and finance—the knowledge and tools they need to map, analyse, and fill gaps in their ecosystems. Although it has been acknowledged that innovation has the potential to contribute to inclusive growth, this is not always the case. An *innovation divide* separates those developing and using emerging technology from those who, at best, are reliant on others to develop solutions, and at worst, do not benefit from access to innovation in ICTs. Bridging this gap requires key actors to identify areas of opportunity to collaborate, and to work together to develop the right policy interventions and projects for their ecosystems.

To support this critical work, ITU is sharing its knowledge of ICT-centric innovation ecosystems and open-sourcing its process for understanding them. With this information, it hopes to equip communities of innovation enablers to create environments that empower entrepreneurs and innovators to thrive and fuel the engines of inclusive growth.

Box 1: ICT-centric innovation

This toolkit, and the majority of the ITU Development Sector work on innovation, focuses specifically on innovation in ICTs and the role of ICTs in innovation. This is framed as *ICT-centric innovation*. ICT-centric innovation has two main characteristics. First, it focuses on innovation and the development of the ICT sector itself. Secondly, it emphasizes the cross cutting role of ICT innovation in society.

The creation of a dynamic ICT sector is a key component of international leadership in the global knowledge economy and the advancement of new technologies. A strong ICT sector is also critical to boosting the presence of foreign direct investment (FDI) and multinational corporations (MNCs) and outsourcing in a national economy, which are commonly identified as drivers of economic development.

The term *ICT-centric* encompasses the ICT sector, the cross-cutting role of ICT innovation, and the way in which innovation fosters the evolution of other sectors in the economy. For example, there are many mobile phone solutions that help farmers to check market prices and access the best local knowledge for raising crops, as well as access insurance and critical inputs. These ICT solutions in the agriculture sector make it easier for farmers to find the information they need, more efficiently and at scale. For policy-makers and other enablers who have limited resources to enact widespread systemic change, this multiplier effect is critical.

By examining the ICT sector and its impact on other sectors in the economy, ICT-centric innovation enables a more complete discussion of the role of ICT in the socioeconomic development of society.

1.1 Overview of innovation ecosystems

Before embarking on an analysis of innovation ecosystems, we will build a basic understanding of what innovation is and how it is produced. Subsequently, we will explore how ICT and policy formulation influence innovation, as well as why a digital divide exists between developed and developing countries. Finally, we will examine the challenges that hamper the development of ICT innovation ecosystems.

1.1.1 Systems of innovation

Innovation is a complex, often used (and misused) concept. For the purposes of this discussion, we will refer to the OECD definition of innovation:

“The implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organizational method in business practices, workplace organization or external relations”.

In the early days of academic research on innovation, stimulating innovation was thought to be a linear process. In this model, science produces technology and technology delivers products and services in response to market need. This led to the idea that increased investment in innovation inputs such as research and development (R&D) yields more innovation. Unfortunately, this perspective does not reflect the dynamism of the innovation process, which includes a variety of factors interacting together such as R&D investment, but also talent pools, culture, economic conditions, markets, and investment, among many others.

As a result, a new school of thought emerged that considers innovation production from a systems perspective. In this model, innovation does not have a singular direction nor is fostering it simply a matter of increasing investment in research. It is a complex process incorporating investment, education, networking, community building, cultural change, economic factors and serendipity. Perhaps most importantly, it illustrates how actors who stimulate interactions between science, technology, institutions, learning, and public policy generate knowledge¹. In other words, the systems approach shows how innovation is driven by stakeholders who know the overall process, their roles, and how those roles relate to those of other stakeholders.

1.1.2 Building innovation policy

Policy is essential to enabling innovation ecosystems. As with traditional industrial policy, the work of the government is needed to support innovation. Although government does not generally create marketable innovation directly, it plays a critical role in creating an environment that fosters the work of other stakeholders. As a result, innovation policy should focus on ensuring that the ecosystem stimulates innovation and uses it to create value. Good policy should also support a country’s transformation to an innovation driven economy that creates jobs, provides export opportunities, and stimulates cross-cutting sectoral growth driven by ICT innovation.

1.1.3 Diagnosing the digital innovation divide

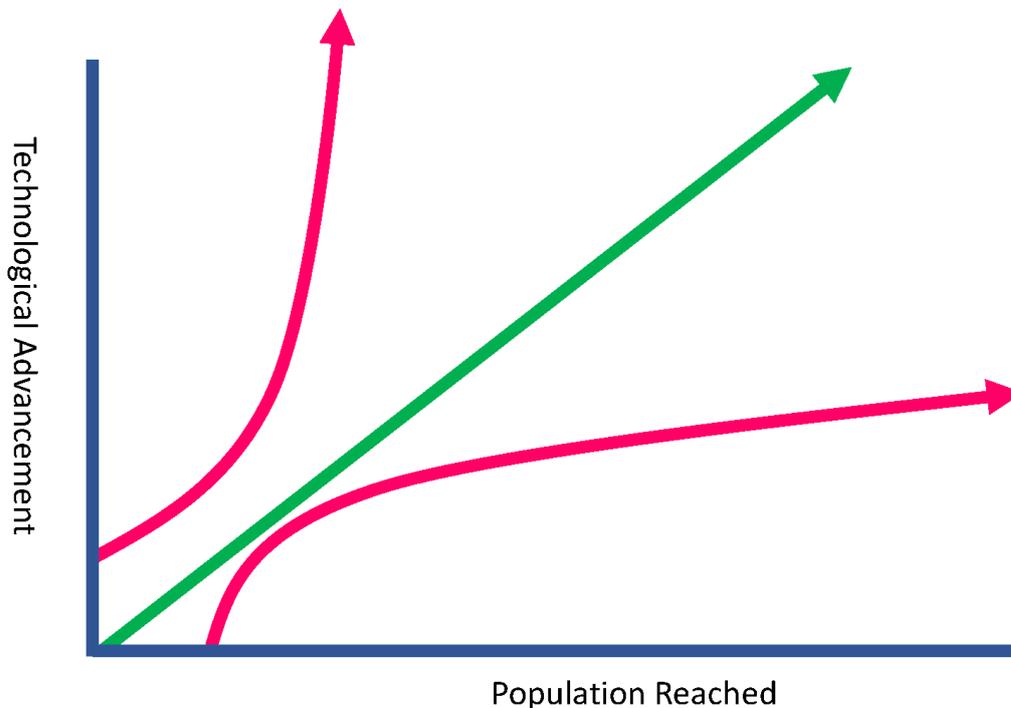
Is innovation capacity created equal?

Expanding on the basic understanding of innovation systems and ICT-centric innovation policy, the focus is now on the innovation divide—a significant barrier to the pursuit of inclusive economic growth. The OECD defines innovation as “the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organizational method in business practices, workplace organization or external relations” and with innovation rising on the policy agenda of national development plans, especially digital innovation, it is seen consequently as a major driver of inclusive growth. Goal 9 of the United Nations Sustainable Development Goals calls for building resilient infrastructure, promoting inclusive and sustainable industrialization and fostering innovation. However, not all innovation ecosystems are created equal. There are vast differences between ecosystems both in terms of resources available, how those resources are applied, and the enabling environment, leading to very different outcomes.

¹ Edquist and Hommen: 1999, page 75.

The creation of, and benefits from, emerging technology are currently concentrated in a small number of countries and communities, leaving much of the world reliant on older technologies and removed from the processes of innovation. This growing split is illustrated in figure 1.

Figure 1: Technology advancement vs. population reached: a tale of innovation in developed vs. developing countries



Source: ITU

This occurs even as countries develop capacity in innovation and ICTs, because they are often developing those capacities at a slower rate than those at the 'top' of the innovation divide, while emerging technologies are often not available to or generating benefits for those at the 'bottom'. Those at the 'top' have access to increasingly advanced emergent technologies, applied for their benefit. Those at the 'bottom' are a rapidly expanding group, largely coming from developing communities, with growing access to technology less likely to be emergent or innovative. They are also far less engaged in developing or receiving economic benefits from emerging technologies.

Competitive strategy and the digital divide

Renowned Harvard academic Michael Porter has outlined three types of economies as part of his country-focused theory on competitive strategies:

- 1) Factor-driven, which is supported by human and natural resources;
- 2) Efficiency-driven, which is centred upon manufacturing and production; and
- 3) Innovation-driven, which is focused on knowledge production.

National economies can generally be described as being at one of these stages of development. However, in most cases, different sectors within an economy exist at different levels. Because digital innovation is cross sectoral and can produce multiplier effects in terms of efficiency, information distribution, and scalability, the ICT sector has tremendous potential to develop quickly and feed innovation into less developed sectors. This is part of the ICT-centric innovation, which is considered a key component of inclusive economic growth. (See Figure 2.)

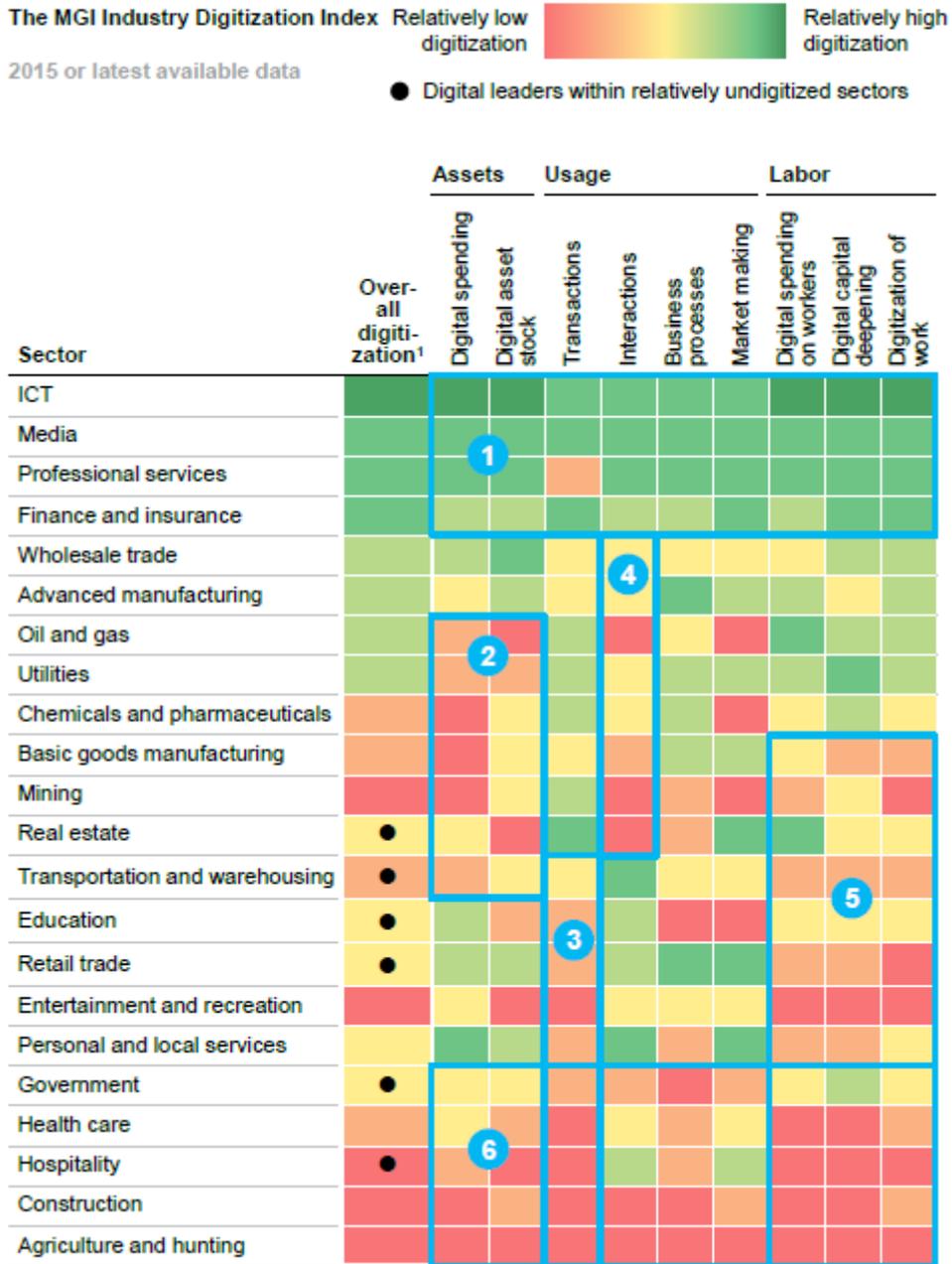
Figure 2: Stages of development in economies



As a result, policy makers are moving beyond traditional ICT and broadband focused policies to address those that support digital innovation. However, digitization and innovation are *not* equivalent, and high levels of digitization do not guarantee high levels of innovation. A largely digital country such as the Republic of Korea or Japan may have not yet fully realized its innovation capacity in all sectors of the economy. These differences in capacity to digitize and innovate create the foundation of the digital divide, which becomes more pronounced when one compares developed to developing countries.

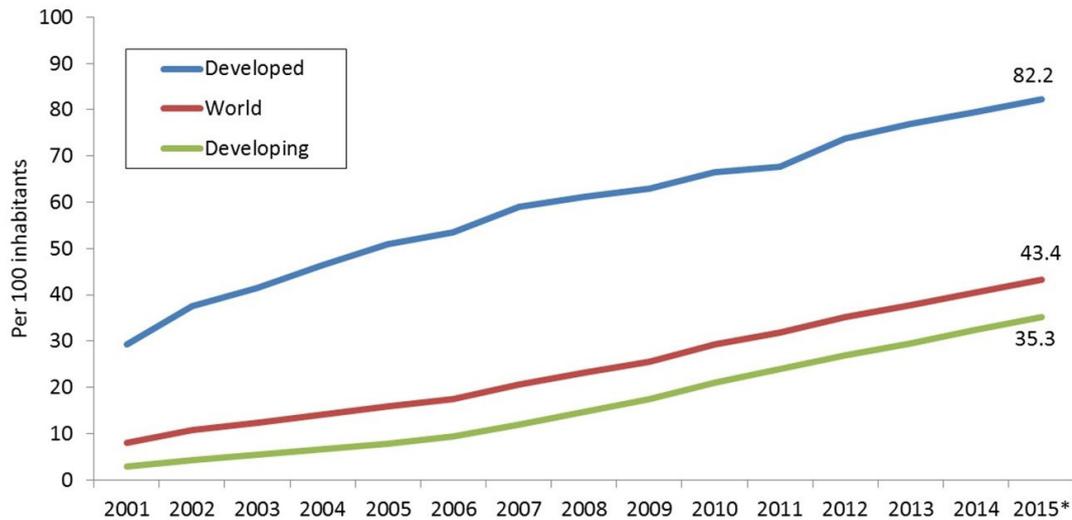
For example, developed countries tend to have low GDP growth and high investment in innovation capacity while developing countries have high GDP growth and low investment in innovation inputs as well as low output in terms of products, services and technology. This disparity places innovation ecosystems of developed and developing countries on different growth trajectories (as also reflected in Figure 1). Nonetheless, an economy does not innovate or digitize as an undifferentiated whole; specific sectors develop at different speeds. The financial services sector may innovate before mining or agriculture while public service or manufacturing might evolve at an average pace. However, the ICT-centric model assumes that innovation in the ICT sector and beyond can drive innovation in other verticals as technologies and models are shared. In sum, the digital divide can be described as *a significant difference in the ability to use ICT technology to build innovation capacity, resulting in new products and services*. (See Figures 3 and 4.). Thus, the root cause of the digital divide can be attributed to an innovation divide.

Figure 3: Levels of digitization of different sectors



Source: McKinsey (2015)

Figure 4: Individuals using the Internet per 100 inhabitants, 2001-2015



The developed/developing country classifications are based on the UN M49, see: <http://www.itu.int/en/ITU-D/Statistics/Pages/definitions/regions.aspx.html>
 Note: * Estimate

Source: ITU ICT Indicators Database

1.2 Challenges in building ICT-centric innovation ecosystems

The previous sections have elaborated a common language about innovation, and established a link between the digital divide and its underlying factor, the lack of innovation capacity, as well as establishing that countries have different level of innovation capacity, leading to an innovation divide.

The innovation divide widens or narrows based on many factors that are too complex to cover extensively here. However, by focussing on three challenges to building ICT-centric innovation ecosystems the field of consideration is narrowed considerably. These barriers are innovation inefficiencies, the lack of a nurturing environment, and insufficient collaboration.

1.2.1 Innovation inefficiencies

The WIPO GII report illustrates how innovation efficiency can be estimated by comparing the ratio of innovation input to output. A highly efficient innovation ecosystem produces abundant output with limited input. In other words, a low ratio indicates high efficiency while a high ratio indicates low efficiency.

Innovation efficiency can be a challenge for countries for several reasons. One reason could be that they make inadequate investments in innovation as a result of priorities that may be focused on essential services (such as education, health, etc.) especially in developing countries. Inputs may not be present, whether in the form of investment, talent or market access, or the enabling environment may not be well established. Another reason could be that innovation systems may not be effectively incentivized to apply research in the form of marketable innovations, and to have the research secure in terms of intellectual property rights.

Box 2: Innovation efficiencies - A tale from the innovation divide and broken R&D links

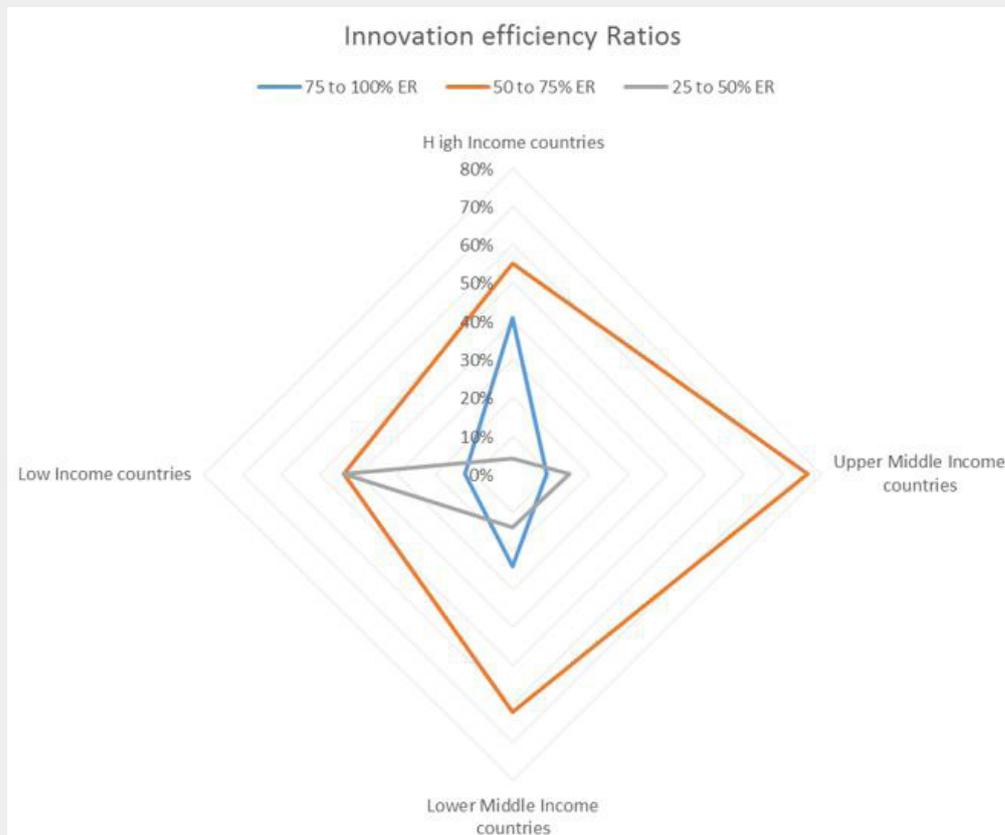
By looking into innovation efficiencies data from WIPO Global Innovation Index, it can be assessed at the first level whether a country is currently generating the seeds of technology invention needed to create disruptive solutions via its innovation ecosystem.

Income level classification of countries seems to have a significant impact on a country efficiency ratio. The efficiency ratio is a measure developed by WIPO, which measures an index of output metrics from the Global Innovation Index over an index of input metrics. As can be seen, high income countries in general have higher innovation efficiency.

However, in the graph below, one can also see that some low income countries still have high efficiency ratio, which points to another challenge they may be facing, that of translating their effective innovation efficiency into income.

The inventor of 3M post-it notes, Dr Geoffrey Nicholson, famously said: “Research is the transformation of money into knowledge, and innovation is the transformation of knowledge into money”. Given the global and increasingly more open economies, digital knowledge can be captured within a country ecosystem, or from other ecosystems. Countries need to understand whether the money they are spending in R&D is moving to create jobs, growth, in other word, income. The ICT-centric innovation ecosystem analysis framework is explored in section 2 and will help an understanding of this linkage.

Figure 5: Innovation efficiency ratios



Source: Adapted data from WIPO GII 2016 report

1.2.2 Lack of nurturing environment

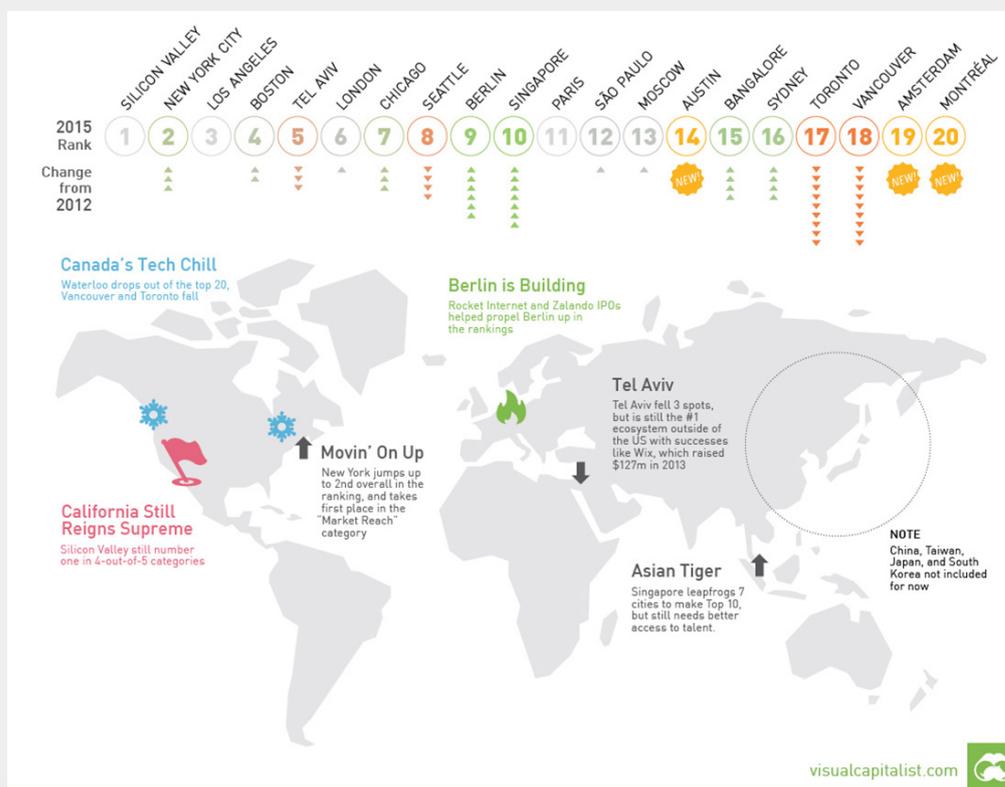
Many components (from policy, initiatives to specific support programmes) in an innovation ecosystem are needed for a start-up to succeed, and the characteristic of these components have big impact on the success or failure of digital entrepreneurs. Failure at any point may lead to a less successful ecosystem in terms of helping to create innovations and bring them to market. As we have noted earlier, different countries have different innovation capacities. The same logic applies to cities and other locations. Innovation capacity needs to be available throughout a country in order to ensure inclusive development. Key building blocks such as access to finance, talent, markets, networks, infrastructure, and support institutions should be distributed and available in different regions, provinces or economic clusters within a country. A thorough analysis of the entire ecosystem is needed to determine challenges and opportunities. For developed countries, many institutions are constantly analysing needs and responding with appropriate programmes and policies. However, in developing countries the institutional capacity may be slightly behind in adjusting to the ecosystem needs, especially further away from major cities.

Box 3: Fostering a nurturing environment - A tale from the innovation divide and two cities

For example, the Global Startup Ecosystem Ranking rates cities globally. Although San Francisco and Chicago are in the same country, the attributes and gaps in their ecosystems vary, which means that the success probabilities of their entrepreneurs will also differ.

For example, San Francisco has a large number of talented entrepreneurs, robust sources of venture capital, and plenty of accelerators and other enabling institutions. Let us assume that Chicago’s assets are comparable, but it has less risk-tolerant VCs. San Francisco based entrepreneurs will have a higher probability of success than those in Chicago. This suggests that every element of an innovation ecosystem is valuable and any single gap affects the entire ecosystem.

Figure 6: Global Startup Ecosystem Rankings



Source: Visual Capitalist 2015 Ranking.

1.2.3 Insufficient collaboration

It follows from the discussion above that each locality, whether it is a city or a country, has to create an ecosystem that reflects its own unique needs and circumstances. However, pursuing a customized approach should not translate into poor coordination between key stakeholders. For example, public and private actors must both contribute to building the ecosystem. Further, sector-focused policies, whether they relate to finance, education, or infrastructure, should complement ICT policies. Finally, it is important to deploy limited resources to support good policy practices as well as divert them from bad practices to good ones. Again, this means that while ecosystems are unique, connecting local, regional and global ecosystems to encourage knowledge sharing and cross-pollination is a critical success factor.

Stakeholders, at both the local, and national level, or private and public sectors must be engaged to change the direction of an ICT-centric innovation ecosystem.

Box 4: Synergies and collaboration - A tale from the innovation divide and the stakeholders' journey to build great companies and transform their economy

In a recent ecosystem discussion in a middle income country and factor driven economy, various stakeholders from public and private sectors, were asked about barriers slowing digital innovation in their ecosystem. They each individually had a clear understanding of their needs, but didn't understand their own role in strengthening their ecosystem. Additionally, together, they didn't understand how their actions can impact the entire ecosystem.

Thus beyond the needs of determining the challenges each stakeholder face as expressed in box 3 "fostering a nurturing environment" above, there is a need to have a framework where stakeholders can come together and take specific action to transform their ecosystem.

Figure 7: Insights from ecosystem stakeholder groups



Source: ITU

1.3 Building blocks of ICT-centric innovation policy

Developing effective ICT-centric innovation policy is a key mechanism in dismantling the innovation divide, which was examined in the previous section. This section examines some guiding principles, pitfalls, and frameworks for building ICT-centric innovation policies.

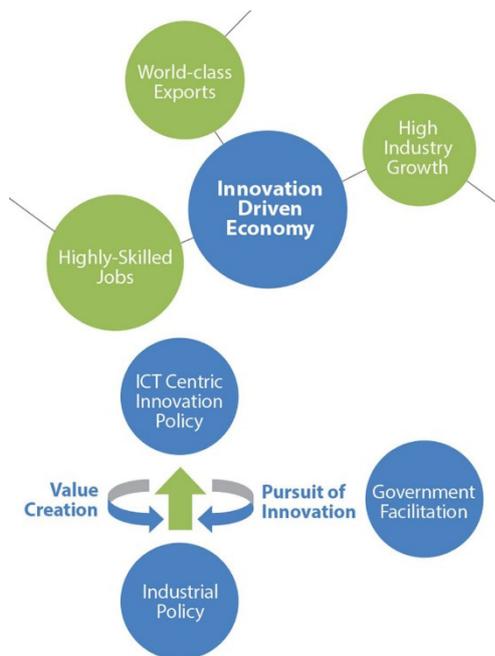
1.3.1 Guiding principles

Having established the role of policy in building innovation ecosystems, a step further considers the main elements of effective ICT-centric innovation policy, which are described below. (See Figures 5 and 6.) The country review process, which is explored in detail in section 2, is iterative and inclusive, drawing from design thinking and user-centred design practices. It also builds on the key characteristics of innovation policy that follow.

- **Policy experimentation.** Engaging in policy experimentation means that policies are developed with input from stakeholders and based on good practices from within and outside the community. Policy should be flexible, innovative, and based on emergent theory and ideas. This is especially true given how rapidly the ICT sector evolves. Working with small-scale pilot programmes to ensure viability and impact is often a key step in this process.

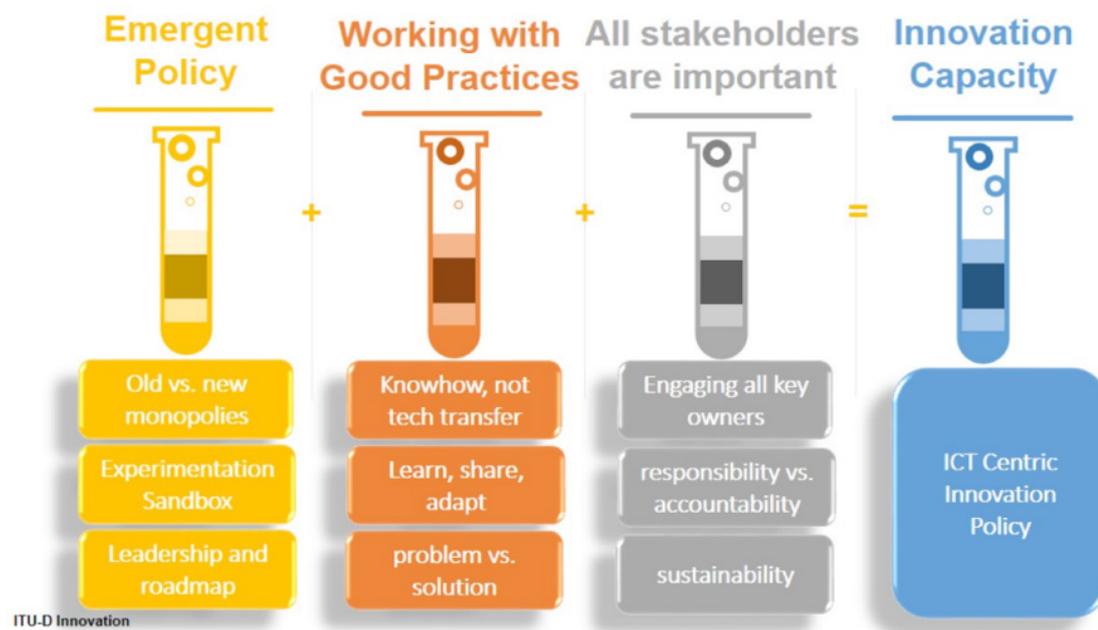
- **User centric.** Policies should focus on aiding entrepreneurs and innovators to build businesses and discover improved processes, products and services. They should also help other stakeholders to support entrepreneurs and innovators. Though politics can never be totally removed from the policy making process, it should focus on stakeholder needs, rather than political priorities.
- **Common language.** Developing truly user centric policy requires engaging stakeholders who understand one another's views and needs. Dialogue, information sharing and common language are elements in developing this kind of understanding. Ultimately, all key stakeholders should understand the broader vision, his or her role in it, and how to chart the way forward.
- **Private sector led.** The work of entrepreneurs and the private sector should be at the centre of innovation policy. They should have ownership over as many programmes as possible, with the government placing itself in a position to support their work. Moreover, policy makers should not use policy to control or dismantle emerging innovations to preserve the status quo, instead using it to create an environment that encourages positive uses of emerging technologies and discourages negative ones.
- **Efficient resource utilization.** Policy-makers have to balance limited resources with a need to deliver systemic impact. As a result, efficient use of resources is paramount; policies should create the most impact for the least investment. For example, public investment can be fully exploited by pairing it with private sector money and strategies to defray costs and monetize projects.
- **Skin in the game.** In order to be effective, any vision of innovation-supporting policy should be coupled with concrete action, not just by the public sector, but all stakeholders. These stakeholders should provide specific inputs and benefit in specific ways. Their engagement will ensure that project leadership remains closely connected to the stakeholders it is meant to serve, and that they have a vested interest in ensuring its success, both for their own benefit and to support their investment.
- **Focus on good practices.** All sources of knowledge and expertise, whether local or global, should be leveraged. Basing work on the experiences of successful projects and policies can help raise the chances of policy success by building on that expertise, especially when good practice owners can directly be tapped as mentors and experts.
- **Replicable.** Policies should be created and documented in such a way that, if successful, they can be used as good practices to develop other policies. These practices can be scaled upward by migrating a national programme to the regional level, downward by creating local parallels to national projects, or horizontally, transitioning from one district to another within a country or from one country to another. Experimentation in policy-making necessitates that information be collected at every stage to support learning, course correction, and breaking boundaries.
- **Sustainable and predictable.** The full arc of a project lifecycle should be considered from the start. Projects should incorporate sustainability planning and estimate what their timelines for completion and termination will be. Also, policies should be based on documented good practices, with plans for ongoing, sustainable funding and programme management.

Figure 8: Policy enabling innovation ecosystems



Source: Adapted from Goh (2005)

Figure 9: Elements to fostering innovation



Source: ITU

1.3.2 Avoiding bad practice

Given the essential role that policy plays in fostering innovation, it is worth discussing how *not* to develop innovation policy. Policy development mistakes to avoid include:

- **Investing in innovation input alone.** Although investing in key innovation inputs such as infrastructure and education is necessary, such investments alone are insufficient. Key institutions such as universities, the private sector, and innovation support networks should be involved to

ensure that potential innovators and entrepreneurs have a range of critical support throughout the innovation journey, from pre-ideation to exit.

- **Over-utilizing the government.** The public sector has a critical role to play in growing the innovation ecosystem, especially in developing economies where the government may be the only actor willing to invest. However, ecosystem leadership should be assumed by the private sector, especially entrepreneurs, as soon as the ecosystem is mature enough to support it. Other stakeholders should augment their work.
- **Underutilizing the government.** While the private sector plays a lead role in fostering innovation, the government can contribute most effectively by creating a hospitable policy environment and engaging in specific projects that support and direct innovation activities.
- **Ignoring policy integration.** In order to stimulate the development of innovation-driven economies, innovation policies should work alongside more traditional industrial policy, and both approaches should be coordinated and complementary.

1.3.3 Analytical framework

In the next section, we will take an in-depth look at the country review process. The crux of the assessment is to understand the current state of the innovation ecosystem, develop a vision for the future, and forge a pathway toward it. Before delving into this approach, we will consider the analytical framework, which guides the assessment and provides an overview of the specific activities executed as part of the process. See Figure 10 to peruse the analytical framework.

- 1) **Agree upon a desired future.** The primary stakeholders in the innovation ecosystem—innovators, investors, academicians, policy-makers, etc.—come together to decide how the ecosystem should evolve.
- 2) **Understand the current state.** Stakeholders engage in identifying the strengths and weaknesses of their ecosystem.
- 3) **Analyse gaps.** Based on the current situation and the desired future state, stakeholders identify key needs that should be prioritized in developing the ecosystem.
- 4) **Good practices.** Irrespective of where the gaps and opportunities are, key actors in an ecosystem discover good practices that should be shared and replicated, and look for international good practices which may serve as a model for addressing the issues. ITU is developing a database of good practices for use in this process.
- 5) **Identify challenges.** Specific areas of action and good practices to be amplified are laid out to become the basis of recommendations for activities going forward.
- 6) **Develop guidelines and recommendations.** Based on a shared vision and understanding of the current landscape, recommendations for how to address challenges and exploit opportunities can be produced.
- 7) **Build programmes.** In order to advance meaningful change in the ecosystem, recommendations and policies must be translated into programmes.

Figure 10: Overall analysis framework



Source: ITU

Section 2: Diagnosing the digital innovation divide

2 Introduction to conducting a country Review

In the previous section, the ICT-centric innovation ecosystems was explored, including the innovation divide, and ICT-centric innovation policy. This section explains how to conduct a country-level innovation ecosystem assessment and design recommendations, step-by-step. This methodology is based on assessments ITU has conducted in Albania, Kenya, Moldova, Rwanda, and Thailand.

2.1 Toolbox overview

In order to complete the country assessment process, there are tools that can be used to collect and analyse data. ITU has developed these tools by conducting innovation ecosystem assessments in multiple countries. These five tools: the stakeholder mapping tool, ecosystem canvas, stakeholders interface canvas, qualitative interviewing tool, and recommendations and programme design tool, are described below.

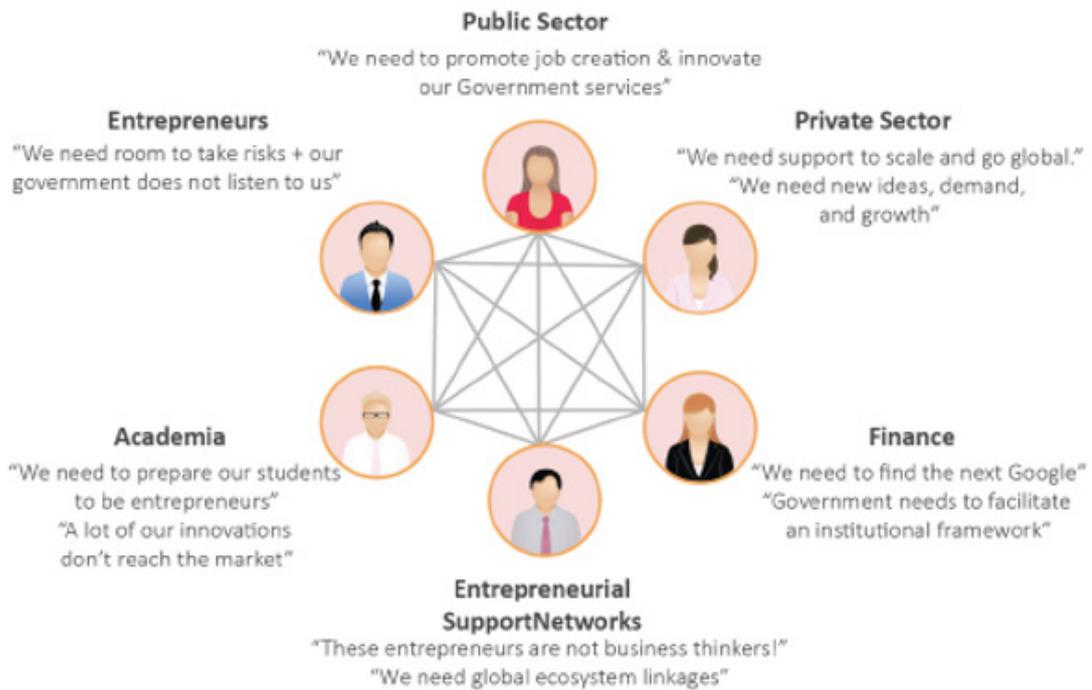
2.1.1 Stakeholder mapping tool

We have established that the collaboration between key actors in the innovation ecosystem is the foundation of the assessment process, and drive the actions taken to build the ecosystem.

As such, being able to identify and engage with these stakeholders is an important part of the country review. More specifically, using this tool can indicate how effective the ecosystem is at supporting entrepreneurs because it highlights specific activities that stakeholders undertake to guide them throughout the start-up lifecycle.

The six actors, described in detail below, are as follows: entrepreneurs, public sector actors, financial actors, academics, private sector actors, and entrepreneurial support networks. See Figure 11 below to view a diagram of major stakeholder groups and Figure 12 to view a blank canvas.

Figure 11: Ecosystem stakeholder groups



Source: ITU

Figure 12: Stakeholder mapping canvas

STAKEHOLDER MAPPING	ENTREPRENEURS	PUBLIC SECTOR	PRIVATE SECTOR
	1	1	1
	2	2	2
	3	3	3
	4	4	4
	5	5	5
	6	6	6
	7	7	7
	8	8	8
	9	9	9
10	10	10	
	ACADEMIA	ENTREPRENEURIAL SUPPORT NETWORKS	FINANCE
	1	1	1
	2	2	2
	3	3	3
	4	4	4
	5	5	5
	6	6	6
	7	7	7
	8	8	8
	9	9	9
	10	10	10

Source: ITU

- **Entrepreneurs:** Entrepreneurs stimulate innovation because they build companies to deliver novel solutions. They participate in all stages of the innovation life cycle from ideation to scale. Entrepreneurs can be leaders and champions in the ecosystem, and are generally supported by the other stakeholders.
- **Public sector:** This stakeholder group includes policy makers and regulators who are active in the innovation ecosystem, along with others such as international organizations and members of civil society. Given the crosscutting nature of ICT, relevant public sector actors represent many areas of work, such as finance, trade, communications, and technology, along with other verticals that might be influenced by ICT-centric innovation.

- **Financial actors:** This category will include the range of investors that support different stages of the start-up life cycle, from prototyping for start-ups to initial public offering (IPO) for more mature companies. They include angel investors, seed funds, crowdfunding communities and platforms, venture capitalists, private equity investors, grant providers such as NGOs, and impact investors. Actors that fund ecosystem-building activities are also included.
- **Academia:** Academic actors include primary, secondary and tertiary institutions, as well as research institutions and training centres. Academic institutions support the ecosystem by conducting primary research, helping to build the capacity of human capital, and encouraging the development of young innovators.
- **Private sector:** The private sector refers to large, mature corporations, established SMEs, and groups such as chambers of commerce that represent the interests of the private sector. Typically, these companies engage in the innovation ecosystem to explore opportunities to disrupt their traditional business models, or to provide services to other businesses.
- **Entrepreneurial support networks:** These are the organizations within the ecosystem, such as innovation hubs, incubators, accelerators, and associations, which support entrepreneurs. They impact the ecosystem by guiding start-ups through the development life cycle, creating a supportive culture, and fostering community.

For an outsider, conducting desktop research is often a good starting point for identifying active stakeholders in an ecosystem, as is working with local partners who have networks of relevant stakeholders. As interviews, workshops and other interactions with the local ecosystem progress, other stakeholders will be selected.

2.1.2 Ecosystem canvas tool

To conduct a country level assessment, one must understand the environment that innovators are facing when undertaking their journey. As you may recall from earlier discussion, the lack of nurturing environment is one of the key challenges facing digital innovation. To address this issue, the ecosystem canvas tool will help you understand and diagnose your ecosystem. This environment can be assessed key pillars reflective of the state of an innovation ecosystem.

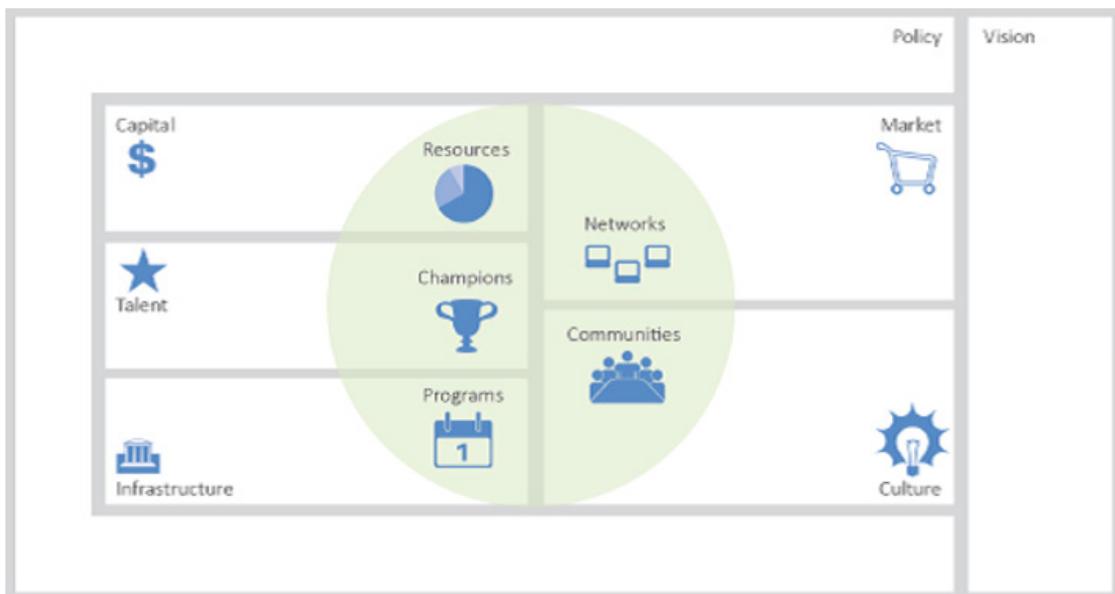
To facilitate this, ITU has created the ecosystem canvas, which outlines seven pillars that comprise an innovation ecosystem.

The pillars, which are described in detail below, are as follows:

- 1) vision and strategy;
- 2) infrastructure and programmes;
- 3) talent and champions;
- 4) capital and resources;
- 5) markets and networks;
- 6) culture and communities; and
- 7) policy and regulation.

The canvas enables stakeholders to examine what is happening in the ecosystem, identifying problems and possible solutions. Let us take a closer look at what each pillar contributes to the ecosystem. (See Figure 13 to view a sample ecosystem canvas.)

Figure 13: Ecosystem canvas



Source: ITU-D Innovation

- Vision and strategy:** Identifying the current and future states of the ecosystem is a key component of the country review. Why? Creating a shared vision helps all ecosystem players to rally around a common goal. Setting forth an accompanying strategy helps them to understand their roles, the roles of others, and how their activities support the common goal. Often these are laid out in government reports, but the vision for the ecosystem can also come from other sources, such as the private sector or academic networks. Given that a vision and strategy are co-created, it is critical that they are exhaustive and inclusive of all stakeholder input across sectors.
- Infrastructure and programmes:** These are the building blocks of an innovation ecosystem. Infrastructure is often categorized as hard or soft. Hard infrastructure includes connectivity, roads, electricity and public transportation while the infrastructure for sharing knowledge such as tech hubs, training resources and research institutions are examples of soft infrastructure. Programmes take advantage of this infrastructure, especially the soft infrastructure, to support the ecosystem.
- Talent and champions:** Talent refers to the human capital that powers the ecosystem and the resources that enhance that capital. Again, it encompasses hard skills such as engineering and programming, as well as soft skills such as management, communications and administration. In addition to a broad talent pool, every ecosystem needs specific champions in order to thrive. A champion is a person who plays a leadership role in the ecosystem by initiating change, building cornerstone institutions, and encouraging the contributions of new actors.
- Capital and resources:** Start-ups need capital to grow and thrive. In the early stages, risk capital, such as from angel investors, is required. As companies mature and expand, funding from larger investors such as venture capitalists (VCs) and private equity funds can help drive growth. Some of this can come from the government or civil society, but ultimately the majority should come from private investors. To complement the work of financing start-ups directly, support networks and other ecosystem-building programmes need resources in order to operate successfully.
- Markets and networks:** Start-ups require markets to serve, which is why it is important to understand the depth of market need and access locally, regionally, and internationally. Additionally, government is often a significant purchaser of products and services, and a source of contracts for budding enterprises. As a result, an efficient and transparent public procurement process is useful for start-ups. Networks and clusters are also needed in ecosystems in order to ensure that innovators have access to all of the resources and connections they need.

- **Culture and communities:** Cultivating an innovative, entrepreneurial culture involves sharing key values such as risk-taking, an appreciation for failure, and a willingness to iterate and learn. These values create a blueprint for behaviour across the ecosystem, shared by communities of innovators and champions through events and activities.
- **Regulation and policy:** Supportive policies and regulations can provide fertile ground for the efforts of entrepreneurs and innovators, while poorly developed policies can stifle innovation. There are a number of areas of policy and regulation that are critical to the success of the innovation ecosystem, including taxation, trade policy, intellectual property law, financial regulation and business regulation, among others.
- **Central pillar:** Amongst the other pillars there is a central space. This space encompasses activities focused on advancing the work of stakeholders in the ecosystem specifically, such as communities sharing entrepreneurial culture, rather than actions that broadly support the economy, such as influencing national culture.

The table below briefly describes the type of information that should be captured in each pillar.

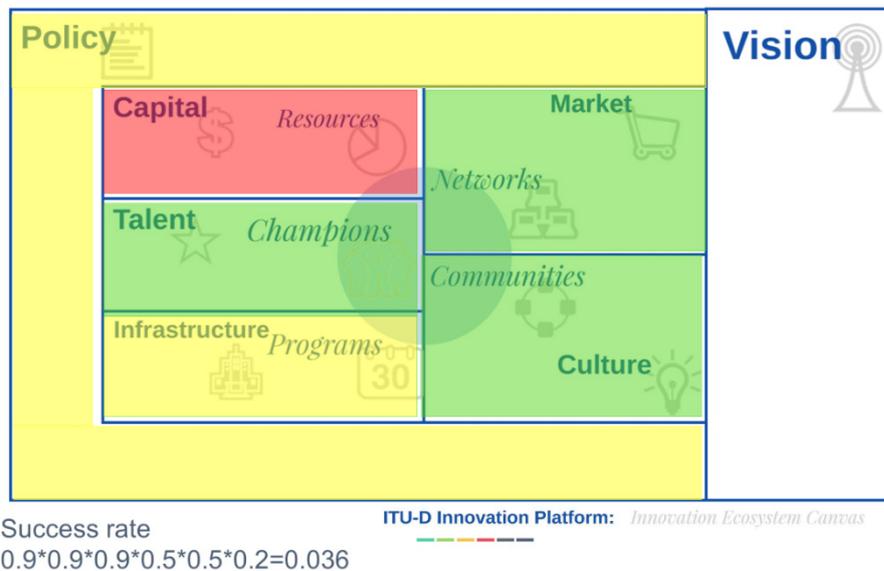
Table 1: Information input examples for each pillar

Pillar	Input
Vision	Shared goal and alignment on key issues
Infrastructure and context	Information on the types of existing “soft” and “hard” infrastructure
Talent and champions	Inventory of strength and weakness of human resources, types of skills and avenues for capacity building
Capital and resources	Insight into capital availability for different stages of enterprise development and FDI; funding for ecosystem building activities
Networks and market	Feedback on the depth of market need domestically and internationally; the existence of formal and informal networks, associations, partnerships and mapping activities
Culture and community	The degree to which the core values of innovation culture are being espoused
Policy and regulation	The extent to which the public sector supports and engages with the ecosystem
Central	Information about ecosystem-supporting activities drawn from other pillars

As is shown above, each pillar of the ecosystem canvas is populated with input from stakeholders. Consequently, the completed canvas prevents an overview of what works and what does not in the ecosystem. This can either be collected during workshops by having groups of stakeholders share their opinions, as shown in the country review methodology, or through qualitative questionnaires or quantitative surveys administered to stakeholders.

Once data across all pillars is collected, the relative strength of each pillar creates an ecosystem ‘heat map’ that highlights areas of strength and weakness. Figure 14 below gives a sample canvas that is colour coded to indicate pillar efficacy. Viewing the effectiveness of the ecosystem as a whole, as demonstrated by the relative strength or weakness across pillars, provides an indication of how likely entrepreneurs are to succeed in that environment.

Figure 14: Colour coded ecosystem canvas



Source: ITU

Since each pillar is one part of a whole, and the function of each pillar is needed to have successful innovation activities, the combined efficiency of the pillars can be taken together to give a sense of the overall efficiency of the ecosystem.

Box 5: Evaluating an entrepreneur’s success rate in an ecosystem- can it measure the vibrancy of an ecosystem?

Most countries would like to have an ecosystem like Silicon Valley. However, as seen earlier, ecosystems even in the same country can have different success rate based on their focus and their economic activity. The case of Chicago and Silicon Valley demonstrated that. The question is whether the vibrancy of an ecosystem can be measured otherwise. This vibrancy for an ecosystem will impact the entrepreneur’s chance of success.

In a perfect ecosystem where each of the pillars can be defined as successful with a 90 per cent success rate, and assuming an entrepreneur has a real opportunity, the vibrancy of that ecosystem can be estimated. It must be assumed that all pillars are interdependent as failure in anyone of them can cause digital innovation to be impacted. Each pillar of the ecosystem canvas has an impact on vibrancy. Excluding the vision pillar, six pillars can theoretically express the vibrancy of that ecosystem as:

- Vibrancy = $0.90 \times 0.90 \times 0.90 \times 0.90 \times 0.90 \times 0.90$, thus 53%.
- If everything an innovator needs is available, they would have a 1 in 2 chance of success.

However, in the case of the ecosystem depicted in Figure 14, one can see that the success rate is approximately 3.6%

- $\text{Vibrancy} = 0.9 \times 0.9 \times 0.9 \times 0.5 \times 0.5 \times 0.2$, thus 3.6% vibrant
- If everything an innovator needs is available, they would have a 1 in 28 chance of success.

First, it is important to note that the vibrancy of an ecosystem is not the only factor for an entrepreneur or innovator to succeed.

Second, the vibrancy rating is subjective, but it highlights the reason behind enabling the right conditions for digital innovation that create jobs and economic growth.

2.1.3 Stakeholder interface canvas tool

One of the key challenges facing an ecosystem is insufficient collaboration and the lack of synergistic initiatives from the stakeholders. To be able to take concrete steps in solving an ecosystem challenge, one needs to understand current activities of the stakeholders, and how they collaborate and interact with one another.

This tool helps map the roles and actions of stakeholders at each stage of the start-up lifecycle, which is adapted from the “Valley of Death” curve. The curve outlines each step of the entrepreneurial journey, emphasizing the gap between the developments of a new concept and when it becomes profitable, which is where many ICT-centric innovation fail.

Most support work in the ecosystem is focused on innovators and entrepreneurs, so the canvas also highlights what key stakeholder inputs are needed to promote ICT-centric innovation at each stage of the start-up lifecycle. In addition to highlighting the work of individual stakeholder groups, the canvas also illustrates how different actors interact with one another to support the work of innovators and entrepreneurs.

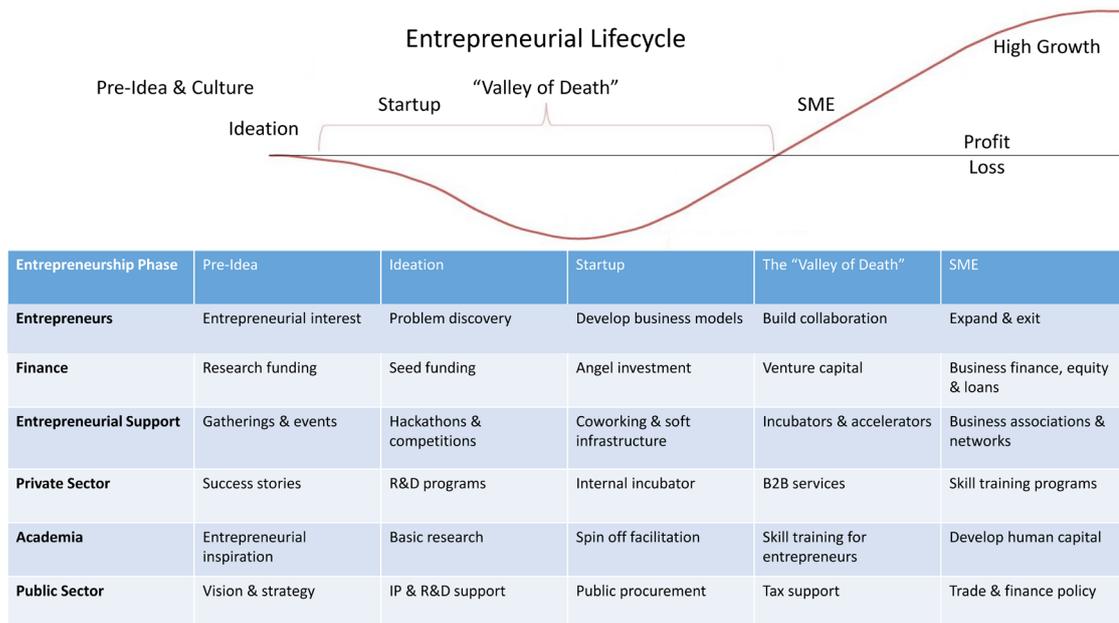
The activities associated with each phase of the start-up lifecycle are described briefly below:

- **Pre-idea:** In this stage, key actors plant the seeds of support in the innovation ecosystem. The public sector provides an overarching vision that other stakeholders can embrace. Entrepreneurs start to explore innovation while entrepreneurial support institutions cultivate their interest by fostering entrepreneurial culture and hosting gatherings. Academia also nurtures this culture by providing an environment for young entrepreneurs to test their ideas. Meanwhile, funding ensures that basic research and prototyping can be done, which eventually leads to successful entrepreneurs that inspire, mentor, and fund new entrepreneurs.
- **Ideation:** This is the stage at which new innovations are developed but have not yet been incorporated as businesses. Again, the public sector creates a policy environment that encourages research and defends intellectual property rights. Support institutions that host idea generation activities such as hackathons help entrepreneurs identify credible problems to solve, and academia contributes by producing basic research that identifies critical needs. Entrepreneurs then begin to engage with these problems, the solutions to which they can commercialize. Investors deploy small amounts of risk capital to support these entrepreneurs while the private sector acts alongside them initially, experimenting with innovation and potentially disrupting their internal business models.
- **Start-up:** In this stage, innovations evolve from concepts into businesses. Entrepreneurs begin to develop business models and seek additional funding from early stage investors such as angel networks to help their businesses grow. Entrepreneurial support institutions such as co-working spaces give entrepreneurs access to community, human capital, and infrastructure

to run their ventures. As entrepreneurs seek customers, a transparent and efficient public procurement system helps them land contracts. Alongside this activity, large companies launch internal accelerators to insource innovations developed by start-ups, and academia supports the commercialization of basic research by entrepreneurs.

- Valley of death:** During this challenging stage of development, entrepreneurs need intense support in order to survive. As such, entrepreneurs will collaborate and share knowledge while VCs provide financing to help start-ups progress from potential to profitability. To reduce operational costs, start-ups will purchase business to business (B2B) services at a discounted rate from large market-leading companies. Supportive tax policies will also reduce start-up tax burden. Some start-ups will enter accelerators where they will gain access to mentorship, investors, and other promising start-ups. During this stage, the business skills of entrepreneurs gained through education or training efforts become critical.
- SME:** The velocity of start-up growth increases as they expand rapidly into established businesses, reach steady state, or exit through buy-outs or IPOs. Finding good human capital will become a greater constraint as start-ups grow. As a result, they will depend on the private sector to provide training programmes and on academia to produce employment-ready graduates. Maturing start-ups will present less risk, giving them access to more traditional sources of financing such as loans and private equity. Ideally, start-ups will continue to expand and eventually return value to investors through an acquisition, buy-out, or IPO. This growth will be supported by access to international markets and investors. Start-ups will also continue to receive support from community groups such as business associations that represent their interests.

Figure 15: Stakeholder interface canvas

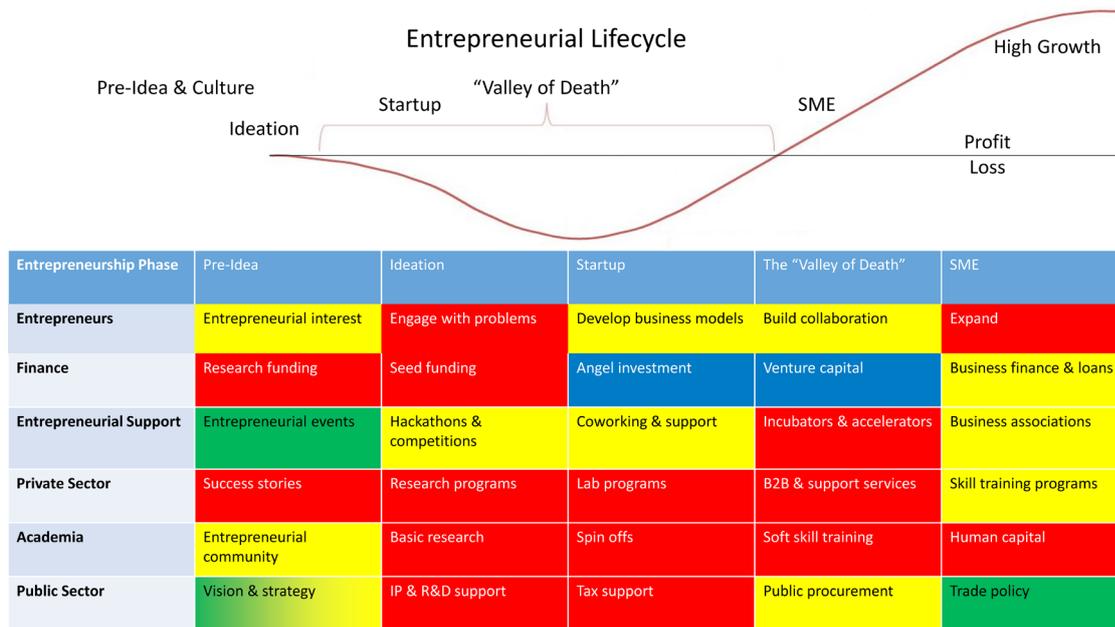


Source: ITU

For a closer look at what stakeholders contribute at each stage of the start-up life cycle see Figure 15.

There are two primary ways of working with the canvas, depending on whether simplicity or specificity is the goal. The simplest way to examine an ecosystem using the canvas is to rate each key activity based on how successfully it is being executed. See Figure 16 to view a sample canvas. In this case, it has been colour coded to provide an “at-a-glance” visual representation of the ecosystem with red representing areas seen as being missing, yellow areas that are present but insufficient or weak, green as areas that are strong, and blue as areas that are weak or missing but with specific programmes underway to improve them. An online survey tool can be used to establish a similar level of understanding by collecting input on each canvas component from respondents.

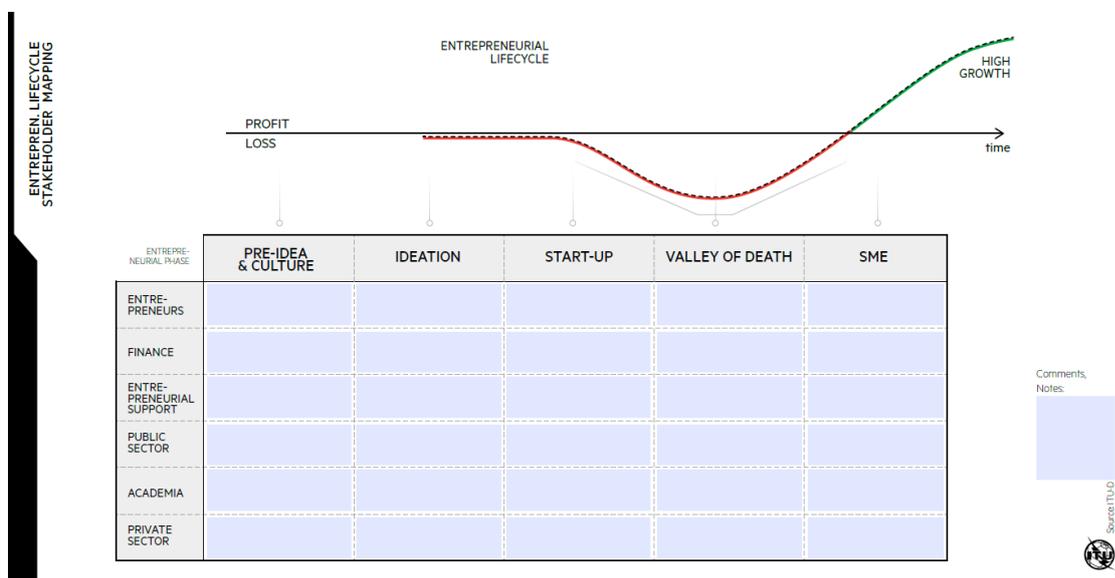
Figure 16: Colour coded stakeholder interface canvas



Source: ITU

The alternative provides more detail, but also requires a more intensive process to derive insights. With this approach, stakeholders use a blank version of the canvas (See Figure 17) to discuss what activities are occurring in the ecosystem and identify gaps for innovation support that may exist. This generates insights that reflect the roles taken on by various stakeholder groups in an ecosystem.

Figure 17: Blank stakeholder interface canvas



Source: ITU

2.1.4 Qualitative interviewing tool

The qualitative interviewing tool is used to gather insights on the strength of each ecosystem pillar by collecting input from stakeholders. This information is meant to enhance what is learned from desk research and provide a ground level understanding of the innovation ecosystem. The tool consists of a 40-question survey that focuses on each pillar and takes approximately one hour to complete. The

interviewer has the latitude to direct the flow of dialogue and expand where necessary. See Figure 18 below to view a portion of the questionnaire.

Figure 18: Section of the qualitative interviewing tool



Standardized Questionnaire for Country Review Interviews

Pillar	Question
Background and General	1. Interviewer name
	2. Time and Date
	3. Respondents and organization
	4. Tell us about your work
	5. What are some of the outcomes you expect from this process?
Strategy and Vision	6. What are the main issues in the ICT centric innovation ecosystem? Do you think the situation is good? Is it improving?
	7. Do you think there is a common understanding and consensus between stakeholders of these issues?
	8. Is there a clear national strategy for the ecosystem?
	9. Are you working under a clear vision, both in your own work and in your role in the ecosystem?
	10. Does the work of your organization specifically include efforts to support national strategies?
Infrastructure and Programs	11. How do you see the quality of overall hard infrastructure, especially in terms of communications and technology?
	12. Is there access to soft infrastructure? Training programs, innovation events, knowledge institutions, research activities, facilities for these activities?
	13. Can firms access needed equipment and resources?
	14. Is there evenly distributed access to soft and hard infrastructure?
	15. Is the country competitive regionally and globally?
Regulation and policy	16. Do they see the public sector as being aware of and engaged with their role in the innovation?

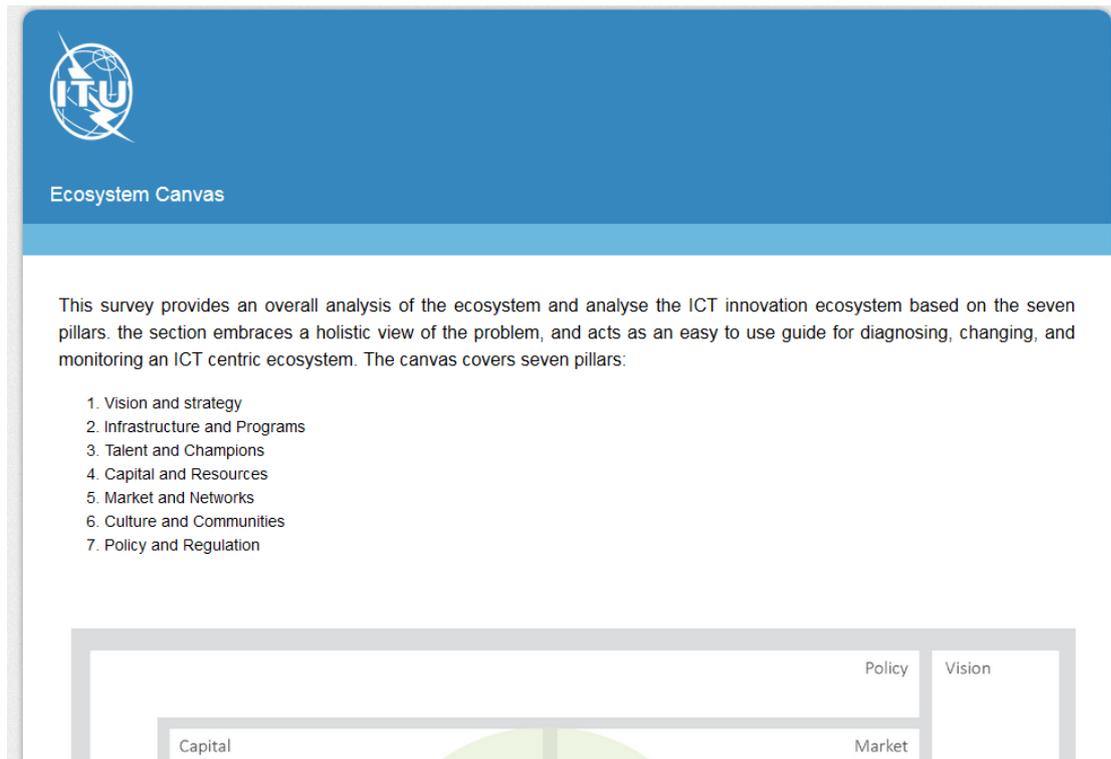
Source: ITU

As part of the survey process, the interviewer assigns the respondent’s opinion a score, which allows the outcomes to be easily represented numerically. This numerical value can be used to establish success rate for each pillar, and subsequently a vibrancy status for the ecosystem (as discussed in box 5).

2.1.5 Quantitative interviewing tool

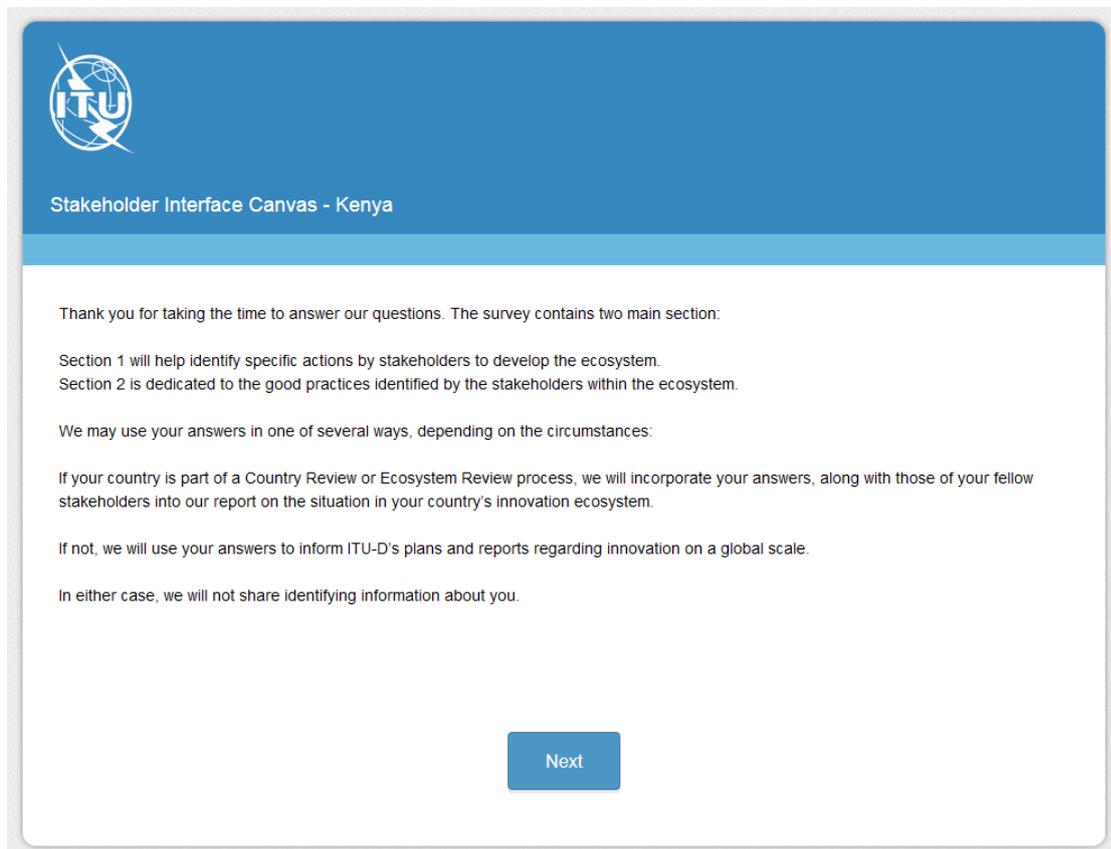
As a supplement to, or replacement for, the qualitative survey, a quantitative survey must also be deployed. This survey tool enables more detailed analysis and better data gathering. The quantitative survey tool is similar to the qualitative interviewing tool, but it is used to draw additional insights from stakeholders or clarify what has already been shared. Input from the tool can also be utilized to create opinion graphs by pillar. The survey can be run to inform the stakeholder interface survey, the ecosystem canvas, or a combination of the two. Figure 19 shows a portion of a sample survey used for diagnosing the ecosystem canvass, while figure 20 shows a sample of a survey used for diagnosing the stakeholder interface canvass. Normally, there is only one survey assessing both, but for improved user experience, two surveys have been developed.

Figure 19: Beginning of quantitative survey for ecosystem canvas



Source: ITU

Figure 20: Beginning of quantitative survey for stakeholder interface canvas



Source: ITU

2.1.6 Interview validation tool

Finally, an interview validation tool can be used as a repository for interview data that allows information to be collated by question, pillar and interviewer. A Google Form can collect, aggregate, and organize interview information, but any platform that meets the needs of a given organization can be chosen.

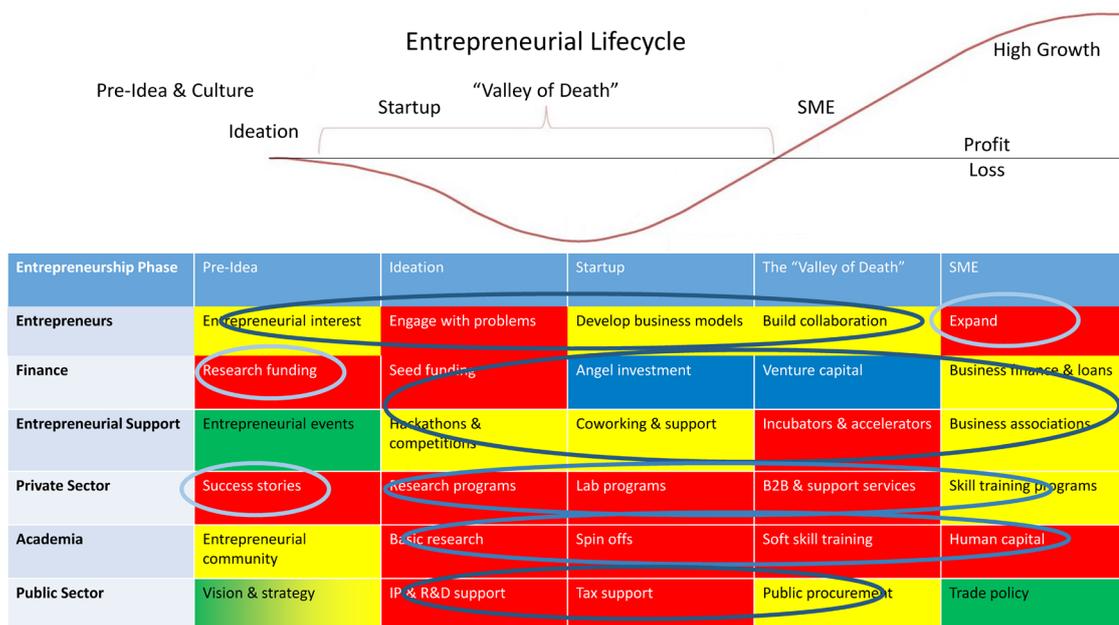
Using such a tool can help identify common themes across pillars or stakeholders, which can be translated into key challenges and opportunities. At a later stage in the assessment process, themes will be used to develop policy scenarios serve as input for recommendations.

2.1.7 Recommendation and programme design tool

After completing the initial phase of data collection through interviews and workshops, the next step is to translate data into content, such as policy scenarios and policy actions, to support policy formation. Four helpful steps to guide this process are: identifying needs, setting priority objectives, identifying good practices and constructing policy scenarios.

- 1) Identifying needs:** Policy scenarios can be written using a variety of inputs, such as interviews or workshop insights. Whatever the source, the main goal is to ensure that all gaps highlighted through the stakeholder interface tool and the ecosystem canvas are included and all key themes are reflected in the recommendations. To see how policy scenarios can be constructed using gaps identified in the stakeholder interface canvas, see Figure 21.

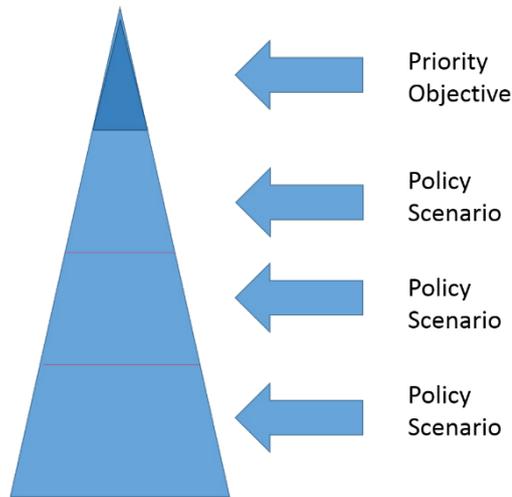
Figure 21: Highlighting weaknesses on the stakeholder interface canvas



Source: ITU

- 2) Setting priority objectives.** With an overall understanding of ecosystem needs, an analysis of the political priorities for development in a country is often valuable. These are generally high visibility, popular actions that are key to garnering support from political leaders. If policy priorities identified by the review process can be framed or defined as supporting the priority political objectives, they are likely to be considered as part of the overall agenda and gain support. Alternatively, needs identified during the analysis can be framed to support political objectives. To illustrate the relationship between policy objectives and actions, an iceberg chart can be created. In this chart, objectives are at the tip of the iceberg, and the supporting actions are beneath them. See Figure 22 for a sample iceberg chart.

Figure 22: Iceberg chart of political objectives



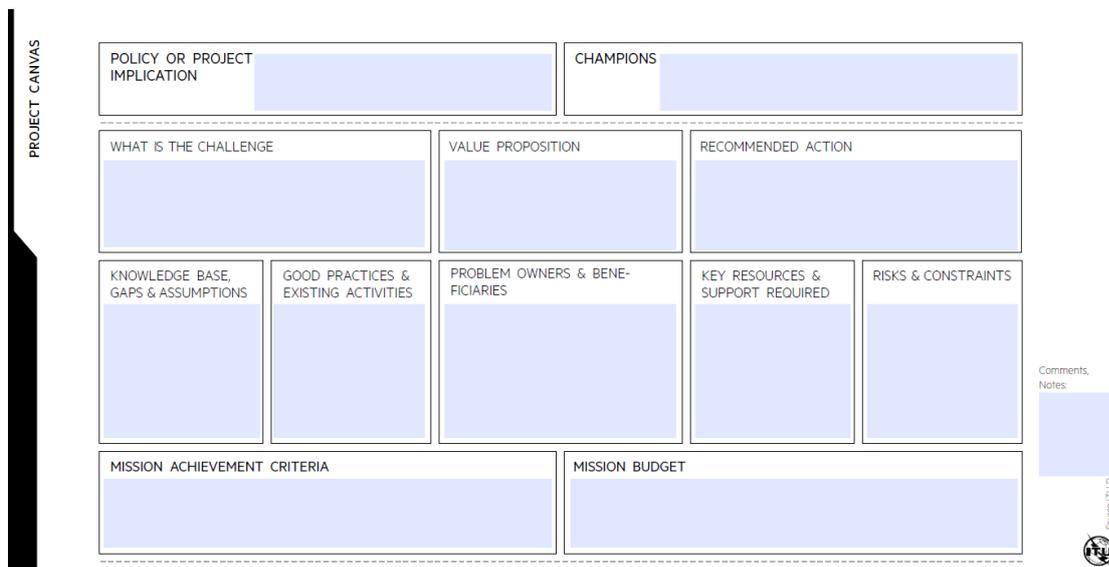
Source: ITU

3) Identifying good practice. Before constructing policy scenarios it is useful to examine what has already been done to address similar problems. This can be done by adopting good practice within the country, which will generally be identified during the needs analysis process. These can be amplified or built on in order to address needs in the ecosystem. International good practices are also widely used to develop recommendations, in many cases other ecosystems will have encountered similar issues, and successful actions there can be used as the basis for recommendations.

To help Member States to identify these international good practice, ITU is developing a good practice database where overviews of good practice will be available with links to deeper research, broken down by the areas of the ecosystem and stakeholder canvasses they address.

4) Constructing policy scenarios. Based on policy and political objectives, and using good practices as a framework, more specific policy outlines can be developed. ITU-D team used a project canvas, shown below in Figure 23, as part of its process. It is loosely based on the business model canvas, which is used by the private sector. Key questions that guide completing the canvas are introduced below.

Figure 23: Project canvas



Source: ITU

- *Policy or project implication:* What is the title and overall theme of the project or policy proposed?
- *Champions:* Which key stakeholders does the project require as leaders to move forward?
- *Nature of the challenge:* What major issue is the project designed to address?
- *Knowledge base, gaps and assumptions:* What is known about the topic? What information is missing? What assumptions will need to be made?
- *Good practices and existing activities:* What is being done to address the challenge, both within the ecosystem and on a global scale? How will that connect to the project?
- *Value proposition:* What will the project enable problem owners to accomplish?
- *Problem owners and beneficiaries:* Who is affected by the challenge being addressed by the project? Whom will it serve?
- *Recommended action:* What activities will the project encompass in order to achieve its mission and deliver on its value proposition?
- *Key resources and support required:* What will be needed to execute the project?
- *Risks and constraints:* What negative side effects could result from the project? What are the limits to its activities?
- *Mission achievement criteria:* What are some indicators that will signal the success or failure of the project? At what point should it be considered complete?
- *Mission budget:* What is the available budget for the project?

2.2 Country review methodology

In the previous section, the tools required to carry out a country-level ecosystem review and develop innovation policy were introduced. In this section, we will walk through the assessment process. A country review has five phases that result in common goals, an ecosystem diagnosis, recommendations, an implementation framework, and a monitoring and evaluation (M&E) approach. See below for a brief description of each stage and Figure 24 for the process flow:

Figure 24: Country review workflow



Source: ITU

- 1) **Common goal.** The first step in the review is to identify the stakeholders who will participate in the process, which can be done using the stakeholder mapping tool and desktop research. This list can be expanded to include stakeholders who are mentioned during the review process. The review commences with an inception workshop, which convenes key stakeholders to collectively identify key issues within the innovation ecosystem, create an agenda for continued engagement, and set shared priorities. It is typically facilitated using a world café format, and the primary output is a community manifesto that identifies needs and priorities for each stakeholder group.
- 2) **Diagnosis.** Data collection and analysis are the primary activities of the diagnosis phase. The ecosystem-mapping tool is used to collect information on the seven pillars of the ICT-centric innovation ecosystem: vision and strategy, infrastructure and context, talent and champions, capital and resources, networks and markets, culture, regulatory and policy, and central. Following that, interviews with key stakeholders will be conducted using the qualitative interview tool. The quantitative survey tool may also be used to collect insight from stakeholders and contribute to the ecosystem canvas. The interviews are analysed to produce a numeric score, which reflects the relative strength of each pillar. The data can be organized by pillar and by stakeholder, and stored using the interview validation tool, as was previously described.
- 3) **Once stakeholder input is aggregated,** an assessment of the overall strength of each pillar from the stakeholder’s perspective can be derived. Using these interview insights and input from the first workshop, a full landscape of the innovation ecosystem emerges, including strengths, weaknesses, opportunities, and gaps.
- 4) **Recommended action.** After the initial phase of data collection and analysis, all data can be reviewed to identify areas of intervention. At this point, a second workshop is convened to help stakeholders develop recommendations and action plans. Before implementation begins, stakeholders should decide who leads execution, typically the public sector or a united group of stakeholders. External actors can also be recruited to help implementers create problem-solving initiatives.
- 5) **Implementation.** Once implementation starts, it is critical to encourage ecosystem champions to take ownership of execution. Ideally a working group will be formed to develop an implementation plan and institutionalize the transition to action. As such, ITU has several

practices, such as articulating policy objectives and constructing policy scenarios, which can be used to facilitate policy development. It is a key component of this phase to recognize those areas of work that require government action and those that can be achieved through collaboration between stakeholders. Once work commences, having ‘skin in the game’ is essential. As a result, stakeholders should be invested in the activities to which they are contributing, so they will be incentivized to push for success. This is especially important given the iterative, feedback-driven nature of the implementation process.

- 6) Monitoring and evaluation. In thinking about measuring progress, the ultimate goal is for stakeholders to take actions that foster the growth of their ICT-centric innovation ecosystem. To jumpstart the process, stakeholders should try to address the recommendations that emerge from the review, but start with interventions that are modest in the consumption of time, money, and human resources. Ongoing projects can then be based on these initial interventions, based on an iterative policy experimentation process.
- 7) As the implementation process unfolds, M&E tools should be developed to track change within the innovation ecosystem and standing groups of stakeholders should be created to oversee the implementation and monitoring process. After a certain period, ideally between six months and two years, the country review process can be repeated, whether undertaken as a full process or a more abbreviated version. This repetition updates the status of the ecosystem needs to see if the recommendations have had an impact on the needs identified during the original review process.

2.2.1 How to conduct a country review

If you are a stakeholder in an ICT-centric innovation ecosystem, what follows should help you lead, or participate in, a country review. Figure 25 gives a step-by-step diagram of the process in addition to the guiding principles discussed in section 1.

Figure 25: Country review process



Source: ITU

Desktop research and stakeholder mapping

- **Stakeholder mapping.** The stakeholder mapping tool can be used to identify key actors in the ecosystem. You will recall from the previous section that there are six primary stakeholder groups: 1) entrepreneurs; 2) public sector actors; 3) financial actors; 4) academics; 5) private

sector actors; and 6) entrepreneurial networks. When selecting stakeholders, it is important to balance the types of stakeholders in each group as well as to ensure that all major groups are represented. The goal is to identify a target group of ten participants per group for a total of sixty participants. Please see the table below for recommended representatives for each stakeholder group.

Table 2: Recommended representatives for stakeholder groups

Stakeholder Group	Recommended Representatives
Public sector	The following ministries or government bodies, if they exist, should be identified: tourism, finance, education, IT/ICT, ICT regulatory, stock market regulatory, commerce, agriculture, SME promotion, and science and innovation commissions.
Support network	Key stakeholders are incubators, accelerators, mentor networks, industry associations, ICT chambers of commerce, ICT media organizations, cluster organizations, or technology parks.
Private sector	Key stakeholders are telecommunications companies, ICT companies, established SMEs, and associations.
Finance	Key stakeholders are the central bank, traditional banks, non-traditional banks, angel investors, venture capital, and private equity.
Entrepreneurs	Key stakeholders will be from each stage of the entrepreneurship life cycle of entrepreneurship (e.g. pre-idea, start-up, SME, growth) and will represent different sectors.
Academia	Key institutions are technology related, e.g. vocational schools, along with research and business institutions.

- Basic indicators for pillars.** Research sources come from organizations that produce data on standard indicators or from suggestions made by stakeholders. Generally speaking, secondary sources should include local and international statistics, ideally from multiple sources; legislative actions relevant to all pillars; and reports, studies and indexes measuring indicators pertinent to the pillar.

Table 3 represents key international data sources for the pillars of the ecosystem canvas. Local sources of data should be used to supplement them, but the sources listed below will provide an excellent starting point.

Table 3: International data sources for the pillars of the ecosystem canvas

Data	Relevance	Sources	Usage
ITU World Telecommunication development indicators and reports	Information on internet penetration, ICT usage, ICT skills, ICT specific reports on broadband, inclusions, etc.	ITU web site	General context; Pillar analysis
UN broadband reports	Strategies and report on broadband and infrastructure	UN Broadband Commission website; ITU website	Pillar analysis

Data	Relevance	Sources	Usage
World Bank statistics and reports	General macroeconomic statistics for GDP information; specific country studies on various domains; World Development reports;	World Bank website; World Development reports; World Bank statistics	General context; Pillar analysis
Global Competitiveness Report	Country rankings on competitiveness and related information on economic stages based on Porter's model; insight into the drivers of productivity and prosperity;	World Economic Forum website	General context; Capital pillar (access to funds); Market (market size)
Global Innovation Index	Ranks innovation performance of countries and economies based on 82 indicators; measures innovation inputs, output and their efficiencies;	WIPO Website; Global Innovation Index website	General context; Capital pillar (diversity in types of funding)
UNDP Human Development Index	A measure of average achievement in key dimensions of human development: a long and healthy life, being knowledgeable and having a decent standard of living	UNDP website	Talent pillar
21st century skills	Provides trends on skills development and requirements	WEF skills and employment report	Talent (trends)
Global Entrepreneurship Index	Measures the health of entrepreneurship ecosystems; data on entrepreneurial attitudes, abilities and aspirations vs. social and support infrastructure	Global Entrepreneurship and Development Institute	Capital (risk capital); Culture (risk acceptance, cultural support, opportunity perception, product & process innovation); Market (internationalization, networking, high growth, competition); Infrastructure (technology absorption); Talent (human capital, start-up skills);
Country specific strategies and policies	National ICT strategies; other related strategies supporting various sectors (e.g. agriculture, tourism, etc.)	Country stakeholders insights; country research	General context; pillar analysis; recommendations

Data	Relevance	Sources	Usage
Country statistics and surveys	Indicators from national statistics office on various measures, outputs, and surveys	National statistics office	General context; all pillars

The primary output from desktop research and stakeholder mapping is a dossier of basic information on the innovation ecosystem that will inform the next step of the review process.

Needs workshop

The needs workshop gathers stakeholders to discuss the state of the innovation ecosystem and develop a shared understanding of its challenges and opportunities. The needs workshop is usually facilitated using world café, design thinking or agile methods, and a typical agenda is as follows:

- Introduction and context setting – 15 minutes
- Goal setting – 65 minutes
- Gap identification – 50 minutes
- Building the framework – 50 minutes
- Next steps – 5 minutes

This workshop lasts approximately four hours and is designed to be participatory. Please see below for an overview of the workshop structure, with the full workshop structure available upon request from ITU.

Introduction and context setting. The day begins with a greeting and a discussion of the impetus for the meeting, why it matters, and what to expect during the workshop. Please note that it is important to have ecosystem champions present to motivate other attendees.

Goal setting. Goal setting helps stakeholders to understand the current and desired future states of their innovation ecosystem.

To create a common goal, stakeholders come together in small working groups composed of different types of stakeholders to develop a 3-5 year vision for the innovation ecosystem. The goal setting process is as follows:

- Each group will be provided an ecosystem canvas flip chart, pens, markers and post-it notes.
- Individual group members will write their ideas on post-it notes and place them onto the relevant pillars of the ecosystem canvas.
- The group will discuss all of the posted ideas and consolidate them into a unified vision statement. This statement will then be posted onto the group canvas.

Facilitator process notes:

- It is important to ensure that each team has a representative sample of stakeholders, and that there is sufficient time to brainstorm and discuss.
- Icebreakers may be useful to encourage team bonding.

Gap identification. Based on the vision developed during the previous session, each group will collectively identify 3-5 challenges to actualizing this vision by pillar—infrastructure, talent, capital,

market, policy and culture. Again, individuals will first write their thoughts on post-it notes. After the canvas is complete, the group will:

- i. Enter consolidated input by pillar onto the canvas;
- ii. Nominate a group leader to explain the group vision and the challenges faced to realizing it, by pillar.
- iii. Migrate post-it notes to the knowledge wall. (See a description of the knowledge wall below.)

Facilitator process note:

- Facilitators can assist groups while they work, collect data, or take pictures;
- To close the session, the facilitator can ask the participants to share their primary takeaways.

Knowledge wall. In this step, output across all groups will be consolidated and displayed on the knowledge wall. The knowledge wall is a shared space, i.e. a wall in the workshop room where input from all groups for each pillar is shared. Each pillar has a dedicated flip chart or large format printout of the ecosystem canvas on which to record insights, and it is used to develop a consensus view of the pillar between all participants.

At the beginning of this session, new groups are formed to work with input from the previous session, which includes the visions and implementation challenges that the teams articulated. With this input, the new teams will:

- i. Revise the vision based on input posted on the knowledge wall from all teams.
- ii. Formulate concrete actions for addressing the gaps to vision execution.
- iii. Prepare a two-minute presentation articulating the revised vision and the steps taken to remove barriers to achieving it.

Facilitator process note:

Because the groups change at the start of this session, the facilitator may introduce an icebreaker to rebuild the team dynamic.

Building the framework. In this session, actions taken by each stakeholder group at every stage of the life cycle will be outlined using the ecosystem and stakeholder interface canvasses. This builds on previous sessions, which focused on ecosystem conditions by pillar and generating a shared vision for the ecosystem.

To begin the session, the participants will be split into two larger groups to:

- i. Discuss the extent to which each activity is happening in the ecosystem and rate it. For example, 0 = no evidence of activity; 1 = some evidence of activity; 2 = significant evidence of activity.
- ii. Submit ratings to the facilitator.
- iii. Write activities that are not included on the canvas on post-it notes.
- iv. Submit post-it notes to the facilitator.

Based on the rating submitted by the two groups, the facilitator will create an average rating and colour code each section of the stakeholder interface canvas (red= weak; yellow = needs improvement; green = strong). The facilitator will then lead the participants in a discussion about what is working, what is not, and what is absent.

Through the needs workshop, initial stakeholder views on the ecosystem pillars and stakeholder canvas, as well as a manifesto describing stakeholder needs and priorities are generated.

Stakeholder interviews

Conducting stakeholder interviews is a critical part of the country review process because stakeholder insights are used to identify opportunities and challenges within the innovation ecosystem. The qualitative interviewing tool, which was introduced earlier, is used to help interviewees collect information on each pillar and identify good practices.

In order to conduct and process a stakeholder interview, the interviewer does the following:

Data Collection:

- i. Speaks to key actors using the 40-question guide.
- ii. Analyzes each interview script.
- iii. Administers a quantitative survey as needed to collect new insights and clarify existing ones.

Data Processing:

- iv. Rates pillar strength based on interviewee insights.
- v. Looks for common themes within each pillar, as well as across pillars and stakeholders.
- vi. Extracts key themes for each pillar.
- vii. Uploads all interview data onto a platform for data collection.

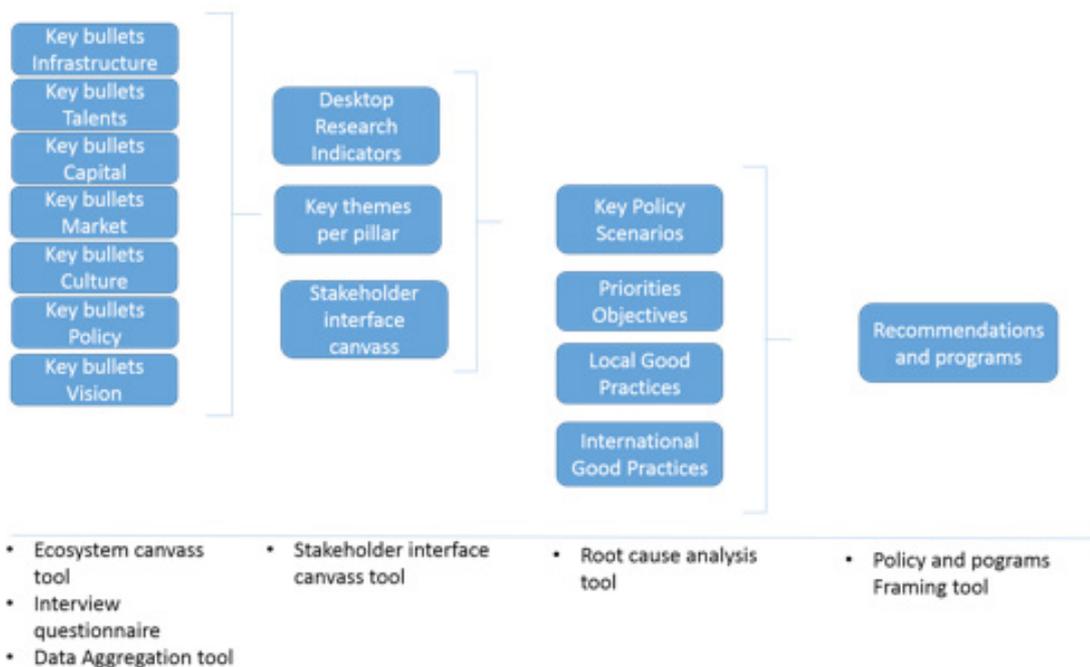
The interviewer should keep the following guidelines in mind:

- Ensure that there is a representative sample in each stakeholder group and all groups are represented.
- A minimum number of interviews must be completed to generate robust results. As a rule of thumb, interviews should be conducted until similar themes start to emerge across interviews. Approximately 40 interviews are recommended.
- The interview methodology should be consistently applied throughout the process.

Data collection and analysis

Data collection represents another step in the diagnosis phase of the analytical framework, and is an integral part of the country review. Consequently, it may be useful to examine how data is compiled for inclusion in the final report. See Figure 26 below for a depiction of data collection and analysis throughout the assessment.

Figure 26: Information flow for country reviews



Source: ITU

- i. **Desktop research indicators.** The earlier desktop research should be supplemented with additional desktop research, some of this will be digging deeper into existing areas, and other material may be research into documents or topics suggested during the interviews and workshops.
- ii. **Key themes per pillar.** Information about strengths, weaknesses and activities associated with each pillar is collected through stakeholder interviews. This information is aggregated into a set of overarching themes for each pillar, noting areas of common agreement, but also areas of disagreement and notable features of the ecosystem.
- iii. **Stakeholder interface canvas.** The stakeholder interface canvas is completed to map stakeholder activities to support start-ups. Areas identified as gaps or weaknesses can be identified as needs, and strengths often become good practice.
- iv. **Key policy scenarios.** Policy scenarios are based on the desktop research, themes from interviews and gaps identified in the stakeholder interface canvas. These are the major needs of the ecosystem that the recommendations will need to resolve.
- v. **Priority objectives.** Priorities are drawn from a country's national strategy, and statements from or discussions with leadership in the country. To create an enabling environment for innovation policy, it is important to signal awareness of key political priorities to political leaders.
- vi. **Local good practices.** Local good practices are identified throughout the process, generally coming from strengths in the interviews and highlights from the stakeholder canvas. These can cover any number of areas, reflecting whatever is being done successfully in the ecosystem, but are particularly important if they answer needs as well. They enable stakeholders, leaders and champions to support the evolution of the innovation ecosystem.
- vii. **International good practices.** With some of the key needs and political objectives identified, international good practices that answer those needs and objectives are researched. These are discovered through desktop research and are used to bolster the overall portfolio of good practices. A collection of good practices is being developed by ITU in order to facilitate this identification process, with the practices identified based on the areas of the stakeholder canvas they address.

- viii. **Programmes and recommendations.** These represent the culmination of the data collection and analysis process. They are developed as action steps or specific policy or project recommendations responding to policy scenarios and political objectives, based on good practices. These recommendations should answer the most important needs identified during the process, support political objectives which would build support, and be grounded in good practices which are shown to address the needs.

A preliminary report should also be drafted upon completion of this phase. The contents should include an introduction and context setting, a current state analysis, a holistic overview, priority objectives, and recommendations. The completed report should be shared with stakeholders for review and commentary.

Hosting a validation workshop

A validation workshop is conducted to share the first version of the country review summary report and collect feedback from stakeholders. During the workshop, the initial findings for each pillar are shared with stakeholders.

Reviews and updates

This workshop also presents an opportunity to fill data collection gaps. For example, the stakeholder interface canvas can be completed if it was not finished during the visioning workshop. Initial findings can be corrected or further developed based on stakeholder feedback. If additional stakeholder interviews are required, they can be conducted as well. Once the report is finalized, it should be released via a public launch event attended by all key stakeholders.

Implementation and launch

During the public launch, dialogue about how to implement recommendations to improve the innovation ecosystem is likely to ensue amongst stakeholders. This is expected and welcome. However, as the assessment process transitions into implementation, a robust M&E framework should be developed to measure progress.

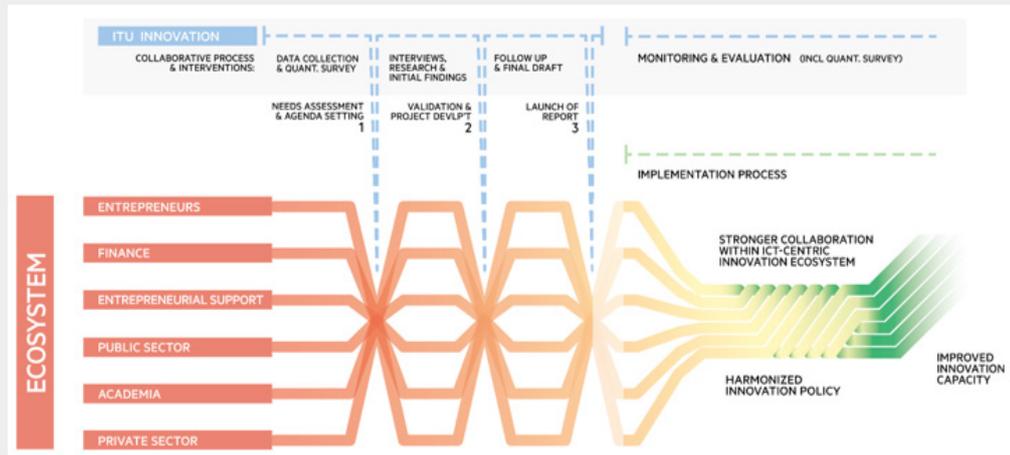
2.2.2 Monitoring and evaluation

During the country-level assessment process, stakeholders are convened to create a vision for the ecosystem, explore their roles in stimulating innovation within an ecosystem, and develop a plan, through policy recommendations and programmes, to actualize that vision. Because a country review is launched to cultivate opportunities to improve the ecosystem, measuring progress is an indispensable part of the process. As such, in this section we will outline a high-level framework for monitoring and evaluation.

Box 6: Changing behaviours of stakeholders – process framework

As illustrated in the process flow below, the country review process aims to strengthen the behaviour of the stakeholders during various workshops, interviews and surveys.

Figure 27: Country review process framework



Source: ITU

The foundation of the framework is understanding that the active engagement of stakeholders who are motivated to improve the ecosystem is paramount.

As such, closing the innovation divide is contingent upon two key elements: 1) stakeholder commitment to the process when it starts; and 2) and institution to ensure their continued engagement as it unfolds.

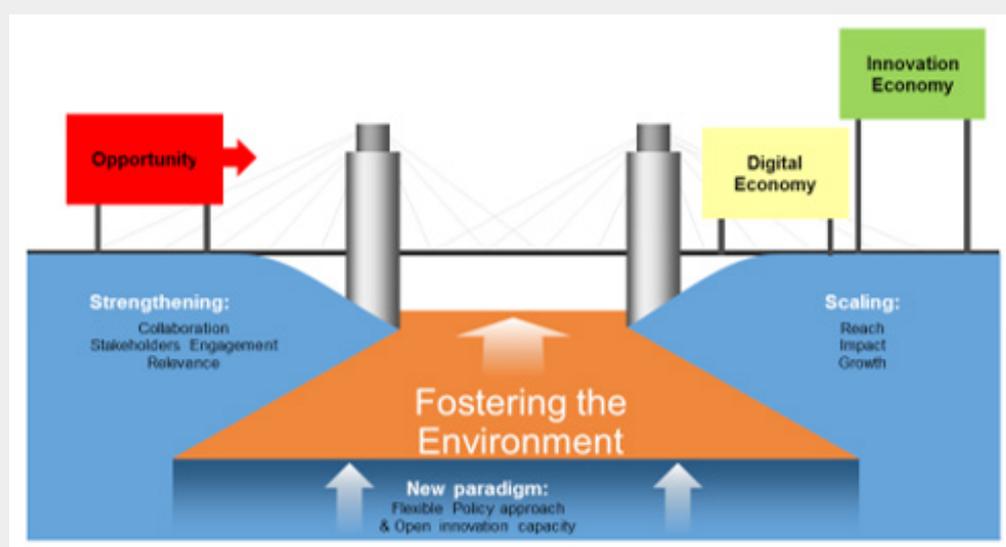
- 1) **Catalysing the ecosystem.** Participating in workshops and interviews can inspire a sense of purpose and ownership over the innovation ecosystem amongst stakeholders, especially those that feel excluded.
- 2) **Empowering an intermediary institution.** An institution with a mission to guide the development of the ecosystem should be created. Given how critical this institution role is to the success of the ecosystem, existing institutions should not take this responsibility, as they may have been ineffective in that capacity in the past. The new institution will be responsible for monitoring ecosystem progress, which includes linking specific activities to the appropriate actors and resources.

Box 7: Building the right bridge

Strengthening an innovation ecosystem is similar to building a bridge for entrepreneurs to cross the “valley of death”, moving from the development of an innovation, through to success as a start-up. The strength of this bridge will depend on engagement of each stakeholder in taking action.

The ultimate goal for an ICT ecosystem is to have all stakeholders contribute to this goal by bringing forward key ingredients unique to their role.

Figure 28: Building bridges in innovation ecosystems



Source: ITU

As the process of acting on the recommendations of a country review goes forward, two major steps are needed in order to ensure that they are having the intended impact in the ecosystem. First, there should be measurable targets attached to as many of the recommended projects as possible. Second, there should be a commitment to periodic repetition of the country review process to monitor progress and guide further action. Together, these actions create a critical space for policy experimentation and adaptation going forward from a country review.

- 1) **Measuring progress.** As with any project, programme or policy, it is critical to incorporate key performance indicators and targets in the recommendations of the country review. This is noted in the ‘mission achievement criteria’ section of the policy canvas above. These targets should be clearly measurable, either through specific outcomes of the activity or through broader social or economic statistics. It is especially important to honestly undergo these measures when policies do not match expectations or meet targets. In those situations, recommendations can be revised in order to become more effective, as discussed under policy experimentation, below.
- 2) **Country review iteration.** In addition to the measures attached to the individual projects, the country review process should be repeated periodically. The ecosystem and stakeholder interface canvasses will provide important information on how the ecosystem’s seven pillars evolve and based on the recommendations from the initial review. It might not be necessary to repeat the entire process, by some of the components should be rerun in order to provide measurement of impact. Based on these iterations of the review process, additional recommendations might be proposed, and existing recommendations might be removed, or revised to better meet evolving needs.

- 3) **Policy experimentation.** Policy experimentation was mentioned above as one of the guiding principles of the process. It becomes central during the measurement and evaluation process. As the recommendations are implemented and their progress measured, both through the impact of the individual programmes, and the overall status of the ecosystem, they should be changed based on those experiences. Failure should be embraced as an opportunity to learn and adopt policies that better address the ecosystem needs.

Section 3: Bridging the digital innovation divide

3 Case studies, monitoring, and evaluation

This section provides examples of how two countries navigated the country review process and outlines an approach to measuring progress. We will begin by reviewing brief case studies of country A (a low income country with factor driven economy) and country B (a middle income country with a factor driven economy), which include basic background, current state analysis of their ecosystems by pillar, implications, priority policy objectives, and recommendations.

3.1 Case 1: Exploring the ICT innovation system of country A, a low income, factor driven economy

Country A has been anonymized for reporting in this toolkit, but all country reports will be available once approved by the various administrations. Country A is classified as a low income country by the World Bank definition, and a factor driven economy by the WEF.

The country review process is designed to promote understanding of the landscape of the country's ecosystem, enable policymakers and key stakeholders to identify strengths and weaknesses, embed ICT, and help realize the benefits of creating an innovation driven economy. Although the country has worked to build its ecosystem by investing in hard infrastructure such as fibre optic connectivity and creating an enabling environment for doing business, it needs to increase affordable access, improve the investing landscape, and support enabling institutions.

3.1.1 Background

Country A has enjoyed significant socioeconomic progress, but challenges remain. According to key development indicators, the county has made great strides in health, education, and gender quality. It achieved its MDG goals by 2015 and has universal school enrolment. Additionally, the country has a good environment for doing business, strong rule of law, and benefits from its membership in regional organizations, such as economic communities, development and technology alliances, and others.

From a macroeconomic perspective, the country's GDP has grown at 8 per cent since 2001. However, its GNI per capita is just USD 700, and most its citizen depend on subsistence farming.

Educational gains are also limited; literacy and higher education enrolment rates remain low. With respect to enabling conditions for innovation, challenges also abound. Although internet access has improved due to the growth in mobile phone subscriptions and the government's investment in a fibre network, it remains constrained by cost, low usage rates, and lack of access to electricity. As such, the country ranks low on the ICT Development Index, regionally and globally.

Box 8: Background research – Country A

Background information similar to what is presented above can be compiled using the desk research required to understand the ecosystem canvas pillars. This is described in part one of the country review process. The content of each pillar is informed by specific datasets, indexes or other research, along with primary sources such as strategy or policy documents.

In the case of country A, some of the desktop research was completed before the first visit. This includes reviewing the ICT Development Index, the Global Entrepreneurship Index, the Global Innovation Index, World Bank data, and government statements on ICTs and innovation. This baseline information was used to provide context for the review process and develop participant lists for the first workshop.

After stakeholder interviews were conducted, key documents and additional supporting data were collected to compliment or contextualize stakeholders' opinions. This included additional research on strategy documents, policies, written analysis of the country (such as in blog posts or on investment portfolios), and statistics collected by government ministries. The output of this process is summarized below in the background section of the case study for country A.

3.1.2 State of ICT innovation ecosystem

While the country has made demonstrable progress on its development goals and invested in basic infrastructure, opportunities to improve remain. The national strategy and development efforts have been impactful, but there is still much to accomplish, as can be described by two overarching themes. First, the country needs to create a foundation for success. Development strategies have contributed to that goal, but its digital markets and the resources required to build the ecosystem (human capital, investment, networks) must be cultivated. Secondly, the leadership of ecosystem building should transition from the government to the private sector. During the country review process, the ecosystem canvas was used to capture ecosystem insights from stakeholders across seven pillars.

A summary of stakeholder assessment of each pillar offers a useful overview of the state of the ecosystem:

- 1) **Vision and strategy.** The country ICT strategies have created a foundation for the ICT innovation ecosystem, while adequately engaging ministries and stakeholders. However, leveraging private sector engagement and leadership can further stimulate progress.
- 2) **Infrastructure and programmes.** As mentioned above, the government investment in fibre optic cable improved the country's ICT infrastructure. However, access to that infrastructure is constrained by cost, limited awareness, and last mile solutions. Additionally, soft infrastructure development outside of capital city is limited.
- 3) **Talent and champions.** Country A has a talent gap across multiple categories—technical, soft, and support skills. A key contributor is the lack of hands-on training available through the education system, which leads to graduates who have low levels of experience and knowledge. However, changes are underway to update university curricula and introduce ICT training into secondary education. The ecosystem has also done a good job of importing talent into the country.
- 4) **Capital and resources.** In country A, there are few investment resources for start-ups and growing companies. Government contracts and international development funding are the

predominant sources of support, although there are some international investment resources. Initiatives to improve the investing landscape include creating a national investment fund.

- 5) **Markets and networks.** Country A size and its population's limited engagement with ICT means that its digital markets are also limited. However, given the strong environment for doing business, there are opportunities for the country to establish regional leadership through membership in the regional communities. However, existing networks should be recognized as stakeholders and ICT clusters need further growth and enrichment.
- 6) **Culture and communities.** Entrepreneurial interest among young people is strong and communities have emerged to support that interest. But culturally, risk tolerance is low due to the conservative culture and limited ability to absorb financial risk.
- 7) **Policy and regulation.** Actors in the public sector own their ecosystem-building roles, as have the ministries, which are engaged in the country's development strategies. However, there is room for building partnerships.

Box 9: Current state – Country A

Using the google form after each interview was uploaded, the following overarching themes were derived regarding Country A:

- Preparation for success in infrastructure and strategy
- ICT use and markets are still underdeveloped
- Ecosystem is still at a very early stage
- There is a need to prepare to shift innovation leadership to the private sector

To summarize, in the word of an ecosystem stakeholder:

“As a country we have all these good ideas, but when it comes to supporting a project financially, it's more difficult. Investors need to step up and help.”

3.1.3 Implications for ecosystem insights

There are three main implications for the ecosystem insights described above. They are as follows:

- 1) Country A should create a new framework for policy experimentation. The government has taken important initial steps to develop effective innovation policies. However, stakeholders need to be more engaged in designing and implementing policy.
- 2) Stakeholders need to recognize their roles and invest in policy outcomes. Not only should stakeholders in the ICT innovation ecosystem take their roles seriously, they need to be invested in policy outcomes. To accomplish this, better tools for understanding the ecosystem as well as identifying and sharing good practices are needed.
- 3) Learning from good practices developed domestically and internationally is critical. There are many good practices within the country and abroad that can be applied to build the local ecosystem. Adopting such practices is a critical element of policy experimentation. To maximize impact and relevance, key actors should focus on those that relate to the recommendations for the country's ecosystem, specifically.

Box 10: Ecosystem insights – Country A

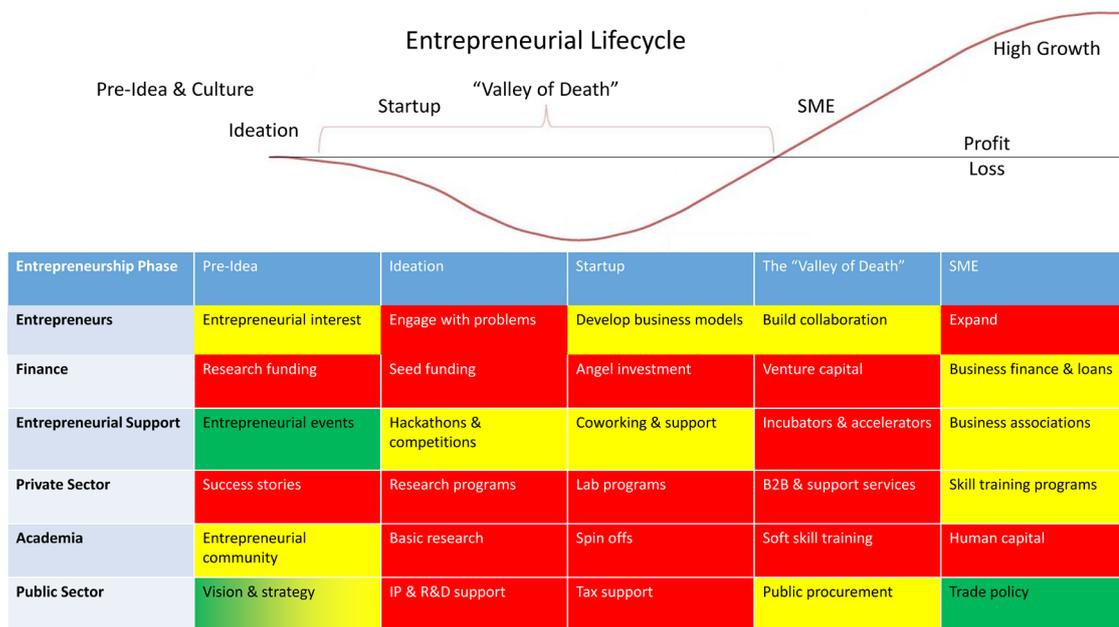
The ecosystem and pillar insights described in this case study were gathered with the qualitative interviewing tool, which is typically used to complete the ecosystem canvas. By aggregating interview insights to create descriptions of ecosystem pillars, which is described in steps 2 and 3 of the country review methodology, a current state analysis similar to what is detailed above can be developed.

In this country, an initial workshop with ecosystem stakeholders was organized to launch the country review process, focusing on the common priorities and needs among them. During the workshop, the ecosystem canvas was utilized to articulate an ideal future state, a current state, and existing gaps.

The stakeholder interface canvas was also used to map which stakeholders were already active, and what roles they played in the ecosystem. Those stakeholders were then approached for follow up interviews over the course of two site visits, supplemented by telephone interviews. Although telephone interviews are not ideal (given limitations around flow of information and non-verbal cues), they were needed to navigate scheduling challenges. In total, 32 stakeholders were interviewed, and 71 took part in workshops.

3.1.4 Stakeholder interface canvas

Figure 29: Colour coded stakeholder interface canvas for country A



Source: ITU

Box 11: The stakeholder interface canvas - country A

The stakeholder interface canvas is filled out during the first workshop as part of the current state analysis. After revisions are made based on initial interviews, it is reviewed during the validation workshop. The process takes place between steps 2 and 5 of the country review process described above.

An initial version of the stakeholder interface canvas was developed with stakeholders during the first workshop. They were asked to record their activities on the canvas and provide a general evaluation of how successful they were. This initial canvas was revised and completed using information gathered through the interview process. During the validation workshop, the participants reviewed this document and revised it based on their knowledge of the country. These revisions were then used as the basis for the final canvas presented above. (See Figure 27)

3.1.5 Priority objectives

Identifying priority ICT objectives that are relevant to policy leaders and reflect what is defined as strategic in a country's national agenda is an important part of the country review process. Recognizing these priorities increases the likelihood that they will be viewed as complementary to national strategies. In the case of country A, three priority objectives were identified in order to align recommendations with political priorities and the national agenda as well as position them as strategic imperatives. They are as follows:

- 1) Position the country as an ICT leader. As previously mentioned, country B can become a regional, and, global ICT leader by focusing on emerging subsectors such as Internet-of-Things (IoT) and smart cities.
- 2) Develop the ICT sector and innovation ecosystem. There are a number of key interventions that could bolster the country's ICT sector and improve its ecosystem. With respect to human capital, cultivating appropriate talent to join start-ups, conducting catalytic research, and addressing local problems should be encouraged. From a markets and ecosystem perspective, improving ICT access and updating laws to support entrepreneurship and innovation would be impactful.
- 3) Emphasize local needs. The country's innovators need to focus on domestic consumers and address local needs. Businesses would benefit from clusters designed to give them access to B2B services and promote collaboration. Also, innovators could work to improve public services.
- 4) Build infrastructure, markets and trust. Access to infrastructure remains a challenge due to cost, lack of last mile solutions, low perception of value and awareness, and limited usage. Improving access as well as lowering the cost, making ICT relevant by using it to solve local problems, and increasing security to enhance public trust, could help surmount these challenges.

Box 12: Priority objectives - country A

Priority objectives are developed by examining the outcomes of the ecosystem canvas and stakeholder needs analysis and following the process for setting priority objectives described in the country review process above.

Some priorities will emerge from political considerations, in which case project recommendations will be matched to stakeholder needs. Other priorities will emerge from the needs analysis, and project recommendations will be synchronized with political priorities.

The outcomes of the workshops and interviews were aligned with strategic priorities defined by the ministry and distilled from discussions with ministry staff. For example, completing last mile infrastructure and aiming for ICT sector leadership were goals expressed in existing strategy documents.

As a result, recommendations were developed to support those objectives. The ecosystem development focus was derived from stakeholder needs, but this objective also complemented strategy document goals generally, as well as the regional ICT leadership imperative specifically. The emphasis on addressing domestic needs came from a desire to improve ICT adoption described in strategy documents, as well as the opportunity to strengthen the market for ICTs described by stakeholders.

3.1.6 Recommendations

- 1) **Broaden the pool of human capital.** The ecosystem requires trained human capital to meet the demands of the ICT innovation ecosystem. To deepen its talent pool, young people interested in ICT careers and tech entrepreneurship should be given a roadmap on how to access these opportunities. For example, the private sector and academia could partner to provide learning experiences such as internships, training, and mentorship.
- 2) **Incentivize entrepreneurs and innovators to address the ecosystem challenges.** The efforts of entrepreneurs should be redirected to focusing on problems that are relevant to the country. Organizing gatherings such as hackathons, pitch competitions and challenges focused on local problems may help inspire and engage entrepreneurs.
- 3) **Continue to develop and improve access to ICT infrastructure.** Although the quality of infrastructure in the country is high, poor people and those in rural areas cannot easily access it to due to cost, limited awareness of the benefits and value of ICT, and lack of last mile coverage. To address this issue, subsidies can be introduced to reduce the cost of access and help people to understand how ICTs can improve their daily lives. Ensuring infrastructure security is also a priority.
- 4) **Build a community of support for entrepreneurship.** To be successful, entrepreneurs require multiple dimensions of support across all stages of development. They need access to B2B services to build their businesses and a pipeline of investors who will fund them from seed to growth, whether that is traditional venture capital or diaspora-driven crowd-funding.
- 5) **Establish a regional digital market.** Country A can solidify its position as an ICT leader in the region and overcome the growth constraints of its start-ups due to its limited size by promoting regional digital market cooperation.
- 6) **Update laws to engender support for start-ups and young businesses.** Amending laws that govern issues such as taxation, immigration, IP protection, procurement, and law enforcement would facilitate the growth of entrepreneurship and innovation.

- 7) **Create a partnership framework.** A formal platform for cooperation would encourage dialogue between the private and public sectors, connect their activities to stakeholder needs, and create a foundation for monitoring the progress of ecosystem initiatives and the ecosystem as a whole.
- 8) **Develop and implement recommendations.** The country has earmarked a budget of twenty million dollars contributed by the public and private sectors and international organizations to fund projects to support the ecosystem.

Box 13: Recommendations – country A

These recommendations represent key outcomes of the country review process. They are developed by compiling insights from interviews and the stakeholder interface and ecosystem canvasses, and using them to identify key projects or policies that can address the needs of the ecosystem.

After initial research, interviews, and the first workshop were conducted, a preliminary set of findings were prepared for the validation workshop along with a first draft of recommendations, as described in the country review. Stakeholders were asked to validate the findings and use the project canvas to provide initial thoughts on the recommendations. The updated findings, political objectives, and recommendations feedback were compiled. Final recommendations were then developed by assessing needs and gaps and proposing projects or policies that could address them. Ideally, these recommendations should be based on domestic or international good practices and constructed using the project canvas to outline specific details.

For the country, it was critical to deliver a set of recommendations that could be quickly implemented by the ministry. Based on these recommendations, specific projects were developed for the country. These projects, with budgets and key activities, amounted to a roadmap for the country digital transformation, together with the innovation agency, they form the basis for catalysing the ecosystem.

3.2 Case 2: Exploring the ICT innovation system of country B, a middle income, factor-driven economy

The country review process is designed to promote understanding of the landscape of the country ecosystem, enable policymakers and key stakeholders to identify strengths and weaknesses, embed ICT, and help realize the benefits of creating an innovation driven economy. The country has worked to improve its ecosystem—government has improved access to ICTs; support programmes and networks have emerged; and entrepreneurs are active. Nonetheless, more work is needed to enable the country to fully reap the benefits of being an innovation-driven economy.

3.2.1 Background

Country B is a middle-income country with a nascent, but growing ICT innovation system. Macroeconomic indicators are positive; prior to the 2008 global financial crisis, the country GDP growth was 6.4 per cent, one of the highest rates in its region. In 2016, it was estimated to be 3.2 per cent. However, a digital divide, or a disparity in access to the internet and ICTs, persists. ITU statistics indicate that internet penetration in the country is strong, a reported 63.25 per cent in 2016, up from 45 per cent in 2010. However, the distribution of ICT-enabled benefits in terms of services, jobs, and opportunity, is unequal. For example, in 2015, according to the World Bank, only 38 per cent of adults had bank accounts. Additionally, 17.3 per cent of adults and 32.1 per cent of young people were unemployed.

Box 14: Background research – country B

The background information described above is rooted in desktop research informed by the ecosystem canvas pillars, as described in the country review process. Content for each pillar is developed using specific datasets, indexes or other research, as well as primary sources such as strategy or policy documents.

Much of the data for the country was drawn from sources such as the ICT Development Index and the World Bank. As with country A, additional data was drawn from government statistics. Additionally, there was a significant amount of information that was gleaned from academia research in the country, notably on the diaspora community and the labour market. A final key source is the regional organization data, because it is connected to extensive economic and legal monitoring.

3.3.2 State of ICT innovation ecosystem

As mentioned previously, the ecosystem is young but growing, and key stakeholders appreciate their roles in supporting it. Nonetheless, opportunities to develop and evolve remain. During the country review process, the ecosystem canvas was used to capture ecosystem insights from stakeholders across its seven pillars. A summary of stakeholder assessment of each pillar offers a useful overview of the state of the ecosystem.

- 1) **Vision and strategy.** Efforts have been made to create an enabling environment for ICT innovation in the country. However, these efforts do not always inspire collaboration and coordination, nor do they completely address the needs of the ecosystem.
- 2) **Infrastructure and programmes.** In urban areas, hard infrastructure is good, but access remains limited and costly in rural areas. The government has also worked to develop soft infrastructure such as training programmes, but they are less prevalent in rural areas.
- 3) **Talent and champions.** There are members of the talent pool, such as university graduates, with an interest in ICT and entrepreneurship. However, they do not receive the practical training necessary to meet the needs of the ecosystem, such as staffing tech enterprises. Additionally, many talents leave the country for better opportunities, which contributes to brain drain. Public and private actors are trying to build the talent pool through training and certification programmes, but more efforts need to be made.
- 4) **Capital and resources.** The investment landscape is weak across the start-up life cycle, from seed funding (angel investors and small VCs) to growth capital (larger VCs and private equity). Again, efforts to bolster funding resources should be improved.
- 5) **Markets and networks.** Because the ecosystem is in a small country, start-ups will have to expand into other regions in order to grow. There are networks that foster cross-border trade and their efforts should be expanded.
- 6) **Culture and communities.** Young people in the country want to pursue innovation and entrepreneurial opportunities and there are programmes and networks emerging to encourage them. However, a low tolerance for risk and lack of trust in the culture hampers entrepreneurs, while enabling institutions are impaired by limited funding and support for their activities, and insufficient coordination amongst each other.
- 7) **Policy and regulation.** The overall ICT policy environment in the country has improved due to the introduction of innovation-focused strategies and policies, progress on e-governance projects, and in addition regional integration process. Procurement processes have also improved, but in general, challenges still remain with taxation, IP protection, and ecosystem support. Notably, the

country's overarching challenge to implementing policy recommendations is for stakeholders to recognize the importance of their roles in building the ecosystem, and commit to delivering policy outcomes.

Box 15: Current state - country B

Using the google form after each interview was uploaded, the following overarching themes could be derived regarding country B:

- Some progress has occurred in developing strategies, but there is insufficient coordination on stakeholder roles
- ICT is not seen as a strategic sector, and thus lacks support
- Large talent pools, with multi-lingual capabilities, exist but do not meet the need of ecosystem
- There is ambition, but risk aversion, trust, and lack of synergies are holding back the ecosystem
- Domestic market size is limited, and global growth underexploited

To summarize, in the word of an ecosystem stakeholder:

“People run in different directions, there is no common strategy to my knowledge.”

3.2.3 Implications for ecosystem insights

There are three main implications for the ecosystem insights described above. They are as follows:

- 1) There is a need for a new framework for policy experimentation. The government has taken important initial steps to develop effective innovation policies. However, stakeholders should be more engaged in designing and implementing policy.
- 2) Stakeholders need to recognize their roles and invest in policy outcomes. Not only should stakeholders in the ICT innovation ecosystem take their roles seriously, they need to be invested in the outcomes. To accomplish this, better tools for understanding the ecosystem, as well as identifying and sharing good practices, are necessary.
- 3) Learning from good practices developed domestically and internationally is critical. There are many good practices within the country and abroad that can be applied to build the country's ecosystem. Adopting such practices is a critical element of policy experimentation. To maximize impact and relevance, key actors should focus on those that relate to the recommendations for the ecosystem, specifically.

Box 16: Ecosystem insights – country B

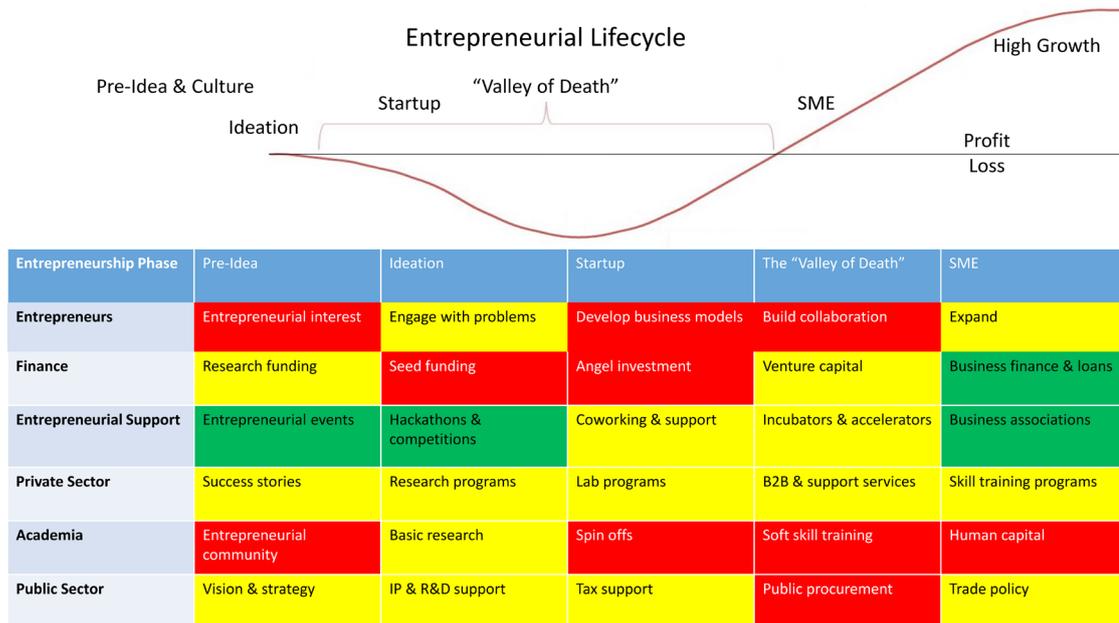
The ecosystem insights described above, both for specific pillars and broader themes, are drawn from the qualitative interview process, incorporating information from desktop research. The results of the interviews are used to describe the current state based on ecosystem canvas insights, as outlined in Steps 2 and 3 of the country review process.

An initial workshop was organized to develop a set of community goals, priorities and needs. Following this, a series of stakeholder interviews were conducted. These interviews contributed significant amounts of data to the ecosystem canvas, but some gaps remained, including additional stakeholders who were referred by existing stakeholders. These stakeholders were interviewed during a second visit, while also reconnecting with original stakeholders to validate additional findings. Also, many respondents suggested documents or datasets that would help complete the desktop research.

To generate the current state analysis presented above, the desktop research and interviews were analysed to develop key themes and insights. In total, 43 stakeholders were interviewed, and 60 to 70 took part in the workshops.

3.2.4 Stakeholder interface canvas

Figure 30: Colour coded stakeholder interface canvas for country B



Source: ITU

Box 17: The Stakeholder interface canvas – country B

The stakeholder interface canvas is completed using information from stakeholder interviews and revised during the validation workshop based on feedback, as described in the country review methodology. An online survey is used to validate the findings.

After the stakeholder interviews, an initial version of the stakeholder interface canvas was completed as part of the preliminary findings. (See Figure 28.) During the validation workshop, this version of the canvas was presented, leading to a discussion amongst the stakeholders about the state of the ecosystem, and how best to revise the canvas. To supplement the canvas, an online survey was conducted and new insights were used to make adjustments where there were discrepancies between the workshop input and interviews.

3.2.5 Priority policy objectives

Identifying priority ICT objectives that are relevant to policy leaders and reflect what is defined as strategic in a country's national agenda is an important part of the country review process. Recognizing these priorities increases the likelihood that they will be viewed as complementary to national strategies. In the case of country B, three priority objectives have been identified in order to align recommendations with political priorities and the national agenda, positioning them as strategic imperatives. They are as follows:

- 1) **Public service delivery.** E-governance projects have been implemented successfully and efforts should continue to leverage ICTs to increase the efficiency, effectiveness, and transparency of public service delivery. However, designating ICT as a priority sector and creating a public services cluster linked to an ICT innovation cluster would greatly enhance these efforts.
- 2) **Fostering success stories.** Amplifying the success stories of entrepreneurs who raise late stage funding, expand internationally, or exit via IPO or acquisition would inspire younger entrepreneurs. This type of visible success would also incentivize investors to participate and help enabling organizations generate the pipeline required to garner more support for their activities. Deepening the pool of human capital, encouraging collaboration, promoting internationalization, and improving deal flow are all key components of this effort.
- 3) **Rural development.** Despite the government efforts to provide hard infrastructure, citizens in rural areas do not experience those benefits equally. As such, part of the push to make ICT a strategic sector should include making ICT access in rural areas equitable and affordable. Mapping local ecosystems and linking ICT clusters to industry clusters focused on agriculture and tourism will support that process.

Box 18: Priority objectives – country B

Priority objectives are developed by examining the outcomes of the ecosystem canvas and stakeholder needs analysis, and following the process for setting priority objectives described in the country review process. Some priorities will emerge from political considerations, in which case project recommendations will be matched to stakeholder needs. Other priorities will emerge from the needs analysis, and project recommendations will be synchronized with political priorities.

In country B, there were three major components of the political agenda. First, strategic objectives were outlined in strategy documents. Secondly, the ministry and other representatives of political leadership shared their goals and interests. Thirdly, there are priorities articulated through the EU accession process and the development agendas of international organizations. The first priority objective listed above, focused on public service delivery, is a logical extension of the country's national innovation strategies. With the second priority, success stories, the ministry was interested in seeing them emerge from the innovation ecosystem. Rural development, which was the final priority, was important to both the ministry and international organizations. All three of these goals aligned with the gaps, needs and priorities described in the stakeholder interviews. This simplified the process of developing the objectives because most of the report recommendations supported the political objectives.

3.2.6 Recommendations

- 1) **Designate ICT as a priority sector.** The role of ICT in the country B economy should be acknowledged and policies developed to cultivate that role. Relevant policy changes might include implementing a tax regime that is favourable to start-ups and mature businesses, investment in improved infrastructure, facilitation of technology transfer and licensed production, trade promotion for the ICT sector, removal of tariffs and taxation from hardware and software, capital investment, and strengthened IP enforcement. Acknowledging the role of ICT would also create an anchor to link government ministries that are influenced by ICT and enable them to work together.
- 2) **Map the ecosystem.** Ecosystem mapping and community building helps identify local needs and facilitate collaboration amongst stakeholders. Mapping across the country, as well as within local communities, will establish what the priorities and critical needs are as well as identify what resources are available to address them. Having a clear picture of where there are overlaps and gaps also contributes to coherent policy development. Finally, needs assessment through mapping ensures that resources are channelled to effective programmes, which enables meaningful change.
- 3) **Build the talent pool.** The country's pool of human capital must be cultivated to meet ecosystem requirements, such as staffing innovative start-ups. Recent university graduates often need extensive training before they are job-ready. Ecosystem stakeholders are tackling this challenge through collaborations between the public and private sector, as well as certifications and trainings. However, broader engagement from stakeholders such as public ministries and universities would help create a shared platform upon which to pursue novel partnerships.
- 4) **Improve the pipeline.** Increasing deal flow is contingent upon start-ups receiving the type of support, e.g. training, mentorship, investments, etc. that drives growth. However, the organizations that provide this assistance need enough high-potential start-ups in the ecosystem to justify their existence and garner support for their activities. Once resources in the ecosystem—entrepreneurs and enablers—reach critical mass, then a virtuous cycle forms to catalyse the

success of entrepreneurs, support organizations, and the ecosystem as a whole. To jumpstart this cycle, more enablers are necessary to assist new businesses at each stage of the life cycle.

- 5) **Cultivate international markets.** Again, because the country is small, its start-ups will need to expand outside of the country to grow and tap the well-resourced diaspora community for expertise and funding. Sourcing and applying good practices from outside the country will also help the ecosystem grow.
- 6) **Foster collaboration.** ICT is an enabler of innovation because it cuts across sectors and creates an environment for cross-pollination. As such, creating collaborative clusters to connect related industries in the private sector, academia, and financial actors can stimulate the process of innovation. This gives the country an opportunity to build innovation capacity and support its ICT sector, become an innovation leader in sectors such as agriculture and tourism, and enhance the strength of these sectors.
- 7) **Empower an institution to build bridges.** Creating an implementation framework delivered by an institution designed to work between the private and public sectors and create linkages between policy, programmes, and stakeholders would advance the policy formulation process. This institution would promote a transparent collaboration between public and private actors, while creating the conditions for a co-led innovation agenda.

Box 19: Recommendations – country B

These recommendations represent key outcomes of the country review process. They are developed by compiling insights from interviews and the stakeholder interface and ecosystem canvasses and using them to identify key projects or policies that address ecosystem needs.

Based on desk research, workshop output, and stakeholder interviews, initial findings and brief recommendations were developed for the validation workshop. This early draft of the report findings was discussed and evaluated by a group of stakeholders in the second workshop. Notably, stakeholders were encouraged to discuss needs and identify common issues. Their feedback, including shared challenges, was integrated into the findings and recommendations, which provided a platform for collaborative projects. These recommendations were contextualized by connecting them with political objectives and good practices, both domestic and international. They were also constructed in a way that projects could be easily developed based on them.

3.3 Common needs and good practice

In the above case studies and other country reviews, a number of common themes emerged. The following five needs are shared across a wide range of ecosystems, and are presented with good practice toward resolving them, as examples of topics which can be addressed and frameworks for recommendations which might emerge from country reviews: leadership, resources, talent, nurturing environment, and markets.

3.3.1 Leadership

Ecosystems need leadership in order to ensure that the needs of ICT entrepreneurs are addressed by a continuum of interrelated services that work toward a common goal. Thus, guiding innovation activities is a key activity in many ecosystems, and a major gap in many of them. Because every ecosystem is unique, each requires a different structure for this leadership, such as an innovation agency, an innovation department, or simply empowering existing institutions to engage with the ecosystem. The type of institution often has a public private character, or clear engagement framework with the private sector, while rooted in public sector.

Box 20: Good practice – innovation agencies

Many ecosystems have strong visions and strategies, but it should be noted that these are not a substitute for ongoing leadership. Leadership means providing anchors, roadmaps, and ongoing coordination and guidance to take action on the vision and strategy. In the words of one ecosystem stakeholder:

“We have a clear vision, a clear strategy, but we have no way point to work toward, or support in achieving this vision”.

Deliberate assessments and initiatives are needed to guide innovation activities. In this way an innovation agency can serve a critical role in the ecosystem. In a study of various innovation agencies worldwide, Nesta* proposed a model for a new type of innovation agency to coordinate interventions for the ecosystem by the following:

- Orchestrate the matching of demand and supply
- Undertake direct and indirect actions to support ecosystem
- Foster partnerships
- Coordinate the balance between policy interventions and political support
- Network with domestic and international experts
- Help navigate a changing ICT sector and emerging technologies

*Nesta is an innovation foundation, see: www.nesta.org.uk/sites/default/files/how_innovation_agencies_work.pdf

3.3.2 Resources

In mature ecosystems, a continuum of resources exist to help ICT innovators successfully survive the innovation lifecycle. In many countries, even in the global north, there is seldom a complete, coordinated portfolio of resources available for innovators. Grants, pre-seed competitions, seed capital, venture capital, angel investment, crowdfunding, R&D funding, private equity, to name a few, all play critical roles in this continuum. Analysing the gaps and addressing the needs is important. This can be done through policy to stimulate resource availability, or programmes to provide risk capital. The overall aim is to ensure critical deal flow in the ecosystem, at the right stages of innovation. These resources allow bootstrapping and growth opportunities, and the investors that provide them need to be aligned with the ecosystem needs.

Box 21: Good practice – Securities and Exchange Commission, Thailand

SMEs represent 37 per cent of GDP and 78 per cent of total employment in Thailand, and one of their main challenges is raising capital to finance their businesses.

With crowdfunding rising as a viable alternative to traditional funding, the Security and Exchange Commission of Thailand has adopted supervisory rules on crowdfunding with the aim to enhance ecosystem competitiveness relative to other regional players.

Several successful platforms have been created to date under this law in Thailand and they are playing a critical role in strengthening the ICT ecosystem.

www.sec.or.th/EN/AboutSEC/Documents/strategy_crowd.PDF

3.3.3 Talents

A key ingredient for success in unlocking opportunity is talent. Education curricula are not adapting quickly enough to address 21st century skills requirements. In addition, talent flight and lack of experience key skills certain skills prevents many ecosystems from developing. Solutions are needed to address challenges, both in the short term (generally attracting talent) and over longer periods of time (generally strengthening education systems).

Box 22: Good practice – start-up Chile

Start-Up Chile is an accelerator programme run by the Chile Government which serves two key functions in developing the Chile ecosystem.

First, it attracts various start-ups and international talent to Chile by providing incentives (space, funding, support) for companies to launch in or relocate to Chile.

Second, it requires the founders of those start-ups to participate in social programmes to educate young entrepreneurs and foster entrepreneurs in Chile.

<http://startupchile.org/about/>

3.3.4 Nurturing environment

Innovators need support networks to provide space, resources, and training throughout the entire innovation process. Policy has a key role to play to enable such environments by lowering barriers to doing business, developing policies to strengthen support networks, and reducing risks for investor and ICT innovators alike. These programmes can be as simple as access to co-working spaces, or as complex as full incubator or accelerator programmes with access to fabrication hardware and full suites of business and technical training.

Box 23: Good practice – Gearbox/Fab lab, Kenya

Entrepreneurs requiring resources to prototype their products need access physical space and rapid prototyping equipment. The Gearbox model offers such spaces under different models.

A country can develop a network of fab labs and gearbox spaces in complimentary combinations to provide some key last mile infrastructure.

www.gearbox.co.ke

www.fablabrw.org

www.klab.rw

3.3.5 Markets

Innovators need access to domestic and international markets in order to foster start-ups. Many domestic markets are too small or lack sufficient access to regional and global markets for an innovation to be nurtured and become competitive. Public procurement and private sector demand can provide the seeds for growth, but deliberate efforts are needed to create necessary trade linkages, support, and networks, in order to ensure that business can scale and grow.

Box 24: Good practice – Hungary INPUT programme

Hungary has launched a start-up support programme for its ecosystem after wide consultations in the country that led to the Budapest Runaway manifesto. A subsequent project, funded by the EU, the INPUT programme aims to develop success stories for start-ups.

The programme has three pillars: education, mentoring and market access. The Hungary programme is a good example of government intervention to guide an innovation ecosystem with a facilitative approach to help resolve its challenges without creating market distortion. The programme seeks to grow the community supporting the start-ups via its innovative approach to building sustainable support networks, competitiveness, and talent growth.

www.inputprogram.com

The country review is meant to be a starting point for countries to strengthen the innovation ecosystem. This is akin to an onion peeling process, and new good practices can be tapped into with every new assessment. ITU is developing a good practice database that can be used as a basis for analysis and recommendations where gaps exist in an ecosystem.

4 Closing

This bridging the digital innovation divide toolkit strives to provide an overview of how to analyse and strengthen an innovation ecosystem. Transformative innovations developed by start-ups are not necessarily a result of new research or technology, but a direct consequence of dynamic, complex, innovation ecosystems composed of groups of well-connected, like-minded people. The ecosystem should allow innovative start-ups to act and move quickly through easy access to capital and talent, minimal bureaucracy, and creating a culture where taking risks is not punished.

To facilitate the emergence of dynamic ecosystems, the governments must work closely with entrepreneurs, investors, corporates and other interested players. ITU has received a specific mandate at WTDC-14 to help countries strengthen their capabilities to integrate ICT innovation into national development agendas. The aim of this is to foster ICT entrepreneurship, strengthen ICT firms and their expansion in the converging digital ecosystem, and to help with public sector transformation.

In light of this, ITU has been conducting country reviews of ICT-centric innovation ecosystems by bringing together, at the country levels six key stakeholders groups, academia, finance, public sector, private sector, entrepreneurs, and support organizations such as incubators, accelerators, mentor network, etc. ITU country reviews provide a digital innovation framework, where they can understand their challenges, opportunities in creating ICT start-ups, in nurturing talent, working hands-in-hands to develop specific guidelines and recommendations, as well as initiatives, programmes, and projects to help them create new jobs, new growth based on the best practices worldwide.

These reviews are concrete, specific, and measurable in outcome. They enable specific actions at the country level, but also provide a knowledge sharing at both the country level, the regional levels and the global level.

This toolkit is designed to help scale these initiatives and activities. The toolkit, the national workshops, the regional innovation forums, the global innovation track at WSIS, and various global dialogues, offer our membership a global innovation platform, where stakeholders can share, network, be empowered and take actions.

Key terms and concepts

Accelerator: A start-up service working with a start-up or entrepreneur for a fixed period of time and providing intensive mentorship and development services.

Angel Investment: Early stage investment intended to provide a boost to initially launch and develop a start-up. This funding is often provided by entrepreneurs, friends or families and connected with mentorship.

B2B Business to Business: Services or products from private sector companies intended to be used by other private sector companies.

Cluster: A geographic concentration of interconnected businesses, suppliers, and associated institutions in a particular field.

Collaborative Regulation: Regulation created by collaboration among all the various government agencies involved in overseeing the digital economy.

Crowdfunding: Financing a new venture, product or project by collecting small amounts of money from large numbers of investors, often in exchange for perks such as early access to the product.

E-Governance: The application of ICT to the delivery of government services, government communications and backend services and activities within the government.

Entrepreneurial Support: Programmes such as incubators, accelerators, labs, and other services that provide entrepreneurs with resources such as training, mentorship and business services.

Exit: A step in a business where the founder sells his or her investment in the company, often through sale or an IPO, limiting losses from a failing company or making profit from a successful one.

FDI Foreign Direct Investment: Investment in the form of a controlling ownership stake in a business enterprise in one country by an entity based in another country.

Fintech Financial Technology: The application of ICTs to make financial services more efficient.

GDP Gross Domestic Product: The monetary value of all the finished goods and services produced within a country's borders in a specific time period.

GNI Gross National Income: The sum of value added by all producers who are residents, plus any product taxes not included in output, plus income received from abroad.

Hard Infrastructure: Physical infrastructure to support businesses such as mobile and fixed connectivity, power, water, roads, physical plants, equipment and other elements.

ICT Information and Communication Technology: An umbrella term covering wireless and wired communication, the hardware and software related to them and their applications.

ICT-Centric Innovation Ecosystem: A description of an innovation ecosystem recognizing that ICTs are often at the centre of innovation, and have a cross cutting role in many other sectors of the economy.

ICT4D Information and Communication Technology for Development: The use of ICTs for the purpose of economic and social development, humanitarian response or promotion of human rights.

Incubator: A start-up service providing business services and training, early stage support and mentorship and often office space and communities for start-ups and entrepreneurs.

Innovation: The implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organizational method in business practices, workplace organization or external relations.

Innovation Ecosystem: The major stakeholders and processes supporting innovation and the establishment of new businesses in a particular area, and their associations and connections.

Investment Rounds: A series of investments made in a business intended to develop a business, each round focuses on a different stage of development, developing business models, expanding and scaling.

ISID *Inclusive and Sustainable Industrial Development:* Development in which all parts of society benefit from industrial progress, which provides the means for tackling critical social and humanitarian needs.

IoT *Internet of Things:* The incorporation of sensors, connectivity, software, automation and other ICT solutions to allow objects to collect and exchange data.

IP/IPR *Intellectual Property/Intellectual Property Rights:* The rights of persons over their creations. They usually give the creator an exclusive right over the use of his/her creation for a certain period of time.

IPO *Initial Public Offering:* The first time that the stock of a private company is offered to the public. This often raises significant amounts of capital, but shifts the company to a publicly traded firm.

MNC *Multinational Corporation:* A corporation that operates across national borders.

MOOC *Massively Open Online Course:* Training programmes offered to a wide community through online services.

Open Data Sandbox: A collection of tools and resources, combined with a collection of open datasets intended to allow experimentation in finding uses for those datasets.

Peer-to-Peer Lending: The process by which individuals lend their own money to other individuals or businesses directly generally through a mediating entity.

PPP *Public Private Partnership:* A public sector project or business venture executed through a collaboration between a government entity and a private business.

Seed Funding: Small amounts of investment, often in the form of grants or angel investment, used to initially launch or develop a company.

SI *Systems of Innovation:* An understanding of innovation as a process representing the flow of information and collaboration between various actors.

Smart Cities: Urban development projects that incorporate ICT solutions into the provision of municipal services and the management of municipal assets.

SME *Small or medium enterprise:* A private firm that is beyond the start-up stage, but is still young, with limited staffing and/or income. The exact definition used in terms of upper and lower bounds on age and scale varies between institutions.

Soft Infrastructure: Programmes and resources in an innovation ecosystem that provide mentorship, skills, experience and other knowledge resources to support innovative businesses.

Soft Skills: A series of skills such as communication, business management and administration, design, and other skills related to the running of a business, rather than the products or services that business provides.

Support Skills: A series of skills such as accounting, legal advisory, regulatory compliance, and other skills necessary to meeting the requirements of running a business, often taken on by outside specialists.

STI *Science Technology and Innovation*

TVET *Technical Vocational Education and Training*

User Centered Design: A design process focused on the experience of the end user, concentrating on empathy with users and use cases.

Valley of Death: The period early in the development of a business where the amount invested in developing the business outweighs its current revenue. Businesses need continuous investment and other support and often fail during this time.

Valuation: The process of estimating the current worth of an asset or a company, or the result of such an estimation.

Venture Capital: High-risk investment in an early stage business that has proven growth potential, intended to help the business develop and expand.

Annex B: Reading List / Bibliography, Theory and Background

Anderson, C. (2006). *The long tail*. New York: Hyperion.

Andrews, M., Pritchett, L., & Woolcock, M. (2016). *Doing Iterative and Adaptive Work*. Cambridge: Center for International Development at Harvard University.

Dutz, M., Kuznetsov, Y., Lasagabaster, E., & Pilat, D. (2016). *Making Innovation Policy Work: Learning from Experimentation* (1st ed.). Paris and Washington DC: OECD and World Bank.

Edquist, C. & Hommen, L. (1999). Systems of innovation: theory and policy for the demand side. *Technology In Society*, 21(1). doi:[http://dx.doi.org/10.1016/S0160-791X\(98\)00037-2](http://dx.doi.org/10.1016/S0160-791X(98)00037-2)

Feld, B. (2012). *Startup communities* (1st ed.). Hoboken, N.J.: Wiley.

Goh, A. (2005). Towards and Innovation Driven Economy Through Industrial Policy-Making: An Evolutionary Analysis of Singapore. *The Innovation Journal: The Public Sector Innovation Journal*, 10(3).

Hwang, V. & Horowitz, G. (2012). *The rainforest*. Los Altos Hills, Calif.: Regenwald.

Lundvall, B. (2005). NATIONAL INNOVATION SYSTEMS- ANALYTICAL CONCEPT AND DEVELOPMENT TOOL. In *DRUID- DYNAMICS OF INDUSTRY AND INNOVATION: ORGANIZATIONS, NETWORKS AND SYSTEMS*. Copenhagen, Denmark. Retrieved from www.druid.dk/conferences/Summer2005/Papers/Lundvall.pdf

Muenti-Kunigami, A. (2016). Why the World Bank endorses the Principles for Digital Development. *World Bank Information and Communications for Development (IC4D)*. Retrieved from <http://blogs.worldbank.org/ic4d/why-world-bank-endorses-principles-digital-development>

OECD. (2008). *Open Innovation in Global Networks*. Paris: OECD Publishing.

OECD. (2010). *Ministerial Report on the OECD Innovation Strategy: Innovation to strengthen growth and address global and social challenges*. Paris: Organization for Economic Cooperation and Development.

OECD. (2015). *The Innovation Imperative: Contributing to Productivity, Growth and Well-Being*. Paris: OECD Publishing.

Porter, M. (1990). The Competitive Advantage of Nations. *Harvard Business Review*, 68(2), 73-93.

Van Looy, B. & Geert, A. (2016). *Long Tail Business Models*.

Waugamen, A. (2016). *From Principle to Practice: Implementing the Principles for Digital Development*. Washington DC: The Principles for Digital Development Working Group. Retrieved from http://digitalprinciples.org/wp-content/uploads/2016/03/From_Principle_to_Practice_v5.pdf

World Bank. (2016). *Remarks by World Bank Group President Jim Yong Kim at the Global Connect Initiative*. Retrieved from www.worldbank.org/en/news/speech/2016/04/14/remarks-by-world-bank-group-president-jim-yong-kim-at-the-global-connect-initiative

World Economic Forum. (2015). *New Vision for Education Unlocking the Potential of Technology*. Geneva: World Economic Forum.

Annex C: Reading List / Bibliography, Indexes and Data

Acs, Z., Szerb, L., & Autio, E. (2016). *Global Entrepreneurship Index 2016*. Washington DC: The Global Entrepreneurship and Development Institute.

Cornell University, INSEAD, and WIPO. (2016). *The Global Innovation Index 2016: Winning with Global Innovation*. Geneva: Cornell University, INSEAD, and WIPO.

ITU | 2016 Global ICT Development Index. (2016). ITU. Retrieved 22 February 2017, from www.itu.int/net4/ITU-D/idi/2016

ITU. (2016). *Measuring The Information Society Report 2016*. Geneva: International Telecommunication Union.

Kelley, D., Singer, S., & Herrington, M. (2015). *Global Entrepreneurship Monitor 2015/16 Global Report*. London: Global Entrepreneurship Research Association.

McKinsey (2015). *Levels of Digitization of Different Sectors*. Retrieved from www.mckinsey.com/industries/high-tech/our-insights/digital-america-a-tale-of-the-haves-and-have-mores

Schwab, K. & Sala-i-Martin, X. (2015). *The Global Competitiveness Report 2015–2016* (1st ed.). Geneva: World Economic Forum.

UNDP. (2015). *Work for Human Development*. New York: United Nations Development Programme, Human Development Report 2015.

World Bank. (2016). *World Development Report 2016: Digital Dividends*. Washington DC: World Bank.

WORLD BANK. (2016). *Doing Business 2017: Equal Opportunity for All*. Washington, DC. Retrieved from www.doingbusiness.org/reports/global-reports/doing-business-2017

World Economic Forum. (2016). *Global Competitiveness Report 2015-2016*. World Economic Forum. Retrieved from <http://reports.weforum.org/global-competitiveness-report-2015-2016/>

World Trade Organization. (2015). *Trade Profiles 2015*. Geneva: World Trade Organization. Retrieved from https://www.wto.org/english/res_e/booksp_e/trade_profiles15_e.pdf

International Telecommunication Union (ITU)
Telecommunication Development Bureau (BDT)
Office of the Director
Place des Nations
CH-1211 Geneva 20 – Switzerland
Email: bdtdirector@itu.int
Tel.: +41 22 730 5035/5435
Fax: +41 22 730 5484

Deputy to the Director and
Director, Administration and
Operations Coordination
Department (DDR)
Email: bdtdeputydir@itu.int
Tel.: +41 22 730 5784
Fax: +41 22 730 5484

Infrastructure Enabling
Environment and
e-Applications Department (IEE)
Email: bdtiee@itu.int
Tel.: +41 22 730 5421
Fax: +41 22 730 5484

Innovation and Partnership
Department (IP)
Email: bdtip@itu.int
Tel.: +41 22 730 5900
Fax: +41 22 730 5484

Project Support and Knowledge
Management Department (PKM)
Email: bdtpkm@itu.int
Tel.: +41 22 730 5447
Fax: +41 22 730 5484

Africa

Ethiopia
International Telecommunication
Union (ITU)
Regional Office
P.O. Box 60 005
Gambia Rd., Leghar ETC Building
3rd floor
Addis Ababa – Ethiopia

Email: itu-addis@itu.int
Tel.: +251 11 551 4977
Tel.: +251 11 551 4855
Tel.: +251 11 551 8328
Fax: +251 11 551 7299

Cameroon
Union internationale des
télécommunications (UIT)
Bureau de zone
Immeuble CAMPOST, 3^e étage
Boulevard du 20 mai
Boîte postale 11017
Yaoundé – Cameroon

Email: itu-yaounde@itu.int
Tel.: +237 22 22 9292
Tel.: +237 22 22 9291
Fax: +237 22 22 9297

Senegal
Union internationale des
télécommunications (UIT)
Bureau de zone
19, Rue Parchappe x Amadou
Assane Ndoye
Immeuble Fayçal, 4^e étage
B.P. 50202 Dakar RP
Dakar – Senegal

Email: itu-dakar@itu.int
Tel.: +221 33 849 7720
Fax: +221 33 822 8013

Zimbabwe
International Telecommunication
Union (ITU)
Area Office
TelOne Centre for Learning
Corner Samora Machel and
Hampton Road
P.O. Box BE 792 Belvedere
Harare – Zimbabwe

Email: itu-harare@itu.int
Tel.: +263 4 77 5939
Tel.: +263 4 77 5941
Fax: +263 4 77 1257

Americas

Brazil
União Internacional de
Telecomunicações (UIT)
Regional Office
SAUS Quadra 06, Bloco "E"
11^o andar, Ala Sul
Ed. Luis Eduardo Magalhães (Anatel)
70070-940 Brasília, DF – Brazil

Email: itubrasilia@itu.int
Tel.: +55 61 2312 2730-1
Tel.: +55 61 2312 2733-5
Fax: +55 61 2312 2738

Barbados
International Telecommunication
Union (ITU)
Area Office
United Nations House
Marine Gardens
Hastings, Christ Church
P.O. Box 1047
Bridgetown – Barbados

Email: itubridgetown@itu.int
Tel.: +1 246 431 0343/4
Fax: +1 246 437 7403

Chile
Unión Internacional de
Telecomunicaciones (UIT)
Oficina de Representación de Área
Merced 753, Piso 4
Casilla 50484, Plaza de Armas
Santiago de Chile – Chile

Email: itusantiago@itu.int
Tel.: +56 2 632 6134/6147
Fax: +56 2 632 6154

Honduras
Unión Internacional de
Telecomunicaciones (UIT)
Oficina de Representación de Área
Colonia Palmira, Avenida Brasil
Ed. COMTELCA/UIT, 4.º piso
P.O. Box 976
Tegucigalpa – Honduras

Email: itufegucigalpa@itu.int
Tel.: +504 22 201 074
Fax: +504 22 201 075

Arab States

Egypt
International Telecommunication
Union (ITU)
Regional Office
Smart Village, Building B 147, 3rd floor
Km 28 Cairo – Alexandria Desert Road
Giza Governorate
Cairo – Egypt

Email: itucairo@itu.int
Tel.: +202 3537 1777
Fax: +202 3537 1888

Asia and the Pacific

Thailand
International Telecommunication
Union (ITU)
Regional Office
Thailand Post Training Center, 5th
floor,
111 Chaengwattana Road, Laksi
Bangkok 10210 – Thailand

Mailing address
P.O. Box 178, Laksi Post Office
Laksi, Bangkok 10210 – Thailand

Email: itubangkok@itu.int
Tel.: +66 2 575 0055
Fax: +66 2 575 3507

Indonesia
International Telecommunication
Union (ITU)
Area Office
Sapta Pesona Building, 13th floor
Jl. Merdan Merdeka Barat No. 17
Jakarta 10001 – Indonesia

Mailing address:
c/o UNDP – P.O. Box 2338
Jakarta 10001 – Indonesia

Email: itujakarta@itu.int
Tel.: +62 21 381 3572
Tel.: +62 21 380 2322
Tel.: +62 21 380 2324
Fax: +62 21 389 05521

CIS countries

Russian Federation
International Telecommunication
Union (ITU)
Area Office
4, Building 1
Sergiy Radonezhsky Str.
Moscow 105120
Russian Federation

Mailing address:
P.O. Box 25 – Moscow 105120
Russian Federation

Email: itumoscow@itu.int
Tel.: +7 495 926 6070
Fax: +7 495 926 6073

Europe

Switzerland
International Telecommunication
Union (ITU)
Telecommunication Development
Bureau (BDT)
Europe Unit (EUR)
Place des Nations
CH-1211 Geneva 20 – Switzerland
Switzerland
Email: eurregion@itu.int
Tel.: +41 22 730 5111



International Telecommunication Union
Telecommunication Development Bureau
Place des Nations
CH-1211 Geneva 20
Switzerland
www.itu.int

ISBN 978-92-61-24841-3



9 789261 248413

Printed in Switzerland
Geneva, 2017