Measuring ICT development: New trends, new challenges

Special Edition

World Telecommunication/ ICT Indicators Symposium

Hiroshima, Japan

ITU

The importance of measuring ICT development
Houlin Zhao, ITU Secretary-General

ITU's recent World Telecommunication/ICT Indicators Symposium (WTIS-15) — held from 30 November to 2 December 2015, in Hiroshima, Japan — was a great example of why measuring the growth of information and communication technologies (ICTs) is so important to improving lives worldwide.

Government ministers, director generals, VIPs, speakers and delegates from 88 countries shared their vision, expertise and ideas. They discussed new trends and challenges for using data to accelerate ICT development. They also took full advantage of the excellent networking opportunities. And they enjoyed the famous hospitality provided by Japan, a leader in ICTs that continues to make immense contributions to ITU's work — including several special WTIS sessions from the Japanese private sector.

WTIS-15 took on added importance because it was held in the wake of the landmark agreement on the United Nations 2030 Agenda for Sustainable Development, which recognizes the great potential of ICTs to accelerate the achievement of the UN's 17 new sustainable development goals (SDGs). Statistics, including ICT statistics, are a crucial step in helping policymakers to make the right policy and investment choices. Better data means better policymaking. The new SDGs clearly demonstrate that more timely and reliable data is needed.

The Internet of Things is accelerating the amount of data collected through sensors and new applications. Such new data sources need to be explored to provide new policy-relevant information and complement existing statistics and indicators. ITU fully supports the UN's call for a consolidated effort to mobilize the data revolution for sustainable development, by fostering and promoting innovation. This requires collaboration among different stakeholders, including private companies, national statistical offices, ministries, regulatory authorities and civil society.

The rapidly growing WTIS event was special because it was the last major ITU event of our 150th anniversary year. Since 1865, ITU has managed to deal with the ever-increasing pace of evolving technologies and industries. We will continue to modernize, innovate and adapt. A key part of that is to continuously review our ICT indicators so they can be of top value to policymakers. This work cannot be done without WTIS. But it does not end with WTIS. It is core to ITU's year-round work as the global leader in public-private cooperation on ICT development.

This special edition of ITU News highlights the key trends and challenges discussed in WTIS-15, which ITU and its members will be tackling through to the next WTIS, to be held later this year in Botswana.

Measuring ICT development: New trends, new challenges

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■ Measuring the Information Society Report

The *Measuring the Information Society (MIS) Report* is the ITU's flagship annual report featuring key ICT data and benchmarking tools to measure the information society. The latest report was launched on 30 November 2015 on Day 1 of the World Telecommunication/ICT Indicators Symposium (WTIS-15), held in Hiroshima, Japan.

Key global findings at a glance

- ■ 3.2 billion people are now online (43% of the population)
- ■ The number of Internet users in developing countries has almost doubled in five years
- ■ Mobile cellular subscriptions are up to 7.1 billion from 2.2 billion in 10 years
- ■ 3G population network coverage has increased from 45% to 69% in four years
- ■ The Internet-use gender gap is at 11%
- ■ Mobile broadband subscriptions grew from 0.8 billion in 2010 to an estimated 3.5 billion in 2015
- ■ Between 2013 and 2014, mobile broadband prices dropped by over 25% in least-developed countries
- ■ Fixed broadband prices surged in 2014
- ■ The Internet of Things (IoT) and Big Data hold the potential to address major development challenges

Report flags new growth, gaps and opportunities

The importance of the latest *Measuring the Information Society Report* was on display moments after it was released at the World Telecommunication/ICT Indicators Symposium (WTIS-15), in Hiroshima, Japan. Government ministers, official statisticians, data scientists, and other distinguished public- and private-sector colleagues immediately began to discuss how to use the report's data on information and communication technologies (ICTs) to improve people's lives.

"ICTs will be essential in meeting each and every one of the [United Nations'] 17 newly-agreed Sustainable Development Goals (SDGs)," said ITU Secretary-General Houlin Zhao at the report's launch. "And this report plays an important role in the SDG process. Without measurement and reporting, we cannot track the progress being made, and this is why ITU gathers data and publishes this important report each year."

Indeed, the *Measuring the Information Society Report* is widely recognized as the most reliable and impartial source of data and analysis on the state of global ICT development. It is extensively relied upon by governments, international organizations, development banks and private sector analysts worldwide.

"[The report] aims to stimulate the ICT policy debate … by providing an objective assessment of countries' performance in the field of ICT and by highlighting areas that need further improvement," said Brahima Sanou, Director of ITU's Telecommunication Development Bureau, which produces the report each year.

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Unequal progress, slower growth

One of the biggest signs of progress highlighted by the report is that the number of Internet users in developing countries has almost doubled in the past five years. In addition, 46% of households globally now have Internet access at home, up from 44% last year and just 30% in 2010.

However, "findings indicate that we still have a lot of work to do to bridge the gap between the world's 48 least-developed countries and the rest of the world," said Cosmas Zavazava, Chief of BDT's Project Support and Knowledge Management Department.

The report reveals that only 6.7% of people in the 48 UN-designated Least Developed Countries (LDCs) have home Internet access, compared to 34.1% in the developing world — and 81.3% in the developed world. In addition, the overall gap between LDCs and other developing countries is growing, according to the ITU's ICT Development Index (IDI) — a key component of the report. (For more on the IDI country rankings, see "**Lessons from IDI award-winning countries**".)

The report points out that significant digital divides also occur within countries, between different sections of society. Gender is
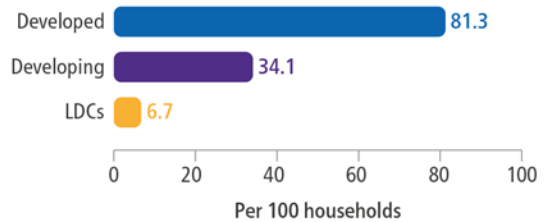
one of the most prominent of those divides, with data suggesting that there is a gap of some 11 per cent in Internet use between men and women worldwide. The 2015 "gender gap" is lowest in developed countries (at 5.4%), significantly higher in developing countries (15.4%), and highest in LDCs (28.9%).

The report highlights the need for much more comprehensive and systematic gathering of gender-disaggregated data from countries, a point echoed by many participants. "If we do not gender-disaggregate the data … it is going to be very difficult for policymakers to give the right solutions to the right problems," said Sharifah Zarah Syed Ahmad, Secretary-General of Malaysia's Ministry of Communications and Multimedia.

So what do the digital divides shown by the report mean for achieving the UN's SDGs — and how do they map to ITU's goals for ICT development?

'Connect 2020' targets: Are we on track?

This year's report statistically assesses the strategic goals and targets set forward in the ITU's Connect 2020 Agenda, which was adopted by ITU members in 2014. For the first time, the report takes stock of where the world stands in terms of the four Connect 2020 goals of Growth, Inclusiveness, Sustainability, and Innovation and Partnerships — and the specific targets attached to each goal.

The report notes, for instance, that the proportion of households projected to have Internet access in 2020 will reach 56%. That is on pace to exceed one of the key Connect 2020 growth targets of Internet access for 55% of households worldwide by 2020. But the report predicts that only 53% of the global population will be online in 2020, a figure that falls below the Connect 2020 target of 60%.

More action will be needed to ensure that targets for growth and inclusiveness are not missed in developing countries, especially in LDCs. The Connect 2020 Agenda aims to ensure that at least 50% of households in developing countries and 15% of households in LDCs have access by 2020, but ITU estimates that only 45% of households in developing countries and 11% of LDC households will have Internet access by that date.

Another target calls for 90% of the rural population to have broadband coverage by 2020. Given that in rural areas the coverage is currently 30%, as opposed to 90% in urban areas, it is clear that focus needs to be on rural broadband coverage over the next five years.

Households with Internet access, by development status, 2015*

	Per 100 households
Developed	81.3
Developing	34.1
LDCs	6.7

Households in developing countries with Internet access

Year	Per 100 households
2005	
2006	
2007	
2008	
2009	
2010	
2011	
2012	
2013	
2014	
2015*	
2020 projection	45
2020 target	50
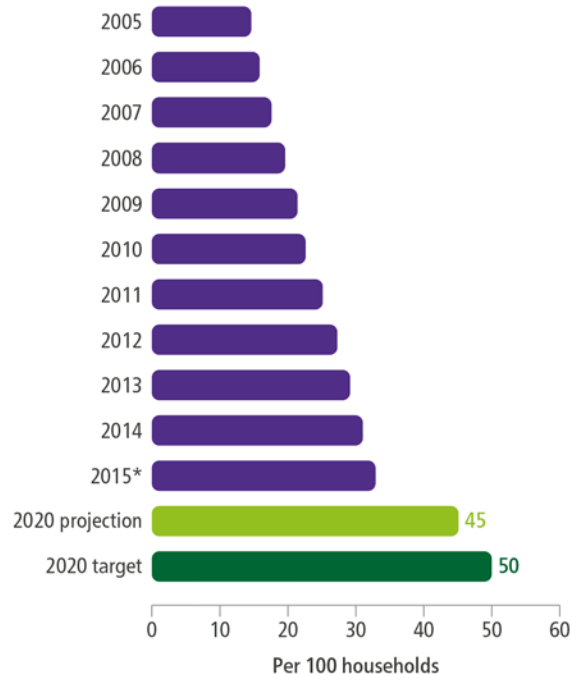
*Note: *Estimates.*
Source: ITU's Measuring the Information Society Report 2015.

IDI overall rankings and ratings, 2015 and 2010

See **interactive guide**

| Economy	2015 Rank	2015 IDI	2010 Rank	2010 IDI
Korea (Rep.)	1	8.93	1	8.64
Denmark	2	8.88	4	8.18
Iceland	3	8.86	3	8.19
United Kingdom	4	8.75	10	7.62
Sweden	5	8.67	2	8.43
Luxembourg	6	8.59	8	7.82
Switzerland	7	8.56	12	7.60
Netherlands	8	8.53	7	7.82
Hong Kong, China	9	8.52	13	7.41
Norway	10	8.49	5	8.16
Japan	11	8.47	9	7.73
Finland	12	8.36	6	7.96
Australia	13	8.29	15	7.32
Germany	14	8.22	17	7.28
United States	15	8.19	16	7.30
New Zealand	16	8.14	19	7.17
France	17	8.12	18	7.22
Monaco	18	8.10	22	7.01
Singapore	19	8.08	11	7.62
Estonia	20	8.05	25	6.70
Belgium	21	7.88	24	6.76
Ireland	22	7.82	20	7.04
Canada	23	7.76	21	7.03
Macao, China	24	7.73	14	7.38
Austria	25	7.67	23	6.90
Spain	26	7.66	30	6.53
Bahrain	27	7.63	48	5.42
Andorra	28	7.60	29	6.60
Barbados	29	7.57	38	6.04
Malta	30	7.52	28	6.67
Qatar	31	7.44	37	6.10
United Arab Emirates	32	7.32	49	5.38
Slovenia	33	7.23	27	6.69
Czech Republic	34	7.21	33	6.30
Israel	35	7.19	26	6.69
Belarus	36	7.18	50	5.30
Latvia	37	7.16	34	6.22
Italy	38	7.12	31	6.38
Greece	39	7.09	35	6.20
Lithuania	40	7.08	39	6.02
Saudi Arabia	41	7.05	56	4.96
Croatia	42	7.00	42	5.82
Portugal	43	6.93	36	6.15
Poland	44	6.91	32	6.38
Russian Federation	45	6.91	46	5.57
Kuwait	46	6.83	45	5.64
Slovakia	47	6.82	40	5.96
Hungary	48	6.82	41	5.92
Uruguay	49	6.70	52	5.19
Bulgaria	50	6.52	47	5.45
Serbia	51	6.45	51	5.29
Argentina	52	6.40	54	5.02
Cyprus	53	6.37	44	5.75
Oman	54	6.33	68	4.41
Chile	55	6.31	59	4.90
Lebanon	56	6.29	77	4.18

Economy	2015 Rank	2015 IDI	2010 Rank	2010 IDI
Costa Rica	57	6.20	80	4.07
Kazakhstan	58	6.20	62	4.81
Romania	59	6.11	55	4.99
TFYR Macedonia	60	6.07	57	4.96
Brazil	61	6.03	73	4.29
Antigua and Barbuda	62	5.93	58	4.91
St. Kitts and Nevis	63	5.92	43	5.80
Malaysia	64	5.90	61	4.85
Montenegro	65	5.90	60	4.89
Moldova	66	5.81	74	4.28
Azerbaijan	67	5.79	76	4.21
St. Vincent and the Grenadines	68	5.69	63	4.69
Turkey	69	5.58	67	4.56
Trinidad and Tobago	70	5.57	65	4.58
Brunei Darussalam	71	5.53	53	5.05
Venezuela	72	5.48	71	4.36
Mauritius	73	5.41	72	4.31
Thailand	74	5.36	92	3.62
Colombia	75	5.32	83	3.91
Armenia	76	5.32	78	4.10
Bosnia and Herzegovina	77	5.28	75	4.28
Georgia	78	5.25	85	3.76
Ukraine	79	5.23	69	4.41
Dominica	80	5.12	66	4.56
Maldives	81	5.08	82	3.92
China	82	5.05	87	3.69
Grenada	83	5.05	64	4.67
Mongolia	84	5.00	97	3.52
Suriname	85	4.99	100	3.39
St. Lucia	86	4.98	70	4.39
Seychelles	87	4.96	81	3.98
South Africa	88	4.90	88	3.65
Panama	89	4.87	79	4.07
Ecuador	90	4.81	90	3.65
Iran (I.R.)	91	4.79	99	3.48
Jordan	92	4.75	84	3.82
Tunisia	93	4.73	93	3.62
Albania	94	4.73	89	3.65
Mexico	95	4.68	86	3.70
Cape Verde	96	4.62	107	3.14
Kyrgyzstan	97	4.62	112	3.02
Philippines	98	4.57	105	3.16
Morocco	99	4.47	96	3.55
Egypt	100	4.40	98	3.48
Fiji	101	4.33	102	3.28
Viet Nam	102	4.28	94	3.61
Dominican Rep.	103	4.26	101	3.38
Peru	104	4.26	91	3.64
Jamaica	105	4.23	95	3.60
El Salvador	106	4.20	110	3.10
Bolivia	107	4.08	113	3.00
Indonesia	108	3.94	109	3.11
Ghana	109	3.90	130	1.98
Tonga	110	3.82	111	3.08
Botswana	111	3.82	117	2.86
Paraguay	112	3.79	108	3.11

Economy	2015 Rank	2015 IDI	2010 Rank	2010 IDI
Algeria	113	3.71	114	2.99
Guyana	114	3.65	103	3.24
Sri Lanka	115	3.64	115	2.97
Belize	116	3.56	104	3.17
Syria	117	3.48	106	3.14
Namibia	118	3.41	120	2.63
Bhutan	119	3.35	128	2.02
Honduras	120	3.33	116	2.94
Guatemala	121	3.26	118	2.86
Samoa	122	3.11	121	2.43
Nicaragua	123	3.04	123	2.40
Kenya	124	3.02	126	2.09
Vanuatu	125	2.93	124	2.19
Sudan	126	2.93	127	2.05
Zimbabwe	127	2.90	132	1.97
Lesotho	128	2.81	141	1.74
Cuba	129	2.79	119	2.66
Cambodia	130	2.74	131	1.98
India	131	2.69	125	2.14
Senegal	132	2.68	137	1.80
Gabon	133	2.68	122	2.41
Nigeria	134	2.61	133	1.96
Gambia	135	2.60	129	1.99
Nepal	136	2.59	140	1.75
Côte d'Ivoire	137	2.51	142	1.74
Lao P.D.R.	138	2.45	135	1.92
Solomon Islands	139	2.42	139	1.78
Angola	140	2.32	144	1.68
Congo (Rep.)	141	2.27	136	1.83
Myanmar	142	2.27	150	1.58
Pakistan	143	2.24	138	1.79
Bangladesh	144	2.22	148	1.61
Mali	145	2.22	155	1.46
Equatorial Guinea	146	2.21	134	1.96
Cameroon	147	2.19	149	1.60
Djibouti	148	2.19	143	1.69
Uganda	149	2.14	151	1.57
Mauritania	150	2.07	146	1.63
Benin	151	2.05	147	1.63
Togo	152	2.04	145	1.64
Zambia	153	2.04	152	1.55
Rwanda	154	2.04	154	1.47
Liberia	155	1.86	161	1.24
Afghanistan	156	1.83	156	1.37
Tanzania	157	1.82	153	1.54
Mozambique	158	1.82	160	1.28
Burkina Faso	159	1.77	164	1.13
Congo (Dem. Rep.)	160	1.65	162	1.23
South Sudan	161	1.63	–	–
Guinea-Bissau	162	1.61	158	1.33
Malawi	163	1.61	159	1.33
Madagascar	164	1.51	157	1.34
Ethiopia	165	1.45	165	1.07
Eritrea	166	1.22	163	1.14
Chad	167	1.17	166	0.88

Source: ITU's Measuring the Information Society Report 2015.

Fixed-broadband prices:
as a percentage of GNI per capita
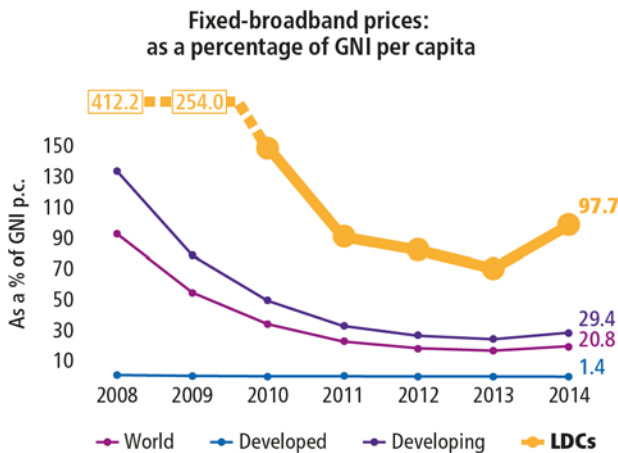
Source: ITU's Measuring the Information Society Report 2015.

Affordability: The key role of price

The report includes ICT price data for most of the world's economies. The report not only looks at the price of ICTs in terms of US dollars and purchasing power parity dollars, but also at affordability, calculated as the price of an ICT service as a percentage of gross national income per capita (GNI p.c.).

ITU collects price data because ICT prices do matter. One of the key findings of the report is that global mobile-cellular prices continue to fall in terms of relative as well as absolute terms. The greatest decreases over the past year have been in mobile-broadband prices, which have made the service on average between 20% and 30% more affordable worldwide. Indeed, mobile broadband has become the most dynamic telecom market segment, with double digit growth rates in subscription numbers over the last eight years. The report reveals that competition has not only increased the variety of available packages, but has also brought down prices.

There is still, however, ample evidence that despite an important drop in prices, the relatively high prices continue to be a barrier for broadband services. That is why one of the key Connect 2020 targets is for broadband services to cost no more than 5% of average monthly income in developing countries by 2020. By early 2015, 111 economies (out of 160 with available data) — including all of

the world's developed countries and 67 developing countries — had achieved the target. However, 22 developing countries still have broadband prices which correspond to more than 20% of GNI p.c.

The report also notes a sharp increase in fixed-broadband prices that had been falling consistently for a number of years. This trend is of particular concern for the LDCs, where the fixed-broadband services that help fuel today's digital economy remain largely unaffordable. The 2014 average fixed-broadband price basket corresponded to 98% of GNI p.c. in LDCs, up from 70% a year before, a steep jump that will not improve the already very low uptake of fixed broadband in the world's poorest countries.

New opportunities in the 'IoT' era

The report includes a chapter on how the Internet of Things (IoT) can contribute to development. It looks at some specific domains in which IoT has high potential, such as health, climate monitoring, energy and disaster management. From drones to precision agriculture to transportation and electric grids in "Smart Cities," the report gives some specific examples of how IoT is being used to boost development.

The report also identifies a number of challenges in order to reap the benefits that IoT could bring for development. Interoperability, for instance, poses major challenges because it is not just a matter of bringing together stakeholders in the ICT sector but also assembling other relevant stakeholders, such as car manufacturers, utility providers, local authorities and more. The report also highlights that fixed broadband connectivity and high bandwidth are required to harness the full potential of IoT. So given the limited infrastructure in several developing countries, this is a challenge that requires policy attention. There are also a number of data management challenges that national statistical offices and regulatory authorities could help in tackling, according to the report.

The participants of WTIS discussed and debated these issues, among others, during several lively panel discussions on IoT and Big Data. (**For more, see "Harnessing Big Data".**)

Lessons from IDI award-winning countries

One of the most exciting moments of the 2015 World Telecommunication/ICT Indicators Symposium (WTIS-15) was the award ceremony for the top-ranked and most-improved countries on ITU's ICT Development Index (IDI). It was a time to recognize outstanding achievement as measured by the IDI's composite of 11 indicators ranking 167 countries according to their level of ICT access, use and skills.

The Republic of Korea took top honours as No. 1 overall, closely followed by Denmark and Iceland. This is the first time the IDI is comparing data over a five-year period — and it is the fourth time that the Republic of Korea was ranked No. 1 in that time period.

Meanwhile, Bahrain won the award for the most improved country in terms of its IDI value, rising to a value of 7.63 from 5.42 in 2010. Costa Rica received the award for most improved in terms of its IDI ranking, jumping to a rank of No. 57 in the world from No. 80 in 2010.

After the applause for each award rang out in the conference hall in Hiroshima, representatives from the Republic of Korea, Bahrain and Costa Rica each shared some of the reasons for their success. The discussion captured the essence of what IDI is all about: tracking where success has been achieved so that it might be duplicated wherever possible.

"The IDI rankings are always high on the list of my discussions with world leaders ..."
Houlin Zhao, ITU Secretary-General

From left to right: Houlin Zhao, ITU Secretary-General; Jae-You Choi, Second Vice-Minister of the Republic of Korea's Ministry of Science, ICT and Future Planning; Musab Abdulla, Manager of Strategy and PMO for Bahrain's Telecommunications Regulatory Authority; Gilbert Camacho, President of Costa Rica's Telecommunications Superintendency; and Brahima Sanou, Director of the ITU Telecommunication Development Bureau

"Each country can use the IDI to measure its own progress..."
Brahima Sanou, Director of the ITU Telecommunication Development Bureau

The IDI's importance

The IDI rankings are "always high on the list of my discussions with world leaders," said ITU Secretary-General Houlin Zhao at the award ceremony. "It's very important for people to understand where we are and what the challenges we face are."

Indeed, the IDI helps countries see how they compare with other similar peer countries — and how they can do better. It is a concrete starting point for discussions on what constitutes good policy for ICT investment and innovation.

"The IDI is not about competition. It's about benchmarking," points out Brahima Sanou, Director of the ITU Telecommunication Development Bureau. "Each country can use the IDI to measure its own progress through the prism of [this] internationally agreed upon index."

Top takeaways: Overall growth, widening gaps

One of the top takeaways emphasized by Mr Sanou is that all 167 economies included in the IDI improved their IDI values between 2010 and 2015 — meaning that levels of ICT access, use and skills continue to improve all around the world.

"When we see the effort they're making through good policy and regulation, we can see they are on the right track," says Mr Sanou.

But the IDI is not just used by policymakers and other UN agencies. The unique, impartial, highly reliable benchmark is widely used by the world's telecoms operators, equipment manufacturers and ICT service providers, the global investment community, and experts in academia.

IDI Indicators and weights

ICT access	(%)	
1. Fixed-telephone subscriptions per 100 inhabitants	20	
2. Mobile-cellular telephone subscriptions per 100 inhabitants	20	40
3. International Internet bandwith (bit/s) per internet user	20	
4. Percentage of households with a computer	20	
5. Percentage of households with Internet access	20	

ICT use	(%)	
6. Percentage of Individuals using the Internet	33	
7. Fixed-broadband subscriptions per 100 inhabitants	33	40
8. Active mobile-broadband subscriptions per 100 inhabitants	33	

ICT skills	(%)	
9. Adult literacy rate	33	
10. Secondary gross enrolment ratio	33	20
11. Tertiary gross enrolment ratio	33	

Source: ITU's Measuring the Information Society Report 2015.

As such, some of the other takeaways are of keen interest. The increase in IDI values was highest in emerging market countries, especially a group of "most dynamic countries." These include (in order of greatest change in IDI ranking): Costa Rica, Bahrain, Lebanon, Ghana, Thailand, United Arab Emirates, Saudi Arabia, Suriname, Kyrgyzstan, Belarus and Oman.

The ICT improvement is far slower, however, among least-developed countries (LDCs). In particular, LDCs are falling behind in the IDI "use" sub-index, which measures individuals using the Internet, fixed-broadband subscriptions, and mobile-broadband subscriptions. This is important as it could impact their ability to derive development gains from ICTs. Leaders at WTIS continually stressed the need for ICTs to be used to achieve the United Nations' Sustainable Development Goals. (See "**How can ICTs drive sustainable development?**".)

Lessons from the Republic of Korea, Bahrain and Costa Rica

So how do countries achieve more rapid ICT growth, as reflected in fast-improving IDI values and ranking? How can the success of countries like the Republic of Korea, Bahrain and Costa Rica be emulated? There are never easy answers, but some high-level patterns emerged in comments from the award recipients.

When asked at the IDI award ceremony about the secret to the Republic of Korea's ICT success, Jae-You Choi, the Second Vice-Minister of the Republic of Korea's Ministry of Science, ICT and Future Planning said that the country's highly competitive ICT environment has fuelled the necessity for ICT firms to provide world-class value for customers at low prices. In addition, he mentioned that the Republic of Korea has made ICT growth a top public priority for decades, which has ensured high-level focus.

Seung Keon Kim, Vice President of the Statistics Information Center of the Korea Association for ICT Promotion, highlighted the fact that the Republic of Korea does not have natural resources, such as oil, and so has to focus on its human resources. He also mentioned that the country has steadily focused on ICT skills growth since the 1980s when it launched concerted efforts to study and emulate neighbouring Japan's rapid ICT growth.

After accepting their awards, the representatives of both Bahrain and Costa Rica also mentioned increased market liberalization, competition, and a sustained government focus as keys to their rapid improvement.

"[The award is] a fantastic confirmation that we've been improving and we have improved," said Musab Abdulla, Manager of Strategy and PMO for Bahrain's Telecommunications Regulatory Authority, as he received the award. "A large measure of our achievement is down to the fact that we passed a law in 2002 that liberalized the market in 2003. Having that strong framework in place is how we reached success."

Gilbert Camacho, President of Costa Rica's Telecommunications Superintendency (SUTEL), received the award for most improved country in terms of ranking on behalf of Costa Rica. "[The award] shows that Costa Rica's model has been a success," he said. "ICTs are 3% of [Costa Rica's] GDP. Opening up competition has brought success to Costa Rica. It has brought social and economic development."

*Distinguished leaders gathered in Hiroshima, Japan, to discuss
some of the most critical issues facing the world today.*

*WTIS-15 participants focused on two themes central to ITU's core work:
How ICTs can further drive development, and how Big Data can enhance policy.*

How can ICTs drive sustainable development?

There is no disputing that information and communication technologies (ICTs) will fuel the global economy of the next few decades. But what role will ICTs play in helping the United Nations (UN) achieve its new Sustainable Development Goals (SDGs), which follow and expand on the Millennium Development Goals (MDGs), to end poverty, fight inequality and injustice, and tackle climate change by 2030?

ITU, as the UN's specialized agency for ICTs, is forging a path forward on this critical issue. And ITU leadership was on display at the 2015 World Telecommunication/ICT Indicators Symposium (WTIS-15), held in Hiroshima, Japan.

"SDGs are about problems. ICTs are about solutions. None of the SDGs can be achieved without ICTs," said Brahima Sanou, Director of the ITU Telecommunication Development Bureau.
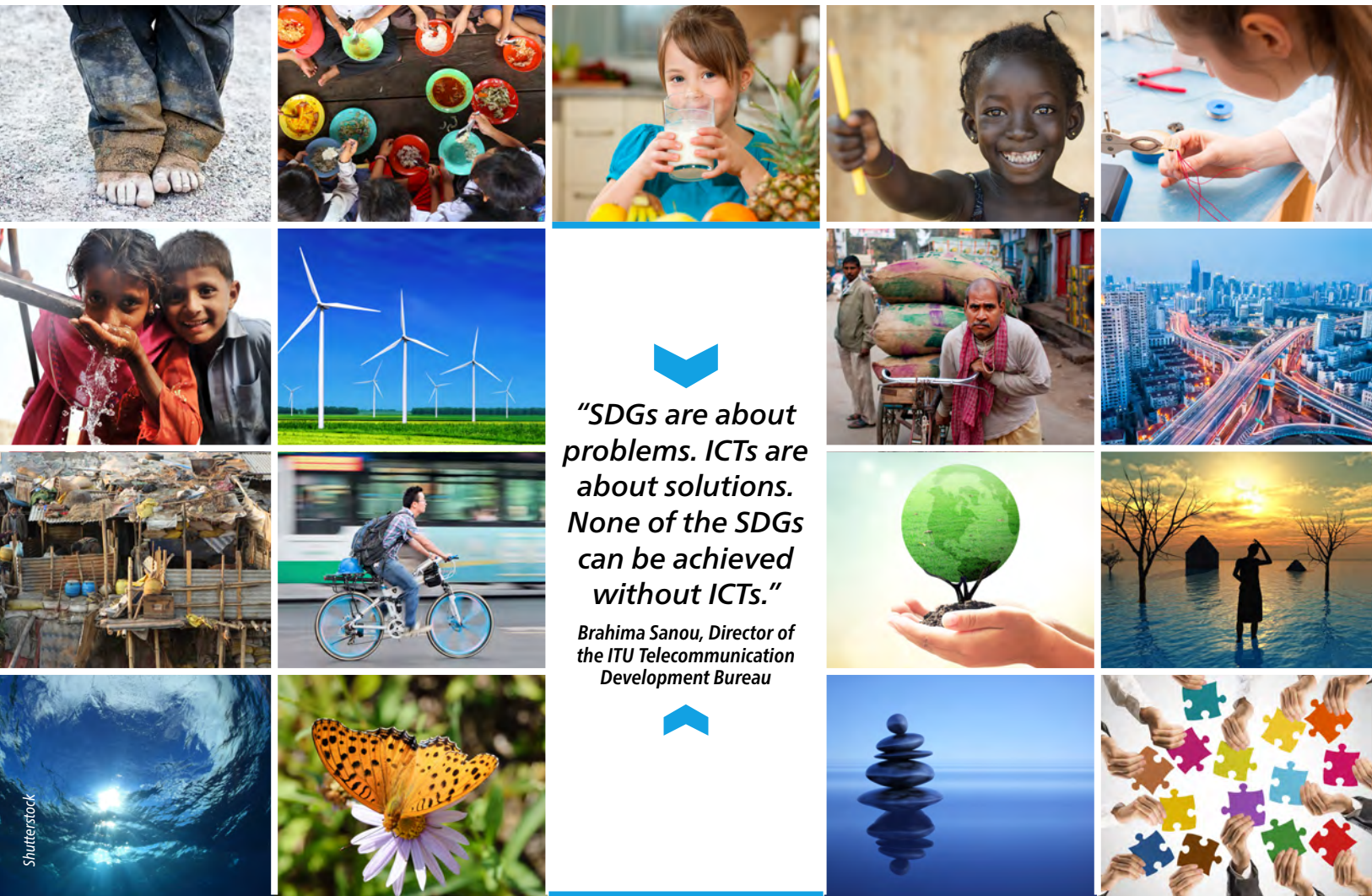
"SDGs are about problems. ICTs are about solutions. None of the SDGs can be achieved without ICTs."

Brahima Sanou, Director of the ITU Telecommunication Development Bureau

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> **"In order for ICTs to play a very important role in SDGs, we have to work on lowering the cost."**
>
> *Joao Bernardo Vieira*
> *Government Minister*
> *Guinea-Bissau*

"ICTs are about people. Our mission is to bring the power of ICTs to ordinary people wherever they live. It is a very noble mission. Let us not miss the opportunity."

Distinguished government officials as well as leaders from the private sector, international organizations, and academia did not miss the opportunity in Hiroshima. They jumped straight into key ICT development issues in panel discussions, bilateral meetings, and ad hoc hallway discussions. They networked to share challenges, successes, failures — and how to take best practices back home to improve their day-to-day work so that the value of the Symposium could live on throughout the year.

Indeed, Japanese Minister for Internal Affairs and Communications, Sanae Takaichi, stated that the discussions held at the Symposium would be reflected in the ICT Ministers' Meeting at the G7 Summit in Takamatsu, Japan on 29–30 April, 2016.

Framing the challenges

At a ministerial round-table discussion on Day 1 of WTIS-15, ministers and deputy ministers shared the ICT challenges and successes of their countries. Many mentioned the cost of ICT services as perhaps the most critical limitation to connecting larger segments of their respective populations.

"In order for ICTs to play a very important role in SDGs, we have to work on lowering the cost," said Joao Bernardo Vieira, Guinea-Bissau's Minister of Transport and Communications. He added that Goal No. 1 of the SDGs (No Poverty) could be strongly advanced if the basic, digital financial services could reach the extreme poor — and that Goal No. 3 (Good Health and Well-Being) could be greatly facilitated through mobile data applications. Vieira also stressed

the importance of the government's role in fostering ICT innovation. He said governments should create incentives, help mobilize capital, and limit regulation for ICT innovators.

Tonga's Deputy Prime Minister Siaosi Sovaleni laid out some of the challenges he faces in a Pacific Small Island Developing State. "Providing central services is difficult. Which one is most important? Roads, health — or ICTs?" asked Mr Sovaleni. "ICT development competes with other more basic and pressing development needs."

This was a familiar challenge for many in attendance. But Mr Sovaleni offered some advice: "It's very important to link the ICT indicators to the other development goals," he said. "Having the link to SDGs will help us [government officials] tap into those development resources."

Zambia's Deputy Minister of Transport and Communications, James Kapyanga, said his government had to create a seat at the president's office to deal specifically with ICTs in order for ICTs to vie for funding amid the other pressing development needs. "If you don't create that seat, ICTs only get lip service," he said.

Sharing successes — and failures

The Philippines has found success by making ICTs a key part of broader development efforts, said Mario G. Montejo, Secretary of the Department of Science and Technology. "In all our initiatives, ICTs are embedded either directly or indirectly," he said. He gave two useful examples. One was a "Smart Agriculture" programme that guides farmers when to plant, fertilize and harvest, based on site-specific weather data. The results were that less water and fertilizers were needed and that farmers could lower their costs, improving productivity and efficiency. The other example was disaster preparedness put in place since the deadly 2013 typhoon. Hundreds of data centres were used to gather and analyse data. "Because of the improvement in early warning, we suffered zero casualties despite many recent disasters," said Mr Montejo.

Underscoring the value of countries sharing best practices, Mr Sovaleni said that Tonga had learned from Japan's experience on disaster management and put early-warning sirens in place, which had helped save countless lives in the disaster-prone area.

> ## "To what extent do we engage the people who are the users of ICTs?"
>
> **Sharifah Zarah Syed Ahmad**
> **Government Minister**
> **Malaysia**

But sharing successes isn't always enough. "It's important to share best practices, but also information about failures" so that we can all make progress, said Areewan Haorangsi, Secretary General of the Asia-Pacific Telecommunity (APT). Participants around the conference hall nodded their heads in agreement.

Jaume Salvat Font, CEO of the Aggaros ICT consultancy and former CEO of Andorra Telecom, said that governments need to focus more on end-user services and business needs in order to create more successful policies. "If we want to be happy with the results, we have to do something different," said Mr Salvat. "The experience of the user is the most important thing. Policy and regulation need to keep pace with technological change. This is why many countries' policies have failed." For instance, he continued: "If an operator is interested in investing in rural areas, they should get an advantage in heavily populated areas — to compensate for the added business risk."

The Secretary-General of Malaysia's Ministry of Communications and Multimedia, Sharifah Zarah Syed Ahmad, reinforced the need to put the end user first when designing ICT policies. That's why Malaysia has introduced "citizen-centric" data collection, which aims to work with people on the ground to co-create and co-produce the data. Ms Syed cited Malaysia's "Connecting the Unconnected" programme, which solicited early feedback from rural populations before launching. She said they are always asking the question: "To what extent do we engage the people who are the users of ICTs?"

Malaysia's demand-driven approach to ICT development also includes fostering ICT entrepreneurship, something many countries are striving to do.

How to foster ICT innovation

The need for homegrown ICT innovation to boost development goals was widely discussed at WTIS.

During a panel discussion on the topic, Sarah Sung Ju Eo, Senior Researcher for the Korea Association for ICT Promotion (KAIT), presented the Republic of Korea's approach to innovation, including the country's more than 20 USD million investment in ICT startup consulting and 17 "Centers for Creative Economy and Innovation" nationwide. She shared an example of a "Smart Farm" that was able to significantly decrease management time and expenses thanks to services provided by KT Corporation (the Republic of Korea's largest telephone company) that allow a farmer to, for instance, control the temperature and humidity inside a greenhouse and water crops remotely with a smartphone.

Google's Public Policy Manager for Asia-Pacific, Middle East and Africa, Andrew Ure, spoke from a different perspective, saying that innovation today is "disbursed, disaggregated, connected and at scale" — and that the key was to unlock people-centered innovation through scalable platforms that best enabled it.

As for the stumbling blocks to innovation, Mr Ure and others pointed to specific regulatory and tax policies, but they also emphasized the need to create a culture where innovation and entrepreneurship can thrive. "Tolerance for failure is right at the top of the list" of what's needed to create that culture, said Mr Ure.

There was keen interest in ITU's efforts to help foster innovation, particularly after the panel discussion on that topic. One participant from the Republic of Korea recalled previous ITU announcements about its drive to push innovation for SMEs as part of its Connect 2020 agenda and asked what ITU is doing in that regard. A participant from Bahrain asked: "How can you benchmark innovation?" And another participant from Iran asked what the major obstacles to ICT-enabled innovation are.

Indeed, the strong demand for information on best practices for fostering ICT innovation indicates that ITU's efforts to connect key public and private stakeholders around this topic will be highly valuable in coming months and years.

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■ Harnessing Big Data: A call to act — together

Big Data: It is a sexy topic as the Internet of Things (IoT) era gathers pace, with billions of smart things, such as devices, vehicles, systems and sensors becoming connected to one another.

The possibilities for improving our daily lives seem endless. Business opportunities loom large. And for those working to leverage information and communication technology (ICT) growth for sustainable development, Big Data holds tremendous potential to drive better decisions and more effective policies.

"Data are fundamental to make sustainable development happen," says Enrico Giovannini, a professor of economic statistics at the University of Rome "Tor Vergata."

But the sheer volume, velocity and variety of Big Data now pose major challenges for accuracy, curation and privacy. And if Big Data are to be harnessed by the international statistical community for better ICT development worldwide, there is a lot of coordination work to do.

That is why the topic was a key theme of the 13th World Telecommunication/ICT Indicators Symposium (WTIS-15), in Hiroshima, Japan.

"I look at this ecosystem of data and development. It's messy and fragmented," said Ludwig Siegele, The Economist magazine's technology editor, during a WTIS panel discussion on how IoT and mobile applications can aid development.

"If we want to harvest the benefits of Big Data, we need to cooperate more," said Mr Siegele, stressing the need for platforms to share best practices, ICT indicators data, and other useful information. "I think an important role [for ITU] would be to be a nucleus for some of these platforms."

"The message is very clear: The data revolution can be turned into a blessing ... and it's up to us to make it happen."

Johannes Jütting
PARIS21

Several participants echoed that call during the Symposium in Hiroshima.

"The message is very clear: The data revolution can be turned into a blessing … and it's up to us to make it happen," said Johannes Jütting, Manager of the PARIS21 Secretariat, which promotes better use of statistics throughout the developing world. "At the global level, we need to set standards and procedures. This community here [at WTIS] can make a great contribution."

The role of the statistical community

WTIS participants debated various ways Big Data could and should be harnessed more by the public sector for ICT development, but there was broad consensus that official statisticians needed to assert more of a role vis-à-vis the private sector — and do it at a faster pace.

"Statisticians were taken by surprise by the data revolution," says Mr Giovannini, pointing out that it has been driven almost completely by the private sector. "The [official statistics] community has to increase the pace at which it moves ahead."

In order for official statisticians to drive the process, there would need to be a "counter-revolution," say Mr Giovannini. He stresses that governments who don't want to be left behind need to invest, not just in technology and methodology to produce the data, but in human capital.

"We must assert leadership that draws its strength from what we know how to do as statisticians," says Margarita Guerrero, Director of UNESCAP's Statistics Division. "We are very good at looking at frameworks. In this data ecosystem, there's no better group to do this than us and we must grasp the opportunity to act now."

Ms Guerrero highlighted needs raised by many others throughout WTIS: Official statisticians need to incorporate private sector data and civil society data into their frameworks, but they need the cooperation, software, technologies, and skills on modelling and visualization to do it.

Challenges to public-private data sharing

So how can the private sector work with the official statistics community to leverage Big Data to improve ICT development policies? The first step would be to start sharing more data, but the risks involved often prevent sharing.

"The ICT industry can provide a lot more real-time unstructured data to [government] statistical offices," said Tango Matsumoto, Chief Technology Officer and Chief Information Officer of Fujitsu, at a WTIS panel discussion. "But the most important thing is that the ICT industry and statistics community have a common understanding not only of the benefits, but that it may endanger privacy."

Many WTIS participants — especially statisticians trying to work with ICT companies to get access to user data — flagged privacy issues as a major obstacle, often from a legal standpoint. But even when the law permits the sharing of data, companies cite privacy concerns as one of many business risks preventing them from sharing.

In one WTIS panel discussion, Igor Kuzma, Senior Counsellor of Slovenia's statistical office, gave an example in which Slovenia's National Statistics Act gave permission to access data from mobile operators under certain conditions, but the operators rejected the sharing, citing commercial risk.

A cautionary tale

Andrew Murray, a statistician at Ireland's Central Statistics Office, shared with WTIS participants a detailed account of the challenges that have stymied Ireland's Central Statistics Office in its bid to obtain better tourism statistics using data from mobile operators. The effort began in 2011 with challenges over who would pay for the costly project. Next came a "legal quagmire" regarding e-privacy regulations and how the data would be anonymized. Then a lack of specificity of requests for microdata made it difficult for the mobile operators to approve requests.

> *"The ICT industry can provide a lot more real-time unstructured data to [government] statistical offices."*
>
> *Tango Matsumoto*
> *Fujitsu*

To make a long story short: "We've been working since 2011 and still haven't got any mobile data — and it may take a few more years," Mr Murray told the audience. By that time, he lamented, technology will have moved on in the IoT era, rendering some of the operational plans to tap the data obsolete.

Participants throughout the audience shook their heads and exchanged knowing glances at this all-too-familiar cautionary tale. Mr Murray did offer some advice. "It's very important, when dealing with mobile companies, that we know exactly what we're looking for," he said to the statisticians in the audience, pointing out that operators are much more willing and able to approve specific requests for data.

Still, regardless of the specificity of requests, sharing data can pose major business risks for operators eying the future revenue potential of the data itself. Mitigating this risk will only become more important for anyone requesting the information — whether from government bodies or international organizations.

"Operators will consider themselves data companies that happen to provide mobile phone coverage," says Erik Wetter, Co-founder and Chairman of the Stockholm-based Flowminder Foundation, a non-profit that uses data to advance public health and welfare in developing countries. "So do they want to give the data for free to all these organizations that get billions in donor funding?"

That certainly is a question to consider moving forward as the statistical community wrestles with how to mitigate private-company risk in order to gain access to Big Data.

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So what's next?

How will statisticians adjust to the new realities of Big Data?

"With Big Data, the question is raised: Does the role of statistical offices change from being primary data gatherers to curators of private-company data?" asks Mr Wetter of Flowminder. Less-stark versions of this question were discussed in several ad hoc hallway discussions between both public- and private-sector participants at WTIS.

There may not be easy answers to these questions around public-private collaboration on Big Data for development, but there was recognition in Hiroshima that all parties need to be involved.

Data as if it were a football match where one side could lose and the other could win. Thankfully, we've moved beyond that," said Stefan Schweinfest, Director of the United Nations Statistics Division (UNSD). "The low-hanging fruit in the next couple of years is to bring various information systems together and bring them to the right users and shape them into the right policies. The problem is not about technical interoperability, it is about human interoperability."

This "human interoperability" challenge won't necessarily be easy, but it underlines the need for initiatives bringing together all the parties at events like WTIS. And it highlights the importance of ITU's ongoing leadership role in convening the dialogue on emerging best practices.

"Any sector verticals that use ICTs will have to be involved in building a common platform," said Mr Matsumoto. "All the users and stakeholders have to have a common understanding. It may take time, but that's a very important step."

Participants agreed that the international community, and in particular ITU, has an important role to play in facilitating the discussion between data producers and data users. The UN Global Working Group on Big Data for Official Statistics has developed a set of draft principles for access to Big Data sources. "The purpose of these Principles is to facilitate partnerships between official and non-official data producers and to provide concrete guidelines for establishing data sharing agreements," said Susan Teltscher, Head of the Data and Statistics Division of ITU's Telecommunication Development Bureau (BDT). "We welcome comments from the ITU membership on these draft Principles." The draft Principles for data access can be accessed **here**. Comments should be sent to **indicators@itu.int**.

Measuring ICTs: Indicators to promote evidence-based policymaking

By Alexandre Fernandes Barbosa

Head, Regional Center for the Development of the Information Society (Cetic.br), Brazil

The rapid dissemination of information and communication technologies (ICTs) in all segments of society has created many opportunities to engage citizens in an increasingly digitally connected world. At the same time, the fast adoption of ICTs by citizens, organizations and governments poses new challenges for policymakers aiming to foster the ICT skills development required for success in today's digital economy while also ensuring digital inclusion across the population.

Measuring the impacts of ICTs in society as well as monitoring how they are being used to promote sustainable development is essential to the design of effective public policies. The production of reliable statistical data to monitor the progress made by countries in promoting digital inclusion — and to measure the adoption of ICTs — is a crucial activity to guide policymakers' ICT growth strategies.

Policymakers need high-quality data to underpin evidence-based policy decisions. Studies show that better use of better statistics leads to better policies — and improved accountability. In turn, good statistics are critical to measure the impact of evidence-based policies put in place.

ITU's leading role

Many countries and organizations — including National Statistical Offices, private companies and non-governmental organizations — have been increasing their capacity to produce specific ICT-related statistics to help policymakers craft better policies. However, some regions and countries still lack the ability to provide systematic and reliable ICT statistics.

Most countries have been collecting and producing supply-side administrative data through ministries or regulators, which is very often insufficient for policy purposes. This is why the need for the production of harmonized, internationally comparable demand-side ICT statistics is being discussed at national and international levels.

The ITU-led Partnership on Measuring ICT for Development (the Partnership) is an international multi-stakeholder alliance created in 2004 to address the challenges of ICT data collection and analysis. The Partnership plays a very important role in providing a harmonized methodological framework to measure 53 ICT core indicators, thereby reinforcing the international comparability of ICT data across countries.

In this regard, ITU is leading an important process to develop statistical standards and internationally agreed methodologies to enable countries to measure the access to and use of ICTs. The ITU *Manual for Measuring ICT Access and Use by Households and Individuals,* for example, is a practical tool to guide countries in their ICT data production. It can be used as basic reference material when preparing, designing and implementing ICT household surveys.

Another important role of ITU is the coordination process at the international level of data collection, compilation and dissemination. Moreover, ITU has been offering capacity-building and technical support to Member States in the process of collecting and compiling ICT-related statistics.

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Lessons learned in Brazil

Brazil officially started to produce internationally comparable ICT statistics in 2004, as a result of a partnership between the Brazilian Internet Steering Committee (CGI.br) and the Brazilian Institute of Geography and Statistics (IBGE), which made possible the inclusion of an ICT module in the National Households Sample Survey (PNAD), giving rise to the first generation of ICT statistics in the country.

After this successful experience, the need to deepen the investigation of the impacts of ICTs in specific areas, such as e-government, e-commerce, barriers to access and use, skills, and safety, has led both the Internet Steering Committee and the Network Information Center (NIC.br) to allocate resources for annual stand-alone ICT surveys. This important initiative made it possible to establish Brazil's

first two national surveys dedicated exclusively to ICTs in households and ICTs in enterprises.

These surveys, conducted annually by the Regional Center for Studies on the Development of the Information Society (Cetic.br), have become the major and primary source of statistical data on ICTs in Brazil. They are important instruments for designing and assessing ICT policies.

In the context of the development of ICT indicators, the solid cooperation between ITU and Cetic.br over the years has been central to the exchange of relevant information, best practices and sharing experiences. For instance, the ICT Households survey follows definitions and standards established by international organizations and is aligned with the guidelines set forth in the *Manual for Measuring ICT Access and Use by Households and Individuals,* published by ITU in 2014.

Cetic.br's experience shows that internationally agreed methodologies are of utmost importance, but not sufficient to promote evidence-based policymaking. Other initiatives are necessary to engage policymakers and other relevant stakeholders in the ICT statistics production process. Capacity-building workshops on how to use survey data in the policymaking process have proven effective in Brazil. Aside from raising awareness on the importance of measurement in the design and monitoring of ICT policies, the workshops are also an important channel for disseminating internationally acknowledged frameworks and methodologies, such as those set forth by the Partnership.

After ten years of compiling ICT statistics, Cetic.br currently conducts the following national stand-alone ICT survey projects: ICT Households, ICT Kids Online Brazil, ICT Enterprises, ICT in Education, ICT in Health, ICT Electronic Government, ICT in Nonprofit Organizations, ICT Providers and ICT in Public Access Centers.

Each survey project relies on the methodological support of an important group of experts, composed of representatives from government and international organizations, academia and civil society. Each expert group meets regularly to discuss and validate survey methodologies, indicators, and define guidelines for data analysis. Currently, this multi-stakeholder network of collaborators is comprised of approximately 200 experts that ensure rigour in all phases of the data production process, and helps Cetic.br to continuously improve methodological procedures for obtaining reliable and quality data, as well as identifying new areas of investigation.

New role for governments in the era of ICT startups

By Isidro Laso

Head of Sector, Startup Europe, European Commission

"We would have never met together if the meeting had not been called for by the European Commission." I received this comment five years ago in London from a participant at the first meeting of the Accelerators Assembly, a key part of the Commission's Startup Europe initiative that supports tech entrepreneurs. Although tech entrepreneurs, investors, and other industry players gathered at that meeting had been attending the same conferences, they had never before met together to discuss their common challenges and agree on solutions.

At the beginning of our journey to help European startups, I received the following remark from an entrepreneur: "I do not want public money, I prefer you help me get connected to the right people and prepare a level field for me to grow." This was another clear lesson for us: Founders do not want "dull" money. They want "smart" money that comes with experience and connections; the kind of money that can only be provided by serial entrepreneurs who have successfully exited from their own startups and are now oiling the ecosystem with smart money.

In this context, what is the role that governments and public administrations should play in fostering the entrepreneurial ecosystem in which information and communication technology (ICT) growth can thrive? In this article I will provide some ideas about government actions in this domain. These ideas are based on my own experience leading the Startup Europe team.

> *"[Entrepreneurs] want 'smart' money that comes with experience and connections…"*
>
> *Isidro Laso*

Transformational economic and social impact

It is a well-known fact that startups (high-growth, young companies) are having a transformational impact on the economy and society. On the one hand, startups' innovative use of technology is impacting consumption patterns. For instance, the "sharing economy" is changing the way people consume limited resources, and also the way people interact within their communities.

On the other hand, startups are mobilizing resources that were otherwise idle, and allowing access to resources located in faraway places, for instance access to human capital.

The transformational effect of startups is also starting to have an impact on net job creation. While the high-growth young firms (less than 5 years old) account for only 5% of the new firms that survive, according to recent data from the the the Organisation for Economic Co-operation and Development (OECD), startups have a disproportionate impact on job creation — from 21% of the total job creation in the Netherlands to 52% in Sweden. At the same time, startups are bringing new, lean ways of working, characterized by agility and the capacity to act fast.

Well-connected ecosystems are the key

Transformative innovations brought about by startups are — in most cases — direct consequences of dynamic, innovative ecosystems composed of groups of well-connected, like-minded people. They are not necessarily direct consequences of new research or technology. The importance of ecosystems of innovative people has never been as evident as in the case of startups. Silicon Valley or Cambridge are excellent examples of successful ecosystems. The emergence of such ecosystems as key components for innovation brings a new dimension for governments seeking to set new policies to foster innovation.

The main feature of the startup ecosystem is the importance of acting fast. The startup ecosystem should include all the necessary components that allow innovative people to act fast, such as access to capital and talent, minimal bureacracy, and a culture in which taking risks is not punished. Acting fast has implications for traditional industries as well as governments. It means that large or medium-sized firms from the last century can still survive if they are able to transform into agile, lean organizations.

On the other hand, this "act fast" feature implies that governments have to adapt to this new reality if they want to play a relevant, positive role. It is important that public administrations engage with the startup ecosystem to identify the role that public authorities need to play.

New government role: agile facilitator

The main role of governments should be to facilitate the emergence of dynamic ecosystems by working closely with ecosystem players, such as entrepreneurs, investors, corporates, local champions, role models, and others. This would require a shift in the role of public administrations from the comfort zone of doing direct investments and launching large financial initiatives to a more nitty-gritty action plan, empowering the ecosystem to implement the action plan itself. It is important that any action plan is implemented by ecosystem players rather than public authority officers. Government authorities can help startup ecosystem players, and encourage them, but should neither compete with nor replace them.

There is a risk that public administrations might jeopardize startup ecosystems if their main proposed action is to pour public money into them. This would result in public money competing against money from alternative finance or venture capital. If public money were to be used to fund startups, instead of "smart" money, from experienced former entrepreneurs, this would have a negative impact on startups, who would find their capacity for growth limited due to lack of connections and good advice that often comes when serial entrepreneurs have provided the investment. There are, however, some creative ways of financially supporting startups that could have a positive impact. For example, Italy's Lazio region provides extra funding only to those startups that have raised a much higher amount of money from a recognized private investor.

Best practices: what Startup Europe has learned

Startup Europe works with more than two-thirds of the startups in the region. It is led by a small team of officers, some of whom are former entrepreneurs. The team itself acts as a lean startup, surfing through the constraints inherent to all public administrations. When launching a new programme, we always start small with the Minimum Viable Product (MVP) concept utilized by successful startups. It means we spend the minimum amount of time, effort, and money required to learn meaningful lessons. We then test early-stage programme effectiveness and pivot as needed until

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we reach a mature product (or programme) that is able to scale up and be self-sustainable. Most of our actions are designed jointly with the relevant ecosystem players (co-creation) and later implemented by the ecosystem players themselves, with our support. If the necessary actions are co-created in conjunction with the ecosystem, and are of great use to it, public financial investment is, in many cases, unnecessary. And we always take stock of the impact on startups. For example, the following testimonial from Eric Risser (founder and CTO of Artomatix) helped us see we were on the right track: "Startup Europe is an unmissable opportunity for Irish startups to connect with Silicon Valley, meet fellow entrepreneurs, investors and potential mentors from across Europe and scale their businesses into European markets and the US."

A good example of this co-creation process — and self-sustainability of the action plan — is "Startup Europe Comes to Silicon Valley" (SEC2SV). It was co-created by myself and Silicon Valley investors Marco Marinucci and Alberto Onetti in May 2015.

It was implemented in September 2015 ("act fast") and with no financial contribution from the European Commission ("self-sustainable"). This first, small-scale edition of SEC2SV has been the small-scale MVP. The next edition in 2016 will have some new features ("pivoting") so that it scales up. The best indicator that the action has been successful is the feedback from the startups who participated in SEC2SV. A good example is the testimonial from Neill Rickets, founder and CEO of Versarien, an advanced-materials engineering company in the United Kingdom: "SEC2SV has been transformational. The connections and the help that we received has been world class. I am now more excited and enthusiastic about my business than I have ever been before."

The views expressed in the article are the author's own. They do not necessarily represent the views of the European Commission and its services.

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