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Celebrating ITU's 150 Years



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■ Leading tomorrow's technology

Houlin Zhao, ITU Secretary-General

The year 2015 marked a historical landmark as we celebrated ITU's 150th anniversary. Now, as the year draws to a close, we look back with pride at the incredible journey we have undertaken together — as a family of Member States, industry, academia and staff — in connecting the world with communication technology.

ITU may be 150 years old, but we remain young at heart — guiding the development of state-of-the-art telecommunications and information and communication technologies (ICT) around the world. As the oldest member of the United Nations family, ITU remains one of the most resilient and relevant organizations in the world today.

The remarkable history of ITU exemplifies its stellar role in connecting the world to the most advanced and innovative means of communication, from the days of the telegraph to the Internet and mobile broadband, which now allows us to be in touch at any time, anywhere, with friends, family, colleagues, and even with things.

We have taken several key steps this year to consolidate ITU's role as the leading intergovernmental body supporting innovation in ICT across a range of sectors and industries, enhancing service delivery and the means of consumption in every corner of the world.

Accelerating digital innovation for social impact was the central theme of ITU Telecom World 2015, which took place in Budapest, Hungary from 12 to 15 October. Bringing together some 4000 participants from 129 countries, the event provided a full programme of dialogue, debate, and networking along with a showcase exhibition focusing on ICT development. Ministers, regulators, high-level representatives of international organizations, academia and media joined industry leaders from across the rich and varied ICT ecosystem — from established players and big corporations to micro, small- and medium-sized enterprises (SMEs), start-ups and entrepreneurs, as well as the incubators, hubs, and accelerators which support them.



The Ministerial Round Table at Telecom World issued the “Budapest Call for Action”, emphasizing the importance of fostering innovation entrepreneurship and the role of ICT-based innovation in addressing key socio-economic and environmental sustainability challenges, such as those addressed by the UN’s Sustainable Development Goals. It also urged the implementation of innovative solutions, technologies and partnerships aimed at bridging the digital divide and ensuring global connectivity for all.

The Radiocommunication Assembly (RA-15) was held in Geneva from 26 to 30 October, prior to the World Radiocommunication Conference. Addressing rapid changes and future needs in the global telecommunications environment, the Assembly set future work programmes on many technical issues in the field of radiocommunications and approved worldwide radiocommunication standards (ITU-R Recommendations). Among others, RA-15 established the principles and processes for the development of IMT-2020 — the next-generation 5G mobile system — as an extension of ITU’s existing family of global standards for International Mobile Telecommunication systems (IMT-2000 and IMT-Advanced), which serve as the basis for all of today’s 3G and 4G mobile systems.

The World Radiocommunication Conference (WRC-15) met in Geneva from 2 to 27 November and addressed a number of key issues that will govern future innovation in ICTs. Following on from RA-15, detailed technical performance requirements for radio systems to support IMT-2020 were established, paving the way to meet the demand for high data traffic in the age of machine-to-machine (M2M) communication and the Internet of Things — with applications for enhanced mobile cloud services, emergency and disaster response, real-time traffic control optimization and driverless cars using vehicle-to-vehicle and

vehicle-to-road infrastructure communication, along with efficient industrial communications and low-energy smart grids.

WRC-15 made allocations of spectrum for broadband satellite systems, while coordinating procedures to make more efficient use of spectrum and satellite orbits for improved communication among both manned and unmanned space vehicles. New allocations were established for Earth-exploration satellite services for enhanced monitoring of the environment and climate change. Spectrum was also allocated for the aeronautical sector related to the use of unmanned aircraft systems and wireless avionics intra-communications as well as for global flight tracking for enhanced safety in the skies. Safety on sea and on land was also augmented. Maritime communications, facilitating the use of on-board digital transmissions and automatic identification system on vessels for improved navigation safety, were strengthened. Frequencies were also allocated for short range, high-resolution radars for collision avoidance systems in vehicles contributing to increased road safety.

The 13th World Telecommunication/ICT Indicators Symposium (WTIS) took place in Hiroshima, Japan, from 30 November to 2 December. Focusing on ICT as a driver of innovation and entrepreneurship, the symposium took a close look at big data and the data revolution, progress in measuring the impact of ICT innovation, as well as the monitoring framework for the UN Sustainable Development Goals. The much-awaited edition of the flagship *Measuring the Information Society Report* was also launched at the symposium. We will have a more detailed account in the next edition of *ITU News*.

As we come to the end of a very eventful 2015. I would like to wish our readers warm season’s greetings and a very happy and productive New Year. ■

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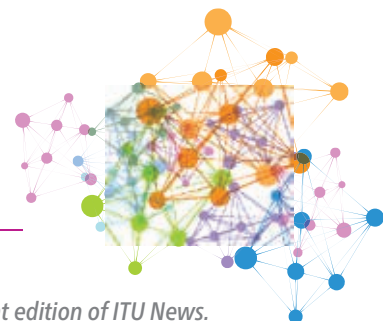
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Note from the Editor

We hope you enjoy this commemorative 150th anniversary print edition of ITU News.

Please note that in 2016 we will be moving to a fully digital format which will soon be available on a new online portal. Special digital editions will also be produced around key ITU events and topics throughout the year.



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■ Celebrating ITU's 150 Years

150  1865
2015

Historic landmarks

The history of ITU has been interwoven with some landmark inventions and innovations in communications over the past 150 years. In the 1850s, soon after Samuel Morse started a service in the United States, telegraph lines crossed national borders and new international agreements had to be forged. In 1865, twenty nations gathered in Paris to sign an international framework on 17 May, the treaty that established the basic principles for international telegraphy, laying the foundations for today's era of international communications. The signing of the Convention established ITU, then known as the International Telegraph Union.

Paris celebrates 150th anniversary

Among the highlights of the year, was the commemoration of the signing of the International Telegraph Convention. France's Minister of State for Foreign Trade Matthias Fekl hosted a reception on 27 April in the Salon d'Horloge on the Quai d'Orsay in Paris, where the signing ceremony had taken place in 1865. The highlight of this year's event featured a display of the original Convention from the archives of the Ministry of Foreign Affairs and International Development of France.

In 1932, ITU was renamed as the International Telecommunication Union in recognition of the technological evolution of telecommunication technology. The venue was Madrid where the Fifth Conference of the Plenipotentiaries was held.

His Majesty Don Felipe VI, King of Spain, and ITU Secretary-General, Houlin Zhao, at a special ceremony in the Spanish Senate to mark ITU's 150th anniversary



Simultaneously, the Fourth International Radiotelegraph Conference met and decided to merge into a single entity. The Telegraph Convention of 1875 and the Radiotelegraph Convention of 1927 were combined into a single convention embracing the three fields of telegraphy, telephony and radio. The new International Telecommunication Convention established at the Madrid Conference served as the Union's charter and constitution, establishing its legal existence and setting forth its purposes, compositions, structure and functions.

Spanish Senate marks renaming of ITU

On 5 May this year, His Majesty Don Felipe VI, King of Spain presided over a glittering ceremony in the Spanish Senate to mark ITU's 150th anniversary.



The digital world has emerged as one of the most important instruments of cooperation and development to expand access to many disadvantaged communities...

His Majesty Don Felipe VI, King of Spain



"The digital world has emerged as one of the most important instruments of cooperation and development to expand access to many disadvantaged communities and to benefits such as knowledge, health and democracy, which are key regions and improve quality of life the citizens," His Majesty King Don Felipe said, noting that digitization is indeed a transforming force that affects all sectors and industries. "But technology should help not only to build a more competitive and productive economy, but also one that is more fair; an economy that generates greater opportunities for employment, training and access to public services."

Carlos J. Martín



I was very privileged to have been in Madrid for this historic commemoration and to listen to His Majesty the King. It was a great honour for ITU.

Houlin Zhao, ITU Secretary-General



"I was very privileged to have been in Madrid for this historic commemoration and to listen to His Majesty the King," said ITU Secretary-General Houlin Zhao. "It was a great honour for ITU."

A focus on innovation

ITU celebrated its 150th anniversary with great fanfare throughout 2015 with a focus on ICTs as drivers of innovation.

In a rapidly evolving global ICT environment, fostering growth and innovation at all levels — from policy-makers and industry to academia and civil society — is critical in meeting the aspirations of end-users and people around the world as we embrace the digital era. Innovative ICTs and broadband access are now recognized as key factors in achieving an environmentally sound and sustainable future in the post-2015 era. Innovative measures can bridge the digital divide between countries, between cities and rural areas, and those living in differing socio-economic levels, while providing a host of new opportunities.

ITU's 150th anniversary focuses attention on our accomplishments. As the specialized agency of the United Nations for information and communication technologies, we can now look ahead at driving innovation in ICTs together with our 193 Member States and a membership of over 700 private sector entities and academic institutions.

Well-wishers from around the world joined ITU in marking this historical occasion.

ITU celebrates 150th anniversary along with 70th anniversary of the UN

United Nations Secretary-General Mr Ban Ki-moon congratulated ITU on its 150th anniversary. "ITU has earned its global reputation for resilience and relevance and I applaud the agency's many contributions as the oldest member in the United Nations system," Mr Ban said. "ICTs can help achieve its goal of a life of dignity for all. New information and communication technologies can help boost the economy and protect the environment. This is a milestone year — the 150th anniversary of ITU, the 70th anniversary of the United Nations, and the potential starting year for transforming our world. Let us work together to harness the power of technology for our common future."

As the oldest member of the United Nations family, ITU also celebrated with the rest of the world to mark the 70th anniversary of the United Nations on 24 October. ITU Secretary-General Houlin Zhao joined a host of dignitaries at the Palais des Nations in Geneva, including former UN Secretary-General Kofi Annan and Mark Müller, at the inauguration of the "Rebirth" sculpture by renowned Italian artist Michelangelo Pistoletto. He also visited the ITU stand, which presented live demonstrations showcasing ICTs to the multitude of visitors, young and old, who came to see how the United Nations worked to improve the wellbeing of present and future generations.

Global celebrations in 2015

The 150th anniversary celebrations kicked off in January 2015 in the presence of the international community and Permanent Representatives of Member States to the United Nations in Geneva. An interactive ITU historical timeline was launched on a custom-built website highlighting key dates in ITU's history from its founding on 17 May 1865 until the present. A toolkit provided campaign materials, resources and instructions to get involved in ITU's 150th anniversary celebrations.

A special section of the website is dedicated to a story-telling campaign with a personal story around the theme of the month (see the following 150th monthly theme stories), supplemented

with a diverse range of related content, including videos, podcasts, webinars, infographics, and social media.

On 13 February, ITU hosted World Radio Day, held concurrently at UNESCO in Paris, to mark the anniversary of the first broadcast by UN Radio in 1946, when it transmitted its first call sign: "This is the United Nations calling the peoples of the world." World Radio Day seeks to raise awareness about the importance of radio, facilitate access to information through radio, and enhance networking among broadcasters. This year, in line with ITU's 150th anniversary, World Radio Day highlighted the theme, "Youth and Innovation in Radio", looking ahead to new and innovative means to connect the world. It featured a live global broadcast of panel discussions coordinated by the European Broadcasting Union, call-ins from radio journalists covering breaking news of the day, radio features and an international concert by the UN Jazz Ensemble. A Radio Hackathon over nearly 24 hours brought together technology buffs working on coding, hacking, building and breaking.

Anniversary celebrations on 17 May

The 150th anniversary celebrations took centre stage with a mid-year climax on 17 May with a glittering ceremony in Geneva.

ITU accorded recognition to the Founding Member States that signed the convention in 1865. With the re-drawing of national borders over the years, the original twenty are now represented by sixteen countries: Austria, Belgium, Denmark, France, Germany, Greece, Hungary, Italy, Netherlands, Norway, Portugal, Russian Federation, Spain, Sweden, Switzerland and Turkey. Long-standing industry members were also recognized, including Telecom Italia (hailing back to 1925), Exelis and Telefónica (since 1929), and Sirti (1931).

The ITU 150 Awards were presented to eminent laureates who have contributed to ITU's work: Martin Cooper, Robert E. Kahn, Mark I. Krivocheev, Ken Sakamura, and Thomas Wiegand. Bill Gates was given special recognition for his contributions and his ongoing work with the Bill & Melinda Gates Foundation.

A panel discussion focusing on ICTs as drivers of a sustainable future, anchored by BBC correspondent Imogen Foulkes, brought in key thinkers and doers: Philip Walton, COO, BRCK; Luis Von Ahn, CEO & founder, Duolingo; Gabriela Styf Sjöman, CTO, Telecom Italia Group; Jian Wang, CTO, Alibaba; and Ulf Ewaldsson, CTO, Ericsson.

The 150th anniversary was generously sponsored by Azerbaijan, Saudi Arabia and the United Arab Emirates. Other sponsors included, Côte d'Ivoire's Telecommunications/ICT Regulatory Body; Ghana's Ministry of Communications; Zimbabwe's Postal and Telecommunications Regulatory Authority; Inmarsat Global Limited; Close Joint-Stock Company National Radio Technical Bureau; Huawei Technologies; Rostelecom; Rohde & Schwarz; Central African Republic's Telecommunications Regulatory Agency; and NTT Group.

ITU's 150th anniversary has been celebrated worldwide and some 150 initiatives have been posted on the ITU 150 website, including the issuing of postage stamps in several countries, such as Argentina, Armenia, Azerbaijan, Bangladesh, Belarus, Bolivia, Brazil, Bulgaria, Croatia, Cuba, Cyprus, Egypt, Gambia, Georgia, Hungary, Indonesia, Kenya, Kuwait, Malaysia, Moldova, Monaco, Portugal, Romania, Russia, Serbia, Spain, Switzerland, Thailand, Uruguay and the Vatican State.



Innovating with Fatoumata



■ Youth and Innovation

Innovating with Fatoumata: How m-farming can feed the next 2.4 billion people

With a rapidly growing population, we must think differently about water to ensure food security, conserve delicate ecosystems and reduce poverty by 2050. Fatoumata Kebe's project CONNECTED ECO, a winner of ITU Telecom's Young Innovators Competition 2014, addresses this issue.

I am an aerospace engineer, but a 2009 trip to Mali provided inspiration for CONNECTED ECO, a social mobile farming solution which hopes to address the global water and food crises.

I was invited to Mali as part of the International Labour Organization's Transfer of Knowledge through Expatriate Nationals (TOKTEN), where I had the opportunity to meet people working in diverse fields, such as agriculture, women's empowerment and education. I was shocked to hear that farmers in Mali were not able to produce enough food to feed their families and had to sell a large proportion of their produce to pay their bills or to have access to health care.

I started developing the idea of a social m-farming project by looking at some facts: By 2050, the world's population is expected to have increased by a third, rising from 7.2 billion today to 9.6 billion. Most of these additional 2.4 billion people will live in developing countries. If current income and consumption growth trends continue, it is estimated that agricultural production will have to increase by 70 per cent by 2050 to satisfy the expected global food demand. At the same time, women in developing countries do almost as much work as men in the field, together with household duties. Additionally, literacy and education rates among women are considerably lower than their male counterparts. In Mali, only 20.3 per cent of women are literate, compared to 36 per cent men.

Agriculture in the developing world must therefore be transformed to feed a growing global population and to provide a basis for economic growth and poverty reduction.

Firstly, how water is managed is at the centre of the problem, as it plays a critical role in crop production. Key to the solution is knowing the right time to irrigate, and how much water to use. However, additional factors such as management practices, technological advances, market prices and agricultural policies must also be taken into consideration.

Secondly, providing women access to education is a cornerstone to reducing poverty and enhancing economic growth. Steps must therefore be taken to ensure women's social and economic inclusion into society.

About CONNECTED ECO

CONNECTED ECO is a social mobile farming solution that takes advantage of existing Internet-of-things (IoT) technologies and transforms their potential into a sustainable business model. The start-up capitalizes on existing IoT capabilities, integrated with a specially designed smartphone app to create "smart farms", where ecological processes are monitored in order to facilitate "smart" water management and deploy irrigation more efficiently. By bringing the cheapest, most suitable and sustainable sensors to Mali we can begin to develop smart sustainable farming: reducing water waste, increasing agricultural yield and promoting digital literacy among female cooperative farmers.

The m-farming concept

By collecting live data on crop and soil conditions, CONNECTED ECO facilitates customized farming to maximize agricultural yield.

Farmers are to be given wireless IoT sensors which are programmed to measure vital agricultural data points including humidity levels, light intensity, soil moisture and electrical conductivity. These data are transmitted via Wi-Fi to an integrated smartphone app — or SMS to low-end handsets — to give real-time information on prevailing weather conditions.

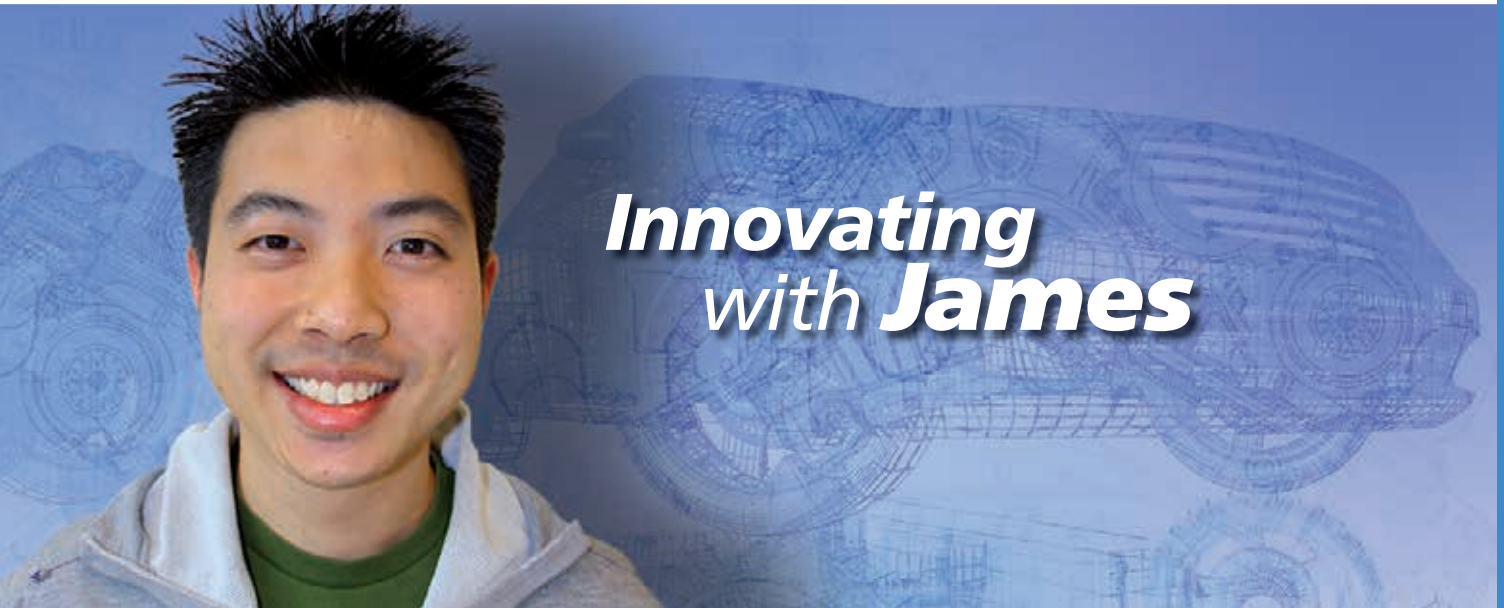
Users can access charts and graphs via the app's dashboard which analyses the data over periods of time and compares measurements to a database of local meteorological conditions. By accessing information farmers will be able to refine their agronomic techniques, reduce crop stress due to overwatering, and therefore reduce water waste. The app advises farmers on the optimum time of day to irrigate their land and the amount of water to use.

By automating the water system, the mobile app can also deploy and control water flow to crops, thus regulating irrigation more effectively. A solar-powered water valve is a flow device which, when attached to a drip irrigation system, allows for more efficient watering. Thus this project will prevent both damage due to drought as well as excessive watering.

Next steps

Once tested and refined, CONNECTED ECO will be deployed across Mali using IoT sensors developed by a technology partner. Eventually, we hope to see this project implemented across West Africa.

*This article is an abridgement.
For full text see: <http://itu150.org/story/february/>*



Innovating with James



■ Intelligent transport systems

Innovating with James: Are driverless cars the answer to improving road safety?

Cityscapes may be redefined by 2025 with the introduction of driverless technology designed to reduce traffic and improve road safety. James Fu and the Singapore-MIT Alliance for Research and Technology team are working to innovate automotive technology and change the way we commute.

There are many reasons to own a car; they provide drivers with greater mobility and independence, and for some can even act as a status symbol. These reasons, coupled with increasing affordability and availability, have led to a rapid growth in car ownership — in 2010 there were 1.015 billion cars worldwide, but it is predicted that there will be 1.7 billion on the road by 2035. This growth will adversely affect travel time. These additional vehicles will also compound current safety statistics: there are 1.24 million road traffic deaths per year worldwide, with drink driving and distracted driving, such as texting while driving, leading causes of road traffic accidents.

I finished my PhD in mechanical engineering at the National University of Singapore (NUS). I then joined the Singapore-MIT Alliance for Research and Technology (SMART) Future Urban Mobility research group, and have since become the Project Lead of the autonomous vehicles group.

Our work focuses on developing the intelligence and decision making behind the smart vehicle — how does the vehicle interpret the environment? How can it tell if an object is moving towards it and act accordingly?

The technology

Developed over six months, hardware and software architecture used on a driverless golf buggy was replicated onto the Shared Computer Operated Transport (SCOT), an electric car converted into a driverless vehicle for use on public roads. It provides Mobility on Demand (MoD), a simple concept whereby intelligent electric vehicles drive independent from human interference, stopping to pick up and drop off passengers. It is a flexible transport system, balancing demand with real-time planning.

The car was then retrofitted with off-the-shelf Light Detection and Ranging (LIDAR) sensors. Maps of the environment are built with LIDAR sensor data and the on-board computers use SMART developed algorithms to understand the 3D environment using 2D LIDAR scans.

A tilted-down LIDAR is mounted on the roof, enabling it to detect its current location; logging a user input destination, the car plans a route based on its current location and the pre-built map. A predictor is used to determine if a dynamic obstacle would come into the car's path, allowing the car to manoeuvre appropriately based on the obstacle's proximity.

This enhances pedestrian and passenger safety while enabling the car to navigate dense and heavily populated areas, tunnels and places where Global Positioning System (GPS) signals are otherwise hindered.

What are the advantages of driverless cars?

Driverless cars can solve the "first and last mile problem" — the distance between the house and the start of the transport network, such as the bus stop or train station, and from the end of the transport network to the office. It also addresses the "rebalancing issue" — getting a car to the next car-sharing customer from the previous customer without needing a driver.

Simulations also show that twice as many driverless cars can go through intersections as regular cars — which can ease congestion especially during peak hours — and reduce greenhouse gas (GHG) emissions caused by stop and start driving. However, the largest benefit of driverless technology is the ability to serve multiple customers at once with intelligent routing, reducing the number of cars on the road by an estimated two thirds.

The technology also revolutionizes road safety. Computers do not have emotions, get tired at the wheel, get distracted by a mobile phone or drive aggressively. This can significantly reduce car fatalities. On-board sensors detect when a person runs in front of the driverless car and immediately perform an emergency stop. Accessibility is also another benefit; people who were previously excluded from car ownership and use such as the elderly, disabled or young, can have easy access to mobility.

Singapore pilot

To better understand driverless technology, SMART deployed two autonomous golf buggies fitted with SMART technology to the Chinese and Japanese gardens in the Jurong Lake District in Singapore. The pilot demonstrated the concept of MoD, and increased public awareness. For six days between 23 October and 1 November 2014, people could book a ride to and from ten pre-determined locations via an online booking system. Vehicle-to-vehicle communication meant the buggies selected routes by enabling them to locate each other to avoid overlapping paths to ensure efficient deployments.

The vehicles carried more than 500 people in over 220 trips across 360 km. The demonstration was incredibly popular, and many people said they hoped to see the technology as part of the transport system one day.

*This article is an abridgement.
For full text see: <http://itu150.org/story/march/>*



Innovating with Alja



■ Girls and women and innovation

Innovating with Alja: How do we close the ICT gender gap?

Women are getting online later than men, leading to a growing technology gender gap. Alja Isakovic shares her story about working to narrow the gender divide in the world of technology.

Living without modern-day technology is almost unthinkable for many of us. I remember the thrill of the slow and chirpy modem connecting to the World Wide Web back in the 90s. Suddenly, I had access to more information that I could have dreamed; I was able to chat with people around the world, learning about different cultures first-hand.

I realized many years later, that it is still unusual for women to be involved in this field.

Technology is omnipresent in today's society; over 95 per cent of jobs now have a digital component. Though the 1995 Beijing Declaration called for the "full and equal participation of women", ITU estimates that 200 million fewer women are online than men. In 2013, Intel predicted that without immediate action, this could grow

to 350 million by 2016. If women are not adequately trained, they will have reduced access to employment, which could have further ramifications for their social, economic and political inclusion.

In this digitally permeated era, we can no longer afford to leave out 200 million women from the technology sphere.

Opportunities and successes

I graduated from the first Media Communications degree offered at the Faculty of Electrical Engineering and Computer Science at the University of Maribor, Slovenia. The programme provided a mix of technical, social and design topics, and programming has always been a hobby.

During my studies, I became very interested in the field of e-learning and co-founded Artesia, a start-up to connect online communities. It led me to various other opportunities, one of the most exciting of which was the chance to work with a local business accelerator to share my story with a new generation of start-ups, helping young entrepreneurs to avoid my mistakes and to communicate best practices. The experience also led me to my current job as online community manager at CubeSensors, a hardware start-up that measures vital environmental indicators such as air quality, temperature, humidity, and noise to help users understand how their home or office is affecting their health, comfort and productivity.

I also organize and teach free programming workshops with Rail Girls and Django Girls. In Slovenia, we had over 1500 applications for these workshops, which is an incredible number given our small population of two million. We have received a lot of support from professional programmers who volunteer their time to share their knowledge with us. Many of them were surprised by the number of women interested in advancing their ICT skills.

Working together

In 2013, I co-founded CodeCatz, a coding study group that meets every Wednesday. We have tried to make learning to code a social activity — and I think this plays a pivotal role in how many women participate. Removing the classroom format, we have developed a fun and friendly atmosphere where we learn from each other and work on interesting open-source projects. Last year we organized and coached a few workshops in Slovenia and spoke at events abroad. This year we are helping to organize WebCamp Ljubljana, a conference for web developers.

One of my proudest moments with the group was building the EU Code Week events webpage.

Connecting communities

Coding teaches people how to solve problems. I believe it is important for young people to have the experience of creating something on their own. By teaching our youth how to code, we are turning them into better problem solvers and giving them the expertise to better understand our digital world.

This belief led me to join the European Commission's Young Adviser programme, set up by Neelie Kroes. We are a group of young people who are actively involved in shaping the digital society. At a Young Adviser's meeting, I learnt about many wonderful initiatives to get girls and women involved in ICTs across Europe, such as CoderDojo and Rail Girls. Unfortunately, although these initiatives have a big impact on local communities, people in the rest of Europe don't hear about them for reasons such as language barriers and a lack of enthusiasm in the mainstream media. We thought we needed to give these initiatives a bigger voice and encourage all of the great work that is being done across Europe to promote coding. That's why we launched EU Code Week, which is about teaching children and adults how to code and understand more about technology. We want to promote it as a new form of literacy and a skill that can bring your ideas to life.

This article is an abridgement.

For full text see: <http://itu150.org/story/april/>



Innovating with Baye



■ ICTs: drivers of innovation

Innovating with Baye: Can ICTs transform access to health care?

It is predicted that by 2030, 366 million people will be living with diabetes worldwide. Baye Oumar Gueye explains how mobile health solutions have revolutionized access to health care for diabetics in Senegal, and what this means for the treatment of non-communicable diseases around the world.

I have lived what many people would consider to be an active life, but at the age of seven, I was diagnosed with diabetes.

Managed properly, the disease does not tend to affect my day-to-day life. I completed two degrees at university, studying my Bachelors in Philosophy, followed by a Masters in Human Resource Management at the *Bordeaux École de Management* (BEM). I then worked my way up the ladder at SudFM, Senegal's number one private radio station, from Reporter to Desk Chief, to Senior Reporter, to Editor-in-Chief, and in September 2014, to Director-General.

While it is true that diabetes radically alters your lifestyle — ensuring that your insulin levels are within a safe range throughout

the day, and by closely monitoring your diet and exercise — it can be managed properly and effectively, and you can live a full and healthy life. Yet, this depends on receiving the right information for best practice, something that is not always easy to obtain. Information and communication technologies (ICT) are the most effective means to achieving dissemination of information. Today, mobile phones have a global reach of nearly 7 billion subscriptions, 3 billion people have access to the Internet and radios are near ubiquitous. Tapping into these services can provide direct, low-cost, engaging and innovative solutions to accessing health care for those suffering from this lifelong disease.

Supporting Senegal's healthcare system

Because of changing lifestyles and diets, most countries in Africa are seeing increased diagnoses of diabetes — and Senegal is no exception. Over four per cent of the adult population lives with the disease across the country, but this could be as high as 10 per cent in some areas. However, these are just estimated numbers; there are still many undiagnosed cases, especially in remote and rural areas.

I am proud to be Secretary-General for the *Association Sénégalaise de Soutien Aux Diabétiques* (ASSAD). For close to 50 years, we have supported people who live with diabetes to help them independently manage their health and live active lives. Through our scientific, legal, medical and social commissions, we raise awareness about diabetes and its treatment, both to people with diabetes and the general public.

In 2014, we teamed up with ITU and WHO to launch their "Be He@lthy, Be Mobile" m-Diabetes programme in Senegal. Senegal is well suited to this innovative programme; 83 per cent of the population has a mobile telephone, 40 per cent of which are smartphones capable of receiving images and videos.

The programme targets four relevant groups simultaneously: the general public; healthcare workers who may not be trained in chronic diseases; diabetics; and diabetics in a high-risk category with known complications.

m-Ramadan pilot

A large majority of the Senegalese population is Muslim (94 per cent). Ramadan is a holy celebration in the Muslim faith where practitioners must fast for a month, not consuming foods or liquids from sunrise to sunset. Consequently, Ramadan is a risky period for diabetics: periods of fasting throughout the day are usually followed by a high sugar intake when consumption resumes in the evening. Because of this dietary irregularity, health authorities witness a peak in the urgent hospitalization of people with uncontrolled diabetes.

m-Ramadan, the first deployment of the m-Diabetes programme, was launched in 2014 to raise awareness about the dangers associated with this holy period and how to fast safely. People living with diabetes or healthcare professionals who had an interest in receiving recommendations about diabetes and fasting, could apply to receive SMS messages before, during and after Ramadan, free of charge.

Four weeks before Ramadan, we sent users one message a day to help them prepare for the month of fasting. This reduced to two a week during Ramadan. Typical messages included: "drink one litre of water every morning before you begin fasting", "take care not to overheat and watch out for foods high in sugar, such as dates", and "ask your doctor to adapt the dose and timing of your diabetes medication before you fast". In total, 80 000 free SMS messages were distributed to more than 2000 users across the country.

ITU's role

ITU was an active facilitator, bringing technical, logistical and organizational expertise to help see the project through from beginning to end. As a nationally deployed programme, we needed to reach different users. Having previous experience with public-private partnerships, ITU helped coordinate the participation of different telecommunications operators. With their assistance, we were able to stick to our schedule and help get people with diabetes safely through Ramadan.

*This article is an abridgement.
For full text see: <http://itu150.org/story/may/>*



■ Innovation and the digital dividend

Innovating with Bassil: What is the “Digital switchover” and why does it matter?

Television is enjoyed by billions of people around the world, and viewers will soon be able to access a range of new services and programming thanks to the “digital switchover”. Bassil Zoubi has worked in the broadcast industry for decades and he shares with us why he believes this migration to digital television is important and looks at the wide-ranging impact it can have.

For consumers, the means of watching television (TV) is simple and has remained largely unchanged since the 1950s: push a button and news from around the world, memorable storylines and images of far-flung places are beamed directly to you. Yet behind the scenes, television is a complicated affair.

This shift towards digital broadcasting means that consumers can enjoy a wider variety of shows, on multiple channels, with a better quality viewing experience. It also facilitates reduced power and

energy consumption, and spectrum efficiency, which brings a host of associated benefits for consumers and broadcasters.

Working as Head of the Terrestrial Transmission Department at Arab States Broadcasting Union (ASBU), I help to support the wide array of stakeholders involved, from stations to engineers and end-users, to ensure a smooth transition to digital broadcasting for the Arab region.

Digital dividend

With the advance of digital technology, we are now able to broadcast more efficiently. Analogue television broadcasts occupy a large amount of spectrum, a finite natural resource and the electromagnetic “channel” over which programming travels. Where a single analogue programme can be broadcast on one transmission channel of 6 MHz to 8 MHz bandwidth, the same transmission channel could carry a multiplex of up to 20 digital programmes of equivalent quality. As spectrum is a limited resource, this is a valuable saving. The spectrum that is now being freed up as a result of the switch-over from analogue to digital is known as the “digital dividend”.

Making the switch

Broadcast transmissions involve many players in the chain — content producers, chain programmers, point-to-point links (e.g. between the studio and the transmitter station), manufacturers and end users. Consequently, a lot of investment, both in terms of money and time, is needed to facilitate the switchover.

While I believe that the existing infrastructure should be used to the largest extent possible, nearly 87 million households in the Arab region will need new equipment, and thousands of stations will need to be renewed or replaced. Therefore, the transition to digital broadcasting will require a long harmonization process, but in order to go smoothly, it must involve all stakeholders as well as the media, telecommunication and frequency regulators and national legislators.

Arab States Broadcasting Union (ASBU) plays a key role in bringing these players together to facilitate the digital switchover in the Arab region; we help to organize and coordinate the exchange of information and provide technical assistance to our members to ensure their smooth and harmonious operation. As part of this service, we have issued many studies and recommendations to help our members understand the advantages of digital transmission.

The benefits

There are many benefits to making the switch from analogue to digital broadcasting. First is the reduction in power and energy consumption and the increase in quality of service (QoS) by providing consumers with better quality transmissions such as HDTV, achieved through digital processing and compression of broadcasts.

However, the most valuable benefit both to service providers and consumers, is the amount of spectrum that is freed up once the switch has been completed: the Arab Region will have over 200 MHz spectrum from 694–698–790 MHz and 790–862 MHz. I expect that this surplus spectrum will primarily be allocated for two purposes: additional local programming, and mobile services such as International Mobile Telecommunications (IMT).

In the Arab region, television is largely watched through live broadcasting services. Less than three per cent of television is currently viewed online or through on-demand services, mostly due to the limited scope of Internet capacity and availability.

The Arab region is comprised of different backgrounds, and has a rich cultural history. As the dividend will facilitate additional local programming, I hope that this programming will be geared towards promoting a culture of tolerance, and help to preserve the different communities.

The digital dividend is expected to be allocated for mobile services such as IMT, which will facilitate the further deployment of mobile broadband services in the Arab region, providing better coverage for highly dense and rural areas. As the Internet plays an important role in delivering a variety of services to customers, such as education and raising literacy rates, increasing the availability of mobile broadband will, in my personal opinion, have a positive impact on the region.

*This article is an abridgement.
For full text see: <http://itu150.org/story/june/>*



Innovating with Lobna



■ Accessibility and innovation

Innovating with Lobna: Why should accessible technology matter to us?

I would classify myself as a regular 20-something: I love my job, I have friends all around the world, and I enjoy travelling. But being a person with a disability, these things do not come easily to me. I was born with severely reduced mobility, only having independent use of my mouth. Growing up, I relied on my parents for everything.

For me, a world without accessible technology, is an isolated life. Information and communication technologies (ICT) give me the opportunity to be like everyone else; like you. But we must ensure that the environment is prepared — that both legislation and technology are in place to facilitate the needs of people with disabilities.

Early life

I have never let my disability hold me back. When I was a child my parents would have guests visit from all over the world and I was soon able to speak Arabic, English and French fluently, avidly listening to their stories of magical far-off places.

My parents pushed for my integration into “normal” society from an early age and searched for a school that would accept me. As I was the first child to try entering a “mainstream” school in my area, they didn’t have the resources necessary to facilitate my education. One day, my Dad bumped into an old headmaster friend by chance and explained my situation. He accepted me into his school without hesitation.

This experience of rejection and triumph was a determining factor in my decision to become an advocate for people with disabilities after I finished my studies.

Transformative technology

I got my first laptop when I was writing my Master's thesis, and it completely changed my life. I would put a pen in my mouth and use it to type the letters on the keyboard which made university papers exponentially easier to write and submit. As a reward for my degree, I was sent to the UK by my university and given a laptop equipped with a voice recognition programme and trained in how to use the technology.

Later, we got the Internet at home. I experienced a freedom that had previously been unparalleled. My wheelchair made me partially independent by giving me physical mobility, but my laptop lets me travel all over the world from my room with the click of a button. I can easily share my thoughts, articulate my arguments and communicate with the outside world, promoting the rights of people with disabilities. Through Facebook, I am a representative of associations and organizations around the world — from Switzerland, to Lebanon and Libya, which aim to help people with disabilities.

ICTs are also integral to my ability to do my job. I have been working as an administrator at the Presidential Palace in Tunisia for six years, and perform various tasks. With the help of ICTs, I can send e-mails and submit my work from anywhere with an Internet connection, so I don't have to always go to the office, which can be rather cumbersome with my wheelchair.

Long road ahead

There have been incredible advances in technology accessibility in the past few decades, but there is still a long way to go.

The development of ICTs themselves have positively impacted my life. Smartphones and their associated application, for example, are truly fantastic: I saw a deaf person make a Skype call on the train using the video for sign language.

As technology reach has expanded, so too has accessible software for persons with disabilities. But significant challenges remain. It is true that there are many smartphone apps designed for people with disabilities: you can type brail, zoom in on text, learn sign language, and install speech recognition apps, custom keyboards, or augmentative and alternative communications (AAC) keyboards. But the button to lock the screen is often on the side, which is difficult to push for some people with reduced mobility. Universal availability is a key issue, and interoperability means more than borrowing a friend's phone when I leave mine at home. Price is a barrier to accessible technology for people with disabilities. For example, if a laptop costs USD 1000, the same laptop developed with accessible technology can cost up to and beyond USD 5000.

With the help of ICTs, I have achieved more than I thought was possible. I have travelled in Tunisia and to other countries, to advocate for the rights of people with disabilities — a job that I love. Technology has given me self-confidence. But I am still somewhat of a rarity; an example of what should be commonplace.

We must continue to work to ensure that everyone has access to this transformative technology, and eventually create a truly inclusive information society.

*This article is an abridgement.
For full text see: <http://itu150.org/story/july/>*

Innovating with **Mirian**



■ Bridging the digital divide

Innovating with Mirian: How do we close the digital divide?

Although 3 billion people worldwide were online and using the Internet by the end of 2014, at least 4.3 billion people were still not online, 90 per cent of whom live in the developing world. Mirian Teresita Palacios Ferreira, Chairperson of CONATEL, explains how she is working to address the digital divide in Paraguay.

Society is becoming more and more connected every day. Today, a housewife from a rural area in Paraguay can pay her household utility bills without leaving the house. Her daughter can connect to a virtual learning platform and continue her studies after arriving home from work in the capital. Later, the whole family can have a video conference, despite geographic distances.

In 2013, Internet penetration was only 36.9 per cent in Paraguay, meaning that the scenario above was not yet an option for most of the population.

Paraguay is now one of the fastest growing economies in South America, poverty has declined over the past decade, and there is universal access to free basic education.

But how do we build on this potential to turn Paraguay into a thriving digital economy?

This task was recently entrusted to me; as Chairperson of *Comisión Nacional de Telecomunicaciones* (CONATEL) it is my job to capitalize on the vital role that ICTs play in national development and to bring ICT access to everyone in Paraguay.

Impact of a connected Paraguay

On an individual level, increased access to broadband connectivity will enable greater access to public services. Access to health care and education will be boosted through m-Health initiatives and online education platforms. Political participation and government transparency will benefit from e-government solutions.

Greater connectivity will also lead to more dynamic trade and private business activities which will drive national economic growth.

Identifying the challenge

Paraguay's geography remains a significant barrier to high-speed, low-cost Internet. As a landlocked country, we are dependent on neighbouring countries for access to the fibre-optic submarine cables that connect most of the world to the Internet.

This, in turn, drives up costs. A connection of 0.75 Mbit/s costs USD 21, which is 6 per cent of the average monthly income for a Paraguayan citizen. Subsequently, only 10 per cent of households have a fixed Internet service. Mobile broadband is an affordable alternative to fixed broadband plans, costing USD 11 — or 3.5 per cent an average monthly salary — for 500 MB.

Subsequently, Paraguay performed below average for both the Americas region and developing countries globally in ITU's 2013 ICT Development Index (IDI), which measures national ICT access, use and skills. Paraguay had an IDI value of 3.71 compared to developing country average of 3.84 and the regional average of 4.86.

However, Paraguayans have an appetite to get online. The case is clear for us to strive to develop the infrastructure necessary to satisfy this desire of our population and enable national ICT growth.

Initiatives

Over the years, CONATEL has launched a number of initiatives to bring connectivity to Paraguay, focusing on a multi-stakeholder approach.

In 2007, CONTAEL liberalized the terrestrial international Internet connection, which resulted in a 715 per cent increase in average peak Internet speeds from 2007 to 2011.

Other such initiatives are working to find alternative solutions to work around our geography as a landlocked country, identifying routes to connect to the international optical fibre networks running under our world's oceans. We are currently exploring links to the Atlantic via Argentina and Brazil and the Pacific via Bolivia and Peru, which will drive down the cost of broadband plans.

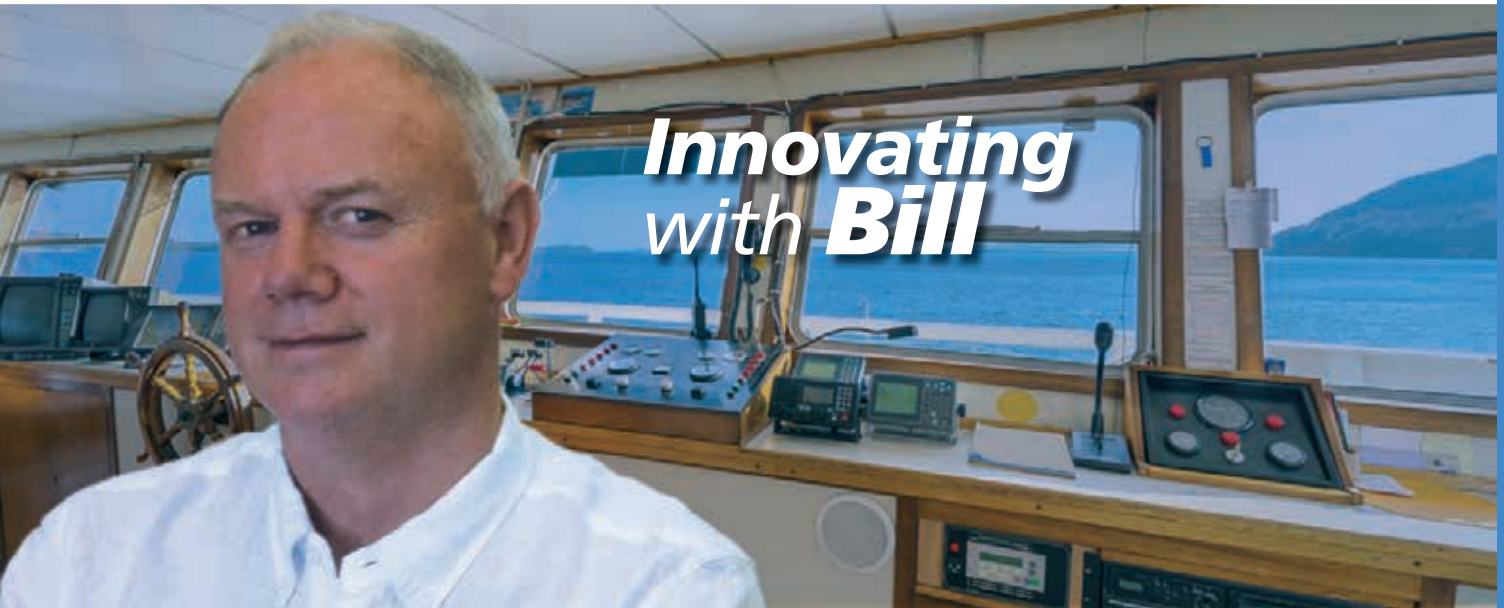
Moreover, the 2011–2015 National Plan for Telecommunications (PNT), which maps the development of broadband in Paraguay, focuses on the deployment of fibre optic backbone networks. Thanks to the subsidizing of private initiatives through the Universal Service Fund, we estimate that all 250 municipalities will have fibre optic lines by the end of 2015 which will vastly increase broadband access. Moreover, to build on the penetration of mobile broadband, CONATEL will soon begin the bidding process for 4G mobile broadband.

Funding from the Universal Service Fund has also helped to set up free WiFi in 50 public spaces across 36 municipalities at the end of 2014.

The next generation

Young people are key to closing the digital divide in Paraguay. They are avid consumers of ICTs; ITU's 2013 Measuring the Information Society Report noted a youth Internet penetration rate of 53.9 per cent in Paraguay. Furthermore, 19.5 per cent of the total youth in Paraguay are digital natives, meaning that they have five or more years of experience online. We must now build on this and empower the next generation to become a driving force for ICT growth in the country.

*This article is an abridgement.
For full text see: <http://itu150.org/story/august/>*



■ Navigation and innovation

Innovating with Bill: How do we stay safe at sea?

Navigating the seas safely is not just important for the lives of the people on board; shipping plays a vital role in today's economy, with over 90 per cent of the world's trade carried by sea. Having navigated the seas for 20 years and rising to the rank of Master Mariner, Captain Bill Kavanagh, explains how seafarers stay safe at sea.

If you ask any seafarer their reason for going to sea, the chances are they will all tell you the same thing: to see the world. At the age of 18, I circumnavigated the world in six months on my second trip as a cadet. The voyage took me to Spain, South Africa, India, Japan, and beyond. Since those first trips at sea, I have commanded a 100-metre long, 3500 tonne ship across Europe, and navigated a 174 metre, 27 000 tonne ship through the Persian Gulf.

Though these vessels may seem large, 94 large ships went missing in 2013. At any given point, you can be hundreds of miles from the coast, with help hours, even days, away. But navigating the seas safely is not just important for the lives of the people on board.

Over 90 per cent of the world's trade is carried by sea; the efficient transportation of cargoes impact on both consumers and the global economy. A typical passenger ship might consume over 200 tonnes of fuel per day, so fuel efficiency is important to retain competitiveness. A collision could cause a breach in the hull of the fuel tank and cause extensive damage to the marine ecosystem. Therefore, safe navigation is paramount.

I became Master Mariner at 29. As the ship's commander, I was responsible for all aspects of life on board: from navigation and engineering maintenance, to cargo and communications between suppliers, ports and other ships.

Navigating the seven seas

Navigation is dependent on three things: you must know where you are, where you are going, and where you came from. Being able to calculate this with pinpoint accuracy is vital to ensuring safety. As risks increase on coastal routes — rocks, coastal and wind effect, shallow water, and increased traffic — accuracy must be calculated to within 20 metres.

When I started out in my early 20s, we would physically plot our course with paper charts, using an up-to-date chart portfolio which provided information on new regulations, lighthouse markers, and any change of communications and navigational aids.

Today, ships rely on computer integrated navigation. By 2018, Electronic Chart Display and Information System (ECDIS) will be mandatory on all commercial ships. This technology integrates electronic navigational charts with information from the Global Positioning System (GPS), Automatic Identification System (AIS) and radar to give continuous real-time positioning in relation to land, charted objects and unseen hazards. An Automatic Identification System (AIS), which is dependent on satellite positioning, can track the path of ships in real time.

Radar is one of the most innovative navigation aids of the past 60 years and one of the biggest success stories of radio navigation. Radar is used to avoid collisions, and for detecting the distance from a position and an object for position fixing.

Staying safe at sea

Professional mariners spend months at sea, working in changing time zones and often in difficult weather conditions. As on-board equipment often seems “fool-proof”, navigators can become over-reliant on electronic navigational systems. The consequences can be catastrophic, with human error accounting for up to 80 per cent of maritime accidents.

When it comes to search and rescue, the simplest devices are the most effective. Emergency Positioning Indicating Radio Beacons (EPIRB) are vital to ensuring crew safety and have saved thousands of people over the past 30 years.

Another key technology is a search and rescue transponder (SART). Once turned on, a signal is displayed on a rescuing ship's radar display, creating a series of dots which can be followed to the point of the emitting SART.

An additional aid to search and rescue operations and safe navigation are the Maritime mobile Access and Retrieval System (MARS) database and maritime service publications. Using the MARS database or maritime service publications, ships can easily be identified using a Maritime Mobile Service Identity (MMSI), name or call-sign. They provide detailed information on each vessels' radio station and other vital Search And Rescue (SAR) information, such as persons on board and emergency on shore contact details. These electronic (DVD) publications can also be used by coast stations to obtain information on vessels in their waters, and are mandatory in all Maritime Rescue Coordination Centres (MRCC) worldwide.

This article is an abridgement.

For full text see: <http://itu150.org/story/september/>



■ Big data and innovation

Innovating with Dan: How does big data help us understand climate change?

Climate change is a real threat to our planet, with destructive consequences already being felt across the globe. Daniel Duffy, High-Performance Computing Lead at the NASA Centre for Climate Simulation (NCCS) explains how big data is essential to the task of studying climate change.

What kid hasn't dreamed of being an astronaut? Science and space exploration have always been extremely interesting to me, so working at NASA is not only an honour and a privilege, but a dream come true. At the NASA Centre for Climate Simulation (NCCS), I work with former astronauts and some of the world's best scientists and engineers to develop solutions to model climate change.

NCCS provides high-performance computing, storage and networking resources for large-scale NASA science projects. Many of these projects involve global simulations of the Earth's weather and climate. These simulations create huge amounts of data; data

that is literally too big for the scientists to read through. Therefore, it is increasingly important to provide new methods for analysing and visualizing the big data sets in order to better understand critical scientific questions such as climate change.

Performing research on weather forecasts will provide us with more accurate information on extreme weather events, such as hurricanes and strong convective systems that can create tornados, which have a direct impact on both the United States and the rest of the world.

**Big data and climate change:
How does it work?**

Big data and studying climate go hand-in-hand; you really cannot study climate without large amounts of data.

The NASA Centre for Climate Simulation (NCCS) facility is home to a cluster of computers called the Discover supercomputer. Its primary objective is to provide the necessary high-performance computing and storage environment to meet the requirements of NASA science projects.

However, providing a large amount of data to a scientist means nothing if they are not able to visualize and map it in meaningful ways. One example of this is the enhanced animation produced by NASA's Global Modelling and Assimilation Office (GMAO), which uses observations from multiple sources to drive weather forecasts.

GMAO's GEOS-5 Data Assimilation System (DAS) blends observational and model information to produce the most accurate and physically consistent picture of the atmosphere at any given time. Over five million observations are accumulated every six hours, mapping variables such as temperature, water, wind, surface pressure, and ozone. Assimilated observations come in eight major types, each measuring different variables from various sources.

**Data mapping: Climate
change and forecasting**

The data generated within the NCCS contributes to a variety of key research and policy papers.

This data enables a more informed conversation on the impacts of climate change on our planet, and can help policy makers develop appropriate strategies and actions in response to climate projections. For example, the data has been used in the assessment reports sponsored by the Intergovernmental Panel on Climate Change (IPCC).

A data simulation produced in the NCCS and visualized by NASA's Scientific Visualization Studio, presents outputs from climate models produced in the IPCC's Fifth Assessment Report, showing how temperature and precipitation are projected to change throughout the 21st Century.

We also generate a re-analysis of the climate over the past 35 years that is used in a variety of projects outside of NASA.

Hurricane Katrina, which hit the United States Gulf Coast in 2005, highlights the importance of accurate forecasting. Though damage was immense, it could have been far worse without the forecasts to provide advanced warning and allow time for adequate preparations. Today, NCCS supercomputers host GMAO's global circulation model, which is up to ten times the resolution of those used during Hurricane Katrina, allowing for a more accurate look inside the hurricane helping to more accurately estimate its intensity and size. This means that meteorologists have a better understanding of where a hurricane is going and what activity is happening inside, which is essential to planning successful preparations for an extreme event like Katrina.

In addition, the output of the global climate models is also used by Observing System Simulation Experiments (OSSEs) to simulate the next generation of remote sensing platforms being proposed by NASA. This provides scientists and engineers with a virtual Earth in which to study the benefits of making new remote observations of the atmosphere from space prior to even building a new sensor or satellite.

*This article is an abridgement.
For full text see: <http://itu150.org/story/october/>*



Innovating with Olga



■ ITU as a platform for innovation

Innovating with Olga: How will technology transform our cities?

It is predicted that 66 per cent of the world's population will live in cities by 2050 — which will put increased pressure on already stretched services and the environment as we rapidly approach 9 billion global citizens. Increased connectivity will help cities adapt to this growing demand through the deployment of smart sustainable cities, which will bring new benefits and opportunities to industries such as health care, transportation and education. Dr Olga Cavalli, ICANN Governmental Advisory Committee vice-chair, ISOC Argentina President, and lecturer at University of Buenos Aires, explains how technology will improve urban efficiency and quality of life.

Current technological development is opening up new opportunities for how we connect with each other and the world around us. This increased connectivity will drive the evolution towards Smart sustainable cities, where services will be powered by information and communication technologies (ICT) to increase environmental efficiencies and improve our quality of life. Things like turning your household heating on from your mobile device or commuting to work with a self-driving car will become a reality

in the near future — and soon, we won't be able to imagine living life any other way.

I have been working to bring this “connected living” to Argentina in various capacities over the past ten years. As vice-chair of ICANN's Governmental Advisory Committee (GAC), President of ISOC Argentina, lecturer and electric and electronic engineer, I've helped to coordinate critical building-blocks including developing critical ICT infrastructure and policy in poor and rural areas, as well

as the transition from Internet Protocol version 4 (IPv4) to Internet Protocol version 6 (IPv6) — a vital step towards the deployment of Smart sustainable cities.

In a smart sustainable city, a fully connected ecosystem will improve quality of life and access to services. It will have a positive impact on our day-to-day lives — enhanced traffic management systems will certainly improve the lives of most daily commuters. But how will this be developed and deployed?

Infrastructure and resources

This next generation of services is a natural evolution of today's Internet-enabled environment. However, technological development cannot occur without an adequate infrastructure to reinforce it, which will play a decisive role in the roll-out of Smart Sustainable City services. This relies on two key elements: greater broadband connectivity and sufficient addressing resources. At the end of 2014, 65 per cent of Argentina was online and using the Internet. Our physical geography — including the Patagonian desert in the South and Andes mountain range which runs along the North-West of the country — has created sparsely populated areas which lack financial incentive for private industries to roll-out Internet. Therefore, government intervention is necessary. In addition to the roll-out of fibre networks throughout the country, the Argentine government has launched a number of infrastructure development initiatives to connect the country: *Argentina Conectada* and the Federal Fiber Optic Network, and the capacity building programme "*Conectar Igualdad*", which has provided more than five million computers to students in Argentina.

To cope with the increasing demand that this expanded connectivity will require, we must increase addressing resources. However, address allocations are rapidly diminishing in the 32-bit address space available in the current Internet infrastructure, Internet Protocol version 4 (IPv4). Therefore, we need to make a

swift transition to Internet Protocol version 6 (IPv6) — the next generation of Internet addressing infrastructure that provides 128-bit addressing space, increasing the size by trillions of times and providing sufficient addresses for the foreseeable future. This vast increase will give us the opportunity to connect a multitude of devices to the Internet — from fridges to traffic lights to sewage systems — which will pave the way for Smart sustainable cities.

Ten years ago, participation in IPv6 discussions in Latin America was very low. We need more relevant engagement in our region because the environment in Latin America is different to other regions — for example, its asymmetry, infrastructure, and the economy — so solutions must be defined with this in mind. Consequently, I co-founded the South School on Internet Governance to train the next leaders of Internet governance in the Latin American and Caribbean region.

Smart sustainable cities and development

Smart sustainable cities are an important component to the future of sustainable development. Goals 9 and 11 of the newly adopted Sustainable Development Goals (SDGs) cite sustainable transport and sustainable urbanization as key targets. By increasing urban and environmental efficiencies, and supporting easier and better access to health care and education, Smart sustainable cities have a role to play in the achievement of the post-2015 agenda more broadly.

Global statistics show a wide digital divide between developed and developing countries, with Internet users representing 82 per cent and 35 per cent, respectively, in 2015. Internet connectivity is a key component if we are to reach these global development opportunities via Smart sustainable cities.

*This article is an abridgement.
For full text see: <http://itu150.org/story/november/>*

ITU 150th Anniversary quotes

150 1865
ITU 2015

As we mark the sesquicentennial of ITU, let us pledge to work even harder to further the vision and mission of the ITU and build a future where all members of the human family are connected and enjoy access to ICT services.

Hamad Obaid Al Mansoori
Director General, Telecommunications Regulatory Authority (TRA), United Arab Emirates

Based on the MoU signed last year between ITU and the City of Busan, I hope that we can continue to work together in ensuring IoT interoperability, nurturing ICT experts and narrowing the digital divide.

Suh Byung-soo
Mayor of Busan Metropolitan City, Republic of Korea

ITU has continually proved its value and capability as it brings the diverse Member States of the world together in achieving consensus solutions. With your dedication, we have enjoyed great progress in international telecommunications and ICTs over the past 150 years.

Kamal Bin Ahmed Mohamed
Minister of Transport and Telecommunications, Bahrain

In the context of the 2015 theme "Telecommunication/ICTs: Drivers of Innovation" I would like to emphasize the significant contribution of ITU to bridging the digital divide, developing economy and building an inclusive information society.

Veselin Bozhkov
Chairman, Communications Regulation Commission, Bulgaria

Today as we mark 150 years of the establishment of ITU, we also mark 15 years since the establishment of Lesotho Communications Authority.

Monehela Posholi
Chief Executive Officer, Lesotho Communications Authority

Another significant development has been the process of migration to digital terrestrial television broadcasting. This process was initiated by ITU. In 2006, Region 1 of ITU comprising Africa, Europe, the Middle East and the Islamic Republic of Iran agreed to migrate from analogue to digital broadcasting by the 17 June 2015.

Khotso Letsatsi
Minister of Communications, Science and Technology, Lesotho

Today, as the oldest specialized agency of the United Nations, ITU with 193 Member States and over 700 Sector Members, including many United States companies and organizations, remains a vital tool for the evolution of the telecommunication sector on a range of important technical and policy issues, including the global allocation of the radio frequency spectrum allocation, the development of technical standards management, and capacity building in developing countries.

John Kerry
Secretary of State, United States of America

I, availing myself of this opportunity, would like to express my deep thanks to ITU for sincere assistance and cooperation for the development of telecommunications in our country in the past, and hope for your active role to continue this history of admirable assistance and cooperation in future.

Kwang Chol KIM
Minister of Posts and Telecommunications,
Democratic People's Republic of Korea

The Hon'ble Prime Minister expressed her firm optimism to launch Bangladesh's first-ever satellite into space by 2017 to bring a revolutionary change in the telecom and information technology sector, while acknowledging wide ranging assistance that Bangladesh has been receiving from ITU.

Permanent Mission of the People's Republic of Bangladesh
to the United Nations Office and other International
Organizations

I would like to congratulate you warmly, on behalf of the Italian Authorities and in my name personally for the interesting and even moving ceremony for the 150th Anniversary of ITU.

Maurizio Enrico Serra
Ambassador of Italy

We are proud to belong to the country which became a Member State of ITU 149 years ago (9 February, 1866).

B. Kovacevic, President of Association of Electrical Engineers of Serbia (AEES), Dean of the Faculty of Electrical Engineering, University of Belgrade; A. Skulic, Chairman, and M. Simic, Vice-Chairman, Management Board, AEES

It was my pleasure and honour to be there [at the ITU150 Awards ceremony] to receive the prestigious ITU150 Award along with other recipients.

Ken Sakamura
Professor, the University of Tokyo,
Director, YRP Ubiquitous Networking Laboratory
Chair, TRON Forum, Japan

It was truly an honour for the institution that I represent, that you shared the commemoration of the Madrid Conference held in 1932, presided by HM King Felipe VI, with a broad representation of Spanish information and communication technologies industry professionals, in the same Sessions Chamber of the Spanish Senate in which you delivered your speech [Houlin Zhao] in commemoration of 150 years of ITU.

Eugenio Fontán
Dean and President, Official College of Telecommunications Engineers
(Colegio Oficial de Ingenieros de Telecomunicación, COIT), Spain

...the Argentine Republic, member of the Union since 1889, wishes to join the celebration. The *Correo Oficial de la República Argentina S.A.* (Argentina's Official Post Office), under the scope of this Federal Authority for Information and Communication Technologies (AFTIC) issued a commemorative postage stamp on 21 August 2015...

Norberto Berner
President, Federal Authority for Information and
Communication Technologies (AFTIC), Argentina

ITU's contribution to the development of communication the world over, the growth and development of ICT and all its allied sectors cannot be gainsaid.

H.E. Uhuru Kenyatta
President of Kenya

Government has to set the vision and put sensible policies in place. And it has to see advances in information technology as part of a larger plan to empower our people and create opportunities. One thing is clear: Information technology is not an end in itself; it is a means to an end.

H.E. Voreqe Bainimarama
Prime Minister of Fiji

ITU 150th Anniversary stamps

150  1865
2015



The State of Broadband 2015

Shutterstock

■ Broadband as a foundation for sustainable development

Each year, the Broadband Commission for Digital Development publishes its annual “State of Broadband” report to take the pulse of the global broadband industry and explore progress in connecting everyone via broadband. This year’s report shows mixed messages about the growth of information and communication technologies (ICT) and the global state of broadband. Although strong growth rates continue for mobile broadband and Facebook usage (which quickly attained their first billion users — Figure 1), and mobile cellular subscriptions exceeded 7 billion for the first time during 2015, growth in global mobile cellular subscriptions and Internet usage has dropped, and growth of the Internet has reached an inflection point.

Indeed, the UN Broadband Commission’s targets or best-estimate projections made in 2011 have not been achieved by the target date, 2015, and only seem likely to be achieved by 2020 at the earliest. The milestone of 4 billion Internet users is also unlikely to be achieved before 2020. Growth in Internet subscribers has fallen from around 8.5 per cent for 2012/2013 and 2013/2014 to 8.1 per cent for 2014/2015. The annual growth in Facebook (13 per cent for 2013/2014) is outpacing growth in the Internet (8.1 per cent), enabling Facebook to increase its market share to 45 per cent of the global online population of Internet users. Nearly one in two Internet users is now a regular, monthly user of Facebook.

1 Mobile broadband is the fastest-growing ICT service in history

Years to achieve one billion users (from launch)



Source: ITU, based on various sources.

Many markets worldwide are now fully saturated with regard to mobile phone penetration. However, although the number of unique subscribers continues to grow (currently between 3.7–5 billion, according to different sources), growth in global mobile cellular subscriptions is slowing due to saturation in a number of mature markets (Figure 2). ITU estimated that there would be 121 countries with mobile cellular penetration in excess of 100 per cent by the end of 2015.

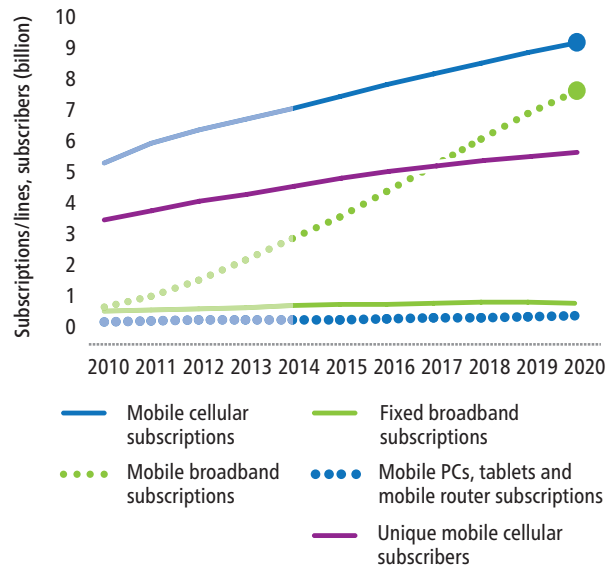
In mature mobile markets, the Report finds that many operators are now focusing on:

- ▶ migrating customers to 3G and 4G to stabilize average revenue per user (ARPU);
- ▶ retaining customers in the face of competition from low-cost mobile virtual network operators (MVNOs); and/or
- ▶ investing in foreign markets through mergers and acquisitions (M&A) activity to achieve further growth.

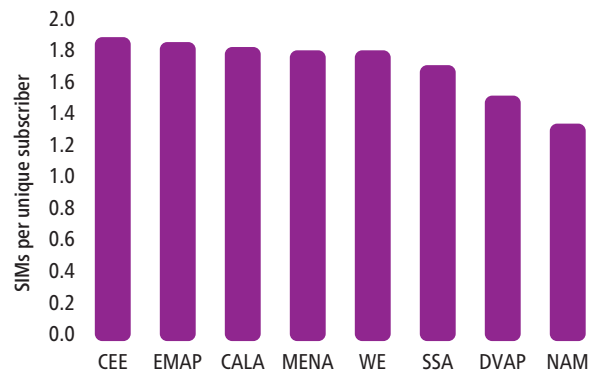
Growth in the mobile industry now relies more than ever on persuading existing subscribers to upgrade their subscriptions for new services and apps (including m-banking and m-payments). There seems to be plenty of room for subscription upgrades — Ericsson estimates that around 40 per cent of all mobile phone subscriptions in 2015 are associated with smartphones.

2 Comparing global subscriptions/lines with subscribers

Global totals of subscriptions and subscribers for mobile and fixed broadband, billions



Total mobile SIMs per unique subscriber, end 2014



CEE: Central & Eastern Europe
 EMAP: Emerging Asia-Pacific
 CALA: Central & Latin America
 MENA: Middle East & North Africa
 WE: Western Europe
 SSA: Sub-Saharan Africa
 DVAP: Developed Asia-Pacific
 NAM: North America

Source: Ericsson Mobility report, June 2015 (top chart): www.ericsson.com/res/docs/2015/ericsson-mobility-report-june-2015.pdf;
 Source: GSMA (bottom chart).

In terms of growth in 3G and 4G, Asia-Pacific now accounts for 50 per cent of all mobile broadband subscribers (Figure 3), up from 45 per cent in 2014. For example, China Mobile (the world's largest mobile operator and largest 4G provider) enjoyed 214.8 million 3G subscribers and 189.7 million 4G subscribers by mid-2015. The rapid expansion of Asia and the Pacific in mobile broadband is squeezing other regions in terms of regional market shares; despite absolute increases in subscribers, Europe's share fell from 16 per cent to 14 per cent and the Americas from 24 per cent to 22 per cent. The story of broadband — fixed and mobile — is very much an Asian success story.

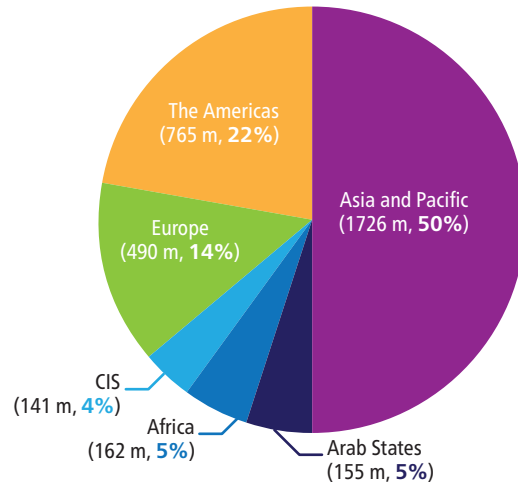
Future first-time Internet users are likely to come mainly from less well-educated, less urban backgrounds and users of less well-represented languages and dialects. According to some sources, the number of languages that are currently represented on the Internet is over 300 (or 5 per cent of languages in terms of number), but the large majority of languages are without a significant online presence. The Internet's content continues to be dominated by a few major languages, most significantly English.

According to W3Techs' survey of the 10 million most popular websites, 55.2 per cent are in English, with Russian, German, Japanese, Spanish and French being used by between 4–5.8 per cent of websites. A significant number of national languages like Hindi and Swahili are used by less than 0.1 per cent of these websites, while most of the world's languages are not represented at all in their data. Wikipedia has performed the best in terms of number of languages over recent years, partly due to its reliance on user-generated content. However, growth in the languages available for some of the main online services is not matching the growth in Internet usage (Figure 4).

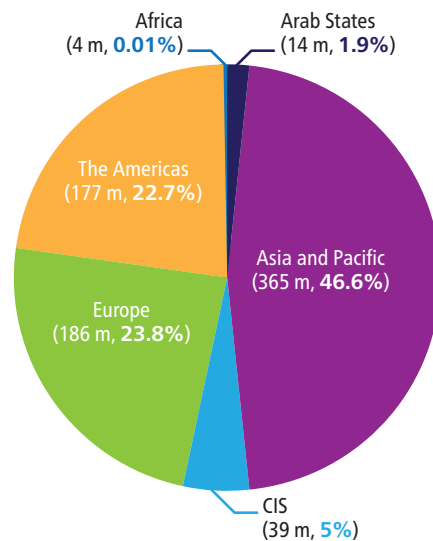
To boost growth in the Internet, and to achieve universally available and more affordable Internet access for all will require huge efforts, better coordination and more effective use of existing resources by all stakeholders. The Report makes a number of policy recommendations about how the broadband industry can be revitalized to enhance growth in the Internet.

3 The status of broadband subscriptions, end 2015 — an Asian success story

Mobile broadband subscriptions by region

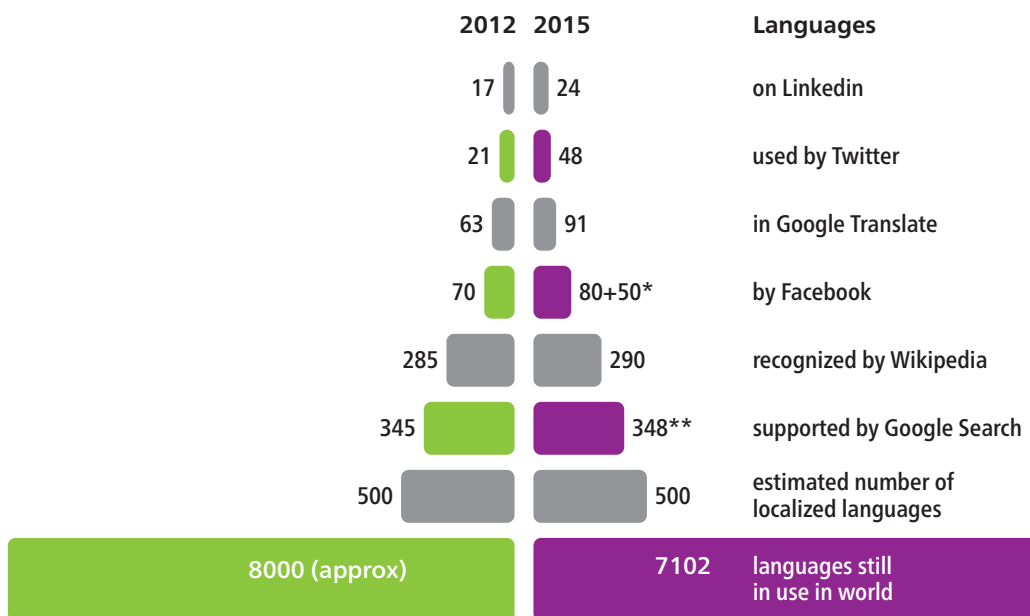


Fixed broadband subscriptions by region



Source: ITU.

4 *Multinational online services, but are they multilingual?*
 Number of languages in which major online services/websites are available

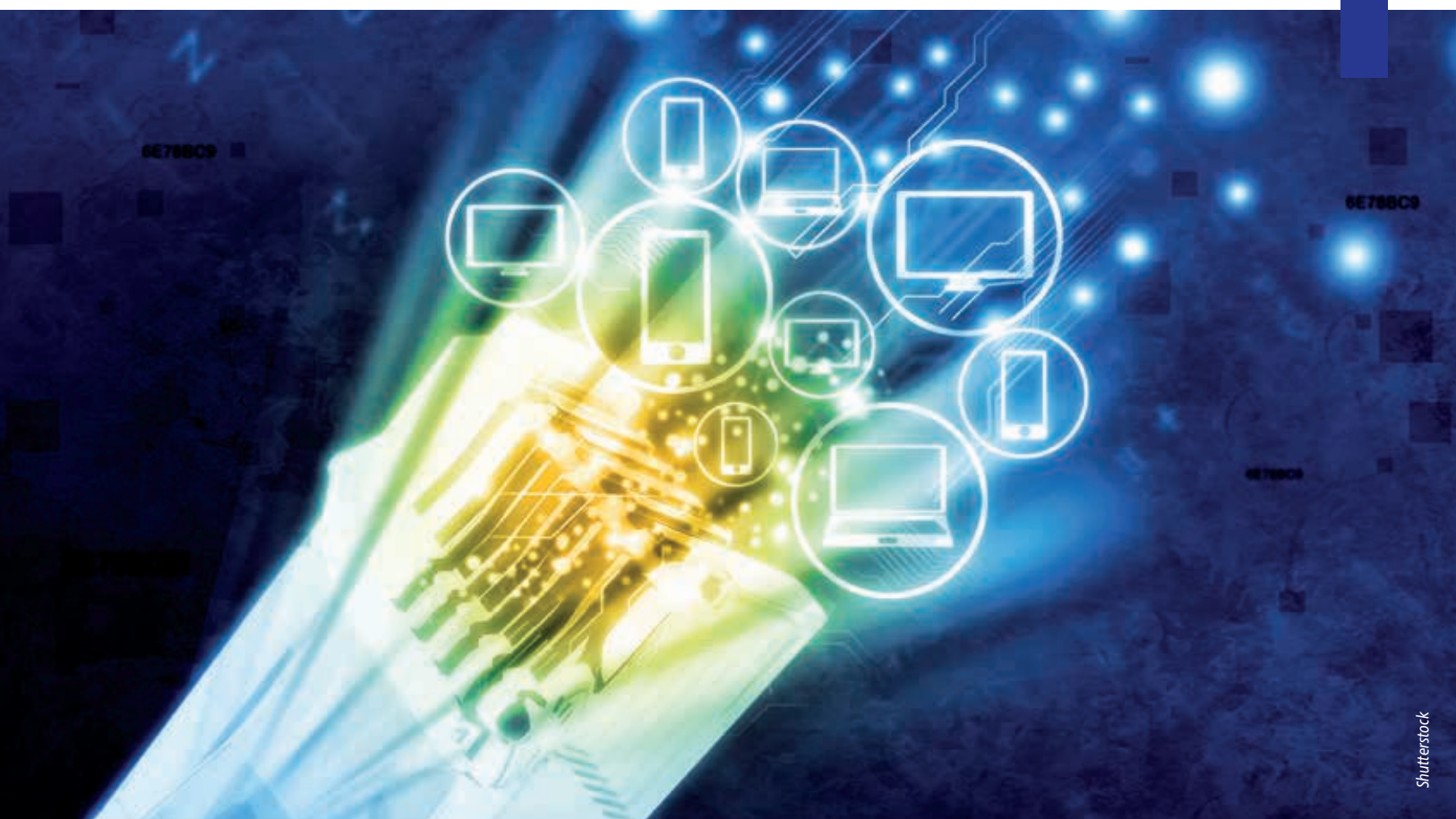


Source: ITU, from various sources.
 * Over eighty languages, with another fifty in translation at the Facebook Community Translation Platform, which enables native speakers of any language open to translation to participate and help bring their language online.
 **Includes some humorous languages such as Klingon, Pirate, Pig Latin and Bork! Not the same as internationalized URLs – https://en.wikipedia.org/wiki/List_of_Google_domains.

Adopting a National Broadband Plan (NBP) is one solution. There is still some growth in the absolute number of Plans, with 148 countries having adopted a national Plan or strategy by mid-2015, and a further six countries planning to adopt a Plan. Forty-two countries still do not have any form of Plan. Many countries are now moving into a phase of consolidation/revision. A number of Plans are reaching the end of their term this year in 2015 (e.g. Finland, Belarus, Belgium, Croatia, Mongolia, Paraguay and Singapore), and

it is unclear whether these countries will “maintain” the recently elapsed Plan, revise it, seek feedback on its achievements and/or introduce a new Plan.

As the Broadband Commission for Digital Development concludes its work programme for 2010–2015, and enters into a new work programme for post-2015 onwards, it shall continue working with many different stakeholders to achieve digital inclusion for all.



■ Policy options for promoting high-speed broadband

By Samer Mourad, Principal, and Stéphane Piot, Partner, Analysys Mason

It is now widely recognized that broadband is an essential pillar of a successful economy, and that the widespread availability and use of broadband has both economic and social benefits. Therefore, governments are now looking to promote next-generation broadband networks as economies become increasingly reliant on digital networks.

Governments are implementing national broadband plans that define specific goals and the different policy instruments required to reach them. Indeed, governments have a large pool of policy

options that they can use to support the development of high-speed broadband. The objectives set out in these plans typically address two areas: coverage and take-up.

In most countries, reaching ubiquitous or near-ubiquitous coverage of high-speed broadband is likely to require public funding, as the high costs of rolling out broadband infrastructure reduce the economic viability of high-speed broadband in low population-density areas.

Based on an existing methodology, refined over decades of experience with the telecoms industry, Analysys Mason recently carried out research to explore the commercial viability of broadband coverage, defined as the maximum household/population coverage that could be achieved economically for each broadband technology (i.e. excluding public intervention or public funds) in several countries. As shown in Figure 1, the incremental costs for Fibre-To-The-Home (FTTH) and Fibre-To-The-Cabinet (FTTC) increase quickly beyond household/population coverage of 40–50 per cent, resulting in a negative Net Present Value (NPV) after such levels. Conversely, Long-Term Evolution (LTE) maintains a positive NPV even with household/population coverage of more than 90 per cent.

According to this commercial viability assessment, the deployment profile and commercial viability of broadband technologies differs greatly as roll-out extends from the early stages of deployment (most often in densely populated areas) towards near ubiquitous coverage (most often in low population-density areas).

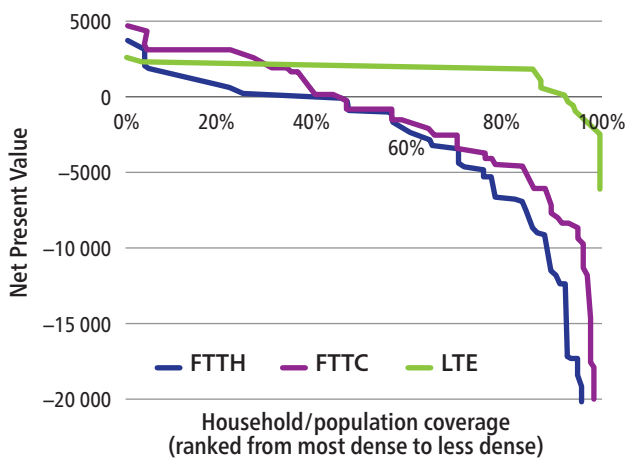
Besides public funding, various policy options have been identified by governments, which can be classified under three main headings, as presented in Figure 2:

- ▶ general measures aimed at improving the overarching regulatory and policy framework
- ▶ measures to develop the supply side — aimed at increasing the availability of broadband to end-users
- ▶ measures to develop the demand side — aimed at increasing citizens’ interest in broadband services and fostering take-up.

These different types of policy vary in terms of their impact on broadband development, as shown in Table 1.

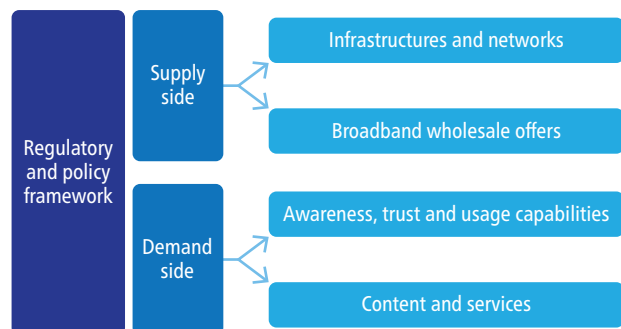
Table 2 presents examples of supply-side measures that can be taken to promote the supply of broadband networks and services, and high-speed broadband in particular. Regulators may need to work closely with operators and other policy-makers to ensure that coverage obligations or sharing requirements are fully understood, and that adequate follow-up and enforcement mechanisms are available.

1 *An illustrative example of commercial viability assessment when developing national broadband strategy*



Source: Analysys Mason, 2015.

2 *Main types of policy to promote the demand for and supply of broadband networks*



Source: Analysys Mason, 2015.

Table 1 – Impact of different types of policy

Area	Potential impact	Policy type			
		Infrastructures and networks (supply)	Broadband wholesale offers (supply)	Awareness, trust and usage capabilities (demand)	Content and services (demand)
Coverage	Increased coverage	✓	■	■	■
Take-up	Quality of service improvement	✓	✓	■	■
Take-up	Price reduction	✓	✓	■	■
Take-up	Higher penetration	✓	✓	✓	✓
Take-up	Usage stimulation	■	■	✓	✓

Source: Analysys Mason, 2015.

Table 2 – Supply-side measures to promote provision of broadband networks and services

Type of policy	Definition and examples
Sharing of telecoms infrastructure	Measures to promote the sharing of existing telecoms infrastructure among players that would benefit operators through a reduction in roll-out costs (e.g. harmonizing and facilitating infrastructure sharing, developing a register of infrastructure locations)
Co-deployment and co-investment	Measures to enable coordination and joint investment in the roll-out of communications networks by telecoms operators, possibly in conjunction with utilities/promoters (e.g. to develop infrastructure in under-served areas, or to promote the joint construction of telecoms networks at the same time as other infrastructure is being constructed)
Access to non-telecoms infrastructure	Measures to allow operators to use non-telecoms civil infrastructure when deploying communications networks (e.g. giving the national regulatory authority (NRA) legal powers to mandate access to infrastructure owned by entities outside the telecoms sector)
Spectrum assignment	Actions to define a clear and efficient spectrum policy to encourage the development of mobile broadband (e.g. promoting technological neutrality when assigning frequencies, assigning the digital-dividend spectrum to mobile)
Spectrum trading	Introduction of the option to transfer spectrum rights to improve flexibility in the use of frequencies
Coverage obligations	Design of new spectrum licences that will increase the availability of broadband networks and services at a national level (e.g. by imposing coverage obligations, or implementing geographical obligations)
Imposition of technical standards	Elimination of uncertainty regarding the technical specifications for broadband roll-out projects (e.g. by defining standards for high-speed broadband connections that must be provided as part of new housing developments, to help achieve economies of scale, improved quality, or access to new markets)
Wholesale and retail markets	Introduction of measures to promote competition to allow potential new operators to successfully enter the market (e.g. appropriate regulation of wholesale broadband offers, carrying out audits and improving the operational terms of bitstream offers)

Source: Analysys Mason, 2015.

Table 3 outlines examples of measures that can be implemented on the demand side, to facilitate the use of broadband by the largest number of citizens possible and increase the amount and attractiveness of digital content and services in order to foster citizens' interest in ICT. In certain developing countries, it may still

be necessary to demonstrate the proven benefits of ICT services (e.g. to gain access to online services, provide remote diagnosis, news reporting or entertainment) to help create more demand for broadband take-up.

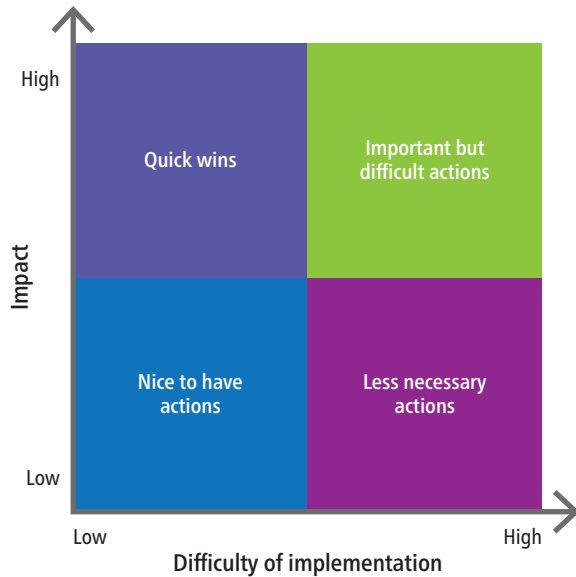
Table 3 – Demand-side measures

Type of policy	Definition and examples
Broadband mapping	Develop a publicly accessible mapping tool to display the availability and speed of retail broadband connections, on a nationwide basis. This would enable citizens to see the current status of broadband services at a particular location, including the availability of basic or high-speed broadband
Transparency and control	Set up transparency requirements for operators to enhance information, control and trust for end users in relation to broadband (e.g. requiring ISPs to be transparent regarding the speed delivered, or requiring broadband contracts to be structured in a way that is clear, understandable and accessible to users)
Communication	Design marketing campaigns to encourage the widespread use of digital services (e.g. to increase awareness of the potential that exists in broadband technologies)
Trust and security	Introduce measures to improve security for users of digital services and increase their confidence in these technologies (e.g. ensuring appropriate security for electronic financial transactions, adapting copyright laws to the digital sphere, and developing services such as e-identification to protect user identities and privacy)
e-Inclusion and ICT literacy	Implement measures to foster access to, and use of, ICT content and services by the vast majority of the population (e.g. promoting education in ICT and broadband, and setting up financial incentives such as fiscal subsidies on ICT services or device subsidies)
e-Education / e-Administration / e-Health / e-Commerce / e-Justice	Devise measures to: <ul style="list-style-type: none"> ▪ connect schools and universities and develop the use of ICT in the education sector by all stakeholders (e.g. introducing digital learning in the classroom) ▪ make the most important administrative services available online to the whole population, to streamline and simplify administrative processes (e.g. by increasing Internet use in the public sector) ▪ leverage the potential for providing online access to the health sector and encourage the use of new services (e.g. developing telemedicine services through the use of videoconferencing, and digitization of health records) ▪ develop the use of e-commerce (e.g. by simplifying the administrative process involved in opening an online business) ▪ enable the judicial system to benefit from the use of ICT services (e.g. by making legal guidance and information services available online, or allowing citizens to initiate small-claims cases online)
High-quality online content	Involve the State in initiatives to develop high-quality and local online content, in order to attract a wide public audience (e.g. by encouraging and supporting the creation of content and services, offering digital access to cultural content that is the responsibility of the State)
Support for industry	Take steps to support ICT businesses, as a way of stimulating the development of new and innovative services or products (e.g. by creating “digital hubs” to concentrate enterprises in the digital sector and stimulate competitiveness and growth, or reducing the rate of value-added tax charged on products and services in the ICT sector)

Source: Analysys Mason, 2015.

3

High-level classification of suggested policies, based on impact on future market development and difficulty of implementation



Source: Analysys Mason, 2015.

Governments and regulators clearly have a broad range of supply- and demand-side policy options that they can use to support the development of broadband — particularly high-speed broadband. It is important for governments to select the most relevant policies that reflect their own particular market situation and to assess each policy in terms of its potential impact and the difficulty of implementing it, as these factors vary considerably.

Figure 3 illustrates how such an assessment might be presented. Typically, many regulators and governments could begin by implementing the “Quick wins” in the immediate term before moving onto the “Important, but difficult actions”, followed by the “Nice to have actions” over the longer term. The “Less necessary actions” may also be considered (as they have some impact), depending on the resources available, but the difficulty of implementation could make them unlikely to be addressed, depending on the market.

This article represents a synopsis of the Working Paper prepared by Analysys Mason for the Broadband Commission

Samer Mourad, Principal at Analysys Mason, has been working in the telecoms and media sector for more than 13 years. Samer supports clients on a range of strategic, technical, financial, regulatory and operational issues.

Samer has led and managed numerous broadband market sizing assignments, economic viability analyses of different fixed and mobile broadband technologies and policy options for the development of broadband.

Stéphane Piot, Partner at Analysys Mason and Head of Paris Office, has been working in the telecoms and media sector for more than 15 years. Stéphane has led and managed projects across a broad range of areas, including strategic assessments and business planning, regulatory projects and due diligence assignments. Stéphane is an expert in the economics of next-generation access (NGA) network and the development of broadband plans.



■ Broadband Commission for Sustainable Development

Inaugural meeting

On 26 September 2015, the ITU/UNESCO *Broadband Commission for Sustainable Development* held its Inaugural Meeting at the Yale Club in New York. Thirty nine Commissioners attended, as well as ten Special Guests and a number of Focal Points. H.E. Paul Kagame, President of Rwanda, opened the meeting. He noted that wide access to broadband will be an important factor in achieving the United Nations Sustainable Development Goals (SDGs); however, around four billion people still have no access to the Internet, while fewer than 7 per cent of households in the least-developed countries (LDCs) are connected, and there is an urgent need to address this situation.

Mr Carlos Jarque, Chief Executive of FCC, Spain, represented Carlos Slim Helú, President of the Carlos Slim Foundation and

co-Chair of the Commission. He observed that the era of education only via classrooms, and of health care only via clinics, is ending. A new era is emerging, where the biggest bookseller does not have bookstores; the company with the most retail sales has no stores; the biggest school in the world does not have classrooms; and the biggest social network does not belong to any specific country. We are creating a new society, made possible to a large degree due to broadband.

Irina Bokova, Director General of UNESCO and co-Vice Chair of the Commission, stated that the Commission was meeting at a crucial moment, a day after the SDGs were adopted at the *UN Sustainable Development Summit*. She explained how the *Broadband Commission for Digital Development* is being relaunched as the



Broadband Commission for Sustainable Development to sharpen action, help drive forward the new goals, and to turn the digital revolution into a development revolution.

Houlin Zhao, ITU Secretary-General, identified the major achievements of the Commission to date as policy leadership and advocacy, indicated by the increase in the number of countries with national broadband policies from under 100 to 148 over the past five years. He thanked all Commissioners for bringing their ideas, insights, resources and energy to the cause of “Broadband for All”.

His Excellency President Luís Guillermo Solís of Costa Rica addressed the Commission on Costa Rica’s “*A Connected Society*” plan launched on 5 October 2015. The “*CR Digital*” Strategy focuses on solving access issues for vulnerable groups and promoting ICT capacity and skills. The *Connected Household Programme* will give free Internet access and subsidized computers to 140 000 families by 2018, while the *Connected Communities Programme* will provide access to underserved communities with a USD 167 million investment. President Solís said he was honoured at being named *ITU Special Patron for Youth and ICT*, and reaffirmed Costa Rica’s commitment to encouraging and supporting the use of information and communication technologies (ICT) for social and economic progress.

First session

The first session, “Broadband for Achieving the Sustainable Development Goals (SDGs)” was chaired by Fred Matiang’i, Kenya’s Minister of Information, Communications and Technology. He observed that government services have often been offered in silos or in different departments, but this new era of governance requires coordination, integration and harmonization in service delivery.

Jeffrey Sachs, Director of the Earth Institute of Columbia University, argued that “the SDGs will be made or lost around this table”. Gyan Chandra Acharya, Under-Secretary-General of UN-OHRLS observed that the growth in popularity of national broadband plans in many countries is thanks to the support of the UN, ITU and UNESCO. Hans Vestberg, CEO of Ericsson, presented Ericsson’s latest research: over the next five years, telecom carriers will provide 90 per cent of people with broadband coverage. Marcus Weldon, head of Bell Labs, described how virtualization is changing ICT networks. Sam Pitroda, Special Adviser to the Prime Minister of India, believes much current organizational architecture still dates from the 20th Century, and this needs to change.

Robert Kirkpatrick, Director of UN Global Pulse, described how we live in an ocean of real-time data and Big Data, which holds massive potential to be used to improve development. Michael O’Neill, Assistant Administrator and Director of the Bureau of

External Relations and Advocacy of UNDP, underlined that ICTs will drive progress across the entire post-2015 development agenda. Gordon Graylish, Vice President and General Manager of the Governments and World Ahead Division of Intel, explained that the barriers to broadband development are not a technical issue — many of the technologies needed exist today. Dato Lee Yee Cheong, the Malaysian Chairman, Governing Council, International Science Technology and Innovation Centre for South-South Cooperation under the auspices of UNESCO (ISTIC), emphasized the urgent issue of gender equality.

Robert Pepper of Cisco cited data on the narrowing mobile phone divide and Internet access divides. However, there is a new digital divide emerging in machine-to-machine (M2M) and the Internet of Things (IoT). Leong Keng Thai, Deputy Chief Executive and Director General, of the Infocomm Development Authority (IDA), Singapore, suggested that the Commission should encourage governments to integrate their NBPs with their national economic development plans. Speranza Ndege, Senior Lecturer at Kenyatta University in Kenya pointed out that, in most developing countries, ICTs are not compulsory in schools and need to be integrated into curricula. Siyabonga Cyprian Cwele, Minister of South Africa's Telecommunications and Postal Services, suggested using Universal Service Funds for funding free WiFi around post offices. Victor Calvo-Sotelo, Spain's Secretary of State for Telecommunications and the Information Society, updated the Commission on Spain's smart cities network for technologies.

Kevin Martin, Facebook's Vice-President for Mobile and Global Access Policy, emphasized the role of local health care and educational content in facilitating Internet adoption and usage. Debretsion Gebremichael, Ethiopia's Minister of Communication and Information Technology, emphasized there is no single one-size-fits-all approach for all countries, and challenges of access and affordability must also be addressed regionally. In his Session summary, Matiang'I of Kenya highlighted the importance of developing new partnerships and new systems, substance, content and capacity. "Dealing with the silos and creating a sense of harmonization will determine our success as we move forward," he said.

Second session

The second session, "Investing in a Level Regulatory Playing-Field", was chaired by Sunil Mittal, Founder and Chairman of Bharti Enterprises. Mr Mittal believes connectivity and mobile broadband should be a birthright. To promote broadband, governments need to be mindful to reduce taxation, make spectrum available in plentiful supply, and bring in more competition.

Denis O'Brien, Chairman of the Digicel Group, suggested that different players need to come together in partnership — in his opinion, there will be no broadband into rural areas without a revenue-sharing model between Over-The-Top (OTT) players and telcos, because current investment models are not sustainable.

Nikolay Nikoforov, the Russian Federation's Minister of Telecom and Mass Communications, updated the Commission on the Russian Federation's experience in covering all small villages of less than 250 people. Nicholas Negroponte, co-founder of the MIT Media Lab, suggested that normal market forces will not solve all problems relating to broadband deployments, and that connectivity should be part of civil society. In response, Phuthuma Nhleko, Non-Executive Chairman of MTN (now Executive Chairman), underlined that the responsibility for broadband must be shared jointly between the public and private sectors. Paul Mitchell, General Manager, Technology Policy at Microsoft underlined that we need to make sure that our policy frameworks and regulatory environments have the flexibility to accommodate technical adaptations which arise. Sunil Mittal thanked everyone for their rich contributions.

The Chairs and vice-Chairs thanked everybody for their rich exchanges on a range of issues, and looked forward to continuing and deepening the discussion at the Special Session of the Commission in Davos and at the next Commission meeting in Dubai, United Arab Emirates, on 13 March 2016.



ITU

■ ITU Telecom World 2015

New focus on young innovators

The ITU Telecom World 2015 event held from 12 to 15 October in Budapest, Hungary, brought together more than 4000 participants from 129 nations to discuss critical issues facing the information and communication technology (ICT) industry.

This year's Telecom World focused on the role Small- and Medium-sized Enterprises (SMEs) and entrepreneurs play in driving innovation. It provided a unique international platform for participants representing a wide range of stakeholders from the private sector, government, international organizations, and academic institutions to connect with new innovators, to explore partnership solutions and investment opportunities, and to share ideas and best practices.

The event began with inspiring messages from Hungarian Prime Minister, Viktor Orbán, and ITU Secretary-General, Houlin Zhao, and culminated in a series of Young Innovator awards to highlight ITU's emerging focus on boosting start-ups and SMEs in the ICT sector.

Discussions were both wide ranging and substantive, but three broad themes central to ITU's ongoing work emerged as dominant and particularly rich with implications for future ITU activity:

- ▶ Boosting the growth of SMEs: What can governments do better?
- ▶ Regulatory changes to accelerate connectivity and ICT growth.
- ▶ Ensuring trust in the "Internet of Things" era.

The following articles focus on each core theme. They aim to synthesize the discussions in the forum sessions, the exhibition floor, and ad hoc hallway networking, to bring the key issues of the Telecom World 2015 event home to you.

■ Boosting “SMEs” for ICT growth

What can governments do better?

Small- and medium-sized enterprises (SMEs) have a critical role to play in driving growth within any economy, especially in the information and communication technology (ICT) sector.

Governments worldwide are becoming aware of this, and are beginning to realize that they need to help spur domestic ICT innovation to power their economies in a digitalized world.

But how can governments work with SMEs to better foster their growth? What is their role? What type of interventions work best? And how can ITU — as the United Nations specialized agency for ICTs — assist the process?

These questions formed a major topic of discussion at ITU Telecom World 2015. The questions cropped up repeatedly in hallway discussions and inspired a vigorous exchange of ideas in exhibition booths and forum sessions.

While there are no easy answers, the importance of identifying how to implement best practices locally cannot be overstated. “The ICT industry cannot be successful if we don’t cooperate with SMEs,” said ITU Secretary-General Houlin Zhao, addressing a round-table dialogue between key government, international organization, and SME players.

Mr Zhao used his address during the opening ceremony to stress the importance of ITU’s emerging role in enhancing the growth of SMEs. “There is no real established platform to bring all ICT stakeholders together to foster SMEs to increase ICT growth,” said Mr Zhao. “That is why we want to do it. This event will be a significant milestone to boost momentum of SMEs.”

ITU’s role and the launch of “Emerge”

Several event participants from a wide range of public and private sector roles used the various forum sessions at ITU Telecom World 2015 to directly ask that ITU play a key role in enabling — and accelerating — meaningful dialogue between governments, large ICT companies, and SMEs.

“Our survival relies on entrepreneurship,” said Sami Al Khursani, Managing Director of the Saudi Aramco Entrepreneurship Centre. “How can we foster it? How can we create tactics to ease the process? We need to have a national agenda, perhaps regional, that governs the behaviour of all parties.”

“ITU is perhaps the only organization in the world that could be a catalyst [for dialogue between SMEs, big companies, and governments],” said Paul Michael Scanlan, President of Huawei’s Business and Networking Consulting Department.

“ITU is entering uncharted territory and engaging unusual suspects,” said Tayo Akinyemi, Director of the Pan-Africa Technology Network AfriLabs as she addressed ITU Telecom World 2015 during the closing ceremony. “I’m looking for some urgency about what’s next for ITU in regard to young innovators. Do not be afraid to inject the DNA of these unusual suspects into ITU.”

Fitting then that ITU launched the new “Emerge Partnership” on Tuesday, 13 October, Day 2 of the event.

Emerge aims to bring together a core group of stakeholders to provide thought leadership and best-practice advice on how to boost the growth of ICT startups and SMEs. Emerge Partners will be actively engaged in supporting innovation and entrepreneurial ecosystems, and include representatives from the United Nations and other international organizations, the ICT industry, incubator/accelerator managers as well as development/innovation practitioners.

*The ICT industry cannot be successful
if we don't cooperate with SMEs.*

Houlin Zhao, ITU Secretary-General



With Emerge, large multinationals, start-ups and SMEs will work together to outline key priorities and requirements for policy-makers to provide a vital enabling environment for innovation and private enterprise.

So, what can governments do?

As a precursor to the collaboration to come with the new Emerge platform, participants across ITU Telecom World 2015 discussed the role governments can play in successfully boosting domestic SMEs. A common theme running through the discourse was that governments need to become more nimble and flexible in their approach if they wish to successfully foster domestic SME growth.

"SMEs know you need to move fast or die," said Michael Weber, co-founder of the Geneva-based startup incubator Seedstars, adding that governments should adopt that same attitude if they wish to remain competitive vis-à-vis peer nations trying to spur growth in

such a rapidly changing industry. "Governments need to move much faster. SMEs need to have certainty that government regulation will move faster. We hope governments take risks."

Promote a culture of risk taking

"Taking risks" was a key theme with several panellists in various forum sessions highlighting the need for a culture of risk-taking to emerge if SMEs are to take off.

"It's a culture shift that we have to aim for in order to get our citizens to invest in trying ICT start-ups," said Jaqueline Pateguana, Adviser to the Ministry of Transport and Communications in Mozambique. "The key is to change the culture."

Rwanda is an example of a developing country where that culture shift is well underway, says Alline Kabbatende, Chief Operating Officer of the RwandaOnline platform, which helps government and businesses move their processes online. "In Kigali, we are working to create this 'cool factor' around start-ups," says

Ms Kabbatende. "There is a new cool factor about saying: 'I'm trying this' and 'I failed.'"

Fear of failure was identified repeatedly as a difficult obstacle to the necessary culture shift. "You need to identify role models... at the local level," said David Maasz, Chief Executive Officer of the Entrepreneurship Foundation, when asked in a panel session what government can do to foster a culture of innovation among young would-be ICT entrepreneurs. "They will automatically inspire the others. If they [young ICT entrepreneurs] get the right role models, they'll immediately think about failure differently."

Create mechanisms for collaboration

Several forum participants cited lack of government-SME collaboration as a key problem. In many countries, for instance there is no mechanism for collaboration between the government and SMEs.

"Government does have a responsibility to ensure that innovation happens at the institutional level," says Ron Sege, President and CEO of Echelon Corporation and long-time Silicon Valley entrepreneur. "It's not what the government can do to help, it's what the government can enable, especially: 1) Promote risk taking, and 2) Foster collaboration," within the entire ICT ecosystem.

What type of government-SME collaboration works best? Participants and panellists shared many lessons learned, both while networking in the hallways and exhibition booths or during the forum discussions.

Isidro Laso Ballesteros, Head of the European Commission's Start-up Europe Programme, shared some advice during a panel discussion that rang true for many listeners in attendance.

Governments must talk with the start-ups from the beginning, said Mr Ballesteros. "Don't do top-down with civil servants and big private sector players only," he said, referencing lessons learned from sub-optimal efforts in Latin America. "Mingle with start-ups where they are, don't ask them to come to you. Keep it local." Governments can also be enormously helpful by collect data, but should avoid grants, because this goes against risk-taking and entrepreneurship and creates dependencies that ultimately stifle innovation, he added.

Crowdfunding could have some promising applications in smaller countries that don't have well-developed small lending financial processes, like they do in the United States, said Stian Westlake, Executive Director of Policy and Research at the London-based innovation charity Nesta.

Long-term focus and commitment

Finally, governments should be prepared for a focused and sustained commitment to really foster the growth of SMEs needed to fuel a digital economy.

Mr Westlake pointed out that success stories, such as Estonia, Israel and Finland "always kept innovation in mind and had a national focus on innovation."

Dina Nath Dhungyel, Bhutan's Minister of Information and Communications, highlighted the importance of government commitment to overcome some of the challenges and problems his government faced in launching Bhutan's IT Park. "Our patience and persistence from the government side has been critical," he said. "The political will of the government is a must."

If you want to double or triple broadband penetration, you have to gather all stakeholders. It requires help from the global community.

Pierre Guislain, Senior Director for Transport and ICT Global Practice, World Bank



Regulatory changes to accelerate connectivity

Regulation was a key area of focus for ITU Telecom World 2015.

Whether discussing how to regulate for affordability and access for the 60 per cent of the world's people who remain unconnected to high-speed Internet, or the pros and cons of regional regulatory zones, or how to regulate "over-the-top" (OTT) players like WhatsApp and Skype, the topic of regulation was covered from all angles with rich discussion from a variety of stakeholders.

Some panellists laid out the problems with existing regulatory systems, many of which are decades old. Others proposed new regulatory models. Many issued calls to action for innovative global regulatory approaches that can keep pace with industry change.

"If you want to connect 4 billion people, something big needs to be done," says Pierre Guislain, Senior Director for Transport and ICT Global Practice at the World Bank. "We need different [regulatory] models depending on the countries we work with. The traditional telecom model we have in most developing countries will not get us there. If you want to double or triple broadband penetration, you have to gather all stakeholders. It requires help from the global community."

Several parties called for ITU to play a greater role in bringing key stakeholder groups together.



This is a wonderful opportunity for us to benchmark and set up for delivery.

Anusha Rahman Ahmad Khan, Pakistan's Minister of State for Information Technology



"This is a wonderful opportunity for us to benchmark and set up [key performance indicators] for delivery [of service of ICTs for sustainable development]," said Pakistan's Minister of State for Information Technology, Anusha Rahman Ahmad Khan. "Most of us are working in isolation. We should use these type of events to set KPIs and set up yearly check-ins."

Much of the discussion, however, revolved around defining the problems that regulatory innovation would address.

Affordability and access

"Only 40 per cent of the world is connected to the Internet, with access to the digital economy," says Bahjat El-Darwiche, a partner with PwC's "Strategy&" consulting group. "Affordability is the big barrier."

Indeed, affordability came up repeatedly as perhaps the biggest hindrance to connecting the world's unconnected with the high-speed Internet access that fuels the modern digital economy.

In one discussion, Rob Middlehurst, Vice President for International Regulatory Affairs for the United Arab Emirates-based telecoms service provider Etisalat, wondered how it would be possible to align with the United Nations goal of providing broadband Internet at a cost of less than 5 per cent of monthly income for customers across least-developed countries, given that so many are only earning an average of USD 1.05 per day. "How do you provide that?" he asked the panel, pointing out that they'd presumably be

paying less than USD 2 per month. "We need to balance public and industry requirements very carefully."

"People don't understand how pernicious the affordability problem is," says H. Nwana, Executive Director of the Dynamic Spectrum Alliance (DSA). "Half of the 7.4 billion people on Earth are only prepared to spend less than USD 12 per year on communications services. You have to wake up every morning and think about how you regulate for affordability and access."

Regarding access to ICTs, the biggest gap is in Africa, as mentioned by several participants. In one round table discussion, Aniko Szigetvari — head of the Telecom, Media and Technology group for the World Bank's International Finance Corporation — pointed out that broadband penetration on the continent is at 6 per cent with less than 30 per cent living within 25 km to fibre. Also, only 4 per cent of users in Africa have access to 4G. More than 70 per cent of Africa is on 2G.

"Today the fact that most people surf by 2G is a real problem," says Mr El-Darwiche. "2G occupies 60 per cent of spectrum in emerging markets. If you killed 2G, you could improve affordability and access to the digital economy."

The rise of smartphones that require high-speed connections to properly utilize most of the functionality critical to a rapidly shifting digital economy was central to the discussion of new regulatory approaches.

Flexible regulation to fuel mobile-first growth

"We have to take into account how different the growth has been in Africa, especially driven by mobile first," says Alison Gillwald, Executive Director of Research ICT Africa. "There's enormous potential as we look forward to seeing what mobile can do. We've seen innovation, despite extreme constraints, especially in mobile banking, for example. But it's important to realize that innovations have taken place where there's a regulatory gap. They were unencumbered by regulatory constraints."

"We have to ensure that the policies understand both sides of the equation [public and private]," says Mr Middlehurst.

“Sustainability comes from economies of scale across borders. But the [regulatory] solutions are being found on a national level. Each of the national policies can become out of sync with the overall objectives. What are the overarching set of goals? And how are we driving towards that?”

This is where he and many others pointed out that ITU can do a lot to convene the dialogue and create the overall set of goals that Pakistani Minister Rahman also separately mentioned was needed.

A first step toward the type of harmonization needed could be regional regulatory zones, several participants said.

Regional regulatory zones?

“In Africa, the vast number of regulatory barriers makes it very difficult to operate,” said the World Bank’s Mr Guislan. “Can you make regulatory zones to create an integrated regional market where operators can operate across borders with a standard regulatory framework?” Many operators at Telecom World 2015 expressed the same point of view.

Derk Oldenburg, the Managing Director of Public Policy for the London-based Liberty Global telecom company spoke of the need in Europe to figure out “how to do a balancing act when you have some Member States who’ve [created] this competitive [regulatory] policy and others who haven’t?” In Europe, says Mr Oldenburg, “we could do with less regulation, but we have to be careful not to lose what is working well.”

“We need to seek common areas of interests where there’s a win-win,” says Guillermo Alarcon, the Global Director of Broadband for Alcatel-Lucent, adding that all stakeholders need to “find which countries are regulated fairly, but that requires agreement on framework.”

There was consensus that such a framework for assessing what regulatory system works best would need to take into account a long-term perspective and allow for flexibility and adaptability.

“European regulation is good from a short-term perspective, but not from the long-term perspective,” said Zoltan Papai, Chief Executive Officer of the Budapest-based group, Infrapont Economic

Consulting. “But now the long-term perspective is more important than before.”

Regulating “Over-the-Top” (OTT) players

The rising trend of over-the-top (OTT) players was a major topic — and one of the most controversial. Many participants, especially telecom operators and government officials, mentioned the need to regulate them better. But several panellists urged caution here due to the rapid global adaption of services like WhatsApp.

“We have to be careful about regulating the OTT players. The regulatory approach has to be long-term,” says Mr Oldenburg.

“I think the genie is out of the bottle with the OTT. There’s no going back,” says Salam Yamout, the National ICT Strategy Coordinator for Lebanon. “We have to talk about how to protect the consumer of the service. I call for less regulation. We all complain about the OTT players. Regulators should work with the ISPs (Internet service providers) to make it possible. But our regulators are working against it.”

Unity of purpose within governments

A wide variety of stakeholders flagged the need to build unity of purpose within national governments. Several participants shared stories of government ministries’ failure to unite — or even communicate.

“One of the big challenges we have is that government ministries do not talk with each other,” says Pierre Guislan of the World Bank. “The ICT, finance, and education ministries need to come together and agree first.”

Many stakeholders emphasized tight coordination with the finance ministries as critical to success.

“The first thing that needs to be resolved is the role of the finance ministries,” says Ms Rahman of Pakistan. “Sometimes telecoms ministries aren’t even consulted when new telecoms taxes are coming down the pike.”

■ Ensuring trust in the “Internet of Things” era

It is hard to overstate the magnitude of the changes coming to people’s daily lives as we move rapidly into the Internet of Things (IoT) era. “IoT is one of the biggest revolutions in the history of humankind,” says Bocar Ba, Chief Executive Officer of the SAMENA Telecommunications Council, which represents the South Asia, Middle East, and North Africa regions.

The possibilities to improve lives through smart and connected devices are increasing exponentially, but so too are the thorny implications around trust. How do you obtain individual consent for usage, storage, and transfer of data in the IoT era? How do you protect users’ identities?

“Within the foreseeable future all of our devices will be connecting in one way or the other,” says Rene Arnold, Head of Department, Markets and Perspectives, at WIK Consult, a German research and advisory institution. “This begs the question: Will this lead to total transparency? Is this something that we as individuals and a society can live with? We need to have a sizeable dialogue about how we want to integrate these technologies in our lives.”

ITU Telecom World 2015 in Budapest featured discussions on these issues from a wide variety of perspectives — along with calls for a sustained and structured dialogue moving forward.

Informed consent

One of the top issues discussed in Budapest regarding consumer privacy in the IoT era was that of “informed consent.” The IoT era hugely complicates the issue of informed consent.

“Can we make informed consent work? This is a very tricky topic,” says Mr Arnold. “Consumers tend not to read or understand terms and conditions. In IoT, most devices won’t even have a screen to show terms and conditions.”

So how do governments craft policies that adequately balance the interests of companies and consumers?

Keng Thai Leong, Director-General of the InfoComm Development Authority, Singapore, shared some of the evolution his government has gone through as it strives to balance consumer and companies’ interests when it comes to data collection, data use, and data processing.

“Singapore is a data hub, so trust is key for us,” said Mr Leong. “We needed to ask: ‘Is there a proper legislative regime that promotes trust?’ So [Singapore’s] law policy struck a balance between companies’ interests and consumers’ privacy interests based on other countries’ laws.”

Leong says the two-year-old law is already facing new challenges, but that Singapore sees itself as a “smart nation” so it has to adapt. “Getting consent is actually context-driven,” said Leong, explaining that Singapore introduced the concept of “deemed consent” which would allow data about your purchase at a grocery store, for example, to be stored without asking for your consent each time. He also mentioned a concept of “reasonableness” which recognizes when it is not feasible to ask for consent, such as closed-circuit television in public areas.

Privacy policies across borders

The data increase with IoT along with the cross-border nature of ICTs will lead to a range of complications regarding privacy laws.

Boutheina Guermazi, Senior Regulatory Specialist for the World Bank, outlined the scope of the problem during a panel discussion about how to regulate trust. She cited a 90 per cent increase in data transfer in the past two years along with more than 100 new privacy laws, leading to huge questions about how all this data should be managed. But she noted studies showing that when domestic laws are tough on privacy there is an impact on foreign direct investment (FDI) and on development.



IoT is one of the biggest revolutions in the history of humankind.

Bocar Ba, Chief Executive Officer of the SAMENA Telecommunications Council

Rob Middlehurst, the Vice President for Regulatory Affairs at the United Arab Emirates-based telecom service provider, Etisalat, used an example to illustrate how vastly different privacy laws in different countries will be the cause of increased complication in the IoT era. He used the example of OnStar, a smart mirror inside GM cars that stores data on driving. "In order to provide that, we have to put in a SIM card. But it has to be registered to someone," says Mr Middlehurst. "[Registered] to whom? The car seller? The car manufacturer? The driver? This is a machine-to-machine environment. As soon as I drive over a border, what happens when we drive to another country?"

Several participants called on ITU to help bring together the relevant stakeholders to discuss these issues in order to harmonize policies so that more people worldwide can benefit from IoT without worrying about the misuse of their data.

"The industrial Internet"

In the meantime, Germany may have an important role to play, says Axel Pols, Managing Director of Bitkom Research.

"One of my favourite topics these days is 'the industrial Internet' or 'Internet 4.0' in Germany," Pols said. "We believe we have a topic emerging from Europe, Germany in particular. Can we use German strength in engineering to shape the Internet in the future? What will be the balance between European manufacturing strength and US and Asian innovation?"

Certainly, ITU will be watching thought leadership emerging from Germany as it continues to foster global coordination on this topic.

Digital health technologies

Planning beyond the delivery of innovation

By Dr Ann Aerts, Head, Novartis Foundation

Commissioner, Broadband Commission for Sustainable Development

We are at a crucial point in global health where we see health systems in low- and middle-income countries (LMICs) still overburdened with managing infectious diseases and maternal and child health, while simultaneously struggling with an emerging crisis of non-communicable diseases (NCDs), expected to account for 65 per cent of all deaths in these countries in 2015.

At the same time we are seeing a rapid expansion of connectivity and use of technology in LMICs. The use of mobile technologies in sub-Saharan Africa alone is expected to have reached 85 per cent by the end of this year.

Connectivity and the use of digital health technologies allow for a significant expansion of patient reach and an opportunity to facilitate patient empowerment and compliance through targeted messaging and education. Another potential application of mobile technology is to centralize expertise and coach community health care workers in their patient care through telemedicine. Digital health tools also allow use of real-time data, making it possible for surveillance systems to be more action-oriented.

This makes it a very exciting time to be in the field of global health care as the use of digital health technologies provides opportunities previously not possible.

However, when we view technology as the end goal or the game changer in and of itself, there is the potential to end up with a highly fragmented landscape of digital solutions in target countries, putting a strain on local governance and control, capacity and sustainability. For example, the fixed costs of many digital health platforms are not considered in pilot projects, and this makes long-term sustainability challenging at best, and impractical in most cases.

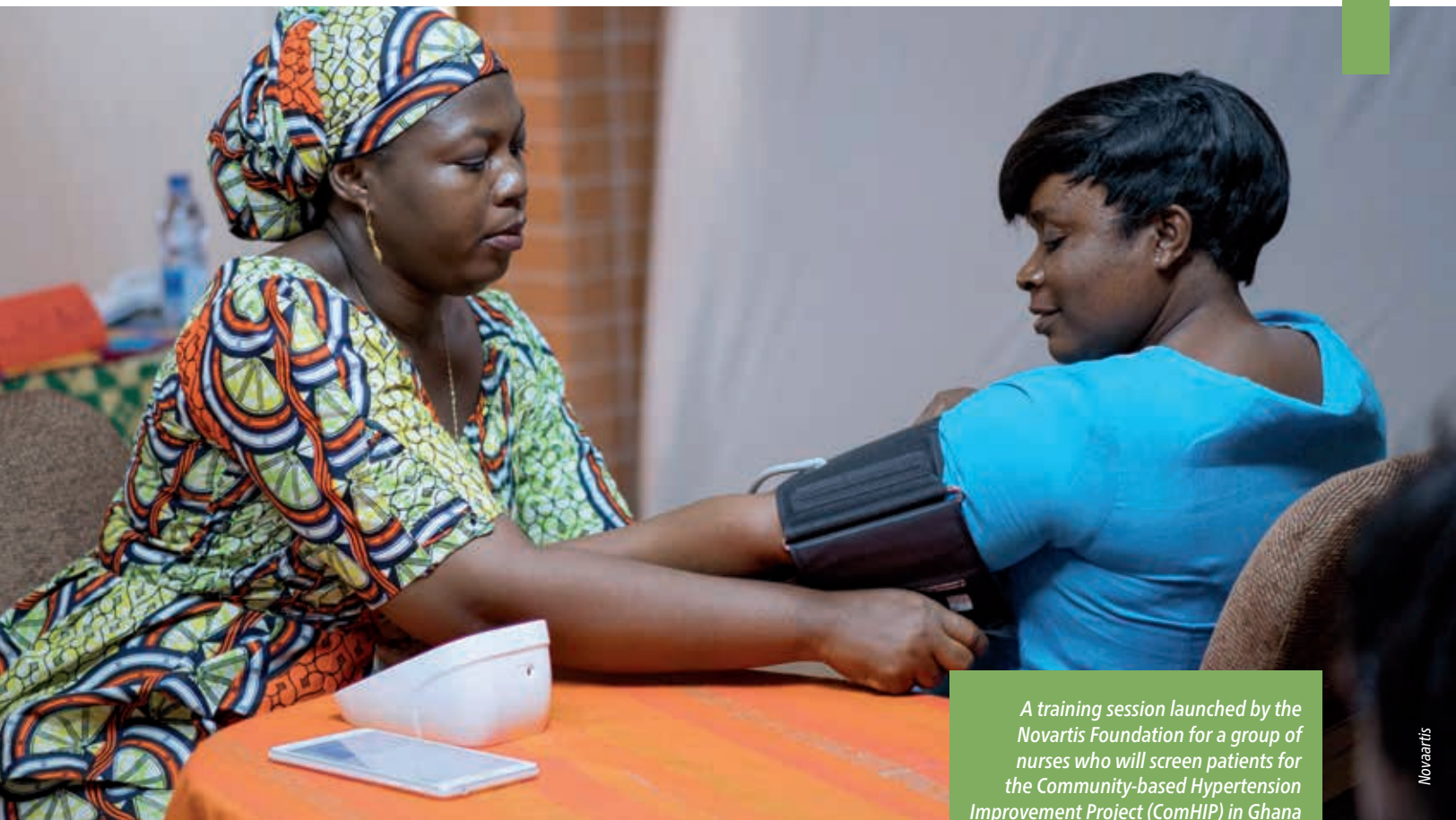
We also face the reality that many digital health solutions are currently still in the pilot phase and, thus, there is limited evidence of their effectiveness, cost and impact on health outcomes.

While we may have a way to go until we have solid proof on how best to use technology to optimize patient outcomes, it is clear already that we must focus on innovation in healthcare delivery, not just the delivery of innovation.

Key factors to consider in any programme include:

- ▶ Build the programme based on the unmet need of patients, not the technology.
- ▶ Ensure the pilot is developed with local input, including local government, with an eye towards future scale and sustainability — including long-term costs and maintenance, and potential integration into the local healthcare system.
- ▶ Plan for resource constraints and barriers outside the technology. For example, some of the population may be illiterate, and if that is the case, then think more about interactive voice recording instead of SMS.
- ▶ Establish clear metrics on the programme and technology, assessing effectiveness, cost effectiveness and health outcomes, as well as the value of the technology in the service delivery.
- ▶ Be prepared to learn and adjust as necessary within the time-frame of the project and taking lessons learned to the next project.

An example from the Novartis Foundation of the use of enabling technology to help deliver health care in an innovative manner is our Community-based Hypertension Improvement Project (ComHIP) in Ghana. This project, launched in late 2014, will test an innovative



A training session launched by the Novartis Foundation for a group of nurses who will screen patients for the Community-based Hypertension Improvement Project (ComHIP) in Ghana

Novartis

model for screening and managing hypertension in an urban district in Ghana.

The World Health Organization (WHO) estimates that 27 per cent of adults in Ghana are living with hypertension, the number one risk factor for cardiovascular disease. And yet it is hardly known or discussed and most Ghanaians suffering from hypertension won't even know they have it.

The intervention seeks to improve the control of hypertension by making services more accessible in the community and supporting self-management, thereby strengthening the primary health care system. The programme will include technological applications such as a patient-level cloud-based database, electronic guidelines and job aids for healthcare workers, and SMS/voice messaging systems for treatment adherence, reminders and healthy living tips.

The programme is being co-created, implemented and measured in partnership with FHI 360, the Ghana Health Service, the London School of Hygiene & Tropical Medicine, the School of Public

Health at University of Ghana, and VOTO Mobile. The local partner organizations are also closely aligning with physician, nurse and pharmacy teams to ensure good cross-collaboration among members of the healthcare community.

We expect to begin screening by the end of 2015 and will closely follow and measure all aspects of the programme as it progresses.

Our focus for this project is on hypertension but our goal is not to create more vertical approaches to health care. Rather, we aim to build evidence on what type of delivery models and technology are effective, and then adapt and apply them to help manage the overall dual burden of infectious and non-communicable diseases that LMICs are still facing.

The potential value of technology to enable and to help realize improved quality of health services that are scalable and sustainable makes this a very exciting time to be in global health. Our ambitions can be much bigger and bolder than ever before.

Infrastructure for new smart sustainable cities

*By David Faulkner,
Director, Climate Associates Ltd*

In some countries, rapid growth in industrialization is causing populations to migrate from rural to urban environments, seeking higher paid employment. This trend started some years ago, and is expected to continue until at least 2050. While this situation exacerbates problems in many urban areas, it also provides opportunities for city planners to design new cities or districts starting from a clean sheet of paper.

Until now, city infrastructure, and the incorporation of information and communication technologies (ICTs), has evolved in a piecemeal fashion, to meet the needs of “organic growth” as villages have grown into towns, and then developed into cities, fed by ever-increasing populations. Each new building or group of buildings has been planned and built at different times.

New city planning

When city planners are embarking upon a new city design project, the following question is raised: “How should ICT infrastructure be planned for a new city, given that it has to be both ‘smart’ and ‘sustainable’?”

“A smart sustainable city” is an innovative city that uses ICTs and other means to improve quality of life, efficiency of urban operation and services, and competitiveness, while ensuring that it meets the needs of present and future generations with respect to economic, social and environmental aspects.



Faulkner



*Masdar City – A smart city
in the United Arab Emirates*

To begin with, a unique opportunity arises, when designing a new city, for the ICT infrastructure to be planned holistically, and a comprehensive set of technical requirements drawn up providing for growth and upgradability. Once planned, relevant specifications can be written, drawing upon the wealth of existing ICT specifications and standards.

This approach assumes that the city or district is to be built with no existing structures above or below ground. This could save additional costs of retrofitting services, such as a sensor layer network and peripheral devices, which may be directly connected to the Internet, or more specifically, to the Internet of Things (IoT). Sensors may be connected directly to a source of power such as an electricity cable or metallic pair. Sensors requiring high bandwidth could be connected by optical fibre and stand-alone sensors, using wireless communication, which would need long-life batteries to provide power.

The importance of infrastructure sharing

Building and maintaining telecommunications and sensor layer networks is expensive, especially when installed piecemeal on a reactive basis to meet emerging demand. To reduce costs, infrastructure sharing could be a viable solution. As a starting point, the infrastructure could focus on a central location, such as the main railway station or city centre, or based in city districts where high-capacity services are distributed towards the periphery of the city. Shared infrastructure can save significant costs, especially when provision is made for maintenance, upgrade and growth over the lifecycle.

The primary concern for all types of installation is safety. For example, if a utility tunnel is planned to include a public railway or gas supply there may be a need to provide reinforced concrete barriers to provide protection against accidents or gas leakage.

Opportunities for infrastructure sharing occur when several services need to be provided along a common path to buildings or other locations, such as where sensors or actuators are to be

Utility tunnel



Source: Nilesh Puery, Presentation on "Gujarat International Finance Tec-City" made at the ITU Training Event "Leveraging ICTs for Smart Sustainable Cities for Asia-Pacific Region", New Delhi, India, 24–26 March, 2015).

located. Examples include urban corridors with direct trenching, utility tunnels and utility shafts within buildings.

When facilities are shared between ICTs and other utilities, ICTs can be used to support the utilities at a lower cost than using separate infrastructures. Sensors can facilitate better monitoring and control and give advance warning of failure or blockages. Possible examples include flood or fire detection sensors in utility ducts, temperature sensors in electric cables, gas leakage detectors, traffic flow monitoring, street lighting control and water utility monitoring and control.

Opportunities for infrastructure sharing at street level include wireless mast sharing, such as the installation of small base stations on street lampposts to improve broadband speeds and coverage.

To obtain maximum benefit, the interconnection of street-level devices needs to be planned along with underground ducts. For example, optical cables could interconnect with wireless base stations on lampposts. Such cables can be fully dielectric to avoid the need for lightning protection required for metallic cables.

Opportunities for infrastructure sharing in the software domain may also represent a cost-saving advantage at the service layer. Each service requires termination onto a server, data storage or smart processor, as well as connection to devices including personal devices, sensors and controllers. In many cases, these can run on a common application platform. Most existing cities have a multiplicity of platforms to support a range of services, and expertise for managing them resides in separate organizational departments, or "silos".

In contrast, when building a new smart sustainable city from scratch, planners have the option to select a service which can handle the bulk of the software functions required by application developers on a single platform. A wide range of applications are envisaged for a smart sustainable city ranging from e-health to e-transport. For example, an "open-data" approach to transport can greatly extend the opportunities for improved efficiency. Application developers can ensure that real-time information is available for citizens and for visitors who may be using a range of different transport types.

All the information concerning available service facilities can then be collected and converged onto a holistic platform, such as a city-level integrated management system. With integrated management, the sensors and sensing networks can function in an organized way to detect various infrastructure events or incidents, such as emergencies that can be rapidly detected and assessed. This may be followed by analysis and dissemination of information across the concerned agencies, helping achieve the goal of making cities smarter, and more sustainable.



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■ Pathway for smart sustainable cities: A guide for city leaders

By Silvia Guzmán, Chairman, ITU Focus Group for Smart Sustainable Cities

Since the Iron Age, the human race has advanced steadily towards becoming a sophisticated manipulator of all factors of production. Man's move from agriculture to capitalization, industrialization and specialization of labour has led to growth in modern-day cities, bringing with it both positive and unwelcome consequences. Socio-economic growth has exploded at unprecedented rates, but alas, at equally unprecedented environmental cost. People are moving to cities for better educational and employment opportunities and higher incomes.

The global urban population has been rising by an average of 65 million people annually during the past three decades, the equivalent of adding seven Chicagos a year.

As of 2014, there are 28 megacities in the world, home to 453 million people. With 54 per cent of the world's population now living in urban areas, cities are experiencing a range of different problems emanating from an ever increasing rural to urban migration. These include acute scarcity of basic amenities, environmental crises, and rising pollution levels — all of which seeming

to burst the seams of already suffocated cities and their ageing infrastructure.

Projections indicate that these trends will continue. The total global population living in cities is expected to rise to 66 per cent by 2050. Cities can usually account for up to 75–80 per cent of a country’s gross domestic product (GDP), and are considered the primary engines of global economic growth. The flip side, however, which may not be sufficiently factored in by city planners, is that cities account for 50 per cent of global waste along with 60 per cent of global greenhouse gas (GHG) emissions.

There is increasing pressure on the availability of natural resources such as water, land and fossil fuels. There are now growing concerns on the viability of existing transportation infrastructure, the provision of adequate health care, access to education, and overall safety for the increasing population in urban areas.

Focus group

Urban stakeholders are faced with daunting dilemmas as to whether to promote cities as drivers of economic growth or to pay heed to issues related to the increasing population, such as resource overuse and dependence. It is in response to this challenge that the ITU’s Focus Group on Smart Sustainable Cities (FG-SSC) sought to set out a path for guiding cities to become both smart and sustainable.

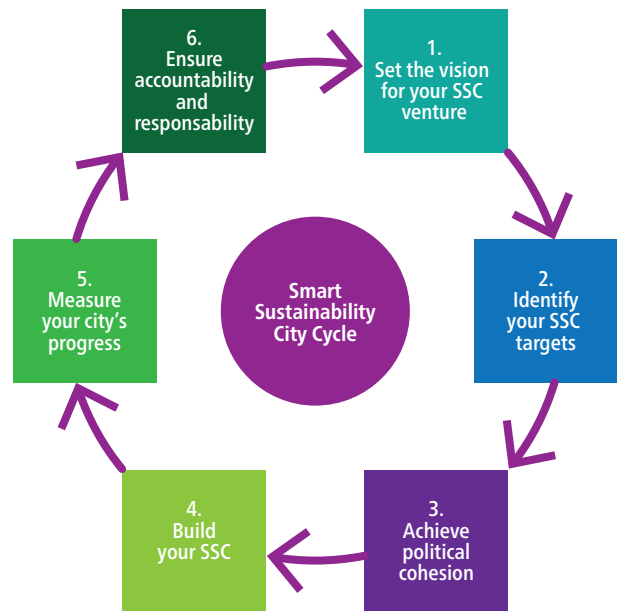
“Smart Sustainable Cities” (SSC) is a concept which emerged more than a decade ago. It intends to leverage the potential of information and communication technologies (ICTs) in urban governance systems to create cities which are not only economically and socially advanced, but are also designed to achieve environmental sustainability.

ITU acknowledges that for cities wishing to become smart sustainable cities, each one starts from a different baseline. However, it is important to understand that building an SSC means embarking on a continuous journey of ongoing holistic improvement, rather than achieving an “ultimate solution”.

A guide for city leaders

Bearing in mind the above, a pathway has been outlined in the FG-SSC “Technical Report on Smart sustainable cities: a guide for city leaders”, based on which urban stakeholders can envisage and establish their very own smart sustainable cities. This guide has been officially referenced in the Habitat III Issue Paper on Smart Cities as an input to the UN-Habitat III Conference on Housing and Sustainable Urban Development, to be held in Quito, 17–20 October 2016.

The pathway to SSC presented by the FG-SSC redefines the way in which smart city infrastructures are planned and built, services are offered, citizens are engaged, and systems are linked. The aim is to transform cities into more sustainable, smart, robust and resilient living environments, taking into account as well disaster resistance, reduced GHG emissions, protection against crime and ensuring cybersecurity.





ICTs and smart sustainable cities

The integration of ICTs into key SSC processes is pertinent to achieving sustainability. ICTs can assist with the establishment of SSC through innovation, as well as redesign existing processes. This can include new applications, technologies and systems for smart energy, smart transportation, smart buildings, smart water management and smart government.

ICTs can provide an integrated strategic approach to sustainability and smartness in SSC, making them key enablers of urban development. ICT integration into the existing urban infrastructure also plays a vital role in the achievement of the UN post-2015 sustainable development goals (SDGs), with particular reference to Goal 9 aimed at building resilient infrastructure, promoting inclusive and sustainable industrialization and fostering innovation; and Goal 11 aimed at making cities and human settlements inclusive, safe, resilient and sustainable. It can also play a crucial role in improving levels of education, attaining gender equality, raising awareness on human rights issues, and strengthening global cooperation for development.

In essence, ICTs act as catalysts in achieving the three pillars of sustainable development — economic growth, social inclusion and environmental balance. In terms of environmental issues, ICTs can provide support through monitoring and reporting schemes on greenhouse gas emissions and energy consumption. ICTs also help provide sustainable products using environmentally conscious design principles and best practices, covering development and manufacture as well as end-of-life treatment.

The ITU Focus Group on Smart Sustainable Cities concluded its work in May 2015, and in June 2015 ITU members established the new ITU–T Study Group 20 to look at “Internet of Things and its applications including smart cities and communities”. ITU–T Study Group 20 will develop, inter alia, standards that leverage IoT technologies to address urban-development challenges.

Towards this end, the smart sustainable city vision can fulfil the dreams of billions of citizens to enjoy a better quality of life. The smart sustainable city option is no longer an option — it is a necessity.

Information on the work of the ITU Focus Group on Smart Sustainable Cities can be found at: www.itu.int/en/ITU-T/focusgroups/ssc



The POLE project 2015 "From Morse Code to the Internet of Things" is an excellent example of successful collaboration between ITU and universities

■ ITU academia membership — A success story

Back in 2010, ITU adopted a Resolution for the admission of academia, universities and their associated research establishments to participate in the work of the three Sectors of the Union, and on 14 January 2011, it welcomed its first twelve academia members. Such participation was made possible by Resolution 169 adopted at the ITU Plenipotentiary Conference (PP-10), held in Guadalajara, Mexico, in October 2010. The Resolution (subject to an initial four-year trial period) states that "the intellectual and scientific contributions of these bodies far outweigh their financial contribution".

The Resolution was updated at PP-14 and a single annual fee was introduced for academia to participate in the work of all three Sectors. In addition, it resolved that academia members be allowed

to participate and make proposals and interventions remotely in ITU meetings, as part of a strategy to widen membership participation in the Union.

"Broadening our membership to include universities and academic institutions was a very positive step. For me, this is a great way of engaging talented young researchers and students in the vital work of ITU, and we will continue to promote this opportunity very actively under my leadership," said Houlin Zhao, ITU Secretary-General.

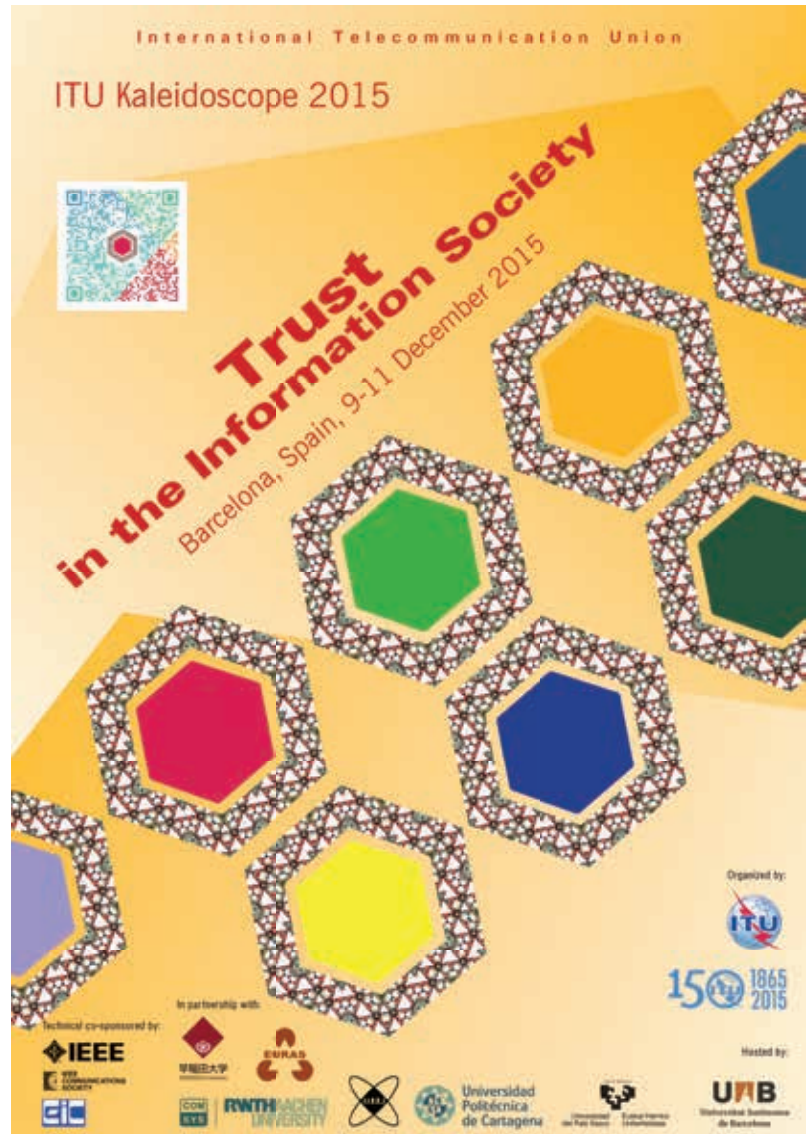
Numerous campaigns were launched to attract new academia members in 2015, and several Member States have already taken significant steps to implement Resolution 169. Over 100 academic institutions from across the world have now joined ITU.

On the occasion of ITU's 150th Anniversary, the "Project Oriented Learning Environment (POLE)" was launched on 17 May. The POLE project 2015 "From Morse Code to the Internet of Things" is an excellent example of successful collaboration between ITU and universities. The students participating in the project demonstrated novel applications in medicine, economy, finance, and production, among other areas.

The first ITU Telecommunication Development Sector (ITU-D) Academia Network Meeting was held on 11 September 2015. ITU-D academia members, Sector Members and government representatives, discussed their specific goals, objectives, projects and issues with regard to ITU-D academia membership.

Below are upcoming events scheduled for academia in 2015 that will gather information and communication technology (ICT) experts from universities and research institutes all over the world.

Kaleidoscope 2015: Trust in the Information Society is the seventh in the series of peer-reviewed academic conferences organized by ITU that bring together a wide range of stakeholders from universities, industry and research institutions in different fields. Kaleidoscope 2015 (Barcelona, Spain, 9–11 December) highlights ideas and research initiatives that help ensure the information society's growth in inclusivity and sustainability thanks to its trusted foundations. A total of 31 papers (out of 96 submitted) have been selected for presentation at the conference, as well as publication in IEEE Xplore. This year's conference also includes the fifth edition of the Jules Verne's corner Special Session "Preparing for data deluge". In parallel with the conference, an Exhibition of Local Universities will take place at the *Universitat Autònoma* de Barcelona, Spain.



A Consultation on ITU-Academia collaboration is scheduled to take place on 8 December 2015 in Barcelona, Spain. It will provide an opportunity for an exchange of views on what ITU can do to best meet the needs and expectations of academia. It will take the form of an informal and interactive hands-on session.

Feedback from members

Prof. György Varju, Budapest University of Technology and Economics, Hungary

"Our students use ITU recommendations and working papers frequently in their practical oriented project laboratory work. Information on the working progress of a recommendation is very useful for their diploma work, and can even contribute to the development of their PhD theses. Other ITU publications and events, such as the Kaleidoscope event, are also very interesting for our students."

Prof. Yang Zhen, President of Nanjing University of Posts and Telecommunications, China

"We see ITU membership as a way of strengthening our communication and exchange of knowledge with experts from other countries in all the academic fields related to telecommunications. More specifically, membership of ITU makes it much easier for representatives of our university to attend the different kinds of academic conferences and meetings organized by the Union, and to participate more fully in ITU activities."

Prof. Ezequiel Tardivo, Universidad de Rio Cuarto, Argentina

"Receiving the invitation to participate in ITU was more than important for the whole university but especially for our studies in communication engineering. The time we spend here at ITU is very motivating. Firstly, you see how the work is done, then you are invited to continue your participation, and lastly, you are enthusiastic about making reports and contributions. Also, coordinated by one professor, our students participate in contributions and meetings. It is not only professors that are active, students use the materials and contribute actively. Having the opportunity to participate is very important."

Prof. Alfredo Debattista, Universidad Nacional de San Luis, Argentina

"It has been very interesting participating in Study Group 5 because I had the opportunity to present an initial contribution. I ended up being one of the editors of the recommendation. One studies a field for many years but it is a different experience to be directly involved. It was a very positive experience and we are very happy to be here. In the studies of engineering, ITU was always present. Professors explain ITU Recommendations and use information from ITU. This project has given us the opportunity to link the academic side with the more practical work of ITU. One can teach students in a different way, if one has been where the recommendations are developed. So one not only takes the recommendations for a fact, but is also able to explain the process of making these recommendations. This is very important for future professionals."

Prof. Dr Lia Molinari, Universidad Nacional de la Plata, Argentina

"As members of a university, this is an excellent opportunity for us to be in the place where standards are discussed and where national views coincide. We see that we might not have the same achievements as other countries but we have highly trained people that are working on topics of international concern. We had the honour of being selected as one of the Centres of Excellence, and this allowed us to position our institution at the international level. We thank you for the time that ITU dedicates to us, and we hope to strengthen this bond with quantity and quality."

Dr Matthias Finger, Professor of Management of Network Industries and Director of the Institute of Technology and Public Policy, EPFL, Switzerland

"As a world-class technical research university promoting science-based innovation, we are proud to partner with ITU in the areas of information technology and telecommunication policy where ITU is the uncontested international leader. ITU plays an important role in shaping the ICT sector and we are happy to assist this international agency in achieving its mission and vision."

Dr Andres Navarro Cadavid, Director, Grupo de Investigación i2T, Universidad ICESI, Colombia

"Spectrum Monitoring, mobile radio and cyber health are part of the specialized technical areas of Universidad ICESI. They are the areas of interaction with the work of ITU-R, which allow us to expand our horizons not only from a technical and academic perspective, but also for networking and international relations. Along with this process, ICESI has participated in ITU study groups, ITU News, and seminars, where we believe our contribution as an academic institution is valuable and enriching."

Dr J.P. Auffret, Director of the MS in Technology Management Programme, George Mason University, United States

"Mobile phones and telecommunications are leading to major changes in industry, society and government, and ITU academia membership provides the Mason faculty another avenue with which to engage actively and be at the forefront of the mobile revolution."

Alain Louchez, Director of the Centre for the Development and Application of Internet of Things Technology, Georgia Institute of Technology, United States

"In addition to falling closely in line with Georgia Tech's strategic vision...our collaboration with ITU also aims at fostering productive relationships with industry, academia and other organizations actively working in the ICT arena."

Dr Jian Song, Director of Tsinghua DTV Technology R&D Centre, Tsinghua University, China

"We strongly believe that ITU has been playing, and will continue to play, an important role for shaping the whole IT industry, and therefore human life, by not only the standardization process, but also other methods. For Tsinghua University, being an academia member of ITU not only benefits this university itself, but it can also make a contribution to ITU to help it achieve its goal."

Dr Ali Abbassene, CIO and Researcher, CDTA, Algeria

"ITU is a wonderful place where different actors especially from academia and industry can meet together and collaborate to achieve valuable technical work. It is also a great opportunity for academic and research institutions from developing countries to be able to participate actively in the development of future standards."

For more information, please visit: www.itu.int/academia

Milestones *in the history of* ITU News

1869



The first issue of the "Journal télégraphique" is published

When the second International Telegraph Conference, held in Vienna in 1868, decided to establish a permanent secretariat for the Union in Bern, Switzerland, among the six tasks assigned to the Bureau was the publication of "a telegraph journal in the French language" (International Telegraph Convention (Vienna, 1868), Article 61). Thus, the publication of the Journal was mandated by the Member States and has been an important part of ITU's role to disseminate information right from the creation of the secretariat. The first issue of the "Journal télégraphique" is published on 25 November 1869. ●



1962

Each language has its own separate edition

Publication of the Journal in three separate English, French and Spanish editions, instead of the old trilingual form, began in January 1962. Throughout the 1960s to 1980s, the journal was increasingly used to spread information about the Union and its work. Part of this strategy consisted of sending copies of the Journal to the United Nations and all its specialized agencies, to the United Nations information centres in various parts of the world and to the Union's Technical Cooperation experts in the field. In addition, an increasing number of organs of the general and technical press asked to receive it. ●

1869

1934

1948

1962

The journal changes its name to: "Journal des télécommunications"

In 1932 in Madrid, the International Telegraph Conference and the International Radiotelegraph Conference decided to combine the Telegraph and Radiotelegraph Conventions to form the single International Telecommunication Convention. At the same time, a new name was adopted to reflect the full range of ITU's responsibilities: International Telecommunication Union. The new name came into effect on 1 January 1934. Accompanying the change of name of the Union, the Journal télégraphique became the Journal des télécommunications on 1 January 1934. ●



1934

The journal is published in three languages: French, English and Spanish

Following the decisions of the International Telecommunications Conference of Atlantic City (1947) related to languages, the Telecommunication Journal became a trilingual publication (English, French and Spanish) starting in January 1948. The three languages were printed side-by-side on the same page. Publishing the Journal in its new form meant a considerable increase in work and in cost of production. ●



1948

The entire collection of the journal, 1869-present, is carefully preserved by the ITU Library and Archives Service. Paper copies can be freely consulted from the Library shelves. In order to enhance access to this invaluable source of information, the Library and Archives Service has undertaken the digitization of the complete collection which will be made available on a specialized website in 2016. Readers will be able to browse, read online and download PDF copies of all issues. The complete collection will be searchable, allowing researchers, scholars and the general public to fully explore and exploit this treasure trove of information about the development of the telecommunications field and the activities of the Union over the past 140 years.

1994



The journal becomes a newsletter

As of 1 January 1994, the Telecommunication Journal was replaced by the "ITU Newsletter". The layout was modified and modernized, and the production schedule was changed to ten times a year. It was announced that, in its new form, the Journal/Newsletter would "concentrate on ITU's activities, on the issues at stake and on the practical results achieved". Opinions, though often conflicting, would also find their place in the new style publication in order to provide readers with not only the basic information about ITU activities, but also "the more hidden aspects, the whys and the wherefores". ●



2016

ITU News will become completely digital

In 2016 ITU News will become completely digital, with a new online portal. Special digital editions will be produced around key ITU events and topics throughout the year. ●

1994

1999

2009

2016

The electronic version is introduced

As part of the response to a study that showed a need for electronic distribution of information about ITU activities, the first electronic version of ITU News appeared on the ITU website in mid-1999. Since then, ITU News has appeared in both digital and paper copies. In 2003–2006, the ITU News website was a high achiever in terms of average number of visits per month, scoring among the top three most visited ITU sites. ●



1999

ITU News is published in 6 languages

Since July 2009, ITU News has been published in all six official languages of the Union, both in print and online, and continues to provide wide-ranging coverage of the events shaping telecommunications around the world. ●



2009

Official Visits

During October 2015, courtesy visits were made to ITU Secretary-General Houlin Zhao by the following ambassadors to the United Nations Office and other international organizations in Geneva, and other important guests.



Houlin Zhao, ITU Secretary-General and Lucija Ljubić, Ambassador of Bosnia and Herzegovina



New Ambassador of Niger, Fatima Sidikou



New Ambassador of the Republic of Korea, Choi Kyong-lim



From left to right: Greer Alblas, First Secretary, Australian Permanent Mission to the Office of the United Nations; John Quinn, Ambassador of Australia; Houlin Zhao, ITU Secretary-General; Caroline Greenway, Director, International Engagement and Strategy Section, Digital Productivity Division, Australian Department of Communications

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Accelerating ICT innovation
to improve lives faster

ITU Telecom World 2016 is the global platform to accelerate ICT innovations for social and economic development. It's where policy makers and regulators meet industry experts, investors, SMEs, entrepreneurs and innovators to exhibit solutions, share knowledge and speed change. Our aim is to help ideas go further, faster to make the world better, sooner. Visit telecomworld.itu.int to register your interest.



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