



The Internet Economy on the Rise

PROGRESS SINCE THE SEOUL DECLARATION



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Preface

Governments around the world are seeking to find new sources of growth, create jobs and improve the well-being of their citizens. The Internet economy represents an enormous opportunity to do just that.

With nearly 1 billion broadband subscriptions in the OECD area, the Internet has now transformed from a useful platform to an essential and multidimensional infrastructure that needs to be kept open and decentralised in order to enable communication, collaboration, innovation, inclusive participation and economic growth. Up to 13% of business sector value-added in the United States, for example, can be attributed to Internet-related activities – and the figure is growing.

The 2008 Seoul Ministerial Declaration for the Future of the Internet Economy marked a turning point for Internet policy. It recognises the essential nature and function of the Internet and the need for governments to work together with business, civil society and the technical community to best guide its development. At that time, Ministers asked the OECD to review and take stock of the progress made at the domestic and international levels in implementing the Declaration in the four years following its adoption, and to identify areas where further political attention and action is required. Major policy-relevant areas of this review include:

- initiatives to stimulate and strengthen our economies, for instance through investments in communications infrastructure.
- decisive action to protect and empower consumers in e-commerce.
- measures to improve network security.
- policies to leverage the role of the Internet in transforming entire sectors (e.g. the media and entertainment sector) and as an enabler of services innovation.

The review underlines that the Internet economy has now reached a point where it has become a new source of growth with the potential to boost the whole economy. It has the capacity to foster innovation, competitiveness and user participation, and to effectively contribute to the prosperity of the whole society. This is especially important given the economic and social challenges we are facing or expect to face in the near future.

Given the ever-increasing importance of the Internet economy, leveraging innovation in this field will be particularly crucial for allowing governments to effectively address such challenges. Therefore, we welcome the initiative to dedicate the next OECD Internet Ministerial to raising awareness of the potential of the Internet at the highest levels of government, and to underlining the importance of a multi-stakeholder approach to Internet policymaking which preserves the open and decentralised nature of the Internet.

I would therefore like to congratulate and thank the OECD Committee for Information, Computer, and Communications Policy (ICCP) and the OECD Committee on Consumer Policy (CCP) for their work in reviewing the Seoul Declaration, and in particular Mr. Jørgen Abild Andersen, Chair of the ICCP, for leading the review process. This report is an important contribution to “*better Internet policies for sustained economic growth and better lives.*”



Angel Gurría
OECD Secretary-General

Foreword

Ministers participating in the 2008 Seoul Ministerial meeting on the Future of the Internet Economy adopted a Declaration (“the Seoul Declaration”), in which they identified future work for the OECD aimed *i)* to carry out further analysis of the Internet economy and, based on this analysis; *ii)* to develop regulatory principles, guidelines and other instruments to promote the future development of the Internet economy. In addition, Ministers emphasised the need to further investigate the role of the Internet and related information and communication technologies (ICTs) in addressing global challenges, such as climate change. Ministers mandated the OECD to review the Seoul Declaration within three years after its adoption.

This report reviews the implementation of the Seoul Declaration and proposes areas for future work. The review is structured into seven themes, considered from three perspectives: the main building blocks of the Internet economy, the framework conditions for its proper functioning and the socio-economic benefits that the Internet should strive to achieve.

The review was prepared under the aegis of the OECD Committee for Information, Computers and Communications Policy with input from its working parties and in collaboration with the Committee on Consumer Policy. Delegates contributed significantly through their responses to the Seoul policy questionnaire and their comments on the several reports.

The review is a collective effort and takes a horizontal approach, coordinated by the Information, Communications and Consumer Policy Division of the OECD Directorate for Science, Technology and Industry. It was produced under the guidance of Anne Carblanc and Dimitri Ypsilanti and the overall co-ordination of Verena Weber.

Chapter 1 summarises the main findings across all the reviewed areas and was prepared by Brigitte Acoca, Christian Reimsbach-Kounatze and Verena Weber.

Chapter 2 on “access to the Internet via a high-speed infrastructure” takes a closer look at progress made in the area of communications infrastructure. It was prepared by Verena Weber with contributions from Deborah Alcocer.

Chapter 3 on “innovation and sustainability: digital content and green ICTs” looks at progress made on the application layer with a focus on digital content and green ICTs. It was prepared by Verena Weber with contributions from Deborah Alcocer, Karine Perset, and Rudolf Van der Berg.

Chapter 4 on “empowering and protecting consumers” monitors developments in the area of consumer policy. It was prepared by Brigitte Acoca with contributions from Ayako Terauchi.

Chapter 5 on a “global participation in the Internet economy” focuses on the progress made in the area of the Internet and ICTs for development. It was prepared by Caroline Paunov and Verena Weber.

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List of abbreviations

ACLE	Amsterdam Centre for Law and Economics
ACMA	Australian Communications and Media Authority
ADR	Alternative Dispute Resolution
AGCOM	<i>Autorità per le Garanzie nelle Comunicazioni</i>
AGEIS	Australian Green House Emissions Information Society
AGIMO	Australian Government Information Management Office
AIOU	Allama Iqbal Open University
ALRC	Australian Law Reform Commission
ANACOM	<i>Autoridade Nacional de Comunicações</i>
APEC	Asia-Pacific Economic Cooperation
APEC TEL	APEC Telecommunications and Information Working Group
APT	Asia-Pacific Telecommunity
ARIN	American Registry for Internet Numbers
ARV	Antiretroviral
AWS	Advanced Wireless Services
BCR	Binding Corporate Rules
BEREC	Body of European Regulators for Electronic Communications
BPL	Broadband over Power Lines
BRICS	Brazil, Russia, India, China and South Africa
CCAAC	Commonwealth Consumer Affairs Advisory Council
CCP	Committee on Consumer Policy
CIF	Canada's Interactive Fund
CISP	Working Party on Communications Infrastructure and Service Policies
CRC	Copyright Review Committee
CRTC	Canadian Radio-television and Telecommunications Commission
CSECL	Centre for the Study of European Contract Law
CSR	Corporate Social Responsibility
DCENR	Department of Communications, Energy and Natural Resources

DG	Directorate General
DoD	Department of Defense
DOI	Deutschland-Online Infrastructure
DRM	Digital Rights Management
DSL	Digital Subscriber Line
DTV	Digital Television
EC	European Commission
ECS	Electronic Communications Service
EU	European Union
FDD	Frequency-division duplexing
FTTB	Fibre to the Building
FTTH	Fibre to the Home
FWALA	Fixed Wireless Access Local Area
GDP	Gross Domestic Product
GPT	General Purpose Technologies
GSMA	GSM Association
IANA	Internet Assigned Numbers Authority
IETF	Internet Engineering Task Force
ICCP	Information, Computer and Communications Policy
ICPEN	International Consumer Protection and Enforcement Network
ICT	Information and Communication Technologies
IdM	Include Digital Identity Management
IDRC	International Development Research Centre
IICUT	International Institute of Cambodia University of Technology
IP	Intellectual Property
IPR	Intellectual Property Rights
ISP	Internet Service Providers
ITU	International Telecommunication Union
KCC	Korea Communications Commission
KISDI	Korean Information Society Development Institute
LLP	Limited Liability Partnership
LTE	Long Term Evolution
MCM	Meeting of the Council at Ministerial
METI	Ministry of Economy, Trade and Industry

MIC	Ministry of Information and Communication
MIND	Mobile Technology Initiatives for Non-formal Distance
MMDS	Multichannel Multipoint Distribution Service
MNO	Mobile Network Operators
MPO	<i>Ministerstvo Průmyslu a Obchodu</i>
MPSC	Mobile Premium Services Code
MSSRF	M.S. Swaminathan Research Foundation
MTR	Mobile Termination Rates
MVNO	Mobile Virtual Network Operators
NCAT	National Carbon Accounting Toolbox
NCTE	National Centre for Technology in Education
NdB	<i>Netze des Bundes</i>
NFP	<i>Nationaal Frequentie Plan</i>
NFC	Near field communication
NGA	Next Generation Access
NTIA	National Telecommunications and Information Administration
ODR	Online Dispute Resolution
OFT	Office of Fair Trading
OLM	Official Language Minority
OLT	Ovi Life Tools
ONS	Office for National Statistics
ONT	Optical Network Termination
PaaS	Platform as a Service
PSI	Public Sector Information
PSTN	Public Switched Telephone Network
PtMP	Point-to-Multipoint
PtP	Point-to-Point
QoS	Quality of Service
RFID	Radio Frequency Identification
RIR	Regional Internet Registries
SaaS	Software as a Service
SFR	<i>Société Française de Radiotéléphonie</i>
SIM	Subscriber identity modules
SNEP	<i>Syndicat National de l'Édition Phonographique</i>

SME	Small and Medium Enterprises
STOU	Sukhothai Thammathirat Open University
TPE	Trans-Pacific Express
TSSG	Telecommunications Software & Systems Group
UNESCO	United Nations Educational, Scientific and Cultural Organization
UHF	Ultra High Frequency
UT	University Terbuka
UNFPA	United Nations Population Fund
USSD	Unstructured Supplementary Service Data
VoIP	Voice over Internet Protocol
VUP	Virtual University of Pakistan
WHO	World Health Organisation
WPCPS	Working Party on Consumer Product Safety
WPIE	Working Party on the Information Economy
WPIIS	Working Party on Indicators for the Information Society
WPISP	Working Party on Information Security and Privacy

*Declaration for the Future of the Internet Economy
(The Seoul Declaration)*

WE, the Ministers and Representatives of Australia, Austria, Belgium, Canada, Chile, the Czech Republic, Denmark, Egypt, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, India, Indonesia, Ireland, Israel, Italy, Japan, Korea, Latvia, Luxembourg, Mexico, the Netherlands, New Zealand, Norway, Poland, Portugal, Senegal, the Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkey, the United Kingdom, the United States of America and the European Community, assembled in Seoul, Korea, on 17 and 18 June 2008 to discuss the future of the Internet Economy¹.

WE STATE our common desire to promote the Internet Economy and stimulate sustainable economic growth and prosperity by means of policy and regulatory environments that support innovation, investment, and competition in the information and communications technology (ICT) sector. We will work with the private sector, civil society and the Internet community to secure the ICT networks that underpin the Internet Economy as well as to take measures to protect the users of the Internet Economy, including the necessary cross-border co-operation.

WE ARE DETERMINED to work together to promote ubiquitous access to ICT networks and services enabling widespread participation in the Internet Economy. The further expansion of the Internet Economy will bolster the free flow of information, freedom of expression, and protection of individual liberties, as critical components of a democratic society and cultural diversity. We will also work to use the tools of the Internet Economy to address global challenges, such as climate change. In moving forward, we recognise the significant foundation that the 1998 *OECD Ministerial Conference on Electronic Commerce* provided to the nascent Internet Economy and take note of the outcomes of the 2003 and 2005 *World Summits on the Information Society* (WSIS).

WE SHARE a vision that the Internet Economy, which covers the full range of our economic, social and cultural activities supported by the Internet and related information and communications technologies (ICT), will strengthen our capacity to improve the quality of life for all our citizens by:

- Providing new opportunities for employment, productivity, education, health and public services as well as addressing environmental and demographic concerns;
- Acting as a key driver for the creation of enterprises and communities and stimulating closer global co-operation;
- Enabling new forms of civic engagement and participation that promote diversity of opinions and enhance transparency, accountability, privacy and trust;

¹ Romania adhered to this Declaration on 5 June 2009.

- Empowering consumers and users in online transactions and exchanges;
- Reinforcing a culture of security which applies to information systems and networks, and their users;
- Developing an increasingly important platform for research, international science co-operation, creativity and innovation in many different sectors;
- Creating opportunities for new economic and social activities, applications and services through ubiquitous and seamless access to communication and information networks;
- Promoting a global information society based on fast, secure and ubiquitous networks which connect billions of people, machines and objects.

WE AGREE that our challenges are, through an appropriate balance of laws, policies, self-regulation, and consumer empowerment, to:

- Expand Internet access and use worldwide;
- Promote Internet-based innovation, competition, and user choice;
- Secure critical information infrastructures, and respond to new threats;
- Ensure the protection of personal information in the online environment;
- Ensure respect for intellectual property rights;
- Ensure a trusted Internet-based environment which offers protection to individuals, especially minors and other vulnerable groups;
- Promote the secure and responsible use of the Internet that respects international social and ethical norms and that increases transparency and accountability;
- Create a market-friendly environment for convergence that encourages infrastructure investment, higher levels of connectivity and innovative services and applications.

WE DECLARE that, to contribute to the development of the Internet Economy, we will:

a) Facilitate the Convergence of Digital Networks, Devices, Applications and Services, through Policies that:

- Establish a regulatory environment that assures a level playing field for competition;
- Uphold the open, decentralised and dynamic nature of the Internet and the development of technical standards that enable its ongoing expansion and contribute to innovation, interoperability, participation and ease of access;
- Stimulate investment and competition in the development of high capacity information and communication infrastructures and the delivery of Internet-enabled services within and across borders;
- Ensure that broadband networks and services are developed to attain the greatest practical national coverage and use;

- Encourage a more efficient use of the radio frequency spectrum to facilitate access to the Internet and the introduction of new and innovative services, while taking into account public interest objectives;
- Encourage the adoption of the new version of the Internet protocol (IPv6), in particular through its timely adoption by governments as well as large private sector users of IPv4 addresses, in view of the ongoing IPv4 depletion;
- Ensure that convergence benefits consumers and businesses, providing them choices with respect to connectivity, access and use of Internet applications, terminal devices and content, as well as clear and accurate information about the quality and costs of services.

b) Foster Creativity in the Development, Use and Application of the Internet, through Policies that:

- Maintain an open environment that supports the free flow of information, research, innovation, entrepreneurship and business transformation;
- Make public sector information and content, including scientific data, and works of cultural heritage more widely accessible in digital format;
- Encourage basic and applied research on the Internet and related ICTs;
- Encourage universities, governments, public research, users and business to work together in collaborative innovation networks and to make use of shared experimental Internet facilities;
- Combine efforts to combat digital piracy with innovative approaches which provide creators and rights holders with incentives to create and disseminate works in a manner that is beneficial to creators, users and our economies as a whole;
- Encourage new collaborative Internet-based models and social networks for the creation, distribution and use of digital content that fully recognise the rights of creators and the interests of users;
- Strengthen the development of human resources to take full advantage of the Internet and related ICTs, and further develop ICT skills and digital and media literacy.

c) Strengthen Confidence and Security, through Policies that:

- Protect critical information infrastructures at national and international levels from security risks;
- Strengthen the resilience and security of the Internet and related networked ICT systems and devices to meet the increasing demands and needs of our economies and societies;
- Reduce malicious activity online through reinforced national and international co-operation among all stakeholder communities in their steps for effective prevention, protection, information sharing, response, business continuity and recovery;
- Ensure the protection of digital identities and personal data as well as the privacy of individuals online;

- Ensure that consumers benefit from effective consumer protection regimes and from meaningful access to fair, easy-to-use, and effective dispute resolution mechanisms, including appropriate redress for economic harm resulting from online transactions;
- Encourage collaboration between governments, the private sector, civil society and the Internet technical community in building an understanding of the impact of the Internet on minors in order to enhance their protection and support when using the Internet;
- Promote research to address emerging security threats.

d) Ensure that the Internet Economy is Truly Global, through Policies that:

- Support expanded access to the Internet and related ICTs, especially for people in developing countries;
- Recognise the potential of the Internet and related technologies to provide enhanced services to people with disabilities and special needs;
- Recognise the importance of a competitive environment for the successful growth of the Internet Economy and the opportunities this can bring for development, particularly for people and regions with the most limited economic means;
- Promote use of Internet and related ICT networks by all communities as well as the creation of local content and multi-language translations to improve economic and social inclusion of people with different capabilities, education, and skills, and to preserve cultural and linguistic diversity;
- Facilitate the introduction of internationalised domain names (IDNs) while ensuring the integrity and stability of the Internet;
- Increase cross-border co-operation of governments and enforcement authorities in the areas of improving cyber-security, combating spam, as well as protecting privacy, consumers and minors;
- Harness the potential of the Internet to tackle global challenges such as improving energy efficiency and addressing climate change.

WE WELCOME the OECD report *Shaping Policies for the Future of the Internet Economy*, **RECOGNISE** its importance and **COMMEND** its consideration by OECD Member countries and non-member economies in developing their policies to support the Internet Economy.

WE COMMIT to working collectively with all stakeholders towards implementing and reviewing, as appropriate, the understanding that we have achieved in this Declaration in order to maintain its relevance to future challenges and opportunities confronting our economies and societies.

WE INVITE the OECD to further the objectives set out in this Declaration, through multi-stakeholder co-operation, by:

- Analysing the future development of the Internet Economy, namely: *i)* the important role and contribution of the Internet and related ICTs as a driver of innovation, productivity and economic growth; *ii)* the economic, social and cultural impacts of emerging Internet technologies, applications and services, including virtual worlds, sensor-based networks and social networking platforms;

- Based on this analysis, developing and promoting policy and regulatory principles, guidelines, other instruments and best practices for the future development of the Internet Economy;
- Researching the impacts of Internet and related ICTs in addressing climate change and improving energy efficiency;
- Examining the role of various actors, including intermediaries, in meeting policy goals for the Internet Economy in areas such as combating threats to the security and stability of the Internet, enabling cross-border exchange, and broadening access to information;
- Improving statistical systems to measure the changing access and use of the Internet and related ICT networks by citizens, businesses and institutions in order to provide reliable measures of evolving uses and the impact of the Internet on economic performance and social well-being;
- Assessing the application of current OECD instruments addressing consumer protection and empowerment, privacy and security in light of changing technologies, markets and user behaviour and the growing importance of digital identities;
- Recommending the development of OECD instruments that provide guidance in the formulation of policies for the development and use of converged communication networks;
- Continuing multidisciplinary work looking at the challenges and good practices of e-government and public sector transformation;
- Supporting measures and mechanisms to implement more effective cross-border co-operation;
- Conveying this Declaration and the OECD report *Shaping Policies for the Future of the Internet Economy* to all relevant international bodies and organisations, including the G8, the ITU, the WIPO, and UNESCO;
- Reinforcing co-operative relationships and mutually beneficial collaboration with the Asia-Pacific Economic Co-operation, the Council of Europe as well as the Internet technical community, the private sector and civil society within fora such as the Internet Governance Forum;
- Reviewing within three years of its adoption, and thereafter as appropriate, the progress made at national and international levels in light of this Declaration.

Chapter 1

The Seoul Declaration: An overview of progress made and recommendations for future work

This chapter provides a synthesis of the recommendations set out in the Seoul Declaration and an overview of developments and progress made in implementing them at national and international levels since the Declaration was adopted in 2008. It sheds light on policy issues that have arisen or have increased in scale or scope since the Declaration and makes recommendations for further work.

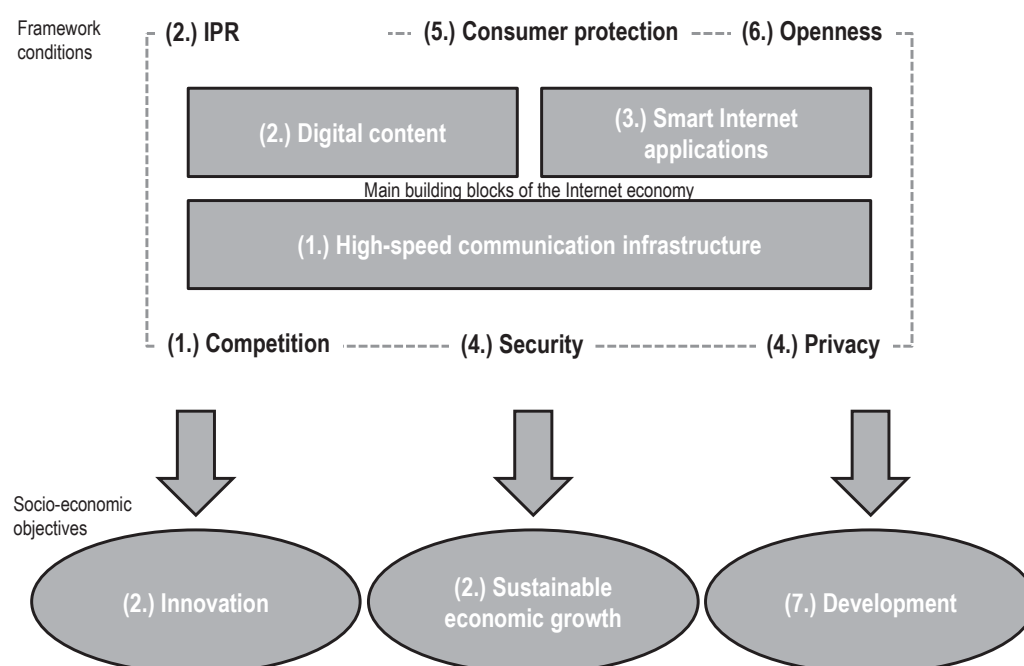
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The proposal entitled “Follow-Up to the Seoul Ministerial Declaration for the Future of the Internet Economy” (OECD, 2010a) set out **seven main themes** (see Figure 1.1), considered from **three perspectives**:

1. Three **main building blocks of the Internet economy**.¹ The themes under this heading are related to *high-speed communications infrastructure*, *digital content*² and *smart applications*.
 - a) **Access to the Internet via a high-speed infrastructure**: High-speed fixed and mobile networks are the enablers for accessing and transferring data across the different parts and stakeholders of the Internet economy. They are the Internet economy’s backbone, on top of which digital content is created and distributed across the economy. This theme, covered in detail in Chapter 2, focuses on main market and policy developments in the area of high-speed networks and points to areas where further work is needed. In particular, it covers the areas of *i) expanding access to networks*; *ii) creating an environment for competition*; *iii) convergence*; *iv) the adoption of the latest Internet protocol, IPv6*; *v) radio spectrum*; and *vi) improving measurement*.
 - b) **Digital content and green ICTs in the context of innovation and sustainable growth**: This theme, covered in detail in Chapter 3, looks at main market and policy developments in two areas, digital content and green Information and Communications Technologies (ICTs); highlights their contribution to innovation and sustainable growth (green growth); and identifies areas where further work is needed. In the area of digital content, issues addressed include: the development of digital content markets, local content, public sector information, the role of Internet intermediaries, and intellectual property rights. In the context of green ICTs, issues addressed include notably: resource efficient ICTs, sensor-based networks, and smart ICT applications such as smart grids. These issues are also related to the next theme on understanding the data-driven economy.
 - c) **The development of smarter applications**: High-speed and fixed-mobile networks also support the operation of “smart” applications based on the collection, transportation, processing and analysis of data flows, some of which are increasingly produced by sensors, sensor networks and machine-to-machine (M2M) communication. This theme covers market and policy developments in smart applications across the economy, such as smart grids, smart transportation, taking into account the proliferation of smart devices such as smart meters and smart televisions. Some of these applications are discussed in the context of green ICTs (see second theme). However, the emphasis here is on the large amount of data being generated through these smart devices – some of which are enhanced through, for example, sensor networks and M2M communication – and on the new role of data as an intangible asset. This theme is not treated in depth in this book, but is addressed in OECD (2013a).
2. The **framework conditions** required to ensure that the Internet economy functions well. Themes under this heading include *security and privacy*, *consumer protection and empowerment*, and *openness*. These framework conditions are critical for ensuring transparency, cultural diversity and the

protection of individual liberties, as well as for enabling innovation and prosperity in the Internet economy. Other framework conditions, such as *competition* and the *protection of intellectual property rights* are discussed in the context of communication infrastructure and digital content, respectively.

- a) **Cybersecurity and privacy:** Security and privacy, as well as consumer protection, are essential for trust online. This theme, not covered in detail in this book, looks at the main market and policy developments in the area of cybersecurity and privacy, highlighting in particular the on-going review of the *OECD (2002) Guidelines for the Security of Information Systems and Networks: Towards a Culture of Security* (Security Guidelines) and the OECD (1980) Guidelines on the Protection of Privacy and Transborder Flows of Personal Data (Privacy Guidelines). Another issue addressed under this theme is digital identity management.
 - b) **Empowering and protecting consumers:** This theme is covered in detail in Chapter 4 and looks at main market and policy developments in the business-to-consumer (B2C) e-commerce marketplace. It focuses on a number of areas including online and mobile payments, consumer purchases of digital content, participative e-commerce (social and collaborative e-commerce), and dispute resolution and redress. This theme is discussed in detail in Chapter 4.
 - c) **Ensuring an open Internet economy:** This theme, not covered in detail in this book, looks at market and policy developments affecting the openness of the Internet economy. Openness refers notably to multi-stakeholder co-operation, access without permission, free flow of information, and freedom of expression. Openness is highlighted particularly in the context of the High-Level Meeting in June 2011 on *The Internet Economy: Generating Innovation and Growth*, which led to the *Communiqué on Principles for Internet Policy Making* and the OECD (2011ba) *Council Recommendation on Principles for Internet Policy Making*.
3. The **socio-economic objectives** that the Internet economy can help to achieve. This theme addresses the question of how the main building blocks of the Internet economy, as well as framework conditions, should be developed so that emerging and developing countries can fully participate in and benefit from the Internet economy.
- a) **Global participation in the Internet Economy for development:** This theme looks at market and policy developments supporting access to the Internet and related ICTs for people in developing countries and the identification of future needs. It highlights four areas for ensuring global participation in the Internet Economy: *i)* fostering access to the Internet economy in developing countries; *ii)* promoting applications and their use in developing countries; *iii)* developing skills; and *iv)* Internet-related innovation: notably, the case of cloud computing. This theme is covered in detail in Chapter 5.

Figure 1.1. Analytical framework for reviewing the seven themes of the Seoul Declaration

Note: Numbers in brackets indicate the number of the theme. For example, the framework condition “competition” has been discussed in the context of theme (1.) “Access to the Internet via a high-speed infrastructure”.

The main building blocks of the Internet economy

The ecosystem of the Internet economy is mainly composed of: *i*) the (high-speed) communication infrastructure; *ii*) digital content; and *iii*) smart Internet applications.³

Access to the Internet via a high-speed infrastructure

This issue is developed in detail in Chapter 2, but we present a summary of the main findings here.

Markets and policy developments

In the Seoul Declaration, Ministers identified the importance of high-speed networks and committed to a series of objectives that can be broken down into the following six areas:

- Expanding access to networks and attaining greatest practical national coverage;
- Creating a market-friendly environment for investment and competition;
- Benefitting from convergence;
- Encouraging the adoption of the latest version of the Internet Protocol, IPv6;
- Encouraging a more efficient use of radio spectrum;
- Improving measurement and statistical instruments.

Since the Seoul Declaration, *access to broadband networks and the Internet* has constantly increased. In terms of fixed broadband, penetration levels are close to maturity in some countries, though expectations and service level requirements continue to evolve. In addition, there has been further deployment of fibre networks, although overall, this is

still at an early stage (see Table 1.1). In terms of mobile broadband, 3G (third generation) coverage is high and data traffic is growing significantly. In terms of policies, national broadband plans have contributed to increasing access to the Internet. Furthermore, some countries have invested public funds in the deployment of fibre networks.

Table 1.1. State of fibre-to-the-home (FTTH)/FTTB deployment in 2010

	Homes passed ¹	Main topology ²	% Main topology	Largest party deploying
Australia	40 000	PtMP	100%	Government
Austria	63 000	PtP	90%	Municipalities
Belgium	3 750	na	na	Incumbent
Canada	280 000	PtMP	na	Incumbent
Chile	20 000	PtMP	na	Incumbent
Czech Republic	195 000	PtMP	100%	Altnets ³
Denmark	795 300	PtP	85%	Utilities
Finland	544 000	PtP	100%	Incumbent(s)
France ⁴	1 383 588	PtMP	55%	Incumbent
Germany	560 000	PtP	70%	Utilities
Greece	5 000	PtP		Altnets
Hungary	215 000	PtMP	100%	Incumbent
Iceland	33 000	PtP	80%	Utility
Ireland	16 900	PtP	95%	Altnets
Italy	2 245 500	PtP	100%	Altnets
Japan	46 000 000	PtMP	80%	Incumbent
Korea	16 000 000	PtMP	100%	Incumbent
Luxembourg	56 000	PtP	100%	Incumbent
Mexico	100 000	PtMP	na	Incumbent
Netherlands	662 500	PtP	90%	Incumbent
New Zealand	50 000	PtMP	80%	Altnets
Norway	381 700	PtP	100%	Utility
Poland	90 265	PtP	95%	Utility
Portugal	1 470 000	PtMP	100%	Incumbent
Slovakia	615 000	PtMP	95%	Incumbent
Slovenia	310 000	PtP	100%	Altnets
Spain	412 500	PtMP	100%	Incumbent
Sweden	1 464 500	PtP	90%	Altnet
Switzerland	212 500	PtP	90%	Incumbent
Turkey	200 000	PtP	na	Altnets
United Kingdom	138 000	PtP	na	Altnets
United States	19 676 200	PtMP	na	Incumbent

Notes: 1) Homes passed are potential premises to which an operator has the capability to connect in a service area, but the premises may or may not be connected to the network. Typically new service activation will require the installation and/or connection of a drop cable from the homes passed point (e.g. fibre-pedestal, handhole, chamber, utility-pole) to the premises, and the installation of subscriber premises equipment, including an ONT (Optical Network Termination) device at the premises. 2) Topologies can be either point-to-point (PtP) or point to multipoint (PtMP). 3) Altnets are alternative network operators other than the traditional Incumbent operator. 4) Data excludes the Numericable network. For additional data on European countries, see also the Body of European Regulators for Electronic Communications (BEREC) (2006).

Source: OECD, 2010b based on IDATE for the FTTH Council Europe, FTTH Council North America, FTTH Council Asia-Pacific, European Communication Committee.

Competition in the infrastructure market has also generally improved, as customers have a wider range of communication services and prices to choose from and as new entrants have gained market shares, including mobile virtual network operators. To address the lack of competition in the area of fixed broadband, some countries have adopted variants of functional and structural separation. For mobile broadband, market regulators have continued to intervene to push down mobile termination rates in countries with calling party pays pricing structures. In addition, policy makers have begun to more closely address high international mobile roaming rates that act as a barrier to trade and travel. This was the subject of an *OECD Council Recommendation on International Mobile Services* in 2012 (OECD, 2012b).

In communication markets, *convergence* has increased, along with a growing number of bundled offers such as triple-play offers. Recently, quadruple-play offers have emerged but, so far, only in a couple of countries. There is also growing competition to cable television, satellite and traditional broadcasters from “over-the-top video services” (OECD, 2012c).

Another trend in communication markets is the growth of mobile voice and data traffic. Coupled with the growing number of smart devices, this trend is already growing and will further increase the demand for scarce *spectrum resources*. Since the Seoul Ministerial, new opportunities in spectrum allocation have arisen from spectrum bands that have been freed by the switch from analogue to digital television. Some countries have already allocated this “digital dividend” spectrum. In addition, technologies have been developed that enable devices to use unused spectrum spaces – so-called “white spaces”.

Some policy initiatives have stimulated the deployment of the latest Internet protocol, IPv6, such as its use by governments, but there is a pressing need for further action to accelerate the transition from IPv4 to IPv6. This is particularly important because the remaining unallocated IPv4 addresses have been completely assigned in some regions.

Finally, the OECD has developed a number of *indicators and price baskets* since the Seoul Ministerial to account for new developments in the broadband infrastructure and to improve the ways they are measured. To track the increased importance of mobile network subscriptions, a wireless broadband indicator has been developed. Fixed broadband price baskets have also been developed to compare the price levels experienced by consumers and businesses in OECD countries for fixed broadband services provided over Digital Subscriber Line (DSL), cable and fibre networks.

Important areas for further work

To attain greater coverage of broadband, attention needs to be paid to the deployment of high-speed networks including fibre networks. In particular, policy makers and regulators need to take measures to attract new investment and promote competition. In rural areas, where for example fibre deployment is at a very early stage or is not currently economic, alternatives need to be explored. Investing in fibre-to-the home technology is very expensive and costs per home increase significantly for fibre in less dense areas. Governments have an important role to play in evaluating how best to provide broadband to these areas and in developing an environment conducive to investments in a range of broadband technologies.

A key question for future work that is linked to the deployment of high-speed networks is how to *preserve and encourage competition*. For example, due to its high cost, only one fibre network may be economically viable in some areas, in particular in less dense areas. This is different from a copper environment where it is economically viable for different providers to deploy their own copper networks. In addition, the choice of network topology determines the conditions for competitive physical access. Investment and topology decisions made today will have important effects on the future infrastructure landscape, its economic viability and competition. In mobile markets, there is also further room to encourage competition, especially as far as mobile termination rates and international mobile roaming charges are concerned.

In terms of *convergence of communication services and bundled offers* such as triple and quadruple-play, policy makers and regulators continue to have an important role to play in increasing the transparency of services and in monitoring potential abuses of market power. Developments in over-the-top video services are an important source of new competitive disciplines of pricing and offers from incumbent cable television and satellite providers, just as VoIP (voice over Internet protocol) services introduced greater competition in telephony.

The review of recent developments has shown that the need for an efficient allocation of spectrum is becoming more acute, due to the increase of mobile voice and data traffic, as well as growing markets of smart phones and smart devices, such as sensors and radio frequency identification (RFID) tags. Where spectrum is freed, there should be prompt reallocation, and market forces should be considered in spectrum reallocation and use.

Available evidence suggests that the deployment of IPv6 remains too slow. It is crucial that policy makers decisively encourage the transition from IPv4 to IPv6. Actions to promote this include the upgrading and testing of hardware devices, encouraging the use of IPv6 by websites and developing measures that record progress, including for mobile networks that are more broadly ready for IPv6. In addition, more governments could engage in mandating IPv6 support for public procurement and further encourage the use of IPv6 by businesses and for services to households.

Finally, there is also room for improving the measurement of access to broadband infrastructure, on the demand side. In particular, indicators measuring the adoption and usage of the broadband infrastructure can be further improved and detailed. To this end, the OECD's model surveys for household and business use of ICTs could be revised and further indicators developed. Work at the OECD has been undertaken, through workshops held in Washington (October 2011) and London (June 2012), to improve broadband metrics.

Digital content: Innovating for economic growth

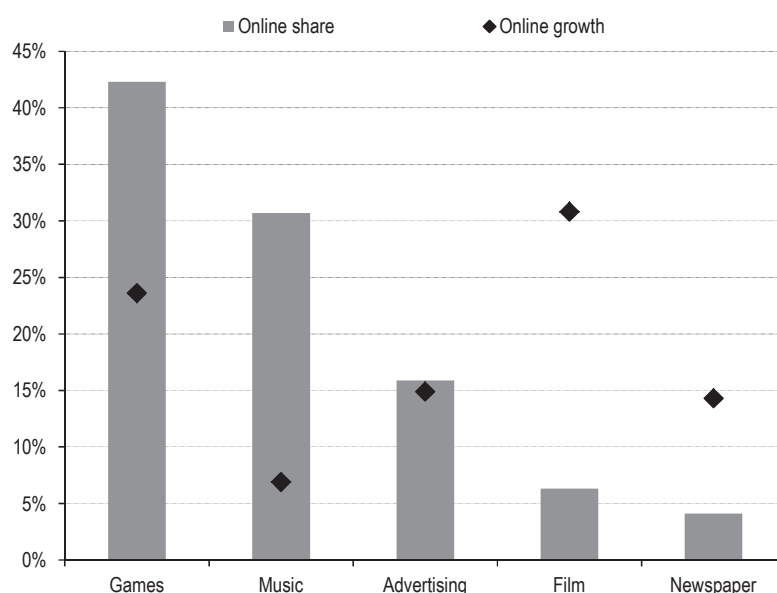
Ministers identified digital content as an important innovation-related area. Here we will first look briefly at market and policy developments in the creation and distribution of digital content, looking also at public sector information and the role of Internet intermediaries. We will also briefly review progress made and point policy makers to new issues that have arisen since the Seoul Ministerial and which could be the subject for further work. We will discuss developments in digital content in detail in Chapter 3.

Markets and policy developments

Digital content, in particular online content⁴ markets, have shown significant annual growth rates, while online revenue shares have increased considerably. Several factors might explain this rapid growth, including increasing digital literacy, declining costs, the growth of the “participative web” (see OECD, 2007),⁵ the increased use of mobile devices to purchase, use and store digital content, and the improvement of the underlying broadband infrastructure.

The games and music content industries have the largest online shares of the overall (online and offline) market, representing at least 30% of total revenues. In terms of 2010 growth rates, the fastest growing online content industry is the film industry, but from a low starting point. The largest market in absolute terms is, by far, the online advertising market, with revenues amounting to USD 70.5 billion in 2010, followed by games with USD 22.7 billion in 2010 (Figure 1.2).

Figure 1.2. Online content share and growth, 2009-10



Source: OECD based on PWC (2011), “Global entertainment and media outlook 2011–2015”, www.pwc.com.

While online advertising has been generating significant revenue, all other content industries, in contrast, are still experimenting to find the best sustainable business model to increase online revenues. Overall, the economic impact of the online content sector is still unclear. Online content continues to have a major impact on traditional value chains in the area of distribution (e.g. music and films). Moreover, the impact on the production side is constantly increasing through, for instance, the volume of user-created content, new forms of advertisement and games.

Since the Seoul Declaration, five areas linked to online content creation, distribution and use have been analysed: *online news*, *virtual worlds*, *local content*, *Internet intermediaries*, and *public sector information*.

While traditional newspaper readership has been declining, the Internet has become an important source of *news provision*. In four OECD countries (Finland, Iceland, Korea and Norway), over 70% of individuals between the ages of 16-74 years read or download news online (OECD, 2010a). TV and newspapers are still the most important sources of information, however, and online news mainly complement offline news. In terms of business models, direct revenues from news content are still small, and a large proportion of revenue is generated through advertising. Users are still reluctant to pay for news services, but this is changing. Overall, the upcoming online news environment creates both opportunities and challenges with respect to the important role of news in societies and democracy in general. Reported positive effects include the large diversity of news online and the independence that the Internet offers for news production and digital entrepreneurial journalism. On the challenges side, some observers caution against a decreasing quality of news and suggest that online newsreaders might doubt the accuracy of the news.

Virtual worlds were ‘hyped’ in the year of the Seoul Declaration (OECD, 2011b). Since then, adoption of virtual worlds has been moderate, while the economic crisis has triggered some consolidation in the sector. More recently, however, there has been evidence of renewed interest in virtual worlds. Overall, there is only anecdotal evidence of the potential social and economic value created by virtual worlds so far.

The analysis of *local content* online has developed from the rationale that societies have a rich cultural heritage and knowledge base that should be distributed much more widely, for the benefit of the whole world. Large parts of *local content* (see OECD, 2001)⁶ are currently only available to local communities, which is why the Internet started to play an important role for these communities. Ways to publish content online include blogs or “crowd-sourced” websites such as Wikipedia. In terms of developments, Wikipedia, for example, has experienced impressive growth over the last years and the number of articles on the site continues to increase at a rapid pace. In addition, the share of English articles only amounted to about 20% of all Wikipedia articles in 2011, while an estimated 27% of Internet users were English speakers. Overall, recent developments indicate that the Internet plays a very important role, from the creation to the distribution of local content and that its largest contribution may consist in giving creators the potential to disseminate their content widely.

Internet intermediaries play a crucial role in delivering online content to consumers, businesses, and governments, since they provide access to the Internet’s basic infrastructure and platforms and enable communication and transactions between third parties. Their main functions are: *i)* to provide infrastructure; *ii)* to collect, organise and evaluate dispersed information; *iii)* to facilitate social communication and information exchange; *iv)* to aggregate supply and demand; *v)* to facilitate market processes; *vi)* to provide trust; and *vii)* to take account of the needs of both buyers/users and sellers/advertisers. The pace of change of Internet services and their technical complexity make it difficult to achieve stable, established business practices. Nonetheless, the available data indicate that these markets are a significant source of growth, innovation and competition. For example, US census data showed that identified Internet intermediaries represented at least 1.4% of GDP value added in 2008. Overall, the past years have shown that intermediaries have contributed to economic growth through productivity gains, lower transaction costs and wider ICT-sector growth.

Public sector information accounts for a significant share of digital content that is created and distributed over the Internet. The OECD (2008a) *Recommendation of the Council for Enhanced Access and More Effective Use of Public Sector Information* (PSI)

that was adopted at the time of the Seoul Ministerial has provided countries with a general framework aimed at increasing economic and social benefits from better access and wider use and re-use of public sector information.

In terms of *policy developments*, governments have emphasised the importance of the availability and accessibility of the underlying information and communication infrastructure - for both fixed broadband and mobile broadband. They have also focused on promoting local content directly. Several initiatives have been put in place to support the digital accessibility of cultural heritage and the creation of new forms of interactive cultural content. Furthermore, governments have promoted the use of digital content in the areas of skills and education. Projects have included the development of high-quality content and the distribution of educational e-books. Finally, they have been increasingly assessing the role of Internet intermediaries and their responsibilities for the action of third-party users of their platforms.

Studies have explored whether, when, to what extent and how Internet intermediaries should help to address issues related to content originated by third parties using their platforms. In the aftermath of the OECD Recommendation on Public Sector Information, countries have initiated several projects promoting the use and re-use of PSI. Examples of projects include large open data initiatives, for example Data.gov in the United States and Data.gov.uk/au in the United Kingdom and Australia, respectively. In addition, governments and the private sector have invested in projects and competitions to find innovative uses for government data. These include, for instance, applications that optimise energy usage in houses or that analyse political data. Finally, various legal developments have taken place in recent years to protect and empower consumers in the purchase, use and storage of digital content. These developments are discussed further in the section on framework conditions, under “consumer protection and empowerment” (and Chapter 4).

Important areas for further work

We need to improve our understanding of the *importance of online content* in the whole economy. Future work should aim at developing new measuring techniques for online content. Several new sources of data such as search-engine data and more Internet-based statistics could be used to improve the measurement of online content. Based on this work, another work stream could look at the impact of online content. New online content services are developing rapidly and are one of the key sources of innovation in the Internet economy.

In this context, there is a need to *analyse upcoming areas of digital and in particular online content creation and distribution*. Interesting developments are taking place, such as the digital book market (e-books) or smart applications (“apps”) and, more generally, digital content for mobile devices. Links to education (e.g. e-textbooks) and consumer protection should be further assessed (see also Chapter 4).⁷ In addition, further work could be undertaken to measure and assess local content, especially in the area of education.

Intellectual property rights (IPR) protection has become an important factor in all digital content areas. Work therefore needs to be undertaken on the economics of copyright. National intellectual property (IP) systems evolve and the changing online environment might call for a review of these systems to promote economic growth. This is particularly relevant in the area of copyright, where business models have undergone and continue to undergo significant changes. In addition, some governments have taken initiatives aimed at balancing copyright and consumer protection regimes (see the section

on consumer protection and empowerment, below, and Chapter 4). A thorough discussion about changes to the copyright regime should be based on sound empirical evidence. So far, however, only little public research has been conducted in this area.

Since the Seoul Declaration, *cloud computing* has increasingly evolved and is now fostering innovation and the creation of new businesses. As such, it has the potential to significantly stimulate content creation, storage and distribution. Policy makers should assess the links between cloud computing and digital content creation, also in the context of encouraging universities, research institutes and governments to work together in R&D networks. Another area that has emerged since the Seoul Declaration is the area of “big data”. Work could be undertaken that assesses the links between “big data” and digital content.

The evolving costs and benefits of *involving Internet intermediaries in advancing public policy objectives* should continue to be assessed. Initiatives involving Internet intermediaries in advancing public policy objectives are already under way, with some quite advanced and others still at an early stage. Further work could be undertaken to advance the policy debate internationally and help address outstanding issues.

Finally, work is underway to review the OECD (2008a) *Recommendation on Public Sector Information* and to obtain a comprehensive picture of where countries currently stand. Another area for further work is the assessment of the potential of big data analytics to enable more efficient and effective use of PSI, through the meaningful integration of datasets from various sources.

Smart applications for a data-driven Internet economy

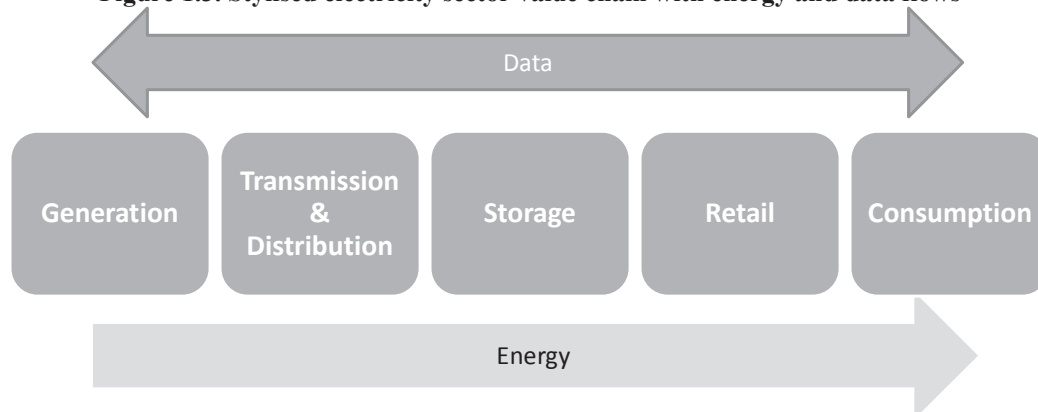
In the Seoul Declaration, Ministers shared a vision of a global information society that connects billions of people, machines and objects. They also identified the need to analyse the economic, social and cultural impacts of emerging Internet technologies, applications and services, such as sensor-based networks. The interconnection of billions of people, machines and objects is one of the main characteristics of a smarter Internet economy, in which big data flows are generated, processed and analysed. Since the Seoul Declaration, work has been undertaken to assess several smart application areas that are based on smart devices such as smart meters in combination with sensors and sensor networks, machine-to-machine (M2M) communication, and big data analytics. These include smart grids, smart transportation, smart buildings and smart agriculture. The following section presents market and policy developments in these areas. It reviews progress made and highlights areas that would benefit from further work. The increasing economic role of personal data, which also falls under this theme, is discussed under the theme of privacy later in this chapter and in Chapter 4.

Markets and policy developments

Work undertaken since the Seoul Declaration suggests that *smarter ICT applications* have an important impact in meeting environmental challenges (see section on green growth as one socio-economic objective for the Internet economy). One of the most promising areas for *smarter ICT applications* is in the electricity sector, in which over two-thirds of global electricity is generated from the combustion of fossil fuels. Smart grids (i.e. electricity networks with enhanced capacities for information and communication), are able to address the major electricity sector challenges along the value chain from energy generation to consumption (Figure 1.3). They are enabling a wider integration of renewable energy sources, promoting low carbon transport options including electric vehicles and inducing structural shifts in electricity consumption.

Most innovative applications for end-users revolve around the smart meter. Over 10% of an individual household's electricity consumption can be cut down simply by providing better information (or providing information *in better ways*). Reductions in “peak demand” can also directly contribute to lowering greenhouse gas emissions since this avoids the connection of additional power plants during peak times. But the benefits are not limited to smart meters. Improved monitoring and networked IT systems can also help limit losses of electricity distribution; such losses represent on average 8% of production worldwide but over 15% in individual countries.

Figure 1.3. Stylised electricity sector value chain with energy and data flows



In the Seoul Declaration, Ministers highlighted *sensor-based networks* as an emerging Internet technology requiring further impact assessment. Work undertaken since then shows that sensors and sensor networks are an important enabler of many smart applications, in particular when it comes to meeting environmental challenges (see the section on green growth, below, and Chapter 3). They significantly contribute to a more efficient use of resources and thus to a reduction of greenhouse gas emissions and other sources of pollution in several fields through smart power grids, smart buildings and smart industrial process control. Whereas studies clearly estimated an overall strong positive effect of smart grids, smart buildings, smart industrial applications as well as precision agriculture and farming, the results for smart transportation were mixed, due to rebound effects. In particular, intelligent transport systems rendered transport more efficient, faster and cheaper, but also increased overall demand for transportation and thus demand for energy. Work conducted also highlighted the crucial role governments have to play to enhance the positive environmental effects of smart applications. Analyses showed in particular that increased efficiency should be paralleled with demand-side management to internalise environmental costs. Finally, the work also highlighted that government programmes demonstrating and promoting the use of sensor technology as well as the development of open standards could help to tap the potential of the technology to mitigate climate change.

The Seoul Declaration also anticipated that networks connecting machines and objects would become widespread. Machine-to-machine networks involve (smart) devices that are actively communicating, using wired and wireless networks. They are not computers in the traditional sense, but are using the Internet in some form or another. Estimations conducted showed that while, at the global level, there were around five billion devices connected to mobile networks in 2012, this may increase to 50 billion by the end of the decade. Analysis also showed that the deployment of M2M-based applications had the potential to contribute to innovation and growth, most notably through smart applications such as smart grids and smart transportation (including electric vehicles).

In terms of *policy developments*, governments have worked in various areas related to smart ICTs since the Seoul Declaration, notably in areas related to greening the economy. A major result of the Seoul Declaration was the OECD (2010b) “Recommendation of the Council on Information Technologies and the Environment”. The Recommendation lays out a ten-point checklist on how governments can employ ICTs to enhance national environmental performance.⁸ The Recommendation was adopted in 2010 and therefore has not yet been evaluated. However, there are various indications that governments are increasingly recognising the positive role of smart applications in greening the economy. In that context, many initiatives have been undertaken to deploy smart grids and smart meters. Some countries such as the United States have responded to the crisis in 2009 with significant investment in smart grids. In addition, some OECD countries have established smart transportation programmes that also promote electric vehicles, smart routing and intelligent transport systems.

Important areas for further work

As the economy becomes “smarter”, many issues are emerging that need to be better understood. These issues, discussed below, include: the emergence of new smart devices such as smart meters, big data (and its implications for privacy, open access to data, etc.), security, competition, employment, and spectrum.

The increasing deployment of smart ICT applications is leading to the generation of *big data streams* that have the potential to become a major resource for enabling new industries, processes, and products, even if many industries, such as energy, are not yet exploiting them. The significant *volume*, *velocity*, and *variety* of these data streams and the possibility of using them across the economy thanks to data analytics, signal a shift towards a data-driven socio-economic model – commonly referred to as “big data”. Work needs to be undertaken to improve our understanding of the ways in which data, as an intangible asset, create significant competitive advantage and drive innovation, sustainable growth and development. With ever more data produced everywhere, so-called “information relating to an identified or identifiable individual” (i.e. personal data) becomes increasingly available, and both the growth of data sources and the increasing ease with which they can be linked and processed, challenge the frameworks on which privacy protection is based. These issues are discussed further below.

The increasing interdependencies between real-world facilities, machines, and objects on the Internet make the Internet a vital infrastructure for society and many smart applications are becoming critical information infrastructures. This raises issues of resilience and security that challenge existing frameworks. The implications for cybersecurity policies are discussed below in the section on the framework conditions.

There are significant barriers to competition in M2M when making use of mobile networks. Given that *subscriber identity modules* (SIMs) are fixed into the device, end-users cannot change mobile operators for the lifetime of the device. This can negatively impact competition, and in turn lead to higher costs for traffic, in particular while roaming. Therefore work could be undertaken to assess policies that allow large scale M2M-deployers, such as car manufacturers, consumer electronics companies and energy companies to access numbering resources.

The connected world is going to greatly influence spectrum policies, as wireless is the most flexible form of connectivity. The life cycle of connected devices, however, can be much longer than is traditionally the case for ICT-enabled applications. Instead of one to ten years, the expected life cycle of connected machines can be up to 30 years. This will change the dynamics around spectrum policy, for which the life cycle of connected devices matters.

The deployment of smart applications promises to increase labour productivity, but may also put pressure on employment when processes that previously required human labour force are increasingly automated. For example, smart meters have eliminated the need for manual meter reading and smart transportation systems based on driverless vehicles may progressively replace taxi and bus drivers. Further work could focus on improving the evidence base needed to better understand the direct and indirect impacts of smart applications on labour markets (see Brynjolfsson and McAfee, 2011).

The framework conditions for the Internet economy

A variety of framework conditions are needed to ensure that the Internet economy functions well and that its potential benefits are fully realised. The following sections focus on the following framework conditions: *i)* cybersecurity; *ii)* privacy; *iii)* consumer protection and empowerment; and *iv)* openness. The first three are essential for trust online. Openness here refers to multi-stakeholder co-operation, access without permission, the free flow of information and freedom of expression. Altogether, these framework conditions are critical components to ensure transparency, cultural diversity and the protection of individual liberties, as well as for enabling innovation and prosperity in the Internet economy. The protection of children online is another framework condition, with links to security, privacy and consumer protection (Box 1.1). Other framework conditions, such as competition and the protection of intellectual property rights were discussed above in the context of communication infrastructure and digital content, respectively.

Box 1.1. The protection of children online

As the Internet permeates every aspect of our economy and society, it is also becoming a daily reality in our children's lives. While it brings considerable benefits to their education and development, it also exposes them to online risks, such as access to inappropriate content, abusive interaction with others, exposure to aggressive marketing practices and privacy risks. At the Seoul Ministerial Meeting on the Future of the Internet Economy in June 2008, Ministers recognised the importance of ensuring a trusted Internet-based environment that offers protection to individuals, especially minors and other vulnerable groups.

Following up on the Seoul Declaration, the OECD organised a joint symposium with APEC in 2009 to explore the issue in more detail. Since then, research has been undertaken to analyse what policies are in place to protect children online, their commonalities and differences, and how to improve the evidence base for further policy making. In 2011, the OECD released a report on *The Protection of Children Online: Risks Faced by Children Online and Policies to Protect Them* (OECD, 2011c). Based on the findings of this report, the OECD Council adopted in 2012 a Recommendation to improve national policy frameworks for the protection of children online through better evidence-based policy making and enhanced co-ordination of efforts between all stakeholders (OECD, 2012d).

Cybersecurity

Over the last 20 years, the OECD has been addressing security of information systems as a fundamental requirement for information technology (IT) and the Internet to contribute to economic and social development. Since the Seoul Declaration, however, there have been significant developments in risks. In addition to a rapid increase in cyber-threats, IT and the Internet have become so essential that our economy and society are dependent on them, not only for their development but also for their basic functioning. Today, the stakes are higher and the challenges greater than before the Seoul Declaration. The international dimension of cybersecurity is attracting greater attention from policymakers, partly because of the inherently global nature of the Internet, but also because of growing cross-border interdependencies.

Markets and policy developments

Current challenges addressed since the Seoul Declaration include work on *botnets*: networks of compromised computers that are remotely controlled by malicious agents. Botnets represent a threat to security and trust in online environments. The OECD carried out an empirical study on the role of Internet service providers (ISPs) in botnet mitigation, based on “spam” data. This study found that the 200 ISPs that hold the lion’s share of the access markets in OECD countries, plus the Russian Federation and five key partner countries (Brazil, China, India, Indonesia and South Africa), harbour over 60 % of all infected machines worldwide. Furthermore, the networks of just 50 ISPs accounted for around half of all infected machines worldwide (OECD, 2010c). ISPs, then, by virtue of their ownership of the physical networks and their consumer-facing position, are well placed to respond proactively to botnets.

Other issues addressed in the Seoul Declaration include *digital identity management* (IdM). Work undertaken since the Seoul Declaration shows that ensuring the protection of digital identities requires both a holistic approach to all policy, law and technology aspects, and the alignment of all the actors concerned. The challenge to developing effective policies for IdM is, on the one hand, to balance privacy and security with the need for usability and interoperability. Another parallel challenge is to respond to the sometimes-conflicting economic and social needs of governments, businesses, and individuals. Government has an integral role to play here in providing assurances for online interactions and protection for individuals.

In terms of *policy developments*, there has been something of a turning point, where governments of many countries are now making the issue of cybersecurity a priority. A new generation of national cybersecurity strategies are approaching the issue from a more holistic perspective, encompassing economic and social aspects as well as sovereignty considerations. They aim to drive economic and social prosperity and to protect cyberspace-reliant societies against cyber-threats. A key challenge of cybersecurity policy making is to pursue these two objectives while preserving the openness of the Internet as a platform for innovation and new sources of growth. Most of these strategies place great emphasis on enhanced international co-operation (OECD, 2012e). To tackle the issues of botnets in particular, a number of countries have established initiatives through which end-users are notified by ISPs when their computer is identified as being compromised by malicious software and encouraged to take action to mitigate the problem (OECD, 2012f).

Many governments have also established national strategies and policies for digital identity management. Their main objectives are to realise e-government, to foster innovation in public and private e-services and to strengthen cybersecurity. Their primary focus is public administration, with expected spillovers in the private sector. These strategies generally adopt an evolutionary approach based on existing offline identity regulations and practices rather than a revolutionary approach, and which touches on policy issues such as registration policies, interoperability, security, and privacy. In 2011, the OECD developed its Guidance on Digital Identity Management for Enabling Innovation and Trust in the Internet Economy (see OECD, 2011d). The Guidance introduces the fundamentals of digital identity from a government policy perspective and provides advice and directions for government policy makers on strategies that support innovation across the public and private sectors, while enhancing security, privacy and trust online.

Important areas for further work

Since 1992, OECD work on security of information systems has been based on a high-level policy framework to help all participants address security challenges for economic and social prosperity. These 1992 Security Guidelines were revised in 2002 to take into account the generalisation of networked interconnectedness (see OECD, 2002). Consistent with the call for assessment of existing OECD security-related instruments in the Seoul Declaration, the guidelines are now being revisited again. Their review is expected to take into account current and anticipated challenges, and to introduce guidance to facilitate their implementation by governments and other participants.

The review will be informed by a broad, open and inclusive consultative process with all stakeholders from member and non-member economies. It will provide a unique opportunity to engage in a global dialogue which can: *i)* advance a common understanding of the importance of cybersecurity for the growth of the Internet economy; *ii)* help make the revised guidelines actionable across varying political and socio-economic environments and improve their relevance to countries at different stages of development regarding Internet access; and *iii)* ensure that the revised guidelines have the widest possible positive impact.

Privacy

In the Seoul Declaration, Ministers explicitly recognised the importance for the development of the Internet economy of protecting privacy and personal data online. They also invited the OECD to assess the application of certain OECD instruments, including the OECD (1980) Guidelines on the Protection of Privacy and Transborder Flows of Personal Data, in light of “changing technologies, markets and user behaviour and the growing importance of digital identities.” This Declaration triggered the launch of a formal review of the 1980 guidelines. The next section presents the market and policy developments surrounding the review process, as well the progress made. It also points policy makers to new issues that have arisen since the Seoul Ministerial, and could be the subject of further work.

Markets and policy developments

Over the last three decades, personal data have come to play an increasingly important role in our economies, societies and everyday lives. Innovations, particularly in ICTs, have impacted business operation, government administration, and the lives of individuals. New technologies and responsible data uses are yielding great social and economic benefits. The volume of personal data being collected, used and stored is vast and continues to grow. Modern communication networks support global accessibility and continuous, multipoint data flows. The potential uses of personal data have increased tremendously as a result of the wide range of analytics that can provide comprehensive insights into individuals’ movements, interests, and activities.

At the same time, the abundance and persistence of personal data have elevated the risks to the privacy of individuals. Personal data are increasingly used in ways not anticipated at the time of collection. Almost every human activity leaves behind some form of digital data trail, rendering it increasingly easy to monitor an individual’s behaviour. Personal data security breaches are common. These increased risks signal the need for more effective safeguards in order to protect individual privacy.

In recent years, there have been several initiatives to address new and elevated privacy risks, particularly in the context of transborder data flows. Examples include the European Union's system of Binding Corporate Rules (BCRs), the Galway Accountability Project on Commonly Accepted Elements of Privacy Accountability, and the Asia-Pacific Economic Cooperation's Cross-Border Privacy Rules (APEC CBPR). At the OECD, cross-border co-operation among privacy enforcement authorities has been a priority, resulting in the adoption of the 2007 Recommendation on Cross-Border Co-operation in the Enforcement of Laws Protecting Privacy.

Privacy frameworks around the world are in flux. Three of the primary frameworks with an international dimension (OECD, European Union, and Council of Europe) have been under review simultaneously, and a fourth (Asia-Pacific Economic Cooperation, APEC) is implementing new cross-border arrangements. Work on domestic privacy frameworks is similarly underway across the globe, from Australia to Brazil, China and the United States.

Consistent with the Seoul Declaration, the OECD has reviewed its Privacy Guidelines. Preparations for the review began in 2010, in the context of the 30th anniversary of these 1980 guidelines. As part of the process, the OECD organised three thematic events, addressing, respectively: *i)* the impact of the 1980 guidelines; *ii)* the evolving role of the individual; and *iii)* the economic dimensions of personal data and privacy. The Organisation also produced two reports, "The Evolving Privacy Landscape: 30 Years after the OECD Privacy Guidelines" (OECD, 2011e), and "Implementation of the OECD Recommendation on Privacy Law Enforcement Co-operation" (OECD, 2011f).

Building on this preparatory work, as well as on the OECD (2011g) *Communiqué on Principles for Internet Policy Making*, the OECD developed terms of reference to serve as a roadmap for the review. The terms of reference articulated a shared view of current issues and approaches, and provided the rationale for further work. In addition to highlighting the changes in the environment, the terms of reference identified those elements which Member countries considered essential to improving the effectiveness of privacy protections.

A multi-stakeholder group of privacy experts ("expert group") was formed for the review process. This group included experts from governments, privacy enforcement authorities, academia, business, civil society, and the Internet technical community. Participants also included representatives of the Council of Europe and the European Union, as well as experts active in APEC.

Important areas for further work

An increasing number of the applications based on the Internet involve personal data, i.e. "information relating to an identified or identifiable individual". As such, they are subject to the policy frameworks that protect individuals in relation to the processing of their personal data. However, the use of big data analytics increasingly challenges the application of these basic principles.

For example, in the paradigm of the 1980 Privacy Guidelines, data that are not related to an identified or identifiable individual fall outside the scope of these guidelines. However, with data analytics, the boundaries between personal and non-personal data are blurring and the application of basic principles, such as the purpose specification principle,⁹ is being challenged. Big data analytics often involve reuses of personal data in ways not envisaged at the time of their collection. They also implicitly rely on the

retention of information for an extended period of time. As such, they raise tensions with existing privacy frameworks, many of which are premised on limits to the collection and storage of information, as well as the confinement of its potential uses. Further work could analyse these issues in greater depth and explore possible avenues to address them.

Consumer protection and empowerment

The Seoul Declaration acknowledges that consumers are important stakeholders in the Internet economy. The Internet provides a platform for consumers to gain easy access to product information, and to purchase a wide variety of goods and services from a broad range of providers. Benefits of the Internet include greater transparency and thus enhanced competition and lower prices. Consumers also have the possibility to buy products from suppliers all over the world. Given these benefits, the Seoul Declaration underlined that governments have an important role to play in ensuring that the Internet provides a secure and trustworthy environment for B2C transactions.

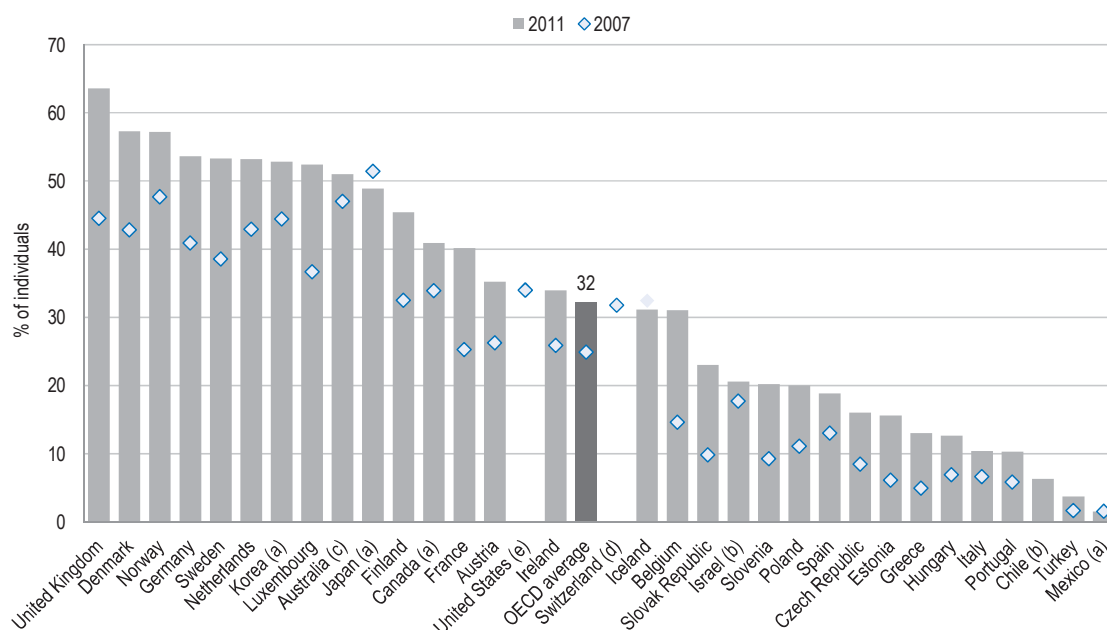
Following the Seoul Declaration, the OECD's Committee on Consumer Policy launched a review of the OECD (1999) *Guidelines for Protecting Consumers in the Context of Electronic Commerce* and is developing policy research and analysis on consumer protection and empowerment in the context of: *i*) online and mobile payments (OECD, 2012g); *ii*) the purchase of digital content *via* the Internet and other ICT channels (OECD, 2013b; 2013c); and *iii*) participative e-commerce. Markets and policy developments in these areas are discussed below, while issues of privacy and empowerment are developed in greater detail in Chapter 4.

Markets and policy developments

Since the Seoul Declaration, the B2C e-commerce marketplace has grown steadily on a global basis. In the OECD area, the average proportion of consumers purchasing products via e-commerce increased from about 25% of individuals in 2007 to 32% in 2011 (Figure 1.4). Asia-Pacific is expected to become the largest B2C e-commerce marketplace by 2013 (representing 34% of total sales share against 31.1% in 2012), followed by North America (31.6% of total sales share in 2013 against 33.4% in 2012), and Europe (29% of total sales share in 2013 against 30.2% in 2012, see EMarketer, 2012). In the United States, e-commerce sales (including retail and selected services) increased by 10.3% between 2009 and 2010, from USD 385 billion in 2009 to USD 424 billion in 2010, (US Census Bureau, 2012). Between 2008 and 2011, the value of Europe's online retail sales nearly doubled, from EUR 118 billion in 2008, to EUR 201 billion in 2011. Some developing economies, such as China and Brazil, are also becoming important economic forces. In China, for example, the volume of online sales increased from CNY 128 billion (about EUR 16 billion) in 2008 to CNY 774 billion (about EUR 94 billion) in 2011. This represents an average growth rate of more than 80% a year.

To a large extent, this is due to online shoppers being increasingly able to access a wider range of products through online and mobile platforms. The range of purchase channels has also increased, in particular for goods and services that are delivered in an electronic format. Purchase channels include traditional e-shops, IP TVs, social media (such as blogs, social networking sites, and other content sharing sites), and cloud computing platforms. With increasing adoption of mobile devices by consumers, such as smartphones, tablets and e-readers, growth is expected to accelerate. Overall, research carried out in the European Union reveals that products¹⁰ sold online are generally offered at lower prices than those sold at points of sales, resulting in estimated consumer welfare gains of EUR 2.5 billion (Civic Consulting, 2011).

Figure 1.4. Individuals who ordered or purchased goods or services on the Internet, 2011 or latest year available (percentage of individuals)



Note: Data from the European Union (EU) Community Survey cover EU countries plus Iceland, Norway and Turkey. They refer to individuals aged 16-74 years, except for Canada (16+), Israel (20-74), Japan (6+) and Switzerland (14+). Data refer to individuals who have bought or ordered goods or services over the Internet, for non-work use, in the last three months (for countries covered by Eurostat). For the rest of the OECD countries, the data refer to individuals placing orders over the Internet in the last 12 months. Information on data for Israel: <http://dx.doi.org/10.1787/888932315602>.

(a) 2010; (b) 2009; (c) 2008; (d) 2005; (e) 2003.

Source: OECD (2012h), *OECD Internet Economy Outlook 2012*, OECD Publishing, doi: [10.1787/9789264086463-en](https://doi.org/10.1787/9789264086463-en).

The growing *participative web* has increased the information available to consumers and their ability to research and compare products online. The use of search engines such as product and price comparison platforms, as well as product ratings and reviews posted by consumers on traditional online platforms and social media, have all been instrumental in empowering consumers. Both businesses and consumers increasingly perceive social media as key platforms for e-commerce, based on friends', family and other consumers' recommendations. With this in mind, businesses have reshaped their advertising and selling strategies.

The development of innovative and easy-to-use *online and mobile payment systems* since the Seoul Declaration has also helped to drive growth. While still relatively low (EUR 62 billion in 2010), the value of global mobile payments is expected to increase particularly rapidly in the near future, up to EUR 223 billion by 2013. Research shows that in the United States, the total transaction value for mobile payments will be USD 640 million in 2012, and should reach approximately USD 62 billion in 2016 as consumer use of smart phones to purchase medium-value products (such as groceries or gas) will continue to increase (EMarketer, 2012). In addition to these new payment systems, businesses have developed a number of loyalty and reward programmes (in particular in the context of digital content purchases), which have helped drive new consumer demand. For example, some businesses enable consumers to purchase products through an annual subscription fee for which they can also get free services (such as free product shipping, or unlimited instant streaming of movies and TV shows).

In terms of *policy developments*, many OECD countries and non-members apply general consumer protection rules (such as contract and distance selling rules) to address B2C e-commerce-related issues, while others have developed more specific e-commerce or mobile commerce regulations. In some instances the rules overlap with other regulations on, for example, misleading and deceptive advertising, telecommunications, privacy, and copyright. In recent years, some countries have taken steps to adapt and/or review their existing frameworks to the evolving Internet economy. For example, in the United Kingdom, in September 2011, the government announced that a new Consumer Bill of Rights would be developed with a view towards clarifying overlapping consumer protection and copyright legislation and regulation, and providing stronger consumer protection, including in the area of digital content. In Canada, the *Competition Act* was amended in December 2010 to include specific provisions to address false and misleading representations and deceptive marketing practices in the electronic marketplace. These amendments have not yet come into force. Taking into account the crucial role that mobile payments increasingly play in the development of e-commerce, some countries, such as Canada¹¹ and Mexico¹² have taken steps to reduce legal uncertainty in mobile payments.

At the international level, the International Consumer Protection and Enforcement Network (ICPEN) calls for enhanced enforcement efforts in this area. In its report on mobile payments, currently being finalised, the organisation points out that mobile payments fall under civil law in most jurisdictions and thus are outside of the authority of most consumer protection law enforcement agencies. Co-operation with other governmental and non-governmental bodies is therefore regarded as crucial to help assist consumers in their civil cases in this area.

Another development being called for by governments and some stakeholders relates to the need to improve consumer access to their own personal data within the context of commercial transactions. Such a tool will help consumers make better informed decisions, by being able to compare prices, get an overview of their transactions history, and/or look at the value of their own data. In the United Kingdom, in 2011, government and industry joined together to launch a voluntary programme, Midata, to help provide consumers with increased access to their personal data in an electronic format (BIS, 2013).

Important areas for further work

Despite the dynamic developments mentioned above, B2C e-commerce has not yet reached its full potential, at both domestic and cross-border levels. It still represents a small share of traditional retail and is relatively low compared to business-to-business e-commerce. Trust in e-commerce remains affected by a number of problems that both businesses and consumers continue to experience. These include: *i*) practical barriers, such as language problems, time required for businesses to set up an effective e-commerce platform, and a lack of interoperability of delivery and payment systems; and *ii*) regulatory barriers, such as complex VAT systems, overlapping frameworks addressing e-commerce issues (including consumer, privacy, intellectual property, telecommunication and competition rules), or regulatory gaps. Such difficulties are perceived to be aggravated in cross-border transactions.

Delivery issues (such as long delivery time periods and non-delivery), inadequate information disclosure, concerns over payment security and misuse of personal data (for example in the context of mobile applications, or apps), as well as inadequate dispute resolution and redress mechanisms, are the major problems being reported by online shoppers in the OECD area, in both domestic and cross-border e-commerce. Some of these issues, such as delivery, may however vary from one region to another, and within regions.

According to a EU consumer market study, 35% of respondents reported concerns over long delivery times in online shopping from another EU country. More specifically, this appeared to be a major concern for consumers in some EU countries, such as Poland (49%), Romania (46%), Bulgaria (41%), and the United Kingdom (40%) while in other EU countries, such as Hungary, Malta and Cyprus¹³, concerns were less significant (Civic Consulting, 2011). Within the United States, while long delivery times remain a concern for some online shoppers, these concerns have been mitigated, in large part, by the availability of premium shipping services and by newer innovations like Amazon's push toward same-day delivery. Another area of growing concern relates to consumer exposure to unsafe products purchased via e-commerce. Such products are, in many instances, counterfeit goods, which are available on professional-looking websites (including auction platforms) (see OECD, 2008b). The protection of consumers in this context is a challenge, in particular for consumer protection and market surveillance authorities that have limited capacity to detect counterfeit products in the online environment.

Openness

In the Seoul Declaration, Ministers stressed the importance of maintaining an open, decentralised and dynamic Internet stemming from globally accepted, consensus driven technical standards that support global product markets and communications. Preserving the openness of the Internet and adopting a multi-stakeholder approach to Internet policy making have been highlighted as key factors for continuing to stimulate innovation and economic growth in the Internet economy.

Openness is also crucial for ensuring transparency, diversity, freedom of expression and the protection of individual liberties, given that many citizens are using the Internet – including blogs, social networks and video-sharing sites – to express their political views and to access information of everyday social, political, and economic concern. By vastly expanding the public's ability to communicate, the Internet has proven to be a platform that can help advance freedom of expression, freedom of association, the free flow of information, the growth of communications, and economic growth. With regard to the Internet and information technology, the free flow of information refers to the right to freedom of expression. It relates more broadly to the commitment to defend and advance freedom of expression, freedom of association and access to information through all media and regardless of frontiers.

Markets and policy developments

Since the Seoul Declaration, work has been undertaken on the following issues related to openness: *i*) open access to government data (sometimes referred to as “open data”) or public sector information (PSI) as discussed in the section above on digital content; and *ii*) open access to broadband networks, including fixed and mobile access networks. Work on open access to broadband networks shows that open access policies, such as mandated regulated access, can be crucial for the development of competition and for enabling investments by new entrants. It highlights, for example, mobile networks as an interesting case, where mobile network operators (MNOs) have been encouraged – either through voluntary agreements or by some type of mandated regime – to host mobile virtual network operators (MVNOs) to improve the level of domestic competition.

To explore how best to ensure continued growth and innovation in the Internet economy, the OECD held a High-Level Meeting in June 2011 on The Internet Economy: Generating Innovation and Growth. A key outcome of the meeting was a Communiqué on Principles for Internet Policy Making. The OECD Council adopted these Principles in December 2011. The

Recommendation on Principles for Internet Policy Making, and in particular its second principle, urges policymakers to promote the “open, distributed and interconnected nature of the Internet” in order to unleash innovation, creativity and economic growth. The Recommendation supports the flexible, multi-stakeholder model of development and management for the Internet, while strengthening international co-operation.

Important areas for further work

The 2011 Council Recommendation on Principles for Internet Policy Making is recent but its essential guiding principles are now well established and increasingly recognised, also in some partner economies. Further work could be needed to apply the principles in different contexts, for example with respect to the evolving role of Internet intermediaries, the use of self-regulatory mechanisms or the development of “back stop” regulatory policies. Drawing on work begun in the follow-up to the Seoul Declaration, further work could aim at highlighting the benefits for partner economies to be derived from policies that ensure greater openness of the Internet. In addition, as noted above, work could be undertaken to examine in greater depth how cybersecurity policy making could drive economic and social prosperity, and protect cyberspace-reliant societies against cyber-threats while preserving the openness of the Internet as a platform for innovation and new sources of growth. The revision of the 2002 Security Guidelines would aim to provide guidance on how to achieve this objective.

Socio-economic objectives for the Internet economy

In the Seoul Declaration, Ministers envisioned that the Internet economy could contribute to innovation and green growth, as well as to development, once the right framework conditions have been established. The following sections highlight two socio-economic objectives that the Internet economy can help achieve: *i)* sustainability; and *ii)* development. The role of the Internet for driving innovation and creativity is discussed in Chapter 3 in the context of digital content (see also section on digital content above).

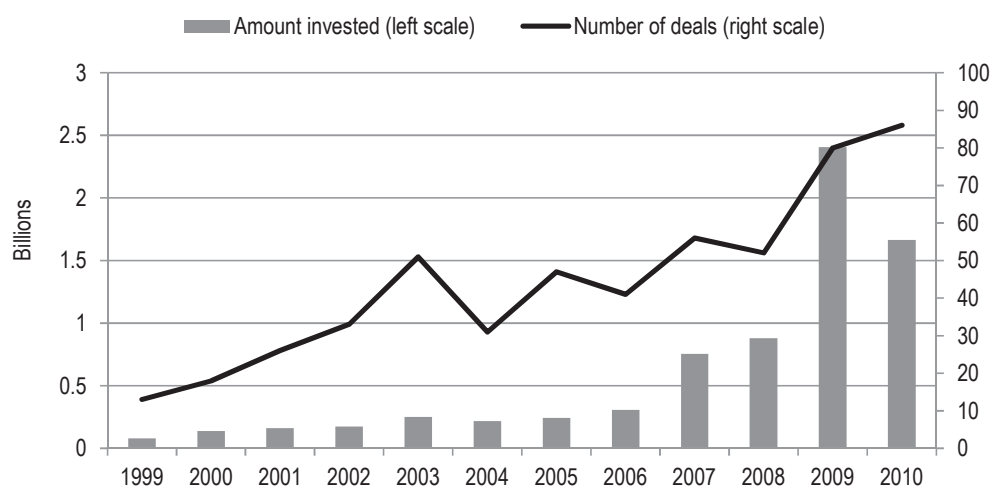
Green growth

The Seoul Declaration highlighted that research on the environmental impacts of ICTs and the Internet and the implementation of appropriate ICT-related policies are essential to tackle global environmental challenges in areas such as energy, transportation, buildings, and agriculture. These environmental benefits are essentially derived from smart applications, (see above section on “smart applications for a data-driven Internet economy”). However, estimates also suggest that ICTs themselves are responsible for two to three per cent of the global carbon footprint and are thus required to become more environmentally friendly. This section presents market and policy developments in “green ICTs”, including smart applications for tackling environmental challenges and ICTs with small environmental footprints. It also presents the role of green ICTs for the creation of green jobs. Finally, this section highlights areas that may require further work. These issues are tackled in greater depth in Chapter 3.

Markets and policy developments

Since the Seoul Declaration, the public and private sectors have significantly invested in green ICTs. Many OECD governments have in particular taken the financial and economic crisis as an opportunity to further deploy green ICTs through their economic stimulus packages, laying a new path for *green growth*. Furthermore, the private sector continues to invest in green ICTs, and venture capital is flowing strongly into ICT-intensive clean technologies (see Figure 1.5).

Figure 1.5. Venture capital investments in ICT-intensive clean technologies¹, 1999-2010
USD billions



Note: This includes seed, first round, follow-on, private equity, and mezzanine investments in firms focusing on the following clean technologies: i) electric & hybrids, ii) electro textiles, iii) electronic, iv) flow batteries, v) lithium-ion, vi) power monitoring & metering, vii) sensors, viii) sensors & controls, ix) smart grid, x) smart irrigation, xi) smart lighting systems, xii) smart metering & control, xiii) software, xiv) software systems, xv) traffic monitoring software, and xvi) ultra-capacitors.

Source: OECD based on the Cleantech Market Insight Database (2011), www.cleantech.com, accessed in September 2011.

In terms of *policy developments*, governments have initiated an important number of green ICT policies and programmes. Countries have engaged in creating awareness of the critical role of ICT innovation in spurring green growth. Many countries have adopted holistic strategies for low-carbon economies that spread across different sectors of the economy. In this context, many initiatives have been undertaken to deploy *smart applications*, such as smart grids and smart meters. The former allow for a more decentralised energy generation and distribution and the latter enable businesses and especially consumers to monitor energy consumption more closely and to adapt their energy usage (see section on “smart applications for a data-driven Internet economy”).

Some countries have also focused on *greening ICTs*, in particular in the public sector, in order to reduce energy consumption by governments. Examples include ICT procurement programmes and programmes that aim at reducing the number of data centres through the use of cloud computing. Furthermore, countries have engaged the private sector to improve energy efficiency. In addition to focusing on energy efficiency, countries have put a great deal of effort into waste management and more efficient e-waste management systems.

One key area that governments have focused attention on is the development of ICT skills and employment in the evolving “green” and “smart” economy because of the potential for eliciting a *double dividend* by both jumpstarting job creation and accelerating the transition towards green growth. As unemployment has remained high in most OECD countries, the economic stimulus packages of many governments addressing the economic crisis have been explicitly aimed at boosting employment, with a significant number having a strong commitment to promote the creation of “green jobs”. Many of these jobs require ICT-related skills (e.g. jobs in R&D, production, deployment, maintenance, and use of green technologies such as “smart” electricity grids and wind energy turbines).

At the international level, the OECD High-Level Conference on *ICTs, the environment and climate change*, held in May 2009, underlined the importance of developing global policy guidelines on green ICTs. It led to the adoption of the OECD (2010b) Council of the Recommendation on Information and Communication Technologies and the Environment which aims at limiting the negative environmental impact of ICT goods and services and at increasing efficiency in other sectors of the economy (enabling impact). The Recommendation was one of the first contributions to the OECD Green Growth Strategy, which was initiated after the OECD *Declaration on Green Growth*.¹⁴

Important areas for further work

Important aims for further work could include: *i)* reducing the direct negative effects of ICTs; and *ii)* leveraging the positive enabling effects of ICTs. In support of the first goal, further work could analyse the environmental impact of the growth of mobile, handheld devices on the one hand, and of cloud computing, on the other. Moving ever more computing power to the cloud allows for “leaner and smaller” devices and could reduce energy consumption significantly. But the increasing number of devices also poses challenges regarding the material and energy in use for the production and use, but also the disposal, of devices.

In support of the second goal, work has been undertaken to assess the positive effects of ICTs in various areas, such as smart grids, smart buildings and smart transportation. However, since this is an area where many new developments are still taking place, work should be continued to assess how to make the best and most efficient use of these ICTs, and of the big data streams they generate (see section on “smart applications for a data-driven Internet economy”). In addition, those smart technology areas that were formerly separated from each other will become increasingly interlinked via the Internet. Work should therefore also analyse these linkages and provide an overview of how policy makers could deal with the convergence of these sectors and how to best use ICTs to maximise their positive effects.

Global participation for development

In the Seoul Declaration, Ministers stated their determination to “support expanded access to the Internet and related ICTs, especially for people in developing countries” and they “recognised the importance of a competitive environment for the successful growth of the Internet economy and the opportunities this can bring for development, particularly for people and regions with the most limited economic means”. The review in the area of the Internet and ICTs for development focuses on: *i)* increasing access to the Internet economy; *ii)* developing skills in emerging and developing countries; *iii)* promoting applications and their use; and *iv)* Internet-related innovation: the case of cloud computing. These issues are discussed in detail in Chapter 5.

Markets and policy developments

In the area of *increasing access to the Internet economy*, significant progress has been made in international interconnection by the deployment of submarine fibre systems, especially in connecting sub-Saharan Africa and in increasing capacity along the transpacific interconnection to South-East Asia. Further progress could be made in improving connections to South America. In terms of national connections, mobile networks seem to be the most promising way to connect the majority of people living in emerging and developing countries. In 2010, 90% of the world was covered by a mobile

signal (International Telecommunication Union (ITU) World Telecommunications/ICT indicators Database). Over the past years, the number of mobile phones and smartphones in developing and emerging countries has increased at a fast pace, which will further drive traffic growth. Overall, the growing number of subscriptions – especially mobile subscriptions – in developing countries is an indication that people and organisations are willing to spend often scarce resources to get access to the Internet and that they see important additional value in being connected to the Internet.

In terms of *applications*, a great number of applications in areas such as agriculture, health, education and mobile banking have been developed over the past years. Evidence shows that users benefitted from these applications, largely because of access to better quality information and services that particularly disadvantaged groups did not have previously. There are also opportunities for greater gains as services improve, possibly also by leapfrogging developed economies that also need to develop applications e.g. on health, given the challenges posed by ageing populations. The gains for disadvantaged groups are probably among the most substantial. However, success was less obvious when it came to the scale of such applications and project sustainability.¹⁵ This was also due to the fact that few initiatives were financially sustainable to allow scaling-up. These initiatives are covered in more detail in Chapter 5.

In terms of *innovative concepts*, cloud computing has gained in importance since the Seoul Declaration and different cloud services are now used in emerging and developing countries. There is, however, room for progress since sometimes poor interconnectivity in these regions still limits the range of cloud-based applications. The major benefit of cloud computing for development is the fact that individuals, businesses and governments can access a wide range of well-developed computing resources that would otherwise not be available in developing or emerging countries. In addition, cloud computing allows them to buy only the quantity that is really needed and avoid the costs of building-up their own infrastructure. Platforms designed for mobile devices seem to be especially interesting for emerging and developing countries, because the deployment of mobile networks is more advanced than the deployment of fixed networks.

Finally, the full potential of the Internet economy can only be tapped if people have the necessary *skills*, if they know how to use ICTs and the Internet for economic purposes and in their social life. Some progress has been made in training people to use specific Internet and ICT-based applications, for instance, by training users to train others.

Important areas for further work

A key message from the 2012 OECD Meeting of the Council at Ministerial Level (MCM) was the renewed emphasis on development. In the area of the Internet economy, the OECD has engaged in development issues through its participation in APEC, the Internet Governance Forum and through workshops on the Internet and ICTs for development.

Demand for work in this domain continues to grow and could be undertaken in several areas. Regarding *communications infrastructure*, progress has been made in deploying submarine fibre cables – but being connected is only the first step. A reliable and competitive offer has to be available in markets before the Internet economy can truly take root. Future work will need to focus on balancing competition and reliability. In terms of the deployment of mobile networks, work could focus on assessing mobile broadband prices in developing countries and ensuring that enough spectrum is made available to enable the further deployment of mobile networks, particularly for

connecting remote and rural areas. When it comes to applications, further innovative mobile applications that can substitute for a lack of administrative and financial structures could be assessed. In addition, more work is needed to ensure that small applications can scale up and that applications are financially sustainable.

Cloud computing can greatly benefit emerging and developing economies that may lack the necessary domestic resources in skills and ICTs. However, access to cloud resources requires the build-up of domestic infrastructure as well as policy frameworks, for example to ensure privacy and security. Standardisation is also key to the further deployment of cloud services in emerging and developing countries. Finally, ICT *skills* have to be developed. Given limited resources, there is a need to assess the relative importance of different types of investment in skills and their costs. The extent to which simple technologies can save on certain training needs also requires further analysis.

Conclusion

Overall, the review of the implementation of the Seoul Ministerial shows that progress has been made in all main policy areas. These areas include: *i)* improving access to the Internet via a high-speed infrastructure; *ii)* enabling the creation and distribution of digital content; *iii)* encouraging the use of smart ICT applications in particular for improving environmental performance (green ICTs); *iv)* promoting consumer protection and empowerment; *v)* privacy and security; *vi)* the openness of the Internet economy; and *vii)* ensuring the global participation in the Internet economy for development.

There is nevertheless room for further work, including to:

- Increase broadband coverage and deploy high-speed networks including fibre and mobile networks.
- Better understand the economics of digital content and copyright.
- Assess the socio-economic role of data as intangible asset and knowledge based capital.
- Increase the common understanding of cybersecurity policy making from an economic and social perspective.
- Communicate the benefits of an open Internet economy beyond OECD countries.
- Tackle the privacy challenges posed by “big data”.
- Address the regulatory barriers to effective cross-border consumer protection.

In addition, as the Internet ecosystem constantly evolves, expert work is needed to continue to monitor, analyse and measure the developing Internet economy and its contribution to economic growth and wellbeing.

Overall, this review shows that the Internet economy has now reached a point where it has become a new source of growth, with the potential to boost the whole economy, to foster innovation, competitiveness and user participation, and to contribute effectively to the prosperity of society as a whole.

Notes

1. The three main building blocks of the Internet economy are listed in chronological order in which they have been addressed by the ICCP (Committee on Information, Communications and Computer Policy).
2. Green ICTs were covered in the second theme along with digital content. But as green ICTs also cover smart applications such as smart grids, green ICTs will be discussed here under “smart applications”.
3. We list the three main building blocks of the Internet economy in the chronological order in which they were addressed by the Information, Computer and Communications Policy committee (ICCP).
4. Online content refers to digital content delivered over the Internet or other digital networks.
5. The concept of the “participative web” refers to an “increased participation and interaction of Internet users who use [the Internet] to communicate and express themselves. [...] It represents an Internet increasingly influenced by intelligent web services based on new technologies empowering the user to be an increasing contributor to developing, rating, collaborating and distributing Internet content and developing and customising Internet applications” (OECD, 2007).
6. Definition of local content: “an expression and communication of a community’s locally generated, owned and adapted knowledge and experience that is relevant to the community’s situation” UNESCO (2001).
7. See also the reports on “Protecting and Empowering Consumers in the Purchase of Digital Content Products” (OECD, 2013c) and “Empowering and Protecting Consumers in the Internet Economy” OECD (2013d).
8. Of relevance to the deployment of smart ICT application are for instance the adoption of life cycle perspectives in ICT and ICT-enabled applications for sustainable management of natural resources and materials in production, use and end-of-life phases as well as the support of research and innovation in green technologies and services.
9. The purpose specification principle states that “the purposes for which personal data are collected should be specified not later than at the time of data collection and the subsequent use limited to the fulfilment of those purposes or such others as are not incompatible with those purposes and as are specified on each occasion of change of purpose”.
10. It should be noted that the study does not cover a number of products including airline tickets and content/music downloads.
11. In Canada, a major review of the payments framework is underway to determine how existing rules should be adapted, or new rules developed, to adequately tackle emerging issues; recommendations were made in that regard to the Minister of Finance in December 2011.

12. In Mexico, a new regulatory framework is being developed by the Mexican Central Bank and the Ministry of Finances, with the participation of the National Banking and Securities Commission to adapt to new mobile payments schemes that have been implemented for the first time in the country in 2011.
13. Note by Turkey:

The information in this document with reference to “Cyprus” relates to the southern part of the Island. There is no single authority representing both Turkish and Greek Cypriot people on the Island. Turkey recognises the Turkish Republic of Northern Cyprus (TRNC). Until a lasting and equitable solution is found within the context of the United Nations, Turkey shall preserve its position concerning the “Cyprus issue”.

Note by all the European Union Member States of the OECD and the European Union:

The Republic of Cyprus is recognised by all members of the United Nations with the exception of Turkey. The information in this document relates to the area under the effective control of the Government of the Republic of Cyprus.
14. The OECD *Declaration on Green Growth* specifically mentions the role of ICTs in meeting environmental challenges: “In order for countries to advance the move towards sustainable low-carbon economies, international co-operation will be crucial in areas such as ... *application of green ICT* for raising energy efficiency (paragraph 2); and “We recognise that special efforts need to be made at the international level for co-operation on developing clean technology, including by *reinforcing green ICT activities ...*” (paragraph 8) (see OECD, 2009).
15. Exceptions include M-PESA for mobile banking and Socialtxt and HMRI 104 Advice for mobile health applications.

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Chapter 2

Access to the Internet via high-speed infrastructure

This chapter looks at developments in access to and use of the Internet through high-speed infrastructure. It addresses a number of issues as set out in the Seoul Declaration and makes policy recommendations and suggestions for further work in this area. Specifically, the chapter provides an overview of progress in expanding access to networks and attaining greatest practical national coverage; creating a market-friendly environment for investment and competition; benefitting from convergence; encouraging the adoption of IPv6; encouraging a more efficient use of radio spectrum; and improving measurement and statistical instruments.

The statistical data for Israel are supplied by and under the responsibility of the relevant Israeli authorities. The use of such data by the OECD is without prejudice to the status of the Golan Heights, East Jerusalem and Israeli settlements in the West Bank under the terms of international law.

High-speed networks that enable access to and use of the Internet provide a platform for the Internet economy. Since the early days of the Internet, the amount of data sent via communication backbone and access networks has increased dramatically. The expansion of data traffic will continue as more and more individuals and companies rely on remote servers (see, for example, on-going developments in cloud computing). In addition, the rapid diffusion of smart mobile devices and applications will drive up the growth of traffic as will the increasing shift in accessing video content through the Internet rather than traditional over-the-air broadcasting channels. Finally, there will be increases in both the number of users and the number of devices connected to the Internet, including the increasing use of machine-to-machine communication.

Figure 2.1 provides an overview of commitments that were made in the Seoul Declaration regarding high-speed infrastructures.

Figure 2.1. Objectives of the Seoul Declaration in terms of communications infrastructure and services

1. Expanding access to networks and attaining greatest national coverage	• “promote ubiquitous access to ICT networks and services” • “expand Internet access and use worldwide” • “ensure that broadband networks and services are developed to attain the greatest practical national coverage and use”
2. Creating a market-friendly environment for investment and competition	• “establish a regulatory environment that assures a level playing field for competition” • “stimulate investment and competition in the development of high capacity information and communication infrastructures”
3. Benefitting from convergence	• “create a market-friendly environment for convergence that encourages infrastructure investment , higher levels of connectivity (...)” • “ensure that convergence benefits consumer and businesses, providing them choices with respect to connectivity, access and use of Internet applications, terminal devices and content, as well as clear and accurate information about the quality and CoS”
4. Encouraging the adoption of IPv6	• “encourage the adoption of the new version of the Internet protocol (IPv6), in particular through its timely adoption by governments as well as large private sector users of IPv4 addresses, in view of the ongoing IPv4 depletion”
5. Encouraging a more efficient use of radiospectrum	• “encourage a more efficient use of radio frequency spectrum to facilitate access to the Internet”
6. Improving measurement and statistical systems	“improving statistical systems to measure the changing access and use of the Internet and related ICT networks by citizens, businesses and institutions in order to provide reliable measures of the evolving uses (...) of the Internet”

Source: OECD based on OECD (2008h), "The Seoul Declaration for the Future of the Internet Economy", *OECD Digital Economy Papers*, No. 147, OECD Publishing, doi: [10.1787/230445718605](https://doi.org/10.1787/230445718605).

In this chapter we will look at the progress made in light of the commitments made in the Declaration, following the structure presented in Figure 2.1.

Greater access to networks and maximum national coverage

Over the last three years, policy makers have strived to meet goals set out in the Seoul Declaration. A number of different factors have led to increased access to the Internet, several of which can be attributed to policies introduced, or strengthened, following the Seoul Ministerial. The next section examines the developments made in terms of increased access to the infrastructure networks and the Internet. Policies at international and national levels that have contributed to these developments will be presented.

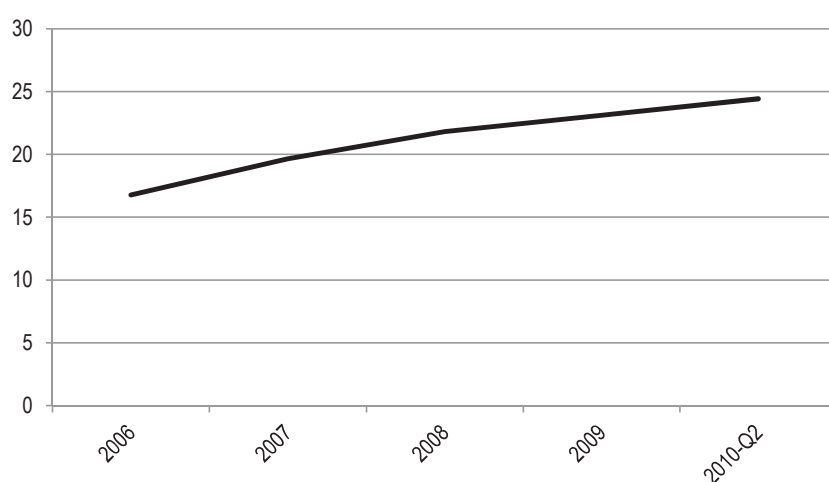
Overview of recent developments

To measure growth in access to the Internet and the deployment of broadband infrastructure, the OECD collects comparative data to report several indicators. These indicators map infrastructure developments from different perspectives. In the following, we will examine selected penetration, coverage and usage indicators for both fixed and wireless access to the Internet.

A measure commonly used for broadband *penetration* is the number of broadband subscriptions. Broadband subscription data provide an indication of the number of connections supplied to users by network operators (OECD, 2008a). Subscription data has the advantage of being available in a timely manner and provides an accurate picture of the number of broadband lines in use in different countries.

Figure 2.2 plots the development of fixed broadband subscriptions in the OECD area. Since the Seoul Ministerial, the number of subscriptions has substantially increased. At the end of the second quarter of 2010, the number of fixed broadband subscriptions had grown by 17.4%, reaching reached on average 24.4 subscriptions per 100 inhabitants. This growth rate is noteworthy as the subscription level in 2008 was relatively high and markets were supposed to be close to maturity at this time.

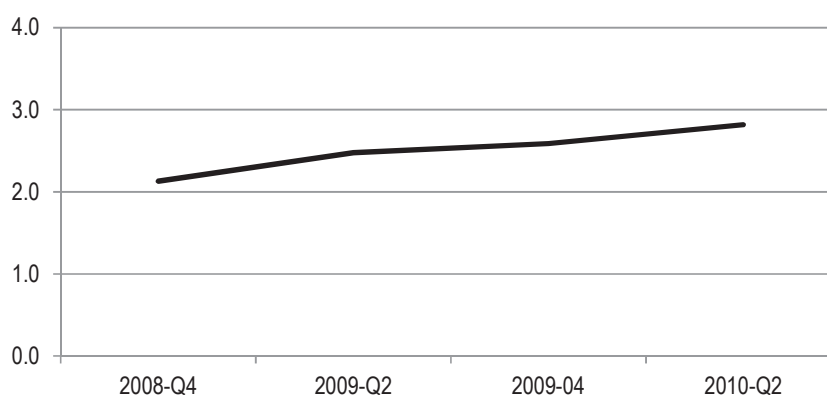
Figure 2.2. Fixed broadband subscriptions in the OECD per 100 inhabitants



Source: OECD Broadband Portal, 2011, www.oecd.org/sti/broadband/oecdbroadbandportal.htm.

Underlying the progress in broadband deployment has been an important increase in quality, especially in terms of the greater capacity of lines that has come with an increase in the rate of deployment of fibre in the local loop. Since the end of 2008, Fibre-to-the-Home (FTTH) and Fibre-to-the Building (FTTB) subscriptions have increased by 33.1%, from 2.13 subscriptions per 100 inhabitants to 2.81 subscriptions per 100 inhabitants (see Figure 2.3). These numbers suggest, albeit with two exceptions, that the overall uptake of FTTH/B networks is still at an early stage (OECD, 2011a). The two exceptions, where uptake has been very significant, are Korea and Japan, where extensive fibre networks have been deployed (17.92 and 14.55 subscriptions per 100 inhabitants). Further significant progress is being made in Northern European countries. The increasing use of fibre networks has raised a set of new issues and seems to be leading to diverging solutions among OECD countries on how to best build and finance FTTH/FTTB networks (see also the next section).

Figure 2.3. Fibre subscriptions per 100 inhabitants

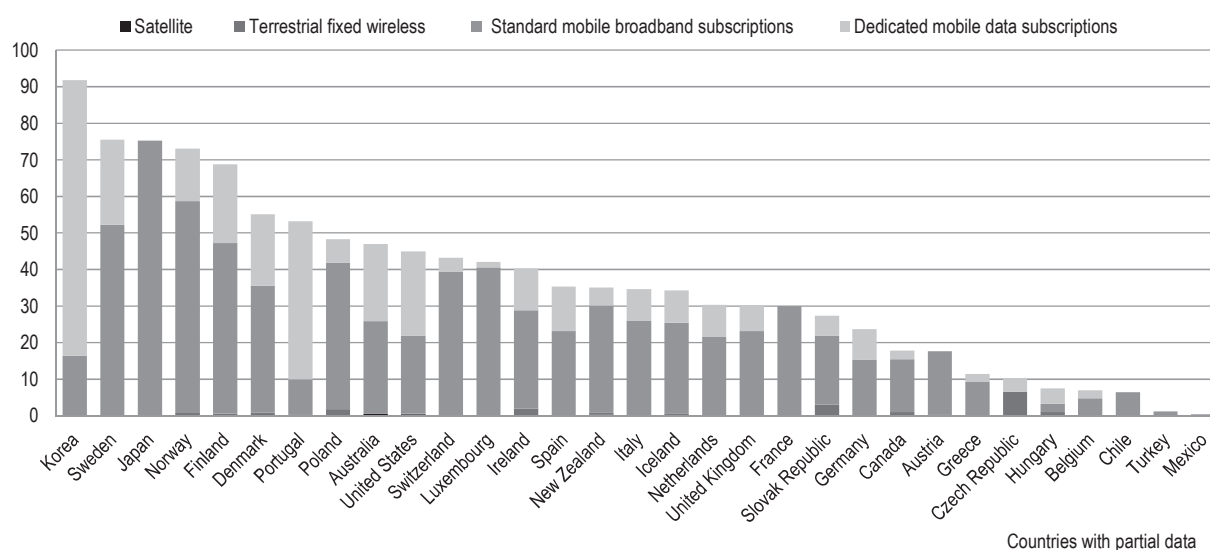


Source: OECD Broadband Portal, 2011, www.oecd.org/sti/broadband/oecdbroadbandportal.htm.

In addition to developments in the fixed market, mobile subscriptions have also accelerated at a very rapid pace (OECD 2010a). In a follow-up to the request to develop new indicators, agreement was reached with Member countries on a definition of an indicator for wireless broadband. Since 2010, the OECD has been collecting data on wireless broadband penetration. Figure 2.4 shows very high subscription rates for Korea, Sweden, Japan and Norway, with over 70 subscriptions per 100 inhabitants. In Korea especially, dedicated mobile data subscriptions are an important part of overall data subscriptions and it is expected that data subscriptions will increase significantly in the OECD area.

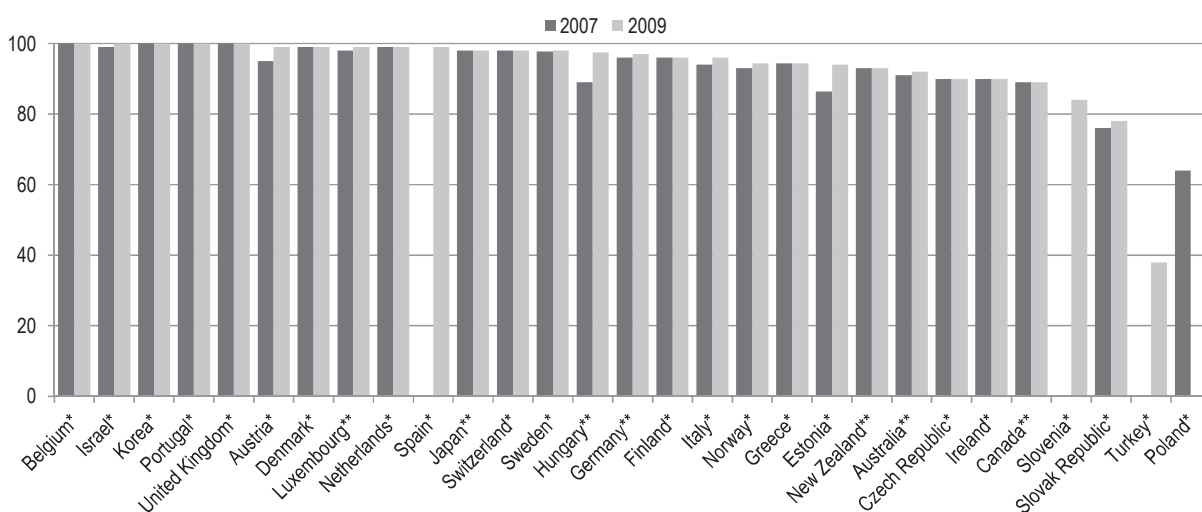
The increasing number of subscriptions is related to the increased availability of high-speed broadband, both fixed and wireless, as well as significant changes that have occurred in the types and availability of terminals supporting mobile broadband.

Figures 2.5 and 2.6 show the development of Digital Subscriber Line (DSL) and 3G (Third Generation) coverage, respectively. In the OECD area, DSL has the most extensive broadband coverage and there has only been a marginal increase in coverage in most countries given that there was already a very high availability in most OECD countries before the Seoul Ministerial (Figure 2.5). Some countries that have a low coverage of DSL lines have seen high rates of growth from 2007 to 2009.

Figure 2.4. OECD wireless broadband subscriptions per 100 inhabitants, by technology, June 2010

Note: Standard mobile broadband subscriptions may include dedicated mobile data subscriptions when breakdowns are not available.

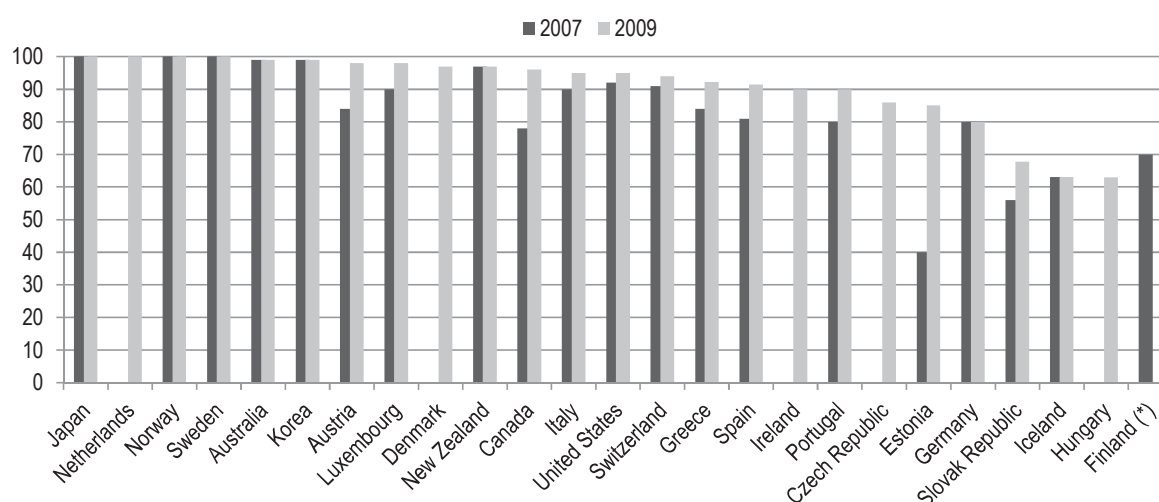
Source: OECD Broadband Portal, 2011, www.oecd.org/sti/broadband/oecd-broadband-portal.htm.

Figure 2.5. Coverage of digital subscriber lines (DSL)

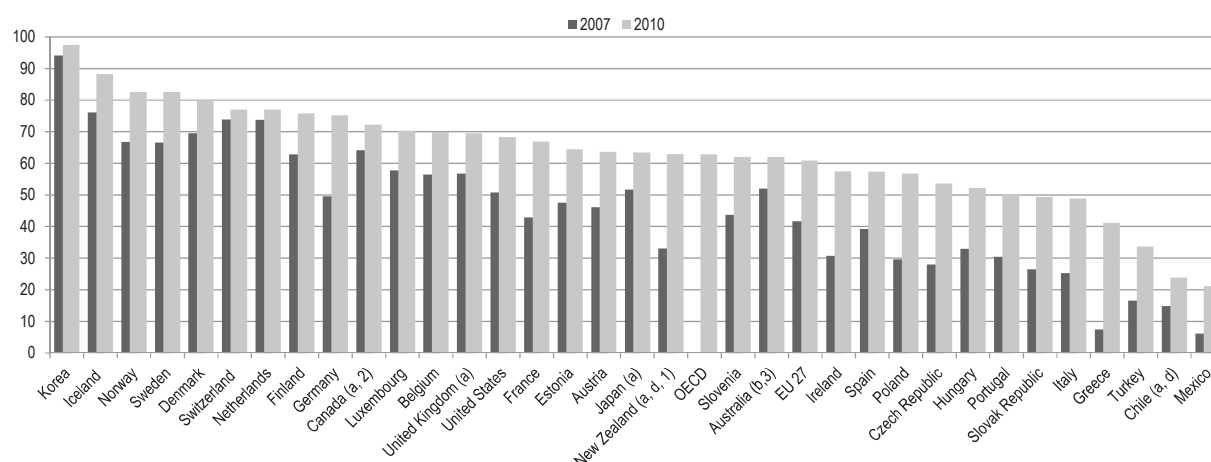
(*) Coverage as a percentage of lines; (**) Coverage as a percentage of population

Source: OECD Broadband Portal, 2011, www.oecd.org/sti/broadband/oecd-broadband-portal.htm.

3G coverage figures show more variance than for DSL, but overall, coverage is also very high (Figure 2.6). At least 18 countries had attained a coverage rate of 90% in 2009 and there have been significant gains in Estonia, Slovak Republic, Canada and Austria.

Figure 2.6. 3G mobile network coverage: Percentage of population

Source: OECD (2011g), *OECD Telecommunications and Internet Statistics*, (database), doi: [10.1787/data-00170-en](https://doi.org/10.1787/data-00170-en).

Figure 2.7. Households with broadband access: Percentage of all households

Notes: a. 2009; b. 2008; c. 2007; d. 2006.

Internet access is via any device (desktop computer, portable computer, TV, mobile phone etc.).

Generally, data from the EU Community Survey on household use of ICT, which cover EU countries plus Iceland, Norway and Turkey, relate to the first quarter of the reference year. For the Czech Republic, data relate to the fourth quarter of the reference year.

Country notes:

1. The information is based on households in private occupied dwellings with access to the Internet. Visitor-only dwellings, such as hotels, are excluded.
2. Statistics for 2001 and every other year thereafter include the territories (Northwest Territories, Yukon Territory and Nunavut). For the even years, statistics include the ten provinces only.
3. Data are based on a multi-staged area sample of private and non-private dwellings, and covers the civilian population only. Data for '2005-06' to '2008-09' includes persons aged 15 years and over except members of the permanent defence forces, certain diplomatic personnel of overseas governments customarily excluded from census and estimated population counts, overseas residents in Australia, and members of non-Australian defence forces (and their dependants) stationed in Australia.

Source: OECD (2011f), "The Future of the Internet Economy: A Statistical Profile", June, available at: www.oecd.org/sti/ieconomy/48255770.pdf.

The figures above show that, on the supply side, developments in OECD countries in terms of penetration and coverage are promising. Broadband provides the platform to support the Internet and services and applications for the Internet economy. While the supply side is important, however, policy makers must also pay attention to the demand side.

A number of sample surveys (see OECD, 2008a, p.14 for more details on methodology) have become an important source of data on the development of Internet access. The development of broadband infrastructure, and in many countries increased speeds, has stimulated the take-up and use of the Internet by households. Data from household surveys shows (Figure 2.7) how the number of households that have accessed the Internet via broadband connections has developed in OECD countries. In 2007, before the Seoul Ministerial, 50% of OECD Member countries had a household access rate of above 50%. Since then, OECD countries with lower access levels have, in most cases, experienced significant growth. In 19 countries, the number of households with broadband access grew by more than 25% between 2007 and 2010. In 2010, more than 50% of households accessed the Internet via broadband connections in 28 Member countries. In 2010, more than 90% of all Korean households used broadband connections, followed by Iceland (86.7%).

Overall, the figures above show that access to broadband networks and the Internet have constantly increased since the Seoul Ministerial in 2008. In the case of fixed broadband penetration and coverage, levels of access are relatively high in a growing number of countries. However, deployment of fibre networks is still at an early stage and there remain open issues regarding the best methods of deployment and financing (see also section two). On the mobile broadband side, 3G coverage is high in the OECD area and data traffic is expected to grow significantly over the next few years (see Figure 2.8). A new technology, Long Term Evolution (LTE) is coming to the market, which can provide higher speed wireless data services with low latency (see OECD, 2010a), with deployment underway, for instance, in Northern Europe, Japan and the United States.

Table 2.1. Recent mobile traffic growth of selected network operators in OECD countries

Operators	Experiences
AT&T	Mobile traffic has increased more than 5 000% over the last three years.
Orange	Cumulated mobile data traffic in four European countries (France, United Kingdom, Spain and Poland) increased fivefold in 2008.
O2	Mobile data traffic was 18 times higher in 2009 than in 2008.
TeliaSonera	Mobile data traffic in their Nordic and Baltic operation increased by 500% in 2008.
Telstra	Traffic on the wireless network doubles every eight months.
T-Mobile (USA)	Mobile data traffic increased by 45% from Q2/09 to Q3/09.
Vodafone (Europe)	Data traffic has increased more than 300% over the last two years.

Source: OECD (2010a), “Mobile Communication Developments in the OECD Area”, OECD, Paris, available at: www.oecd.org/sti/ieconomy/48459973.pdf.

Policies and programmes to promote greater access

The previous section described the developments in access to broadband infrastructure since the Seoul Ministerial. This section focuses on policies and programmes, at both international and national levels, put in place that contributed to achieving the objectives of the Seoul Declaration.

International and national broadband plans

Since the Seoul Ministerial, a number of countries have developed national broadband plans, while the economic downturn gave an impetus to the development and implementation of these plans. This was because of increased recognition of the impetus for productivity and growth this could provide. High-speed broadband was viewed as “shovel-ready”, that is, could be implemented rapidly (OECD 2011a, 2011b). During this period, many countries have developed and started to implement national broadband plans.

The plans have a number of different objectives. On the supply side, objectives include coverage, speed and technology objectives. In terms of coverage, governments have specified concrete coverage targets within a certain time frame, some of which are linked to providing certain minimum levels of speed. In some cases, targets are linked to specific technologies. Very high, close to ubiquitous coverage targets have been set, for example, by Australia (93% by 2016), European Union Member States (100% basic broadband access by 2013 (see Box 2.1), Israel (broadband included in universal service), Japan (100% fibre by 2015) and Turkey. Attaining a broader coverage in rural and remote areas is at the heart of many plans.

Most of the enhanced engagement countries identified by the OECD have also set coverage targets in their national broadband plans (see Table 2.2). Compared to OECD targets, however, those have been set at a lower level, reflecting less mature levels of deployment and access. Several aim to attain ubiquitous access.

For many countries, the coverage goals of broadband plans are focused on extending access to rural and remote areas. A couple of countries aim at accessing some remote areas via wireless broadband connections, e.g. Australia, Estonia and Ireland. Other countries link coverage obligations to spectrum auctions. In Germany, for example, operators who have succeeded in obtaining 800 MHz spectrum in the auction had to commit to extend rural coverage by 2016. In addition, the operators have to cover first rural areas with fewer than 5 000 inhabitants before they can start using the acquired frequencies in more densely populated areas.

In terms of speed, many national broadband plans have defined some minimum down- and upstream speeds. For 2010, the United States set a download speed target of 100 Mbps and an upload speed target of 50 Mbps for at least 100 million households. Germany set the target of a download speed of 50 Mbps for 75% of all households by 2014. Denmark has the target that all households and enterprises should have access to 100 Mbps or more in 2020. Some countries such as Japan or Singapore have even committed to a nationwide ultra high-speed FTTH access infrastructure for every household.

Box 2.1. Broadband targets and policies in the European Union: The Europe 2020 Strategy and the Digital Agenda for Europe

The Europe 2020 Strategy has emphasised the importance of broadband deployment “to promote social inclusion and competitiveness in the European Union” (EC, 2010b). Objectives set in the Europe 2020 Strategy are directed at both coverage and speed. They include *i)* bringing basic broadband to all Europeans by 2013; *ii)* ensuring access for all Europeans to Internet speeds of above 30Mbps by 2020; and *iii)* ensuring that at least 50% of European households subscribe to Internet connections of above 100Mbps. To achieve these objectives, the EU Commission adopted a Broadband Communication 2010 laying out the framework of actions that include the following instruments:

- **Promotion of investments and reductions of investment costs:** Several actions are proposed, e.g. *i)* the reduction of civil engineering costs (through the co-ordination of policies and town planning rules as well as through regulatory requirements for operators to disclose their local infrastructure), and *ii)* support of broadband deployment by public financing.
- **European Union broadband finance instruments for high-speed broadband networks:** Instruments include funding through the European Union financial framework, public-private-partnerships, the development of new finance instruments (e.g. guarantees, equity type instruments) and a more efficient use of structural and rural development funds for broadband deployment in rural areas.
- **Spectrum policy programme:** First Radio Spectrum Policy Programme of the European Commission, proposed to the European Parliament and Council in 2010. The programme sets up regulatory principles and policy objectives and defines concrete actions. Among others, it calls for an inventory and monitoring of needs for spectrum and calls for improvements in standardisation. In addition to these measures, EU Member States are asked to set fully operational plans for their national broadband strategies.

Sources: EC (2010a, 2010b, 2010c, and 2010d).

Table 2.2. Broadband targets in the EE5

Country	Objective
Brazil	By 2014 to have 30 million fixed broadband connections, including homes, businesses and cooperatives, plus 100 000 telecentres
Russia	By 2010 to have 15 lines per 100 population By 2015 to have 35 lines per 100 population
India	By 2010 to have 20 million broadband connections
China	By 2014 to raise broadband accessibility to 45% of the population
South Africa	By 2014 to have 5% broadband penetration (min. 256 kbps)
Indonesia	No awareness of a national broadband plan

Source: Based on OECD (2011b), National Broadband Plans”, *OECD Digital Economy Papers*, No. 181, OECD Publishing. doi: [10.1787/5kg9sr5fmqwd-en](https://doi.org/10.1787/5kg9sr5fmqwd-en)

Acknowledging new technological developments in the area of high-speed broadband, some national broadband plans emphasise specific broadband technologies. For instance, Luxembourg, Singapore and Japan have committed to fibre deployment. Australia decided to invest in a fibre-to-the premises network to 93% of households and businesses and to deploy next generation wireless and satellite services for the remaining 7%.

On the demand side, an important objective of many plans is to spur adoption by households and businesses. The level of adoption depends on multiple aspects such as digital literacy, hardware availability (e.g. laptops, smart phones) as well as the availability of infrastructure and its quality. Demand factors, such as availability of online applications, digital content and e-Government services, also play a role. Policies to promote adoption differ significantly from supply side policies. So far, a number of national broadband plans (e.g. Hungary, United Kingdom and Norway) address measures in several areas of demand. As far as digital literacy is concerned, concrete measures include, for instance, training courses to acquire sufficient skills and communication strategies highlighting the benefits of being connected to the Internet. Overall, policy measures in national broadband plans intended to increase adoption levels are often ‘softer’ than supply side policies aimed at network deployment and performance. In addition, it is often more challenging to measure adoption levels (see below).

Overall, broadband plans have contributed and will further contribute to the Seoul Declaration objective of expanding access to the Internet in OECD countries and likely in most EE5 countries. National plans have been playing a major role in the deployment of broadband in remote and rural areas. They have further contributed to higher speed objectives in countries and some countries have committed to deploy nationwide FTTH broadband access. In addition, national broadband plans have also focused on the demand side, i.e. on the Seoul Declaration’s objective to increase the use of broadband.

However, governments have, in general, been less active in pushing forward with policies that would give a significant boost to demand, for example, by stimulating the availability of smart electricity grids, or investing in smart transport networks, and so forth. Although the metrics of broadband coverage, subscribers and usage are important, it is less clear how countries are monitoring the implementation of their national broadband plans and their impact. Peer reviews of national broadband plans could be a very useful instrument to identify good practices and the experience gained in different broadband plans to increase the effectiveness of public spending in the area of broadband network deployments, Internet access and use.

Next Generation Access (NGA) networks

Many countries have engaged in increasing deployment of NGA networks with a focus on fibre networks. In some countries, the deployment of these networks is well advanced. Examples include Japan and Korea and some of the larger cities in some countries such as France, Italy, Portugal, Slovak Republic, Sweden and the United States. However, overall investments are in some cases not proceeding as fast as policy makers would like and coverage of most urban areas in OECD countries remain to be developed (OECD, 2011c). Table 2.3 gives an overview of the state of fibre deployment in 2010.

Table 2.3. State of FTTH/FTTB deployment in 2010

	Homes passed ^a	Main topology ^b	% Main topology	Largest party deploying
Australia	40 000	PtMP	100%	Government
Austria	63 000	PtP	90%	Municipalities
Belgium	3 750	na	na	Incumbent
Canada	280 000	PtMP	na	Incumbent
Chile	20 000	PtMP	na	Incumbent
Czech Republic	195 000	PtMP	100%	Altnets ^c
Denmark	795 300	PtP	85%	Utilities
Finland	544 000	PtP	100%	Incumbent(s)
France ^d	1 383 588	PtMP	55%	Incumbent
Germany	560 000	PtP	70%	Utilities
Greece	5 000	PtP		Altnets
Hungary	215 000	PtMP	100%	Incumbent
Iceland	33 000	PtP	80%	Utility
Ireland	16 900	PtP	95%	Altnets
Italy	2 245 500	PtP	100%	Altnets
Japan	46 000 000	PtMP	80%	Incumbent
Korea	16 000 000	PtMP	100%	Incumbent
Luxembourg	56 000	PtP	100%	Incumbent
Mexico	100 000	PtMP	na	Incumbent
Netherlands	662 500	PtP	90%	Incumbent
New Zealand	50 000	PtMP	80%	Altnets
Norway	381 700	PtP	100%	Utility
Poland	90 265	PtP	95%	Utility
Portugal	1 470 000	PtMP	100%	Incumbent
Slovakia	615 000	PtMP	95%	Incumbent
Slovenia	310 000	PtP	100%	Altnets
Spain	412 500	PtMP	100%	Incumbent
Sweden	1 464 500	PtP	90%	Altnet
Switzerland	212 500	PtP	90%	Incumbent
Turkey	200 000	PtP	na	Altnets
United Kingdom	138 000	PtP	na	Altnets
United States	19 676 200	PtMP	na	Incumbent

Notes: a) Homes Passed are potential premises to which an operator has the capability to connect in a service area, but the premises may or may not be connected to the network. Typically new service activation will require the installation and/or connection of a drop cable from the homes passed point (e.g. fibre-pedestal, hand hole, chamber, utility-pole) to the premises, and the installation of subscriber premises equipment, including an ONT (Optical Network Termination) device at the premises. b) Topologies can be either point-to-point (PtP) or point to multipoint (PtMP). c) Altnets are alternative network operators other than the traditional Incumbent operator. d) Data exclude the Numericable network.

Source: OECD (2011d), “Broadband Bundling: Trends and Policy Implications”, *OECD Digital Economy Papers*, No. 175, OECD Publishing, doi: [10.1787/5kghtc8znnbx-en](https://doi.org/10.1787/5kghtc8znnbx-en), based on IDATE for the FTTH Council Europe, FTTH Council North America, FTTH Council Asia-Pacific, European Communication Committee¹

Investing in fibre-to-the-home technology is expensive. The costs per home increase for fibre in less dense urban areas, and even more so for rural areas. Countries have taken very different approaches to investment in fibre networks and to define the terms of competition. In countries such as Australia, the government is deploying fibre networks, whereas other countries such as the Netherlands prefer a market-driven approach. Investment decisions taken today will have an important effect on the future infrastructure landscape and competition. The two main deployment topologies that are currently used, Point-to-Point (PtP) and Point to Multipoint (PtMP), differ significantly in the competitive physical access conditions that they provide. Physical access alternatives are significantly more limited when PtMP is deployed. Consequently, this limitation in a PtMP network might limit future competition. In this context, policy makers need to assess potential solutions in order to ensure competition is maintained.

For the future, policy makers have two main challenges:

1. Policy makers could continue to encourage investments in high-speed networks including fibre networks. Thereby, policy makers should carefully evaluate the advantages and drawbacks of the different approaches that are currently taken. A comparison of best practises and results of the different approaches on an international level can provide a very valuable decision support tool for the approach to be taken.
2. Policy makers should ensure that adequate competition is maintained during and after the deployment of the fibre networks. Only attractive offers for consumers and business ensure the take-up of the networks and further innovation. Increased take-up, in turn, spurs further investments in networks as they determine return on investment.

Creating a market-friendly environment for investment and competition

Recent developments²

Since the Seoul Ministerial, competition in telecommunication markets has increased and has been beneficial for households and consumers. The share of new entrants in total PSTN (public switched telephone network) subscriber lines has risen and new entrants in the PSTN line subscriber market have gained market share since 2008, as shown in Table 2A.2 in the Annex. In addition, prices have fallen and new technologies and services have emerged. Competition outcomes have been more marked in fixed broadband markets, which are still growing in the OECD area though at a slower pace than in the previous decade. Competition remedies such as local-loop unbundling have been very successful in some broadband markets and have increased the number of providers available for consumers and businesses, especially in urban areas. Most OECD countries also have at least one cable operator that provides end-to-end infrastructure competition, although in some cases not on a nationwide basis.

The private sector has accounted for major investments in broadband infrastructure. However, policy makers are assessing whether governments have to support the deployment of NGA networks in less populated areas to ensure broadband availability. Fibre “local loop” network deployment has been very limited to date, with the exception of Japan and Korea (see above), and some urban areas of other countries (e.g. Portugal, the Slovak Republic, Sweden and the United States). The business case for fibre deployment is in many cases not compelling for operators that are reluctant to face the significant investments involved. Policy makers are concerned that the pace of deployment of these networks may not meet their policy objectives.

In the area of wireless networks, smart phones have triggered a major development that has driven the competition in higher speed mobile services. Mobile broadband services are expected to grow over the coming years and to contribute significantly to operators' revenues. Mobile operators continue to invest in upgrading their networks and thus provide a means for effective competition to fixed networks for traditional voice communications. Mobile networks complement fibre network services and, for some services, can compete with fibre broadband services. An indicator for this recent development is the number of households that have given up their traditional PSTN line and have not replaced it by a fixed broadband service. Another indicator is the boost of mobile broadband, which has rapidly overtaken fixed broadband in terms of penetration in many OECD countries. While clearly valued by users in its own right, mobile broadband plays an important complimentary role to fixed networks in improving connectivity and communications uptake.

Mobile operators have been successful in building revenue during the economic crisis. Most large operators have maintained market shares and some of them are expanding their footprint to non-OECD countries. Mobile virtual network operators (MVNOs) provide competitive pressure to established operators. A number of them are offering new services, previously only offered by more established providers, such as pre-paid smartphones, thus entering new markets and segments, and promoting competition. Number portability remains a key instrument of competition as it allows users to switch to the providers and the services of their choice, while keeping their existing number and thus reducing switching costs.

Policies fostering competition

Next generation access networks – fibre and cable networks

In terms of next generation network deployment, countries are following a number of different approaches. Key factors being taken into account include how to stimulate investment and competition in order to achieve social and economic benefits, bearing in mind the challenges of deploying fibre ever closer to users.

Australia, New Zealand and Singapore are investing public funds in deploying next generation access networks. The EU issued “Community Guidelines for the application of State aid rules in relation to rapid deployment of broadband networks” (EC, 2009). India is also considering a proposal, from its regulatory authority, to publicly fund a national broadband network. While the use of public funding is quite common, in itself, these countries have introduced changes in market structures associated with this investment. In order to foster competition, associated with publicly funded networks, some countries are implementing some form of vertical separation between the wholesale and retail service provision. A further group of countries have introduced functional separation for fixed broadband networks, not always in association with public investment, such as in Sweden and the United Kingdom, while this is being proposed in Japan. In a further group of countries, public investment is associated with “open access” networks, such as fibre backbone networks. This is the case for proposals in Chile and India. In another group of countries seek to enhance competition via unbundling of legacy copper networks or shared use of new fibre infrastructure. Finally, a number of countries mainly rely on infrastructure competition, such as Canada, Korea and the United States (OECD, 2011c). In these countries, public investment has primarily been used for expansion, and network upgrades in rural areas, sometimes with open access requirements but little use of unbundling.

Overall, as mentioned above, fibre-based networks (either based on FTTH or as an upgrade of current cable television networks) are not always being deployed at the speed, or with the geographic coverage, policy makers would wish. In terms of competition, it is important that policy makers set up a clear regulatory framework where terms and conditions are transparent and reliable and where the longer-term implications for investment have been assessed. Current decisions may have a large impact on the future competition environment, as the upgrade to fibre is expected to have an impact over the next decade. If policy makers decide to support the deployment of next generation networks, they need to pay careful attention in order to provide the right incentives, not to interfere with private investment nor distort competition where it can be avoided, while preserving the regulatory certainty for the players involved. Overall, they need to strike a balance between four key objectives when relying on public investments: improving connectivity, increasing competition, stimulating innovation and growth and increasing social benefits (OECD, 2011c, p. 8)

An important source of competition in high-speed broadband markets and substitutes to fibre networks are cable networks in countries with widespread cable coverage. Since the Seoul Ministerial, considerable investments in cable networks in some countries have been undertaken. The DOCSIS 3.0 (Data Over Cable Service Interface Specification) fostered this development. In terms of competition within the cable market, local-loop unbundling has been mandated by few countries but not effectively implemented due, to a large extent, to technical challenges. A couple of countries (e.g. Canada) have regulated the market by imposing bitstream obligations on operators. These wholesale remedies may provide an arguably inferior solution in terms of service innovation and independence for new entrants. However, given the architecture of cable networks, it is not clear whether any technically and economically practical solutions exist that permit full unbundling.

The mobile communications market rates and roaming

Challenges to competition remain in many mobile markets that can act as a barrier to greater use of mobile services in supporting the Internet economy, especially in areas such as trade and travel.

For example, mobile termination rates³ can represent a significant element of the price paid by users in providing retail services of mobile-to-mobile or mobile-to-fixed calls – in countries with a “calling party pays” system. An example may be the high cost of termination on an international call from a user in a developing country to the mobile phone of a user in an OECD country.

These *termination rates* can be a barrier to competition and to lower prices for calls if they are set at a much higher price than the actual costs. High mobile termination rates (MTRs) impede operators from acting independently from competitors, prevent flat-rate mobile plans and thus might decrease the usage of mobile phones. In addition, they provoke market distortions in the fixed and mobile communication markets by creating transfers from the fixed to the mobile communication market (OECD, 2011c). In order to improve competitive conditions in the mobile communication market, regulators in countries with “calling party pays” pricing structures, have continued to intervene to push down termination rates toward long run incremental cost.

The high prices for *international mobile roaming* services are a further concern for all stakeholders. Since the Seoul Declaration, policy makers and regulators have begun to address high international mobile roaming rates more closely. In 2009 and 2010, the

OECD prepared three reports on this issue, proposing a range of options. These included, among others, the empowerment of consumers by raising awareness about substitutes, greater price transparency and increased levels of international co-operation. They also included the possibility of wholesale and retail price regulation, should other measures not result in lower prices paid by consumers (see also OECD, 2010b; 2010c; and 2011e).

Most regulators and international organisations have been engaged in addressing the insufficient competition in mobile roaming markets. The EU, in 2007, issued the European Roaming Regulation, which was subsequently amended and expanded. It enforced retail and wholesale price regulation and included other measures to improve transparency and consumer empowerment. Other entities in multiple regions have also been engaged in discussions, e.g. APECTEL and APT (Asia), IIRSA/CITEL (Latin America), AREGNET (Arab countries). In addition, the governments of Australia and New Zealand have started the evaluation of bilateral roaming services (OECD, 2011c), with a view to examining the lack of competition in these markets. However, prices for both mobile voice and data services remain high and further action to reduce prices of international mobile roaming is required.

Benefitting from convergence

Recent developments

Since the Seoul Ministerial, convergence in communication markets has increased, along with an ever-growing number of bundled offers. Many DSL providers offer VoIP (voice over Internet protocol) and IPTV (Internet protocol television) services, challenging the market position of traditional PSTN offers as well as other television broadcast platforms. Cable operators, in turn, offer high-speed broadband and data services, including voice services. Convergence has encouraged an important level of cross-platform and cross-services competition, because several technology platforms provide similar services. For instance, the advent of Skype and other free VoIP services has added competition and new services to the traditional fixed and mobile voice market (OECD, 2011c).

Along with trends in convergence, the number of bundled services (double, triple or quadruple play) is constantly increasing. In 2010, broadband services were overwhelmingly sold as mixed bundles, i.e. consumers had the choice between bundled services and stand-alone offers (OECD, 2010b). Triple-play offers are available in many countries now, although not always in remote areas, as these offers depend on network upgrades by operators in those areas. Quadruple-play services are just emerging and are, so far, only offered in some countries. A couple of challenges, such as arrangements that have to be made with mobile operators, expected revenue decreases from packaged mobile and fixed offers (instead of selling them separately) and limited options for incumbents to provide these offers due to their market power and respective regulations hamper a fast roll-out of quadruple-play. However, some mobile providers in France, the United Kingdom and others in Austria, Germany, the Netherlands, Portugal and the United States have launched quadruple-play offers (OECD, 2011c).

Besides these bundled offers, new devices such as the Apple's iPad, iPhone or Amazon Kindle trigger new ways of bundling. These devices use mobile services and have a commercial relationship with mobile operators. Smart devices have often been bundled with the offer of one mobile operator, which raised concerns regarding competition (OECD, 2011c). In addition, sponsored connectivity models are arising where device

providers, such as Amazon for the Kindle, negotiate with telecommunication operators and where the end-customer of the device has no direct contact with the connectivity provider. In the case of a Kindle, the customer pays for the service through the content purchased.

Bundling can have benefits and drawbacks to consumers and businesses. On the benefit side, bundled offers are usually less expensive than the sum of stand-alone services. In addition, customers profit from the fact that several services are offered by one provider only. On the negative side, however, the complexity of bundles makes a comparison of different offers difficult so there is a lack of market transparency. Compared to stand-alone prices, customers are confronted with the task of mapping different services from different operators to prices. Furthermore, bundles can lead to consumer lock-in, making it harder to switch providers. Finally, there are some fears that bundling may enable abuse of market power if some incumbent operators are able to cross-subsidise some services in product bundles, while new entrants usually have difficulty if they are not able to provide all the components of a bundled offer.

Roles for policy makers and regulators

The increasing convergence of fixed and mobile phone, broadcasting and Internet services create the need for a coherent regulatory approach. In terms of organisational structures of regulators, it could be reasonable to merge different regulators. Some countries such as Mexico have already merged telecommunications and broadcast regulators.

In terms of bundled services, a major aim of policy makers and regulators is to ensure that competition is fostered. To achieve this aim and to overcome the drawbacks of bundled services, policy makers have a role in *i)* increasing the transparency of services and pricing; *ii)* avoiding customer lock-in; and *iii)* avoiding the abuse of market power by large operators.

In the first area of increased transparency, policy makers and consumer protection agencies should encourage service providers to “provide more information on the characteristics of packages they are selling and to make prices clear and understandable” (OECD, 2011d, p. 4). To date, however, offers are still promoted in a rather non-transparent way and policy makers should require providers to indicate clearly all services and costs of the bundled offers. Websites that compare offers of different providers are a helpful tool for customers to compare the different packages and service characteristics. In some countries such as Belgium and Ireland, regulators have already sponsored dedicated websites. In other countries, private websites fulfil the role of comparing different broadband offers. However, only a few of them compare sophisticated bundled offers and it is not always clear whether some offers receive preferential treatment in bundling rankings.

To avoid customer lock-in, regulators should ensure that customers of bundled services can switch providers quickly and easily (see, for example, the Body of European Regulators for Electronic Communications [BEREC, 2010] report on “best practices to facilitate consumer switching”). Policymakers have a role in educating customers about their rights and switching procedures. The possibility of number portability for fixed and mobile phone numbers further reduces perceived switching costs of customers. Furthermore, regulators could prohibit automatic initial contract renewals.

Finally, in the area of a potential abuse of power, “regulators and competition authorities may need to work together to address lingering problems with market dominance, noting that operators face varying levels of competition in different areas of the country” (OECD, 2011d, p. 4). Options to avoid those abuses include extended unbundling regulations or investments in separated infrastructure. In some countries, operators have already determined that bundles with a broadcast component could lead to abuse of market powers by large operators. In Luxembourg, for instance, the incumbent’s bundled offer does not include television services.

Encouraging the adoption of IPv6

On 3 February 2011, the Internet Assigned Numbers Authority (IANA) distributed the last blocks of IPv4 addresses to the Regional Internet Registries (RIRs). The growth of Internet connections in recent years along with a fast growing number of different Internet-connected devices such as smart phones have contributed to this run-out.

The Internet community first addressed this issue in 1992 with the establishment of the RIRs, who implemented Classless Interdomain Routing and strict guidelines to issue addresses. Technological fixes like Network Address Translation further delayed the complete exhaustion and its impacts. Today, it is likely that a market for IPv4 addresses will emerge, where those who came too late can buy new addresses, which may extend the life of IPv4 by a few more years. However, the deployment of IPv6 is seen as the only sustainable and long-term solution to ensure that the Internet continues to be a driver of innovation and growth (see OECD, 2011c, Chapter 5).

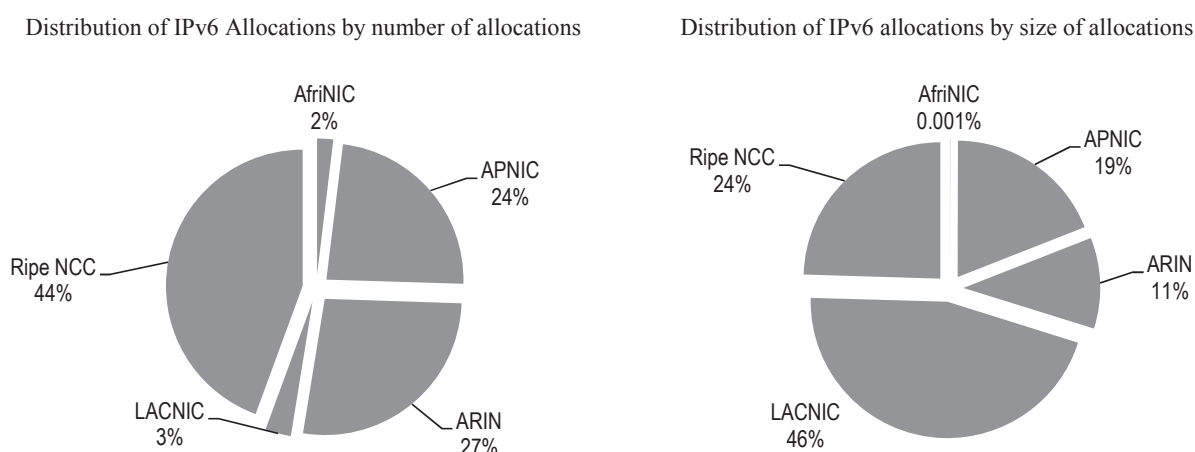
IPv6, a newer version of the Internet protocol, uses 128-bit addresses and has a quasi-virtual address space of 2^{128} (3.4×10^{38}) IP addresses (compared to 4.3×10^9 for IPv4). Furthermore, it has several advantages over IPv4 such as improved quality of service (QoS), authentication and privacy qualities and better support for the mobile Internet (OECD, 2011c, Chapter 5).

In the Seoul Declaration, ministers recognised the need to deploy IPv6 in a timely manner. They committed to “encourage the adoption of the new version of the Internet protocol (IPv6), in particular through its timely adoption by governments as well as large private sector users of IPv4 addresses, in view of the on-going IPv4 depletion”.

Recent developments in the deployment of IPv6

With IPv4 exhaustion fast approaching, deployment of IPv6 has become a pressing issue. Current IPv6 deployment can be mapped in several ways. In the following, we will discuss developments in allocation⁴ of IPv6 addresses and the use of IPv6 by Internet users.

Following the same procedure as for IPv4, IANA allocates IPv6 address space to RIRs based on needs. Figure 2.8 (left) shows the regional distribution of IPv6 allocations by the number of allocations. In the first half of 2010, OECD countries accounted for 74% of total IPv6 allocation.

Figure 2.8. Distribution of total IPv6 allocations by the RIRs, August 2010

Source: OECD (2011c), *OECD Communications Outlook 2011*, OECD Publishing, doi: [10.1787/comms_outlook-2011-en](https://doi.org/10.1787/comms_outlook-2011-en)

In terms of size, the Latin American Market in 2010 had the largest share of IPv6 allocations, which could be interpreted as a reflection of a keen interest in deploying IPv6 on a large scale. However, this high number is more likely to be due to an extremely large allocation by the National Internet Registry of Brazil in 2008 (see Table 2.4). Other large size allocations were assigned to European and Asian telecommunication operators as well as to Departments of Defence. For example, a/19 blocks have been allocated to the operators France Telecom and Deutsche Telekom and a/20 blocks to providers in Italy, Japan and Korea and the Australian Government Department of Defence.

Table 2.4. Selected large IPv6 allocations

Prefix	Company	Date
2804:0000::/16	NIC Brazil	2008/11/28
2003::/19	Deutsche Telekom, Germany	2005/01/13
2a01:c000::/19	France Telecom, France	2005/12/30
2a01:2000::/20	Telecom Italia, Italy	2006/05/16
2400:2000::/20	Softbank BB IPv6 Network, Japan	2005/07/12
2400:0000::/20	Korea Telecom, Korea	2005/06/01
2401:6000::/20	Australian Government Department of Defence, Australia	2007/08/10
2a01:1000::/21	Telekomunikacja Polska S.A.	2006/02/01
2608:0000::/22	United States Department of Defense (DoD), United States	2008/05/06
2a00:2000::/22	British Telecom, United Kingdom	2007/08/29
240e:0000::/24	China Telecom	2010/05/20
240a:0000::/25	Japan NIC	2010/03/02
2a02:1000::/26	German Federal Ministry of the Interior	2009/11/16
2a02:1400::/26	B2 Bredband AB, Sweden	2010/03/01

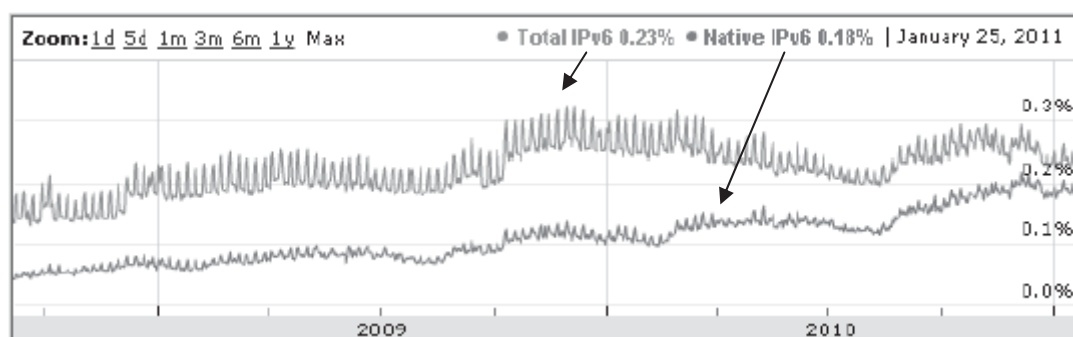
Source: OECD (2011c, Chapter 5), *OECD Communications Outlook 2011*, OECD Publishing, doi: [10.1787/comms_outlook-2011-en](https://doi.org/10.1787/comms_outlook-2011-en). Extracted from RIR IP Whois databases.

Overall, the size of IPv6 allocations could give some indication of the planned scale of IPv6 deployment. Since 2007, the demand for IPv6 addresses has surpassed IPv4 demand and the RIRs had made 6 000 allocations in the first half of 2010. However, some operators and heavy users have so far largely driven allocations.

The allocation numbers in the preceding paragraphs have given some indications of the general interest in deploying IPv6, but they do not show the actual usage. To check the current state of deployment, it is thus crucial to monitor the usage of IPv6.

Figure 2.9 shows the availability of IPv6 connectivity among users of Google. Google checks whether it would have been possible for a user who still uses IPv4 to have used IPv6 to reach the site. On 25 January 2011, for example, only 0.23% of Google users that accessed the webpage via an IPv4 or IPv6 connection were capable of using IPv6 and an even lower percentage (0.18%) were capable of using native⁵ IPv6 connections (see also Colitti et al., 2010). It is also worth noting that the percentage varies during the week, with higher percentages over the weekend. This indicates that IPv6 is more available for households than for users at workplaces. Over the years 2009 and 2010, IPv6 connectivity has been growing, but the percentage is still *very low*, especially in light of this year's IPv4 exhaustion.

Figure 2.9. Availability of IPv6 connectivity among Google users



Source: OECD based on Google IPv6 Statistics (2011), www.google.com/ipv6/statistics.html, accessed in February 2011.

Overall, despite the foreseeable exhaustion of IPv4, the deployment of IPv6 has been very slow. Substantial challenges have to be overcome to achieve the transition from IPv4 to IPv6, as IPv6 is not downward compatible. The relative use of IPv6 has to be increased significantly in a short period of time to satisfy future foreseeable demand. Important investments have to be made in order to upgrade, for example, the hosts, support systems and networks. For instance, the take-up in mobile network upgrades has been very limited to date (see also OECD, 2010a). Overall, all stakeholders of the Internet economy have to be mobilised.

Although in the Seoul Declaration ministers called for a timely adoption of the new Internet protocol in 2008, developments have not been very promising during the last three years. In the next section we will discuss policies that have been put in place since the Seoul Ministerial and ways to move forward to a quicker adoption of IPv6.

Policies and programmes to encourage the deployment of IPv6

In 2008, the OECD made recommendations for a policy environment to spur the timely deployment of IPv6 (OECD, 2007). Recommendations included: *i)* Working with the private sector and other stakeholders to increase education and awareness and reduce bottlenecks; *ii)* demonstrating government commitment to adoption of IPv6; and *iii)* pursuing international co-operation and monitoring IPv6 deployment.

Since then, governments have engaged in initiatives to promote the deployment of IPv6. Table 2A.3 in the Annex provides an overview of national policy initiatives.

In terms of broadband infrastructure readiness, Slovenia made a very remarkable commitment. In its strategy for the development of broadband networks, all networks have to be IPv6 ready to enable future innovation and development in many areas of the Internet economy such as e-health, e-commerce and e-government. It also seems to be the only country to have commercially available IPv6 over mobile networks.

In addition, most governments in OECD countries have undertaken awareness-building initiatives. These include the publication of IPv6 activities (e.g. Japan), IPv6 taskforces (e.g. Austria, Ireland, Italy, Japan, the Netherlands), IPv6 educational programmes and training (e.g. Japan, Korea, New Zealand) and public-private partnerships (e.g. Denmark, Korea, Norway). Furthermore, some countries such as Denmark, Germany and Japan have engaged in IPv6 pilot projects and testing platforms.

Several countries have also focused on government adoption of IPv6. As governments are important users of networking equipment, it is supposed that an early adoption by governments has an important multiplier and spillover effect on businesses and households. The United States, for example, have set a timeline for the use of IPv6 on public servers by 2012. The Czech Republic, Denmark, New Zealand, Netherlands and Switzerland, for instance, have mandated IPv6 support in public procurement contracts. Australia and Germany have set up strategies for a comprehensive adoption of IPv6 by the transition of government agencies to IPv6 and a centralised IPv6 public administration, respectively.

Overall, many initiatives are in place. However, IPv6 deployment is currently still too slow, given that the final IPv4 blocks have been distributed to RIRs. While government initiatives are in place for the use of IPv6 by government agencies, it is crucial that the adoption of IPv6 gains momentum. Upgrading existing networks, Internet Exchange Points, endhosts and routers, webpages and so forth, is further a key issue to spur IPv6 adoption.

Overall, the following actions should be taken: *i)* Encourage the upgrade of routers, firewalls, middleware and support systems and ensure that these devices are tested regarding the proper support of IPv6s; *ii)* develop measures to make fixed and mobile broadband networks ready for IPv6; ensure IPv6 readiness for new networks; *iii)* mandate IPv6 support in public procurement; *iv)* encourage the support of IPv6 by websites; *v)* encourage the use of IPv6 by businesses and households; *vi)* expand the use of IPv6 by governments and *vii)* pursue international co-operation and further monitor the state of IPv6 deployment.

Encouraging a more efficient use of radio spectrum

Mobile voice – and especially mobile data – traffic are expected to increase significantly in the coming years and further fixed-mobile convergence is taking place. In addition, the market for smart devices, including sensors and radio frequency identification (RFID) tags is growing. These trends will increase the demand for scarce spectrum resources and require more efficient ways to allocate and use spectrum. Ministers in the Seoul Declaration committed to “*encourage a more efficient use of radio frequency spectrum to facilitate access to the Internet*”.

Since the Seoul Ministerial meeting, new opportunities in spectrum allocation have arisen from the release of spectrum resources that have been freed due to the switchover from analogue to digital TV. This spectrum, which is located between 200 MHz and 1 GHz, is known as the “digital dividend”. It is especially attractive and considered a premium spectrum, since it provides an optimal balance between distance coverage and transmission capacity (EC, 2007) making it particularly suitable for rural and remote areas.

Some countries have already undertaken the switchover and further countries are planning to do so over the next months. The EU, for example, has advised its Member States to perform the transition by 2012. By 2010, 12 OECD Member countries have undertaken the transition (see also OECD, 2011c). Table 2A.4 in the Annex provides information on spectrum allocation processes in the OECD area since 2008, the year of the Seoul Declaration. Most of the countries that have been allocating or are planning to allocate digital dividend spectrum have relied or will rely on a spectrum auction generating significant public revenues.

For instance, Germany not only linked certain obligations, such as the deployment of broadband in remote areas, to the auctions in 2010 but also generated around USD 6 billion for different spectrum bands with the auction of the 800 MHz band, generating more than 80% of these revenues. Japan allocated spectrum in the 1.5 and 1.7 GHz band for the recent mobile technology LTE (long-term evolution). The Australian Communications and Media Authority has released a spectrum of several bands for different purposes: Spectrum in the 3.6 GHz band has been allocated for wireless access services in regional and remote areas. For the deployment of public telecommunication services in specified remote areas, spectrum in the 2 GHz band has been made available. In addition, the 2.5GHz band is being considered for mobile broadband access services and Australia plans to auction the digital dividend spectrum, comprising the range of 694-820 MHz in 2012.

These examples, as well as those set out in Table 2A.4, show that many countries have engaged in the allocation of additional spectrum and in a more efficient management of spectrum since the 2008 Seoul Declaration. Due to the growth of mobile services and mobile data traffic and the fact that smart devices such as sensors and RFID tags are gaining momentum, the efficient allocation of spectrum will become even more important in future.

It is therefore crucial that countries continue to engage in the following:

- Carefully evaluating the potential uses of spectrum that will be released and balancing multiple factors regarding investments, competition issues and consumer choice before decisions are taken on defining the particular use of released spectrum.

- Increasing the efficiency of spectrum management (e.g. through avoiding too narrow bands) to spur the further growth of the mobile communication sector and smart ICTs.

Improving measurement and statistical systems

In the Seoul Declaration, Ministers agreed on “*improving statistical systems to measure the changing access and use of the Internet and related ICT networks by citizens, businesses and institutions in order to provide reliable measures of the evolving uses and the impact of the Internet*”. This commitment to improved measurement is directed towards all areas of the Internet economy. This is why each report of the Seoul follow-up work contains a section on measurement, indicators and the improvement and further development of statistical systems. In the following paragraphs, we will present developments in improving measurement and statistical systems in the area of broadband infrastructure.

Indicators measuring the Internet economy can be grouped into *readiness indicators*, *intensity indicators* and *impact indicators* (OECD, 2009a). Readiness measures include indicators that capture “the technical, commercial and social infrastructure which is necessary to support ICT use” in the Internet economy (OECD, 2009a, page 2). Intensity indicators deal, amongst others, with the volume and nature of the Internet and ICT use, while impact indicators measure the economic and social effects of the Internet.

Most indicators that measure the deployment of a high-speed broadband infrastructure can be grouped into the category of readiness indicators measuring the readiness and deployment of the infrastructure and into the category of intensity indicators that measure the availability of broadband to households, business and government.

Development of new indicators

Since the Seoul Declaration, a new and important indicator has been developed: the *wireless broadband indicator* (OECD, 2010d). It can be assigned to the group of readiness indicators. The underlying rationale was to account for the increasing importance of mobile network subscriptions with data services, which were not included in OECD or ITU statistics at the time.

In historical OECD broadband subscriber statistics, two wireless technologies: *i*) satellite; and *ii*) terrestrial fixed wireless have always been included but have contributed only a small percentage to overall numbers. Mobile network subscriptions with data services were not included, as transmission speeds were low at the time and as it was difficult to estimate the usage, especially for standard subscriptions.

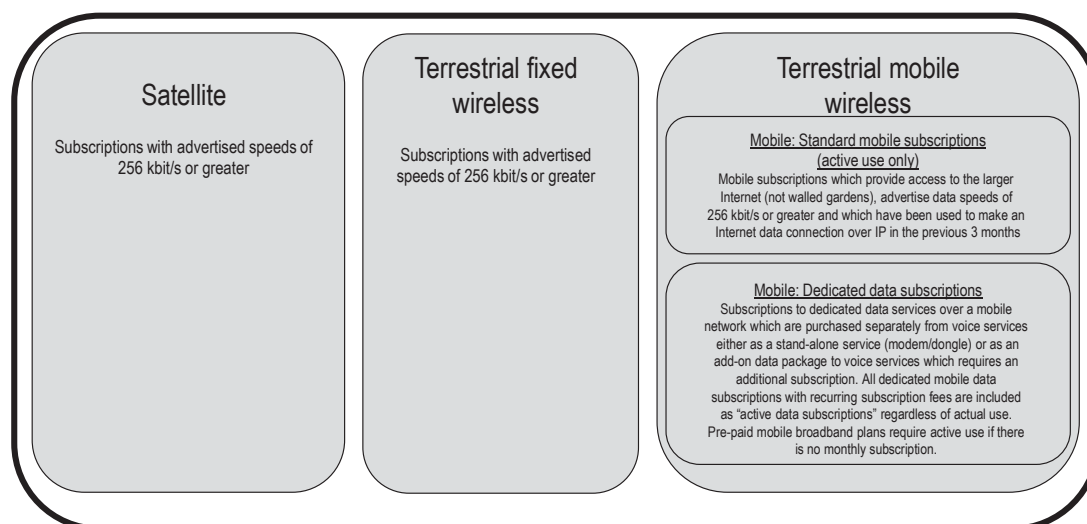
The upgrading of 3G networks provides higher transmission speeds, while further upgrades to new platforms, including LTE, are under way, facilitating the development of improved mobile broadband data access.

To account for these changes, the OECD developed a new wireless broadband methodology, based on an expert meeting and several rounds of contributions from and discussions with Member countries.

Figure 2.10 provides an overview of the elements of the wireless broadband indicator. It consists of satellite, terrestrial fixed wireless and terrestrial mobile wireless. Only connections with advertised speeds of at least 256 kbits/s are considered.

The terrestrial mobile category has two sub-categories: standard mobile subscriptions and dedicated data subscriptions. The first category contains mobile subscriptions that provide access to the broader Internet (and not only to walled-garden content) and which are considered as being in active use, i.e. which have been used to make an Internet data connection over IP in the previous three months. The second category comprises dedicated data subscriptions that are purchased separately from voice services, either as stand-alone packages or as add-on data packages. The OECD now publishes two broadband indicators: a fixed and a wireless broadband indicator.

Figure 2.10. Components of the wireless broadband indicator



Source: OECD (2010d), "Wireless Broadband Indicator Methodology", *OECD Digital Economy Papers*, No. 169, OECD Publishing, doi: [10.1787/5kmh7b6sw2d4-en](https://doi.org/10.1787/5kmh7b6sw2d4-en).

With the development of this new indicator, the OECD has a means to measure and to compare the growing wireless broadband connection markets of different countries.

Besides the development of the wireless broadband penetration indicator, the OECD also developed new pricing baskets for fixed broadband. The fixed broadband baskets enable comparisons to be made between the price levels experienced by consumers and businesses in OECD countries for fixed broadband services provided over DSL, cable and fibre networks. Overall, ten baskets were created for five different speed tiers and two usage levels in each tier (high and low). In addition, the existing PSTN baskets, mobile baskets and leased line baskets have been updated to reflect changing usage patterns and improve the methodology (see also OECD, 2009b). An area for future work is the creation of a new wireless broadband price basket.

At national levels, several countries have engaged in developing new indicators and measuring new relationships between several indicators since the Seoul Declaration. Table 2.5 provides a non-exhaustive list of examples. On the supply side, Denmark, and Germany, for example, created indicators to monitor the deployment and availability of broadband infrastructure. Another example is the NTIA's national broadband map in the United States⁶ and ANACOM's information system on broadband infrastructures in Portugal. Some countries are also evaluating the relationship between the deployment of broadband infrastructure, economic (e.g. productivity, firm-level growth) measures and social benefits.

Table 2.5. Examples of new broadband indicators at national level (supply and demand side)

Country	Development of new indicators
Australia	• New data collections in areas of specific government policy interest such as media use in homes, the move to an online environment • Development of new mobile wireless broadband data collection and measurement of benefits of broadband and of fibre infrastructure
Austria	• E-government feedback forms were recently centrally developed, in order to get feedback from users and to evaluate the e-government services
Canada	• Data retrieved on residential broadband availability by technology platform and by speed. Using the following sub-indicators: - Percentage of households with access to broadband by technology - Percentage of Internet subscriptions - Average Gigabytes (GB) downloaded per month per user
Denmark	• Availability and take-up of high-speed broadband access • Use of cloud computing in enterprises, as an add-on to the annual surveys carried out by Statistics Denmark • Study on impact of digitisation on the productivity of Danish firms
Egypt	• ICT indicators portal in Egypt (2008): currently includes more than 160 indicators that monitor the use of ICT by different educational and economic levels • Collaboration with ITU to enhance ICT measurement in the Arab states and facilitate building a unified and comprehensive database for Arab ICT indicators • MCIT has developed an alternative and more representative price index for ICT service. Thus allowing to review and validate the contribution of ICT to real GDP
France	• Measurement of number of citizens with high-speed network (FTTH or FTTB) availability
Germany	• New IT-based instruments were introduced to monitor the broadband infrastructure development
Ireland	• The work programme includes modelling the market for broadband services, economic and social aspects of broadband availability and adoption, effects of electronic communications services on company performance and implications of behavioural economics for economic regulation • How much value users place on incremental improvements in particular service attributes such as listed download speed or contention • Broadband demand and supply • Market dynamics: propagation of innovative features pricing of services contracts • Measure effects of broadband on firms and consumer behaviour
Italy	• Examine the influence of the social-territorial-cultural factors on the adoption and the use of innovation
Netherlands	• Development of projects related to online trade, location-based services by using mobile phones, measuring actual use of broadband, etc. • First results expected in 2011
Norway	• Study on impact of ICT on the productivity of firms • Developed a methodology to measure ICT capital in firms • Compare the impact of ICT capital in firms in the service and manufacturing sectors
Portugal	• Three new surveys: Use of ICT in hospitals (2006), use of ICT in hotels (2008), use of ICT by individuals 10 to 15 years old • Adoption of new indicators for uses that are coming more prevalent than traditional fixed access and web browsing, e-science, e-commerce etc.
Slovak Republic	• E-government platform. To serve the individual requirements and needs. (also answers questions of perception, willingness, trust and, the expectations of users and the satisfaction of citizens and businesses with former electronic services).
Spain	• Analysis of demand for telecommunications and Internet Society services in households. To obtain: attitudes toward new technologies, cost/benefit ratio of ICTs and ICT devices, computer and Internet skills and level of skills, equipment and services
Sweden	• To seek relations between firm-level growth and their use of broadband and their innovation practices

Source: OECD (2011e), "International Mobile Data Roaming", *OECD Digital Economy Papers*, No. 180, OECD Publishing. doi: [10.1787/5kg9zb6716r3-en](https://doi.org/10.1787/5kg9zb6716r3-en).

On the usage side, countries are increasingly assessing the take-up and uses of households and businesses. Australia, for instance, collects new data in the areas of media use in homes and the move to an online environment. Ireland is evaluating how much value users place on incremental improvements in particular service attributes, such as listed download speed or contention as well as the effects of broadband on companies and consumer behaviour. The Netherlands is developing new methods to measure the actual use of broadband and Spain is performing a demand analysis for telecommunications and Internet services in households. These developments show that countries are increasingly interested in the measurement of the adoption of broadband technology, services and use. In the next section we will discuss possible ways to move forward in this direction.

Areas for future work on indicators

While indicators measuring the deployment of broadband infrastructure by Internet service providers are well advanced, both at national and international levels – and also in light of the development of the mobile broadband indicator – it can be observed that more and more countries are focusing on the measurement of the demand side, e.g. how households and businesses adopt and use the Internet. We propose that an important area for future work would be the further development of demand-side indicators on an international level, which will reflect the adoption and use of the Internet by households and businesses at a more detailed level. These indicators belong to the group of intensity indicators.

In this context, the OECD is proposing to revise two ICT model surveys, one for households and individuals and the other for businesses (see OECD 2010e). In order to reflect potential changes in technologies, it is proposed that additional questions could be added. For instance, questions should be added on the measurement of wireless broadband access by households and businesses.

In terms of usage indicators, two additional and interesting areas include the concepts of *technology engagement* and *technology dependency*. In 2010, suggestions were made for the definitions of these concepts and a framework for measurement (see OECD 2010f). The rationale behind these measures is not only to track frequencies of use – which in some cases might be misleading (e.g. permanent Internet connection at work) – but to measure the extent to which users of the Internet are engaged and committed to their online activities and to what extent they effectively depend on the Internet.

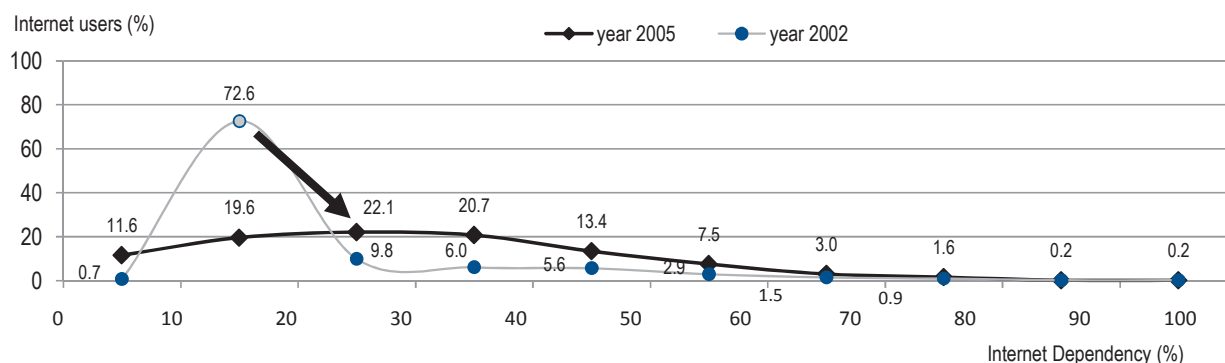
A proposition for *technology engagement* has been formulated as follows: “an individual may be said to be ‘engaged with a technology’ when three conditions are true: *i*) S/he uses the technology on a regular basis; *ii*) S/he perceives the potential utility of a technology; and *iii*) S/he tries to improve his/her capability to use the technology (OECD 2010f, p. 3). Regarding *technology dependency*: “an individual may be said to be ‘dependent on a technology’ if he/she uses this technology on a regular basis for a common set of his/her daily activities” (OECD 2010f, p. 4).

Based on these definitions, potential new indicators for the measurement of these concepts would include the *intensity of use*, the *perceived utility of use* and the *learning attitude*. An interesting way to move forward for the measurement of the *intensity of use* is the measurement of the share of a daily activity carried out online.

The Korean Information Society Development Institute (KISDI) uses this indicator and defines it as the ratio of the daily time spent on activities carried out on the Internet (online activities) to the overall daily time spent on the same activities (online and offline

activities summed up). This measure has the advantages that it *i*) not only counts the time persons spend online; and that it *ii*) provides a proportion of the intensity of Internet use by activity (OECD 2010f). Fifteen Internet activities have been defined by KISDI for which the online percentages are calculated. In a next step, the average of these shares is calculated which is then termed as the Internet Dependency Index. Figure 2.11 shows the distribution of this index in Korea for the years of 2002 and 2005.

Figure 2.11. Distribution of the Internet Dependency Index across Internet users, 2002-05



Source: OECD (2010f), “Measuring ICT Engagement and Dependency: A Statistical Framework”, Secretariat working document, OECD, Paris, based on KISDI data.

Measuring the daily share of an activity carried out online is one example of how to measure the Internet engagement and dependency of individuals. OECD (2010f) proposes a framework for a whole set of new indicators to measure engagement and dependency in order to obtain a more precise picture of the demand side, of the extent and the way the Internet is adopted and used.

To complement the survey data presented above, a further potential area of future work is the collection of Internet-based statistics. The OECD is currently working together with the EC to conduct a feasibility study. First preliminary results were expected for June 2011 (OECD, 2010g). Currently, three methods for the collection of Internet-based statistics are examined: *i*) the self-filled questionnaire on Internet usage; *ii*) Internet Access Provider survey; and *iii*) web search.

Overall, for future work, it is suggested to advance in the development of demand-side and usage indicators and to determine ways of efficient data collection for these indicators. To fully benefit from this work, it should be carried out at an internationally harmonised level.

Notes

1. For additional data on European countries, see also the BEREC Report on “Next Generation Access – Collection of factual information and new issues of NGA roll-out”, http://erg.eu.int/doc/berec/bor_11_06.pdf.
2. The following paragraphs are based on the *OECD Communications Outlook 2011*, Chapter 2 (OECD, 2011c)
3. Mobile termination rates are the fees that mobile operators charge other carriers to terminate calls on their networks.
4. The following paragraphs on allocation are fully based on Chapter 5 of the *OECD Communication Outlook 2011* (OECD, 2011c).
5. The native IPv6 graph excludes users using 6to4 or Teredo.
6. www.broadbandmap.com.

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Annex 2.A

Table 2A.1. Overview of OECD reports related to work on a high-speed infrastructure

Work area	Report	Main findings
Broadband over Power Lines (PBL)	Broadband over Power Lines (BPL): Developments and Policy Issues DSTI/ICCP/CISP(2008)3/FINAL	BPL as a means to further competition in the broadband market. Little evidence, however, that it provides a competitive alternative to xDSL or FTTH in the near future. Regulators should nevertheless ensure that no unnecessary barriers are in place for the commercial diffusion of BPL and that interference with other licensed wireless services is minimised.
Cable broadband	Developments in Cable Broadband Networks DSTI/ICCP/CISP(2009)9/FINAL	Report on developments of cable broadband networks Over the last ten years, cable companies in the OECD have transformed themselves from providers of analogue video services to providers of an array of advanced digital communications services, upgrading their networks to support bandwidth intensive services. One of the key trends: Consolidation of cable providers to more effectively compete with traditional telephone providers. While cable companies do provide important infrastructure-based competition there is still asymmetric treatment of different delivery platforms such as DSL and cable in several OECD markets.
Broadband bundling	Broadband bundling: Trends and Policy Implications DSTI/ICCP/CISP(2010)2/FINAL	Broadband services in the OECD are overwhelmingly sold as mixed bundles. Broadband bundling can provide both benefits and drawbacks to customers. Benefits to consumers largely derive from the choice between stand-alone and bundled services; stand-alone offers still a key role in maximising consumer surplus. Regulators and consumer protection agencies should encourage ISPs to provide more information on the characteristics of packages they are selling and to make prices clear and understandable. Consumers should further be able to switch providers.
Broadband coverage indicators	Indicators of Broadband Coverage DSTI/ICCP/CISP(2009)3/FINAL	Overview of how broadband physical coverage and availability can be measured. Coverage and availability measures related to different types of technologies.

Work area	Report	Main findings
Broadband, the economic recovery and national broadband plans	The Role of Broadband Infrastructure Investment in Economic Recovery DSTI/ICCP/CISP(2009)1/FINAL	Examination of the role of communication infrastructure investment in economic recovery and policy options Policy makers need to evaluate the costs and benefits of any public investment in telecommunication infrastructure and select projects which can deliver both strong immediate aggregate demand effects and strong longer-term aggregate supply side effects. All public investments in telecommunications should balance four key items – connectivity, competition, innovation/growth and social benefit.
	National Broadband Plans DSTI/ICCP/CISP(2010)9/FINAL	Survey of national broadband plans across the OECD area. Overview of goals and common elements of the plans. Most governments have set targets for the plans and an important focus has been to make high-speed broadband available at affordable prices in rural areas.
Broadband, innovation and fibre	Network Developments in Support of Innovation and User needs DSTI/ICCP/CISP(2009)2/FINAL	Objective of the report is to support two key elements of the Seoul Declaration – stimulating investment and competition in broadband networks and developing policies which maintain an open environment supporting innovation. Case for investment in a competitive, open access national fibre-to-the-home network roll-out based on potential spill-overs in four key sectors of the economy: electricity, health, transportation and education. Cost savings of between 0.5% and 1.5% in each of the four sectors over ten years resulting directly from the new broadband network platform could justify the cost of building a national point-to-point, FTTH network
	Fibre Access – Network Developments in the OECD Area DSTI/ICCP/CISP(2010)10/FINAL	Assessment of developments on the use of fibre to provide local broadband access networks. There is no simple solution to the question of how to get FTTH/B networks built. Countries that wish to achieve an accelerated improvement in their FTTH/B deployment should consider measures to improve access competition on current networks.
NGA Networks and Market Structure	Next Generation Access Networks and Market Structure DSTI/ICCP/CISP(2010)5/FINAL	Report focuses on developments in broadband market structures emerging from the deployment of high-speed broadband services and the policy and regulatory implications. Aim: To underline good practices for policy and regulation in relation to “next generation access networks” (NGA) and the market structures to enhance their development. Recently, a number of different approaches in respect to NGA market structure have been taken by OECD countries. Given that there is a high probability that public funding will be needed to construct high-speed broadband networks in a number of geographic areas, this will have a profound effect on how a market structure will evolve in those areas.
Measurement	Data Collection on Broadband Mobile Services DSTI/ICCP/CISP(2009)13/FINAL	Draft on the development of a methodology on how to define mobile broadband and on how to collect and report mobile broadband statistics across the OECD.
	Wireless Broadband Indicator Methodology DSTI/ICCP/CISP(2009)13/FINAL	Proposal for an indicator measuring the development of wireless broadband connections across OECD countries Proposal for the wireless broadband indicator methodology incorporating comments received by the Secretariat in July 2009.

Work area	Report	Main findings
	Implementing the Seoul Agenda, Discussion Points for the Round Table on “ICT Measurement: Assessment and Proposals by Member Countries” (internal working document) Measuring ICT engagement and Dependency: A Statistical Framework (internal working document) Proposals for a Revision of the OECD Model Survey of ICT Access and Use by Households and Individuals (internal working document) Internet-Based Statistics Proposals for a Feasibility Study (internal working document)	Report identifies issues related to the current measurement of ICTs and suggests possible room for development. Report discusses a framework for the measurement of technology engagement and technology dependency. Indication of direction for future indicator development in this area. Proposal to revise the two OECD ICT Model Surveys (households and individuals; businesses). Proposals for a Feasibility Study for the collection of Internet-Based Statistics.
Mobile broadband	Mobile Broadband: Pricing and Services DSTI/ICCP/CISP(2008)6/FINAL	Overview of prices, speeds and data caps of mobile broadband services. At the time of the report wide range of subscriptions available with considerable variation between and within countries.
Mobile communications	Mobile Communication Developments in the OECD area DSTI/ICCP/CISP(2010)3/FINAL	Report on the development of mobile communications in the OECD area. Examination of the impact of mobile communication developments on market dynamisms and the implications for policy makers and regulators.
International Mobile Roaming	International Mobile Roaming Charges: Proposal by Australia (internal working document) International Mobile Roaming Charging in the OECD area DSTI/ICCP/CISP(2009)8/FINAL	Report by the Government of Australia proposes that CISP examine competition, costs and prices as well as policy options in international mobile roaming charges. Information and analysis on market developments and pricing in international mobile roaming service (IMRS). Wholesale rates charged are major contributor to high retail charges. Roaming rates are excessive and similarities exist with the fixed market prior to the collapse of the accounting rate system.
	International Mobile Roaming Services: Analysis and Policy Recommendations DSTI/ICCP/CISP(2009)12/FINAL	Follow-up to the first report on international mobile roaming charging and proposition of solutions to described problems in the first report. This report strongly supports the implementation of transparency measures that increase consumer awareness of retail roaming charges. The report acknowledges that directly regulating roaming prices may be the only way to guarantee that consumers are not unreasonably charged. The aim should be to protect consumers and remove international barriers for trade and travel.
	International Mobile Roaming Services: Next Steps and Recommendations (internal working document)	Presentation of a framework of recommendations and thus provision of guidance for policy makers and regulators. Recommendations in 5 areas: empowering the consumers (roaming substitutes, transparency measures), competition issues and market structure (cross-country network expansion, alliances), improved information in the wholesale market (inter-operator tariffs, WTO framework, localisation), price regulation (wholesale, retail), consideration of other impacts.

Work area	Report	Main findings
	International Mobile Data Roaming DSTI/ICCP/CISP(2010)12/FINAL	Examination of the pricing of international mobile data roaming. Data roaming prices very high compared to domestic rates.
Voice markets	Developments in Voice Service Markets (internal working document)	Overview of developments in voice markets across the OECD. Voice services commoditised, shift from charging my minute to flat-rate pricing. Dramatic shift from fixed-line to mobile telephony. Shift from circuit-switched to packaged-switched voice.
Telecommunication Price Baskets	Revision of the Methodology for Constructing Telecommunication Price Baskets DSTI/ICCP/CISP(2009)14/FINAL	2009 revisions to the OECD's basket methodologies. New aspects in the areas of voice call calculations, selective discounts and local calling areas for the PSTN baskets.
International Traffic Exchange	Network Externality Premiums and International Telecommunication Traffic Exchange DSTI/ICCP/CISP(2008)4/FINAL	Examination of the economic impact of proposals to add a non-cost "premium" to international telecommunication charges to fund network expansion. Conclusion: Attempts to use non-market methods are likely to have negative implications for the provision of international telecommunication services. Competition meets policy goals more efficiently.
IP traffic exchange	IP traffic exchange: Market Developments and Policy Challenges DSTI/ICCP/CISP(2011)2/FINAL	Outline of a report on IP traffic exchange. Main topics to be discussed include an overview of the development of the IP market, the performance of the market and future challenges.
IPv6	Economic Considerations in the Management of IPv4 and in the Deployment of IPv6 DSTI/ICCP(2007)20/FINAL Internet Addressing – Measuring Deployment of IPv6 DSTI/ICCP/CISP(2009)17/FINAL	Overview of Internet addressing. Managing of IPv4 exhaustion and deployment of IPv6. Proposal for a policy environment conducive to the timely deployment of IPv6. Report provides an overview of several indicators and data sets for measuring IPv6 deployment. Areas considered: indicators of infrastructure readiness, indicators of actual use of IPv6 on the Internet, results from a survey on network operators' deployment of IPv6.
Geographically segmented regulation	Geographically Segmented Regulation for Telecommunications DSTI/ICCP/CISP(2009)6/FINAL	Aim: To appraise the case for, and developments in, the use of sub-national geographically segmented regulation for fixed telecommunications networks.
M2M communications	M2M communications: Connecting Billions of Devices DSTI/ICCP/CISP(2011)4/FINAL	Analysis of the impact of the Machine-to-Machine communication on business models and regulation. Main conclusion: governments need to liberalise access to the mobile communications market to stimulate the growth of M2M.

**Table 2A.2. Competition in fixed lines: Subscriber market share of new entrants
(% of total fixed analogue subscriber lines)**

	2002	2003	2004	2005	2006	2007	2008	2009
Australia*	0.9	1.8	2.5	1.8	1.9	2.2		13.8
Austria	5.3	6.0	7.4	9.6	10.2	14.3	16.0	17.3
Belgium*			7.7	11.3	13.9	18		
Canada	32.1	36.7	37.2	39.5	42.6	46.2	50.3	52.0
Chile	20.0	30.0	30.0	30.0	30.0	40.0	40.0	40.0
Czech Republic				3	3		15	18
Denmark	13.1	14.1	18.5	19.8	19.0	18.9	18.0	18.1
Estonia	0	0	0	10	10	10	20	20
Finland					33.6	32.0	33.0	33.6
France			2.3	1.3				5.2
Germany	0.8	3.0	5.0	8.0	13.0	19.0	27.0	33.0
Greece								
Hungary	21.0	21.0	22.0	23.0	25.0	27.1	29.82	21.0
Iceland								
Ireland				20.0		23.0	27.0	28.0
Israel								
Italy						14.3	21.2	25.7
Japan			5.3	6.2	7.5	9.0	10.0	12.1
Korea	4.0	4.4	6.2	6.8	7.9	9.6	10.2	10.1
Luxembourg				1.2	3.0	4.0	9.0	11.5
Mexico								
Netherlands								28.0
New Zealand					8.0	11.5	19.0	25.0
Norway								
Poland	1.3	10.0	9.0	10.4	11.7	14.7	18.2	26.8
Portugal	4.7	5.6	6.7	10.8	21.5	28.0	31.0	35.3
Slovak Republic	0	0	0	0.05	0.08	2.26	3.69	4.75
Slovenia				0.5	0.5	0.5	0.5	
Spain	4.9	5.6	6.7	10.7	21.7	28.4	21.1	27.4
Sweden				0.5	0.5	0.5	0.5	
Switzerland*	0	0.1	0.2	0.2	0.3	0.3	0.3	
Turkey								
United Kingdom	17.0	18.0	20.0	24.0	30.0	32.0	36.0	42.0
United States	13.0	16.0	18.0	18.0	17.0	18.0		

* Government estimates.

Table 2A.3. National policy initiatives for the deployment of IPv6, 2010

	IPv6 adoption in government	Awareness building efforts	Initiatives
Australia	Yes	Yes	The Australian Government Information Management Office (AGIMO) is coordinating the transition of Australian Government agencies to IPv6, and has developed 'A Strategy for the Implementation of IPv6 in Australian Government Agencies', that aims for Australian Government networks to be IPv6-enabled by the end of 2012.
Austria		Yes	An industry platform (IPv6 Task Force Austria) dealing with various IPv6 issues was founded in 2004 with the support of the government and telecommunications regulatory authority.
Belgium		Yes	
Canada		Yes	Canada does not currently plan to use legislation or other government-led measures, such as target-setting for industry, to influence the introduction of IPv6. The American Registry for Internet Numbers (ARIN) has assisted with awareness-raising efforts within the Canadian government.
Switzerland		Yes	Switzerland does not have an active policy to encourage IPv6 deployment. However, IPv6 support is a requirement for public procurement contracts.
Chile			
Czech rep	Yes		In June 2009, the government approved a resolution according to which ministries and central state bodies must: i) Include IPv6 support as a public procurement condition, and ii) ensure that by the end of 2010 government websites and e-Government services are accessible over both IPv4 and IPv6. The document "MPO State Policy in Electronic Communications - Digital Czech" further addresses IPv6 deployment (approved by the Czech Republic government on 19 Jan 2011).
Germany	Yes	Yes	A national IPv6 plan for Germany was launched in 2009 (German IPv6 Roadmap). The objective is a complete technical and organisational set-up for a centralised IPv6 public administration in Germany as of 2011. IPv6 was also included in the 3rd and 4th German IT Summits declarations under the patronage of German Chancellor Angela Merkel. The German Federal Ministry of the Interior was allocated and administers a /26 IPv6 address block for all -federal, state and local- public administration in Germany end of 2009. In 2008 two large programs were launched to modernise the communication infrastructure of the public administration based on IPv6: i) "Netze des Bundes" (NdB), the Common network for the federal administration, and ii) "Deutschland-Online Infrastructure" (DOI), which serves Federal Government, states and municipalities. In addition to these two large network infrastructures operated by the Federal Government, IPv6 is being introduced through a variety of IPv6 projects and initiatives at different policy, organisational and technical levels, with numerous IPv6 pilot projects, working groups and activities at state and local level.
Denmark		Yes	The National IT and Telecom Agency has developed a strategy as well as an action plan for the deployment of IPv6 in Denmark, approved by the Minister of Science, Technology and Innovation after public hearings and four-pronged: i) Creating awareness of IPv6 and the exhaustion of IPv4 addresses, through the establishment of a private/public partnership that represents relevant Danish stakeholders (e.g. content providers and telecom operators); ii) Public procurement IPv6-compliant mandate; iii) Creating an IPv6 test-bed in the future, and; iv) Potentially making IPv6 support mandatory for Danish State institutions and agencies (as opposed to the current 'recommended standard').
Estonia			
Finland		Yes	No active policies for IPv6 deployment, some trials.

	IPv6 adoption in government	Awareness building efforts	Initiatives
France		Yes	
Hungary			
Ireland		Yes	No active policies for IPv6 deployment. However an IPv6 Task Force is in place, co-founded in 2004 by the TSSG research center, the HEAnet and the Department of Communications, Energy and Natural Resources (DCENR). In 2005 the Irish National IPv6 Centre was established.
Iceland			
Israel			
Italy		Yes	IPv6 taskforce
Japan		Yes	In February 2009, the Japanese Ministry of Information and Communication (MIC) convened a "Study Group Concerning the Improved Use of IPv6 on the Internet". MIC is also developing policies such as the "Guideline of information disclosure for ISPs to cope with IPv4 address exhaustion". The MIC has developed an IPv6 testing platform to build IPv6 expertise. The "Task Force on IPv4 Addresses Exhaustion, Japan", launched by MIC and telecommunications/Internet associations in September 2008 helps interested Internet operators to build action plans, publicise IPv6 activities, and develop IPv6 educational programs.
Korea		Yes	In December 2008, the Korea Communications Commission (KCC) announced the "Second Basic Plan for the Promotion and Management of Internet Address Resources for 2009-2011" and has been conducting various activities to help all stakeholders adopt IPv6. In order to encourage the voluntary adoption of IPv6 by Internet stakeholders such as ISPs and web portals, the KCC created a public-private consultative body and is providing systematic support for the deployment of IPv6 in Korea through pilot projects, offering training, conducting promotional activities, and operating IPv6 interconnection networks. The Ministry of Strategy and Finance stipulates in its "2010 Guidelines for the Execution of Budget and Fund Operation Plan" that all of its network infrastructure should support both IPv4 and IPv6. The Ministry of Public Administration and Security also issued a government notification that applies the same principle to public administrative organisations
Luxembourg		Yes	
Mexico		Yes	
Netherlands	Yes	Yes	IPv6 is expected to become compulsory by end of 2010 for governmental procurement of ICT equipment. The promotion of IPv6 by government is an action point in the progress report of the National ICT Agenda 2008-2011. The central government has taken the initiative to deploy IPv6 in its applications, starting with pilots. In 2009 the Dutch IPv6 Task Force rewarded winners of IPv6 implementation in different categories and will do so again in 2010. In 2010 research funds were awarded to monitor the implementation of IPv6 in the Netherlands.
Norway		Yes	The Norwegian Government is working with the private sector and other relevant stakeholders to increase awareness of the need for IPv6 adoption. The Norwegian strategy for the deployment of IPv6 is focused on creating awareness of the need to focus on IPv6 among managers and CEOs in the private and public sectors, rather than technical staff, as a pre-requisite for a successful IPv6 transition. In October 2010, a national meeting on IPv6 resources was held to exchange knowledge and information on the IPv6 transition. The Norwegian Post and Telecommunications Authority and The Ministry of Transport and Communications, invited Internet providers, the no registry, hardware and software suppliers, the public sector and other interested organisations.

	IPv6 adoption in government	Awareness building efforts	Initiatives
New Zealand		Yes	To date the government response to IPv6 deployment has generally been to raise awareness of the issue. Recommendations have been issued to government agencies: i) Procurement: Agencies should ensure that any hardware or software purchased is IPv6 capable, through a clear statement in all requests for proposals; ii) Training: Agencies should consider training key technical staff on IPv6 to build test IPv6 networks and build experience and capability for IPv6. Agencies with good technical capability should consider implementing IPv6-only networks for new offices or new buildings, and; iii) IPv6 support by applications: Agencies with in-house applications should check for potential IPv4 / IPv6 issues. New applications should be required to be IPv6-capable.
Poland		Yes	There is political debate on IPv6 in Poland. Poland wishes to take into account commitments made at the OECD level by further promoting the development of IPv6 in Poland.
Portugal		Yes	The Portuguese IPv6 Task Force was created in 2004. FCCN, which manages the Portuguese Research and Education Network, has been an active promoter of IPv6 since the late 90s. As it manages the ccTLD for Portugal and the national Internet Exchange Points, it assured IPv6 capabilities of DNS at top level very early. Its other main activities are related to the promotion of the adoption of IPv6 in a timely manner in all higher education and R&D institutions. The backbone of the network operates in dual-stack mode (IPv4 and IPv6) since 2003. During 2008 significant investments have been made to enable dual-stack operation of the following services in these institutions: DNS servers, mail servers and web servers. Trainings and Workshops have been organised as well. There is still a lot of work to be done in terms of IPv6 awareness and IPv6 training. Some vendors have already included IPv6 content in their training programs, but in some cases the real IPv6 support is still not comparable to IPv4 support. IPv6 is a mature protocol in terms of standards defined in the IETF, however there is still a long path to be taken in order to make all Internet applications compatible with IPv6. Portugal considers that the main problem with the low degree of IPv6 deployment is its low priority status in each network/environment, despite its efforts close to national entities in particular electronic communications providers.
Slovak Republic		Yes	IPv6 support is mandatory in public services since 2008. Awareness is promoted through several channels and survey on IPv6 usage is being co-ordinated by the Ministry of Finance in November 2011.
Slovenia		Yes	In 2008, the Slovene Government adopted a strategy for the development of broadband networks in the Republic of Slovenia. One of the commitments included in the strategy is that broadband networks will be ready for the implementation of IPv6 protocol, to enable further development of e-government, e-health, e-education, e-commerce and other services. Moreover, the IPv6 Forum for Slovenia and the Go6 Institute endeavour to accelerate IPv6 deployment among industry, research communities and State administration.
Spain		Yes	
Sweden			
Turkey			
United Kingdom		Yes	The United Kingdom encourages a market-lead, needs-driven approach. The UK wishes to encourage stakeholders to be proactive with adopting IPv6, while being mindful of their commercial needs and costs.
United States	Yes	Yes	The United States has set a timeline for adopting IPv6 6 for use on public servers by the end of 2012.

Source: OECD (2011c), *OECD Communications Outlook 2011*, Chapter 5, OECD Publishing, doi: [10.1787/comms_outlook-2011-en](https://doi.org/10.1787/comms_outlook-2011-en).

Table 2A.4. Spectrum allocations

Has additional spectrum for new generation wireless services been made available since 2008? If so which bands?		How was/will this spectrum been/be allocated? Comparative selection, auction, etc.
Australia	Yes. Spectrum in the 3.6 GHz band (3575-3700 MHz) has been released by the Australian Communications and Media Authority (ACMA) to support deployment of wireless access services in regional and remote areas of Australia. Spectrum in the 2 GHz Band (1920-1980 MHz & 2110 – 2170 MHz) was also made available by the ACMA in mid-2010 in specified remote and regional areas of Australia for public mobile telecommunication services. The ACMA is considering the 2.5 GHz band (2500-2690 MHz) as a candidate band to address emerging demand for broadband wireless access services in Australia. In addition, the Government is examining its approach to the reissue of expiring key 15-year spectrum licences that are used to provide mobile phone and wireless services. In June 2010, the Australian Government confirmed for release a contiguous 126 Megahertz of spectrum comprising the frequency range 694-820 MHz inclusive as Australia's digital dividend.	The 3.6 GHz band (3575-3700 MHz) – the ACMA is allocating spectrum in this band on a staged basis for specified geographic areas using an administrative allocation process and then a price-based allocation (auction) process for the right to apply for apparatus licences. Any remaining spectrum will then be allocated by the ACMA on an administrative allocation basis. The process chosen depends on the level of supply and demand of spectrum in a specified geographic area. The 2 GHz band (1920-1980 MHz & 2110 – 2170 MHz) – the ACMA is allocating spectrum in this band on an apparatus licence basis using an administrative allocation process (over the counter process). Digital dividend spectrum (694-820 MHz) – The Government intends that this spectrum be allocated via a price-based allocation (auction) process.
Austria	Yes, parts of the 3.5 GHz and 900 MHz spectrum. An assignment procedure for the 2.6 GHz spectrum is currently on-going.	Auction
Belgium	The following royal decrees have been developed: 1) <i>Arrêté royal du 24 mars 2009 concernant l'accès radioélectrique dans les bandes de fréquences 3410-3500/3510-3600 MHz et 10150-10300/10500-10650 MHz.</i> 2) A royal decree for the identification of a fourth 3G operator has been prepared. After publication of this decree, the auction can start 3) A royal decree for the identification of 4G-operators in the band 2500-2690 MHz has been prepared. After publication of this decree, the auction can start	The following procedures apply: - bands 3410-3500/3510-3600 MHz: comparative selection (beauty contest). - fourth 3G-operator: auction. - 4G networks in the band 2500-2690 MHz: auction.
Canada	Advanced Wireless Services (AWS) Auction On November 28, 2007, Industry Canada released its policy framework for the auction for 105 MHz of AWS and other spectrum. Of the 90 MHz of AWS spectrum, 40 MHz was set aside for new entrants. Under the licence conditions, licensees are mandated to negotiate roaming agreements with new entrants, under certain conditions. On July 21, 2008, Industry Canada announced that 282 licences (worth \$4.25 billion) were conditionally assigned to 15 companies in the auction. In September 2009, all 15 companies were issued licences. 700MHz Spectrum Band The CRTC has announced August 31, 2011, as the shutdown date for analogue over-the-air television. The transition to digital transmission of over-the-air TV signals (DTV) will reduce the amount of radio spectrum currently dedicated to over-the-air TV, thereby freeing-up spectrum to be used for other purposes, including public safety and commercial uses e.g. wireless broadband. On December 20, 2008, Industry Canada published a post-transition DTV allotment plan, in consultation with the industry, that will accommodate DTV broadcasting in channels 2-51, and free-up spectrum in what are now TV channels 52 to 69. The same day, it also published an interim agreement between Canada and the United States concerning DTV, which deals with potential cross-border interferences.	Auction

Has additional spectrum for new generation wireless services been made available since 2008? If so which bands?		How was/will this spectrum been/be allocated? Comparative selection, auction, etc.
Chile	The band for 3G services (1.710 ~ 1.755 paired with 2.110 ~ 2.155 MHz)	It was a comparative selection (beauty contest) process based on deployment plans and population coverage.
Czech Republic	The bands 800 MHz, 900 MHz, 1800 MHz, 2.6 GHz and 3.4-3.8 GHz have been identified for the purpose of electronic communication services according to the relevant European harmonisation documents. The bands 800 MHz, 2.6 GHz and additional spectrum in the 1800 MHz band will be subject of upcoming tender for operators providing broadband electronic communication services. Deployment of new innovative mobile communication systems is anticipated.	Auction format is supposed for the assignment of the radio spectrum rights.
Denmark	The frequency band 2500-2690 MHz has been made available in 2010 on a service and technological neutral basis. It is most likely that the spectrum will be used for LTE, though this is not a requirement. The 900/1800 MHz bands was liberalised on 1 January 2011 in accordance with the 2009 amendment of the GSM directive and the Commission Decision. A decision has been taken to make the 800 MHz band available for other uses than broadcasting including mobile broadband services. The allocation is expected to take place by the end of 2011 through an auction process.	The frequency band 2500-2690 MHz was subject to auction during spring 2010. In the 900 and 1800 frequency bands, one frequency block of 2 x 5 MHz in the 900 MHz band and one frequency block of 2 x 10 MHz in the 1800 MHz band was awarded through auction in October 2010 to accommodate a new operator in each band. H3G received both licenses and may - as well as the three current operators - use wireless technologies other than GSM for the purpose of testing new technologies since 1 January 2011 and may use it commercially from 1 May 2011.
Estonia	No.	
Finland	The 2500-2690 MHz spectrum band in autumn 2009 For more details, see; www.fcora.fi/en/index/palvelut/palvelutaitaitain/radiotaajuuudet/huutokauppa.html	Auction
France	Yes: 1) ARCEP has allocated 5 MHz in the 2.1 GHz band to Free Mobile (4th 3G license), in January 2010. Free Mobile is also entitled to use 5MHz duplex in the 900 MHz band, following reallocation of spectrum released by the three existing mobile operators. 2) ARCEP has also allocated, also in the 2.1 GHz band, 5 MHz duplex to SFR and 4.8 MHz duplex to Orange France in May 2010. 3) Finally, the 800 MHz (790-862 MHz) et 2.6 GHz (2500-2690 MHz) bands have been identified for the purpose of high-speed wireless broadband, and should be allocated in the following months.	1) The 4th 3G license has been allocated following a call for proposals (comparative selection process). There were nine selection criteria: coherence and feasibility of the project, service and tariff offers, coverage, deployment speed, coherence and feasibility of the business plan, QoS, relations with service providers and consumers, impacts on the environment and employment. 2) The remaining spectrum in the 2.1 GHz band has been allocated by means of a comparative selection process, depending on two criteria: price commitments for future MVNO deals and financial offer. 3) Allocation in the 800 MHz and 2.6 GHz band for 4G mobile networks are under review. The allocation of the 800 MHz band will have to observe the needs for territorial cohesion (Law against the digital divide, 17 December 2009).

Has additional spectrum for new generation wireless services been made available since 2008? If so which bands?		How was/will this spectrum been/be allocated? Comparative selection, auction, etc.
Germany	Yes, in the following frequency ranges:	The Federal Network Agency allocated these frequency ranges by auction in April/May 2010. The results are given in the following table.
	800 MHz Band	
	791,0-821,0 and 823,0-862,0 MHz	
	1,8 GHz Band	
	1710,0-1725,0 MHz, 1730,1-1735,1 MHz, 1805,0-1820,0 MHz, 1825,1-1830,1 MHz, 1853,1-1858,1 MHz	
	2 GHz Band	
1900,1-1905,1 MHz, 1930,2-1940,1 MHz, 1950,0-1959,9 MHz, 2010,5-2024,7 MHz, 2120,2-2130,1 MHz, 2140,0-2149,9 MHz		
2,6 GHz Band		
2500,0-2690,0 MHz		
Hungary	Frequency bands:	Methods for authorisation: a) 2.6 GHz - auction b) 5.8 GHz - licence exemption c) 26 GHz - comparative selection
	a) 2.6 GHz (2500-2690 MHz)	
	b) 5.8 GHz (5725-5875 MHz)	
	c) 26 GHz (25.5-26.5 GHz)	
Ireland	ComReg has issued licences to several local area broadband providers using spectrum in the 3.6 GHz, 10.5 GHz, and 26 GHz frequency bands	ComReg endorses the policy of technology neutrality in the drive to enhance competition and investment. Management of the radio frequency spectrum is becoming more market-oriented, with greater reliance placed on operators (following consumer preferences) to decide on the best use of spectrum. The management of spectrum centres on facilitating early access to spectrum rights on a non-discriminatory basis, using competitive selection mechanisms where appropriate. ComReg strives to ensure an efficient and fair allocation of this resource. In general ComReg strives to apply appropriate competitive mechanisms such as auctions when making spectrum available in response to market demand. ComReg is currently working towards the liberalisation of the 900 MHz band, which will provide Mobile Network Operators (MNOs) with the flexibility to upgrade current capacities and has proposed an auction for allocation of this spectrum.
	In order to maximise the efficient use of the 3.6 GHz band, and particularly in light of a recent EC Decision which Ireland must implement, ComReg must ultimately replace the current 3.6 GHz FWALA licensing scheme with a scheme that best facilitates the provision of fixed, nomadic and mobile wireless access services.	
	ComReg is also developing its plans for the liberalisation of the 900 MHz and 1800 MHz frequency bands currently used for the provision of second-generation (2G) GSM-based mobile services to consumers.	
	With the liberalisation of spectrum in these bands, operators will be able to offer higher speed electronic communications services to consumers (such as mobile broadband and other innovative services) with better quality and more comprehensive coverage.	
Iceland	No.	
Israel		

	Has additional spectrum for new generation wireless services been made available since 2008? If so which bands?	How was/will this spectrum been/be allocated? Comparative selection, auction, etc.
Italy	Yes: - 900 MHz: AGCOM, by Decision n. 541/08/CONS, has allowed in 2008 the refarming of 900 MHz band to be authorised for 3G services by the Ministry of economic development (Communications Department) and AGCOM, according to the new EC provisions (revised GSM Directive 2009/114/CE and accompanying EC Decision 2009/766/CE). The AGCOM Decision paves the way to complete a new re-assignment plan for 900 MHz band on the basis of 5 MHz blocks. One 5 MHz block has been made available on a progressive way for 3G new entrants, which previously had 2.1 GHz spectrum only. The operators' migration is on-going. In particular it is foreseen that the new entrant will also obtain 3G roaming on the 900 MHz networks of the incumbents where technically feasible. - 2100 MHz: three 5 MHz FDD blocks of 2100 MHz have been made available on September 2008 for 3G services by AGCOM decision n. 541/08/CONS; related rights of use of spectrum has been assigned in 2009 by the Ministry of economic development (Communications Department) by auction to the existing 2G/3G mobile network operators. No 3G new comers were emerged during the assignment procedure made by the Ministry. - 2600 MHz: AGCOM is fine tuning the spectrum assignment rules based on consultation results emerged by AGCOM decision n. 559/08/CONS and taking into account EC Decision n. 2008/477/EC; the process will be launched shortly. - 1800 MHz: specific regulation on 1800 MHz is under study. AGCOM is studying the spectrum assignment rules based on information to be made available by Ministry of economic development (Communications Department) on spectrum availability, taking into account EC Decision 2009/766/CE; the process will be launched as soon as possible. AGCOM Decision n. 541/08/CONS also introduced a possible reservation of two 5 MHz blocks at 1800 MHz for 3G new entrants that became also a new comer at 900 MHz. - 800 MHz: AGCOM decision n. 300/10/CONS regarding the new Italian National Frequency Assignment Broadcasting Plan has envisaged the allocation of the upper part of UHF band for mobile services to be used by ECS other than broadcasting. Specific regulation on 800 MHz should be defined by AGCOM as soon as possible, taking into account the European Commission general framework and related provisions. - 2500 MHz: This band has to be made available for telecommunication services and the Ministry of economic development and the Ministry of Defence (the current assignee) is discussing the conditions under which this will be possible.	In 2009, released spectrum in the 2100 MHz band has been assigned to TLC Mobile Applications by the Ministry of economic development (Communications Department), on the basis of AGCOM rules/decisions, by means of auctions. For spectrum in the 800, 1800 and 2600 MHz bands (TLC new generation wireless services), an auction is expected to be the assignment procedure (see also AGCOM decision n. 300/10/CONS for 800 MHz band and decision n. 559/08/CONS for 2600 MHz band). Procedures will be shortly defined.
Japan	On 6/2009, spectrum was allocated in the 1.5/1.7GHz band for LTE(3.9G) technology.	The application of the deployment plans are accepted after the MIC announces the deployment guidance of specified base stations and the deployment plans are approved through the examination.
Korea	Spectrum in the 800/900 MHz and 2.1 GHz bands for IMT-Advanced was allocated (The spectrum allocation plan was announced on Feb. 22, 2009, and the allocation was completed in May 2010). - Allocated spectrum was in the 800 MHz, 900MHz and 2.1GHz bands with 20 MHz bandwidth.	Method of spectrum charge assignment: comparative selection + assignment of spectrum charge considering economic values of the spectrum to be assigned Spectrum charge is calculated based on the expected sales revenue during the period of spectrum use, bandwidth and the characteristics of the spectrum

Has additional spectrum for new generation wireless services been made available since 2008? If so which bands?		How was/will this spectrum been/be allocated? Comparative selection, auction, etc.
Luxembourg	No	No
Mexico	During 2009, the process of spectrum tenders for bands 1850-1910/1930-1990 MHz and 1710-1770/2110-2170 MHz began, which were allocated on May 25, 2010.	By a simultaneous ascending process (auction).
Netherlands	1/1/2008: 2010-2019.7 MHz. Allocated to Mobile Communications. 1/1/2008: 2500-2690 MHz. Allocated to Mobile Communications (excluding aeronautical applications). 20/1/2010; 1900-1980 MHz. The restricted use of IMT 2000 technology in the NFP (National table of allocations) has been cancelled. 20/1/2010; 2019.7-2025 MHz. The restricted use of IMT 2000 technology in the NFP (National table of allocations) has been cancelled. 20/1/2010; 2010-2170 MHz. The restricted use of IMT 2000 technology in the NFP (National table of allocations) has been cancelled. August 2010: 900 MHz frequency band and 1800 MHz frequency band. The restricted use of GSM technology in the NFP (National table of allocations) has been cancelled.	2008: 2010-2019.7 MHz. This frequency band process is not licensed. (Was subject of the 2.6 GHz auction in 2010) 2008: 2500-2600 MHz. Auction. 2010: 1900-1980 MHz. Auction. 2010: 2019.7-2025 MHz. Auction. 2010: 2110-2170 MHz. Auction.
Norway	August 2010: 900 MHz frequency band and 1800 MHz frequency band. The restricted use of GSM technology in the NFP (National table of allocations) has been cancelled. Norway allocated the 2500-2690 MHz band in 2007 on a technology neutral basis through an auction. Norway has also made the frequency band 790-862 MHz band available for new services. The allocation has not yet taken place, but will take place during 2011.	The 790-862 MHz band will be allocated through an auction. The 2.6 GHz band was allocated through an auction.
New Zealand	No.	When it is allocated it will be likely done by auction
Poland	Mobyland 1800 GHz Centernet 1800 GHz Aero2 2620 GHz	Auction
Portugal	Yes, additional spectrum for new generation wireless services has been made available since 2008. In 2008, 2x1.25 MHz in the 450-470 MHz on a national basis. In 2009/2010, 36 lots of 2x28 MHz in the 3.4-3.8 GHz band on a regional basis (4 lots per region). ICP-ANACOM launched a public consultation for the 2.5-2.69 GHz band and it is planned to be awarded during 2011, probably in conjunction with remaining spectrum in the 1800MHz and 2100 MHz bands. Additional spectrum in the MHz band is also available (e-GSM) which is envisaged to be assigned in the near future.	For the 450-470 MHz spectrum a beauty contest was used, while for the 3.4-3.8 GHz band a spectrum auction was implemented. For the 2.6 GHz band, and probably in conjunction with the remaining spectrum (e.g. the 1800MHz and 2100 MHz), ICP-ANACOM is planning to conduct an auction.
Slovak Republic	The frequency bands 800 MHz, 1800 MHz, 2.6 GHz and 3.6-3.8 GHz have been identified for new generation wireless services according to the relevant EC Directives and Decisions. Spectrum in the band 800 MHz have been made available after switch-off analogue terrestrial TV broadcasting since October 2011. Frequency band 2.6 GHz is used by MMDS operators. These licenses will expire on 31st December 2011 and will be not prolonged.	Spectrum in the bands 800 MHz and 2.6 GHz will be subject of prepared tender for operators providing broadband electronic communication services in the first half of 2012. Procedures will be shortly defined.
Slovenia	No.	
Spain	It is foreseen to launch the awarding processes of bands 2500-2690 MHz and 790-862 MHz in 2011. The 790-862 MHz band will be effectively made available on 1 January 2015 at the latest.	It is foreseen to launch the awarding processes of bands 2500-2690 MHz and 790-862 MHz in 2011. The 790-862 MHz band will be effectively made available on 1 January 2015 at the latest.

Has additional spectrum for new generation wireless services been made available since 2008? If so which bands?		How was/will this spectrum been/be allocated? Comparative selection, auction, etc.
Sweden	No.	
Switzerland	No.	
Turkey	No.	When it is allocated it will be done by auction
United Kingdom	No.	
United States	No.	

Source: OECD (2011c), *OECD Communications Outlook 2011*, Chapter 5, OECD Publishing, doi: [10.1787/comms_outlook-2011-en](https://doi.org/10.1787/comms_outlook-2011-en).

Chapter 3

Innovation and sustainability: Digital content and green ICTs

This chapter focuses on two areas of innovation and sustainability identified as important in the Seoul Declaration: digital content and 'green' information and communication technologies (ICTs). Regarding digital content, issues addressed include: the development of digital content markets, local content, public sector information, the role of Internet intermediaries, and intellectual property rights. In the context of green ICTs, issues addressed include: resource efficient ICTs, sensor-based networks, and smart ICT applications such as smart grids.

When addressing the issues of innovating for economic growth and sustainability, the Seoul Ministerial Declaration of 2008 decided to focus on innovation by looking at *digital content*, and to address sustainability through so-called ‘green’ ICTs (information and communication technologies). The present chapter looks at progress in these two areas since 2008, and also includes analyses of new areas and issues that have arisen since the Declaration. This international review is mainly based on OECD publications, as well as responses to a questionnaire for the OECD Information Technology Outlook 2010 regarding progress at national levels.

Innovating for economic growth – digital content

The Seoul Declaration and digital content

As economies have moved towards a knowledge economy, digital content has become an increasingly important and pervasive sector, shaping a large number of industries and therefore influencing economic and social development. The 2008 OECD Policy Guidance for Digital Content acknowledged these developments and provided principles aiming at laying the ground for policy discussion, development and review (OECD, 2008a). In addition, Ministers set the following objectives in the Seoul Declaration (OECD, 2008b):

“Promote Internet-based innovation, competition and user choice”.

“Encourage new collaborative Internet-based models and social networks for the creation, distribution and use of *digital content* that fully recognise the rights of creators and the interests of users”.

“Promote use of Internet and related ICT networks by all communities as well as the creation of local content and multi-language translations to improve economic and multi-language translations to improve economic and social inclusion of people with different capabilities, education, and skills, and to preserve cultural and linguistic diversity”.

“Make public sector information and content, including scientific data, and works of cultural heritage more widely accessible in digital format”.

“Ensure respect for intellectual property rights”.

“Combine efforts to combat digital piracy with innovative approaches which provide creators and rights holders with incentives to create and disseminate works in a manner that is beneficial to creators, users and our economies as a whole”.

“Examining the role of various actors, including intermediaries, in meeting policy goals for the Internet Economy in areas such as combating threats to the security and stability of the Internet, enabling cross-border exchange, and broadening access to information”.

Here, we will first look at major developments in the field of digital content since 2008 and the various policy initiatives. At the end of this chapter we will also look at public sector information, since this is closely related to the area of digital content.

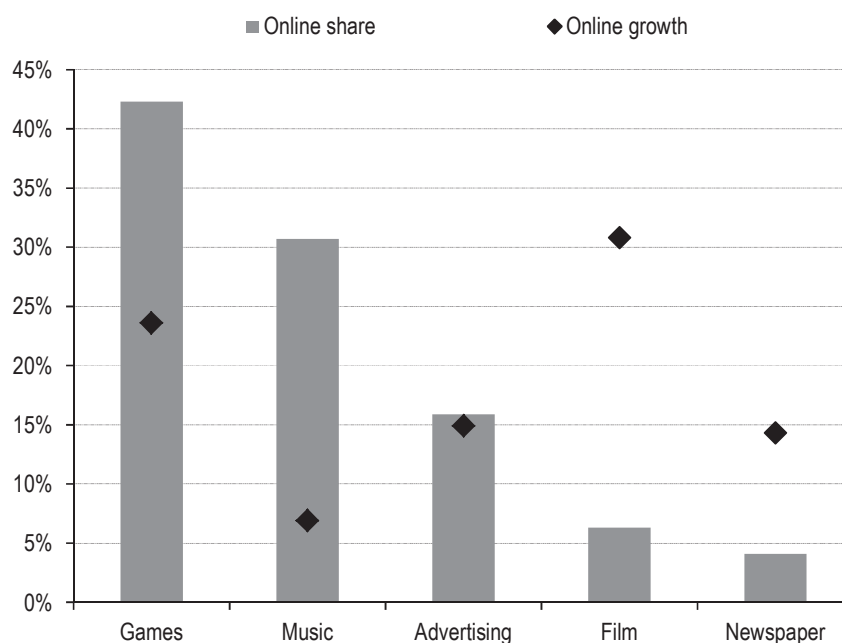
Recent developments in online content markets

Games, music, film, news and advertising industries

Digital content¹ markets have shown significant annual growth rates, while online revenue shares have increased considerably. This rapid increase has been facilitated by several factors, including increased digital literacy, declining costs, the growth of the participative web, the increased use of mobile access devices and the improvement of the underlying fixed and mobile broadband infrastructure (see Chapter 2). However, growth rates vary between different digital content areas and activities.

Figure 3.1 shows the share of online content and its growth for different industries that the OECD has monitored for a number of years. The games and music content industries have the largest online shares of the overall online and offline market, with at least 30% of total revenues. The fastest growing online content industry is the film industry, but starting from low levels, with 30.8%, followed by growth rates of 23.6% for games and 14.9% for advertising, respectively. The largest market by far in absolute terms is online advertising, with revenues amounting to USD 70.5 billion, followed by games with USD 22.7 billion (see Table 3.1).

Figure 3.1. Online content share and growth 2009-10



Source: OECD based on PricewaterhouseCoopers (2011), *Global Entertainment and Media Outlook—Industry overview*, PricewaterhouseCoopers LLP, New York.

Table 3.1. Market size and growth of online content industries

	Games^a	Music^b	Advertising^c	Film^d	News^e
Global revenues (2010)	USD 53.7 billion	USD 23.44 billion	USD 442.29 billion	USD 84.19 billion	USD 159.7 billion
Global market growth, 2009-10	5.1%	-7.7%	5.8%	3.2%	0.0%
Online revenues (2010)	USD 22.7 billion	USD 7.19 billion	USD 70.52 billion	USD 5.28 billion	USD 6.56 billion
Online market growth, 2009-10	23.6%	6.9%	14.9%	30.8%	14.3%
Online share in total (2010)	42.3%	30.7%	15.9%	6.3%	4.1%

a. Global computer and video games revenues comprise console games, PC games, online games and wireless games. Online revenues include online and wireless games.

b. Global music revenues include physical and digital music. Online revenues include PC and mobile downloads and subscriptions.

c. Global advertising revenues include expenditure for advertisements in the following media: print publications, television, radio, cinema, out-of-home, video games and Internet (fixed and wireless).

d. Global film and video revenues do not include television licensing. Online revenues include paid movie downloads, streaming, and (mobile) subscriptions; they do not cover IPTV.

e. Global newspaper revenues cover advertising and circulation. Online revenues include online newspaper advertising revenues and online circulation.

Source: OECD based on PricewaterhouseCoopers (2011), *Global Entertainment and Media Outlook—Industry overview*, PricewaterhouseCoopers LLP, New York.

The *games industry* has been the most successful in exploiting online potential (despite unauthorised content downloading and online piracy). It has incorporated online activities in its business models and the industry has exploited mobile games capabilities, especially for smartphones (see also OECD, 2010a). In addition, cloud computing gaming services have emerged during the last years.

With the development of online content during the last few years, there have also been developments in value chains and business models. In comparison to offline value chains, some activities are becoming much less important (e.g. production and distribution of physical carriers such as CDs and DVDs), and new activities have been created along the value chain. In recent years, several forms of information intermediaries have been growing that offer support functions and content aggregation and distribution (e.g. music streaming services, search engines, online shops and smart apps; see also the section on Internet intermediaries, below).

New business models have been emerging. Some of these reflect developments in the offline world, while some business models (such as the sale of virtual items or professional subscription accounts) are new. Table 3.2 provides an overview of business models by content sector. While *online advertising* has been generating significant amounts of revenue, all other content industries are still experimenting to find the best sustainable business model to increase digital content revenues.

Overall, the content sectors of video, games, news and advertisement have been growing over the past years, but at different paces. However, although growth rates are significant, the impact of the online content sector is still unclear. According to the Information Technology Outlook 2010, “Established firms face adjustment pressures, increasing numbers of businesses compete for relatively small direct revenues, and setting up new partnerships and revenue-sharing agreements in new digital content value chains

is complex. Concentration appears to be high and increasing for online activities, as the transition to online models is winnowing out weaker market participants” (OECD 2010a, p. 188). Online content continues to have a major impact on traditional value chains in the area of distribution (e.g. music and films). Moreover, the impact on the production side is constantly increasing through, for instance, the volume of user-created content, new forms of advertisement and games.

Table 3.2. Evolving sector-specific online business models

User-created content	Mostly free or voluntary donations and contributions. Increasingly subscription- and advertisement-based revenues and business-to-business licensing of technologies. Revenue increasingly generated by selling user information or offering access to the user community.
Computer and video games	Mostly digital content sales (purchase of console games with Internet functionality) and subscription-based revenues. Increasingly advertising-based and selling of virtual items, etc.
Film and video	Mostly digital content sales (pay-per-view), with some examples of advertising-based business models. Increasingly subscription-based.
Music	Mostly digital content sales (pay-per-track) and some examples of advertising-based. Increasingly subscription-based revenue and revenue from concerts and some voluntary contributions.
News	Most revenue via online advertising or online classified ads and content licensing.
Advertising	Mainly search advertising (cost-per-click and cost-per-action models) and display ads. Increasingly behavioural advertising to target consumers.

Source: OECD (2010a), *OECD Information Technology Outlook 2010*, OECD Publishing, doi: [10.1787/it_outlook-2010-en](https://doi.org/10.1787/it_outlook-2010-en).

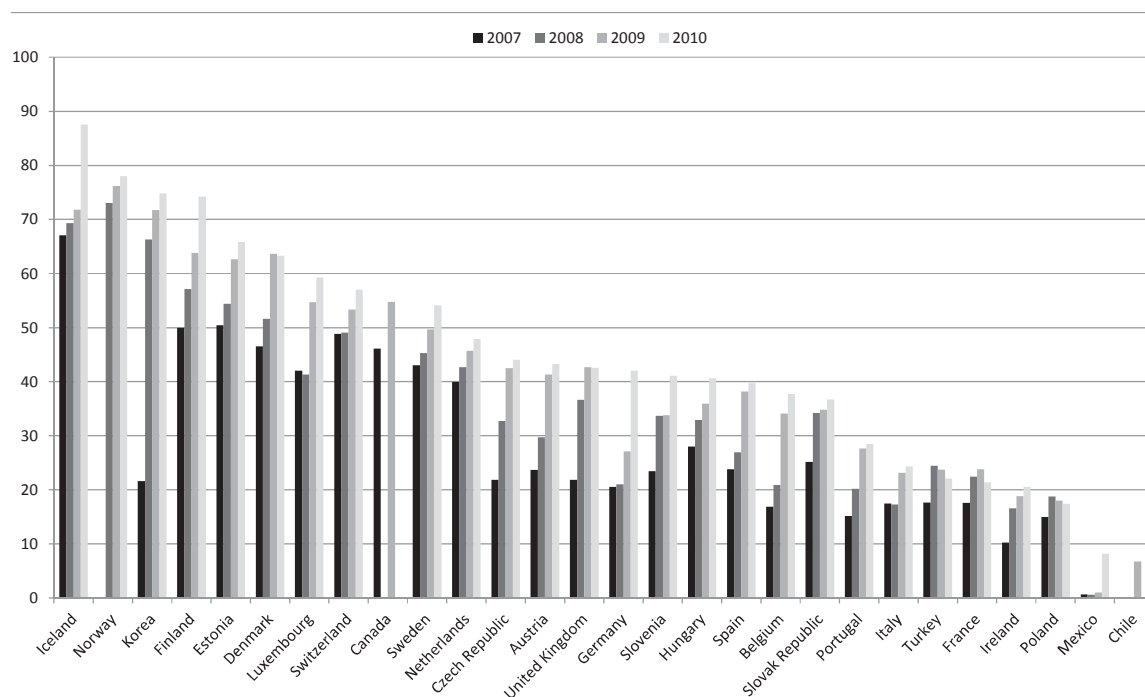
Since the Seoul Declaration, four new additional areas linked to online content creation, distribution and use have come to the fore: online news, virtual worlds, local content and Internet intermediaries, so these have also been included in our analyses. We have already touched on the online news sector above and will now discuss the development of news in more detail, before looking at recent developments in the areas of virtual worlds, local content and Internet intermediaries.

Online news

While traditional newspaper readership and advertising revenues have been declining, the Internet has become an important source of news provision. The proportion of individuals reading news online has been constantly increasing among OECD countries (see Figure 3.2). In four OECD countries (Iceland, Norway, Korea and Finland), over 70% of individuals in the age range of 16-74 years read or download news online. In terms of frequency, reading news online is the third most popular Internet activity, after e-mailing and search (OECD, 2010b). In terms of relative importance, however, TV and newspapers are still the most important sources of information and the online share in the newspaper sector was only about 3% in 2008. However, this is shifting, with newspapers and TV losing ground to the Internet. Currently, online news mainly complements offline news. In terms of demography, younger people tend to read online news more actively than the more senior generation. In addition, online reading habits show a different pattern than offline reading habits. On the one hand, Internet users typically rely on a variety of news sources. On the other hand, access to news is much more sporadic and spontaneous and it is supposed that the news spectrum Internet users read is more fragmented compared to readers of traditional newspapers.

Figure 3.2. Proportion of individuals reading/downloading online newspapers/news magazines over the Internet for private purposes

Percentage of individuals aged 16-74



Note: No data for Australia. Latest official data from the US broadband survey is from 2003. The 2008 value is taken from Pew Internet. Figures in the graph are rounded.

Source: Based on OECD (2010b), *News in the Internet Age: New Trends in News Publishing*, OECD Publishing.
doi: [10.1787/9789264088702-en](https://doi.org/10.1787/9789264088702-en). Data updated.

The main drivers of online news are technological developments, novel online offers and business models of Internet intermediaries, the growth of handheld devices, as well as social factors. In terms of technology, increased broadband availability, new information distribution technologies (e.g. news aggregation technologies), as well as digital content management systems incorporating various formats (e.g. HTML, XML) have acted as important drivers. Internet intermediaries have also been playing important roles, by, for instance, acting as news aggregators. Smart phones and e-books have been allowing users to access online news anywhere and in real-time. Finally, the participative web has spurred new forms of online news and has contributed to a more decentralised news production.

The rise of these technologies and the Internet has changed players and business models (OECD, 2010b): Multiple news providers with very different backgrounds (e.g. newspapers, broadcasting corporations, and Internet companies) and underlying business models compete in a real-time and global news environment. Many of these players are not primarily focusing on generating revenues by selling content and do not have the same level of fixed costs that traditional newspapers are faced with. Direct revenues from content are still small and large parts of revenues are generated through advertisement. Most surveys report that, apart from news, consumers are still unwilling to pay for content but that this willingness is increasing. And even for news content the increase is from a very low base (OECD, 2010b).

Overall, the changing news environment creates both opportunities and challenges with respect to the important role of news to societies and to democracy in general. On the positive side, observers argue that news production and distribution have never been more independent and dynamic and that the Internet offers access to a large diversity of news. In addition, the Internet provides a platform for entrepreneurial journalism, for a wider participation of the general public in commenting current events and debates and for non-profit ventures for news types of (sometimes investigative) journalism. On the challenges side, observers warn that the quality of journalism is decreasing and that the Internet might leave the reader in doubt about the accuracy and quality of the information. This argument is based on the evaluation of some analysts that there is no properly functioning online business model. In addition, some observers see a tendency towards softer news with an entertainment purpose and appeal to advertisers. Overall, the truth probably lies somewhere between the two poles (OECD, 2010b). Due to the dynamic nature of the Internet, the exact outcomes are difficult to predict at this stage.

Virtual worlds

Virtual worlds provide opportunities for enhanced social interaction, improved business processes and accelerated research activities to businesses, governments and citizens. They have evolved as “Internet-mediated ‘spaces’, where large groups of people meet and interact in real-time for learning, scientific research, health care, defence and further areas other than entertainment only (i.e. ‘serious’ games)”² (OECD, 2011a). Driving factors of virtual worlds include powerful though affordable computing devices, better graphic processing units and the fast diffusion of high-speed broadband. Fields of application can be found in the areas of: *i*) entertainment and social networking; *ii*) education and training; *iii*) e-commerce and e-business; *iv*) research and development; *v*) tele-working and tele-conferences; and *vi*) e-government and public sector information.

Figure 3.3. Weekly Web search interest for “virtual world” on google.com, 2004-10

Index 01-07 August 2010 = 100, 4-weeks moving average

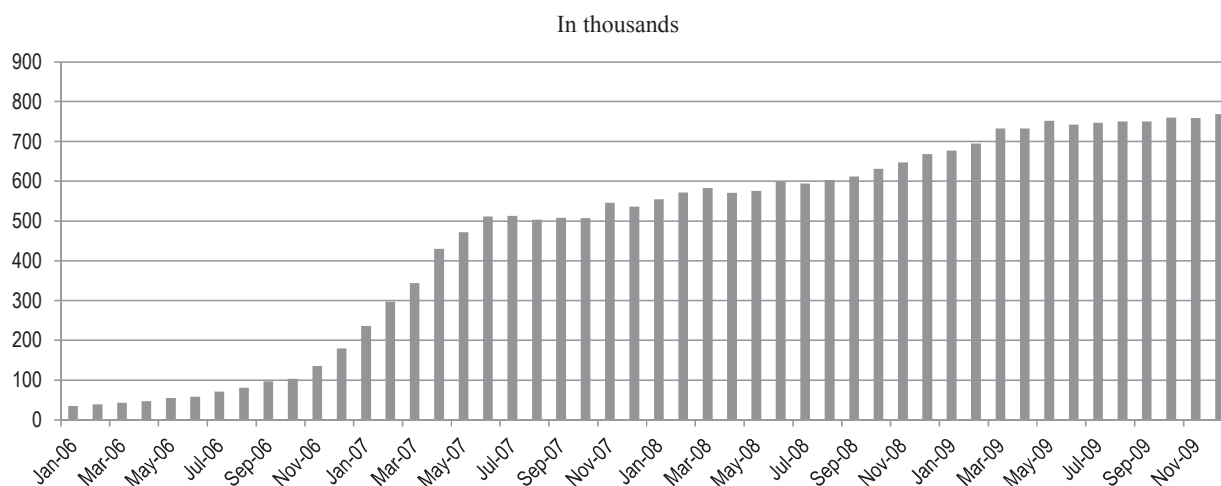


Note: The index indicates the likelihood of a random user searching for the term “virtual worlds” at a certain time.

Source: OECD based on Google Insights for Search, (2004), *Virtual world*, www.google.com/insights/search/#q=%22virtual%20world%22.

Compared to the hype related to virtual worlds in 2008 (e.g. Second Life), adoption has been moderate since 2008 and the economic crisis has triggered some consolidation in the sector. Currently, however, there is some evidence that the interest in virtual worlds is increasing again as shown in Figures 3.3 and 3.4 and leading Information and Communication Technology (ICT) firms such as Intel or Nokia continue to invest in virtual worlds technologies (see OECD 2011a). Overall, as Messinger et al. (2008) have pointed out, “despite receptive coverage in the press, it is not yet entirely clear, however, what values virtual worlds add to more traditional e-commerce and e-government, or how organisations and individuals can harness this value”.

Figure 3.4. Monthly unique users with repeat logins in *Second Life*, 2006-09



Source: Linden Lab “The Second Life Economy - First Quarter 2009 in Detail”

<http://blogs.secondlife.com/community/features/blog/2009/04/16/the-second-life-economy--first-quarter-2009-in-detail>

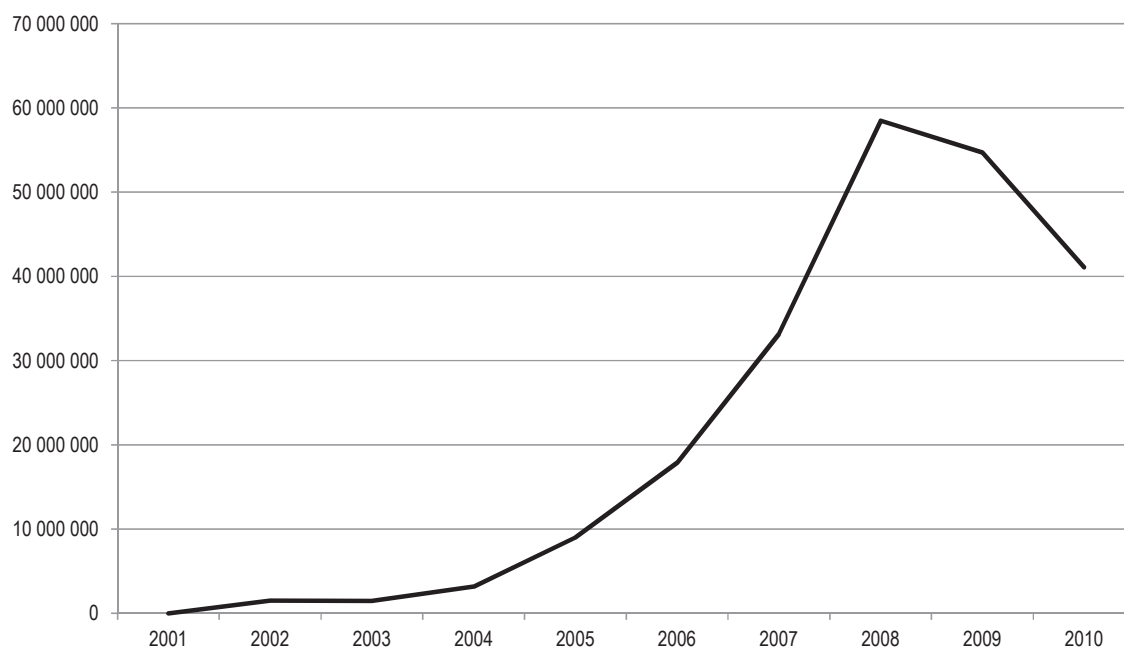
Local content

The recent work on local content³ has developed from the rationale that societies have a rich cultural heritage and a knowledge base that should be recorded and distributed widely for the benefit of the whole world. According to the United Nations Educational, Scientific and Cultural Organization (UNESCO), local content can be defined as “an expression and communication of a community’s locally generated, owned and adapted knowledge and experience that is relevant to the community’s situation” (UNESCO, 2004). To date, much of this local content is only available to local communities.

Besides more traditional means of local content distribution such as print media or radio, the Internet has become an important means to stimulate the development and dissemination of local content. Several ways to publish content online include blogs or crowd-sourced websites such as Wikipedia.

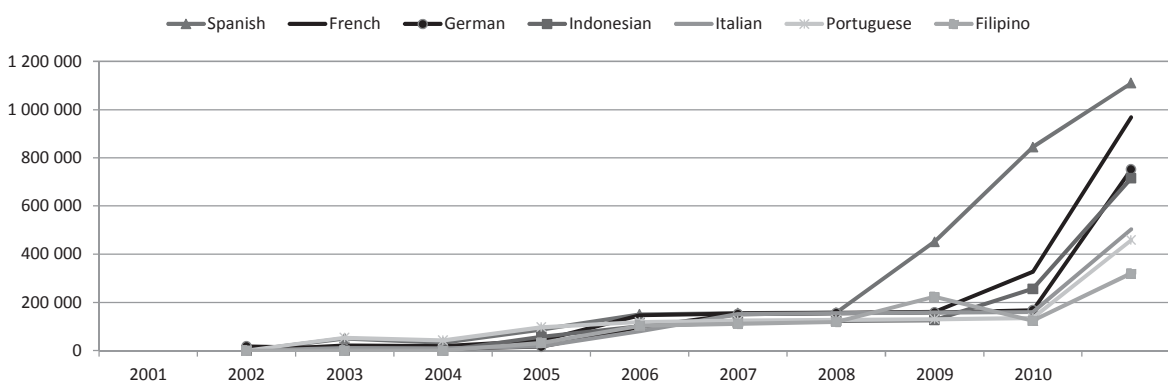
Figure 3.5. Number of blogs indexed by Google (total)

By year, millions

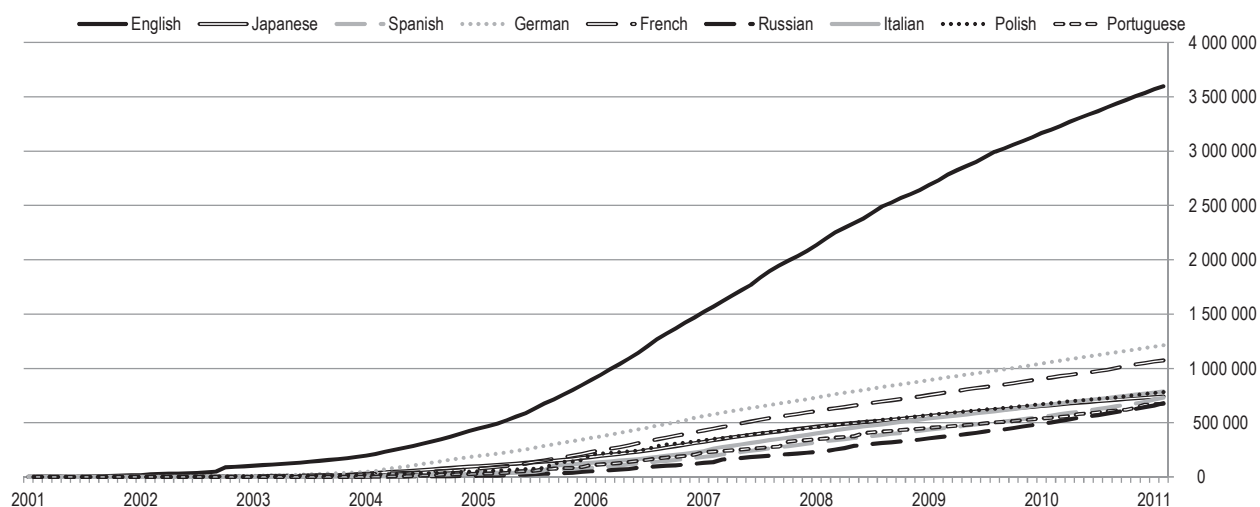


Source: OECD, UNESCO and ISOC (2012), “The Relationship between Local Content, Internet Development and Access Prices”, *OECD Digital Economy Papers*, No. 217, OECD Publishing, doi: [10.1787/5k4c1rq2bqvken](https://doi.org/10.1787/5k4c1rq2bqvken).

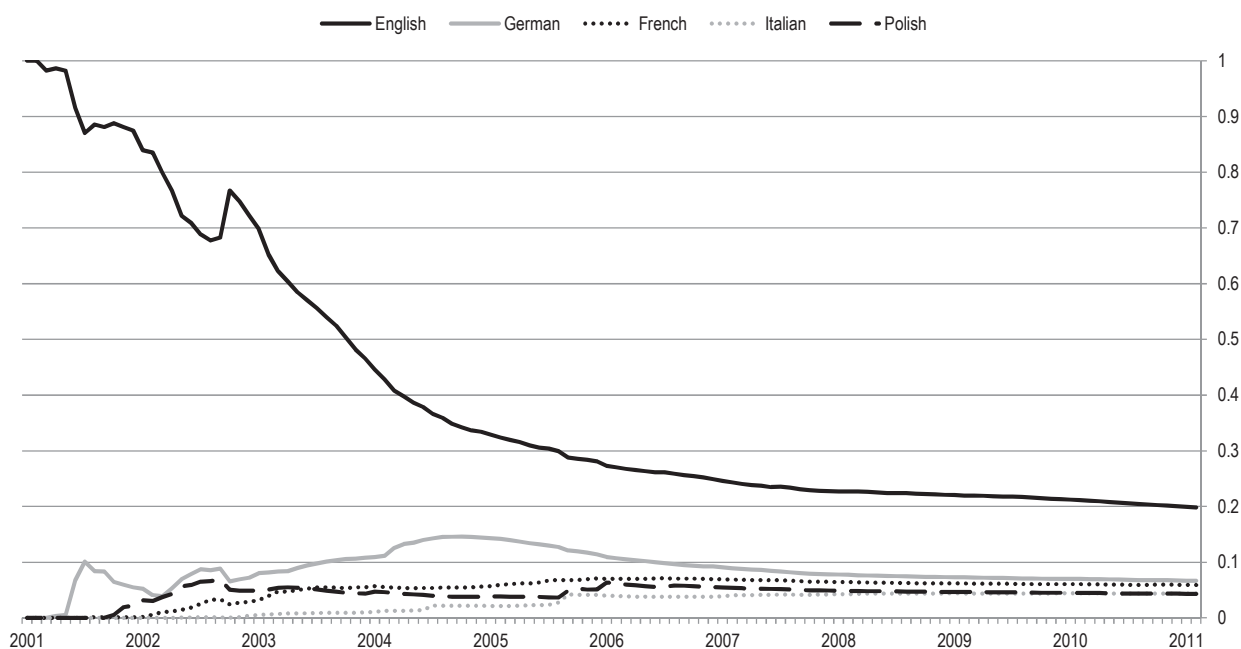
In terms of development, the number of blogs indexed by Google has decreased since 2008 but this is primarily due to a decline of blogs written in English (see Figure 3.5). Whereas the total number of blogs published in other languages than English continues to grow steadily (see Figure 3.6 for the top ten languages indexed).

Figure 3.6. Number of blogs indexed by Google (top 10, non-English)

Source: OECD, UNESCO and ISOC (2012), “The Relationship between Local Content, Internet Development and Access Prices”, *OECD Digital Economy Papers*, No. 217, OECD Publishing, doi: [10.1787/5k4c1rq2bqvken](https://doi.org/10.1787/5k4c1rq2bqvken).

Figure 3.7. Total Wikipedia articles by language

Source: OECD based on Wikipedia.org (2012), <http://stats.wikimedia.org/> accessed in April 2012.

Figure 3.8. Proportion of Wikipedia articles by language (top-10 languages)

Source: OECD based on Wikipedia.org (2012), <http://stats.wikimedia.org/> accessed in April 2012.

Crowd-source websites such as Wikipedia have been providing a viable platform for the creation, storage and dissemination of community-developed and peer-reviewed content. As such, they provide a good means of measuring developments in the area of online content.

A first main finding is that Wikipedia has experienced an impressive growth over the last years. The number of articles continues to increase at a rapid pace, particularly in English, as shown in Figure 3.7. A second finding relates to the composition of languages (see Figure 3.8). After the initial dominance of a very small set of languages – mainly English – the share of English is declining although the total amount of English content is growing. While articles in English mainly dominated Wikipedia when it first started, only about 20% of all Wikipedia articles were in English in 2011, “while it was estimated that 27% of Internet users were English speakers” (OECD, UNESCO and ISOC 2012).

Overall, these developments give an indication that the Internet plays a very important role, from the creation to the distribution of local content. Perhaps the largest contribution is “the potential it gives to creators to disseminate their content widely and nearly instantaneously at a very low cost” (OECD, UNESCO and ISOC, 2012).

Internet intermediaries

The functions of Internet intermediaries (see OECD, 2010c)

Internet intermediaries provide the Internet’s basic infrastructure and platforms by enabling communication and transactions between third parties. They can be commercial or non-commercial in nature, and include Internet service providers (ISPs), hosting providers, search engines, e-commerce intermediaries, payment intermediaries and participative networked platforms. Their main functions are: *i)* to provide infrastructure; *ii)* to collect, organise and evaluate dispersed information; *iii)* to facilitate social communication and information exchange; *iv)* to aggregate supply and demand; *v)* to facilitate market processes; *vi)* to provide trust; and *vii)* to take account of the needs of both buyers/users and sellers/advertisers. Related public policy issues concern notably their roles, legal responsibilities and liability for the actions of users of their platforms.

A source of economic growth and innovation

Against the backdrop of a broadening base of users worldwide and rapid convergence to IP (Internet protocol) networks for voice, data and video, Internet intermediaries offer increasing social and economic benefits through information, e-commerce, communication/social networks, participative networks and web services. They contribute to economic growth through productivity gains, lower transaction costs and wider ICT-sector growth. They operate and largely maintain the Internet infrastructure that now underpins economic and social activity worldwide. They help ensure continuing investment in physical and logical infrastructure to meet the network capacity demands of new applications and an expanding user base.

The services provided by Internet intermediaries create network externalities in that their value depends on having a critical mass of users. They also often operate in two-sided markets as intermediary between different groups, such as users and advertisers or buyers and sellers and they adopt pricing and investment strategies designed to attract both sides and balance their interests. For example, online advertisers, which now represent over 10% of global advertising revenue, allow intermediary platforms to provide increasingly sophisticated content and services at no monetary cost to users. Other revenue models include subscription and paid “on-demand” service models, brokerage fees, donations, and community development models for content or software.

The pace of change of Internet services and their technical complexity make it difficult to achieve stable, established business practices. Also, because of the blurring of boundaries between national statistical classifications and the creation of new areas of activity that are not necessarily based on transactions, measurement is more challenging. Nonetheless, the available data indicate that these markets are a significant source of growth, innovation and competition.

For example, US census data show that identified Internet intermediaries represented at least 1.4% of GDP value added in 2008: ISPs, data processing and web hosting providers, and Internet search engines accounted for 0.6%; retail e-commerce intermediary platforms for 0.2%; and wholesale e-commerce intermediary platforms for 0.57%. In comparison, the broadcasting and telecommunications sector accounted for 2.5% of GDP value added and the publishing industries for 1%.

Internet intermediaries stimulate employment and entrepreneurship by lowering barriers to starting and operating small businesses and by creating opportunities for previously impossible “long-tail” economic transactions (i.e. sales of many items in small quantities). They enable creativity and collaboration among individuals and enterprises and generate innovation. They facilitate user empowerment and choice, along with improved purchasing power through downward pressure on prices. By establishing user trust, they enable individuality and self-expression and can help advance fundamental values such as freedom and democracy.

Policy developments in the area of digital content

To exploit the benefits of the creation, distribution and use of digital content, governments have worked in various areas since the Seoul Ministerial in 2008.⁴

Two main areas could be identified. First, governments worked towards ensuring that the underlying information and communication infrastructure, such as access to high-speed networks, is available and accessible. In many countries, significant investments have been made to increase access to broadband Internet (see also OECD, 2012d). One example is the deployment of Australia’s Broadband Network, which includes delivering local broadband hubs in regional Australia. And in Sweden, for instance, more spectrum has been made available for radio communication for mobile broadband.

Governments have also directly been promoting the development of local content and the use of digital content in the areas of skills and education. In Australia, for example, the government has established community websites and portals and has created “virtual town squares” to support the development of high-quality educational digital content. Belgium is also promoting the development of local content through its Heritage 2.0 project, focused on the digital accessibility of cultural heritage, providing the user with a historical time traveller, able to map a visit at a historical or cultural site according to personal interests and preferences. Canada’s Interactive Fund (CIF) will support the creation of new forms of interactive cultural content and services developed by Aboriginal, ethnocultural and OLM (Official Language Minority) communities and other not-for-profit cultural organisations, to better reflect today’s environment. In Ireland, the National Centre for Technology in Education (NCTE) expanded its digital content for schools through the provision of World Book and Britannica Online to provide a central resource to teachers, pupils and parents in order to offer access to a growing repository of different digital content products.

In addition, governments and other stakeholders have increasingly been investigating the roles and responsibilities of Internet intermediaries for the actions of third-party users of their platforms (OECD, 2011e). As the Internet permeates all aspects of the economy and society, there is increasing national and international pressure from governments, holders of intellectual property rights, child protection groups, some consumer groups and others to involve Internet intermediaries in helping, for example, to control intellectual property (IP) infringement, protect children, reduce fraud, or improve cyber security.

The work conducted to date explores questions such as whether, when, to what extent and how Internet intermediaries should help to address issues related to content originated by third parties using their platforms or services? What would the consequences be for online innovation, free speech, and various business models?

Since existing legal frameworks limiting the liability of Internet intermediaries were established, new issues have arisen, on-going issues have increased in scale, and the scope and types of Internet intermediaries have continued to evolve, creating regulatory challenges and a large quantity of case law. In particular:

- The notions of intermediary and content provider are increasingly blurred, especially on participative networking sites.
- New types of intermediary or intermediaries whose role has increased (e.g. search engines and social networking sites) raise questions about the need for distinct safe harbours and questions on the different categories of activity and the size of intermediaries.
- Pressures and priorities differ in terms of responsibility for copyright, pornography, privacy, consumer protection or security, raising questions as to whether “one-size-fits-all” and horizontal regimes are workable or desirable.
- Ex ante filtering rather than ex post take-down is increasingly called for, or provided voluntarily, by some intermediaries for some types of content/activity raising questions about whether and how the law should intervene, the cost, and possibilities for automation.
- Assessing the costs and benefits of new policy proposals on public and user interests is critical and safeguards should be provided to ensure respect for fundamental rights.
- Consultation with all interested stakeholders in developing policies can help form the multi-stakeholder partnerships necessary to address complex emerging Internet policy issues.
- The global distribution of and access to online content and services by multinational operators make the global dimensions of liability rules increasingly relevant.

Market forces or self- and co-regulatory initiatives, informally encouraged by governments, can in many cases help resolve issues, improve standards of operation, or advance particular principled ideas, without the need for legislative intervention.

Areas for future work on digital content

In the field of digital content, different areas for future work are proposed:

- *New measuring techniques for digital content, in particular online content.* The OECD is currently conducting a feasibility study in co-operation with the European Commission towards developing new Internet-based statistics including online content statistics. Based on this study, additional measures could be developed in order to amplify measurement techniques, especially by using data retrieved via search engines.
- *Measuring the impact of digital content and online content in particular.* The Internet is a key source of innovation in OECD countries and has become the key platform for new communication services, as well as for distributing digital applications and content through new business models. The development of new services, as well as the distribution of applications and online content, plays an important role in the economy. This work would build on existing studies to examine the impact of new communications industries and digital services and content industries on the economy as a whole.
- *Future analyses of online content areas.* To date, sectors that have been analysed in the area of online content include games, music, film, news, advertising, virtual worlds and local content. As local content is growing, further work could be undertaken in co-operation with other international organisations such as UNESCO. Work could focus on measuring local content and assessing the potential of local content in the area of education. Regarding new areas of work, very interesting developments are currently taking place in the areas of the digital book market and “smart apps” for mobile devices (see OECD 2012a). Analytical work in these two areas is proposed.
- *Intellectual property protection.* In all digital content areas, intellectual property protection has become an important factor. It is thus proposed to undertake work on the economics of copyrights. As national IP systems evolve, the changing digital environment might call for a number of modifications to these systems to promote economic growth and societal innovation. This is particularly pertinent in the area of copyright, where the relevant industries observe a major shift of business models caused by technological progress. Clearly, any discussion about the IP system requires sound empirical evidence. Even though there are several patent-based studies, little economic (especially quantitative) research has been carried out so far on the economic importance of copyrights, trademarks etc.
- *The link between digital content and big data.* An emerging area of interest in the Internet economy is the area of “big data”. Analyses could be undertaken that assess the links between big data and digital content and specific content areas such as virtual worlds and smart apps.
- *The link between cloud computing and online content.* Cloud computing is supposed to provide a platform that is stimulating innovation and the creation of new businesses. In the context of further work on cloud computing and online content, there could be an assessment of how the cloud impacts the creation, storage and dissemination of various forms of online content, and how the inter-linkage of cloud computing and online content could help to encourage “universities,

government, public research, users and business to work together in collaborative innovation networks” as called for in the Seoul Declaration (OECD, 2008a).

- *The costs and benefits of involving Internet intermediaries in advancing public policy objectives.* There are a number of initiatives where Internet intermediaries play a role in advancing public policy objectives, but these are still in their early stages. However, some data are now available in some areas (for example regarding the role of ISPs in combating malware security threats, or counterfeiting). Analysing overall social costs and benefits — both quantitative and qualitative — can help inform policy debates internationally.

Areas for future work on public sector information

The areas of digital content and public sector information are closely interlinked, as PSI is often delivered digitally. In the following pages we will look at developments in this area and potential areas for future work.

The 2008 “OECD Recommendation of the council for enhanced access and more effective use of public sector information” (OECD, 2008c) provided a general framework for countries. It aimed to increase the returns on public investments in PSI and to increase economic and social benefits from better access and wider use and re-use, in particular through more efficient distribution, enhanced innovation and development of new uses. It outlined several principles that, together, form a framework. The following list provides an overview of these principles:

- Openness
- Access and transparent conditions for re-use
- Asset lists
- Quality
- Integrity
- New technologies and long-term preservation
- Copyright
- Pricing
- Competition
- Public-private-partnerships
- International access and use
- Best practices

Public sector information is on a continuum with public content, where PSI is information generated by governments that tends to be readily reusable (e.g. geographical and meteorological information) and where public content is held by governments for a clear public good task and includes e.g. public cultural holdings, public archives etc.

There is a wide variety of examples of the re-use of PSI. Some notable examples are:

- *Buienradar.nl*: Through a website and mobile apps, the service offers high-resolution rain radar images of the Netherlands and a prognosis of where rain will fall. It is among the top ten most used websites in the Netherlands according to

Multiscope (2010). The website makes use of images procured from the Dutch meteorological institute KNMI.

- Flight tracking websites, which allow real-time tracking of flights by passengers, but also by various commercial organisations, for instance airlines and their corporate customers.
- Websites that track crime in a particular region. For instance in the United Kingdom, *www.police.uk* can give an overview of crime based on the name of the area or a postal code. Other countries have similar commercial and non-commercial websites.
- Many maps and sites with geographical information are based on PSI. More and more governments are opening up access to this data for private sector re-use and some governments are even giving free access to the data.
- The Guardian newspaper in the United Kingdom has a blog dedicated to data that often makes use of PSI to discuss public policy issues.

Though this is a very limited list, it is clear that information held by the public sector can be re-used in many different ways other than those originally foreseen by the public sector entity that collected it.

In recent years, several OECD countries have initiated projects that promote the re-use of PSI. One of the most visible has been the launch of *data.gov* of the United States government in 2009, which aims to be a central asset list and repository of PSI. This initiative was followed in several other countries, for instance in the United Kingdom which established *data.gov.uk* in 2010 under the guidance of Sir Timothy Berners-Lee, in Australia with *data.gov.au* and in Spain, where *www.aporta.es* became a central point for public sector data. Other countries had similar initiatives.

The Internet is the main driver behind the push for greater re-use of PSI. It allows the easy dissemination of data to those who want to re-use it. In turn, the data are combined, enriched and displayed through websites, mobile apps etc. in new ways that were not easily achieved before the widespread use of the Internet. “Big Data” is an equally important trend that helps develop the re-use of PSI. Many PSI datasets used to be too big to manage except by those who generated them. Today, large datasets have become the norm and tools have been developed that allow users to handle these large datasets in meaningful ways. This allows for the integration of several large datasets into one single view. An interesting example is the display of flight tracking information over an online map. Only a few years ago, only national aviation authorities were in a position to provide this information.

Many governments and private initiatives, both national and regional, have invested in projects and competitions to find innovative uses of government data. Such projects do not only stimulate the users of data to come up with new uses, but also stimulate governments to evaluate the different sources of data that are available and whether these sources could be made available to third parties.

In 2011 the Danish government held a competition in which the winners could win USD 18 000 for an idea that made innovative use of public data. The winning ideas used public data to optimise the energy efficiency of houses, for analysis of political data and to find a public toilet. The Open Government Data Camp, in 2011 in Poland, brings together 400 experts not only to discuss PSI, but also to work together on new projects. It is supported by various governments and NGOs.

The evaluation of the Recommendation in 2012 will delve deeper into where the countries stand with regard to PSI and what the results are. It does seem from an analysis of data and also from the talks and actions of political leaders that the topic has become more important for countries to focus on. For the OECD, the main area for future work will be the review of the Recommendation on Public Sector Information.

Another potential area of future work could consist in the exploration of the links between big data and PSI.

Sustainability – Green ICTs

The Seoul Declaration and green ICTs

Green ICTs contribute to tackling climate change. They have the potential to increase efficiency in many different areas, such as energy, buildings and transportation and thus to reduce greenhouse gas emissions significantly. As their increased efficiency provides economic incentives for businesses to use green ICTs, their impact on effectively reducing greenhouse gas emissions is increasingly important. The field of green ICTs is closely interlinked with the emergence of smart devices, as many green ICT applications rely on sensor technology.

In the Seoul Declaration, ministers agreed to “harness the potential of the Internet to tackle global challenges, such as improving energy efficiency and addressing climate change” (OECD, 2008a).

Recent developments in green ICTs

A major result of the Seoul Declaration was the “Recommendation of the Council on Information Technologies and the Environment” (OECD, 2010d). The recommendation asks governments to:

- Co-ordinate ICT, climate, environment and energy policies to improve environmental performance, tackle climate change, enhance energy efficiency and improve sustainable resource management.
- Adopt life-cycle perspectives in ICT and ICT-enabled applications for sustainable management of natural resources and materials in production, use and end-of-life phases.
- Support research and innovation in green technologies and services.
- Develop green ICT skills, through education, training and skills development.
- Increase public awareness of the role of ICTs in improving environmental performance through standards and labels.
- Encourage the wide sharing of best practices.
- Lead by example by using green ICT approaches, applications and services.
- Improve public procurement, so that it takes greater account of environmental criteria in procurement of ICT goods and services.
- Encourage the measurement of environmental impact of ICT goods and services.
- Set policy targets and increase evaluation.

By implementing the recommendation, governments can limit the environmental impact of ICT goods and services and use ICTs to decrease the environmental impact of other uses of goods and services (enabling impact).

The recommendation only dates from 2010 and therefore has not yet been evaluated. However, there are various indications that governments are seeing the role that ICTs can play in greening the economy. Governments are taking measures to increase the efficiency of ICTs and to reduce energy consumption by ICTs in government. For instance, the United States Federal Government has embarked on a programme to reduce the number of data centres it uses from 2 100 to 1 300 in 2015 by consolidating the data centres and moving applications to the cloud. The effect will be a dramatic reduction in energy used by these data centres. Other governments are embarking on similar projects because of the possible financial and energy savings that can be achieved.

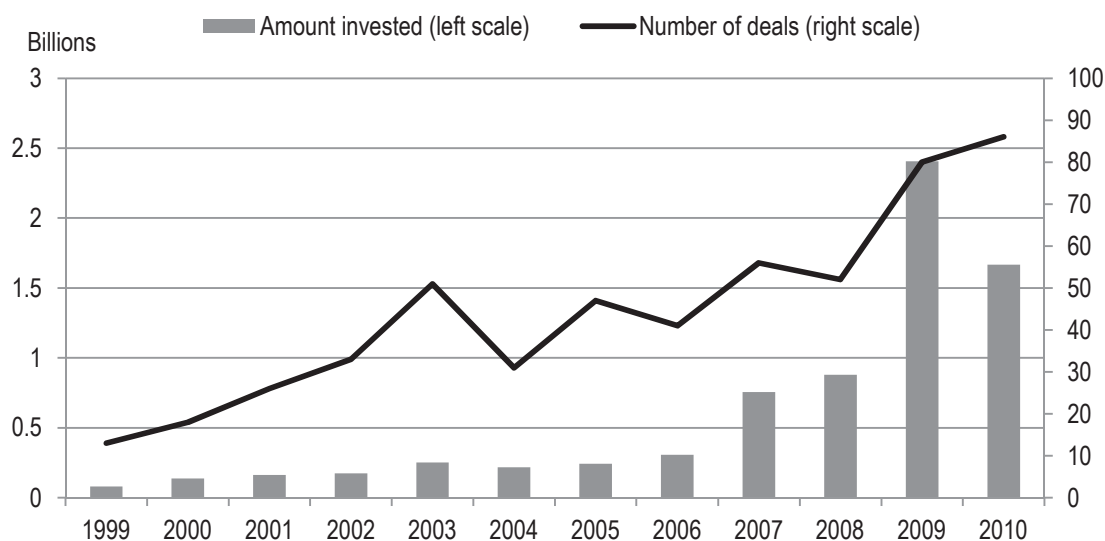
Another example of greening the economy through the use of ICTs is the implementation of smart metering and smart grids for electricity and gas networks that many countries have embarked on. These have been analysed in the report “ICT applications for the smart grid: Opportunities and policy implications” (OECD, 2012b). These programmes have two main goals: On the one hand governments raise consumers’ awareness of the amount of energy they use and on the other hand they create networks that are ready for the decentralised generation and distribution of energy through the use of alternative sources of energy. In order for these networks to become smart, they need to deploy sensor networks, a concept that was explored in Smart Sensor Networks: Technologies and Applications for Green Growth (OECD, 2009b).

Another way of looking at green ICTs and their potential savings was explored in “Network developments in support of innovation and user need” (Enck and Reynolds, 2009). Here the question was what level of savings in four major sectors (health, energy, transport and education) had to be achieved to justify a national fibre network. It concluded that a saving of 4% to 11% over 10 years in the electricity sector alone is large enough, on average, to pay to build a national fibre-to-the-home network without taking into account any other spill-over effects. For the area of transportation, it concluded that a saving of 2% to 8% on transport alone would pay for the whole network. The report, however, was not meant to show how those savings could be achieved. What the report does show is that investments in ICTs could go hand in hand with investments and savings to make the economy green.

Developing green ICT skills is another way of approaching the challenge. This was analysed in “ICT skills and employment” (OECD, 2012c). Designing systems with their life cycle and environmental impact in mind requires a different way of thinking than engineers may currently have. In recent years, energy consumption has become more important in the design of ICT-systems, but it continues to be a challenging topic for engineers to tackle as it requires not just solving the problem at hand, but also overseeing the long-term implications of the solution on energy and resource usage. It is an area, however, where growth is expected, which is shown by the amount of venture capital that is invested in the area (see Figure 3.9).

Figure 3.9. Venture capital investments in ICT-intensive clean technologies¹, 1999-2010

USD billions



Note: This includes seed, first round, follow-on, private equity, and mezzanine investments in firms focusing on the following clean technologies: *i)* electric & hybrids, *ii)* electro textiles, *iii)* electronic, *iv)* flow batteries, *v)* lithium-ion, *vi)* power monitoring & metering, *vii)* sensors, *viii)* sensors & controls, *ix)* smart grid, *x)* smart irrigation, *xi)* smart lighting systems, *xii)* smart metering & control, *xiii)* software, *xiv)* software systems, *xv)* traffic monitoring software, and *xvi)* ultra-capacitors.

Source: OECD based on the Cleantech Market Insight Database (2011), www.cleantech.com, accessed in September 2011.

That it is an area that needs ICT-related jobs can be seen from a table in the same report (see Table 3.4).

Table 3.4. Occupations in demand due to the deployment of selected green technologies

Green technologies	Representative occupations in demand
Energy efficient building	Electricians, heating/air conditioning installers, carpenters, construction equipment operators, roofers, insulation workers, carpenter helpers, industrial truck drivers, construction managers, building inspectors
Smart grid	Computer software engineers, electrical engineers, electrical equipment assemblers, electrical equipment technicians, machinists, team assemblers, construction labourers, operating engineers, electrical power line installers and repairers
Wind power	Environmental engineers, iron and steel workers, millwrights, sheet metal workers, machinists, electrical equipment assemblers, construction equipment operators, industrial truck drivers, industrial production managers, first-line production supervisors
Solar power	Electrical engineers, electricians, industrial machinery mechanics, welders, metal fabricators, electrical equipment assemblers, construction equipment operators, installation helpers, labourers, construction managers
Cellulosic biofuels	Chemical engineers, chemists, chemical equipment operators, chemical technicians, mixing and blending machine operators, agricultural workers, industrial truck drivers, farm product purchasers, agricultural and forestry supervisors, agricultural inspectors

On a global level, the importance of greening the economy was demonstrated in the OECD Forum on Green Growth in 2011 and during the 2011 OECD Ministerial meeting, where four reports were presented on green growth:

- “Towards Green Growth” (OECD, 2011b) provides a practical framework for governments in developed and developing countries to boost economic growth and protect the environment.
- “Towards Green Growth: Monitoring Progress - OECD Indicators” (OECD, 2011c) outlines a framework and monitoring tools that can help governments measure progress towards green growth.
- “Towards Green Growth: A Summary for Policy Makers” gives an overview of the key messages (OECD, 2011d).

As a result, the OECD has started more work on green growth in all the sectors it focuses on and the role that ICT can play as one of the enablers.

National policy developments in green ICTs

Here we will present some concrete examples to show what has been done at national levels. These examples are taken from the responses to the questionnaire for the *OECD Information Technology Outlook 2010*.

First of all, countries have engaged in creating awareness of the fact that ICT innovation is a crucial element to foster green growth. Several conferences and expert meetings have been organised to discuss the opportunities, existing challenges and policy issues. Examples include the OECD ICCP Foresight Forum “Smart ICTs and Green Growth” in 2010 (OECD, 2010e) and the Conference on “ICTs, the environment and climate change” in Denmark in 2009 (OECD, 2009e).

In addition, a number of initiatives have been targeted toward efficient and effective energy use. Some governments have undertaken green ICT initiatives and programmes. Examples include Australia’s ICT sustainability plan, which is directed towards government procurement of ICT products and services. In Denmark, the government is establishing a private cloud to host all government servers in a highly virtualised and energy-efficient environment. Other examples can be found in the areas of promoting smart grids and smart transportation.

Portugal’s “InnovGrid” project launched to promote the use of smart grids, including the installation of smart meters, which is allowing for remote energy management, as well as the US Smart Grids plan, which aims at making the US power distribution system secure, more efficient and environmentally friendly. In the area of smart transportation, several initiatives have been undertaken, including projects on electric vehicles, smart routing, intelligent transportation systems and smart ticketing for public transportation. The EU Commission has, for example, funded a series of projects for electromobility (e.g. ICT 4 EVEU, MOBI.EUROPE). Many OECD Member countries such as Germany and Portugal also have programmes on electromobility underway and smart ticketing is also well advanced, for instance in the Portuguese cities of Lisbon and Porto.

Other ways to work towards efficient energy usage include engaging the private sector to improve energy efficiency or educate consumers. The Netherlands, for example, established the “Long-term agreements” programme in which the industry committed to improve energy efficiency by 2% annually between 2005-2010. In the area of educating consumers, Denmark launched an initiative to address the huge amount of energy being consumed in private homes. The Danish government offers a web service that provides targeted advice to homeowners on possible energy savings in their homes.

But energy efficiency has not been the sole area that countries have focused on to stimulate green ICTs. Several policy initiatives in the field of waste management are underway, such as the National Waste Policy for Australia 2020, the Egyptian e-Waste Management Initiative and the Estonian environmental strategy 2030 that also focuses on waste management. In addition, Governments have also made efforts to include social and behavioural factors into waste management policies. Austria, for example, has implemented an Eco-label that provides information on environmental impacts of production, use and waste disposal of products and presents environmentally friendly product alternatives to consumers.

Governments have also focused on the move to a low-carbon economy. Australia, for example, has put in place the National Carbon Accounting Toolbox (NCAT) and the Australian Green House Emissions Information Society (AGEIS). Korea has established a national strategy for green ICT and the United Kingdom has developed a Low Carbon Industrial Strategy.

Overall, countries have also started to develop policies with the aim of sharing best practices on how to leverage ICTs for the environment. The Danish government, for example, has established a website with a large number of green ICT solutions and uses cases from both the public and the private sector. The country also organises competitions and celebrates the best green ICT initiatives in Denmark, in co-operation with the Danish IT Industry Association and the Danish IT Society.

Areas for future work on green ICTs

Future work in the area of green ICTs could focus on two main areas.

- *Reducing direct negative effects of ICTs.* Future work could analyse the environmental impact of the growth of mobile, handheld devices on the one hand and cloud computing on the other hand. Moving more and more computing power to the cloud allows for “leaner and smaller” devices that do not need very high storage capacities any more. This could reduce energy consumption significantly. On the other hand, the increasing number of devices poses some challenges regarding the material and energy in use for the production but also for the disposal of devices.
- *Emerging trends in smart technologies:* Based on the work undertaken in 2011 and 2012, work in this area could focus on developments in smart energy provision, smart water management and smart transportation in co-operation with other parts of the OECD, including the International Energy Agency. Those smart technology areas that were formerly separated from each other will become increasingly interlinked via the Internet. Work could also analyse these linkages and provide an overview of how policy makers could deal with the convergence of these sectors.

Notes

1. Online content refers to digital content delivered over the Internet or other digital networks.
2. In the literature, the term “serious game” is used to refer to game-like applications used in areas other than pure entertainment (see OECD, 2011a).
3. Local content has been defined as: “an expression and communication of a community’s locally generated, owned and adapted knowledge and experience that is relevant to the community’s situation” http://portal.unesco.org/ci/en/ev.php-URL_ID=14206&URL_DO=DO_TOPIC&URL_SECTION=201.html.
4. The following paragraphs are based on responses to the questionnaire for the 2010 OECD Information Technology Outlook.

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Chapter 4

Empowering and protecting consumers

This chapter provides an overview of developments since the Seoul Declaration in business-to-consumer (B2C) e-commerce – at both domestic and international levels – and identifies some remaining obstacles to its expansion. It focuses on a selected number of issues that raise important ongoing and emerging consumer concerns that require attention. These include complex legal landscapes; inadequate information disclosure; fraudulent and misleading commerce practices; geographical restrictions; privacy concerns; and inadequate dispute resolution and redress.

The statistical data for Israel are supplied by and under the responsibility of the relevant Israeli authorities. The use of such data by the OECD is without prejudice to the status of the Golan Heights, East Jerusalem and Israeli settlements in the West Bank under the terms of international law.

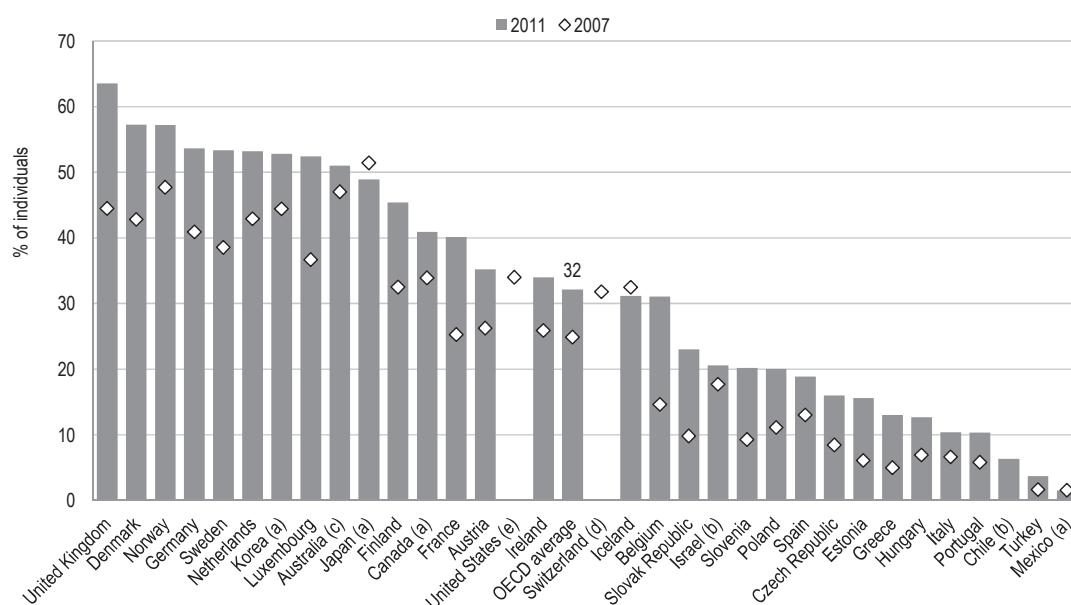
Business-to-consumer e-commerce developments

Growth of the e-commerce marketplace

It is not easy to measure the volume of business-to-consumer (B2C) e-commerce. Data are not available in all countries, and when the data are there, they are not always comparable.¹ Statistics can vary – sometimes quite significantly – from one source to another (e.g. e-commerce platforms, market research firms, and official government statistics) and depending on the product category (goods or services) or the nature of the transaction under consideration (domestic versus cross-border). However, available data and estimates generally show that, since 2008, the market has grown steadily on a global basis. According to private sector data, the Asia-Pacific region is expected to become the largest B2C e-commerce marketplace by 2013 (representing a 34% of total sales share against 31.1% in 2012), followed by North America (31.6% of total sales share in 2013 against 33.4% in 2012), and Europe² (29% of total sales share in 2013 against 30.2% in 2012) (EMarketer, 2012a).

In the OECD area, the average proportion of consumers purchasing products via e-commerce increased from about 25% of individuals in 2007 to 32% in 2011. In the same year, the United Kingdom topped the list of countries in which consumers engaged the most in e-commerce (almost 64% of individuals in 2011 against about 44% in 2007), followed by Denmark, Norway, Germany, Sweden, the Netherlands and Korea with more than 50% of individuals purchasing products online (Figure 4.1).

Figure 4.1. Individuals who ordered or purchased goods or services on the Internet, 2011 or latest year available (percentage of individuals)



Note: Data from the EU Community Survey covers EU countries plus Iceland, Norway and Turkey. It refers to individuals aged 16-74 years, except for Canada (16+), Israel³ (20-74), Japan (6+), Switzerland (14+). Data refer to individuals who have bought or ordered goods or services over the Internet, for non-work use, in the last three months (for countries covered by Eurostat). For the rest of the OECD countries it refers to individuals placing orders over the Internet in the last 12 months. Information on data for Israel: <http://dx.doi.org/10.1787/888932315602>.

(a) 2010; (b) 2009; (c) 2008; (d) 2005; (e) 2003.

Source: OECD (2012), *OECD Internet Economy Outlook 2012*, OECD Publishing, doi: [10.1787/9789264086463-en](https://doi.org/10.1787/9789264086463-en).

In addition to the number of consumers using the Internet to purchase products, other indicators, such as the volume of sales, are being looked at to help measure growth. In Europe, between 2008 and 2011, the value of online retail sales⁴ nearly doubled, from EUR 117.84 billion in 2008, to EUR 200.52 billion in 2011. In the United Kingdom, online retail sales grew from 8.6% of total retail sales in 2008, to 12% in 2011. In France, online retail sales amounted to 7.3% of total retail sales in 2011, representing a 24% increase from 2010 (Center for Retail Research, 2012). In the United States, e-commerce sales (including retail and selected services) increased by 10.3% between 2009 and 2010 (from USD 385 billion in 2009 to USD 424 billion in 2010, accounting for 4.4% of total retail sales and 2.3% of total revenues in selected services industries, including transportation, publishing (non-Internet) and securities/brokerage (US Census Bureau, 2012).

In some emerging countries, such as China and Brazil, growth has been exponential. In Brazil, in 2011, the value of online sales amounted to about USD 11 billion (about EUR 8.5 billion), a 26% increase from 2010 (Forbes, 2012). In China, the volume of online sales increased dramatically from CNY 1 28.2 billion (about EUR 15.6 billion) in 2008 to CNY 773.6 billion (about EUR 93.9 billion) in 2011, representing approximately a 500% growth (iResearch, 2012). In March 2010, 41% of Chinese Internet users spent more than 10% of their monthly spending in online shopping; this contrasts with the situation in other developing countries, including Egypt, Saudi Arabia, South Africa, Pakistan and the United Arab Emirates where about 47% of Internet users had never made an online purchase (Nielsen, 2010).

A number of converging factors have facilitated the growth of e-commerce. These include *i*) increased Internet and broadband penetration and the proliferation of mobile devices; *ii*) enhanced consumer choice and lower prices, *iii*) customised consumer experience, and *iv*) increased competition.

Increased Internet and broadband penetration

Back in 2008, consumers with broadband access were described as the most active in e-commerce (OECD, 2009). In recent years, broadband connections have notably boosted digital content products purchases, enabling consumers to download larger files quickly and at relatively low cost (OECD, 2012, Chapter 5). In 2011, in the OECD area, an average of almost 67% of households reported a broadband subscription (OECD, 2012, Chapter 3).

In developing countries, the proportion of households with Internet access increased from 12.5% in 2008 to 20.5% in 2011. The proportion of individuals using the Internet increased from 14.7% in 2008 to 24.4% in 2011 (ITU, n.d.).

Enhanced consumer choice and lower prices

Consumers can today access a wider range of products at lower prices *via* e-commerce (OECD, 2012, Chapter 5). Research carried out in 17 EU Member States between December 2010 and February 2011 reveals that online products⁵ are indeed generally offered at lower prices than those sold offline, resulting in consumer welfare gains of EUR 2.5 billion (Civic Consulting, 2011, p. 9).

Among the many categories of product that are today available *via* e-commerce, consumers increasingly purchase intangible digital content products (i.e. goods and services delivered electronically), through downloading and streaming. Such growth in

demand, which concerns a wide range of OECD countries, is expected to continue to rise in the near future; in 2010, the European Commission predicted that by 2020, digital content and related applications should become almost entirely delivered online in the EU area (EC, 2010). In the United States, in 2010, 65% of Internet users paid to download or access online content (Pew Internet & American Life Project, 2010).

In 2011, digital content products were the fastest growing e-commerce category, with a 26% growth rate, followed by consumer electronics. An increase in e-book downloads has been seen as a strong driver of this growth (ComScore, 2012, p. 28). In a 12-month period ending in February 2012, one-fifth of Americans had read e-books (Pew Internet & American Life Project, 2012). In the United Kingdom, in 2009, some 34% of consumers streamed videos online and 20% purchased music online (Consumer Focus, 2010). In France, between March 2011 and March 2012, digital music sales increased by 15.7% while total sales of the music market decreased by 9% (SNEP, 2012). In Japan, in 2010, the market for digital content was estimated at JPY 6 815.8 billion (about EUR 68.2 billion), an increase of 10.9% from 2009 (DCAJ, 2011). Survey results show that in Australia, from November 2010 to April 2011, 34% of consumers purchased audio or video content online (ACMA, 2011).

Customised consumer experience

To help consumers engage further in e-commerce and provide them with a more convenient experience, some reward and loyalty programmes have successfully been implemented in recent years. For example, Amazon's "Prime" model enables consumers, subject to an annual subscription fee, to get a free two-day product shipping with no minimum size order, unlimited instant streaming of a large number of movies and TV shows, as well as limited free lending of e-books for those consumers owning Amazon's e-reader device (the "Kindle"). These advantages may also be passed on, although to a limited extent, to a third party of the subscriber's choice. Providing more individualised and convenient experiences to consumers has included enabling them to purchase single music tracks instead of full albums, or selected chapters of a book. For example, some travel book companies, like Lonely Planet, allow consumers to purchase selected chapters of its country guides rather than the entire book so as to enable consumers to customise their product (which can be printed out and downloaded multiple times on a variety of digital devices) to their travel itinerary. Moreover, through on-demand "windows" for film and TV, consumers can watch a premiere of a TV event or movie. Companies such as Hulu (the video platform of News Corp, Walt Disney, and NBC Universal) are now expanding their on-demand windows offers by enabling a consumer, for example, to watch the full season of a TV series based on a monthly subscription fee. And consumers can do so from a variety of platforms including mobile devices, console game players, Internet enabled TVs, and PCs.

Consumer access to their own personal data

In some countries, such as the United Kingdom, enhancing consumer access to their own personal data within the context of commercial transactions is being regarded as an increasingly important means to empower consumers that should also drive innovation and enhance competition in the marketplace. Such a tool will help consumers make better informed decisions by being able to compare prices, get an overview of their transactions history, and/or look at the value of their own data. In 2011, the UK launched a voluntary programme, Midata, along with industry, with a view towards providing consumers with increased access to their personal data in an electronic format (BIS UK, n.d.).

Increased competition

Consumers can today purchase products online from a wider range of *i*) shopping platforms, including traditional online retail stores, cloud computing-based e-shops, and social media (such as blogs, and social networking sites), and *ii*) parties, including apps developers, mobile operators, and ISPs. They can do so based on research carried out *via* product and price comparison websites that help consumers quickly to identify cheaper and/or better quality products in one or more countries.

Continued access to the market by new online retailers is seen as an important factor influencing e-commerce activities, leading to more consumer purchases (FEVAD, 2012). According to research, e-retailers that are present in several countries are growing faster than those selling products in just one or two countries (Oracle, 2011a).

Changing consumer demand

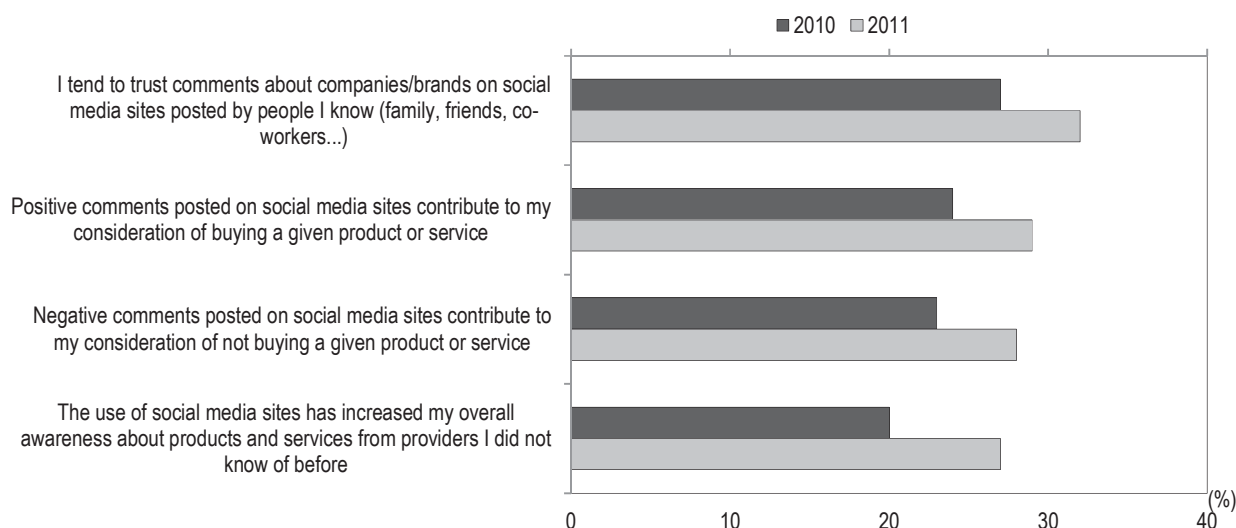
Internet ubiquity, easier access to online information about products and brands, wider product choice and cheaper prices, have changed consumers' shopping attitudes and the commercial strategies of businesses. The economic and financial crisis has accelerated this trend. While shopping online and offline used to be separate experiences until recently, the line between the two areas is blurring. Consumers increasingly search for information online to then purchase products offline, and conversely. Businesses advertising and selling products across various channels including online, mobile, and physical stores are expected to succeed in such changing environments (Oracle, 2011b). Consumers have, for example, the possibility to test products online before purchasing them online or offline. They can preview movies online before watching them in cinemas; they can listen to part of a song track or album online, before downloading it. The spread of mobile devices, including those requiring proximity for mobile payments through Quick Response Codes ("QR codes"), near field communication (NFC) technology, and audio signals, combined with added-value services, such as loyalty rewards (such as m-vouchers) and location-based services, has also helped to bring those consumers, who used to shop exclusively online, back into physical stores.

Mobile commerce

Consumers increasingly use mobile devices to engage in e-commerce. The mobile channel is in that respect seen as a key platform through which e-commerce sales will continue to grow rapidly. Most consumers, including children and young adults, today have ready access to the Internet through smartphones, tablets and e-readers. At the end of 2008, the number of mobile subscriptions worldwide reached 4 billion, with emerging economies being the most dynamic in this area. By the end of 2011, this number reached 6 billion, corresponding to a global penetration of 86% (ITU, 2012). In the United Kingdom, the percentage of sales *via* mobile devices, which amounted to 0.4% of e-commerce sales in 2010 (Q1), reached 5.3% in 2011 (Q4), representing a growth rate of 1 320% over the 2-year period (EMOTA, 2012). In Japan, sales *via* mobile devices, which amounted to EUR 13.4 billion in 2008, reached EUR 18.9 billion in 2011, representing a 40.9% growth (MIC, 2012).

Social commerce

Greater consumer interest in purchasing products through social media, based on other consumers, friends' and family's reviews and recommendations, is also seen as a promising source for further e-commerce growth. Today, consumers tend to regard reviews and ratings on social media as more transparent and trustworthy than traditional advertising (Figure 4.2).

Figure 4.2. Influence of social media in 2010 and 2011

Source: Accenture (2012). *Accenture 2011 Global Consumer Research Survey*, www.accenture.com/SiteCollectionDocuments/PDF/Accenture-Global-Consumer-Research-New-Realities.pdf.

Businesses, in turn, consider such consumer reviews and ratings as key drivers of sales enabling them to keep existing customers and reach out to a potentially larger audience. Brands and e-retailers indeed increasingly use social media as platforms where they can *i)* sell their products directly, *ii)* advertise their products, *iii)* drive traffic to their own e-shop, and/or *iv)* receive feedback from existing or potential customers. Some businesses rely on these sources to help reshape their products' features and thereby meet consumer expectations, on an accelerated basis. For example, on Ideastorm, which is a blog maintained by Dell, consumers can suggest ways to improve the company's products.

Online and mobile payments

In recent years, B2C e-commerce has been facilitated by the growing availability of sophisticated payments mechanisms. These include:

1. Online payments, which are payments made *via* the Internet using, among others:
 - a) credit and debit cards; these may be linked to an online wallet account
 - b) electronic currency systems (or pre-paid payment services);
2. Mobile payments, which can be:
 - a) online payments made via a mobile device (paid by credit, debit, or pre-paid cards),
 - b) payments made through SMS
 - c) payments charged onto consumer mobile operators' bills (OECD, 2013a).

In 2010, the worldwide value of online payments was estimated at EUR 824 billion; this was expected to reach EUR 1 400 billion in 2013. The value of global m-payments was estimated at EUR 62 billion in 2010, with the level expected to reach EUR 223 billion by 2013, mainly driven by developments in developing economies (Capgemini,

2011, p. 16). Research shows that in the United States, the total transaction value for mobile payments will be USD 640 million in 2012, and should reach approximately USD 62 billion in 2016, as consumer usage of smart phones to purchase medium-value products (such as groceries or gas) will continue to increase (EMarketer, 2012b).

The spread of mobile devices, combined with the increased engagement of consumers in social media activities in recent years, has driven the development of new business models offering consumers specific easy-to-use payment mechanisms aimed to facilitate, for example, purchases of intangible digital content products. For example, Facebook Payments, which were introduced in the United States, the United Kingdom and Germany in September 2012, enable consumers to purchase virtual items (such as products used in online games) on the social platform via mobile network operators (International Business Times, 2012).

Geographically, the use of mobile payments varies from country to country. In general, m-payments are mainly used to process low-value transactions. In the United States and Canada, mobile payments are being used primarily to purchase digital and virtual goods (such as music, ringtones, and “in-game” items). In some Asian and European countries, mobile payments are made to purchase a broader range of products, including transport tickets, movie downloads and physical goods (OECD, 2013a).

With the introduction of new payments mechanisms that are based on near field communication (NFC) technology, growth in mobile payments, and, thereby, mobile commerce, is expected to accelerate. A number of mobile operators, payment card networks, and financial institutions, are joining forces in this regard. For example, in February 2012, Visa and Vodafone established a partnership with a view towards enabling Vodafone customers to make small value purchases at retail stores by waving their devices in front of a payment terminal; payment will be made from their Visa pre-paid account. Under the partnership, Vodafone customers will also be able to make high value purchases using a secure password (FT, 2012).

Remaining obstacles to e-commerce

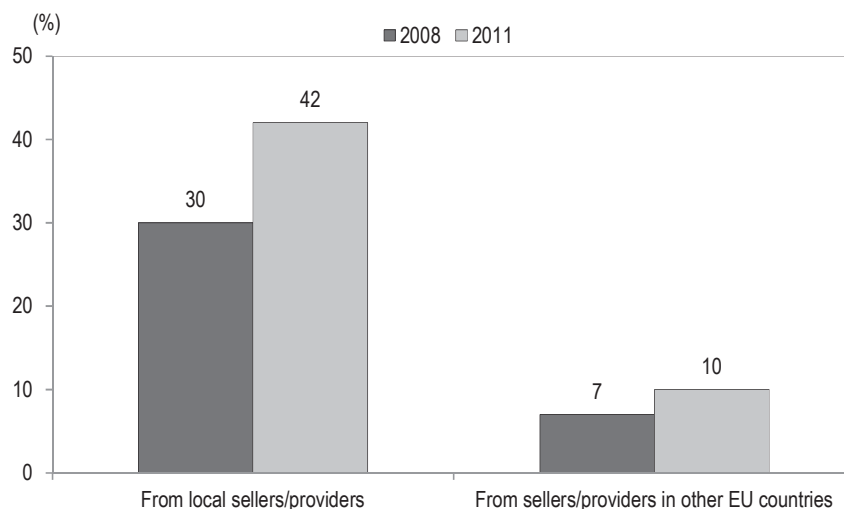
The above developments have enabled continued e-commerce growth, despite the financial and economic crisis. This growth has triggered a number of economic and social benefits, including job creation (EC, 2012b) and enhanced consumer welfare through lower product prices, increased information about products and greater product choice. Private sector research shows that in 2009, the Internet constituted 3.4% of GDP in economies including the G8 countries, China, India, Brazil, Korea, and Sweden (MGI, 2011, p. 12). Estimates further indicate that, over the past fifteen years, in France, while the Internet economy destroyed 500 000 jobs, it created 1.2 million new ones, generating a net 2.4 jobs created for every job cut (MGI, 2011, p. 3). In the United States, in 2010, approximately 13% of business sector value added could be attributed to Internet-related activities (including B2B and B2C e-commerce activities) (OECD, 2012).

Domestic e-commerce still represents a small share of countries’ total retail sales. In Australia, in 2010, it was estimated at 4% of total retail sales (Productivity Commission, Australia, 2011); in France, in 2011, it amounted to 7.3% of total retail sales (Center for Retail Research, 2012); in the United Kingdom, in February 2012, it accounted for 10.7% of all retail sales (excluding fuel) (ONS UK, 2012).

Cross-border e-commerce is also lagging behind. In the European Union (EU), in 2011, online retail sales only accounted for 3.4% of total retail trade (EC, 2012b). Between 2008 and 2011, the number of purchases made by EU consumers in their

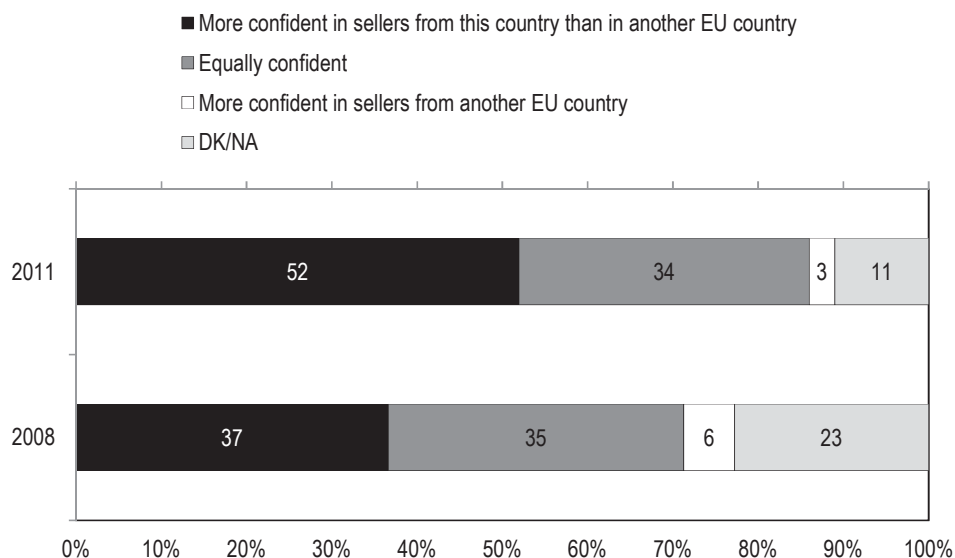
country of residence has been increasing more rapidly than those made across borders (Figure 4.3). Consumer confidence in cross-border Internet purchases actually dropped from 6% in 2008, to 3% in 2011 (Figure 4.4). Moreover, most businesses selling products online still limit their offers to domestic markets (EC, 2012c, p. 47).

Figure 4.3. Domestic and cross-border Internet purchases in EU countries (2008-11)



Source: EC (2012a). Consumers' Attitude toward Cross-Border Trade and Consumer Protection, at: http://ec.europa.eu/public_opinion/flash/fl_332_en.pdf, and EC (2008), Consumer Protection in the Internal Market, at: http://ec.europa.eu/public_opinion/archives/ebs/ebs_298_en.pdf.

Figure 4.4. Consumer confidence in domestic and cross-border Internet shopping in EU countries (2008 and 2011)



Source: EC (2012a), Consumers' Attitude toward Cross-Border Trade and Consumer Protection, at: http://ec.europa.eu/public_opinion/flash/fl_332_en.pdf.

Trust in e-commerce remains affected by a number of problems that both businesses and consumers continue to experience. These include *i)* practical barriers, such as language problems, time required for businesses to set up an effective e-commerce platform, and a lack of interoperability of delivery and payment systems; and *ii)* regulatory barriers, such as complex VAT systems, overlapping frameworks addressing e-commerce issues (including consumer, privacy, intellectual property, telecommunication and competition rules), or regulatory gaps. Such difficulties are perceived to be aggravated in cross-border transactions.

Delivery issues (such as long delivery time periods and non-delivery), inadequate information disclosure, concerns over payment security and misuse of personal data, as well as inadequate dispute resolution and redress mechanisms, are the major problems being reported by online shoppers in the OECD area in both domestic and cross-border e-commerce. These issues may however vary from one region to another, and within regions. According to the EU consumer market study, 35% of respondents reported concerns over long delivery times in online shopping from another EU country. More specifically, this appeared to be a major concern for consumers in some EU countries, such as Poland (49%), Romania (46%), Bulgaria (41%), and the United Kingdom (40%) while in other EU countries, such as Hungary, Malta and Cyprus,⁶ concerns were less significant (Civic Consulting, 2011, p. 132). Within the United States, while long delivery times remain a concern for some online shoppers, these concerns have been mitigated, in large part, by the availability of premium shipping services and by newer innovations like Amazon's push toward same-day delivery.

According to a survey conducted in the United Kingdom in 2009, some 19% of Internet shoppers had experienced at least one problem between January 2008 and 2009, while 16% of them did so in 2006. Major problems in the country concerned *i)* product delivery (48%); *ii)* damaged/faulty products (6%); *iii)* privacy issues (5%); and *iv)* inadequate information (4%); (Office of Fair Trading (OFT), 2009). In France, in the first half of 2010, non-food product-related issues topped the list of the overall amount of consumer complaints; 45% of such complaints concerned online transactions and related to: delivery (24%), fraud (19%), and redress issues (9%) (DGCCRF, 2010). In Japan and the United States, in 2009, nearly 80% (Japan) and 75% (United States) of consumers did not conduct cross-border online shopping. While most of them were not interested in cross-border online shopping as the top reason (about 70% of consumers in both countries), nearly 50% (Japan) and 40% (United States) of those consumers who did not conduct cross-border Internet shopping had concerns over after-sales services, as well as over a lack of available dispute resolution and redress mechanisms (METI, 2010). Consumers in a number of developing countries have reported similar problems. For example, in 2011, in China, Indonesia, and Vietnam, more than one-third of consumers experienced delivery problems (METI, 2012a).

Another area of growing concern relates to consumer exposure to unsafe products purchased via e-commerce. Such products are, in many instances, counterfeit goods, which are available on professional-looking websites (including auction platforms). The protection of consumers in this context is a challenge. Indeed, market surveillance and customs authorities have limited competence to detect counterfeit products and consumers have difficulty identifying whether information on the seller and the product is accurate (OECD, 2008a). In recent years, consumers who purchased, via e-commerce, counterfeit batteries used in electronic devices have reported a number of problems, such as being exposed to explosion hazards.

Some countries at the OECD's Working Party on Consumer Product Safety (WPCPS) meeting held in April 2012 briefly discussed ways to enhance consumer protection against unsafe products sold *via* e-commerce. The French government, for example, indicated that new legislation should be adopted in the country in 2013 with a view towards enhancing market surveillance and enabling market surveillance authorities to: *i*) carry out mystery shopping initiatives through which they would be able to act as consumers, purchase a suspicious product to then test it in a laboratory; and *ii*) request closing of a website through which an unsafe product was sold. In June 2012, the Japanese Ministry of Economy, Trade and Industry co-operated with five major auction shopping platforms in Japan to raise consumer awareness, through the latter's websites, on product non-compliance issues (METI, 2012b). The launching of an OECD global portal on product recalls by the WPCPS in October 2012 will also help improve consumer protection in e-commerce. The web portal, which enables jurisdictions to upload information on their product recalls in a timely and multilingual fashion, will be promoted on e-commerce platforms, such as eBay.

Assessment of selected consumer policy issues

This section offers a snapshot of some of the key consumer issues that, since the Seoul Declaration, have been identified as on-going or emerging barriers to trust in e-commerce. These include: *i*) complex legal landscapes; *ii*) inadequate information disclosure; *iii*) unauthorised charges, misleading and fraudulent commercial practices; *iv*) geographical restrictions; *v*) privacy, and *vi*) dispute resolution and redress.

Complex legal landscapes

As highlighted in the first part of this report, the e-commerce marketplace is evolving rapidly with new technologies and business models surfacing constantly. In this context, policy makers and law enforcers have difficulty keeping up with new developments while working towards enhancing consumer confidence and promoting fair and transparent commercial practices. The challenge is exacerbated by the complex nature of the e-commerce regulatory framework, which varies among countries. Many OECD countries and non-members apply general consumer protection rules (such as contract and distance selling rules) to address issues, while others have applied more specific regulations.

In some instances, the rules overlap with other regulations on, for example, misleading and deceptive advertising, telecommunications, privacy, and copyright; how these interrelate in the e-commerce context is not always clear. In other instances, existing consumer protection rules do not cover developments, such as issues arising from tangible/intangible digital content purchases, and mobile payments. For example, in a number of OECD countries, legislation does not indicate whether intangible digital content products are goods or services, and thereby, what consumer rights and obligations are. This may have important implications for consumer rights (such as a right of withdrawal from a transaction) in some OECD countries (BIS UK, 2012, p. 5). It should be noted however that the distinction may not matter in all areas of consumer law. For example, general consumer protection laws against deceptive and unfair commercial practices may apply regardless of the format in which digital content products are being delivered.

In such a complex environment, consumers, merchants and other parties involved in e-commerce transactions have difficulty understanding what legal framework applies to their transaction, and thus what rights and responsibilities they may have in the event of a problem.

This is particularly true in the area of online and mobile payments where a number of parties, including financial institutions and non-financial institutions are increasingly interacting with consumers. The availability and level of consumer protection in this area vary significantly within and among countries, depending on (OECD, 2013a):

- *The payment means used* (including debit/credit cards, SMS, pre-paid card, payment charged to a mobile phone bill). Except for countries including Korea, Japan, Norway, Sweden and Denmark, pre-paid payments, and those processed by mobile operators, are not covered by existing regulations.
- *The payment parties involved* (financial or non-financial institution, including, for example, mobile operators and some social networking platforms).
- *The nature of the problem*. In most countries, consumers have a high – or at least some – level of protection in case of non-delivery, or late delivery, unauthorised charges or processing/billing errors; the level of protection is however unclear or inexistent in some countries in cases where products do not conform with the order.
- *The nature of the purchased product*. In a number of countries, consumer protection laws do not address issues associated with the purchase of intangible digital content products, and therefore rights and responsibilities of consumers and other parties involved are unclear or inexistent.

Much has already been done to date to try to address the above concerns. Regulatory initiatives have been implemented with a view towards: *i)* expanding the scope of consumer protection laws to, *inter alia*, mobile payments and digital content products-related issues; and *ii)* clarifying/simplifying copyright laws that may overlap with consumer protection laws in this area.

As regards expanding the scope of consumer protection laws, in Canada, the Competition Act was amended in December 2010 to include specific provisions to address false and misleading representations and deceptive marketing practices in the electronic marketplace. These amendments have not yet come into force. Taking into account the crucial role that mobile payments increasingly play in the development of e-commerce, some countries have taken steps to reduce legal uncertainty in this area. For example, in Mexico, a new regulatory framework is being developed by the Mexican Central Bank and the Ministry of Finance, with the participation of the National Banking and Securities Commission, to adapt to new mobile payments schemes that have been implemented for the first time in the country in 2011. In Israel, the Consumer Protection Authority, together with the Ministry of Justice, is examining ways in which the Israeli debit card legislative framework may need to be adapted to apply to mobile payments. In Canada, a major review of the payments framework is underway to determine how existing rules should be adapted, or new rules developed, to tackle emerging issues adequately. Recommendations were made in that regard to the Minister of Finance in December 2011.

On 19 September 2011, the UK minister responsible for consumer policy announced that a new Consumer Bill of Rights would be developed with a view towards clarifying overlapping consumer protection and copyright legislation and regulation, and providing stronger consumer protection, including in the area of digital content products. Also in 2011, the UK OFT launched a Distance Selling Hub, which is a portal providing guidance for retailers and business support organisations on regulations that affect buying and selling goods and services via the Internet, phone, mail order, e-mail, interactive TV. It contains downloadable documents and checklists that businesses can use when they do business through distant-selling (OFT, 2011).

In a report being finalised on mobile payments, the International Consumer Protection and Enforcement Network (ICPEN) calls for enhanced enforcement efforts in this area. The organisation points out that consumer issues with mobile payments fall under civil law in most jurisdictions and thus are outside the authority of most consumer protection law enforcement agencies. Co-operation with other governmental and non-governmental bodies is therefore regarded as crucial to help assist consumers in their civil cases in this area.

As regards amending copyright law, in Ireland, in May 2011, a Copyright Review Committee (CRC) was established with a view towards examining the existing copyright framework and identifying areas where attention would be required to, notably, adapt to the digital economy (CRC, 2012). Based on discussion with a wide range of stakeholders (including business and consumer organisations), the CRC is expected to issue recommendations in the course of 2013. In Canada, a proposal for legislation amending existing copyright laws (the Copyright Modernization Act) received royal assent in June 2012. The act aims to legalise a number of consumer practices including *i)* using a personal video recorder to record a TV show for later viewing (“time shifting”), *ii)* copying music from a purchased CD to an MP3 player (“format shifting”) and *iii)* editing existing copyrighted material on the condition that this be made for non-commercial purposes (“mashing-up”). The act includes restrictions on these practices to ensure that the legitimate interests of rights holders are respected, for instance, by not permitting the circumvention of technical protection measures to make a copy, and prohibiting mash-ups from being used for commercial purposes or from interfering in markets for the original work (Government of Canada, 2012).

In June 2012, the Australian Law Reform Commission (ALRC) was required to review the existing copyright framework and examine ways that it may notably affect participation of consumers in the digital economy. The ALRC published a consultation paper in August 2012 (ALRC, 2012) where it notably points out new consumers behaviour in the digital economy and the issues that may arise in this context; the paper notably focuses on the increasing use of cloud computing services by consumers to store copyrighted material which they and other parties (for example, family and friends) may access and use, and which, under certain conditions, may infringe copyright (see ALRC, 2012, p. 27). The ALRC is developing a discussion paper with proposals for reform; a final report is to be delivered by 30 November 2013.

Some of these issues are also being addressed by industry through efforts to increase the interoperability of digital content products. For example, in late 2011, a consortium of major movie studios, consumer electronics manufacturers, retailers, network hardware vendors, systems integrators and DRM vendors launched Ultraviolet, a digital rights authentication and cloud-based licensing system enabling a consumer to *i)* make a digital copy of an Ultraviolet certified purchased CD, DVD, Blu-ray disk, or content delivered in an electronic format; *ii)* store it onto a server in the cloud; and *iii)* stream and/or download that copy to a certain number of devices (up to 12) connected to the Internet. Under the initiative, consumers can create an account. Up to six members will be able to sign up for this account and access the purchased product from the cloud without having to pay any additional charges. Some other industry initiatives have moved towards offering consumers with the possibility to benefit from some of the rights associated with the purchase of physical digital content products. For example, Amazon offers its US customers the possibility to loan Kindle e-books once to other consumers for a 14 day period; and in 2009, Apple changed its policy and made its iTunes music DRM-free making it accessible to other companies’ devices.

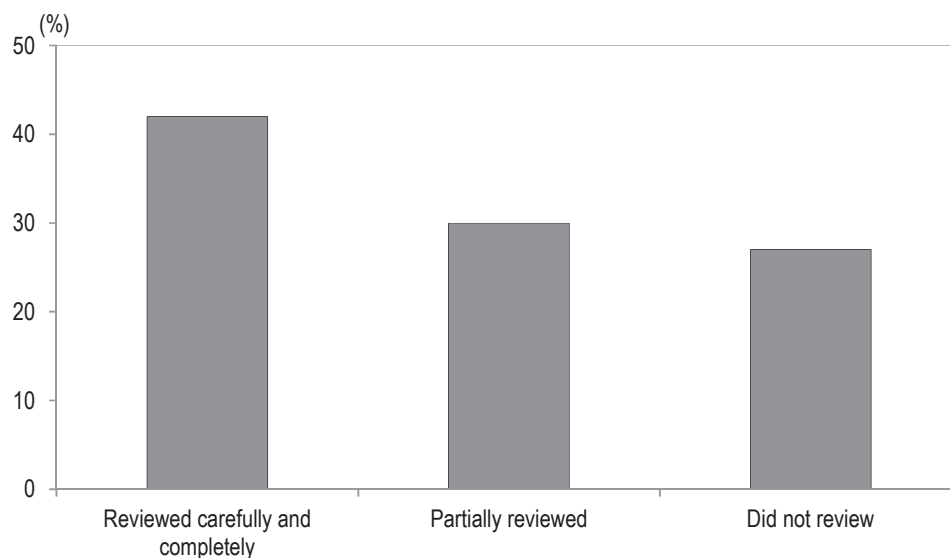
Information disclosure

While continued competitiveness and innovation in e-commerce have, in recent years, provided consumers with access to more and better quality information about products and related transactions, there is general recognition among stakeholders that such information is still imperfect. As a result, consumers may be prevented from being able to compare product quality and price and understand fully the nature, length, level and scope of the commitments that they are making in e-commerce. Research in behavioural economics indicates that in such contexts, consumers may end up using heuristic “rule of thumb” to make purchase decisions. This may result in dissatisfaction with a product that did not meet expectations, surprisingly high bills (i.e. “bill shock”), as well as frustration with the procedures and costs that could be incurred in terminating a transaction and trying to obtain redress (OECD, 2010b).

Transparency, clarity, completeness, and timeliness of information disclosure

Recent surveys carried out in a number of countries suggest that a majority of consumers purchasing products online do not fully read or understand the terms and conditions in e-commerce transactions (including those relating to payment procedures). According to a survey carried out in the EU in 2010, 27% of survey respondents did not read the terms and conditions at all, and 30% read them partially (Figure 4.5).

Figure 4.5. Proportion of EU consumers reading the terms and conditions in online purchases



Source: EC (2011b), *Special Eurobarometer 342, Consumer Empowerment*, Conducted by TNS Opinion & Social on request of Eurostat and DG SANCO, Survey co-ordinated by DG Communication April 2011, EC, Brussels, http://ec.europa.eu/consumers/consumer_empowerment/docs/report_eurobarometer_342_en.pdf.

The main reasons explaining why consumers do not read terms and conditions at all, or carefully, are as follows:

- Information is often presented in lengthy and technical legal terms that are difficult for consumers to understand.

- The terms are sometimes presented in small size, are buried in footnotes, or require accessing a series of web links or windows. A mystery shopping survey on digital content products carried out in 2010 in the United Kingdom for example reveals that 56% of mystery shoppers could not find information on dispute resolution in the terms and conditions, even though such information was, in most instances, available (Consumer Focus, 2010).
- Consumers would need to invest considerable time to review and access information.

As highlighted in the OECD Consumer Policy Toolkit, the situation is even more complex in the mobile context where consumers tend to take decisions on an accelerated basis (in an “on the go” context); their ability to review the terms of a transaction sufficiently before concluding is more limited (OECD, 2010b).

In recent years, a number of information problems have been identified in relation to price comparison websites, billing statements provided by mobile operators, and premium SMS.

A survey carried out in the EU between December 2010 and February 2011 reveals the following issues associated with price comparison websites: a majority (53%) do not provide their full business address; only 20% provide information on delivery time; 62% do not provide any information on product availability; and in 60% of the cases, there is no clear information about whether the referenced retailers pay to have their products listed (Civic Consulting, 2011).

The ICPEN report being developed on mobile payments indicates that unclear or incomplete information on billing statements provided by mobile operators is a growing challenge for consumers. In many instances, such statements do not provide enough details of, for example, premium rate services purchased. Typically, information about the supplier of the service, or time of purchase, is usually not specified. This may create problems for consumers who might have difficulty fighting unauthorised charges on their bill, or pre-paid credit.

Information disclosure problems in premium SMS was discussed at an OECD Toolkit workshop on communication services held in October 2011. Reference was made to a contest secretly carried out by the Belgian government that imitated some SMS competitions being run on the Internet. Participants were directed to the contest through platforms such as Facebook and Google. They had to send an SMS, in return for which they received a code to validate on the website; if they won, they were told that they would win a smartphone. All of the thousands of people who took part in the contest received a message warning them to be on the lookout for fraudulent SMS services. Had they carefully read the terms and conditions of the contest, which contained many absurd clauses, they would have been aware of the fraud. A review of the visitors to the campaign website revealed that less than 1% actually clicked the general terms (OECD, 2012).

Some regulatory initiatives have been developed in recent years to improve information disclosure. The EU directive on consumer rights, adopted in 2011, for example, introduced for the first time specific information disclosure requirements to be provided to consumers by businesses prior to purchasing digital content products. In Switzerland, in April 2012, amendments to the Unfair Competition Act entered into force. These amendments notably introduced specific information obligations for businesses engaging in e-commerce. In Germany, a law was adopted by the Parliament in March 2012, requiring businesses to provide consumers with a set of information (including

price) when selling goods or services on the Internet, whether *via* a local computer, smartphone or tablet. In Norway, in 2009, the Consumer Ombudsman developed guidelines for online shopping, which specify the type of information that businesses should provide to consumers including product price, privacy policy, payment processes and available dispute resolution and redress mechanisms (Consumer Ombudsman, Norway, 2011). In the United States, the Federal Trade Commission is currently exploring how best to make disclosures to consumers in new media, including on smartphones and social networks; the agency, which organised a workshop in this area in May 2012, is now in the process of developing guidance (FTC, 2012b).

More needs to be done, however, to provide consumers with relevant information that enables them to make informed decisions in e-commerce. Work could be for example conducted on enhancing consumer access and understanding of such information.

Contract clarity

Concerns continue to be expressed about a lack of clear information in contracts regarding consumer rights and obligations in e-commerce. This is particularly true in cases where consumers purchase digital content products that are often sold with restrictions on use (OECD, 2006). Discrepancy between usage restrictions and consumer expectations in this area is growing. While it is generally easy for consumers to determine what they can do with physical products, their understanding of what they can or cannot do with digital content products has become difficult in today's Internet economy where *i)* through technology advances, content may be easily shared, copied, transformed and format-shifted by many parties (Hargreaves, 2011, p. 43, paragraph 5.10); and *ii)* usage conditions can vary significantly from one product to another, depending on the terms and conditions in the end-user licensing agreement consumers have agreed to prior to the purchase, and the technology being used (digital rights management or copy control technology).

Consumers generally have little knowledge about the applicability of copyright laws and related restrictions to their transaction, even though they may be prevented from: playing a digital content product on different devices (interoperability limitation); copying, sharing or transferring products to others; or downloading a product (such as an e-book) several times (functionality limitation). Moreover, there have been instances where consumers had not been notified about changes in the terms of use of products that they had previously purchased. In one case, for example, a supplier of e-books imposed limits on the number of times a book could be downloaded, after which re-purchase was required. Mention of the limit was not included in the license agreement under which consumers were actually given a non-exclusive right to keep a permanent copy of the applicable digital content product and to view, use, and display such product an unlimited number of times (The Consumerist, 2009).

There is a need for clarification of consumer rights and obligations in online and mobile commerce. Some countries, such as Sweden, are indeed reviewing the effectiveness of their e-commerce framework, from both policy and enforcement perspectives. Other stakeholders have suggested developing standards that would specify the type of essential information that should be provided to consumers prior to purchasing products. In the area of digital content products, this could cover information on the functionality and interoperability of content (University of Amsterdam, 2011, p. 289). It should however be noted that with a view towards ensuring flexibility, such standards should be broad enough to encompass all types of digital content products, and should also evolve along with advances in technology.

Unauthorised charges, misleading and fraudulent commercial practices

Misleading and fraudulent practices, which may involve unauthorised charges, continue to undermine trust in e-commerce. These are often tied to inadequate or misleading information disclosure. The following provides examples of some problematic practices that have been reported by consumers in recent years; these relate to in-apps purchases and renewals of premium SMS services.

In-apps purchases

Unauthorised charges related to the purchase of “apps” for mobile devices have been identified as a growing source of concerns by stakeholders at both an OECD roundtable on digital content and a workshop on online and mobile payments. An example was given of a case in the United States involving free games targeting children, within which additional items (“in-apps”) were available for sale; such items had been purchased by children without their parents’ knowledge, exposing the latter to expensive bills. In Australia, in November 2012, the Assistant Treasurer provided terms of reference to his expert advisory Committee on Consumer Policy, the Commonwealth Consumer Affairs Advisory Council (CCAAC), to examine the Australian app market and the implications for consumer policy. The CCAAC released an Issues Paper in this area (CCAAC, 2012a), and, on 12 December 2012, opened consultations on app purchases. Consultations were to conclude on 31 January 2013 (CCAAC, 2012b).

Some countries have taken action to address the situation, highlighting the need for better and more timely information disclosure about the price of products that are sold within free apps. Under these initiatives, information should be provided each time, and prior to in-apps purchases being made. In Finland, for example, the Consumer Agency has worked with the business community to develop an opt-in procedure whereby mobile content is delivered to consumers only after confirmation has been given, through, for example, an SMS.

Negative option and cramming

The practice of “negative option” involves a company taking a consumer’s silence or failure to cancel as acceptance of an offer and permission to bill them. While potentially convenient to consumers, a lack of express consumer consent and/or information about the offer and related financial consequences on a long-term basis could be problematic and lead to consumer detriment. Another practice leading to unauthorised charges is “cramming”, which involves including fees and charges on bills for services consumers did not purchase or authorise, usually after they responded to an e-mail or downloaded an item that they believed was free or of nominal cost.

Negative option problems have been reported to be on the increase, in particular in the mobile context (OECD, 2013a). Likewise, cramming has been identified as a growing problem for consumers purchasing products through their mobile devices (US FTC, 2012c). Some initiatives have been carried out since the Seoul Declaration to help resolve issues. On 1 July 2009, the Australian Communications and Media Authority (ACMA) gave legal force to an industry-developed mobile premium services code (MPSC), which introduces a double opt-in requirement whereby a prospective consumer will have to give two independent confirmations before being able to subscribe to an on-going premium SMS service. Since November 2010, ACMA is able to issue a temporary “Do Not Bill” order to stop suspect content suppliers from charging customers while it investigates a premium service. At the OECD Toolkit workshop on communication services, the

Australian Competition and Consumer Commission reported on a significant decrease in the number of complaints concerning mobile premium services. This was seen as a sign of success of the policy measures that had been taken to address problems. In the United States, the Mobile Marketing Association's US Consumer Best Practices Guidelines require vendors to ask consumers twice to confirm that they want to make a purchase, before charging them for a premium service (MMA, 2011).

Enforcement

More could be done in the enforcement area to fight against domestic and cross-border misleading and fraudulent commercial practices. On the domestic front, some OECD members are obtaining new powers to deal with these issues. For example, in Finland, in February 2011, the Communications Market Act was amended to provide new enforcement powers to the Consumer Ombudsman. This included the authority to order a telecommunications company to close an SMS number used to offer fraudulent or deceptive mobile content services. In the United States, in 2012, Congress reauthorized the US SAFE WEB Act of 2006, which provides the Federal Trade Commission with enhanced tools to combat online cross-border frauds, for an additional seven years.

In Israel, investigations carried out in 2012 revealed a number of misleading practices and violations of distance selling legislation on the part of some fixed and mobile operators when charging consumers for products supplied by such operators or third-party content providers. To protect consumers against such practices, the Consumer Protection and Fair Trade Authority proposed an amendment to the consumer protection legislation that would prevent fixed and mobile operators from billing consumers for products purchased from such operators or third-party content providers, unless consumers' explicit written and prior consent is obtained. Likewise, in 2012, the Ministry of Communications proposed amendments to the licenses of mobile operators with a view toward prohibiting consumer billing in the absence of *i*) documentation containing consumers' explicit request for a service; and *ii*) consumers' explicit consent to the service. However, in light of the fact that the enforcement of the license terms (to be carried out by the Ministry of Communications) is administrative in nature and does not deal with consumer protection *per se*, the Israel Consumer Protection Authority is working on the development of a broader amendment to the consumer protection legislation that will apply to all types of payments (including mobile payments) and will prevent any businesses from charging consumers without the latter's explicit and prior consent, regardless of whether the transaction was made directly with them or with a third-party provider. The burden of proving consumer prior and explicit consent will be borne by the business charging consumers or claiming payments from them. Any breach of such provision will bring about criminal penalty.

Some countries have suggested that closer informal co-operation or co-ordinated actions with the business community could also be pursued to help address issues. This question was discussed at the OECD Toolkit workshop on communication services. Belgium, for example, reported on a case where consumers located in Belgium had been victims of fraudulent billing for ringtones by a vendor located in the Netherlands. Instead of suing the third-party vendor abroad, the Belgian authorities turned to the Belgian mobile operator that had processed the payment and asked the company to terminate the fraudulent transaction. The authorities specified that in the absence of such action, the operator could be named as an accomplice to the third-party vendor.

Geographical restrictions

While consumers might expect that products sold *via* e-commerce are accessible wherever they happen to be located, in practice, access to a number of such products (including, in particular, digital content products) is restricted to geographic regions. Kindle's e-books, for example, may only be accessed from a store based in a consumer's country of residence, or based on the country where their credit card is registered (Consumer Focus, 2010, p. 12). This is mainly due to the territorial character of *i*) copyright protections, as established in the international copyright legal framework, with which businesses must comply, and *ii*) the licensing of content, which aims to respond to some challenges being faced by rights holders including varying a) legal frameworks, and b) needs of local distributors. Some industry stakeholders take the view that consumers would not necessarily be better off if pan-territorial licensing were mandatory, for the grant of such rights could entail a high cost, thereby possibly excluding smaller innovative services from launching and/or being successful in smaller markets.

The European Commission sees the development of an adequate framework that will help increase the volume of cross-border offers as an important goal. This is, in part, because digital music distribution rights are generally administered by domestic collecting societies in the EU and are subject to territorial restrictions. As a result, for digital music to be accessible across the EU, licences from the relevant collecting society in each of the 27 EU Member States need to be obtained. Accordingly, the EU is planning, within the framework of its European Strategy for Intellectual Property Rights, to submit proposals to create a legal framework for the collective management of copyright, with a view to enabling multi-territory and pan-European licensing (EC, 2012b).

Privacy

The purchase of products via e-commerce often requires that consumers provide a significant amount of personal information. In many instances, consumers do not realise what may be done with their personal information, with whom it may be shared, and for what purposes it could be used. Disclosure about privacy policies is in that regard reported to be often unclear, incomplete, and/or missing.

The CCP, in the context of its analytical work on digital content products, and the WPIE, in the context of its work on apps, are both exploring these issues. The work is being conducted in consultation with the OECD's Working Party on Information Security and Privacy. The work is focusing on the conditions under which consumers are granting permissions when purchasing apps for their mobile devices (OECD, 2013a). The work is looking at both the Apple and Android systems. With respect to Apple, "apps" that collect or transmit a user's contact data without the company's prior permission are in violation of its guidelines. Apple requires that explicit user approval be secured before contact data could be accessed. However, once the app has been downloaded, consumers have no possibility to review the permissions they have granted. With respect to Android, prior to installing an app on a mobile device, consumers must be informed about the permissions that they are granting. Following the app's download, consumers can access the list of permissions they have provided, without however being able to change it.

Additional concerns have been further raised as regards "apps" that enable developers to access data stored and processed through mobile phones, without consumer knowledge and/or consent. This would include address books, consumers' location, phone number, call logs, unique identifiers (such as an iTunes user's account number) and personal information being transmitted to a business during a mobile payment process through the use of near field communications technology (New York Times, 2012).

The issue of the collection and use of personal data via apps is of particular concern in the case of children. The US Federal Trade Commission has called on industry to provide parents with greater transparency about businesses' data practices (FTC, 2012a). The action is being taken under the provisions of the US Children's Online Privacy Protection Act (COPPA), which requires operators of online services, including mobile "apps," to provide notice and get parental consent prior to collecting information from children under the age of 13.

Dispute resolution and redress

Dispute resolution

E-commerce has become a complex multi-party environment where consumers do not always know who to turn to in case of problems with a product. Unclear division of responsibilities between the parties that are involved in a transaction (such as a mobile operator, a financial institution and a merchant) can make it difficult for consumers to claim their rights in an efficient manner.

As described above, the situation may be particularly complex for consumers purchasing products online or via mobile devices. Issues have also been raised in the context of apps purchases on online platforms from third-party developers. There have been instances where, after consumers had unsuccessfully tried to reach out to a third-party developer to resolve problems with the transaction, the role of the online platform on which the product had been sold, was unclear. Research shows that under national legislation of a number of EU countries, the online platform provider may only be held liable for problems in instances where *i)* the product was sold under its own brand; *ii)* the contact details of the vendor provided on the platform were inaccurate; or *iii)* the platform had negligently allowed a third party vendor to use its platform (University of Amsterdam, 2011, p. 123).

Developing effective dispute resolution mechanisms and informing consumers about the existence of such schemes is a crucial area, where work needs to be furthered to help to enhance consumer confidence in the e-commerce marketplace. According to an EC survey, 28% of consumers who did not purchase online over a 12 month period ending in September 2011, and 35% of consumers who did not buy from an online seller based in another country in the same period, claimed that they did not do so due to the potential difficulties they may encounter to solve problems if something went wrong (EC, 2012d).

In order to facilitate the resolution of problems, some businesses are turning to alternative dispute resolution (ADR) mechanisms, such as mediation and arbitration.

In this context, in 2011, the European Commission proposed both a directive on ADR and a regulation on online dispute resolution (ODR) with a view towards ensuring effective dispute resolution processes (EC 2011c, and EC, 2012b). There are also plans to develop a European ODR platform that enables consumers to resolve their problems out of court in a rapid, inexpensive, and easy way. The United Nations Commission on International Trade Law (UNCITRAL) is developing a legal standard for online dispute resolution involving cross-border e-commerce transactions. Draft procedural rules were discussed at the Working Group III's meetings held in May and November 2011 and June 2012. The rules are aimed at facilitating, in particular, the handling of low-value, high-volume transactions. In Belgium, Belmed, a new online platform for resolution of consumer disputes was launched in April 2011 (Belgium SPF Economie, P.M.E. Classes Moyennes et Energie, 2011). Both consumers and businesses can use the platform for

out-of-court online resolutions of consumer disputes with the help of an independent mediator. Belmed targets not only domestic consumer disputes but also cross-border consumer disputes.

Redress

In 2007, the CCP developed a Recommendation on Consumer Dispute Resolution and Redress, which was adopted by the OECD Council (OECD, 2007). The Recommendation recognises the rapid growth of e-commerce, and recommends the development of a wide range of redress mechanisms for both online and offline transactions, including compensation for economic harm, whether in the form of a monetary remedy (such as voluntary payment, damages, restitution, or other monetary relief) or conduct remedies with a restorative element (such as exchange of a good or service, specific performance or rescission of a contract). Such remedies however may, or may not always be available to consumers in e-commerce transactions, depending on:

- The nature of the problem.
- The payment mechanisms used and the parties involved. As seen above, in many instances, consumers do not obtain any remedies when payment has been processed by mobile operators. This is in contrast with the level of protection afforded to consumers in most countries in cases where a credit or debit card is used.
- The nature of the product (tangible, or intangible), depending on the legal framework.

As a result, the level of protection afforded to consumers may vary within and across countries, leaving consumers exposed to legal uncertainty that may, or may not, be addressed by voluntary business practices. With respect to tangible digital content products, it is often not possible to return them, for any reason; this would be the case, for example, once a packaging seal has been broken. Whatever remedies may exist for defective or undelivered digital content, products are often available only at the discretion of retailers. According to a mystery shopping survey carried out in the United Kingdom in 2010, most terms and conditions of contracts exclude liability for damaged software (Consumer Focus, 2010, p. 24).

The situation is further complicated when digital content products are delivered electronically. In a number of OECD countries, legislation does not indicate whether such intangible digital content products are goods or services, and thereby what remedies are available to consumers. As discussed at an OECD workshop on digital content products held in April 2012, a majority of retailers, it seems, do not provide consumers with redress for non-conforming, defective or undelivered digital products, in particular for products accessed by downloading or streaming (University of Amsterdam, 2011, p. 229). In the United States, in a case where an online retailer remotely deleted e-books from consumers' e-readers, consumers sued the retailer in a class action, alleging fraud. The online retailer ultimately agreed to a settlement allowing all affected consumers to replace their e-books with an identical copy, or receive compensation. It also agreed to pay USD 150 000 to the plaintiffs and suffered substantial media backlash.

Notes

1. Available data vary depending on the source (such as government official statistics and private sector estimates) and methodology used. These data often refer, interchangeably, to “the Internet economy,” “Internet usage,” or “e-commerce” without always specifying whether domestic and/or cross-border e-commerce, and/or B2B and B2C e-commerce are being looked at.
2. EMarketer’s estimates for Europe include Germany, France, the United Kingdom, Italy, Spain, the Russian Federation, and “other” countries.
3. Footnote by Israel: The statistical data for Israel are supplied by and under the responsibility of the relevant Israeli authorities. The use of such data by the OECD is without prejudice to the status of the Golan Heights, East Jerusalem and Israeli settlements in the West Bank under the terms of international law.
4. Whether these figures cover both domestic and cross-border online retail sales is not always indicated.
5. It should be noted that the study referred to above does not cover a number of products including airline tickets and content/music downloads.
6. Footnote by Turkey:

The information in this document with reference to “Cyprus” relates to the southern part of the Island. There is no single authority representing both Turkish and Greek Cypriot people on the Island. Turkey recognises the Turkish Republic of Northern Cyprus (TRNC). Until a lasting and equitable solution is found within the context of United Nations, Turkey shall preserve its position concerning the “Cyprus” issue.

Footnote by all the European Union Member States of the OECD and the European Union:

The Republic of Cyprus is recognised by all members of the United Nations with the exception of Turkey. The information in this document relates to the area under the effective control of the Government of the Republic of Cyprus.

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Chapter 5

Global participation in the Internet economy

This chapter looks at key elements of the Internet economy, as well as new developments and innovation models, and how these can contribute to the development of the Internet economy in developing and emerging countries. It also looks at the skills that are already available and those that are needed.

The Internet economy as a platform for inclusive economic, social and cultural development

Since the Seoul Declaration, a growing number of publications have endorsed the positive impact of broadband on development (see Strykowski, 2012 for a detailed review). From an *economic perspective*, a number of case studies and other analyses have identified benefits both at the firm- and at the macro-levels. At firm level, the Internet has increased efficiencies within firms, enhanced communication, transformed content markets (e.g. music, film, news) and enabled the creation of new businesses. At the macroeconomic level, many studies, including on-going OECD work, highlight the positive link between an increasing adoption rate of the Internet and economic growth. For example, the OECD Internet Economy Outlook 2012 (OECD, 2012a) finds that up to 13% of business sector value added in the United States in 2010 could be attributed to Internet-related activities depending on the scope of the definition.

From a *social perspective*, the Internet is already bringing benefits to individuals in various ways although there is room for improvement. For instance, they benefit from positive impacts in education, improved information gathering and sharing, and access to and use of a larger variety of digital content. As consumers, they benefit from an increased transparency, more distribution channels and eventually lower prices.

Finally, from a *cultural perspective*, the Internet has been shown to spur the development and distribution of local content (OECD, UNESCO and ISOC, 2012). The web provides an easy means for individuals to become content creators, to develop “crowd-sourced” knowledge bases, and perhaps most importantly, to make this content accessible globally and thus to open cultural heritage and knowledge to a much broader audience than was possible before.

However, a source of rising concern has been that the positive effects of the Internet economy are not sufficiently inclusive. Alongside well-known differences across countries, there are also within-country inequalities in living conditions, income and capabilities. And such inequalities are often much greater in developing and emerging economies, as the gap between the most advantaged and the most disadvantaged is wider. Also, those at the bottom of the distribution face more extreme living conditions than those in developed economies. The concept of inclusive growth often figures prominently in political debate: for instance, the Indian government’s eleventh Five-Year Plan (2007-12) focuses not only on sustainable growth but also specifies the reduction of economic disparities as its key objective.

Achieving “inclusive development” is, then, part of a wider policy agenda and also relates to innovation, which, in turn, influences “inclusion” in a variety of ways (see OECD, 2012b and 2012c for a more detailed explanation). The Internet and information and communication technologies (ICTs) can potentially play a substantial role, for example by providing low- and middle-income groups with applications to support their welfare, as well as their entrepreneurial activities.

ICTs have had a massive transforming effect in recent decades, partly because they are general-purpose technologies (GPTs). They have also allowed for a whole range of innovations, not only in developed countries. ICTs are particularly relevant to the debate around inclusive innovation because accelerating technological progress over the past years has had substantial effects on price levels. Similarly, as we will discuss below, the dissemination of mobile technology has made it possible to reach out to low- and middle-

income groups, thus satisfying one of the baseline conditions for these groups to benefit from ICTs. A variety of applications seem particularly geared at bringing fundamental changes to the most disadvantaged groups. Nevertheless, inequalities in income and skills continue to condition access to ICTs, with disadvantaged groups having fewer opportunities for access.

The challenge, then, is to extend the economic and social opportunities of the Internet and related ICTs to emerging and developing countries on the one hand, while also achieving *inclusive* development of the Internet economy in these countries.

This chapter reviews the overall progress that has been made at country level and also sheds light on progress in terms of inclusive development in four key areas of the Internet economy:

- increasing access to the Internet economy
- promoting applications and their use in developing and emerging countries
- developing skills for the Internet economy in developing and emerging countries
- the role of innovation and new business models, and how they can be applied to developing and emerging countries.

Increasing access to the Internet economy

High-speed broadband networks are the underlying platform of the Internet economy. Expanding access to the Internet and related ICTs, as one of the key objectives in the Seoul Declaration, is the necessary condition to enable emerging and developing countries to profit from the economic and social benefits that the Internet offers. Since the Seoul Declaration, numerous activities have been undertaken to increase access to the Internet economy in emerging and developing countries.

Increasing access to broadband involves both enhanced international interconnection and improved national connection. Since international interconnection is fundamental for connecting emerging and developing countries to the global Internet, we will first look at developments in this area. We will then turn to developments in mobile networks and mobile broadband, since these are regarded as the most promising route for connecting people and organisations in developing countries and thus for achieving the goal of inclusive connection.

Deployment and use of submarine fibre cables

Satellite, land-based or submarine fibre cables are the typical ways to carry data over long distances and to assure the connectivity to other countries. Submarine fibre cables are normally the preferred solution because the failure rate is supposed to be lower compared to landline fibre cables and they are also able to carry much more data than satellites (OECD, 2013a).

Since 2008, important progress has been made in the deployment of submarine fibre cables worldwide. Where, in 2008, many sub-Saharan coastal nations were not connected to submarine cables, by 2012, all coastal nations in Africa except Somalia were connected. Today, many economies are connected to more than one submarine fibre cable, which ensures reliability, and significant efforts have been undertaken to bridge the digital divide in international interconnection. Only 21 states and territories still lack international fibre connectivity (see Table 5.1). During the past years, the private sector has

driven a significant part of the deployment in developing or emerging countries, either in consortia of telecommunications companies or investors of other sectors, like content providers.

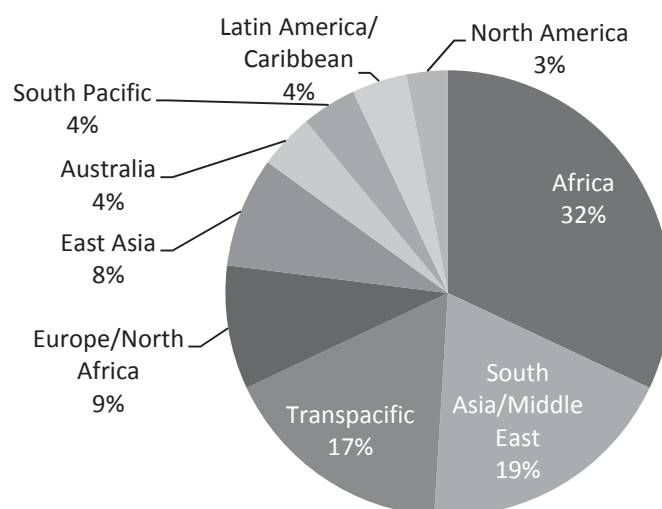
Table 5.1. States and territories without international fibre connectivity

Africa	Somalia (including Somaliland) – a fibre connection has been built, but has not yet been connected. Saint Helena, Ascension, Tristan da Cunha (British Overseas Territory)
Asia	Christmas Islands, Cocos (Keeling) Islands (Australian External Territory)
North America	Saint Pierre and Miquelon (French <i>collectivité d'outre-mer</i>)
South America	Easter Islands (Chilean Special Territory), Falkland Islands (British Overseas Territory), Galapagos Islands (Ecuador)
Caribbean	Montserrat (British Overseas Territory)
Oceania	Cook Islands, Kiribati, Nauru, Niue, Norfolk Islands (Australian External Territory), Palau, Pitcairn Islands (British Overseas Territory), Solomon Islands, Tokelau (New Zealand Dependent Territory), Tonga, Vanuatu, Wallis and Fortuna (French <i>collectivité d'outre-mer</i>)

Source: OECD based on Submarine Telecoms Forum (2012), *Submarine Cable Industry Report*, Submarine Telecoms Forum, Sterling, Virginia.

In terms of investments, USD 10 billion have been spent on new submarine fibre projects from 2008 to 2012. Figure 5.1 shows that, out of these investments, over two third have been made in sub-Saharan Africa, South Asia and the Middle East, and most of these have targeted the markets of South Africa, India and China. Interestingly, telecommunication companies accounted for 80 % of investments from 2008 to 2012 as private investors were rather reluctant. Government and development agency funding amounted to 5% in this period (Submarine Telecoms Forum, 2012).

Figure 5.1. Investment in new submarine fibre projects by region, 2008-12



Source: Submarine Telecoms Forum (2012), *Submarine Cable Industry Report*, Submarine Telecoms Forum, Sterling, Virginia..

When taking a closer look at developments in several regional areas, it becomes apparent that development stages differ across regions and emerging and developing countries.

Sub-Saharan Africa. Before 2008, sub-Saharan Africa was only connected by two fibre cables, SAT-2 and SAT-3, whereby SAT-2 only served South Africa. SAT-3, in addition connected various countries on the west coast to Europe. No submarine fibre connection existed on the east coast and many African countries were dependent on expensive satellite connection or the also expensive SAT-3 cable. From 2008 on, huge developments have been made leading to a current overcapacity. On the west coast, four additional cables were put in service, while the east coast is now connected by two cables. Somalia is the only country that still lacks access to submarine fibre.

South America – North America/BRICS/developing countries. The connection between North America and South America has some of the highest interconnection prices with a pricing that is about ten times higher than transatlantic pricing (Submarine Telecoms Forum, 2012). At the moment, most of the capacity is carried by only three cables: SAM-1, South American Crossing and Globe Net, all built in 2001. Wholesalers have an important control of the entire market, which accounts for the high prices, together with a rapidly increasing Brazilian demand for capacity. For the years 2013/14, at least three major projects are planned, which would increase capacity significantly along the North America-South America route. In an interesting development, four additional projects are underway to connect South America to the BRICS and emerging and developing countries. The Atlantic Cable System, for example, which is expected to be fully deployed by 2014, will connect Brazil to Angola, Argentina, and Uruguay besides connecting the country to Europe and the US.

Transpacific interconnection and South Asia. From 2008 to 2012, three new submarine fibre systems - TPE, AAG and Unity/EAC Pacific - have been built, in addition to four existing transpacific-cable systems. This has tremendously increased the overall capacity between the United States and East Asia. Out of these, AAG was mainly built to connect Southeast Asian countries to North America and TPE was mainly built to serve Chinese demand. Until 2014, four additional transpacific fibre systems are currently planned. In addition, Southeast Asian operators plan on deploying intra-Asian fibre systems, which would allow them to become more independent from transpacific fibre systems. As a consequence, it is expected that prices will fall since access could be provided in a more cost-effective way.

South Asia. The highest demand in South Asia comes currently from India. The main interconnection between South Asia and Europe is through the Gulf of Suez, which is known to suffer frequent outages due to anchors, earthquakes and also some political uncertainty in Egypt. Prices on that route are still considered rather high, which leads to lower priority traffic being routed via North America (see also OECD, 2013a). Some alternative routes have been built, for instance, the extension of SAT-3, which connects Europe and South Asia via South Africa. From 2008 to 2012, four cable systems have been built so that India is currently served by more than ten international cables. At least three additional cables are planned for 2014, partially with a high degree of involvement from Chinese operators (Sea-Me-We-5), which would significantly increase capacity.

Overall, significant progress has been made in the deployment of submarine fibre systems in emerging and developing countries, especially in connecting sub-Saharan Africa and in increasing capacity along the transpacific interconnection to South-East Asia. Progress should be made in better connecting South America. Since there are many

projects in the pipeline in this region, developments look rather promising if these new projects also contribute to balancing the power that some wholesalers currently have in the South American market. Competition and mostly private investments, often by a consortium of operators, have been the driving force behind connecting emerging and developing countries.

Reliability of submarine cables

When a fibre submarine cable is cut, a country needs other fibre systems to fall back on. Many countries are currently connected to only one fibre system and therefore face disconnection of their national Internet when maintenance has to be carried out, or when there is catastrophic failure following earthquakes, or damage caused by anchors or fishing vessels. In 2012, Lebanon, Bangladesh and Nigeria all suffered from outages due to fibre cuts on submarine fibres, which greatly affected businesses and end-users in their countries (AFP 2012, BGPMON 2012, Dailytimes 2012). Countries are therefore looking into ways to improve the reliability of the networks connecting their countries. Increasing reliability can however negatively impact competition. For example, private investors may be reluctant to invest in additional redundancy because multiple new or upgraded cables to a country or region may result in an oversupply of capacity – a situation that has, in the past, led to bankruptcies.

Access to submarine fibre systems and landings stations

Once fibre systems and landing stations are established, the crucial question for connecting countries is if and how a fair and open access to the submarine fibre systems and the landing stations is provided, so that multiple operators can make use of the international interconnection and competitive prices can be obtained at the wholesale level. At present, the situation in many emerging and developing countries is often not transparent regarding how open the access to landing stations is, and under which conditions access is provided to these stations.

However, although many emerging and developing countries have been connected to the global Internet and/or increased their access to global interconnection from 2008 to 2012, only some have access to one landing station. Where there are multiple landing stations, these are usually controlled by a single operator, with a substantial risk of them exploiting their monopoly to overcharge consumers. In cases where cable systems are controlled by consortia, it is often difficult for Internet service providers (ISPs) that are not part of the consortium to obtain competitive and fair access to the landing stations controlled by the consortia.

Areas for further work on submarine cable systems and landing stations

Submarine fibre cables have become the backbone of international telecommunications. Reliable and competitive access to submarine fibre is therefore of vital importance to the economic development of nations. Further work could focus on how both reliability and competition can be improved, i.e. on how to guarantee open access and fair prices for ISPs that are not part of the consortium that built these cables.

Regarding competition, more detailed analyses could be conducted to determine in which regions and countries there is a clear lack of competitive and fair access to landing stations. Where there is no competitive access, authorities should ensure that firms outside of the cable consortium that built the submarine systems also get access to

landing stations. In addition, both access to landing stations and the prices charged for access should be transparent.

A number of measures can be taken to control monopolistic behaviours, according to the specific countries, such as (Esselaar, Gillwald and Sutherland, 2007):

- By the enactment of a statute,
- By the application of competition law, and
- By the application of telecommunications regulations.

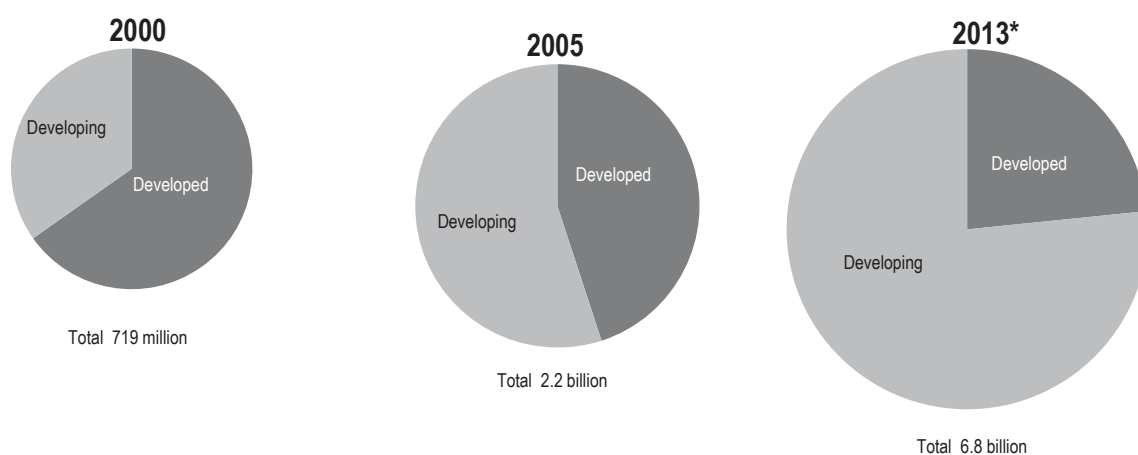
Singapore is often cited for its success in opening up access to landing stations. This country has mainly relied on a regulatory approach. Once access to landing stations has been opened successfully, it is then important to also ensure an adequate backhaul capacity.

Overall, progress has been made in connecting countries to the Internet. Every time a country is connected to submarine fibre, the speeds go up and the costs go down by orders of magnitude. The digital divide is being closed by further investment in local markets. Being connected is, however, only part of the solution. A reliable and competitive offer has to be available in markets before the Internet economy can truly take root in an economy. Further work would need to focus on balancing competition and reliability.

Developments in mobile communications

Mobile networks are regarded as a promising way to increase access to the Internet in emerging and developing countries and it is expected that the majority of future Internet users will connect to the Internet via wireless networks (see OECD 2009b, IADB 2011). In 2010, 90 % of the world was covered by a mobile signal (ITU World Telecommunications/ICT Indicators Database). Over the past years, the number of mobile phones and smartphones in developing and emerging countries has increased at a fast pace. This will further drive traffic growth.

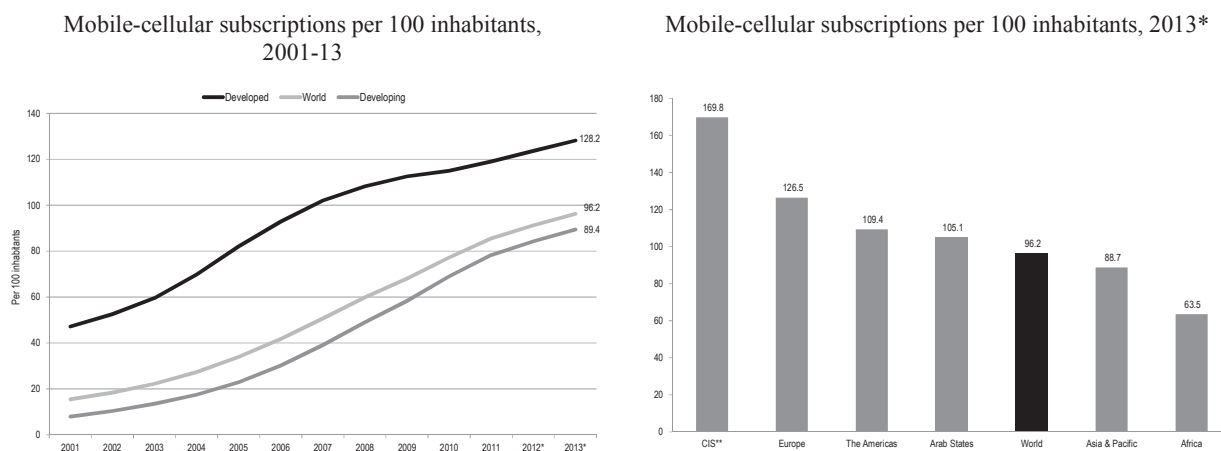
Figure 5.2 provides an overview of developments in the number of mobile subscriptions worldwide. It depicts two important factors: From 2005 to 2013, the number of mobile subscriptions tripled to attain more than 6 billion subscriptions worldwide. In addition, the ratio of overall subscriptions changed significantly over time: While in 2000, the share of developing countries in overall subscriptions was 35 %, three-quarters (76.6 %) of all mobile subscriptions are expected to be located in developing countries in 2013. This tremendous growth goes along with a highly increasing number of mobile and, to a lesser extent, smart phones, in developing countries that, in turn, will be one of the drivers of further growth in mobile communications.

Figure 5.2. Mobile subscriptions, by level of development

Note: * Estimates

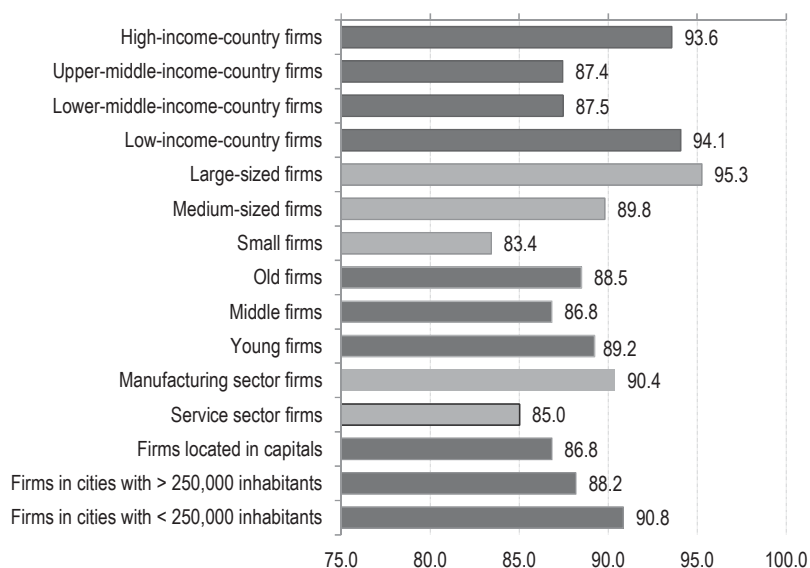
Source: ITU World Telecommunication/ICT Indicators Database (2013). The developed/developing country classifications are based on the UN M49, see: www.itu.int/ITU-D/ict/definitions/regions/index.html.

In terms of mobile subscriptions per 100 inhabitants, subscriptions have especially risen at a high pace in developing countries; by rising from 49.1 per 100 inhabitants in 2008 to 78.3 per 100 inhabitants in 2011 (see Figure 5.3) Africa is currently the region with the fewest mobile subscriptions per 100 inhabitants. Overall, the gap between developed and developing countries has been *shrinking* in terms of mobile subscriptions since 2007. The overall divide curve has thus followed an S-shape over time.

Figure 5.3. Mobile subscriptions per 100 inhabitants

*Estimates. **Commonwealth of Independent States.

Source: ITU World Telecommunication /ICT Indicators Database (2013). The developed/developing country classifications are based on the UN M49, regions are based on the ITU BDT Regions see: www.itu.int/ITU-D/ict/definitions/regions/index.html.

Figure 5.4. Share of firms using mobile phones for business, 2009-11

Note: Statistics are based on 16 777 firm observations in 38 countries. See Paunov and Rollo (forthcoming) for further detail.
Source: Paunov and Rollo (forthcoming), “Has the Internet fostered Inclusive Innovation in the Developing World?”, *OECD Science, Technology and Industry Working Papers*, forthcoming, based on World Bank Enterprise Surveys.

Table 5.2. Statistics on technology use in the informal sector, 2009-10

		Overall		AFR		LAC	
		Firm number	%	Firm number	%	Firm number	%
Use of electricity							
No		553	24.9	369	29.7	178	20.7
Yes		1668	75.1	873	70.3	681	79.3
Connection to the grid							
No		145	8.7	130	14.9	13	1.9
Yes		1522	91.3	745	85.1	665	98.1
Experienced power outages							
No		765	46.1	275	31.8	489	72.0
Yes		894	53.9	591	68.2	190	28.0
Use of cell phone							
No		1026	40.7	295	23.8	674	58.0
Yes		1495	59.3	943	76.2	489	42.1
Use of e-mail (only for Cote d'Ivoire, Madagascar, Mauritius)							
No		.		347	94	.	
Yes		.		22	6	.	
Use of cell phone (only for Cote d'Ivoire, Madagascar, Mauritius)							
No		.		87	22.8	.	
Yes		.		294	77.2	.	

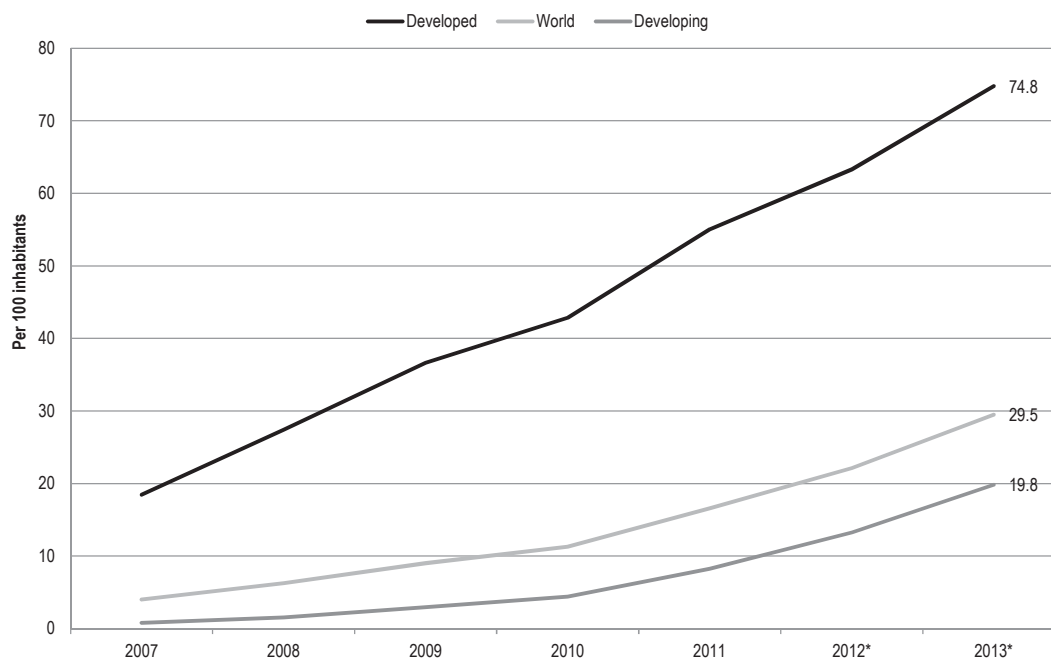
Note: Information is based on firm observations for 14 countries: Angola, Argentina, Botswana, Burkina Faso, Cameroon, Cape Verde, Democratic Republic of Congo, Côte d'Ivoire, Guatemala, Madagascar, Mali, Mauritius, Nepal and Peru.

Source: Paunov and Rollo (forthcoming), “Has the Internet fostered Inclusive Innovation in the Developing World?”, *OECD Science, Technology and Industry Working Papers*, forthcoming, based on World Bank Informal Firm Surveys.

Another sign of a closing digital divide in the area of mobile communications is the share of businesses that use mobile phones for work purposes. Based on a sample of firms in 38 developing countries for 2009-2011, Figure 5.4 shows the percentage of businesses that use mobile phones. For the period 2009-2011, no digital divide based on country, location or age could be identified: 94.1% of firms in low-income countries, 90.8% in remote locations and 89.2% of younger firms used mobile phones in their operations. Uptake was also substantial in the informal sector¹. Table 5.2 shows, based on a sample of informal businesses in 14 countries that, for African businesses, the uptake of mobile phones was even greater than uptake of electricity.

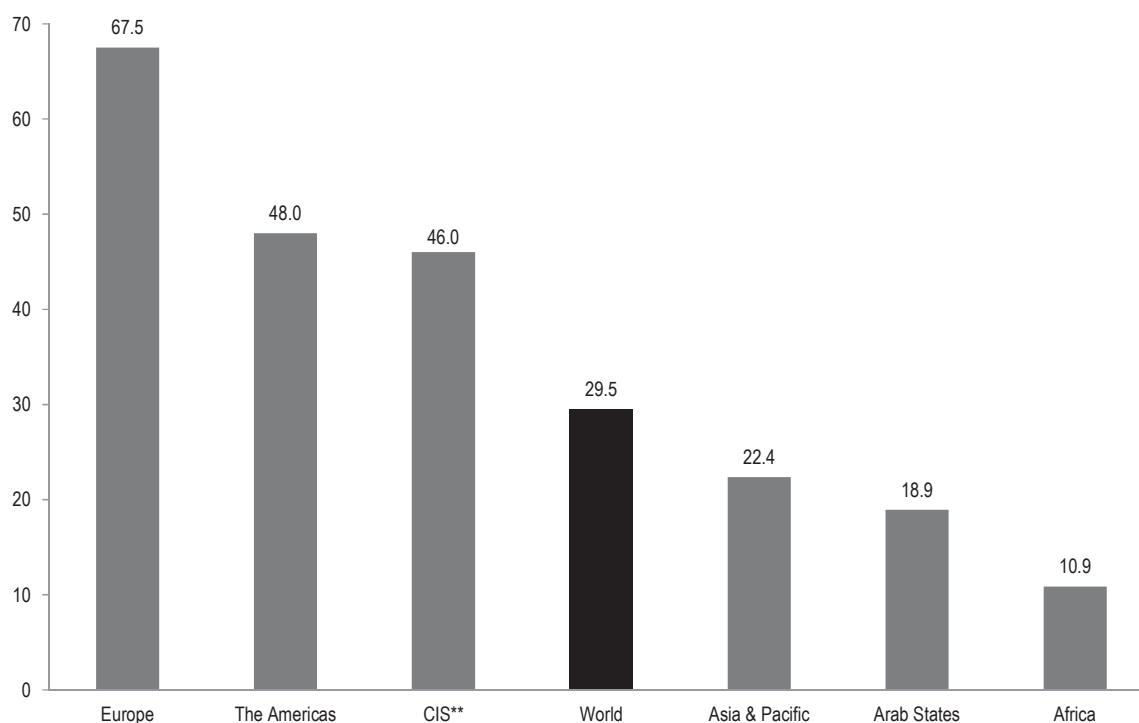
The mobile subscriptions discussed above provide the basis for *mobile broadband*. Statistics on mobile broadband subscriptions have only been available for the past few years, but they show significant trends. Overall, it can be observed that mobile broadband subscriptions per 100 inhabitants grew significantly. As can be seen from Figure 5.5, in developed countries (see figure legend for a definition), the number of subscriptions grew from 18.5 subscriptions per 100 inhabitants in 2007 to 55.1 in 2011. While in 2007, access to mobile broadband was close to zero in developing countries, the number of subscriptions per 100 inhabitants rose to eight by 2011, which represents a growth of 900%, but from low levels. For the next years, it is expected that the number of subscriptions will keep rising. However, the graph also shows that while the digital divide in the number of basic mobile subscriptions is narrowing, it is currently growing for mobile broadband subscriptions. When comparing the number of mobile broadband subscriptions over regions, Africa is clearly behind, with 10.9 subscriptions per 100 inhabitants (see Figure 5.6).

Figure 5.5. Active mobile broadband subscriptions per 100 inhabitants, 2007-13



Note: * Estimates.

Source: ITU World Telecommunication /ICT Indicators Database (2013) The developed/developing country classifications are based on the UN M49, see: <http://www.itu.int/ITU-D/ict/definitions/regions/index.html>.

Figure 5.6. Active mobile broadband subscriptions per 100 inhabitants, 2013**

*Commonwealth of Independent States² ** Estimates.

Source: ITU World Telecommunication /ICT Indicators Database (2013), Regions are based on the ITU BDT Regions, see: www.itu.int/ITU-D/ict/definitions/regions/index.html.

Overall, the growing number of subscriptions in developing countries is an indication that people and organisations are willing to spend often scarce resources to get access to the Internet and that they see important additional value in being connected to the Internet. However, there needs to be greater deployment of high-speed mobile networks, especially in more remote and rural areas. Another key factor is said to be affordability of subscriptions. Unfortunately, at this stage, only case studies and some regional studies exist on current mobile broadband prices across developing countries. A sound methodology and additional resources are needed to collect statistics on mobile broadband prices. The OECD has recently adopted a methodology for measuring mobile broadband prices (OECD, 2012d), which adds to its existing set of price benchmarking methodologies. This methodology could be used for conducting mobile broadband price comparisons in developing countries, and could be adjusted or simplified to adapt to those countries. For example, the ITU is developing a simplified set of basket for mobile broadband.

Areas for future work in mobile communications

As mentioned above, a coherent methodology on mobile broadband prices needs to be developed in order to have a sound basis to compare different regions and continents regarding the affordability of access to mobile broadband and to assess whether there are large differences within countries and different groups of the society.

Deployment of high performance mobile networks such as 3G and LTE (Long-Term Evolution) networks continues to be crucial and affects the availability of spectrum. In this regard, governments should give priority to spectrum refarming, i.e. reallocating spectrum from low-value applications to high-value applications, and a transparent release of additional spectrum to enable operators to offer 3G and even more advanced services (OECD 2009b). In some OECD countries, spectrum auctions proved to be a valuable instrument for spectrum allocation. In Germany, for example, the most recent auction also turned out to be an efficient tool to close *access gaps* to broadband in *rural* and *remote areas*. The country linked the allocation of spectrum to the obligation of deploying broadband in remote areas. Before the winning operator could use the spectrum in cities and in densely populated areas, it had to ensure connectivity in rural and remote areas. This approach could be also considered in emerging and developing countries. In addition, any wireless network relies on a wired infrastructure in the ground. Further effort should thus also focus on deploying a powerful backbone infrastructure in emerging and developing countries. Policies are needed to spur the participation of a greater number of suppliers in the backhaul market (OECD, 2009b).

In terms of devices in use, low-income groups in particular mainly use simple handsets that do not currently allow for complex online operations. Since an increasing number of developing countries have now started to introduce 3G mobile networks, it is expected that higher-end phones will slowly become more popular, also among people in lower income groups – starting with the use of second-hand devices. A major current impediment to the use of smartphones, especially in rural areas, is the lack of electricity, since many models have to be charged on a daily base. New solutions could be developed, e.g. phone charging stations that rely on solar power.

Promoting applications and their use in developing and emerging countries

When it comes to applications, the innovation potential of the Internet and ICTs becomes obvious. Since 2008 there have been substantial developments and a large variety of different applications have been created in developing and emerging countries. This section will focus on four types of applications: those for *i)* agriculture and fishing, *ii)* health, *iii)* education and *iv)* mobile banking. The selection is based on two factors: these applications have a potentially strong impact on low- and middle-income groups and substantial experimentation and developments have taken place over the past years. Agriculture and fishing are among the principal activities of low- and middle-income groups and better access to information in dispersed locations is one of the major gains from the wider spread of ICTs. Health and education are key applications for welfare and, what is more, for stimulating welfare improvements. In the remainder of this chapter, we will first discuss some recent development across each of these applications and then focus on areas for future work to support further development.

ICT-based applications for agriculture and fishing

A basic role of ICTs and the Internet is to disseminate up-to-date and accurate information widely. Disadvantaged rural communities in developing and emerging countries often have most to gain from mobile telephony, and it has often provided them with access to such information for the first time. Such simple, often cost-effective functionalities (compared to more sophisticated applications) can support the activities of these communities (Box 5.1). Figure 5.7 summarises the sources of benefits for agricultural and rural development. These range from simple access to information functionalities, to access to services and connectivity across networks, to more advanced uses related to access to finance (see below).

Box 5.1. Example of mobile agricultural and rural development applications based on information provision

KACE, Kenya: Provides daily market information on 20 commodity prices, facilitates offers and bids to match farm outputs with demand from wholesalers, and facilitates links between farmers and buyers (such as with contract negotiations and commodity transport).

DrumNet, Kenya: Covers the horticultural and oilseed industry and provides information on market trends, weather, prospective partners, and related topics. Includes finance, production, delivery, and payment functions to smooth supply chain processes among various actors (producers, buyers and processing plants, transport providers, banks, and input retailers).

Virtual City, Kenya: Provides automated systems to major buyers of tea, coffee, cotton, and dairy for collecting, recording, accounting, and traceability/distribution of agricultural products. Farmers receive faster and more accurate price, quality, and quantity information. Small and medium-size retailers can use phones to facilitate sales, deliveries, orders, and payments.

Ushahidi, Kenya: Collects and reports information on crises, disturbances, and other events by mobile phone and updates the information on Google Maps. Has been used beneficially in Kenya and Haiti, and has been licensed to many other locations (see section on cloud computing).

Farmers Texting Center, Philippines: Offers an innovative SMS-based service for answering agricultural queries mainly about rice production from farmers, extension workers, and other actors. Also provides technological updates on rice production and a virtual network to facilitate interactions among farmers and clients.

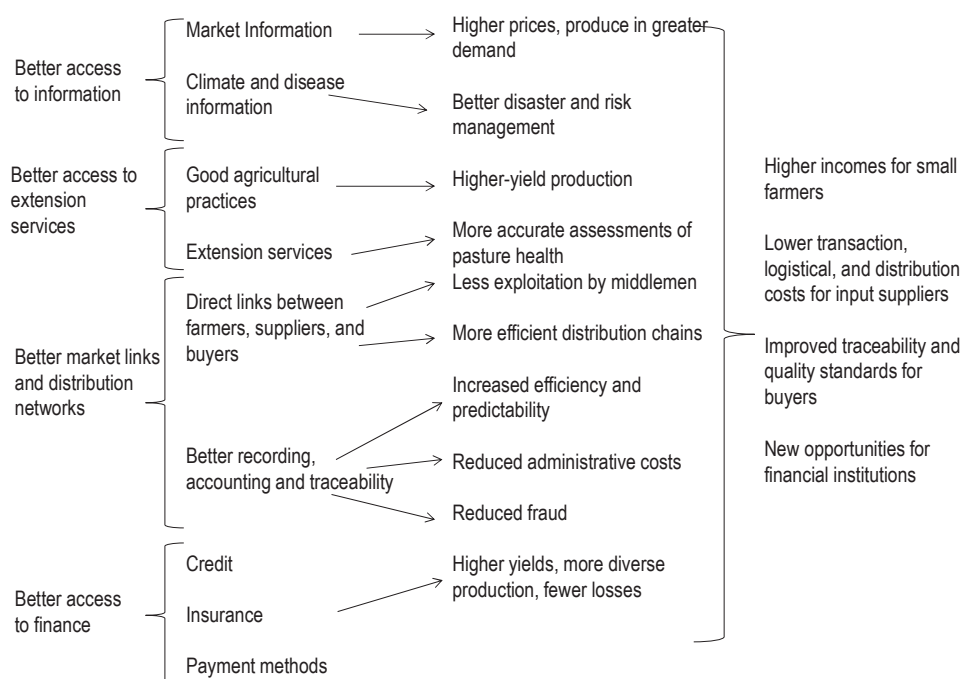
b2bpricenow, Philippines: Provides current market price information to farmers and cooperatives. Its online marketplace links these sellers to buyers and can process financial transactions using bank accounts (web) or debit cards (mobile phones).

1920 AgriExtension (also known as Govi Sahana Sarana), Sri Lanka: Toll-free hotline service that provides crop advisory and technology advice to farmers in Sinhala and Tamil. The aim is to help farmers solve problems related to technology, inputs, and marketing. Users can call from anywhere in the country for immediate answers by call centre operators. Agriculture experts are also available as a second line of support for more complicated questions.

Dialog Tradenet, Sri Lanka: Forwards agricultural commodity price information by SMS and Unstructured Supplementary Service Data (USSD), reducing information arbitrage. Subscribers receive up to five price alerts for five fruits and vegetables from each of the three markets covered. Also provides a trading platform for farmers to identify potential buyers.

Fisher Friend, India: Provides timely information on local fish markets, the weather, the sea and critical information for fishers. It “also increases their knowledge base by providing information on government schemes and entitlements, health services, directory services, and a marine toll-free helpline.” Collaboration between the M.S. Swaminathan Research Foundation (MSSRF), Tata Teleservices in India, Astute Systems Technology, Wireless Reach, and Qualcomm.

Source: Zhenwei Qiang et al. (2011), *Mobile Applications for Agriculture and Rural Development*, ICT Sector Unit, World Bank, Geneva, December 2011, except for Fisher Friend, India.

Figure 5.7. Sources of potential benefits from mobile applications for agricultural and rural development

Source: Zhenwei Qiang et al. (2012), *Mobile Applications for the Health Sector*, ICT Sector Unit, World Bank, Geneva, April 2012.

Impacts in terms of welfare for users

The wide uptake of mobile technology by rural communities is an indication of the demand for access to information (e.g. Batchelor, 2002). Indeed, de Silva and Ratnadiwakara (2010) showed that 11% of the total production cost of a representative sample of 300 smallholders in Sri Lanka was for information search. A study of agricultural micro-enterprises and their use of ICT found that there was particular interest in receiving fertilizer and market price information (Lokanathan and Kapugama, 2012).³ The study also found, however, that face-to-face communication was still preferred to other modes of communication. This may be an indication of the potentially gradual uptake of mobile-based agricultural information services, as potential users have to adjust to using message-based systems rather than traditional face-to-face communications to benefit fully from relevant mobile applications.

There is also specific evidence on the benefits of access to information for rural communities. Jensen (2007) has shown that access to timely information – in this case price information – enabled the fishermen and farmers respectively to gain better prices for their products as inefficiencies were reduced. He demonstrated that access to timely price information enabled fishermen to increase profits by an average 8%. In addition, consumer prices fell by 4% and waste, which had averaged 5-8% of daily catch in the past, was eliminated. The DrumNet application (described in Box 5.1 above) appears to have allowed Kenyan farmers to raise their incomes (Zhenwei Qiang et al., 2011). Regarding the success of functionalities such as extension services, Sri Lanka's e-Dairy helps farmers earn up to USD 262 more a year for each of their calves by providing veterinary and extension services over mobile phones. And tea growers in Kenya have reported average income growth of 9%, or about USD 300 a year, by using Virtual City's production measuring, recording, and traceability functions (ibid.).

Scale, project sustainability and aggregate impacts

The evidence above has shown generally positive effects for users of mobile applications in the past years. However, stronger aggregate effects are conditioned by the scalability of mobile applications, which is also strongly related to their financial sustainability. In fact, the study of agricultural micro-enterprises discussed above found that the use of the Internet amongst the entire farmer sample was non-existent, suggesting that, if at all, impacts would rather be reaped from basic mobile technologies, but not at this stage, from the Internet. However, even mobile-based agricultural information services were not much used except for the Indian case.

Many of the existing applications operate on a relatively small scale because they are not profitable. For instance, a study of mobile applications for agricultural and rural development that reviewed 74 cases found that only 29% had enough revenue to cover operating expenses, while most received at least some funding from governments, donors or corporate social responsibility (CSR) sources (Zhenwei Qiang et al., 2011). The situation is worse for initial development costs: More than four in five projects relied on not-for-profit funding for their development and start-up phases. There are, however, some profitable services, such as the information service provided to Indian fishermen in Kerala, discussed above. Moreover, further experimentation with innovative pricing models, such as pay-as-you-go, micro-leasing and tiered pricing or chain financing can enable funds to be raised, even among lower income groups (Mendoza and Thelen, 2008; OECD, 2012a).

Applications for health

Potential gains from health applications

Health and education are fundamental elements when it comes to welfare. Internet and ICT-based applications offer opportunities for greater outreach and higher quality of service. As disadvantaged groups – particularly, but not only, in rural areas – have been widely excluded from quality education and health services, potential benefits are probably higher for them than for other groups. For instance, mobile phones can make it possible to connect to health services or allow health workers to consult with experts in remote locations and thus improve their services. The applications are particularly attractive, since the costs of expanding health and education services in “traditional ways” tend to be too high for developing and emerging countries to satisfy demand.

More specifically, four types of contributions can be identified in terms of health applications (Zhenwei Qiang et al., 2012):

1. Improving *quality of and access to healthcare* (e.g. treatment support through application reminders, patient tracking, emergency services, improved training for rural health workers and other professionals).
2. Increasing *efficiency of health sector human resources* (e.g. record keeping, clinical decision support).
3. Capturing and using *real-time health information* (e.g. disaster management, social accountability, disease surveillance).
4. Promoting *public health* (e.g. disease prevention through public health advice and educational programmes).

Health applications in practice

Box 5.2 shows that there are many examples of each of these types of project. Many of these projects were initiated recently (see for example, ADB, 2010, for an overview of some of their projects).

Box 5.2. Examples of mobile health applications

Child Count+, Kenya: Application registers pregnant women and children under five and collects basic information about their health to prioritize visits by health workers.

Sehat First, Pakistan: Social enterprise aimed at providing access to basic health care and pharmaceutical services across Pakistan through self-sustainable franchised tele-health centres. Founded in 2008 with an equity investment from the Acument Fund, Sehat First has served over 4000 patients, mostly women and children.

Tamil Nadu Health Watch, India: Disease surveillance system introduced after the tsunami in 2004. Provides links between primary health centres in four districts to enable health experts and programme managers to co-ordinate activities more effectively and allocate resources more efficiently. Use of mobile phones allows health workers, even in remote areas, to immediately report disease incidence data to health officials, speeding up their ability to respond.

Project Masiluleke, South Africa: Increases volume of patients screened for HIV/AIDS and receives information on prevention and treatment. Sends out about 1 million messages a day and covers nearly all of country mobile phone users in a year. The project is supported by the Praekelt Foundation, the PopTech innovation network, LifeLine Southern Africa (the government-backed provider of the helpline), iTEACH, Frog Design and MTN.

Telemedicine support to promote maternal and newborn health in remote provinces of Mongolia: Aims at reducing infant and maternal mortality by improving rural healthcare services. Project funding obtained through a joint venture between the Mongolian Government's Mother and Child Health Research Centre, the Government of Luxembourg (Lux-Development Agency), and the United Nations Population Fund (UNFPA).

WelTel, Kenya: SMS-based messaging system which supports antiretroviral (ARV) therapy helping patients with a series of reminder to follow prescribed treatments.

Source: Zhenwei Qiang et al. (2012) for ProjectMind and text2teach, Melhem and Tandon (2009) for Sehat First and (www.sehatfirst.com), Adler and Uppal (2008) for Tamil Nadu Health Watch, Zhenwei Qiang et al. (2012) for Project Masiluleke, CHAI/HP, Zhenwei Qiang et al. (2012) for WelTel, Child Count+, ADB (2010) for Mekong Subregion Project, Baggaley and Belawati (2010) for the Virtual University of Pakistan (VUP).

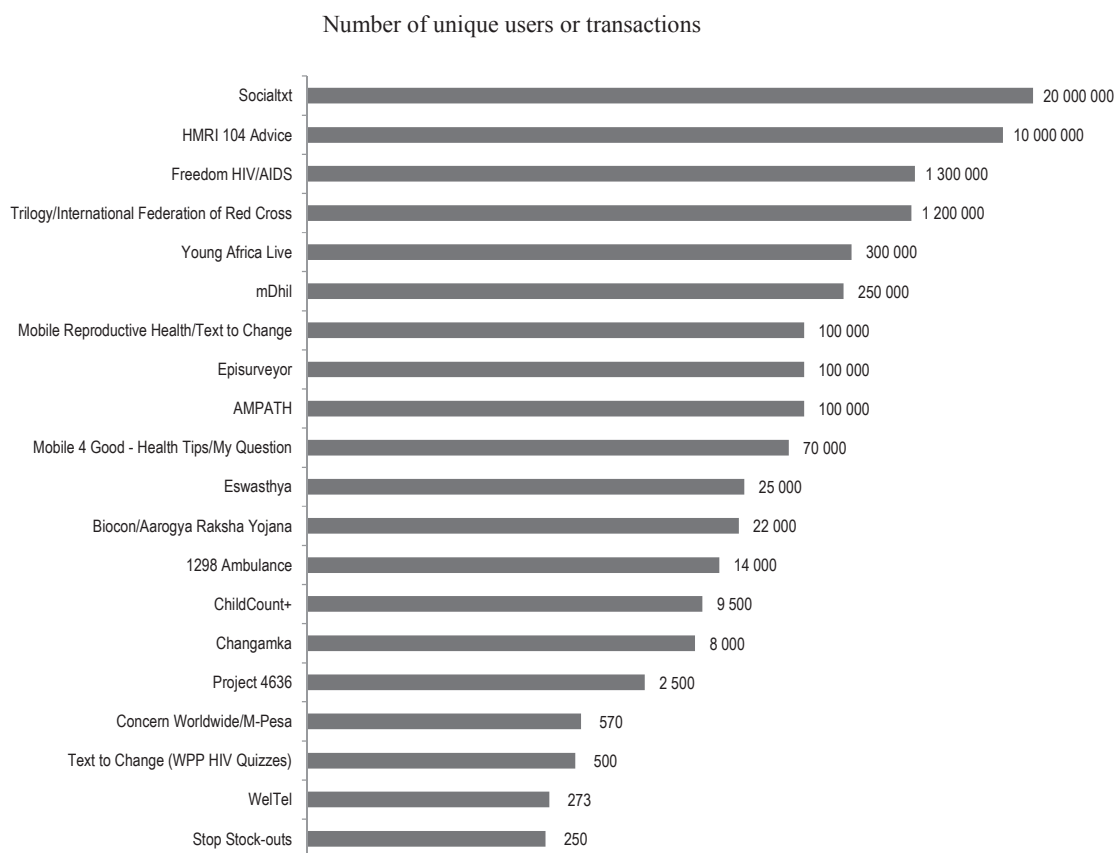
Impacts in terms of welfare

Evidence shows that many Internet and ICT-based health services have indeed had positive welfare effects. This includes for instance, Project Masiluleke (see Box 5.2) that, since it started, has brought about a fourfold increase in use of the country's HIV/AIDS helpline. Also, Medic Mobile, a project that seeks to provide support to community health workers in rural areas, has proved to be successful. In a pilot in Malawi, 75 such workers using the system saved substantially on transportation costs, and made it possible to double the capacity of tuberculosis treatment programmes in six months (Mahmud et al, 2010). Another example where positive impacts were identified is WelTel, a Kenyan programme that sends text messages to people with HIV/AIDS to help them comply with their treatment regimens. A clinical trial using WelTel's Health intervention showed that receiving SMS reminders raised patients' compliance with antiretroviral therapy (Zhenwei Qiang et al., 2011).

Scalability and project sustainability

As in the case of applications for agriculture and fishing, there are challenges related to extending these programmes and replicating successful applications in and between countries. While a few applications such as Socialtxt and HMRI 104 Advice have had rather wide impacts, the great majority of applications is small as described in Figure 5.8 and, thus, has not so far had substantial impacts at the aggregate level. This also applies to Kenya, in spite of its considerable progress regarding the use of mobile technology. Few pilot projects have been able to sustain themselves once initial seed funding has ended, even those that had proven feasible, clinically useful, sustainable, and scalable (WHO, 2009).

Figure 5.8. Scale of mobile health applications in Haiti, India, Kenya, 2010



Source: Zhenwei Qiang et al., (2011), *Mobile Applications for Agriculture and Rural Development*, ICT Sector Unit, World Bank, Geneva, December 2011, based on Dalberg research and analysis.

This outcome is closely related to the financing models of these kinds of application, which often have not achieved long-term viability. Substantial costs of some of these health services suggest that for-profit business models for these applications will potentially be much less feasible compared to, for instance, those applications for agriculture. However, the private sector has been engaged in a variety of initiatives, not only as part of social responsibility programmes: Novartis, for example, is running the SMS for Life program in Tanzania. SMS for Life uses a combination of mobile phones, SMS messages and electronic mapping technology to track weekly stock levels at public

health facilities to eliminate stock-outs, increase access to essential medicines and reduce the number of deaths from malaria. There have also been attempts to introduce innovative pricing strategies that would not exclude lower income groups but still raise sufficient funding: for instance, by implementing price discrimination across incomes. Through the 1298 programme, Ziqitza operates a network of fully equipped Advanced and Basic Life Support Ambulances across two states in India. 1298's business model uses a sliding price scale, driven by a patient's ability to pay, which in turn is determined by the kind of hospital to which he or she chooses to be taken. Financial sustainability is assured through cross-subsidisation.

Internet and ICT-based applications for education

The anticipated benefits in the area of education are high, especially regarding quality and access, as there is a shortage of qualified teachers in many developing and emerging countries. Several features are particularly attractive: the potential to offer education with fewer qualified staff; an opportunity to tailor learning requirements to specific needs and circumstances; the possibility to provide learning at flexible times and locations, so that those not able to comply with common teaching hours (such as workers in rural areas, among other disadvantaged groups) can access educational services. Finally, there could be gains within the education sectors rather like those for health.

Applications for educational purposes in practice

Examples of mobile education applications are provided in Box 5.3. There have been more ambitious experiments beyond information sharing including, for example, the development of downloadable games to increase awareness of HIV/AIDS in India (Adler and Uppal, 2008).

Box 5.3. Examples of mobile health and education applications

Project Mind, Philippines: Provides distance and informal education services by mobile phone. Students' performance is monitored through their answers—sent by SMS—to multiple-choice maths and science questions. Exams are also administered this way.

text2teach, Philippines: Provides fast and timely educational content using mobile and satellite technologies. Content includes more than 900 multimedia materials in video, picture, text, and audio formats. Also uses SMS to receive feedback and comments.

Text to Change, South Africa: Uses mobile phone technology, specifically interactive and incentive based SMS messaging, to send out and receive information to educate, engage, and empower people on wellbeing related issues, such as healthcare, education, and economic development. Text to Change also has campaigns in South America.

Virtual University of Pakistan (VUP): Established in 2002, information technology based university currently offering 17 degree programmes. It uses the national telecom infrastructure and delivers its lectures asynchronously through satellite broadcast TV channels with interaction provided over the Internet.

Source: Zhenwei Qiang et al. (2011) for ProjectMind and text2teach, Melhem and Tandon (2009) for Sehat First and (www.sehatfirst.com), Adler and Uppal (2008) for Tamil Nadu Health Watch, Zhenwei Qiang et al. (2012) for Project Masiluleke, CHAI/HP, Zhenwei Qiang et al. (2012) for WelTel, Child Count+, ADB (2010) for Mekong Subregion Project, Baggeley and Belawati (2010) for the Virtual University of Pakistan (VUP).

Impacts in terms of welfare for users

There is also consistent positive evidence for impacts when it comes to educational projects. The Mobile Technology Initiatives for Non-formal Distance Education (MIND) project, for example, was an International Development Research Centre (IDRC) backed initiative that focused on the non-formal education sector: out-of-school youth, adult learners and others with no access to tertiary education. The results showed that the project's SMS courses in English and Mathematics had positive effects among students in the Philippines and Mongolia (Baggaley and Belawati, 2010).

Scalability and project sustainability for wider impacts

Mobile education applications face very similar challenges to the health applications reviewed above regarding scale and project sustainability. But for ICT-based educational programmes, including distance education, the picture is different. Some projects, such as the Virtual University of Pakistan (VUP), have expanded their activities to a network of more than 100 associated institutions across 60 cities to cater for a wide student population.

Mobile banking applications

In many developing and emerging countries, people have only limited access to banking services. For example, in Kenya – where mobile banking has been most successful – only 19% of the population had access to a bank in 2010 (AfDB, 2010). If the wider uptake of mobile telephony helps extend banking services to those previously without them – as is the case in Kenya for example – it could potentially have substantial impacts for developing and emerging countries. It is, however, more challenging to establish a wider network of formal banking services. This is especially the case if it is to reach many small communities, for instance in countries such as India, because there is often no positive business case for banks (Banerjee and Duflo, 2011).

Simple mobile banking services help increase welfare by mitigating security risks incurred by transporting and storing cash. They also reduce potentially high transportation costs such as those that migrant workers in urban areas have to incur to send money to their families in remote locations. There are even larger potential gains if mobile banking services support the entrepreneurial activities of disadvantaged groups, for example by helping improve the savings behaviour of disadvantaged groups or by providing credit and insurance for business activities, to help reduce risks. Encouraging savings can help generate savings which in turn can support investments in human capital or business activities which can help support market opportunities of often excluded groups. More advanced insurance services can also help reduce vulnerability to unexpected events such as accident, illness, theft, or drought and, by reducing risk, support a progressive increase of capacities. Finally, there are potential gains in terms of transparency, compared to cash-based transactions that can, for example, reduce corruption in the delivery of governmental services.

Mobile banking applications in practice

The most popular and successful example of mobile banking is Kenya's M-PESA. This mobile payment service was piloted in 2005 as a public-private initiative and launched in March 2007 by Vodafone and Safaricom. It became an instant success, with 2.37 million subscribers in its first year (Maurer, 2012). According to estimates, there are about 15 million users in 2012, or roughly 70% of the adult population of Kenya (The

Economist, 2012). M-PESA is a mobile phone money transfer service that uses text-messaging and a network of retail agents as cash in / cash-out points (Mas and Morawczynski, 2009; Jack and Suri, 2011). Several other programmes have been developed, based on M-PESA, demonstrating its wider developmental impacts. These include, for instance, Grundfos Lifelink, an automated village well water supply system in Kenya. The system relies on M-PESA for payment: customers purchase an electronic key to access safe pumped groundwater. The system is used directly to pay for maintenance and to repay the community loan for the well.

There are a number of similar mobile banking initiatives in other emerging and developing countries. A survey conducted among 52 operators worldwide found that there were a total of 60 million registered customers of mobile money services by mid-2011 (GSMA, 2011). However, the customer base was highly skewed towards 11 services. In addition to M-PESA they include SMART Communications and G-CASH in the Philippines (Maurer, 2012). M-PESA has also encouraged mobile services to grow up elsewhere than in Kenya, such as Ekokash, a mobile money service in Burundi. However, most services are small, especially if the actual mobile banking transactions are taken into account. Estimates suggest M-PESA is used for over half of all mobile money transactions in the world (The Economist, 2012).

Large potential gains from mobile banking services have attracted private and public interest, including industry consortia such as the GSM Association (GSMA), which represents mobile network operators across the world, and the Bill and Melinda Gates Foundation. An example of such collaborations is the ‘Mobile Money for the Unbanked’ competition for grants, created in 2009, which rewards mobile banking initiatives aimed at poor sectors of society (Maurer, 2012).

General conclusions across applications

Applications improve welfare, especially for disadvantaged groups

Overall, there is evidence that users benefitted from applications with simple services. The benefits come largely from access to better quality information and services, especially for disadvantaged groups that previously did not have them. There are opportunities for even greater gains as services improve in quality and design. They could also leapfrog developed economies that also need to develop applications, for example on health, given the challenges posed in these economies by ageing populations. Disadvantaged groups who previously had no access to certain kinds of information and services probably feel the most substantial gains.

Sustainability and scalability remain a challenge

The success of mobile banking applications is less substantial when considered in terms of their scale and project sustainability. Exceptions include M-PESA for mobile banking and Socialtxt and HMRI 104 Advice for mobile health applications. Most of these initiatives depended on public funding, NGOs, and international development banks and did not build in provisions for longer-term development and scaling-up. Public funding was particularly necessary during the set-up phase. Nevertheless, there are also several positive signs regarding improvements in sustainability and scalability for these applications. First, they have generated substantial interest from international foundations and donors (due also to the robust evidence on benefits) but also corporate social responsibility projects. If well managed, such funding could be used to support

investments in larger-scale projects and allow for the development of more sustainable business models. Second, innovative pricing strategies have made it possible to finance applications even if these are aimed primarily at lower income groups. One example is tired-pricing, a form of price discrimination, whereby higher-income users cross-subsidise lower-income users in exchange for extra service or via other forms of market segmentation. In India Ziqitza operates the 1298 programme, a network of fully equipped advanced and basic life support ambulances. 1298's business model uses a sliding price scale based on a patient's ability to pay, which is determined by the kind of hospital to which patients choose to be taken.

Areas for future work on mobile applications

Several priorities for future work could be identified, based on the assessment of recent developments in mobile applications.

Beyond case studies towards lessons learned

Many case studies describe specific Internet and ICT-based applications, but it would be useful to compile some of lessons learned from these projects. This could help inform both public and private funding decisions and provide the incentives needed for those decisions to aim for larger-scale services with an opportunity for aggregate benefits. For instance, in the field of telemedicine, WHO Member countries indicated that they required more information on the cost-effectiveness of such services to implement suitable policies (WHO, 2009). Specifically, it would also be important to go beyond single case studies towards a more systematic reporting on failed initiatives, rather than focusing only on successes.

A better understanding of business models is also needed, to foster sustainable projects on a larger scale. It would be especially useful to track the various phases of business development from conceptualisation to execution, given the different investment needs during these phases. Another requirement would be to explore how pricing models can be aligned in such a way that low- and middle-income groups can benefit from such applications, while achieving financial sustainability. Several business approaches have been developed including flexible pricing (e.g. pay-as-you-go, micro-leasing, etc.), chain financing (services are provided to low-income groups jointly with financing opportunities to make them affordable), and production chain innovations that lower costs (including, for example, relying on the poor themselves to provide some of a given service). It would be relevant to test to what extent such models can work within the context of the specific applications reviewed here.

Infrastructure and device constraints and application quality

In some cases, the ICT infrastructure and devices used are below the technology standards of developed countries, while many groups of the society have very limited financial resources. This forces a more pragmatic approach to providing services. In the past, over-ambitious projects that exploited technological opportunities failed because they ignored local conditions. One example is a project on ICT for Education in Mongolia, which provided a large number of schools with computers. However, due to lack of training on their use, the absence of electricity and suitable software, the project failed (ADB, 2010). In contrast, simpler, more aligned projects (even those exploiting simpler technology than was available) were often very successful. Since standard mobile phones will most likely continue to dominate for at least the next five years (and probably longer in rural areas), applications will need to be simple. At the same time, improve-

ments in infrastructure and access to corresponding devices will be important in extending opportunities for improved and more sophisticated applications. This stresses the importance of future work on infrastructure, as discussed above.

Local content, international knowledge and technology transfer

The value of many applications to their users increases significantly with the availability of local content. This is obvious, for instance, in systems that share agricultural information: local information on weather and soil conditions are what users most want. Similarly for most applications, it will be necessary to adapt information to local cultural contexts and write it in local languages. However, such contextualisation can greatly increase costs and, conversely, constrain scalability, especially if the content has to be specifically developed. But this is not necessarily the case for all applications. Many teaching materials or health applications can be more widely adopted, and only require translation into local languages. For example, the Khan Academy provides more than 3 000 educational videos for free, covering a multitude of subjects.⁴ The potential savings through these materials can be useful to sustain and help develop new projects.

Another avenue worth pursuing is the creation of international and national repositories of digital objects, (e.g. for learning purposes), as has been carried out by the University Terbuka (UT) in Indonesia, Sukhothai Thammathirat Open University (STOU) in Thailand, the International Institute of Cambodia University of Technology (IICUT) and Allama Iqbal Open University (AIQU) in Pakistan (Baggaley and Belawati, 2010). Governments can also contribute to this kind of initiative by making public data available and ensuring their quality. To date, several initiatives have looked at sharing of materials, but many services still face the challenge of creating their own materials. It is worth exploring further ways to improve access to content for applications, which also include questions of intellectual property rights.

Openness to experimentation and regulations

As it is the case with innovative projects generally, there is a trade-off between providing space for innovators and, at the same time, protecting markets, and thus consumers, by implementing regulations. These include consumer protection and privacy provisions, legislation to reduce fraud and regulate competition of private companies in the sector. There are significant challenges in this respect regarding online and ICT-based applications, as their often disruptive nature creates new markets, with impacts on different market actors. On the one hand, overly heavy regulation can raise the costs of such applications or even render their implementation impossible. The limited uptake of mobile banking, beyond the few success cases, has been attributed to regulatory constraints that do not allow non-banking entities to offer payment services. On the other hand, lack of regulation can lead to abuses that could be detrimental to the uptake of applications e.g. if mobile savings were lost. A build-up of undue market power can also impede the development of competitive services. In the context of developing countries, both the lack of regulation (e.g. with regard to the role of mobile operators and impacts on competition) and overly stringent regulations (e.g. regarding banking regulations) have been identified as obstacles. It is also relevant to consider exactly where regulations and their absence impose undue costs on products and hamper their financial viability.

Need to create interoperable platforms and open standards

In addition to the financial dimension, the lack of open and interoperable platforms (see also below, regarding cloud computing) has been identified in many instances as a severe constraining factor (see for example Zhenwei Qiang et al., 2011). Open interoperable platforms can stimulate the development of applications and increase their scale at much lower costs and more quickly than if the infrastructure had to be created from scratch by a wide pool of potential customers. It can also facilitate mobile application payments to providers. Examples of developments in that direction are applications like Nokia's Ovi Life Tools (OLT) and, to a lesser extent (insofar as only subscribers of Telefonica can access it), Telefonica's BlueVia. Since such platforms have a strong public goods character, it is relevant to study further roles for policy intervention and examples of successful interventions.

Wider and more coherent national policy agendas

All the applications mentioned above are substantial domains of public policy, notably education and health. Applications that provide agricultural and banking services for the disadvantaged are also closely linked to social policies and financial agendas. Their importance within such broader agendas will often be essential, given the limited financial sustainability of many of these initiatives – in spite of their potential to help save on and improve public expenditures. Changes in this respect have been slow. For instance, with respect to ICT-based health applications, African, Eastern Mediterranean and South-east Asian regions have lagged behind others in terms of coherent national policy implementations and initiatives (WHO, 2009). However, it is also worth noting that countries like Brazil, China, India, Mexico as well as Mauritania, Mali and Sudan already had national tele-health policies in place in 2009. Also, the development of distance education in Cambodia, Laos and Viet Nam has been encouraged in the three countries' national policies and plans (Baggaley and Belawati, 2010). It would be helpful to track more generally how different countries have incorporated online ICT-based applications into their overall policy agendas.

Gains from international collaboration

Many initiatives have been implemented in isolation and, in some cases, this has led to costly repetition of mistakes. There have been several initiatives at the international level. For instance, the WHO Regional Committee for Africa was already calling on Member States to adopt and implement e-Health strategies to improve their health systems in 2006. This was followed up by other declarations, including the Ouagadougou and Algiers Declarations of 2008 and the Framework for Implementation of the Algiers Declaration of 2009. It is relevant for future work to explore where international gatherings can help support international collaboration on these applications. The continued challenge of gaining larger-scale and more financially sustainable models suggests exploiting ways that effectively improve sharing, for example by cross-country exchange forums on specific applications.

Developing skills for the Internet economy in developing and emerging countries

Developments in skills

There are several dimensions through which skills obviously condition benefits from the Internet and ICTs. A *first dimension* is the most basic capacity to use specific ICT-based applications from the end-user side. The evidence on specific applications aimed at helping disadvantaged groups reviewed above has shown that uptake can be enhanced by

including a training element and that this can often be highly cost-effective. For instance, the Fisher Friend application in India (see Box 5.1, above) employs a ‘train the trainer’ approach: A group of young local fishers were trained on how to use the application; these “master trainers” are now showing other fishers how the application works. This procedure has been important for wider uptake. Another approach has been initially to provide not only digital but also traditional offline services that users know well; this facilitates the transition to more cost-effective digital services. For instance, the United Villages model in India provided a network of friends that can conduct online transactions if end-users prefer (Adler and Uppal, 2008).

A *second dimension* includes the skills required for upstream users, often professionals such as health professionals, who need the skills to be able to apply mobile health applications. Many applications for health or education or other services have found insufficient expertise among professionals providing such services, which has reduced potential uptake and impaired the best possible use of opportunities provided by the Internet and related ICTs (Zhenwei Qiang et al., 2012). Skills requirements often go beyond those most closely related to applying ICTs and require professional approaches towards reforming management systems. This includes, for example, the need to incorporate ICT-based applications as part of programme evaluations, so that programme managers have incentives to apply those applications.

In addition, in a more advanced and *third dimension*, significant gains can be obtained from local Internet and ICT skills, such as for example, local web-creation and software design skills: The popularity of home-grown sites in many emerging economies shows a clear advantage for such applications. A lot will depend on the capacities of national higher education systems to train software developers. The success of the Indian software industry has, in that respect, been a stimulus for other emerging and developing countries to improve such capacities in the search for developing a competitive software industry.

ICTs themselves can potentially support education efforts, especially if Internet and ICT-based education programmes of sufficient quality can increase the number of students who can be trained. The positive appeal of social media for large young populations can also help overcome the constraints imposed by skills shortages, notably by relying on the kinds of innovative educational tools described above in the section on Internet- and ICT-based applications. However, a pragmatic approach towards skills barriers will be important, since skills shortages cannot be quickly and easily overcome, particularly when it comes to reaching disadvantaged groups.

Besides increasing Internet and ICT skills, an important factor for the success of applications and content designed for developing countries will be whether they are user-friendly, and thus reach even the low-skilled. The very success of mobile phones in contrast to computers owes a lot to their simplicity. A great deal can be achieved by emulating the simplicity in applications for disadvantaged groups. This principle should be borne in mind, as failure to do so risks excluding a large number of users and leading projects to fail. In contrast, if initial uptake is achieved, small steps can be taken towards building skills, while users benefit from simple functionalities. This might not take full advantage of ICTs but has a better chance of success over a longer period.

Areas for future work in skills development

The need for greater investments in skills, particularly in emerging and developing countries, is not new, nor is the need for ICT skills. Given limited resources, there is, however, a need to assess the relative importance of these kinds of investment and their

costs. There is a need to assess, in specific contexts, the extent to which simple technologies can save on training in the use of applications, as well as the importance of local software development.

The role of innovation: Cloud computing and development

Innovation is taking place at a rapid pace in the Internet economy. This section highlights one innovative concept that has grown in importance since the Seoul Ministerial meeting and that is expected to significantly change the way computing is undertaken and the way computing resources are provided: *Cloud computing*.

Definition of cloud computing, cloud service and deployment models

Cloud computing can be understood “as a service model for computing services based on a set of computing resources that can be accessed in a flexible, elastic, on-demand way with low management effort” (OECD, 2013b). This means that users of cloud computing infrastructure and services do not have to make capital-intensive up-front investments in IT infrastructure and software any more, but, instead, can pay for computing resources in a flexible pay-as-you-go model. They do not have to plan the provision of their computing resources in advance, since they can access computing resources on-demand. Furthermore, applications and information stored in the cloud can be accessed through multiple fixed and mobile devices, so long as a network connection is available.

Cloud computing providers have significantly lower operating costs, due to their global scale and capacity to aggregate the demand of multiple users than companies and governments of all sizes would have if they ran their own IT infrastructure. Cloud providers can offer computing resources quickly and flexibly, allowing rapid adjustment to changing requirements.

Overall, a multitude of different cloud computing services exist, including software, platform and infrastructure services. The existing *service models* can be categorised into: *i*) infrastructure as a service (IaaS); *ii*) platform as a service (PaaS); and *iii*) software as a service (SaaS). IaaS provides raw computing resources, such as storage, processing and networks and enables users to deploy their own applications and software. PaaS provides users with a more structured platform and users typically rely on programming languages and further tools of the cloud provider to deploy their own applications and services. With SaaS, cloud users directly access the applications of the cloud providers. The spectrum of these applications is vast and ranges from e-mail applications to business applications, such as customer relationship management tools. In addition to the service models, there are several delivery models that include private, public, hybrid and community clouds (see OECD, 2013b for a more detailed description of cloud service and deployment models).

The role of cloud computing for development

The major benefit of cloud computing for development is the fact that individuals, businesses and governments can access and benefit from a wide range of well-developed computing resources that would otherwise not be available in developing or emerging countries. In addition, cloud computing allows users to buy only the quantity that is really needed. The different service and deployment models of cloud computing provide a wide array of potential cloud IT services and platforms.

Individuals in developing countries, for example, can mainly benefit from multiple SaaS applications, such as private e-mail accounts, text and spreadsheet programmes and storage services. These programmes are often free of charge and allow not only for more efficient digital communication, but also for composing documents, carrying out calculations and managing daily life in an easier way. In addition, there are services that provide individuals with a free platform on which they can develop their own applications.

Platforms designed for mobile devices seem to be very interesting, as the deployment of mobile networks is more advanced than the deployment of fixed networks in emerging and developing countries. One very successful example of a platform that was especially developed for integrating input from mobile devices is Ushahidi (see Box 5.4). Many services with social and business purposes have been created since its launch. It has proved to be a very valuable tool for fostering inclusiveness. As long as a mobile device and some connection is available, content can be uploaded, even from remote rural sites. A major benefit of many of the applications that have been developed on the platform is that they gathered information from dispersed geographical areas and different groups of the society.

Box 5.4. The Ushahidi platform – an example of cloud computing services in emerging and developing countries

Ushahidi (“testimony” in Swahili) is an open source cloud computing platform on top of which users can create their own services. It is a free service that enables the programmer to collect information from multiple web sources, to do “crowd-sourcing”, to create timelines and provide mapping services. In addition, a key component of the website is to use mobile phones as a primary means to send and retrieve information. It was initially launched in Kenya to collect eyewitness reports of election violence. Since its creation, it has been used across the world for various purposes. In India, for example, a software engineer built a disaster-tracking map on the Ushahidi platform when the city of Mumbai suffered bomb attacks in July 2011. It was also used for other disaster-tracking purposes during earthquakes in various locations. Other examples of how the website is used include geospatial visualisation services e.g. on (human) trafficking, monitoring elections in various countries such as India, Mexico and Afghanistan, monitoring medicine stock-outs in Zambia, building ICT knowledge bases (e.g. in the area of agriculture) and tracking business incubators and tech organisations in Africa.

Source: OECD based on Ushahidi, www.ushahidi.com, accessed in October 2012.

Businesses, including start-ups and small and medium enterprises (SMEs), often have greater constraints on financial resources in emerging and developing countries than in more developed countries. In particular, small firms can often not afford to purchase and maintain expensive IT infrastructure, including hardware and software (IADB, 2011). Through the use of cloud computing, these companies do not have to make expensive, up-front capital investments, but can buy computing resources on-demand and only pay for the actual amount they use. In addition, these services will, in most cases, be more developed and of higher quality than the infrastructure and software they could afford to buy and install (e.g. in terms of the quality of service, regular updates and the security measures provided by the cloud services).

Cloud computing also provides an important opportunity for individuals and small groups to create new businesses more easily, since less seed capital is needed. Both in developed and developing countries, a growing number of start-ups and small companies have been created by fully relying on cloud computing for all of their IT processes and services, which allowed them to save fixed infrastructure costs. In India, for example, start-ups such as Sparsha Learning⁵ (educational services) or Whitesharkk⁶ (web apps) fully rely on PaaS services. Cloud computing thus provides an attractive means to lower entry barriers for small firms and to allow them to participate in the overall Internet economy.

Governments in emerging and developing countries rely increasingly on IT infrastructure and are confronted with the need to upgrade and extend it. Since cloud computing can provide IT resources in a very cost-efficient and energy-efficient way, it would be particularly interesting for governments in emerging and developing countries to investigate the use of cloud computing. Several OECD countries have already taken initiatives to move government services to the cloud (e.g. the United States and Denmark), and could serve as models. There is a broad range of potential applications, from programmes that track the use of public funds to knowledge management and legal case management systems.

Cloud computing, then, could become a very valuable tool for economies in emerging and developing countries. It provides a platform for the development of new businesses in these countries and can underpin social development, including education, health care, and governmental services. However, there are also challenges regarding the deployment of cloud computing in developing countries that need to be addressed. These challenges and other areas for further work are discussed next.

Areas for further work on cloud computing for development

Need to improve infrastructure: Internet access and electricity supply

Cloud computing services can only be used if an Internet infrastructure (i.e. wired or wireless broadband) is in place. As the section on infrastructure has shown, significant progress has been made in connecting emerging and developing countries to the Internet and in the number of mobile broadband subscriptions. However, greater efforts have to be made to connect more people, businesses, schools and government agencies to the Internet, especially in rural areas, so that developing countries can benefit from cloud computing.

A second major infrastructure challenge is the lack of electricity or a reliable electricity supply in many regions. There has to be a reliable electricity supply in order to move content to the cloud and to run computers. This supply could come from alternative energy sources, such as wind or solar power. Work has to be undertaken to analyse how to ensure adequate energy supply for cloud computing services and how best to combine the provision of cloud services, electricity and connectivity.

Need for awareness-raising and education measures

It is crucial that individuals and businesses in developing and emerging countries understand the inherent benefits and challenges of cloud computing. Cloud computing services have blossomed recently and the concept has become something of a buzzword, masking a lack of a clear understanding. And SMEs – even in developed countries – can experience difficulties in fully understanding the concept. It is therefore fundamental to raise awareness of the concept in developing countries, for example by giving examples of best practices, and conducting educational activities that are adapted to the needs in these countries. Governments also need to take on the role as lead users of the cloud in order to demonstrate its benefits. There should be a transfer of knowledge from countries that are already have experience in public sector use of cloud computing.

Need to address privacy and security challenges

Privacy and security challenges are more or less the same for developed and developing countries. In the area of privacy, a globally interoperable approach by governments would facilitate the deployment of cloud computing. More particularly, policy makers should address the questions of whose laws apply to the data stored in the

cloud, including who can access these data, and under which circumstances processing of data in the cloud amounts to a cross-border transfer.

Meanwhile, cloud computing does not present completely new security challenges, but since it is based on networked computing, there needs to be a risk management approach to assure the availability, integrity and confidentiality of data. In addition, authentication and identity management challenges need to be addressed, as individuals conduct more of their online activities through cloud-based services. Since the challenges are essentially the same for developed and developing countries and since some parts of the world have already worked on these issues, there could be knowledge transfer in the areas of both privacy and security.

Open standards are essential for cloud computing in developing countries

Open standards are important for stimulating the use of cloud computing in emerging and developing countries. Several standards institutes are currently working on a set of standards for different cloud computing applications (see OECD, 2013b for a more detailed discussion). Institutes, international organisations and public authorities should work together in further developing these standards, while cloud service providers from emerging and developing countries should be included in current standardisation efforts. Furthermore, public authorities could mandate open standards when they decide to rely on cloud computing services.

Promote cloud computing as a platform for big data

Cloud computing is an enabling platform for the use of “big data”, i.e. data with significant *volume* (challenging the capacities of traditional IT systems), *velocity* (with data collection, access, and processing at almost real-time), and *variety* (combining data of different types, including structured and unstructured data). For developing countries, the use of big data promises to generate significant value by informing policymakers on, and helping them meet major social and economic challenges. Examples include the use of crowd-sourcing event data from sources as diverse as telephones, SMSs, and social networking sites such as Twitter, to evaluate elections or for disaster tracking purposes, and providing data processing and analytic capacities for low-skill tasks that cannot be substituted by machines (see for example Amazon Mechanical Turk).

Conclusions

Since the 2008 Seoul Declaration, significant progress has been made with respect to the development of the Internet economy for emerging and developing countries: infrastructure has enabled better and more connections between countries. There has also been progress in the development of applications serving disadvantaged groups, in areas that include agriculture and fishing, health, education and mobile banking. Many of these applications have demonstrated benefits for their users, but a challenge often remains regarding the scalability of activities.

This chapter focused on the four areas of infrastructure, skills, applications and cloud computing and singled out some important themes. The impacts of ICTs have also been substantial in other areas that could not be covered here, but would warrant investigation. Two notable areas are the impacts of the Internet and ICTs on good governance (e.g. reducing corruption and increasing transparency) and the impact of the Internet and ICTs on different businesses.⁷

Notes

1. The informal sector covers non-registered business activities.
2. Countries include Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Moldova, Russian Federation, Tajikistan, Turkmenistan, Ukraine and Uzbekistan.
3. The 2011 study, Teleuse@BOP4, conducted in Bangladesh, India, Pakistan, Sri Lanka was based on 10 147 people interviewed from May-June 2011 who had used the phone to make a call in the last three months, were between ages of 15-60 and belonged to the lower income deciles.
4. www.khanacademy.org/
5. www.sparsha-learning.com/
6. www.whitesharkk.in/
7. See forthcoming OECD work on innovation for inclusive development:
<http://oe.cd/inclusive>

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The Internet Economy on the Rise

PROGRESS SINCE THE SEOUL DECLARATION

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