2015 2018

INFORMATION SOCIETY STRATEGY AND ACTION PLAN

Information Society Department
March 2015

Foreword

Industrial Revolution, which started in Europe, and following innovations in manufacturing and transportation technologies led to mass production and eased mobility of raw materials, goods and labor force across different places of the world. As a consequence of these developments, restricting effects of geographic boundaries and distances in procuring production inputs and consuming final goods diminished and, in this context, production and consumption processes of the economies were reorganized. Societies that developed and effectively utilized such technologies, which led to economic globalization, and managed penetrating production and trade networks formed by these technologies outcompeted others and increased their welfare.

Recent developments in information and communication technologies within the last 30-35 years have moved globalization to a new phase. Widespread use of these technologies eased transmission, processing and storage of digitizable information and led to creation of a new information based economic structure by changing structures of economic and social activities using this kind of information as input and creating new goods and services that never existed before. As in post industrial revolution period, societies developing information and communication technologies, using these technologies in goods, services and information production processes and managing resulting information network effectively are outperforming others and increasing their welfare.

Information Society Strategy and Action Plan (2015-2018) was prepared as a result of a comprehensive and inclusive study in order to get involved in this global transformation and benefit from this process to the maximum extent possible. The Strategy outlines 8 main policy pillars in information society by focusing on growth and employment as main items of our country's development agenda. In this context, building a strong information technology industry, installing broadband infrastructures through a healthy sectoral structure, organization of human resources in line with the needs of information society agenda, increasing effectiveness and reducing inequalities regarding access to information and communication technologies by different segments of the society, ensuring information security and user trust, benefiting from information and communication technologies supported innovative solutions in societal challenges, forming an ecosystem supporting economic development through internet entrepreneurship and e-commerce, and ensuring user-centricity and effectiveness in public services are foreseen targets to be reached with this Strategy. The Strategy doesn't only provide the implementation framework for efforts of different institutions but also defines high level implementation steps to be followed in this regard.

I would like to thank to members of Ministry of Development's Information Society Department as well as all public institutions, NGOs, private sector representatives, our citizens and consulting team who contributed vastly to this Strategy. I wish this Strategy, which will be implemented within the next four years in cooperation with all stakeholders, to be beneficial for our country.

Cevdet YILMAZ
Minister of Development

THIS PAGE IS INTENTIONALLY LEFT BLANK

TABLE OF CONTENTS

FIGURES

TABLES AND BOXES

ABBREVIATIONS

2G	Second Generation
3D	Three Dimensional
3G	Third Generation
4G	Fourth Generation
5G	Fifth Generation
ADSL	Asymmetric Digital Subscriber Line
AKS	Address Registration System
API	Application Programming Interface
ARBİS	Researcher Information System
B2B	Business to Business
B2C	Business to Consumer
B2G	Business to Government
BDDK	Banking Regulation and Supervision Agency
BİMER	Prime Ministry Communication Center
BKM	Interbank Card Center
BSA	Bit Stream Access
BTAP	Information Society Research Programme
BTK	Information and Communication Technologies Authority
BTYK	Science and Technology Supreme Council
C2C	Consumer to Consumer
CEIT	Computer Education and Instructional Technology
CEPT	European Conference of Postal and Telecommunications Administrations
DSL	Digital Subscriber Line
EBA	Education Informatics Network
EITO	European Information Technology Observatory
EMO	Chamber of Electrical Engineers
ENoLL	European Network of Living Labs
epSOS	Smart Open Services for European Patients
eSENS	Electronic Simple European Networked Services
EU	European Union
Eurostat	The Statistical Office of the European Union
FATİH	Movement of Enhancing Opportunities and Improving Technology
FCC	The Federal Communications Commission
G-20	The Group of Twenty Finance Ministers and Central Bank Governors
GDP	Gross Domestic Product
GIS	Geographic Information Systems
GML	Geography Markup Language
GPS	Global Positioning System
GSM	Global System for Mobile Communications
HIS	Healthcare Information System
IaaS	Infrastructure as a Service

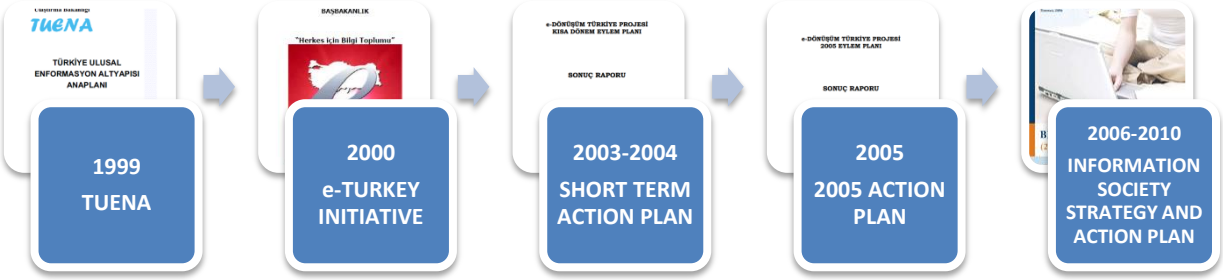
IBM	International Business Machines Corporation
ICANN	Internet Corporation for Assigned Names and Numbers
ICT	Information and Communication Technologies
IDC	International Data Corporation
IMT-2000	International Mobile Telecommunications-2000
INSPIRE	Infrastructure for Spatial Information in the European Community
IP	Internet Protocol
ISCO	International Standard Classification of Occupations
IT	Information Technologies
ITU	International Telecommunications Union
IXP	Internet Exchange Point
İKİS	Provincial Coordination and Monitoring System
İLEMOD	Provincial Inventories Modernization Project
İŞKUR	Turkish Labor Agency
KOSGEB	Small and Medium Enterprises Development Organization
LLU	Local Loop Unbundling
LTE	Long Term Evolution
M2M	Machine to Machine Communication
MAKS	Spatial Address Registration System
MERNİS	Central Civil Registration System
MERSİS	Central Legal Entity Registration System
METU	Middle East Technical University
METUTECH ATOM	Animation Technologies and Game Development Center
MGI	McKinsey Global Institute
MIT	Massachusetts Institute of Technology
MYK	Vocational Qualifications Authority
NACE	Statistical Classification of Economic Activities in the European Community
NGO	Nongovernmental Organization
OECD	Organization for Economic Cooperation and Development
OSS	Open Source Software
OTT	Over the Top
ÖSYM	Student Selection and Placement Center
PaaS	Platform as a Service
PIACs	Public Internet Access Centers
PICs	Public ICT Centers
POS	Point of Sale
PPP	Public Private Partnership
PTT	Turkish Post and Telegraph Organization
R&D	Research and Development
RRC	Regional Radiocommunication Conference
RTÜK	The Radio and Television Supreme Council
SaaS	Software as a Service
SAN-TEZ	Industrial Thesis Support Programme

SCT	Special Consumption Tax
SCT	Special Communication Tax
SGK	Social Security Institution
SME	Small and Medium-sized Enterprises
SODES	Social Support Programme
TAKBİS	Land Registry and Cadastral Information System
TBMM	The Grand National Assembly of Turkey
TCMB	Central Bank of the Republic of Turkey
TDZ	Technology Development Zone
TGBD	Technology Development Zones Association
TİB	Presidency of Telecommunication
TİM	Turkish Exporters Assembly
TNAP	Turkey Network Infrastructure Platform
TOBB	The Union of Chambers and Commodity Exchanges of Turkey
TOKİ	Housing Development Administration
TRCERT	Turkey Computer Emergency Response Team
TRCI	Team for Responding to Cyber Incidents
TRT	Turkish Radio and Television Corporation
TSE	Turkish Standards Institution
TUCBS	Turkey National Geographic Information System
TUENA	Turkish National Information Infrastructure Plan
TURKSTAT	Turkish Statistical Institute
TÜBİSAD	Informatics Industry Association of Turkey
TÜBİTAK	Scientific and Technological Research Council of Turkey
TÜRKAK	Turkish Accreditation Agency
TÜRKSAT	Satellite Communications and Cable TV Operations Company
UIS	Urban Information System
UMEM	Specialized Vocational Training Centers
UMTS	Universal Mobile Telecommunications System
UN	United Nations
UNCTAD	United Nations Conference on Trade and Development
USA	United States of America
USD	United States Dollars
VAT	Value Added Tax
WRC	World Radiocommunication Conference
YASAD	Software Industrialists Association
YASED	International Investors Association
YÖK	Higher Education Council
YPK	High Planning Council

I. INTRODUCTION

1. Information has been the main source of prosperity throughout history. Societies possessing high quality information and using it properly for political, economic and social organization have advanced in the competition of achieving higher level of prosperity.
2. Advancements in electronics, especially after mid-20th century, accelerated information society transformation by radically changing the collection, storage, processing and delivery of information. Recently, information and communication technologies (ICT) have become general purpose technologies used in all aspects of economic and social life. In that regard, ICT industry has arisen as a high value-added sector that affects various other sectors by enabling the production of new information, development of innovative and efficient business processes, high utilization of production factors and the rise of new businesses and fields of expertise.
3. These advancements are deeply affecting economic and social life. Economic competition among countries is highly affected by these advancements, and countries that use these technologies effectively are gaining competitive advantage in the global arena.
4. Digital transformation is challenging individuals, corporations, public and social institutions to acquire necessary qualifications required in the digital era. In that sense, societies are becoming more prominent in which individuals and institutions have a high motivation to create knowledge as well as utilizing it for better decision making in business, have ability to think systematically, question the environment they live in, and learn throughout their lives.
5. In the information age where individuals, societies and institutions are changing in a very dynamic and reproductive fashion, current laws and public policies are falling short in responding to such a rapid transformation. Hence, new approaches and policies are required. Many countries are revising their economic, social and administrative policies as well as building new comprehensive or thematic policies in order to benefit from opportunities provided by the information society and also trying to avoid risks along the way. International bodies like UN, EU and OECD are carrying out studies for both understanding and shaping information society transformation.
6. In Turkey, efforts to build policies and strategies regarding developments in ICT as well as economic and social impacts of these technologies have flourished after mid-90s.
7. In Turkish public administration, there are several documents and tools for policy making purposes. Primary and secondary legislation, Government Program, Development Plan, Medium-term Program, Medium-term Financial Plan, Annual Program, Budget and Investment Program, strategic plans of public institutions, thematic strategies and action plans, regional and land use plans and public and institutional conventions are among these documents and tools.
8. Turkey's information society policies, strategies, goals and practices have been covered in parts by aforementioned national documents and tools. Turkish National Information Infrastructure Plan – TUENA (1999), e-Turkey Initiative Action Plan (2000), e-Transformation Turkey Project Short-term Action Plan (2003-2004, 2005) and Information Society Strategy and Action Plan (2006-2010) are national plans and programs that particularly address information society policies. These documents describe information society policies, which are recited in main policy documents, in a detailed, comprehensive and integrated manner.

Figure 1 - Turkey's Main Policy Documents for Information Society, 1999-2013



9. While TUENA and e-Turkey Initiative Action Plan could not be implemented, stability is mostly attained in the implementation of other strategies and action plans that are coordinated by Ministry of Development since 2003. In that period, action plans are implemented in line with thoroughly formulated strategies and goals in order to boost national benefits and added value for all parts of the society. Differing levels of progress was achieved in different areas.

Information Society Strategy and Action Plan (2006-2010)

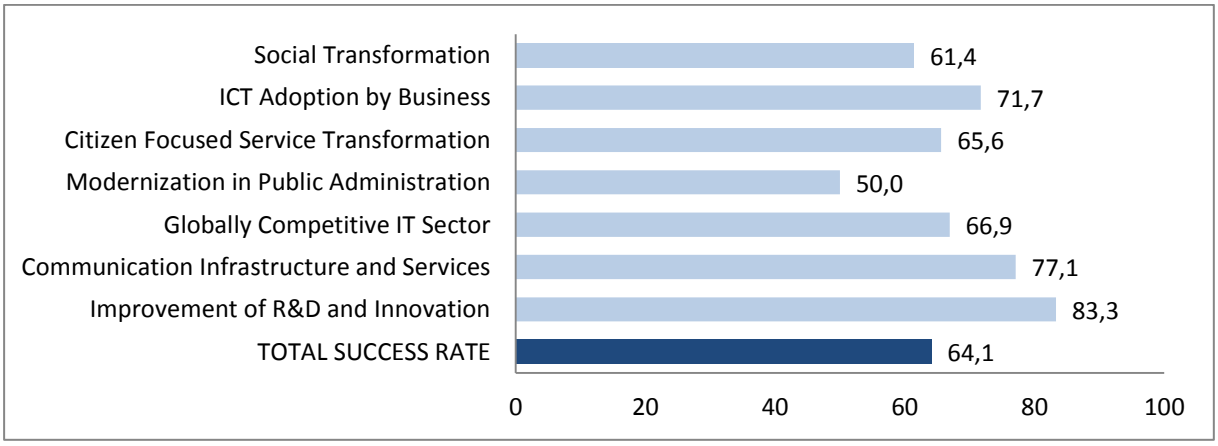
10. Information Society Strategy and Action Plan (2006-2010) was approved as a main policy document that would enable Turkey to achieve its information society goals through a medium-term program in parallel with global developments. The Plan was put into force on 28.07.2006 by the High Planning Council's Decision no. 2006/38.
11. The Strategy was designed with an approach to benefit from network effects as a result of dissemination of ICT throughout the society. Thus, in the Information Society Strategy, a strategic framework was outlined such that all economic and social actors are considered from an information society perspective in a comprehensive manner.
12. Information Society Strategy proposed strategies, goals and actions in 7 fundamentally strategic priority fields addressing 4 groups of actors: public sector, private sector, individuals and ICT industry. The Strategy focused on following priorities:
    - *Social Transformation:* Through effective usage of ICT by citizens in their daily and professional lives, economic and social benefits will be increased.
    - *ICT Adoption by Businesses:* SME's will be encouraged to engage in e-commerce by increasing computer ownership and internet access and ICT needs of sectors and regions that have strategic importance will be determined and sector specific productivity programs will be launched addressing these needs.
    - *Citizen-focused Service Transformation:* With the help of ICT, public services will be moved to electronic channels, prioritizing services of high usage and high return. Business processes will be reengineered in line with user needs, and hence effectiveness in service delivery will be ensured.
    - *Modernization in Public Administration:* An effective e-government model with organizational and process structures in conformity with country's specific conditions will be established, prioritizing efficiency and citizen satisfaction.
    - *A Globally Competitive IT Sector:* Focus will be on expanding into foreign markets by developing sector competencies via public-private partnerships and project-based services

in the field of IT services, and on vertical solutions with highest competitive advantages in packaged software.

- *Competitive, Widespread and Affordable Telecommunications Infrastructure and Services:* Effective competition in the sector will be established in order to develop and ensure widespread use of telecommunications infrastructure and services; and hence, a conducive environment will be created for the establishment of telecommunications infrastructures based on new technologies and for the provision of fast, secure, continuous and quality services at affordable prices.
- *Improving R&D and Innovation:* As an innovative sector with a high value added and an increasing demand in global markets, priority will be given to R&D activities in the ICT sector and new technologies with market potential will be supported. Besides, ICT will be used to the maximum extent in developing and increasing productivity of R&D and innovation activities.

13. Information Society Strategy was put into action as a comprehensive program in the aforementioned 7 priority fields with 38 responsible government agencies and 111 actions where progress was measured via 117 indicators, of which 36 were fundamental.
14. Progress reports and annual statistics were employed as two main tools to monitor implementation of Information Society Strategy. In progress reports, which were produced periodically through 2008-2010, developments were illustrated both qualitatively and quantitatively in accordance with the methodology developed by Ministry of Development. 5 progress reports covering the May 2008-March 2010 period and final evaluation report of March 2013 were prepared by Ministry of Development with the contribution of all relevant public institutions. Three versions of Information Society Statistics reports were shared with public in 2009, 2010 and 2011 in order to report the progress of Information Society Strategy in terms of 117 pre-determined indicators.
15. As of June 2012, overall success rate in the implementation of Information Society Strategy Action Plan was 64.1 percent. Progresses in actions of different priority fields are as follows.

Figure 2 - Success Rates in 7 Priority Fields of Information Society Strategy Action Plan (2006-2010), June 2012



Source: Ministry of Development, Information Society Strategy and Action Plan (2006-2010) Final Evaluation Report, 2013

Preparation Process of the New Strategy and Action Plan

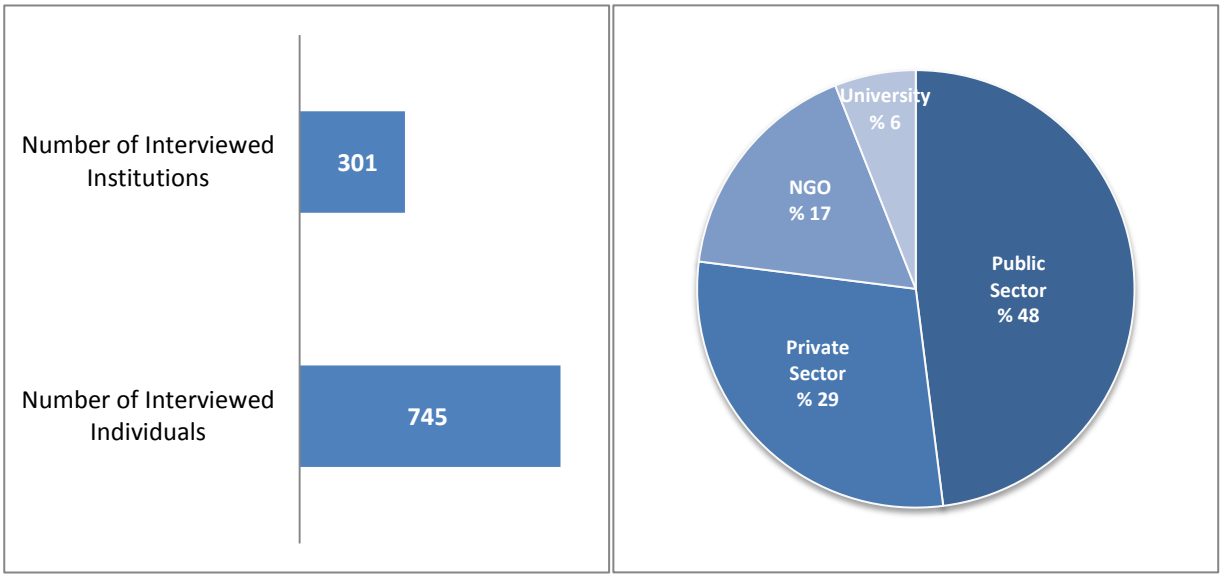
16. Information Society Strategy and Action Plan (2015-2018) was prepared in two phases.
17. In the first phase, after determining the conceptual framework; background studies and analyses were carried out by a consultancy firm between November 2012-October 2013 in order to build a solid base for the preparation of the Strategy and the Action Plan. Outcomes of these studies were documented in four main categories: Current State, Global Trends, Macroeconomic Effects and Needs Assessment.

Table 1 - Outputs of Consultancy Service for Renewal of Information Society Strategy

Main Outputs	Outputs of Supportive Studies
- Current State Report - Global Trends and Country Reviews Report - Macroeconomic Projections and Opportunities Report - Needs Assessment and Recommendations Report - Project and Participation Portal	- Focus Group Studies and Reports - Workshops and Reports - Progress Reports

18. In order to ensure and encourage the participation of all relevant actors in the preparation period of Turkey's Information Society Strategy, a threefold participation process was carried out. Primarily, a large number of participants from public sector, private sector, NGO's and universities were given the opportunity to freely express their experience, general recommendations and also comments on preparation documents via 24 focus group studies and 20 workshops. Secondly, contribution of various parties and individuals were gathered and reflected in the documents through several meetings and interviews on specific subjects.

Figure 3 - Number of Interviewed Individuals/Institutions during Consultancy Period and Distribution of Individuals by Type of Institution

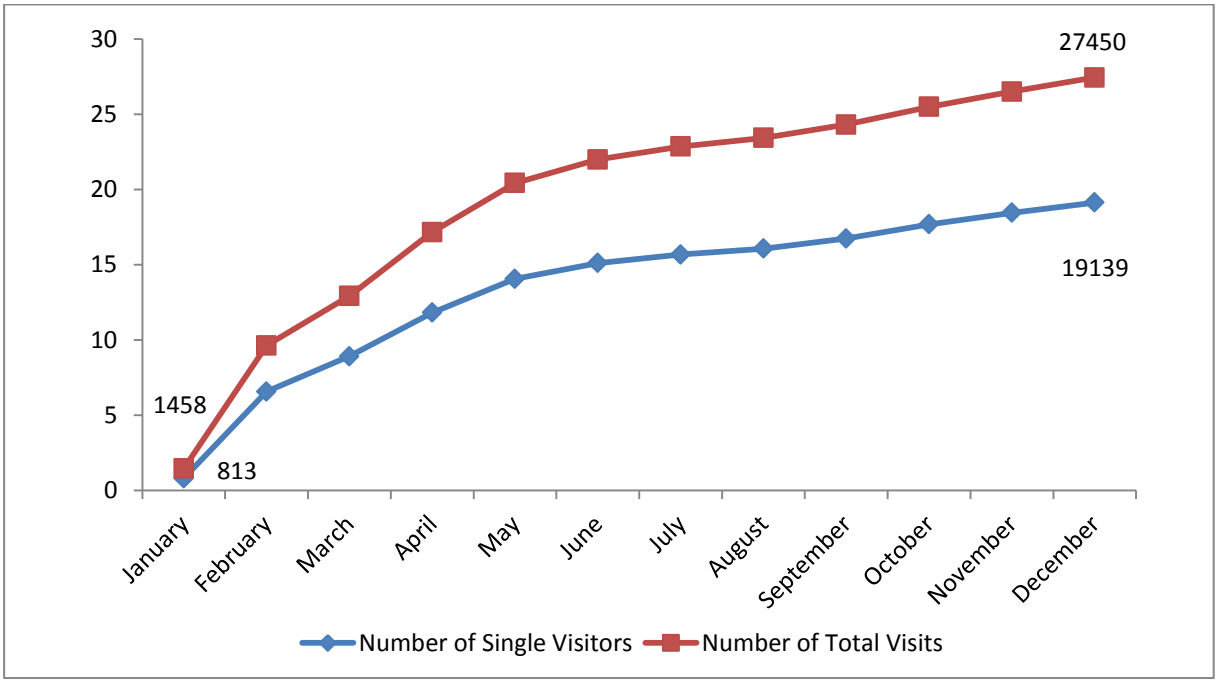


** Includes interviews carried on during focus group studies, workshops and one-to-one meetings.*

19. Furthermore, in order to share all outcome documents and get the contribution of all voluntary parties, Project and Participation Web Portal was created shortly after the initiation of preparation studies. Bilgitoplumustratejisi.org was designed as a platform to publicly share

all project outcomes as well as to utilize online participation tools to enable all relevant parties and individuals to share their knowledge, expertise, comments and documents. In that regard, not only final reports, but all outcomes of the project were kept open for contributions from all parties and individuals.

Figure 4 - Number of Visitors and Visits to Project and Participation Portal, 2013



20. In the second phase of the preparation period, a draft version of the Plan was prepared under the coordination of Ministry of Development based on background documents, studies and contributions. Upon receiving and evaluating feedback from relevant parties on the draft, the Strategy and Action Plan was finalized in 2014.

2015-2018 Information Society Strategy and Action Plan

21. 2015-2018 Information Society Strategy and Action Plan was prepared with a focus on growth and employment under eight main pillars. Five factors played critical role in determining the focus and the context of the Strategy. These factors are; Turkey's progress and ongoing needs in transforming into an information society; Turkey's fundamental problems and immediate opportunities; national, thematic and regional policy documents, in particular The Tenth Development Plan; and international policy trends, particularly the Digital Agenda for Europe initiative.
22. In that framework, eight pillars of Information Society Strategy and Action Plan are as follows:

1) Information Technologies Sector
2) Broadband Infrastructure and Competition
3) Qualified Human Resources and Employment
4) Diffusion of ICT into the Society
5) Information Security and User Trust

6) ICT-Supported Innovative Solutions

7) Internet Entrepreneurship and e-Commerce

8) User-Centric and Effective Public Services

23. 2015-2018 Information Society Strategy and Action Plan was designed as a policy tool that elaborates on and acts upon information society policies and goals defined by the Tenth Development Plan. Briefly, 2015-2018 Information Society Strategy and Action Plan serves for the realization of Turkey's 2023 goals in the direction drawn by the Tenth Development Plan with a focus on growth and development.

24. Strategy and Action Plan consists of seven main chapters. In the Introduction, milestones of information society transformation in Turkey, relevant previous studies and outcomes, and also the preparation period of the new Strategy are outlined. The second chapter discusses how the new Strategy connects and serves to Turkey's goals on growth and employment. Current global state and trends in information society transformation are presented in the third chapter. The fourth chapter analyzes current state in Turkey and discusses promising opportunities. The fifth chapter covers Turkey's policies, strategies and goals towards 2018; and necessary actions to achieve these goals are explained in detail in the sixth chapter. Finally, the seventh chapter presents the monitoring and coordination approach for implementation of the Strategy.

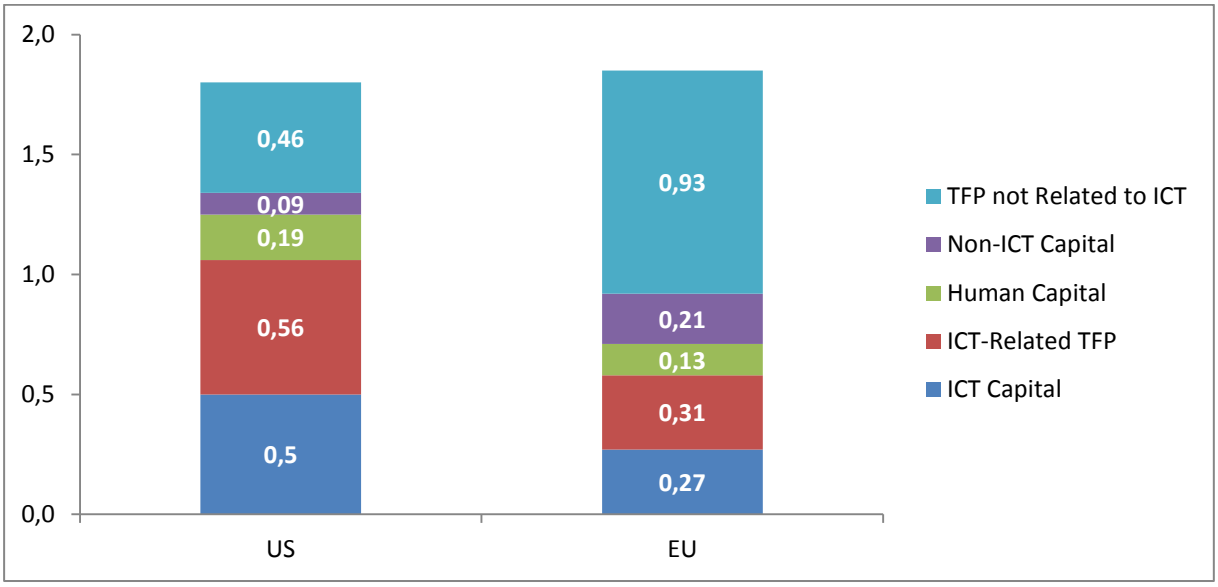
II. FOCUS OF INFORMATION SOCIETY STRATEGY: GROWTH AND EMPLOYMENT

25. Information and communication technologies intensely affect economic and social life as well as individuals' lifestyles. Internet users, currently more than 3 billion people globally, are spending more and more time on the internet for a wide array of activities such as learning, entertainment, shopping and socializing. In short, life is becoming more digital day by day. In all kinds of economies, production, consumption, saving and allocation patterns are getting transformed; availability and impact of new goods and services are increasing; ownership and effective use of ICT is becoming a prominent factor of competitiveness in the business world; and business models and labor market structures are rapidly changing. Countries who are effectively utilizing ICT are becoming globally competitive, whereas countries that are slow to adopt these technologies are falling behind.
26. ICT, being a high value added sector and creating opportunities for dynamic and qualified employment, accounts for 5.85 percent of overall added value and 3.68 percent of all employment as of 2012 in OECD countries. In addition to direct contribution to GDP, ICT sector is also critical for developments in many other sectors. Diffusion of ICT into other sectors make it possible to implement new innovative solutions; easily produce new goods and services; decrease costs of supply, production, sales and other business processes; increase efficiency rates; and reach new markets.
27. As ICT diffuse into conventional industries, share of ICT in composition of goods and services is getting higher. Automotive industry presents a good example as embedded software is becoming an important component of new motor vehicles. Software with millions of lines of code is used in new generation hybrid cars. Internet and ICT applications have become prominent in production and delivery of services in industries such as finance, logistics, transportation, energy, healthcare, and disaster management.
28. As digital trends spread over all aspects of life, digital content is growing fast. Increasing volume of data is expected to be an important driver of innovation in productivity, cost reduction, service delivery and product development as life becomes more digital and ICT enables and accelerates the transformation of conventional industries.
29. As ICT radically changes business processes; job definitions are changing and some professions are becoming obsolete. On the other side, shortage for new types of qualified labor arises. In particular, as a result of proliferation of automation systems and change in user behavior and preferences in entertainment, shopping, communication and other daily routines; some sectors and occupations are disappearing. However, the rise of new ICT-enabled and information-intensive sectors, businesses and access to new markets are creating new employment opportunities.
30. Developments in ICT create demand for new types of professions such as cyber security expert, data analyst and social media expert. Along with ICT sector, employment of ICT experts in other sectors is becoming a substantial part of these sectors' labor force. Moreover, many professions are transforming in such a way that it is becoming impossible to pursue these professions without necessary digital skills. Similarly, basic ICT skills are among essential qualifications of new hires in many sectors. Thus, individuals are forced to acquire these skills whereas share of ICT-related employment is getting higher in total employment.

31. Needs for ICT experts and digital skills are definitely on rise. According to a scenario-based study, in case of fast penetration rate of ICT innovations into other sectors, it is estimated that there will be 669 thousand ICT job vacancies between 2010 and 2015 in EU.

32. Productivity is a significant indicator of competitive power of countries as well as increase in GDP per capita. ICT related productivity improvements have been a hot topic of research in the last two decades. A 2010 study of European Commission shows that ICT capital deepening and ICT-based total factor productivity have contributed 0.5 and 0.56 percent respectively to the overall 1.8 percent average annual growth rate of labor productivity in USA between 2003-2007. Although EU attained a similar growth of 1.85 percent in labor productivity during the same term, contributions of these two components were only 0.27 and 0.31 percent respectively.

Figure 5 - Rate of Growth in Labor Productivity and its Sources in USA and EU, percent, 2003-2007



Source: European Commission, Europe's Digital Competitiveness Report, 2010

33. In Turkey, there are a number of studies that investigate effects of ICT for national economy. A 2012 study conducted by TÜBİSAD shows that 1 percent increase in share of ICT investments in GDP yields 1.6 to 1.8 increase in GDP per capita. Another 2012 study conducted by YASED indicates that in order to reach developed countries in terms of ICT sector's share in GDP, size of the sector should have been greater than the current level by 15.2 Billion USD as of 2011. In case of such an increase in sector size, GDP could increase by 12.2 Billion USD due to ICT-based productivity improvements.

34. As a part of the preparation of Information Society Strategy, another study was conducted to analyze effects of certain policies regarding ICT industry development and diffusion on economic growth and employment. In that context, economic impact of certain prospective programs was analyzed through a macroeconomic model that relies on direct effects of these programs on investments, consumption, exports and imports as inputs. Such direct effects are quantified and calculated based on global practices, target markets and existing applications (Box 1).

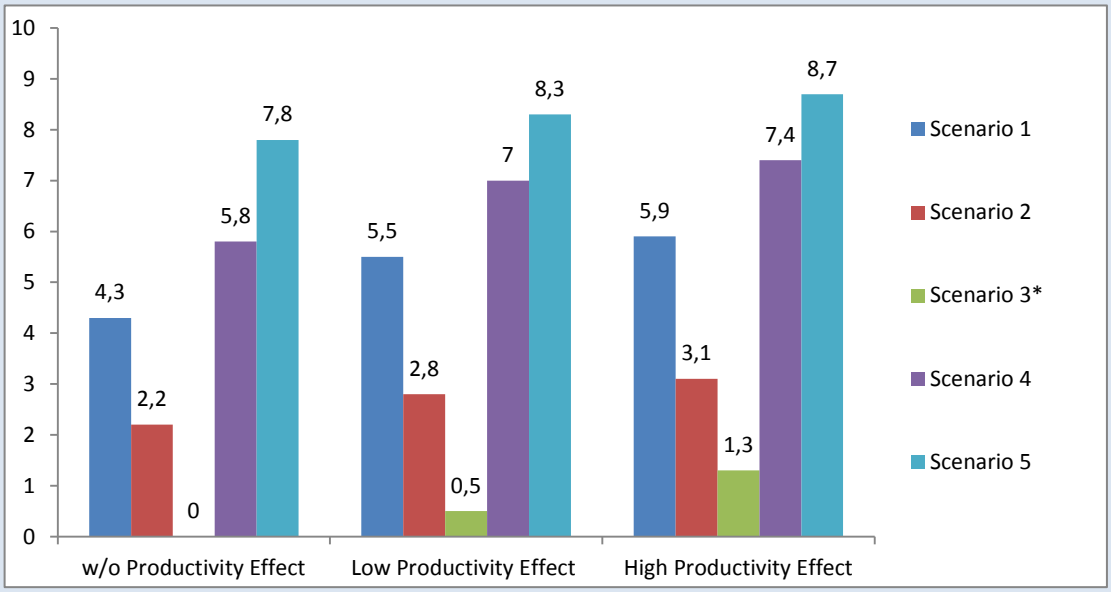
Box 1 - Results of Macroeconomic Projections and Opportunities Report

Macroeconomic Projections and Opportunities Report was prepared as a part Information Society Strategy Renewal Project. Purpose of this Report is to discover the opportunities that emerge as a result of Turkey's current state, global trends and country-specific conditions; and also to evaluate macroeconomic impacts of these opportunities through relevant scenarios. Oxford Economic Model was employed for the Report. Analyses were done under three different assumptions where productivity impact of ICT in economy in general is none, low or high.

5 different scenarios are projected in the Report:
1- Turkey will become a regional data center and cloud computing will become widespread
2- Turkey will largely invest in next generation broadband infrastructures
3- Movement of Enhancing Opportunities and Improving Technology (FATİH) Project will support the development of local ICT industry
4- Turkey will become a regional center for e-commerce
5- Clustering will be created for priority sectors in software development (defense, healthcare, mobile applications/games)

Outcomes of these 5 scenarios are given in the graph below:

Figure - Scenario-based Investment/Return Rate



* Low and high value-added assumptions were made rather than assumptions on productivity

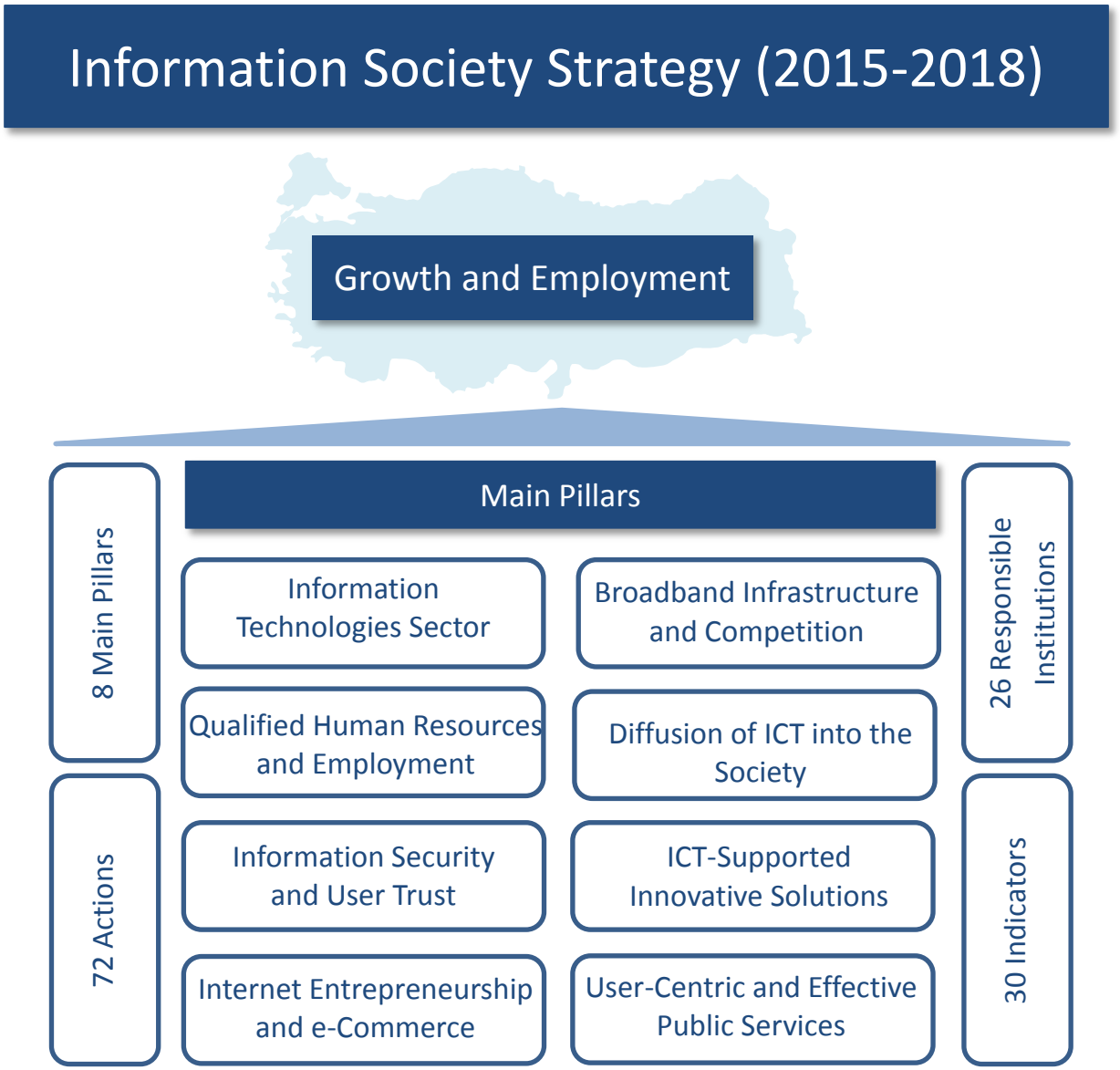
Outcome of this study indicates that becoming a regional e-commerce center and clustering around priority software areas will yield the highest return in terms of increase in GDP per unit investment. Since FATİH Project is a long-term investment in education, its impact on economy is expected to be limited in the next 10 years. On the other hand, it is necessary to take actions in order to increase economic value-added to improve FATİH Project's return on investment.

In these 5 scenarios, it is estimated that 52-86 billion TL increase in GDP would be achieved through 24 billion TL (2013 prices) investment in the next 10 years (2014-2023). Thus, 1 TL investment could

yield 2.2-3.6 TL increase in GDP through these scenarios. ICT employment, which is 183,000 as of 2011, would reach 233,000 with an increase of 27 percent, even if just these 5 scenarios are realized.

35. Actions of 2015-2018 Information Society Strategy and Action Plan are expected to support economic growth and employment by increasing strength and competitiveness of ICT industry, boosting diffusion of ICT in other industries and creating a prolific ecosystem for internet startups. Moreover, it is expected to amplify ICT industry's contribution to the economy through several supportive actions such as constructing broadband infrastructures; training and providing qualified ICT labor force; ensuring information security and user trust by establishing a favorable legal infrastructure; performing innovative solutions in urban life, green ICT, e-health and effective use of information; and providing user-centric and effective public services.

Figure 6 - Main Pillars and Focus of 2015-2018 Information Society Strategy



III. GLOBAL OUTLOOK AND TRENDS

Information Technologies Sector

36. IT has become a horizontal sector that affects almost all aspects of economic and social life. As life becomes more digital, dependency on IT goods and services is increasing. The sector facilitates emergence of new goods and services, development of new and more efficient business models as well as increase of overall productivity. Economies of scale and technology-based competition are two determining factors in sharing added value of IT industry. IT ranks first in attracting R&D investments and venture capital.
37. Size of global IT sector was about 1.5 Trillion USD in 2007 and reached 1.7 Trillion USD in 2011, which is nearly 2.5 percent of the global economy. IT market is comprised of IT services with 33 percent, packaged software with 18 percent, and hardware (including communications equipment) with 49 percent.
38. Due to high development costs and economies of scale, global packaged software market is dominated by a certain number of global players. In packaged software market, activity of local players is limited to areas requiring customized software and proximity to customers.
39. According to UNCTAD data, share of global IT service exports in overall service exports has almost doubled in ten years and reached 5.7 percent in 2011. Unlike the case in packaged software sector, developing countries are able to gain substantial share from global IT services sector. This share was 14.2 percent in 2000 and reached 30.4 percent in 2011, especially with help of India's leading role. Besides India, countries like China and Israel are also getting significantly prominent in IT service exports.
40. Although global demand for hardware is increasing, due to high productivity levels and fierce competition, prices are decreasing and share of hardware sector in global economy is getting lower. China is the undisputed leader of the sector, and Asian countries dominate the hardware industry. Some nearby countries to Turkey are also increasing their share in the hardware market. Even though overall hardware production of Eastern European countries does not exceed 5 percent of the global production, hardware exports of countries like Hungary, Czech Republic, Poland and Slovakia increased by 30 percent annually on average between years 1996-2008. Exports of these countries, as a result of clustering policies, concentrate on various subsectors such as communications equipment in Hungary, computer equipment in Czech Republic, and consumer electronics in Poland and Slovakia.
41. Demand for IT is increasing as a result of IT-enabled transformation of conventional industries as well as digitalization of life. As needs and demand change in time, new fields of IT such as cloud computing, big data, digital games, mobile applications and information security are coming to the forefront.
42. Cloud computing facilitates efficiency and intensity of IT usage, and enables introduction of new IT startups without requiring costly infrastructure investments. Nevertheless, there are ongoing efforts to define, measure and legally protect quality and reliability of cloud services. In developed countries, public institutions either develop their own cloud computing infrastructure or run their public information systems on private clouds. Expansion of cloud service use in public sector is also critical to have a mature cloud computing market for SMEs. Cloud services are expected to be the subsector with the highest growth rate in global IT

services market. Cloud services market is estimated to grow at an average annual growth rate of 24 percent and reach 98 Billion USD in 2016, which was about 40 Billion USD in 2012.

43. As social life goes digital and new generation mobile devices become widespread, digital games sector is expected to grow with an increasing share of online console games, mobile/tablet games and social games. Social and mobile games are being developed not only by big companies but also by individual developers, since market entry barriers are relatively low.

44. In parallel with increasing use of smart devices; mobile application market, which grew at an average annual rate of 48 percent between 2008 and 2011, is expected to keep its pace and comprise nearly half of the all consumer software expenditures in 2016. Mobile application market also serves as a platform with increasing importance for advertisement sector and e-commerce.

45. Volume of digital data is expected to increase 44-fold in the next ten years. Such a big volume of data has an enormous potential for advancements in productivity, cost minimization, service provision and product development. In fact, OECD considers big data driven innovation as a new source of growth. Big data market is expected to grow with an annual average rate of 60 percent and reach 53.4 billion USD in 2016. Demand will increase in areas such as non-relational database systems, business intelligence and data analytics applications. Developed countries are working on new educational and employment policies in order to meet the demand for qualified labor required by big data and investing in new R&D programs.

46. Need for safety, security and privacy in the internet environment and prevalence of cyber security threats that are getting more sophisticated drive increase of allocated resources in such areas as well as triggering new technologies, processes and business models. An increasing number of firms are providing products and services in various fields of cyber security such as mobile risk management, security flaws inspection, and digital identity and authorization management. Furthermore, new firms are arising for enabling individuals and companies to manage and utilize their digital assets. Volume of global expenditures for information security services is expected to exceed 49 billion USD in 2016, which was 38.3 billion USD in 2012.

47. ICT sector has been keeping its share of 35 to 40 percent in all patent applications in the last decade. ICT sector also holds a leading position in R&D spending with nearly 300 billion USD annual expenditure, which comprises one fifth of global private sector R&D expenditure. More than half of the global R&D expenditure in ICT is financed by USA companies, of which one fifth is spent abroad. On the other hand, share of Asian countries in global ICT R&D expenditures is apparently on the rise. ICT is the focus of new entrepreneurial activities by attracting more than half of all venture capital globally.

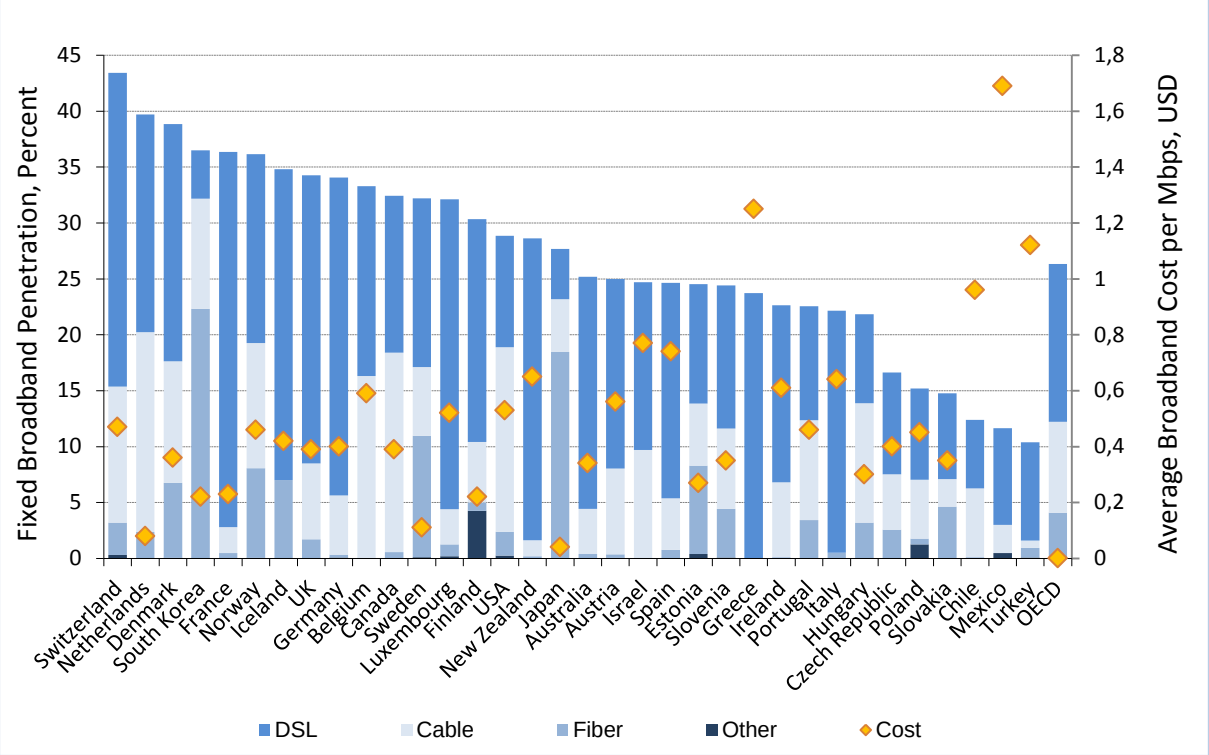
Broadband Infrastructure and Competition

48. Demand for internet is constantly increasing as it penetrates into all aspects of life. Increase in internet usage, high volume of online video content, requirements of new technologies and technological convergence boost internet data traffic, which increases demand for higher bandwidth. Global data traffic is rising as a result of increasing number of internet users, diffusion of internet in all aspects of life and mobile penetration. Global data traffic is expected to increase nearly three-fold between 2012 and 2017. Besides, share of mobile internet data traffic is getting higher in global internet data traffic. Mobile internet data traffic is expected to

increase 13-fold from 2012 to 2017. These trends necessitate next generation access networks with higher speed and quality.

49. IP-based next generation access networks are replacing copper cable infrastructure of current broadband networks. Fiber technologies for fixed infrastructure and LTE for mobile infrastructure are two technologies getting prevalent among next generation access networks.
50. Transition to fiber infrastructure to meet increasing bandwidth demand is an obvious global trend. Despite higher costs, share of fiber technologies in fixed broadband services is rising due to speed and quality advantages. As of June 2012, there are about 100 million fiber internet subscribers in the world. Far East countries in particular focus on fiber infrastructure in order to achieve the goals they set in their national broadband strategies. In terms of share of fiber connections in all broadband connections; as of 2013, Japan and South Korea are two leading countries with 69.7 and 64.5 percent respectively.
51. As a result of widespread penetration of broadband infrastructures and increasing internet speeds, various businesses provide multi-services that bring phone, internet and broadcast content all together. Thus, transitions across different markets enhance competitiveness.
52. High increase in mobile data traffic requires next generation access networks for mobile market, and LTE is becoming the preferred one among 4G communication technologies. As of March 2014, there are nearly 250 million LTE subscribers in the world, of which 80 percent reside in USA, Japan or South Korea. As of the same term, LTE services are actively provided in more than one hundred countries. Diffusion rate of LTE shows that the transition between 3G and 4G is faster than the transition from 2G to 3G in 2000's. This figure is expected to reach 1 billion global subscribers in 2017. Particularly smart device ownership plays a critical role in such an increase. As of 2012, smart device ownership rate was as high as 56.3 percent in developed countries, whereas it was only about 14.5 percent in developing countries.
53. Infrastructure-based competition is getting prominent to overcome problems due to high service costs, lower access costs for consumers and create a permanently and effectively competitive environment to achieve sustainable growth in telecommunications industry. Although service-based competition provides various advantages, infrastructure-based competition is preferred since it allows operators to have more control over their networks and costs, creates capital investments and mitigates uncertainty. Regulatory authorities all around the world are working primarily on regulations to establish infrastructure-based competition.

Figure 7 - Fixed Broadband Penetration in OECD Countries, December 2013 and Average Broadband Cost per Mbps, September 2012



Source: OECD Broadband Portal

54. Due to high infrastructure costs and relatively longer times required for returns on next generation access network investments, government support seems to be a viable option for deploying such an infrastructure. While there are countries where infrastructure investments are fully funded by the government (Australia, Qatar, Singapore, Brazil etc.), there are others as well where these investments are partially funded (South Korea, France, Malaysia etc.). South Korea is the world leader in terms of penetration rate and speed of broadband internet with 96 percent of households having fixed broadband and 100 percent of all population having mobile broadband subscription. In South Korea, with a population of 50 million, there are 13.2 million fiber internet subscribers. In accordance with a policy that covers the 2008-2012 period, South Korean Government supported deployment of broadband infrastructure by funding R&D ventures as well as actively involving in R&D studies, pilot services and technologies and seed technology development programs. An initial governmental support of 2.3 billion USD triggered an investment of 69 billion USD in that period. In order to encourage investors, countries that provide direct or partial support also work on new regulatory changes towards prevention of duplicate investments, regulation exemptions, lowering excavation costs and innovation in spectrum policies.

55. Several countries set ambitious goals in accordance with their national broadband strategies. Some remarkable examples are given as below:

Table 2 - Broadband Goals in Selected Countries

Countries	Target Year	Speed	Explanation
USA	2020	100 Mbps (Download speed), 50 Mbps (Upload speed)	For at least 100 million people.
EU	2020	100 Mbps	For at least 50 percent of households.
Australia	2016	100 Mbps	Coverage of 93 percent at least by 2020.
South Korea	2020	10 Gbps	For all households.
Brazil	2014	5 Mbps	With an infrastructure of 30,803 km extension; coverage of 40 million households and 4,283 municipalities by 2014.
Qatar	-	100 Mbps	Coverage of 95 percent of households and 100 percent of workplaces and state offices.

56. Spectrum, which is the main resource for mobile communication, needs to be used effectively and properly. Spectrum policies are important as they affect competition in mobile communications sector. EU emphasizes an approach for countries to avoid damaging competition when determining their spectrum policies. In USA's National Broadband Plan, FCC recommends partial allocation of spectrum for technology-neutral usage.
57. Service providers (OTTs), who reach end users by distributing content on the internet, both deliver widely used services and create the majority of data traffic. OTTs, which provide services without any authorization and liability as a result of changing telecommunications market structure, increase their share in global telecommunications market and financially challenge infrastructure operators and investors. Despite rapidly increasing global data traffic, revenues don't increase by the same rate. This is partly because of low profit margins of the market and increasing market share of OTTs who don't bear license fees, taxes and other costs. Since increasing data traffic is not reflected in revenues, telecommunication operators are discouraged to invest in new and costly infrastructure. Thus, infrastructure coverage progresses slowly.

Qualified Human Resources and Employment

58. There are both direct and indirect relations between human resources and employment needed by economies and ICT. While making some occupations obsolete, ICT also leads to creation of new ones. ICT has enabled new distance and flexible working models. Thus, in addition to productivity in labor force, ICT provides both a better work-life balance for certain parts of society such as housewives and students, and also low costs for enterprises. On the other side, rise of ICT-supported automation systems and new business models require new skills for existing human resources.
59. As automation becomes widespread, ICT causes a decline in employment of low-to-mid qualified labor force performing routine works whereas it helps creation of new business branches for highly-educated employees. According to a 2012 survey that covers 30 countries, as internet penetrates globally, 3.1 new jobs are created per 1 job loss. For 8 countries

including Turkey (Turkey, Argentine, Hungary, Malaysia, Mexico, Morocco, Taiwan, Vietnam) this ratio is 3.2; and 3.5 for Russia, India and China.

60. Demand for qualified labor increases globally in ICT sector. In parallel with that demand, employment in ICT sector grows faster compared to other sectors. Between 2009 and 2011, while overall employment rate in EU countries decreased by 0.2 percent, employment in ICT sector increased by 2.1 percent. In OECD countries, where ICT sector accounted for 6 percent of all private sector employment as of 2009, ICT sector employment grew 0.8 percent annually between 1995 and 2009, which was faster than private sector employment growth.

61. Software and IT services have been two main sub-sectors creating employment growth in ICT sector. In OECD countries, while employment in hardware sub-sector is on decline, employment in software and IT services is rising. Between 1995 and 2009 in OECD countries, employment in software and IT services grew by 2 percent, while employment in hardware shrank by 1.9 percent. Between 2008 and 2011, employment decreased by 6.5 percent in hardware sector of the UK, while it increased by 3 percent in Germany's software and IT services.

62. Despite growing demand for labor force in ICT industry, supply is limited in terms of both quantity and quality. Scenario-based forecasts in EU show that between 2010 and 2015 supply of qualified labor force in ICT sector will not be sufficient to meet the demand. In 2015, supply deficit of qualified personnel is expected to be 86,500 for the scenario of low economic growth, and 669,000 for the scenario of very rapid penetration of ICT-based innovations into other sectors.

63. Countries develop strategies to meet their country-specific demand for labor force in terms of quantity and quality. Digital Agenda for Europe features certain actions to cultivate qualified labor force, and member countries develop their strategies in that regard. Austria for example, has determined certain goals towards increasing quality of ICT education, enabling students to acquire digital competence, developing e-skills and emphasizing on e-inclusion activities. Moreover, through Grand Coalition for Digital Jobs Program, EU aims to boost the supply of qualified ICT experts and to minimize quality mismatch in that sector. The program includes activities such as making ICT careers more appealing, creating educational programs, and revising curriculum in vocational education and universities in accordance with the expectations of students and employers. Ireland has prepared an action plan in cooperation with public institutions and employee associations in order to meet the deficit of qualified ICT experts and managers. In that plan, there are short-term actions such as developing internship programs and support programs for jobseekers; and long-term ones such as helping university students to improve their math skills and strengthen higher education programs in cooperation with private sector.

64. Demand for occupations in new fields that change the structure and functioning of the ICT industry will increase. In this respect, fields with high demand like data analysts for big data, cyber security specialists for information security and specialists developing smart applications in various sectors are becoming prominent.

65. Besides developing ICT education; countries are adopting different approaches in order to increase average level of ICT skills as well. The most notable one is a program initiated in USA, which encourages software coding at secondary education.

66. Another effect of ICT on labor market is to enable matching employers and jobseekers through job search platforms. Thus, skilled employees can be found quickly and efficiently. Use of these platforms is increasing worldwide.

Diffusion of ICT into the Society

67. Use of ICT is rapidly increasing worldwide. However, there are significant differences among regions and countries in ICT use regarding quantity and quality. As of 2012, internet usage rates are 73.1 percent in Europe, 61.8 percent in USA, 30.1 percent in Asia-Pacific and only 16.8 percent in Africa. On the other hand, more than 3 billion people globally have not met internet yet.
68. Many countries are implementing comprehensive policies in order to increase use of ICT. Developing countries concentrate on increasing access to infrastructure, reducing access and device costs and equipping individuals with major ICT skills. On the other hand, developed countries create programs for training individuals on advanced ICT skills, providing disadvantageous groups with ICT access and developing ecosystems for content and applications.
69. Telecenters are used effectively for increasing access opportunities and building digital skills in many countries. Approximately 1 billion people use 500.000 telecenters annually, mostly in developing countries. These centers are used especially for education in developed countries. For example, in the 2010-2012 period, 4.000 telecenters were active and used to train approximately 1.2 million people in the UK.
70. A tendency towards providing legal assurance for internet access has risen in several countries recently. EU adopted the target of providing legal assurance for access to high quality and affordable telecommunication services. In this regard, Finland is the first country that introduced broadband access as a legal right. In 2009, it was legally obliged on operators to provide at least 1 Mbps broadband service at reasonable prices. Finland is considering increasing this speed to 100 Mbps.
71. Willingness to use ICT in daily life promoted mobile technologies; thus mobile device adoption increased and internet subscription shifted to mobile broadband. Mobile revolution accelerated by developments in battery and display technologies and location based applications raised smart phone penetration to 70 percent in Western Europe and North America. Competition in new generation ICT devices (smart phones, e-book readers, tablets) reduced prices of these products. For example, smart phone prices are expected to decrease by 8 percent annually worldwide until 2017. In parallel to this reduction in prices, it is expected that number of ICT devices per person will be 5.8 in North America, 5.4 in Japan and 4.4 in Western Europe as of 2015. In the 2010-2013 period, global fixed broadband subscriptions increased 10 percent on average annually, while this figure was 40 percent for mobile broadband subscriptions.
72. Social networks have become the most appealing and effectively used platforms. In 2012, 82 percent of internet users have used social networks and spent 6 hours per day on average on these platforms. While individuals use these platforms mostly for communication, entertainment and socializing, companies and public agencies benefit from them mostly for communication, advertisement, promotion, service delivery and inclusion in decision-making processes. Furthermore, as an alternative and effective way of self-expression, these networks play an important role in many protests and demonstrations worldwide.

Box 2 - Digital Agenda for Europe

In order to formulate information society policies and align them among member states "e-Europe Initiative" (1999), "Lisbon Strategy" (2000), "e-Europe 2005" (2002) and "i2010: Information Society for Growth and Employment" (2005) initiatives were launched in the EU. Despite these initiatives implemented by EU until 2010, problems like fragmented digital market, deficiencies in broadband infrastructure, insufficient digital literacy and skills, lack of interoperability, insufficient R&D and innovation activities, inadequate use of ICT in mitigating social challenges, cybercrime and increasing security risks hampered transformation into information society. In order to overcome these problems, "Digital Agenda for Europe" initiative was launched by the European Commission in 2010. Digital Agenda for Europe initiative is one of the 7 pillars of "Europe 2020 Strategy" aiming intelligent, sustainable and inclusive growth.

Among the main targets of "Digital Agenda for Europe" for 2020 are; at least 30 Mbps broadband service for every household and 100 Mbps broadband service for at least half of them, increasing regular internet use to 75 percent for all citizens and to 60 percent for disadvantaged ones, raising e-government service use above 50 percent, doubling public ICT R&D investments and achieving half of all individuals and one third of all SMEs use e-commerce.

73. Several approaches are being developed for use of ICT as an enabler for improving access to and efficiency in education. Within the context of formal education, ICT infrastructure is being installed, digital content is being created and several countries including Portugal, Peru and India provide students with computers. ICT-supported education not only increases quality of education but also supports students in improving their digital skills. In non-formal education, certified and ICT-supported distance learning programs have become widespread. On the other hand, millions of people use e-learning platforms operated by universities, specialized companies or social media sites in order to develop their skills.
74. ICT leads to huge changes in daily life whose effects can be observed in consumption habits regarding entertainment, education, culture, shopping and access to public services and information. While the ratio of people who use traditional media channels like radio, newspaper and television for information gathering is decreasing, internet and social media use is increasing. In 2006, the share of digital music in global music market was 10 percent, whereas this figure increased to 44 percent in 2013 and is expected to reach 53 percent in 2016. Similarly, e-book market is expanding rapidly. It is expected that e-book sales would surpass printed book sales by 2017 in USA.
75. This transformation taking place in all aspects of socio-economic life creates several risks for individuals and especially for children, adversely affecting adoption of ICT by society. Risks caused by misuse of ICT like inappropriate content, game addiction, cyber vandalism, hate speech and disinformation is on the rise. Moreover, intense use of ICT, particularly social networks and games, cause many adverse effects like decline in job performance, time-sink, problems in communication within family and impairment of health. This situation requires development of policies for appropriate ICT use.

Information Security and User Trust

76. Information society transformation brought not only individual or social risks but also important problems like cyber-attacks, cybercrime, unauthorized use of personal data, data theft and user abuse. These problems may result in economic loss, decrease in user trust and interruption in services, slowing down the process of information society transformation.
77. In this regard, in order to ensure widespread and secure use of ICT, countries develop national strategies especially in areas like information security, personal data protection, fight against cybercrime and secure internet. In addition to national efforts, international cooperation becames a must due to the widespread use of ICT and global nature of internet. On the other hand, international organizations prepare guidelines, strategy and action plans regarding legal, institutional and technical infrastructure in addition to coordination mechanisms to facilitate international cooperation and timely and effective response to cyberattacks.
78. Global competition among countries and companies has shifted to the virtual world in the recent years. Countries, intelligence agencies or companies may involve in activities like taking control, espionage and harming parties whom they perceive as a threat or rival. There are such examples with multidimensional and international impact like Wikileaks, Stuxnet and Prism. According to a research, the ratio of global companies incurring losses over 100.000 USD caused by cyber-attacks reached 40 percent in 2013, which was 5 percent in 2007. As a result of this, countries consider information security as a component of national security, take measures to protect their information assets against attacks and form cyber defense and attack teams.
79. Among the information assets of countries that should be protected, critical infrastructures are gaining importance and countries take specific measures in this area. As ICT diffuses into daily life, the extent and definition of critical infrastructure is expanding to include information infrastructures of the private sector and decision making and coordination models based on public private partnership (PPP) are emerging. USA took extensive measures to protect critical infrastructures with its National Infrastructure Protection Plan in 2013 and stressed the importance of coordination among relevant actors.
80. Today, protection of personal data is regarded as a crucial issue for a healthy transformation into information society. A great deal of personal data of individuals using ICT services are saved and processed during service provision and can be shared with third parties. It is foreseen that, in the near future, processing of personal data will increase exponentially with technologies and services developing and increasing in variety. Nevertheless, this brings about concerns regarding unauthorized use of personal data and reduces user trust. In this context, countries formulate national data protection legislation regarding collection, processing, using and sharing of personal data. Moreover, international institutions prepare guidelines to improve national data protection regulations.
81. Protecting personal data has become socially and economically important as global ICT services are becoming widespread and volume of international exchange of data is rising. In this context, it is observed that countries are trying to harmonize their data protection regulations. Some countries adopt a conservative approach in order to raise trade barriers by complicating their data protection regulations, trying to promote their domestic players. ICT service exporters take measures to meet the needs of markets, with which they are in contact, regarding data protection. Data protection regulations are also important to access foreign

markets for traditional services like health, insurance and finance, which require intensive use of personal data.

82. EU Data Protection Directive presents a framework for personal data protection, which is well accepted all around the world. This Directive covers provisions to take appropriate institutional and technical measures in order to prevent personal data being lost accidentally, seized by unauthorized parties or exterminated illegally. Efforts to update this Directive has been underway, considering some technological developments like social networks, cloud computing, location based services and smart cards as well as requirements of globalization.

83. As ICT applications like e-health, smart grids and intelligent transportation systems are being widely adopted, information security has become indispensable for daily life. On the other hand, with the effects of technological developments and trends like internet of things, big data, mobile technologies, convergence, cloud computing and outsourcing, maintaining ICT security and user trust has become more challenging. For this reason, in order to ensure uninterrupted and high quality service delivery and personal data confidentiality, having a strong legal, institutional and technical infrastructure has become crucial for countries.

84. In the near future, new types of crimes are expected to appear and cybercrimes are predicted to be rising due to some reasons like increasing value of online transactions, the anonymous structure of internet, cheaper attack tools and easy access to them as well as increasing and easier cooperation among criminals. Furthermore, internet is increasingly being used as an effective communication tool in committing traditional crimes. In fight against cybercrime, countries strengthen the capacity of their legal and law enforcement units, amend their criminal laws to cover cybercrime and seek international cooperation due to cross-border and complicated nature of these crimes. Nevertheless, countries are facing challenges in international cooperation due to the differences in their approaches and regulations.

85. Regarding safe use of internet, countries adopt policies like raising awareness for internet users and training individuals. Besides, there are remarkable examples in which NGOs and vocational associations are included in decision making mechanisms regarding removal of inappropriate online content and regulating the internet.

86. Efforts to ensure safe use of the internet are becoming widespread throughout the world. Many countries implement safe internet programs in order to mitigate risks especially for children who are exposed to them on the internet. Developments in ICT challenge traditional approaches in defining access, content and hosting service providers. As cross-border ICT services are becoming more prevalent, it becomes harder to make regulations and impose sanctions in this field. Within this context, countries are in need of cross-border cooperation to put such sanctions into practice.

ICT-Supported Innovative Solutions

87. Use of ICT in many areas and converging technologies promoted innovative solutions relying on them. ICT has a key role in creating solutions to major societal problems in various fields such as urban life, environment, education, health, energy etc., in providing new services with an understanding that puts the citizens in the center and in transition to an information based low carbon economy. Innovative solutions in this field are services that are implemented through many ICT related advanced technologies rather than a single technology. Another significant issue for the near future is effective use of large amount of digital data and easy access to generated high-quality information.

88. Today, 52 percent of the world population, which is about 7 billion, lives in urban areas. The rate of urbanization tends to increase all around the world. Fast pace of urbanization makes it difficult to provide sustainable and quality services in housing, infrastructure, transport, education, health and security. Developed countries have launched GIS based smart city applications that facilitate provision, monitoring and improvement of various city services and enable decision making based on real-time information.
89. Living labs approach, with which needs of citizens are identified through more effective channels, ICT goods and services are developed in accordance with these needs and these goods and services are tested by people in real life, is widely used in smart city applications. Countries cooperate to share their experiences and practices related to living labs approach. For instance, Europe Network of Living Laboratories (ENoLL) was founded in 2006 to this end.
90. Smart cities yield considerable benefits for environment as well. Smart cities with minimum energy consumption and the most livable environment are being emphasized by EUROCITIES, which is composed of important cities in Europe. Especially smart grids and buildings are among significant developments in this field. More than 40 percent of the electricity consumed in EU is used for lighting, heating and cooling buildings. 20 percent energy saving was observed in smart building pilot projects supported by EU community programs. Countries devote a great deal of public resources through state banks, research funds and direct public investment for smart cities.
91. Global greenhouse gas emission is expected to increase by about 30 percent between 2010 and 2020. It is predicted that, in 2012, 2-3 percent of global carbon emission was due to ICT industry and this figure is expected to rise gradually with the increase in ICT use. The rise in data volume and cloud computing applications foster demand for data centers. The share of data centers' carbon emission in total ICT industry carbon emission is predicted to increase from 13% to 22% between 2007 and 2020. Data center standards are specified to reduce rising energy costs and greenhouse gas emission. Besides, global data center firms tend to meet their energy needs from renewable energy.
92. Regulations and targets of countries, in line with international developments regarding greenhouse gas emissions, forced firms to search for ICT based solutions for improving their production processes and increasing energy efficiency. Being a key sector in fighting against climate change and in improving energy efficiency, green ICT is estimated to reduce greenhouse gas emissions by 15 percent in non-ICT sectors, especially due to significant reductions in transportation, buildings and energy, according to a research conducted by Global e-Sustainability Initiative in 2008. It is predicted that ICT enabled energy efficiency will create about 600 billion Euro saving by 2020. Besides, environment friendly production of ICT goods and services and disposal of e-waste have become more important.
93. Another important role of ICT in energy efficiency is adding the energy generated from renewable sources to the electricity grid. Smart grid practices help to integrate the energy generated from these sources, which provide distributed and intermittent energy, into the grid as planned and in a sustainable way. Developed countries introduce smart applications for distribution networks like electricity, water and natural gas for efficient, uninterrupted, reliable and high quality service. EU devoted 5.5 billion Euros for 300 smart grid applications between 2003 and 2012.
94. In line with increasing population and life expectancy, expenses of countries on health services are rising. While the rate of global health expenses to GDP was 8.8 percent in 1995, it raised to

10.4 percent in 2010. This figure was 17.2 percent in 2010 in North America. e-Health services have gained importance all around the world in order to keep health expenses under control, improve their efficiency, make decisions based on data and analysis and improve scope and quality of health services.

95. Developed countries achieved significant progress in telemedicine by generating and sharing electronic health records. epSOS Project, which aims at sharing electronic records and prescriptions among countries, was put into practice with the participation of 23 European countries including Turkey. Telemedicine services enable remote monitoring of chronic diseases, provision of health services in underpopulated regions and creation of opportunities for cases that require costly follow-up. Denmark, Sweden, Norway and Finland have come forward in implementing telemedicine applications at the national level. In EU, various telemedicine applications are supported to monitor chronic diseases.

96. With the advances in mobile technologies, processes of health services have been transformed as well. Data of patients derived from mobile devices are converted into electronic health records and thus health services are provided more in a more effective and cost efficient manner. Between 2010 and 2012, mobile health applications market grew 13 times. It is predicted that 30 percent of smart phone users will be using mobile health applications in 2015.

97. It is expected that 50 billion devices will be connected to the internet by 2020. Integration of sensor and chip technologies into many living or non-living objects and communication among them (machine to machine communication - M2M) make anything around us a part of a living information system. This structure, called “internet of things”, provides important opportunities in the fields of data analysis and automation. In the analysis of information, sensor based decision support systems and tracking of objects or data in terms of time and location came to the forefront. For example, thanks to cell phone signals and GPS data received from vehicles, regions with the most intensive human mobility can be traced in real-time and thus commercial decisions can be made based on this information.

98. Maturing and dissemination of “internet of things” applications in every industry lead to generation of large volume of data. Furthermore, data related to customer behavior collected by companies especially in retail sector, increasing use of multimedia in every industry and need for analyzing and managing data in social networks caused development of new technologies and emergence of “big data”. To take advantage of growing big data economically and socially, countries and companies are interested in this field and devote significant resources, especially for R&D activities. It is foreseen that with a growth rate of 60 percent annually, big data market will reach 53.4 billion USD by 2017. This growth contributes to the emergence of new occupations and employment. According to an MGI report, health, public administration, retail, manufacturing and personal location information are described as important transformation areas where big data can be used.

99. GIS and remote sensing technologies are employed in areas such as planning the use of terrain, detecting agricultural land vegetation and irrigable terrain, prediction of harvest, determining the effects of erosion and desertification, thanks to their advantages in providing data collection and analysis.

100. One of the important application areas of ICT is disaster management. Sensors, mobile technology based big data applications and GIS infrastructures are widely used in fundamental areas like preplanning before the disaster, early warning systems, loss assessment after the

disaster and organization of help. In Japan, satellite communication and sensor based early disaster warning system has been set up and thus mechanisms like fire-prevention, informing and evacuation before disasters like earthquakes or tsunami are put into use. Throughout the world, studies are conducted to set up an effective management system that will work in case of a disaster, and focus of these studies is to ensure an effective exchange of information during and after the disaster.

101. ICT provides significant opportunities for access to cultural heritage and scientific information. While 38 percent of libraries in the USA were providing e-book services in 2007, this ratio rose to 67 percent in 2011. In addition, libraries, adapting themselves according to the changing behaviors of users, started to provide more services through the internet and social networks. Regarding open access to scientific information, Open Access to Research Results Platform was established in Europe in order to provide free publications of academicians. Apart from this, records of ongoing scientific researches and results of completed researches are provided to the researchers via European Current Research Information System.

Internet Entrepreneurs and e-Commerce

102. The economy realized by means of internet, i.e. internet economy, shows an important progress since the beginning of 2000s. Internet has led to emergence of new internet-based business models especially in retail, finance, tourism, education, entertainment and transportation sectors and has significantly affected economic growth and transformation in many sectors. For example, the contribution of Internet on the British economy was 8.3 percent of GDP in 2012. It is expected that the internet economy in G-20 countries will approximately double from 2010 level and will reach 4.2 billion USD in 2016. The transition to internet economy is continuing globally and many policies and measures addressing internet economy are being formulated by developed countries.
103. Entrepreneurship has become a more important issue in terms of high quality growth and employment in current economies. Within this context, encouraging and developing entrepreneurship is regarded as one of the major priorities especially for sustaining growth and creating new jobs. Entrepreneurship concentrates in areas with relatively high innovation capacity and low start-up costs. Thus, ICT, especially internet, offers substantial opportunities for creating new occupations and improving the quality of employment.
104. Access to larger markets, low capital requirement and low running costs are the major factors that distinguish internet companies from traditional ones. According to some studies, internet companies have become distinct among ICT firms in many ways. In the 2000-2011 period, revenue and employment of internet companies have achieved annual increases of 31 percent and 15 percent respectively. These figures are very high compared to other segments in ICT industry. Turning to global companies, the revenue per employee was 925.000 USD for internet companies whereas the revenue per employee was 460.000 for software companies in 2011.
105. Internet enterprises, especially at the initial phase where a business plan is being developed, need financing and management experience. Angel investment is the most important tool for financing and guiding internet start-ups. There are widespread angel investor networks in countries like USA, UK, and Israel, which are successful in angel investment. Significant tax incentives and subsidies are provided for angel investors in France, UK and New Zealand.

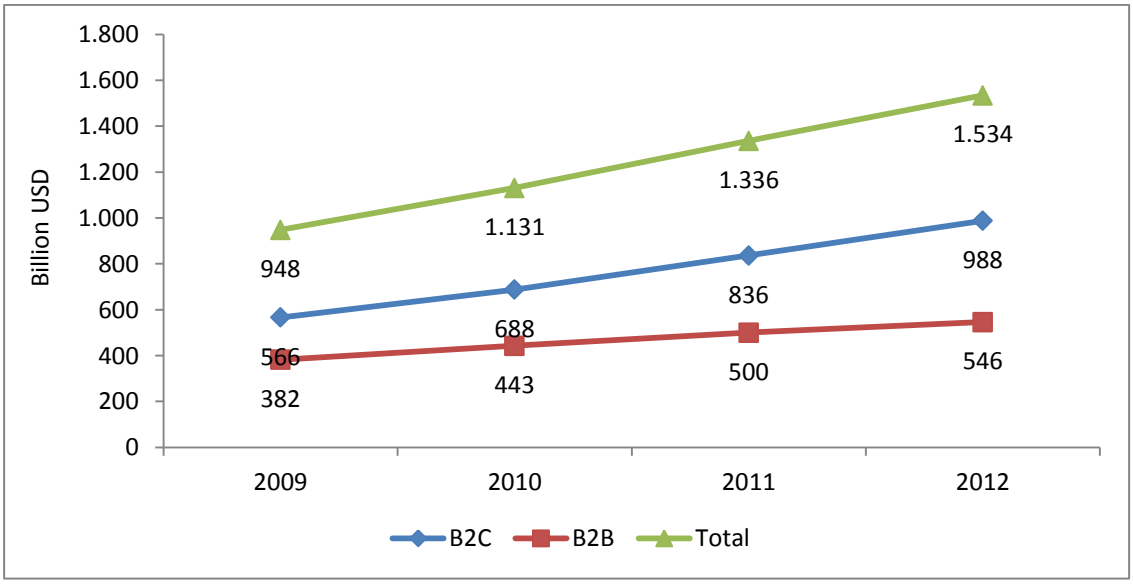
Successful internet companies at the growing stage can acquire venture capital easily and attract considerable foreign investment.

106. Incubation and accelerator centers are the most effective mechanisms to flourish internet enterprises at the starting stage. The main aim of these centers is to connect entrepreneurs having new brilliant ideas with investors and to provide seed capital for entrepreneurs. In the process of fund raising and commercialization, incubation and accelerator centers provide internet enterprises with important supports including working space, hardware, training, guidance and consulting. Accelerator centers, constituting an important part of internet ecosystem in the USA, concentrate especially on internet and mobile technologies. According to a study in the USA, survival rate of an enterprise graduated from an incubation or accelerator center is 87 percent whereas this rate is 44 percent for an ordinary one.

107. New generations are more apt to entrepreneurship worldwide in this era. In order to turn this potential into production, entrepreneurship experience should be acquired and shared particularly through formal education. Advisors guiding at the initial stage of entrepreneurship have critical roles for implementing innovative ideas. Availability of successful entrepreneurs, sharing success stories, competitions and similar activities are beneficial for establishing entrepreneurship culture.

108. e-Commerce, defined as goods and services traded on internet, is distinguished from traditional commerce by value proposition with respect to price, variety and convenience. Global volume of e-commerce grew by 16 percent annually between 2009 and 2012 and reached 1.5 trillion USD. Business to consumer e-commerce constitutes two thirds of global e-commerce, where tourism, transportation, digital products, clothing and accessories and computer and consumer electronics are the major sectors. Share of e-retail in retail market is increasing and it reached 20 percent in countries like South Korea. In addition, e-commerce companies grow more rapidly and reach more people compared to traditional retail companies. A prominent e-commerce company in the USA grew 35 percent annually between 2006 and 2011 whereas this figure was 6 percent for traditional retail companies.

Figure 8 - Global e-Commerce Market Size, 2009-2012



Source: Internet Entrepreneurship and e-Commerce Global Trends and Country Analysis Report, 2013

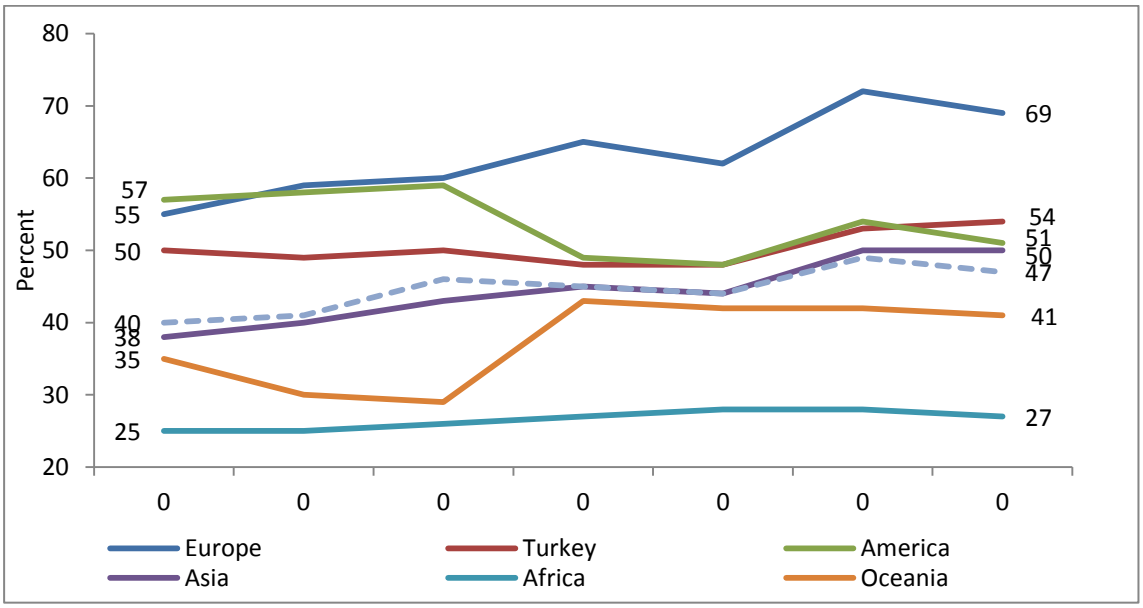
109. Migrating commercial activities of SMEs to e-commerce offers significant economic opportunities for growth of internet economy as well as institutionalization and taxation of companies by shifting their business processes to the digital medium. Several support programs in areas like infrastructure, security, technical trainings are provided for SMEs to improve their internet and e-commerce skills by many countries including China, South Korea, UK and Spain. Internet marketplaces are emerging facilitators for SMES to engage in e-commerce. Electronic retailing has significant contributions to the growth of SMEs in China and 90 percent of the sales of e-retail market are conducted by means of these marketplaces.

110. Several legislations and regulations were introduced by some countries in order to support e-commerce; regulatory and supervisory agencies were established in this context. For example, protection of personal information and consumer rights, ensuring secure payments, internet advertisement activities and e-mail transactions, electronic signature use in contracts and taxation by records are regulated in USA. Increasing consumer trust is considered as a priority; security and regulatory compliance of e-commerce sites are monitored and certified in this respect. Regulations regarding venture capital, stock options, payments, taxation and similar issues are important for strengthening internet ecosystem.

User-Centric and Effective Public Services

111. The potential of ICT to rapidly respond to emerging needs enabled introduction of significant innovations in public service delivery and improved accessibility to such services by citizens and enterprises. e-Government concept and delivery of electronic public services emerged in the 1990s and experienced rapid progress. According to UN e-government surveys, world average of development index in e-government services was 47 percent in 2014. During this development period, technical solutions were initially considered sufficient but it was recognized that new approaches focused on user-centricity in public administration and effectiveness of public services should be developed in order to overcome administrative and legal obstacles.

Figure 9 - e-Government Maturity Level by Continents, 2003-2012



Source: UN e-Government Surveys (2003-2012)

112. It is expected that mobile technologies will be the most preferred technology for e-government service delivery. Use of social media in e-government service delivery is anticipated to increase gradually due to changes in user preferences and technological developments. Use of social media is increasing in several areas like public decision making, informing and advertisement, service delivery via electronic channels and assessment of service quality and user satisfaction. Delivery of customized e-government services will be prevalent as a requirement for user-centric service delivery. New trends like virtualization, cloud computing, green ICT, open source software will be used widely for electronic service provision.
113. There is a worldwide trend regarding transition to common data centers and government cloud. Countries are inclined to aggregating large number of data centers due to security and saving concerns. South Korea, USA and UK are successful countries in implementing common data centers and related innovative applications. Countries endeavoring government cloud focus on issues of administrative structure, determining priorities and route maps, developing partnership models with private sector, security and legal compliance. Regarding procurement mechanism for cloud services, Netherlands and South Korea prefers government cloud but USA and UK procure cloud services from private sector under certain conditions.
114. Technological advancements facilitate delivery of common services in public sector. One stop, integrated and high quality e-government service delivery is provided by means of sharing information and documents among public institutions. Thus, administrative burdens can be reduced with significant cost and time savings. Public agencies provide streamlined services through coordination of agencies due to pressure of user demand and integration of technology with their processes. They even tend to develop cross-border services. EU e-SENS Project covering various fields like health and interoperable e-ID is an example of this approach.
115. Sharing public data with third parties not only creates new value-added services but also makes the “open-government” approach, embracing transparency in public administration, possible. Countries are taking innovative steps regarding this issue, which creates significant social, commercial and academic benefits and is also reflected on modern public administration approach. Many developed and developing countries including USA, UK, Canada and Kenya that launched open portals to share data set rules for sharing public data in order to create value-added services. Number of countries and international organizations having public open data catalog exceeded 40 as of 2012. All top 10 countries in UN e-government development index established open data catalogs.
116. New procurement procedures and rules have been developed by countries like USA, EU members, Singapore and South Korea in order to procure ICT goods and services more efficiently, which have significant share in government expenditures. In this respect, framework agreements and consolidated procurements that provide cost savings and common standards are widely used.
117. Administrative and legal regulations formulated for traditional service processes are revised and aligned with information society services in order to improve efficiency of e-government service delivery, reduce administrative burdens, increase service use, protect personal data and ensure information security.
118. Competence of public IT employees is prioritized and countries introduced regulations regarding employment conditions of these workers in accordance with their own

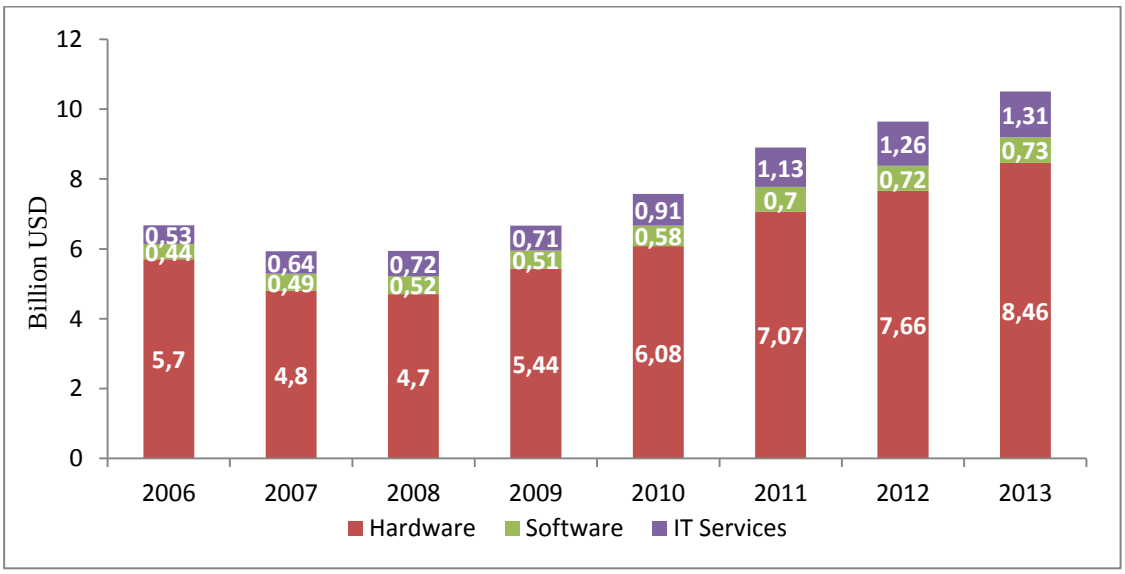
circumstances. For example, there are special exams for employment of IT staff, higher salaries and good carrier opportunities in Germany and UK. IT staff can gain experience by working in different agencies in Netherlands and IT staff at private sector can be temporarily employed in government in USA.

IV. CURRENT STATE AND POTENTIAL OF TURKEY

Information Technologies Sector

119. Considering Turkey's population and its share in global economy, IT market is small in size and has significant potential to grow. According to IDC data, IT market of Turkey reached 10.5 billion USD in 2013 from 5.93 billion USD in 2007. According to a survey conducted by TÜBİSAD and TOBB Telecommunication Council, IT market size was 17.9 billion TL in 2013.

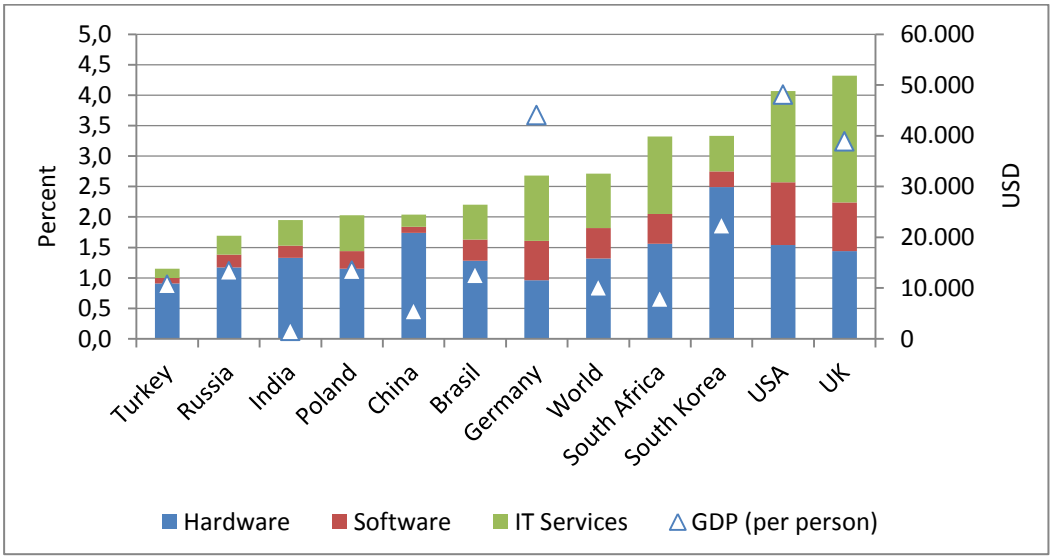
Figure 10 - Turkey's IT Market Breakdown, 2006-2013*



(*) Although TÜBİSAD has been publishing ICT market data since 2011, IDC data was used for IT market targets, which enables international comparison.
Source: IDC

120. When IT expenditure is associated with GDP per capita, Turkey takes place at the lower band of middle income countries. Share of IT services in IT market, which is 20 percent, is very low compared to the world average of 50 percent. High level of in-house IT development in telecommunications and finance industries, which are prominent users of IT, is one reason for this. These industries meet their needs by their own IT departments instead of IT sector. When in-house IT development in public and private sector is taken into account, the share of software and IT services in IT expenditure reaches 40 percent. According to TÜBİSAD survey, size of software sector reached 4.9 billion TL, IT service sector reached 3 billion TL and share of software and IT services combined in IT market was 44 percent in 2013.

Figure 11 - GDP and Ratio of IT Market to GDP in Selected Countries, 2011



Source: IDC

121. The hardware sector, which has a significant share in IT market, is mainly composed of imported products. Value-added in domestic products is confined to low value-added assembly processes. Besides, high value-added software and IT services market being very small in size, contribution of IT market to GDP is low.
122. While assessing IT industry in Turkey's economy, added value and job creation of private sector are two important indicators. Due to convergence of IT and telecommunications industries, added value of IT sector is considered together with that of telecommunication sector. In this perspective, share of ICT value added in private sector value-added was 4.63 percent in 2012. This figure is approximately 5 percent for global economy, whereas OECD average is above 8 percent. The share of ICT specialists in total employment in Turkey is 1.7 percent, which is 3-4 percent for OECD countries. Considering these indicators, it can be seen that the potential of ICT hasn't been fully unlocked yet.
123. Export of high value-added goods and services is essential for reaching 2023 export targets. Turkey hasn't moved up in global value chain as much as its potential suggests. Development of IT industry is important as the Tenth Development Plan emphasizes that the share of high value-added areas in the service sector should be increased.
124. Government procurements, especially through FATİH Project, widespread use of IT in SMEs and increasing individual IT use have important potential to boost IT sector.
125. Large scale firms (250+ employees) have labor productivity up to 5.5 times of small scale firms' (1-19 employees) productivity in Turkey. One of the major causes of this low labor productivity in small scale firms is low level of technology use. According to National Statistics Institute's 2013 IT Usage Survey in Enterprises, the usage ratio of ERP software in large scale firms (250+ employees) reached 57.8 percent, which was only 14.9 percent in small scale firms (10-49 employees). IT aided automation and design of production and business processes provide important potential for developing SMEs.
126. Cloud computing, relying on pay as you go principle, provides flexibility and saving in IT expenditure. Cloud computing services, currently having a very small share in IT market, is expected to grow rapidly. Lack of awareness about cloud computing services and security and

privacy concerns of SMEs willing to use these technologies hinder widespread adoption of cloud computing by SMEs. Distribution channels of goods and services in IT sector don't encourage SMEs to use cloud computing.

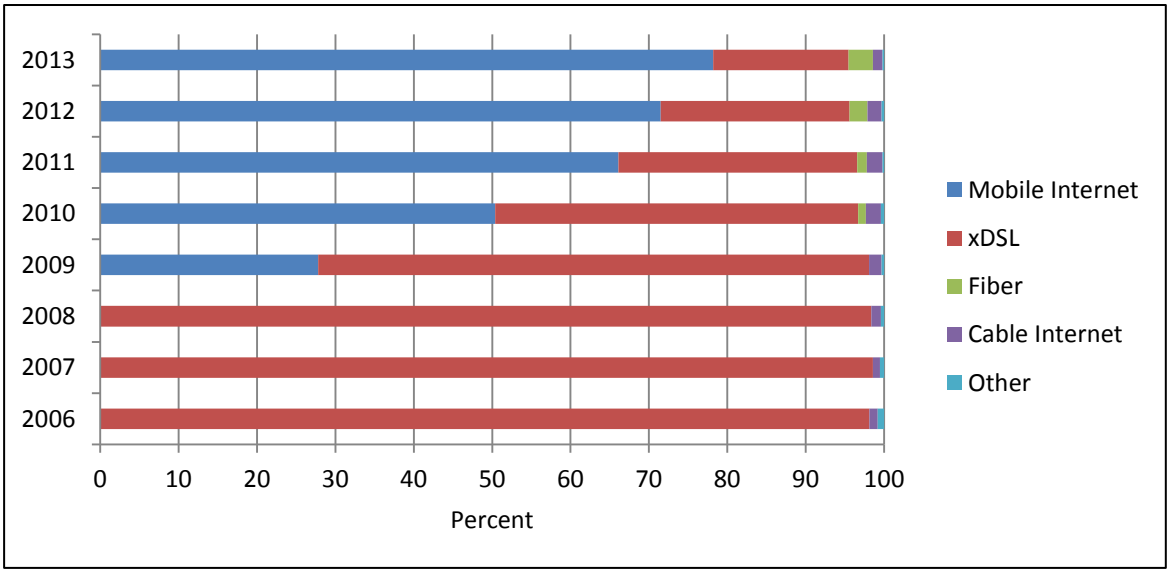
127. Game technologies covering programming, simulation, animation, design, editing, music and sound are also used in other sectors, especially defense, health and education. Digital game culture is prevalent due to young population in Turkey. It is estimated that size of digital game market in Turkey exceeded 300 million USD in 2013. In South Korea, which is similar to Turkey in terms of number of gamers, this figure is 2 billion USD. In this respect, Turkey has a large domestic market potential and there is an opportunity to turn it into export.
128. 11.2 billion TL (2013 prices) was allocated for public ICT investments between 2006 and 2012. Public ICT investments exceeded 3.5 billion TL in 2013. Increase in allocated ICT investment funds for public sector, which constitutes one of the major clients of IT industry, is a significant opportunity for domestic IT industry. However, shortcomings in procurement legislation, project management and human resources in public sector hinder the potential positive effects of public procurement on IT sector. With a legislation enacted in 2008, TURKSAT gained exemption from public procurement act for e-government service procurements of public agencies.
129. FATİH Project is one of the major education projects of Turkey. In the scope of this project, installation of smart blackboards in all classrooms, distribution of tablets to 10.6 million secondary and high school students and developing computer aided education are main targets. Pilot project was launched in February 2012. The Project has an important potential for growing local IT market and increasing domestic value-added, thanks to its scale and continuity.
130. 65-70 percent of global hardware market is under the control of 5-10 global firms. Access to market is rather challenging due to reasons like importance of technologies with patent protection, first mover advantage and economies of scale. Hence, determining technologies that will be in demand in the future and channeling R&D activities to these areas are essential for gaining technological competitive advantage. Besides, there is potential of creating new brands in domestic and regional markets by design and marketing strategies for current technologies and these kinds of efforts are increasing in tablet and mobile phone market in recent years.
131. IT industry, by its nature, is included in different public agencies' mandates. In order to achieve expected outcomes for IT policies, a common platform, which enables coordination of sectoral policy and actions as well as responding to policy and regulation demands of sector players, is required.
132. IT firms benefit from horizontal incentive and supports in areas like innovation and R&D, institutionalization for SMEs, entrepreneurship and export supports. Recently, customized support mechanisms for ICT or ICT related projects have been introduced such as R&D fund of Ministry of Transportation, Maritime Affairs and Communications and export incentives provided by Ministry of Economy. Evaluation of effects of horizontal or sector specific support programs and redesign of these programs dynamically based on feedback is still a necessity.
133. Law no 5746 on Support of R&D Activities, which includes support for new and unique software development, and Law no 4691 on Technology Development Zones are among main regulations that affect the sector. As of April 2014, 58 percent of 2,667 firms in Technology Development Zones (TDZ) operate in IT sector. TDZs host more than one third of software

firms in domestic IT market. Efforts to evaluate the performance of TDZs and associate current incentives with their performance directly affect the sector. As of March 2014, 17 of 155 firms that acquired R&D Center Certificate were operating in ICT industry. Approximately 1,600 researchers are employed in ICT sector R&D centers. Requirement on employing at least 50 full time researchers in R&D centers was reduced to 30 by a Cabinet Decree published in Official Gazette dated 18 June 2014.

Broadband Infrastructure and Sectoral Competition

134. Liberalization of electronic communications sector in Turkey was initiated after expiration of incumbent Türk Telekom's monopoly rights in fixed electronic communication services at the beginning of 2004 and full competition was introduced in the sector. After privatization of 55 percent share of Türk Telekom in 2005, government monopoly on sector was abolished.
135. Broadband services were introduced in Turkey by DSL technologies delivered over copper infrastructure. While share of DSL technologies in fixed broadband internet services was 98 percent in 2006, this figure came down to 78.4 as of March 2014. For OECD countries this ratio, which was 62 percent in 2006, reduced to 51.5 percent in 2013 and keeps falling. Number of DSL subscribers was 2.8 million in 2006 and reached 6.67 million in March 2014. However, this number has not changed significantly over the last 3 years. For the same period, broadband coverage with 98 percent, which is higher than many European countries, has been achieved in Turkey by DSL technologies.

Figure 12 - Breakdown of Broadband Subscribers in Terms of Technology, 2006-2013



Source: Information Technologies and Communication Authority, Market Analysis Data

136. Regulations on resale in 2004, Bit Stream Access (BSA) and Local Loop Unbundling (LLU) in 2007 were introduced to foster competition in fixed broadband services. However, market share of alternative fixed broadband operators has been much lower compared to EU average since 2004 and desired level of competition has not been achieved. Market share of alternative DSL operators in fixed broadband market in terms of number of subscribers was just 11.5 percent as of March 2014. LLU, which facilitates effective competition and enables alternative operators to provide differentiated internet packets to consumers, did not mature

in Turkey. Instead of LLU, BSA approach is more widely adopted. There were only 3,000 LLU subscribers as of March 2014, but 907,000 DSL subscribers were getting services from alternative operators based on BSA approach. Ineffective implementation of regulations causes LLU adoption to remain relatively low.

137. Share of fiber technologies in fixed broadband internet services is increasing. A resolution that provides partial exemption to infrastructure operators regarding access to fiber was adopted by Information Technology and Communication Authority in 2011. Number of fiber subscribers increased significantly especially due to competition in the market. Number of fiber subscribers was 154,000 in 2010; it reached 1.28 million in March 2014 with fiber infrastructure coverage hitting 22 percent of households. Although, Turkey, with its 14.2 percent share of fiber internet in fixed broadband services, is behind countries like Japan, South Korea and Sweden, it is ranked 14th among 34 OECD countries outperforming USA, French, Germany, Canada, the UK and some others.

138. There are obstacles regarding rights of way among operators, local authorities and public agencies related to digging and construction works for building electronic communication infrastructure. Differences in prices and procedures of rights of way determined by local authorities and public agencies cause cost and timing problems in practice. Although Ministry of Transportation, Maritime Affairs and Communication introduced regulations on rights of way as of 2012, conflict of public agencies and local authorities with operators still prevails and should be resolved.

139. Cable internet infrastructure, as an alternative network, has an important role in broadband internet services market for establishing infrastructure based competition. Contrary to board decisions, taken by Information Technology and Communication Authority as well as Competition Authority in 2001, related to sharing cable TV infrastructure with other operators, intended outcomes were not achieved due to revenue sharing model then in place. Following privatization of Türk Telekom in 2005, cable TV infrastructure was vested in TURKSAT Company. Regulation introduced by Information Technology and Communication Authority related to Cable Platform Services in February 2005 was abolished by the decision of Council of State in 2007. Revenue sharing model regarding Cable TV infrastructure and lack of competition in the market causes inadequate utilization of the potential of Cable TV infrastructure. Only 16 percent of households can access Cable TV infrastructure covering only 22 cities in Turkey. Number of cable internet subscribers was 27,000 in 2006 and reached 492,000, which constituted 6 percent of broadband subscribers, as of March 2014. Considering the fact that this figure was 58 percent in the USA and 31 percent in OECD countries in 2013, it can be concluded that cable TV infrastructure has not matured and utilized efficiently in Turkey.

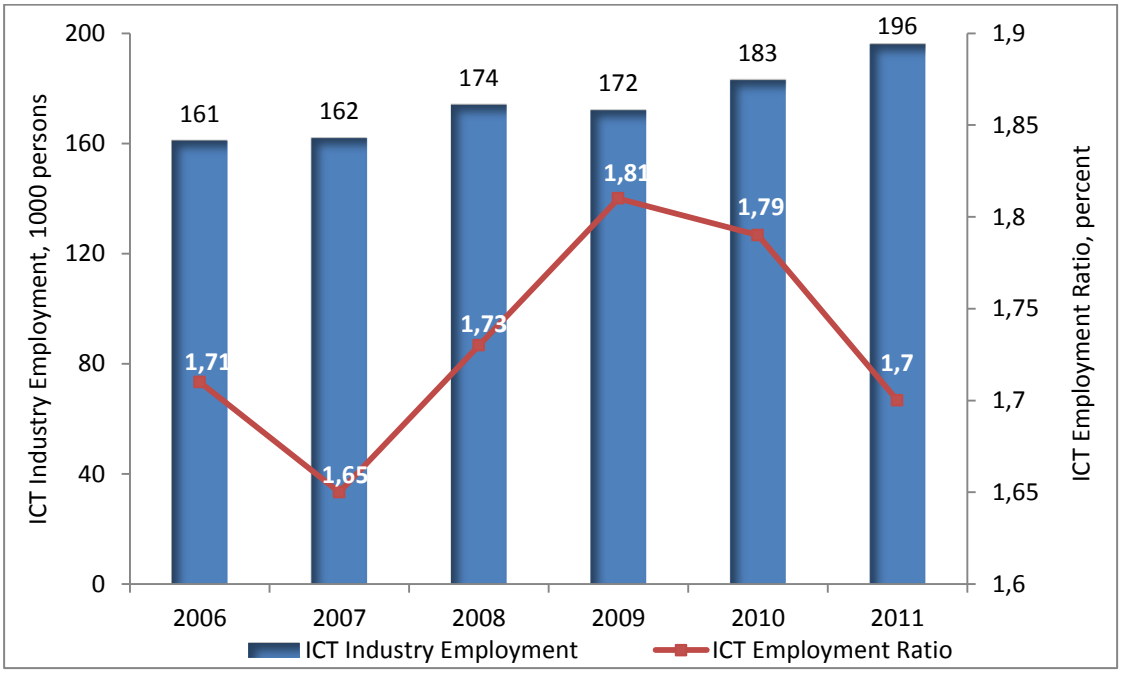
140. Number of fixed phone subscribers, having a falling trend since 2004, was 13.3 million in March 2014. On the other hand, increasing trend of number of mobile subscribers has been preserved during this period and the figure reached 70.1 million with a penetration rate of 91.5 percent. Agreements between Ministry of Transportation, Maritime Affairs and Communication and contractors were signed for installing infrastructure in areas where there is no electronic communication and mobile infrastructure. Cost of this infrastructure was covered by universal service fund. With these agreements coverage rate reached approximately 100 percent. Prevalence of both mobile infrastructure and its use shifted broadband access to mobile.

141. Operators were forced to work with R&D companies and purchase services from domestic SMEs by the 3G Mobile Communication System Tender performed by Information Technology and Communication Authority in November 2008. With this Tender, mobile broadband services have been provided since July 2009 in Turkey. Competition among three operators, which provide services with 2G and 3G licenses, further increased after mobile number portability was introduced in 2008. However, some operators are disadvantaged due to use of different frequency bands. Moreover, increase in mobile data traffic requires more spectrum resources for mobile services. There were 51 million 3G and 26.4 million mobile broadband subscribers as of March 2014. Although transition to 4G has not been completed yet, efforts in this regard are going on. In this respect, transfer of 790-862 MHz band reserved for digital broadcasting to the Information Technology and Communication Authority has not been completed.
142. Broadband technologies vary by region in terms of speed, quality, prevalence and diversity. Cost of access to broadband technologies is high compared to OECD countries due to high tax burden on sector and insufficient competition in fixed broadband market. While cost of broadband access to GDP per capita ratio was 4.9 percent in 2006, it dropped to 1.75 in 2013. This figure is approximately 1 percent in OECD countries.
143. Infrastructure sharing among fixed and especially mobile operators remains underdeveloped. This leads to an increase in the cost of operators, negative effects on environment and waste of resources; and as a result, penetration rate is influenced by higher costs for broadband access. In order to ensure infrastructure sharing in the industry, Information Technology and Communication Authority introduced a regulation in 2013 that obliged all fixed electronic communication operators to share their infrastructure.
144. Internet Assigned Names and Numbers Authority (ICANN), which performs internet domain name management at the global level, chose Istanbul and Singapore as global centers in internet domain names management outside USA in February 2013. This development will help Turkey to be more effective in internet governance and facilitate provision of various services in the internet ecosystem from Turkey.

Qualified Human Resources and Employment

145. Alongside with the main factors affecting labor market like low labor force participation of women and youth in Turkey, high unemployment rate among the youth and disruptions in the balance of supply and demand, ICT sector has its own characteristics that affect structure of employment and human resources in this sector. Continuous change of required employee skills due to pace of technological change in the sector and its dynamic structure, and lack of appropriate training mechanisms are among these characteristics.
146. According to the Annual Survey of Industry and Services of 2011 published in June 2013, ICT sector employment in Turkey was around 196,000 and had an average annual growth rate of 4 percent between 2006 and 2011. Despite this increase in sector's employment, share of ICT sector employment in total employment remained unchanged (1.7 percent) due to increase in total employment.

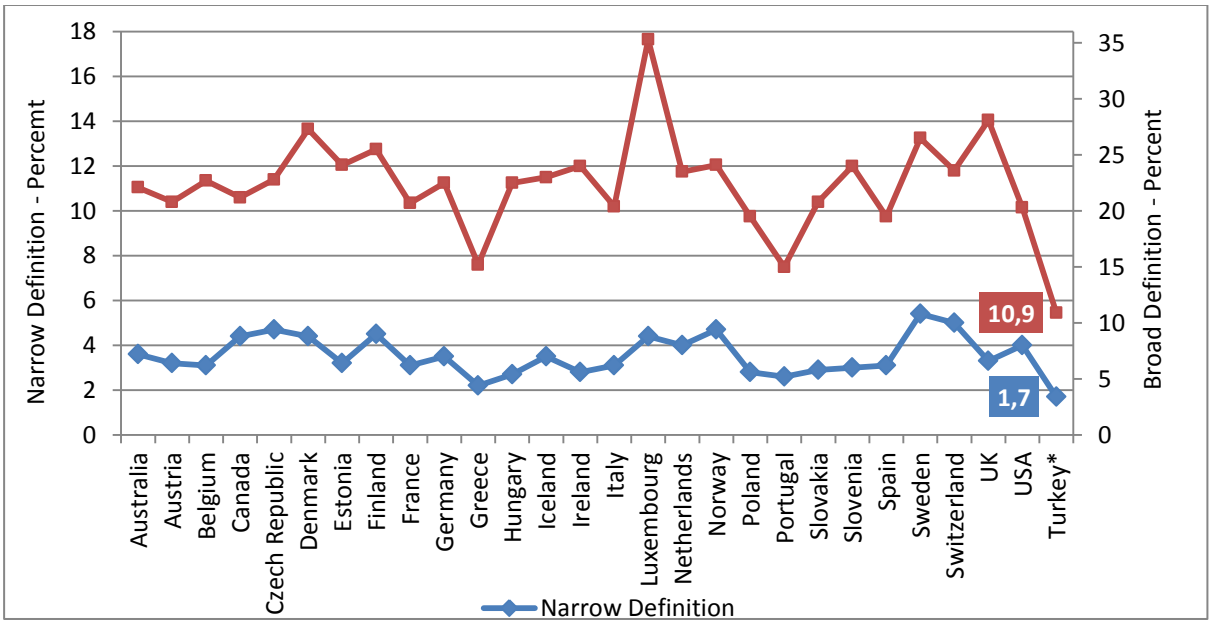
Figure 13 - ICT Sector Employment, 2006-2011*



* "Consumer electronics manufacturing" in the NACE Rev. 2 list is not included in 2009 ICT sector employment. Annual Industry and Service Statistics are considered as total employment figures.
Source: TURKSTAT, Annual Industry and Service Statistics

147. Share of ICT sector employment in overall employment is low due to comparatively small size of software and IT services sectors, lack of major hardware production centers in Turkey, saturation in communications industry in terms of employment and inadequate use of ICT in other sectors.

Figure 14 - Ratio of ICT Employment in Total Employment in OECD Countries, 2010

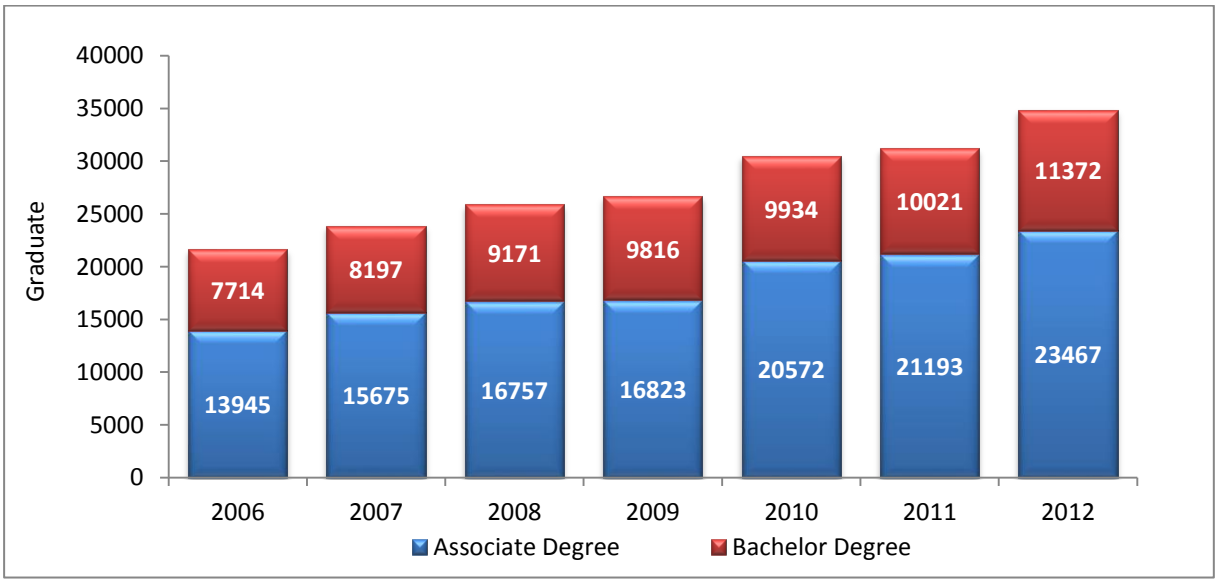


*Annual Industry and Service Statistics is used for Turkish data.
Source: OECD

148. Besides jobs created by ICT sector, those who use ICT in their jobs should be examined as well in order to evaluate penetration of ICT into business world and human resources employed in this field. "ICT professionals" (narrow definition) and “employees benefiting from ICT in their activities" (broad definition) are determined and their share in total employment is monitored based on OECD ISCO-88 occupational classification. While narrow definition covers professions related to computer and electronics, broad definition corresponds to occupations such as managers, architects, engineers, lawyers, statisticians and secretaries who rely on ICT in order to perform their jobs. As of 2010, Turkey has an employment rate of 1.7 and 10.9 percent in terms of narrow and broad definitions respectively. Turkey is lagging behind OECD countries in terms of both figures.

149. Total supply of individuals having undergraduate and associate degrees in the field of ICT has increased in recent years; 60.9 percent increase between 2006 and 2012. 32.6 percent of these graduates earned undergraduate and 67.4 earned associate degrees in 2012. On the other hand, in 2013, 44,000 students graduated from vocational programs associated with ICT.

Figure 15 - Number of Associate and Bachelor graduates in ICT field, 2006-2012*



*The following programs are considered as ICT related: Associate degrees: Computer, electronics, mechatronics, information management and e-commerce; Bachelor degrees: Computer, statistics and computer, mathematics and computer, management information systems, business information management, knowledge and document management, informatics, electrical-electronic, control engineering, mechatronics, quantitative programs (industry, mechanical)

Source: ÖSYM, Higher Education Statistics of 2006-2012

150. Besides, software development courses within certification programs supported by international IT vendors and training programs offered by private educational institutions, NGOs, universities and municipalities are provided in order to increase employment in this field. Certification programs and professional IT trainings facilitate equipping IT professionals with new skills, keeping qualifications up to date and attracting human resources from other sectors. For example, between 2010 and 2011, total number of certificates issued by 17 training centers providing Microsoft training programs was 7,632. Within the Qualified ICT

Employees Program, organized by İŞKUR in 10 provinces, 600 individuals were trained through certified training programs.

151. On the other hand, rapid technological changes in the field of ICT render qualifications of employees acquired through formal education inadequate. Therefore, employees employed in ICT related sectors should be provided with on-the-job training in order to effectively practice their profession.
152. Despite the increase in human resources supply, qualifications demanded by employers cannot be met. In order to identify employer demands, a study, which covered companies with intensive ICT employment, 20 of them being from ICT sector and 12 from others, was conducted in 2012. This study indicates that ICT qualifications of new graduates and expectations of employers do not match exactly. 35 percent of employers who were involved in the study stated that ICT-related knowledge, skills and preparedness of recent engineering graduates for entry-level positions were insufficient. Similarly, 63 and 78 percent of them stated that it is harder to find qualified human resources for entry and mid-level positions respectively in the ICT field compared to other sectors. According to the same study, 84 percent of employers believe that, in the next 5 years, increase in number of available ICT-related positions will be higher compared to other fields. In addition, in a study conducted by TÜBİSAD in 2012, 58 percent of employers stated that shortage of qualified human resources is the biggest problem of the sector.
153. National Employment Strategy was put into practice in May 2014 by the High Planning Council Decision No. 2014/4. The Strategy aimed at boosting employment in the sector by improving quality of labor source for the IT sector, promoting entrepreneurship, supporting researches for developing new products and technologies. To achieve this goal, it is targeted to train 10 thousand IT specialists every year and increase number of people employed in the ICT sector by 50 percent by 2023.
154. Quality of ICT education in higher education institutions varies considerably from university to university due to technical and teaching staff capacity. 72 percent of employers think that for entry-level ICT positions, graduates of engineering departments in top 10 percentile based on university exam rankings are ahead of other university graduates in terms of knowledge, skills and work readiness. These differences observed in current training capacity of universities indicate that demand for qualified human resources in ICT sector cannot be met. In this context, in order to close the gap in quality between educational institutions in the field of ICT there is a need to improve the capacity of higher education IT programs.
155. Joint ICT projects should be developed in order to increase cooperation between private sector organizations and educational institutions, and interaction of university students with the industry should be strengthened.
156. ICT labor demand is on the rise and new occupations and skill requirements are emerging in our country. In line with these requirements, there is a need to reshape curriculum of education programs to meet market demand in this area by considering emerging professions.
157. One of the factors in development of human resources in this area is defining and certifying professional qualifications. Vocational Qualifications Authority (VQA) is in charge of determining occupational standards and qualifications in the IT sector as in other sectors as well as matching them with certifications. As of December 2013, 17 occupational standards at various levels in ICT field were published.

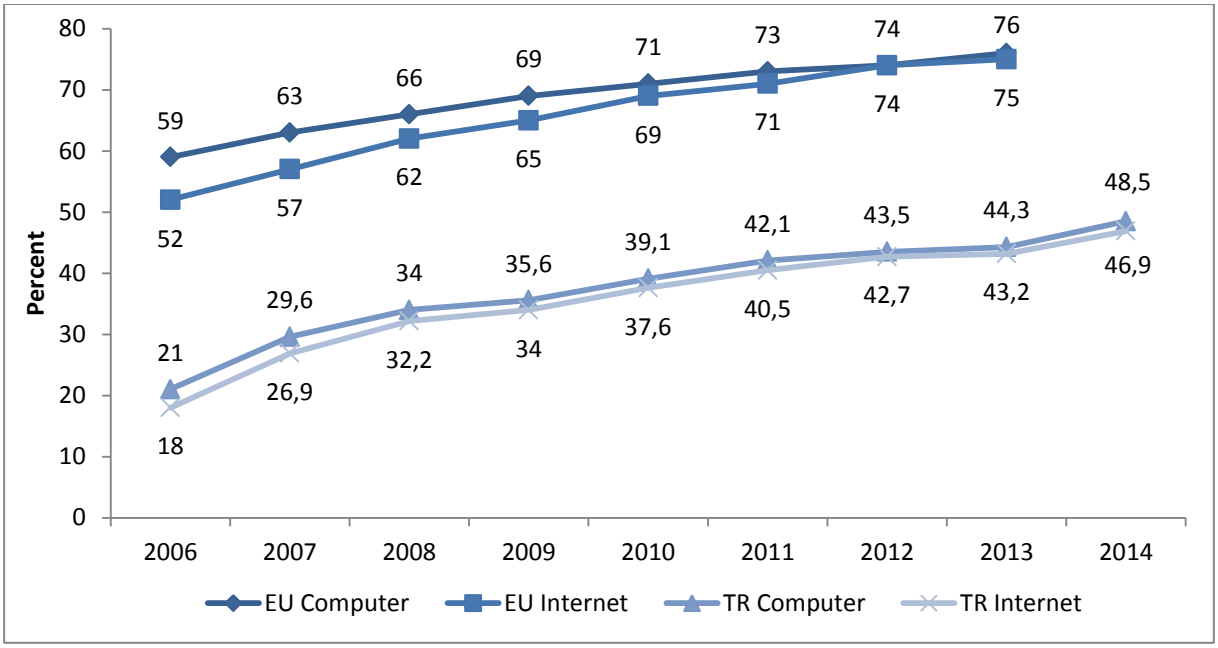
158. Professional English knowledge is important to keep competencies of ICT employees up to date and to follow new developments. English education in ICT departments of universities should be improved in order to attract multinational ICT companies to our country, ensure participation of graduates in overseas projects and facilitate services export.

159. Business world gains more flexible working opportunities thanks to remote working opportunities enabled by ICT. In this way, ICT increase workforce participation by providing time and space flexibility in labor market. However, flexible working schemes are not prevalent in Turkey as much as in EU countries. Call centers is one of the prominent sectors with remote working opportunities. As of November 2013, about 80 thousand people are employed at 1,060 call centers in 43 provinces. Number of call centers, which are creating employment particularly in cities where there are relatively fewer job opportunities, is increasing.

Diffusion of ICT into the Society

160. ICT prevalence and use have been increasing in recent years due to increasing competition in telecommunications sector in parallel with global developments, lower device prices and internet becoming an essential need by penetrating into all aspects of daily life. Proportion of individuals using internet in the last three months was 18 percent in 2006 which rose to 48.5 percent in 2014. However, this level is not sufficient considering Turkey's rapidly developing economy and relatively young population. The same figure was 75 percent in EU in 2013. Difference in this figure, which is an indicator of ICT usage, with respect to EU average and signals of saturation in recent years indicate that there are structural barriers for ICT use in Turkey.

Figure 16 - Computer and Internet Use in the Last Three Months in Turkey and EU, 2006-2014 *



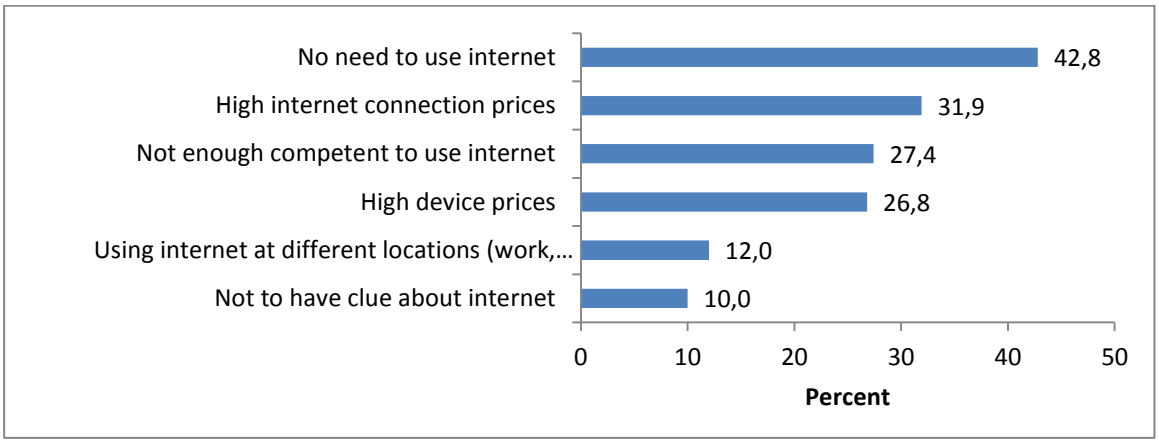
* 2006 data for Turkey is estimated by the Ministry of Development.

Source: TURKSTAT Household Information Technology Usage Survey, Eurostat

161. As of 2014, rate of households without internet access was 39.8 percent. Perceiving content on internet as useless or harmful, high device and connection fees and inability to use are among reasons for lack of internet access in these households. In light of this information,

insufficient digital content, applications and services or lack of awareness, high cost of access and devices and lack of digital skills are main obstacles for widespread use of ICT.

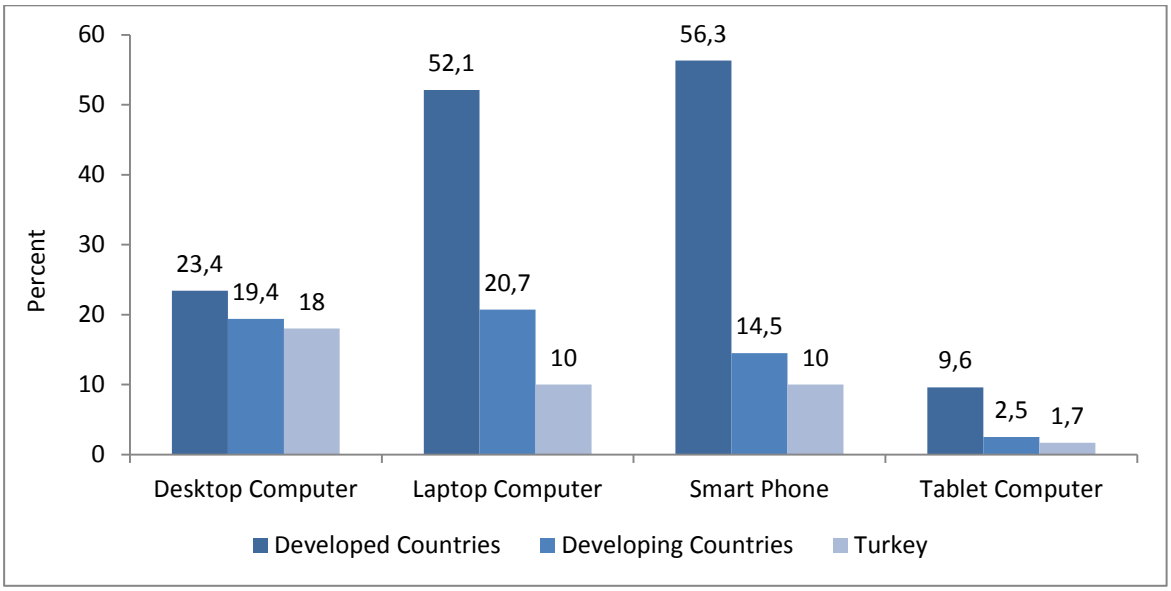
Figure 17 - Reasons for Lack of Internet Access in Households, 2014



Source: TURKSTAT Household Information Technology Usage Survey, 2014

162. ICT use is not attractive enough for individuals as volume and quality of digital content and applications in Turkish are insufficient. That 55 percent of global web content was in English as of 2013 is a disadvantage for individuals who do not speak English. As another indicator, number of articles on Wikipedia per 1000 speakers is 3 for Turkish, 16 for Italian, 22 for Polish and 85 for Norwegian speakers.
163. Access prices have declined significantly in recent years as a result of increased competition in mobile broadband market and Special Communication Tax (SCT) on internet services being reduced down to 5 percent, which was 15 percent in fixed-line and 25 percent for mobile subscriptions. Mostly imported ICT equipments' prices are nearly twice as expensive as countries even at similar development level such as Brazil, Mexico and Russia, particularly due to 18 percent Value Added Tax (VAT) and 25 percent Special Consumption Tax (SCT) applicable for some types of devices. This causes Turkey being pushed back in global device ownership rankings, especially for mobile devices. On the other hand, many households will have ICT devices for the first time with the FATİH Project, which covers distribution of about 10.6 million tablets. Therefore, launching of the project will start a new era in Turkey with respect to device ownership and internet access.
164. Digital literacy rate among children and young individuals is high particularly due to intensive ICT use in formal education in recent years. On the other hand, lack of basic ICT skills for digital immigrants, who are mostly over a certain age, still constitutes an important problem.

Figure 18 - ICT Device Ownership Comparison, 2012



Source: Pyramid Yankee

165. The most obvious result of structural problems in ICT use is digital divide, which represents inequality in access of individuals to ICTs and can vary with individuals' demographic and socio-economic characteristics such as gender, age, disability, income level, education level, geographic area of residence. For example, in 2014, internet use for men was 58.2 percent while it was 38.8 per cent for women. Internet use rates were 73, 15.3 and only 5 percent for age groups 16-24, 55-64 and 65-74, respectively. While internet use rate in Istanbul is 64.4 percent, it is 39 per cent in Southeastern Anatolia. Among individuals with disabilities, who are the most exposed group to digital divide, the ratio of people using none of the computer, mobile phone and internet was 60.6 percent in 2010. This data indicates that factors leading to digital divide should be identified and specific policies and strategies for each social segment should be formulated accordingly.
166. Although rate of internet use is relatively low in our country, average time users spend on internet is high. As of 2014, 71.2 percent of internet users were using internet almost every day, while 21.3 percent use it at least once a week. Increase in regular use of internet in recent years has also increased the length of time spent on internet. Time spent on internet is 31 hours per month per user in Turkey, while this is 26.9 hours in Europe.
167. 79.1 percent of Internet users access to the internet at home, 38.7 percent in the workplace, 30.2 percent in other people's houses, while 14.3 percent in internet cafes. 20.6 percent of men and 4.9 percent of women use internet cafes, which still has an important function for individuals with no device or internet connection. Besides, internet cafe utilization rate for children in the 6-10 age group is 8.7 percent, while this figure is 28.8 percent in the 11-15 age group. Widespread use of internet cafes all around the country, particularly by children, requires that conditions of these facilities should be improved in a way to serve all individuals.
168. Use of social networks and social media is quite common in our country. 96.2 percent of internet users use social networks in Turkey and the average time they spent on these platforms is 10.2 hours per month. 53.5 percent of children in the 6-15 age group are active on social networks.

Box 3 - Literates Teach Computer Use to Illiterates

Literates Teach Computer Use to Illiterates Project, which is conducted by UNDP, Ministry of Development, Habitat Development and Governance Association and Microsoft, supports Turkey's e-transformation process by improving ICT skills of disadvantaged individuals, particularly children, youth, women and handicapped. Project is carried out in partnership with National Youth Parliament, City Councils Youth, Women and Handicapped Assemblies and local authorities in 78 provinces with the support of 1,200 voluntary young trainers, 50 master trainers and hundreds of young volunteers.

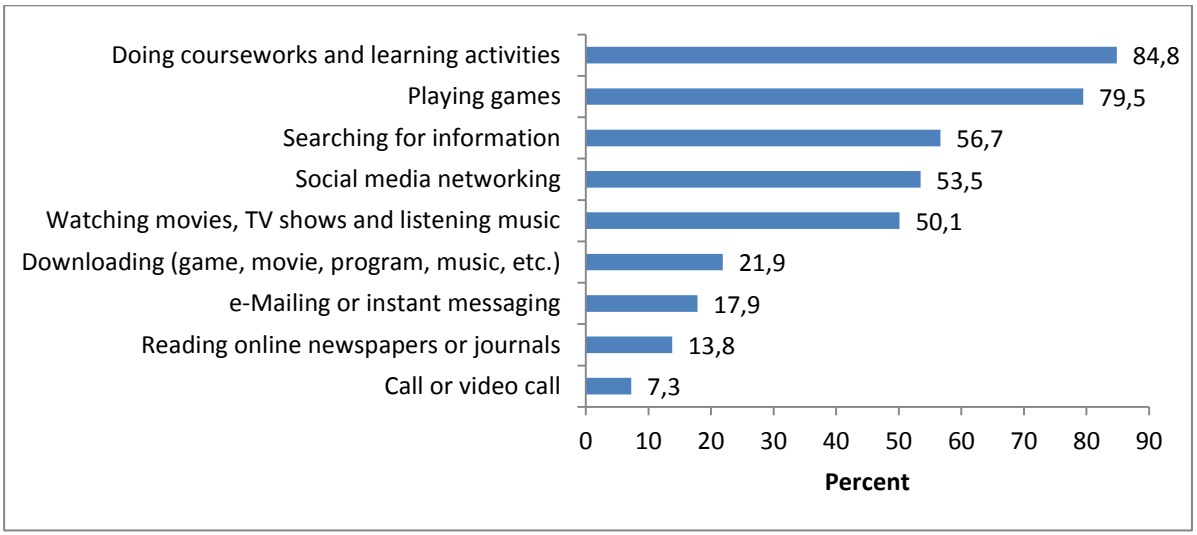
Since 2005, almost 150,000 individuals were trained on basic computer and internet skills, office programs, digital life and internet security and web design and software development. Average age of participants is 19 years, of which 58 percent are women and 42 percent are men.

Trainings are delivered at facilities provided by ministries and local authorities. Continuous Training Centers and IT Academies deliver these trainings with the support of local authorities where infrastructure is inadequate.

This project was highlighted as a best practice by UNDP as well as chosen by European Commission in 2008 as one of the best 5 projects in Geographic Participation category of European e-Inclusion Awards.

169. Use of ICTs among children is increasing rapidly. According to the Survey on Use of Information Technology and Media among Children, conducted by TURKSTAT in 2013, the rate of computer, internet and mobile phone usage rates in the 6-15 age group were 60.5, 50.8 and 24.3 percent respectively. In the same age group, 38.2 percent of children spend up to 2 hours per week, 47.4 percent spend 3-10 hours, 11.8 percent spend 11-24 hours and 2.6 percent spend more than 24 hours on the internet. Rate of access to internet at home is 65.6 percent, while figures for school and internet cafes are 27.9 and 21.4 percent respectively. Doing homework, searching for information, playing games and participating in social networks are among the top ranking purposes for using internet. Considering the prevalence of internet use among children and the growth rate of use, it is needed to direct children more quality content and applications as well as create content in this field.
170. Increased time spent on computers and internet use among children, which is close to level of addiction for some of them, affect leisure time activities and increase importance of using these technologies properly. Although, in this field, many activities with legal, technical and educational aspects are currently being carried out by public and private institutions and NGO's, more pervasive use of ICT and diversification of internet-based activities raise the need to more effectively mitigate psychological, social, physiological and cultural risks these technologies might cause.

Figure 19 - Purpose of Internet Use among 6-15 Age Group Children, 2013



Source: TURKSTAT, Survey on Use of Information Technology and Media among Children, 2013

171. ICT use in education, which became more prevalent with setting up IT classrooms in schools and introducing compulsory IT lectures into the curriculum, is expected to intensify as FATİH Project is being implemented. Within the scope of this Project, Education Information Network (EBA) is being enriched, curriculum is being adapted to new technologies and in-service training is being provided to teachers.

Box 4 - FATİH Project

ICT use in education, which became more prevalent with setting up IT classrooms in schools and introducing compulsory IT courses into the curriculum, is expected to intensify as FATİH Project is being implemented. The Project that aims to ensure equality of opportunity in education and improve technology in schools is composed of five pillars;

1. Provision of hardware and software infrastructure
2. Provision and management of educational e-content
3. Effective IT use within education programs
4. In-service training for teachers
5. Ensuring appropriate, secure, manageable and measurable IT use

The Project aims to build internet access infrastructure for pre-school institutions and primary and secondary schools, equipping all classrooms with smartboards, providing all teachers and students with tablets, creating digital educational content by aligning education programs with ICT-supported education and sharing this content over EBA. The Project, whose preparatory work and pilot implementations are underway, is expected to contribute to growth of software, services, digital content and mobile applications markets as well as increasing domestic value-added in hardware.

Tendering By-Law for FATİH Project was published in the Official Gazette on 7/7/2012 and put into force as of this date. Regarding the Project, work for building network infrastructure is currently ongoing. Within the scope of hardware procurement, tendering of interactive boards and multi-functional printers was completed in 2013. 347 thousand interactive boards are expected to be installed at all secondary schools as of 2015. Procurement process of 10.6 million tablets was

initiated in June 2013, of which 62,800 have already been distributed to students. Furthermore, enrichment of EBA and in-service training of teachers are ongoing.

172. In Information Society Strategy and Action Plan (2006-2010), it was aimed to boost ICT competency and internet access capabilities of individuals through the establishment of 4,500 countrywide full-time Public Internet Access Point (PIAP). In this respect, about two thousand PIAPs were established in places such as libraries, adult education centers, vocational training centers and barracks. Although there are successful ones among them, these centers could not generate the expected impact due to various deficiencies related to their design. Number of initiatives launched by public agencies, universities, private sector and NGOs for various purposes such as ensuring widespread use of ICT, improving digital literacy and development of e-skills is on the rise.
173. In the 2014-2018 Turkey Lifelong Learning Strategy and Action Plan published in July 2014, it was aimed to disseminate distance education for encouraging improvement of skills of adults in areas such as innovation and IT and supporting access to education for disadvantaged groups.

Information Security and User Trust

174. Studies aimed at ensuring information security and user trust in Turkey was initiated in 1990s. Those studies were mostly related to public information systems and focused on ensuring information security since internet technologies were newly emerging.
175. Since the beginning of 2000s, ensuring information security of diversified services provided by public and private sector in areas like e-government, e-banking and e-commerce have become a prerequisite for expansion of these services. Similarly, storage and use of personal data in provision these services increased rapidly, thus raising the need for privacy of personal data. On the other hand, widespread use of internet and computers lead to cybercrimes. Therefore, it became a priority to handle information security and user trust issues with a holistic perspective in Turkey.
176. Creating awareness regarding information security and internalization of information security culture by users and service providers are seen as an important topic in ensuring national information security. Benefiting from international cooperation opportunities in ensuring national information security is a requirement for our country. Particularly, cross-border nature of cyber-attacks requires technical cooperation and coordinated action of nations to prevent such attacks.
177. Due to increasing importance of critical information infrastructure in our country's economic and social life, ensuring security of these infrastructures is vitally important. In this context, protection of information systems in energy, finance, communications, health care, transport, water supply and public services comes to the forefront.
178. In Turkey, legislative activities related to protection of personal data have not been completed yet although they have been on the agenda since the first half of 2000s and the draft billhas been submitted to the parliament several times. Nevertheless, protection of personal data was guaranteed as a fundamental right by the constitutional amendment enacted in 2010. By completing legal regulations regarding protection of personal data, Turkey will have a reliable country status in the presence of EU countries in terms of data protection. This legal arrangement is crucial for our ICT sector in order to provide information society services abroad, particularly in EU countries, to increase business potential of our country in certain

sectors such as finance, health and insurance, in which personal data is used as basic input, and to ensure effective judicial cooperation as well as cross-border data sharing.

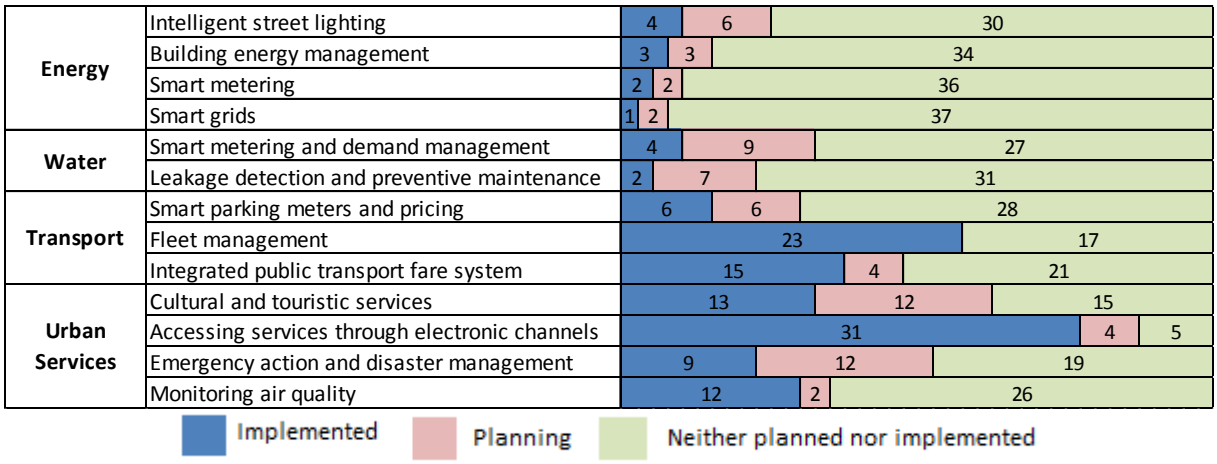
179. Establishing legal framework for national information security activities could not be finalized even though it was on the agenda for a long time. To address this need, it is important that work on draft law is completed under coordination of Ministry of Justice. Cyber Security Council was established in 2012 by a Cabinet Decree and National Cyber Security Strategy and Action Plan (2013-2014) was adopted in 2013. In this context, Turkey Computer Emergency Response Team (TRCERT) was established in May 2013. With a communiqué published in November 2013, building Cyber Incident Response Teams (TRCI) at public institutions and private sector organizations was arranged.
180. Number, variety and sophistication of crimes committed via internet have been increasing in our country. This increase renders traditional methods to fight cybercrime ineffective or hard to implement. There are a number of serious problems in fight against cybercrime in fields such as coordination among public institutions, recruitment of qualified personnel and judicial and administrative procedures. Considering these problems, it is necessary to develop a holistic strategy covering areas such as coordination infrastructure in fight against cybercrime, judicial and administrative procedures, qualified human resources and training, technical infrastructure, user awareness and crime prevention, international cooperation and cybercrime R&D.
181. With the Law No. 6460, it has become possible to create specialized civil courts to deal with IT law cases. However, in order to effectively fight against cybercrime, it is vitally important to have specialized prosecutors and judges to work in IT field and to establish specialized courts.
182. Law No. 5651 was adopted in 2007 that aims to fight internet crimes and regulates responsibilities of content, hosting, access and providers and entities providing internet to multiple users for which Presidency of Telecommunication and Communication (TİB) was appointed to implement. Safer Internet Program was launched by TİB in February 2011. In addition, Law No. 5651 was amended in 2014.
183. Internet use exposes particularly children to inappropriate content as well as raising risks such as cyber bullying, hate crimes and promotion of harmful habits. In order to mitigate these risks, it is important to conduct awareness-raising activities aimed at all segments of society, and especially children. In this context, it is particularly necessary that NGOs participate effectively in awareness-raising activities and take an active role in the process of shaping policies in this field.

ICT-Supported Innovative Solutions

184. Rapid growth of urban population in our country raises many problems in areas such as transport, energy, water, health, environment and safety. ICT-supported innovative solutions have a great potential to resolve these problems, to improve public services and to raise quality of life for citizens.
185. Although there are GIS-based smart city solutions of central and local government institutions in Turkey, basic goals have not been set and strategies have not been determined yet in this regard. Smart city solutions have been implemented recently especially in urban services, transportation and water management, particularly in metropolitan areas. According to Municipalities Smart City Applications Survey carried out in 40 municipalities in February 2013, applications in urban services and transportation have come to the forefront while smart city

applications in energy and water management have been implemented by fewer municipalities.

Figure 20 - Smart City Applications Used in Municipalities, 2013



Source: Municipalities Smart City Applications Survey, 2013

186. Smart city applications offer significant opportunities in urban transformation process. Innovative applications provide time and cost savings in design and management of urban transformation and participation of citizens in this process. In this context, measures such as creation of smart city infrastructure and implementing smart building applications in newly constructed buildings also contribute to improvements in living standards.
187. GIS infrastructure, which is a base for smart urban planning, has been implemented by a small number of municipalities in our country. According to e-government survey conducted by Ministry of Interior in 2011 covering over 90 percent of all municipalities, only 3 percent of municipalities completed GIS work and 14 percent of them were working on it. It is necessary to support municipalities without technical capacity to build GIS infrastructure.
188. Finance, lack of standards and guidelines to ensure interoperability among cities, legal problems, lack of citizen adoption of applications and shortage in qualified human resources are among the primary obstacles for local governments to implement smart city applications.
189. Intelligent transport systems contribute to safe, fast, comfortable, environment friendly and economical transportation. Necessary measures to develop intelligent transport systems have been identified in the Intelligent Transportation Systems Strategy (2014-2016) prepared by Ministry of Transport, Maritime Affairs and Communications.
190. Industrialization and urbanization process, which has been accelerating since 2000 in Turkey, gradually increase demand for energy. Among OECD countries, Turkey experienced the most rapid energy demand growth over the past 10 years. On the other hand, greenhouse gas emissions and climate change resulting from increased energy consumption has made measures against environmental problems a priority in our country as well. Green ICT was not addressed specifically in Climate Change Action Plan, which was put into force in 2012. Therefore, there is a need for a holistic road map to address green ICT related works. Reduction of e-waste is an important part of green ICT. Although e-waste produced annually in Turkey is around 400-500 thousand tons, average amount of legally collected e-waste was around 8 thousand tons in 2011. Amount of collected e-waste is expected to increase thanks

to By-Law on Control of Waste Electrical and Electronic Equipment published in 2012 that imposes obligations on producers, sellers and consumers regarding disposal of e-waste.

191. Smart grid is one of the areas where green ICT can be used most effectively. Smart grid applications are covered in the Energy Efficiency Strategy 2012-2023. However, despite the widespread use of smart meters and remote reading systems, real-time monitoring and management of electricity networks could not be achieved yet.

192. As part of the transformation in our health sector in recent years, many ICT-supported innovative services are being delivered. Advancements particularly in health standards, electronic health records, appointment systems and telemedicine have made it possible for citizens to access health care services more easily. In our country, National Health Data Dictionary was prepared to enable collection, analysis and evaluation of health data in accordance with certain standards. Furthermore, Ministry of Health created a certification mechanism for companies that develop healthcare software. Sağlık-NET, which constitutes a foundation for all e-health applications in Ministry of Health, gathers health data centrally and acts as a decision support system. However, in order to share collected patient data in line with the principle of personal data protection and privacy, legal amendments are needed. With the telemedicine application launched in 2007, currently 61 sender and 10 receiver hospitals are connected to each other to enable remote examination of data. However, uncertainty regarding responsibility for decisions made based on telemedicine applications impedes the dissemination of this practice. Considering over 10 million patients with hypertension and diabetes, 1.5 million physically disabled and 400 thousand home care patients in Turkey, widespread implementation of remote health services may provide substantial savings in healthcare expenditure.

193. Although some big data related studies have been initiated in Turkey, number of implementations in this field is limited. Companies operating in fields such as telecommunications, retail and banking, where customer behavior is closely monitored, are conducting data analysis. In public institutions, some work has been initiated in order to increase productivity, reduce theft-loss rate and improve service quality by doing various analyzes on large volumes of data in some areas such as tax, social security and public safety.

194. Importance of digital content in Turkish increased due to a rise in volume of digital content and time spent on internet. Ministry of Culture and Tourism conducted several studies in order to facilitate access to periodicals and library services. Higher Education Council Thesis Center provides access to 300 thousand master's and doctoral theses in digital form. Furthermore, some Turkish universities participate in international initiatives for open access to scientific information. However, in order to increase volume of local digital content, it is necessary to remove legal and technical barriers and to establish cooperative structures among universities regarding open access to scientific information. Moreover, libraries are losing their position as a primary source of information. Therefore, in order to attract users' attention, libraries should ensure uninterrupted and instant access to information resources through multiple devices. Regarding virtual museums, some studies have been conducted for digitization of cultural heritage in our country; yet progress in this area remains limited due to lack of qualified human resources.

Internet Entrepreneurship and e-Commerce

195. Entrepreneurial ecosystem in our country is still developing and demand for internet use and e-commerce is not high enough. On the other hand, given young population, which enables emergence of qualified internet enterprises, and proximity to emerging markets, internet entrepreneurship and e-commerce may create significant opportunities for Turkey.
196. The biggest obstacle internet entrepreneurship faces in Turkey is the lack of funding particularly for startups. While venture capital funds targeting mature companies are becoming more prevalent in Turkey, number and volume of investment tools for early stage ventures are still quite low. In this regard, new internet initiatives in our country are facing a substantial level of shortage in funding. Value of an index that shows ease of finding finance for new ventures is 12 percent for Turkey while it is 96 percent for the US.
197. Angel investment and organization in this field, which is extremely important for success of early-stage ventures, is still under development in Turkey. Number of angel investor networks per million people is 0.1 in Turkey, while it is 1.0 in the UK and 4.1 in New Zealand. By-Law on Individual Participation Capital, which was put into force in 2013, has been an important step towards development of angel investment. This By-Law allows individual investors to deduct 75 percent of the capital that they put into early stage joint-stock companies from tax base. This rate is 100 percent for investors if the invested companies have been supported through programs determined by Ministry of Science, Industry and Technology, TÜBİTAK and KOSGEB in the last five years.
198. Council of Ministers Decision on Transferring Resources to Superordinate Funds published in March 2014 enables transfer of public resources to venture capital funds. This regulation will significantly contribute to development of venture capital sector in Turkey by facilitating access of entrepreneurs to finance.
199. It is observed that state aids aiming startups are dispersed in terms of type and volume and can't be monitored. According to 2011 data, about 6 percent of financial supports provided by KOSGEB were granted to IT companies. On the other hand, there is no support mechanism particularly for internet initiatives, which significantly differ from other IT companies. Evaluation and acceptance criteria of existing support programs make it harder for internet initiatives to benefit from such financial supports.
200. In general, it is observed that especially young people are inclined to internet entrepreneurship. In this regard, Turkey has a significant entrepreneurial potential. Acquiring essential skills at an early age particularly through formal education is very important to benefit from this potential. Considering working-age population, proportion of individuals who got in-school or out of school entrepreneurship education is 21.2 percent in Germany, 9.4 percent in Brazil and 6.3 percent in Turkey. Besides, practical aspects of entrepreneurship courses in formal education in our country remain weak.
201. Although cultural tendency and desire towards entrepreneurship are strong among young individuals in Turkey, rate of those establishing their own business after basic education is low. Main reasons for this situation are presence of high risk perception regarding entrepreneurship and inadequate guidance mechanisms in this area. There is a considerable need for guiding mechanisms that address entrepreneurs and startups in order to improve internet ecosystem in Turkey.
202. One of the major obstacles for internet entrepreneurship in our country is difficulty in starting and closing down a business. Compared to developed countries, while time necessary to start

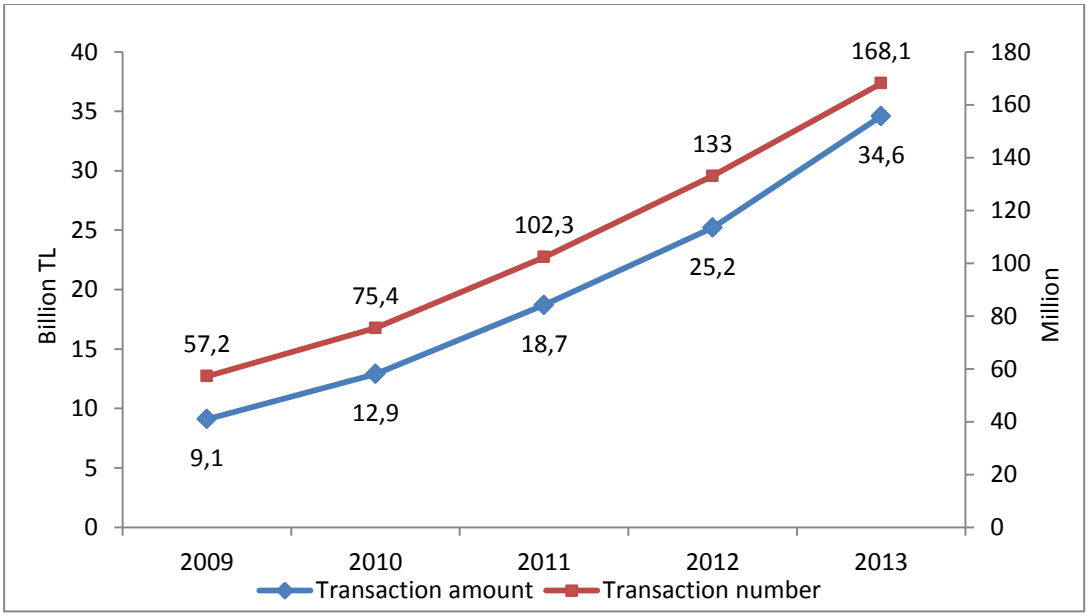
a business is short, its cost is high in Turkey. For example, ratio of cost of starting a company to annual per capita income is 12.7 percent in Turkey while it is 1.5 percent in the US and 0.3 percent in the UK. On the other hand, the main difficulty is being experienced in closing down the company and bankruptcy process. Average time for collection of receivables after bankruptcy is 1 year in the UK and 3.3 years in Turkey. Similarly, the cost of bankruptcy process to creditors in Turkey is 15 per cent of the amount receivable; while this ratio stands at 5 percent in developed countries.

203. Employee stock options is a highly effective tool especially for growth and development of technology companies. Our tax legislation does not provide any incentives regarding employee stock options. New Income Tax Act Bill presented to the Parliament is expected to grant stock options to employees.

204. Ratio of online shopping among internet users in Turkey was approximately 25 percent as of 2013, while this figure is 70 percent in developed countries and 50 percent in developing countries. On the other hand, share of e-commerce in total retail market is only 1 percent in our country, while it is around 5 to 15 percent in developed countries and 3 to 4 percent in developing countries. Main factors that impede online shopping are low average age of internet users and perception of internet as insecure for shopping. Significant improvements can be achieved in Turkey regarding demand for internet economy if widespread use of internet is ensured and measures for e-commerce security are taken.

205. It is quite hard to find reliable data on total volume of consumer to business e-commerce market in Turkey. On the other hand, no data is available for business to business e-commerce market. Amount of credit card transactions on internet is an important indicator used to estimate volume of e-commerce in our country. This volume increased significantly in recent years, rising to 34.6 billion TL corresponding to 168 million transactions in 2013.

Figure 21 - Volume and Number of Credit Card Transactions on Internet in Turkey, 2009-2013



Source: Interbank Card Center (BKM)

206. Among reasons why internet users do not shop online in Turkey are concerns regarding security, privacy and service quality. In order to improve e-commerce and direct user

preferences to it, it is necessary to eliminate security and privacy concerns and increase user trust by establishing quality of service standards.

207. Considering price, an important component of value proposition of e-commerce, it is observed that e-commerce sites in Turkey have price advantages only for certain types of products. For development of e-commerce market in Turkey, especially SMEs must be able to compete on internet. In this regard, it is necessary to reduce technical infrastructure costs of e-commerce, which constitute a major expense item for SMEs.

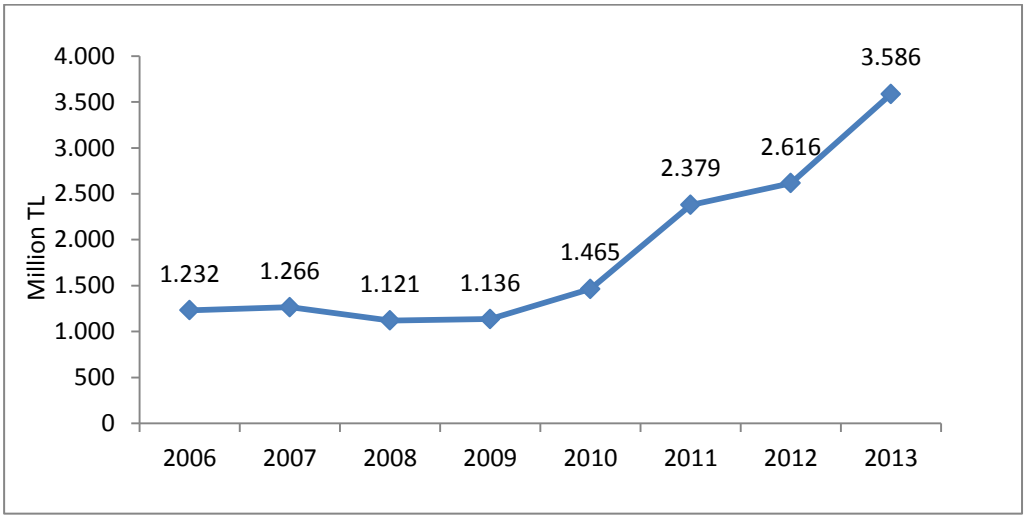
208. In line with developments in e-commerce in Turkey, need for legislation that is compatible with EU's e-Commerce Directive has emerged in Turkey's EU accession process. Draft law prepared in this context was adopted by the Parliament and published on November 5th 2014. Law No. 6563 on Regulating Electronic Commerce shall be put into force on May 1st 2015. This Law regulates commercial communications, electronic contracts, information disclosure obligations regarding e-commerce and applicable sanctions.

User-Centric and Effective Public Services

209. Regarding transformation of our country into an information society, significant steps were taken to provide public services in the electronic environment, particularly after the 2006-2010 Information Society Strategy and Action Plan. Several public services commonly used by citizens and businesses are currently provided electronically.

210. Considering e-government services which has been either launched or in the pilot phase, common infrastructure and services such as Central Civil Registration System (MERNİS), Address Registration System (AKS), Land Registry and Cadastral Information System (TAKBİS), Central Legal Entity Registration System (MERSİS), Electronic Correspondence and Electronic Identity Card as well as such applications on education, health, tax, justice, social security, customs, public safety and local services are densely demanded by citizens and businesses. Despite institutional initiatives, it is necessary to carry out studies regarding integration among institutions and provision of common services in order to reduce administrative burdens, create cost and time savings as well as increase citizen satisfaction and quality of life. 3.6 billion TL for 224 projects was allocated to public ICT investments in 2013. This figure corresponds to a three-fold increase compared to 2006. Recent investments are generally addressing operations&maintenance, improvement and dissemination of current implementations. Although solutions for basic e-government implementations and foundations for integrated e-government service delivery were established initially, improving quality of these services through a citizen centric approach and encouraging participation in public decision making mechanisms both at the local and central level is currently prioritized rather than the number of e-government services.

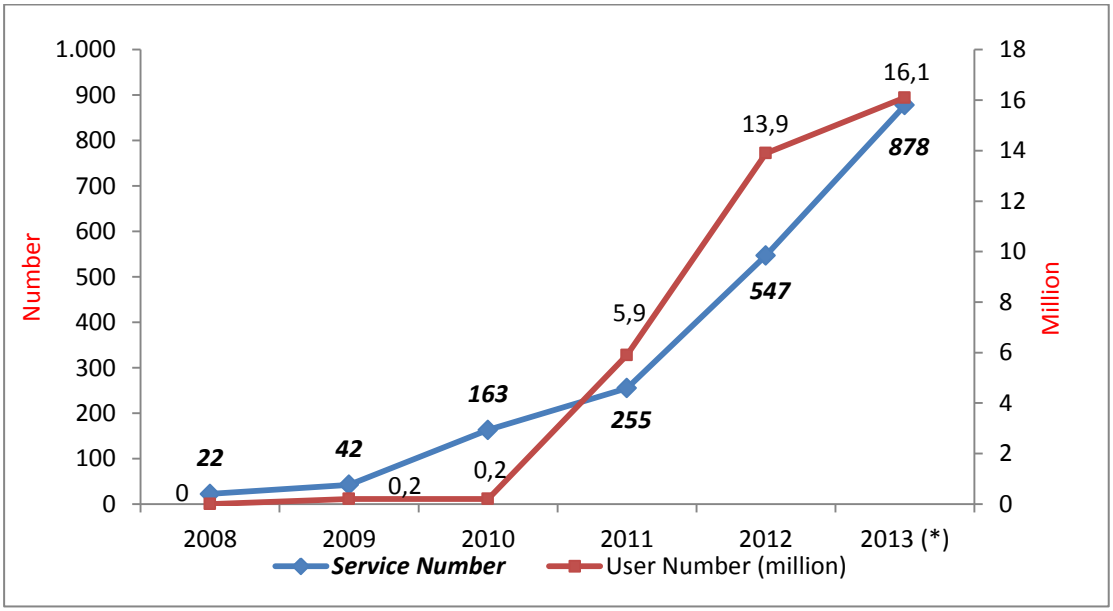
Figure 22 - Public ICT Investments, 2006-2013



Source: Ministry of Development Information Society Department, Public ICT Investments 2013

211. e-Government Gateway, which aims at provision of electronic public services from a single point in an integrated and secure way, has been in operation since December 18th 2008. Recently, local government services, which are closely related to daily lives of citizens and businesses, have been provided through the e-Government Gateway. Number of registered users increased significantly after introducing intensely used services to the Gateway.

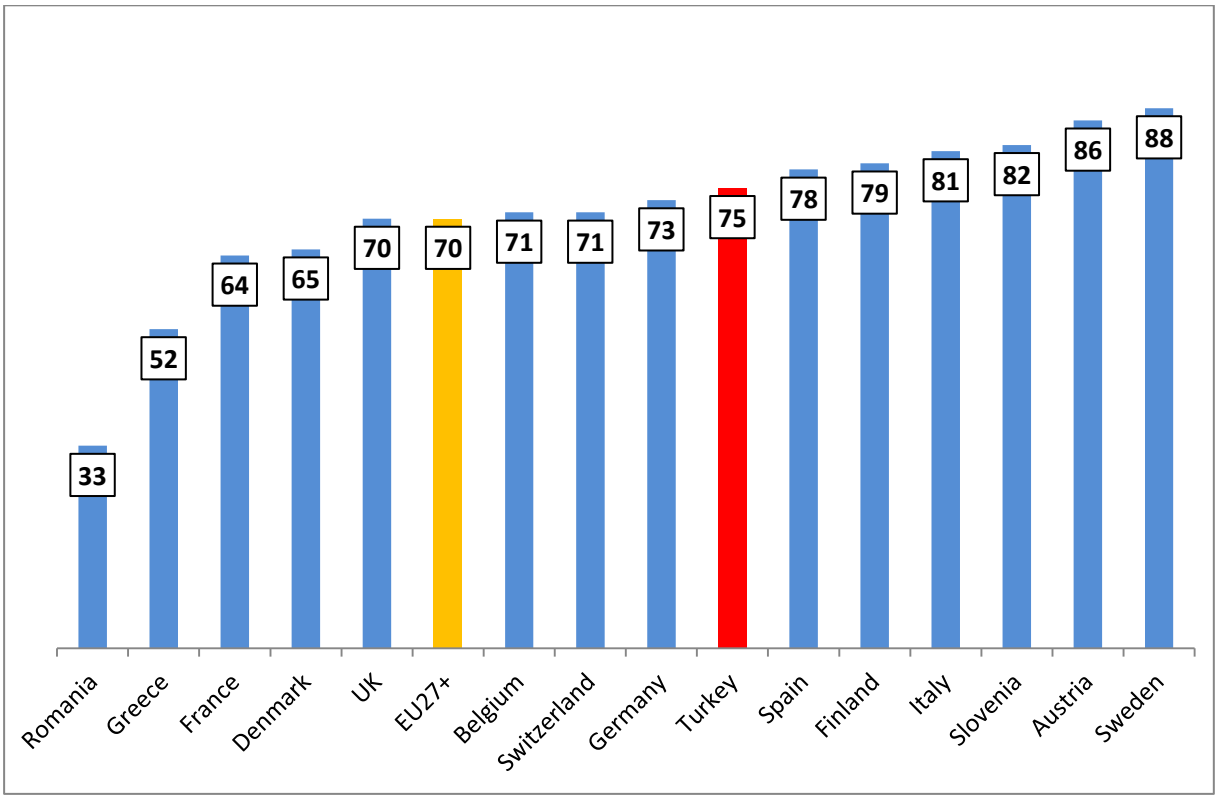
Figure 23 - Numbers of e-Government Gateway Users and Services, 2008-2013



* December 2013 Data
Source: TURKSAT, e-Government Gateway

212. In the e-Government Benchmarking Report published by EU in 2013, Turkey was above the EU27+ average in terms of "e-government services maturity" indicator, which is associated with e-government service use, and "ease of use in the provision of online services" indicator, which is developed for user-centric service provision.

Figure 24 - Online Usability of e-Government Service Sites in the EU, 2013



Source: EU e-Government Benchmarking Report 2013

213. According to TURKSTAT Household Information Technology Use Survey 2014, 28.7 percent of population aged 16-74 years is using e-government services, while this rate is 53.3 percent among individuals using internet in Turkey. Considering purpose of using internet, getting information from websites of public organizations ranks first with 51.2 percent. On the other hand, according to TURKSTAT Business Information Technology Use Survey 2013, 73.7 percent of enterprises with more than 10 employees used e-government services in 2012. TURKSTAT Life Satisfaction Survey 2013 indicates that satisfaction rate of e-government services is 86.2 percent.
214. Sharing and reusing public sector information offer great potential for developing innovative services. However, no tangible progress was achieved in Turkey for sharing public sector information with third parties to create new value-added services.
215. Likewise, need for creating an e-government organization model that fits Turkey's circumstances and setting principles and standards for employing technologies like virtualization, mobile applications, cloud computing in e-government applications still persists.
216. GIS-based systems have great importance in development of spatial applications, provide ease of use and constitute an important basis for decision support systems. Number of e-government applications that employ GIS and volume of related investment increased in recent years. However, lack of coordination in GIS projects and duplicate investments, especially in local government, are observed. On the other hand, there is a shortage for qualified human resources and spatial data regarding GIS-based projects and it is observed that GIS cannot be effectively used as a decision support system. Administrative and technical requirements of urban management information system should be determined and this

system should be implemented in cities in accordance with the smart city approach in order to improve life quality of citizens.

217. On the other hand, reasons such as increasing complexity of ICT and increasing number and diversity of services are challenging public institutions with respect to ICT projects development and implementation capacity. In order to employ qualified IT personnel required for more sophisticated projects in public sector, it is required to arrange recruitment process appropriately and review financial benefits, staffing title and other personnel rights in a way to avoid wage and title differences among IT personnel with the same job description. Although, partial improvement has been achieved in this regard with the Decree numbered 375 and some other recent regulations regarding improvement in wages of some public ICT personnel and inclusion of analyst and programmer staff in technical services category, employment of public ICT staff should be reviewed in a holistic way and a comprehensive regulation to this end is necessary.

Box 5 - ID Card Project

In the Information Society Strategy and Action Plan (2006-2010), "Citizenship Card; Piloting Phase and Countrywide Implementation" action numbered 46 was involved. With this action, whose responsibility was given to the Ministry of Interior General Directorate of Civil Registration and Nationality, it is intended to develop Turkish Identity Card, test it in a pilot project and launch countrywide implementation afterwards.

The principles managing the activities to be carried out under the project are determined by the Prime Ministry Circular No. 2007/16. In accordance with the Circular, a pilot project was intended to be initiated first and following its completion it was planned to launch countrywide implementation. Turkish ID Card was distributed to 220 thousand people within the scope of the pilot implementation in Bolu, which ended in November 2010. Dissemination activities of Turkish ID Card are ongoing and the project is scheduled for completion in 2016.

With widespread implementation of electronic ID card, which will be used for authentication to access public services and will contain the basic identity information and biometric credentials, all authentication functions will be aggregated onto a single card. Turkish ID card will enable authentication at different security levels depending on sensitivity of the application.

218. In addition to employment issues, both increasing public ICT investments following the launch of 2006-2010 Information Society Strategy and ICT becoming an indispensable part of all kinds of public service provision created a need to improve institutional capacity regarding ICT project development and implementation. Public ICT projects and related institutional

activities should be designed in accordance with needs of institutions and users; in this context institutional IT strategies should be prepared in line with strategic plans by public agencies including local governments. On the other hand, there is a lack of sharing technical solutions, knowledge and experience possessed by public IT departments with other institutions. In order to improve ICT project development and implementation capacity in institutions, develop faster and cheaper solutions and thus provide more effective services, it is necessary to create conditions that will enable exchange of ICT solutions and best practices among public agencies.

219. Volume of public procurement of ICT products and services and ICT projects in public institutions is increasing in parallel with expansion of e-government services. However, since the current legislation was designed for conventional and standard goods and services, it should be reviewed in order to improve ICT products and services procurement and eliminate problems rooted in legislation. In addition, regarding implementation of public ICT projects and maintenance of existing systems, alternative financing models, particularly public private partnership model, should be examined. In this respect, public procurement legislation should be updated in order to ensure more rational procurements and improve effectiveness in ICT project implementation. Besides, review of legislation is required in order to enable supporting domestic industry, creating a vendor accreditation system, employing alternative financing models and diversifying legislation with cost-saving mechanisms such as joint procurement.

V. STRATEGIES AND 2018 TARGETS

220. Main objective of information society policies set in this section for each axis is to support economic growth and employment in our country. Widespread and effective use of ICT in all economic and social areas is of critical importance to reach 2023 targets for national income and exports, attain high and stable economic growth and ensure qualified employment.
221. ICT products and services are used horizontally in all areas from education to cultural activities, from production to marketing, from public services to national security; they deeply affect processes and structures in these areas. Therefore, prevalence of use of ICT seen in almost all areas of life requires a common approach and horizontal coordination in all policy areas. In this context, transformation to information society will be considered as one of the long term and priority agenda items; and policies in this field will be implemented and monitored effectively. In addition, transformation into information society and efficient ICT use will constitute a basis for policy decisions in different fields such as, tax, sectoral incentives, employment, industry, services, exports, investment and business environment, intellectual property, R&D and innovation, education, health, justice, security and public services. In the process of implementation of policies, cooperation of relevant parties will be ensured and effectiveness of implementation will be evaluated through a participatory process.
222. ICT sector will be considered as a strategic industry in implementing information society policies focusing on economic growth and employment. Growth and productivity increase in ICT sector contributes to improvements in productivity and competitiveness in other sectors. As seen in global examples, a developed ICT industry will have one of the key roles in transforming our economy into a knowledge economy. In this context, development on solid foundations and international expansion of ICT sector will be supported.

1. Information Technologies Sector

223. Formation of a strong IT industry in a competitive market structure and increasing direct and indirect contribution of the industry to economy is the main objective. To this end, use of IT, particularly in SMEs, will be expanded, local value added and export of IT industry will be increased and actions will be taken for efficient management of IT policies.
224. IT will be employed in order to improve efficiency of businesses, particularly SMEs. In this context, use of cloud computing services will be supported. Necessary legal and administrative arrangements will be made for development and widespread use of cloud computing services.
225. Public ICT procurement processes will be rearranged in a way to prioritize increasing domestic value added and strengthening SMEs.
226. R&D, innovation and export incentives associated with ICT will be implemented in priority areas in a measurable form.
227. In the context of FATİH Project, a competitive environment will be created for development of innovative applications to be used in tablets and smart boards. Content generation will be encouraged so as to ensure sales of content also in international markets.
228. Gaming industry, game development activities in particular, will be supported and necessary actions in this respect will be taken in accordance with a strategy and action plan to be determined.
229. Development of open source software (OSS) ecosystem, which supports use of OSS in public sector and increases use of IT in the entire economy, will be ensured.

230. Necessary actions will be taken to protect property rights in software and digital content.
231. Our IT exports will be increased by focusing on areas such as security, defense, healthcare, telecommunications, business practices, education and digital games in line with Turkey's current export capacity and global trends.
232. An ecosystem will be shaped around firms having access to international markets and actions will be taken to attract global IT vendors in a way to increase Turkey's share in high value-added services in the global value chain.
233. Similar to supports provided in Technology Development Zones, location independent support will be given to software industry. Number of R&D centers in IT industry will be raised.
234. IT policy making process will be improved, cooperation among public and private sectors and NGOs will be ensured in setting and implementing these policies.
235. IT industry data will be monitored in a way to evaluate development of the industry and allow international comparisons. For this purpose, a mechanism for tracking data in the hands of public and private institutions will be created and regular data sharing with the public will be ensured.

Table 3 - Information Technologies Sector Targets

Targets	2013	2018
IT market share in GDP (percent)	1.27 (10.5 billion USD)	1.76 (23 billion USD)
Software and the services sector share in the IT industry (percent)	20 (2.04 billion USD)	35 (8.05 billion USD)
IT sector exports ($ billion)	0.52	2
The ratio of the total value added of ICT sector to the private sector value added (percent)	4.63 (2011)	5.7

Source: TURKSTAT, TÜBİSAD (export data), IDC. 2018 data is Strategy target.

2. Broadband Infrastructure and Sectoral Competition

236. Formation of alternatives in access to broadband technology, strengthening infrastructure-based competition in line with the principle of effective and efficient use of resources, increasing broadband penetration, ensuring fast and high-quality broadband access at affordable prices for all segments of society and sustaining sectoral competition is the main objective.
237. National broadband strategy that is compatible with Information Society Strategy will be prepared. This strategy will determine broadband targets for 2018 and will detail how they will be achieved.
238. In order to improve fiber access infrastructure and reduce digital divide, regional regulation and investment models will be adopted in places which significantly differ in terms of infrastructure diversity, speed, quality, socio-economic circumstances, competition and penetration.
239. In order to increase prevalence of next generation access infrastructure, support and regulations will be implemented to ensure infrastructure sharing among operators.
240. In order to increase prevalence of next generation access networks, investments undertaken by operators will be partially supported by government. Operators will be encouraged through

universal service fund to invest in broadband infrastructure where it is not sufficiently profitable to build. Universal service fund will be used appropriately and efficiently.

241. Right of way related problems of infrastructure operators with local governments and public institutions will be eliminated; regulation in this area will be implemented effectively.
242. In order to reduce fiber access infrastructure costs and encourage investments, standards for indoor communication infrastructure will be determined; regulations will be made to promote sharing this infrastructure and to set responsibilities of property owners.
243. Infrastructure based competition will be strengthened and provided services will be diversified. In this context, necessary measures will be taken in order to transform existing cable TV infrastructure into an alternative network and increase infrastructure coverage.
244. Spectrum policy will be reviewed in terms of fair sharing, effective competition, access costs, technological advancements, speed and quality. In this context, unused resources will be allocated to operators in a technology neutral way.
245. Tax burden on mobile communication services will be reduced considering budget constraints in order to increase prevalence of broadband access services and improve competitiveness of the economy.
246. Regulatory framework in electronic communications sector will be reviewed; new regulations will be introduced with participation of interested parties.
247. Ex-ante and ex-post regulatory impact assessments of regulations will be conducted in electronic communications sector in order to better evaluate their impact on the industry and participatory mechanisms will be developed for this purpose.
248. Taking into account the experiences of transition to 2G and 3G technologies, legal, administrative and technical work for 4G authorizations will be completed in a way to maximize value-added this technology offers.
249. Necessary steps will be taken to manufacture next generation network equipment domestically. In this context, domestic production will be supported.
250. R&D work related to 5G mobile broadband infrastructure equipment will be initiated and participation in 5G standards development process will be ensured.
251. Measures will be taken to position Turkey as an international data communication hub. In this context, legislative work necessary for establishing internet exchange points will be completed; incentives such as tax exemptions, space allocation and energy support will be granted in order to attract international investment in this field.

Table 4 - Broadband Infrastructure and Sectoral Competition Targets

Targets	2012	2018
Broadband Subscriber Penetration Rate (percent) [1]	26.5	70
Fiber Internet Subscribers (in thousands)	645	4,000
LTE Subscribers (million)	-	10
Alternate DNS Management Market Share Ratio (percent)	10.8	25
Broadband Access Per Capita Income of Cost Ratio (percent)	1.9	1

[1] This figure is the ratio of number of broadband subscribers to population; mobile broadband subscribers are included in number of broadband subscribers

Source: Information Technologies and Communication Authority, Ministry of Development. 2018 data is Strategy target.

3. Qualified Human Resources and Employment

252. Training of qualified human resources for needs of ICT sector and creation of new employment opportunities through ICT is the main objective. In this context, number and qualification of instructors, particularly in higher education institutions, and number of students trained in ICT will be increased. Cooperation among private sector and educational institutions, on-the-job training and English literacy in the ICT field will be improved.
253. ICT curriculum provided at high schools and universities will be improved so as to meet needs of ICT sector; emerging occupations will be addressed as a priority in ICT education. To this end, consultation groups will be formed with the participation of academicians and private sector representatives; ICT curriculum of universities will be updated regularly and achieved progress will be shared with public.
254. Number of faculty members teaching ICT will be increased to expand supply of human resources in this field; in this context, study abroad scholarship programs will be developed and Turkish academicians, who live abroad, will be encouraged to come back.
255. In order to meet human resource needs of ICT sector, cooperation among educational institutions and private sector will be promoted. To this end, this cooperation will be enhanced in order to close the gap between qualifications and readiness to work of new graduates and expectations of private sector. In that regard, regulations will be put into force regarding issues such as encouraging private sector to establish research centers at universities and improving effectiveness of internships and graduating projects.
256. University curriculum supporting OSS will be expanded and participation in international OSS communities and projects in cooperation with the private sector will be strengthened.
257. Work on setting occupational standards in the ICT field will be continued.
258. On-the-job training will be improved and expanded. In this regard, support mechanisms will be established for expenditures of the private sector regarding this kind of training and relevant legislation will be prepared.
259. In order to increase employment in our country through ICT, informal training programs will be provided in cooperation with private education institutions based on an assessment regarding training topics and relevant stakeholders to cooperate with. 10 thousand individuals will be trained annually to this end.
260. English skills of trainees in the field of ICT will be improved. In this context, regulations will be made in order to update the curriculum and provide sufficient number of instructors so as to equip higher education students with necessary English skills.
261. In order to provide new employment opportunities through ICT, investments that create employment through remote working such as call centers will be encouraged, particularly in developing regions. These incentives will be aimed at increasing the employability of disadvantaged groups as a priority.
262. Regulations will be implemented to attract qualified IT professionals from abroad to Turkey. In this context, industry specific privileges regarding citizenship and work permits will be considered. These regulations will be introduced especially for neighboring countries in the region.

Table 5 - Qualified Human Resources and Employment Targets

Targets	2012	2018
ICT specialist employment rate (OECD - narrow definition) (percent))[1]	1.7 (2010)	2.6
Employment rate associated with ICT (OECD - broad definition) (percent)[1]	10.9 (2010)	15
The number of graduates from the departments related to ICT (undergraduate, graduate)	34,839	70,000

[1] These targets may be updated in order to comply with international benchmarking studies as well as ISCO-08 classification, which replaced ISCO-88 that is the basis for statistics regarding employment targets.

Source: TURKSTAT, Higher Education Council, OECD. 2018 data is the Strategy target.

4. Diffusion of ICT into Society

263. Effectively benefiting from the opportunities ICT offers and spreading these technologies to all segments of society is the main objective. In this context, ICT equipment ownership and access opportunities will be increased, digital skills will be developed, Turkish digital content will be enriched, ICT opportunities for disabled people will be improved, appropriate use of ICT will be encouraged and ICT access, use and skills of the society will be measured more soundly.
264. Access of individuals to ICT will be improved. In this context, service delivery will continue in active public internet access centers (PIACs), particularly in public libraries. Of these centers, operating within local authorities and newly established ones will be configured as Public ICT Centers (PICs). In the establishment of PICs, prioritized development provinces determined within the scope of regional development policies and rural areas will be prioritized. PICs will be supported through public funds. In addition to provision of access opportunities at PICs, training will be delivered to improve digital skills without competing with private training institutions. Guiding content will be created for these programs and activities of these centers will be reported to the public regularly.
265. Internet cafes' conditions will be improved, particularly regarding physical conditions, in order to serve for all individuals.
266. For reducing digital divide, poor families will be provided with free limited internet access.
267. In order to contribute to development of digital content in Turkish, educational digital content and applications that encourages individuals to use ICT will be offered.
268. ICT access of disabled persons will be improved. In this context, people with disabilities who need special software and hardware to access ICT will be supported to acquire these products and services.
269. Appropriate use of ICT will be promoted. In this framework, education curriculum will be enhanced in a way to reflect positive economic, social and cultural impact of ICT when used properly. Awareness raising applied content will be included in the curriculum to mitigate risks of inappropriate use of ICT.
270. In collaboration with public and private sector and NGOs, studies will be conducted for development of software programming skills starting at an early age.
271. ICT access and usage status of individuals and their skills will be measured more soundly. In order to measure ICT access, use and skills, a digital divide index will be developed that will enable development of focused policies for disadvantaged groups in terms of age, income

level, gender, physical conditions and residential location. Currently conducted field studies will be improved in a way to measure individuals' digital skills.

Table 6 - Diffusion of ICT into Society Targets

Targets	2014	2018
Internet usage rate (percent) [1]	48.5	75
Internet usage rate of disabled persons (percent) [1]	10.4 (2010)	25
Women's internet usage rate (percent) [1]	38.8	65
Internet usage rates of individuals over 45 (percent) [1, 2]	19	30
Households with broadband internet access (percent)	57.2	75

[1] In the last three months

[2] Calculated by the Ministry of Development using TURKSTAT data.

Source: TURKSTAT. 2018 data is Strategy target.

5. Information Security and User Trust

272. In order to facilitate transformation into information society, ensuring information security and increasing user trust is the main objective. In this context, national legal framework for information security and personal data protection will be set, fight against cybercrime will be addressed in an integrated manner and training and awareness raising activities regarding safe internet applications will be promoted.

273. Legal, technical and administrative infrastructure will be created for information security. In this context, audit, standardization and coordination of authority and responsibilities regarding both public and privately owned information systems and critical information infrastructure will be regulated by law and institutional structures specific to this area will be created. Necessary measures for protection of critical information infrastructure against potential attacks will be taken. Awareness raising activities will be conducted in order to build information security culture at institutional and individual level. International cooperation in information security will be strengthened. National Cyber Security Strategy and Action Plan (2013-2014) will be implemented effectively and updated in line with technological trends and needs.

274. Training and awareness raising activities for both staff taking part in service delivery and beneficiaries of services in the field of information security will be expanded. Measures will be taken in this field to meet academic staff and human resources needs. In order to ensure information security at individual and institutional levels, dissemination of security-enhancing technologies such as certificates, electronic signature and encryption software will be encouraged.

275. Studies for legal infrastructure and secondary legislation regarding personal data protection will be completed. A balance between economic aspects of the issue and privacy of personal data will be sought to this end and studies will be conducted with a participatory approach. Initiatives will be launched to raise awareness of personal data processing organizations and individuals whose data is processed. Measures regarding collection, processing and disposal of personal data will be taken through a study that identifies data processing life cycle of public authorities processing personal data.

276. In order to effectively counter newly emerging IT related crimes, National Cyber Crime Strategy will be put into force to improve coordination among institutions with a mandate to fight cybercrime. This Strategy will be prepared in line with the Cyber Security Strategy and Action Plan and its implementation will be overseen by the Cyber Security Council. Necessary activities in this field will be carried out to improve international cooperation, which is of great importance in the fight against cybercrime.
277. Specialized IT courts will be established to strengthen the fight against cybercrime; necessary measures will be taken to increase competency of judicial staff working in these courts.
278. Measures will be taken to increase public awareness regarding safer use of internet. In this context, awareness campaigns will be carried out by public institutions, private sector and NGOs.

Table 7 - Information Security and User Trust Targets

Targets	2012	2018
Number of citizens trained on safer internet	40,000	250,000
Number of public agencies with a Cyber Incident Response Team (CIRT)	1	200

Source: TİB. 2018 data is Strategy target.

6. ICT-Supported Innovative Solutions

279. Achieving economic, social and environmental benefits and improving quality of life through ICT-supported innovative solutions is the main objective. In this context, especially smart cities, environment, energy, green ICT, e-health and high quality digital content will be addressed as a priority.
280. Measures will be taken for transformation into smart cities. For this purpose, strategy and targets will be set; policies for integrated operating principles and necessary governance models will be determined. Smart city applications will be prioritized in metropolitan and urban transformation regions and a roadmap will be created in this regard.
281. Support will be provided for expansion of GIS and Urban Information System (UIS) solutions in local governments.
282. Intelligent transport systems will be built and coordination among implementations of different institutions will be ensured.
283. Call-based support will be provided for development of smart applications using public data that is produced by central institutions and local authorities.
284. Living lab approach will be adopted in development and commercialization of high-tech products. In this context, environment where citizens participate in the innovation process will be built.
285. Use of ICT in healthcare will be increased. ICT-assisted remote healthcare applications will be used to improve quality of life of citizens. In this context, in order to disseminate integrated care services; quality, scope, delivery and pricing mechanism of these services will be redesigned.
286. Use of health data efficiently and sharing it in conformity with information security and privacy policies will be ensured. In this context, complete entry of electronic health records by healthcare units and sharing this data with relevant parties including the patients themselves will be ensured in line with information security and privacy principles. Moreover, standards

for e-health services and devices will be determined and effective interoperability and compliance with international standards will be provided.

287. ICT will be used as an effective tool to increase energy efficiency and protect the environment. In this context, green ICT implementations will be promoted to reduce negative impacts of ICT and other sectors on the environment. Use of green ICT in public institutions will be increased. Green ICT awareness will be created in all segments of the society, private sector will be supported through incentive mechanisms and necessary qualified human resources will be developed.
288. Economic value of big data will be released. To this end, big data implementations will be developed in the public sector particularly in areas such as social security, healthcare, taxation, security and statistics. Necessary measures will be taken in order to promote innovative applications based on M2M usage.
289. Access to cultural heritage and scientific information will be improved through ICT. Coordination and standardization of planned and ongoing digitization activities in information centers such as libraries, archives and museums will be ensured, cultural assets stored in these centers will be digitized and easy access to them through different platforms will be achieved. In addition, a clear national policy will be formulated to enable open access to scientific information.

Table 8 – ICT-Supported Innovative Solutions Targets

Targets	2012	2018
Number of Living Labs	2	20
Percentage of Municipalities with GIS Infrastructure	3	30
Number of Receiver Hospitals in Telemedicine	10	100

Source: Ministry of Interior, Ministry of Health. 2018 data is Strategy target.

7. Internet Entrepreneurship and e-Commerce

290. Building an advanced internet ecosystem that enables emergence of high value-added internet initiatives and transforming Turkey into an e-commerce hub is the main objective.
291. Development of angel investor ecosystem will be encouraged, public-civil society collaboration will be improved in order to expand and enable angel investor networks across the country and support will be provided to organizations that are active in this field as well as relevant activities.
292. Public support provided to venture capital funds will be expanded to cover internet enterprises and amount of capital transferred to this area will be increased.
293. A financial and infrastructure support program for internet startups will be designed; supports will be monitored and evaluated on a regular basis.
294. In order to promote institutionalization of internet initiatives and improve their contact with investor networks, accelerator centers will be established particularly at universities and their cooperation with technology development zones will be ensured.
295. Legislation governing starting and closing a business and liquidation procedures will be revised in accordance with the needs of internet initiatives. Incentives for providing employees of internet initiatives with stock options will be covered in the new Income Tax Law.

296. In order to develop and spread internet entrepreneurship culture; entrepreneurial networks, domestic/international events, projects and business idea competitions and similar activities will be promoted. In formal education, entrepreneurship programs will be developed and implemented in cooperation with NGOs.
297. An infrastructure will be developed in order to closely monitor and evaluate e-commerce in Turkey and in the world; research will be conducted to understand the dynamics of the market.
298. e-Commerce trust mark system will be created in order to ensure a safer online shopping environment.
299. A study for the development of electronic and mobile payments infrastructure in Turkey will be carried out; measures needed in this regard will be designed and implemented.
300. Domestic e-commerce companies will be encouraged to expand abroad by using e-commerce as an important export channel. Turkey will be transformed into a e-commerce hub, especially for neighboring countries and nearby markets.
301. Training and infrastructure support will be provided to SMEs to ensure that they sell products and services over the internet. Building internet marketplaces for SMEs will be promoted.
302. Legislation, directly or indirectly, related to functioning of e-commerce will be finalized and implemented. In this context, secondary regulations under the Law No. 6563 on the Regulation of Electronic Commerce will be implemented.
303. Measures will be taken to address informal economy and taxation issues, which may arise in parallel with the growth of e-commerce and internet economy.
304. Studies will be carried out in order to incentivize global internet companies to invest in Turkey and create employment.

Table 9 - Internet Entrepreneurship and e-Commerce Targets

Targets	2012	2018
Ratio of online shopping among internet users (percent)	24.1	70
Individuals with entrepreneurship training (percent)	6,3	15
Number of angel investor networks (per million population)	0.1	1

Source: TURKSTAT, Global Entrepreneurship Research Association, Ministry of Development. 2018 data is Strategy target.

8. User-Centric and Effective Public Services

305. Achieving efficiency and adopting a user-oriented approach from design to implementation in e-government service provision is the main objective. In this context; needs and expectations of citizens and enterprises will be analyzed, public business processes will be simplified accordingly and services will be re-designed in a way to maximize benefit to the user. Similarly, e-government services will be employed as a tool to improve transparency, reliability, accountability and participation in public administration.
306. Electronic public services will be offered through different platforms in an interoperable and integrated fashion while ensuring information security and privacy. Citizens will not be requested to provide information repeatedly. Demands and needs of disadvantaged groups in access to services will be considered especially. Compliance with international standards in delivery of e-government services will be ensured.

307. e-Government activities will be carried out with strong and effective coordination at inter-institutional and supra-institutional levels. Necessary administrative and organizational structure will be created in this regard.
308. Joint infrastructure and services and basic information systems that haven't been completed will be prioritized, common services in the public sector will be expanded and interoperability will be ensured.
309. Principles and procedures will be determined for e-government service delivery and compliance with IT standards will be ensured in e-government projects and implementations. e-Government activities will be carried out in line with the action plans to be prepared. These action plans will embrace joint services and applications for local government as well. Indicators for monitoring and evaluation of progress will be determined and periodically measured.
310. e-Government projects and implementations will be addressed through a holistic approach, government ICT investment projects will be carried out in a way that ensures inter-agency coordination and interoperability.
311. Use of open source software (OSS), particularly PARDUS, will be expanded in the public sector and support will be provided to public institutions in this context. Private sector part of the OSS ecosystem will be strengthened.
312. Government cloud will be implemented in accordance with a strategy to be prepared. In this context, public data centers will be consolidated, necessary R&D activities related to cloud computing will be conducted, relevant technical, administrative and legal infrastructure will be created and government application platform will be implemented.
313. In order to ease the daily lives of citizens and improve the quality of life, and especially reduce administrative burdens on businesses; local government services will be provided electronically in common norms and standards. Number of local government services integrated into the e-Government Gateway will be increased.
314. In order to ensure fast, reliable and economically sustainable provision of city services; integrated urban management information system, which increases the efficiency of local services, ensures effective coordination in this respect and serves transparency, participation and accountability principles, will be developed for 81 provinces.
315. Policies related to production and sharing of geographic data and its use in decision-making processes will be determined, an action plan will be prepared in accordance with those policies and necessary regulations will be implemented. Lack of coordination in public GIS investment projects will be addressed and duplicate investments will be avoided.
316. Social networks and mobile technologies will be used effectively in e-government service delivery.
317. e-Government project management capabilities of public institutions will be improved, competencies of public IT departments will be enhanced, benefits of public IT employees will be bettered and IT specialist post will be created. Especially in public institutions carrying out large-scale e-government projects, an approach to prepare IT strategy consistent with corporate strategic plan will be adopted.
318. Demand consolidation and other public procurement methods will be developed in order to reduce the cost of procurement of ICT products and services in the public sector. Necessary changes in public procurement legislation will be made to improve efficiency in public procurement of ICT products and services.

319. Policies regarding sharing and re-use of public data will be designed; legal and administrative arrangements will be made to enable use of public data by third parties for new value-added products and necessary technical infrastructure will be created in this respect.
320. Measures will be taken to promote participation in public policy formation and decision-making processes; ICT-supported public participation applications will be developed.
321. Existing legal and administrative arrangements will be reviewed and amended as needed to ensure user-centricity in public services, to reduce administrative burdens on citizens and enterprises and to increase efficiency of public institutions carrying out e-government projects.

Table 10 - User-Centric and Effective Public Services Targets

Targets	2012	2018
e-Government services use rate (percent): - Among internet users (16-74 years old) - Among all enterprises (10+ employees)	 41.3 73.7	 60 85
Number of services to be revised in terms of citizen centricity principles	-	50
Number of institutions in the government cloud	-	30
Number of data sets in the Open Data Catalogue	-	> 10,000

Source: TURKSTAT. 2018 data is Strategy target.

VI. ACTION PLAN

322. In 2015-2018 Information Society Strategy Action Plan; association with policies of the Strategy, description of the action, responsible and related agencies, rationale behind the action, foreseen implementation steps and period are presented for each action.
323. 72 actions in the Action Plan for 8 axes of the Strategy are listed below.

Table 11: Action List for each Axis

No	Name of Axis and Action
1. Information Technologies Sector	
1.	Building IT Sector Data Infrastructure
2.	Ensuring Effectiveness of Incentives and Supports for IT Sector
3.	Development of Cloud Program for SMEs
4.	Establishing Software Sector Working Group
5.	Promoting Content Development in FATİH Project
6.	Ensuring Expansion of IT Companies to Global Markets
7.	Preparation of Game Industry Strategy
8.	Introducing Location-Independent Supports for Software Companies
9.	Increasing Domestic Value-Added in Smart Devices
2. Broadband Infrastructure and Sectoral Competition	
10.	Transition to Regional Regulation Approach
11.	Establishing Fiber Access Support Program
12.	Reviewing the Regulatory Framework
13.	Adoption of Ex-ante Regulatory Impact Analysis
14.	Preparation of National Broadband Strategy
15.	Allocation of Spectrum Resources
16.	Transition to 4G Mobile Broadband
17.	Promoting Domestic 4G Electronic Communications Equipment
18.	Initiating 5G R&D and Standardization Activities
19.	Forcing Installation of Internet Infrastructure in Buildings
20.	Supporting Installation of Internet Exchange Points
3. Qualified Human Resources and Employment	
21.	Updating ICT Curriculum in Universities
22.	Updating ICT Curriculum in Vocational High Schools
23.	Development of ICT Education Cooperation Program between Private Sector and Educational Institutions

24.	Increasing Effectiveness and Dissemination of On-the-Job Training
25.	Implementing Non-Formal Vocational ICT Trainings
26.	Improving Capacity of ICT Departments in Higher Education
27.	Improving English Proficiency in ICT Education
28.	Creating ICT-Supported Remote Working Conditions
29.	Developing a Program to Attract Skilled Labor from Abroad
4. Diffusion of ICT into the Society	
30.	Creating the Digital Divide Index
31.	Dissemination of ICT Hardware and Software for the Disabled
32.	Updating the Curriculum for Raising ICT Awareness
33.	Dissemination of Internet Access
34.	Developing Turkish Digital Content and Applications
35.	Building Public Information Centers in Local Governments
36.	Improving Conditions of Internet Cafes
5. Information Security and User Trust	
37.	Enactment of Cyber Security Law
38.	Enactment of Legislation on Privacy of Personal Data
39.	Preparation of Strategy and Action Plan for Combatting Cyber Crimes
40.	Increasing Awareness on Safer Use of Internet
41.	Foundation of Specialized Courts for Cyber Crimes
6. ICT-Supported Innovative Solutions	
42.	Development of Smart Cities Program
43.	Supporting Smart Applications
44.	Development of Living Laboratories Program
45.	Ensuring Integration of e-Health Records
46.	Realization of e-Health Standardization and Accreditation
47.	Disseminating Integrated Care Services
48.	Developing Green ICT Program
49.	Big Data Pilot Implementation in Public Sector
50.	Open Access to Digital Cultural and Scientific Information
7. Internet Entrepreneurship and e-Commerce	
51.	Completing e-Commerce Legislation
52.	Founding Internet Entrepreneurship Support Center
53.	Preparing e-Export Strategy

54.	Developing Internet Entrepreneurship Culture Program
55.	Developing e-Commerce Monitoring and Evaluation System
56.	Founding Acceleration Centers in Universities for Internet Entrepreneurs
57.	Forming Trust Mark System for e-Commerce Sites
8. User-Centric and Effective Public Services	
58.	Provision of User-Centric e-Government Services
59.	Developing City Management Information System
60.	Preparing Institutional ICT Strategies
61.	Regulating Employment of Public ICT Workers
62.	Encouraging Use of Open Source Software in Public Sector
63.	Establishing Public ICT Competency Center
64.	Building Government Cloud Computing Infrastructure
65.	Preparing Geographic Information Strategy and Action Plan of Turkey
66.	Improving Effectiveness in Public ICT Procurement
67.	Sharing Public Data
68.	Developing ICT-Supported Participation Program for Public Policy Making
69.	Reviewing e-Government Legislation
70.	Benefiting from Mobile Platforms and Social Media in e-Government Services
9. Horizontal Topics	
71.	Developing Information Society Research Program
72.	Developing Information Society Monitoring Program

324. Distribution of actions according to axes and responsible agencies is given in the following table.

Table 12: Distribution of Actions according to Axes and Responsible Agencies

No	Responsible Agency	1. Information Technologies Sector	2. Broadband Infrastructure and Sectoral Competition	3. Qualified Human Resources and Employment	4. Diffusion of ICT into the Society	5. Information Security and User Trust	6. ICT-Supported Innovative Solutions	7. Internet Entrepreneurship and e-Commerce	8. User-Centric and Effective Public Services	9. Horizontal Topics	Total
1	Prime Ministry								3		3
2	Ministry of Justice					3					3
3	Ministry of Family and Social Policies					3					3
4	Ministry of Science, Industry and Technology	4					1	2			7
5	Ministry of Labor and Social Security			3							3
6	Ministry of Environment and Urban Planning		1				1		1		3
7	Ministry of Economy	1						1			2
8	Ministry of Energy and Natural Resources						1				1
9	Ministry of Customs and Trade							3			3
10	Ministry of Interior								1		1
11	Ministry of National Education	1		1	2						4
12	Ministry of Development						1			2	3
13	Ministry of Culture and Tourism						1				1
14	Ministry of Health						3				3
15	Ministry of Transport, Maritime Affairs and Communications		7		1				7		15
16	Council of Higher Education			4							4
17	Information Technologies and Communication Authority		3								3
18	Presidency of Telecommunication and Communication					1					1

19	Social Security Institution						1				1
20	State Personnel Presidency								1		1
21	TURKSTAT				1						1
22	Small and Medium Enterprises Development Organization	1						1			2
23	General Directorate of Turkish National Police					1					1
24	Turkish Labor Agency			1							1
25	The Union of Chambers and Commodity Exchanges of Turkey	1									1
26	METUTECH	1									1
Total		**9**	**11**	**9**	**7**	**5**	**9**	**7**	**13**	**2**	**72**

Information Technologies Sector

1. Building IT Sector Data Infrastructure	
Policy	IT industry data will be monitored in a way to evaluate development of the industry and allow international comparisons. For this purpose, a mechanism for tracking data owned by public and private institutions will be created and regular data sharing with the public will be ensured.
Description	In order to monitor progress in IT sector and build the data infrastructure to enable making international comparisons, a mechanism will be created in cooperation with related public institutions and NGOs to track sector data; and this data will be shared with the public.
Responsible and related agencies	The Union of Chambers and Commodity Exchanges of Turkey (R), Ministry of Customs and Trade, Ministry of Science, Industry and Technology, Ministry of Economy, Ministry of Development, TURKSTAT, Revenue Administration, NGO's
Period	2015-2015
2. Ensuring Effectiveness of Incentives and Supports for IT Sector	
Policy	R&D, innovation and export incentives associated with ICT will be implemented in priority areas in a measurable form.
Description	In order to monitor results of incentives and supports intended for IT sector and ensure coordination, these incentives and supports will be reviewed and updated accordingly. Incentives and supports provided will be linked to performance criteria.
Responsible and related agencies	Ministry of Science, Industry and Technology (R), Ministry of Economy, Ministry of Transport, Maritime Affairs and Communications, Ministry of Development, Ministry of Customs and Trade, Small and Medium Sized Enterprises Development Organization, The Scientific and Technological Research Council of Turkey, Development Agencies, The Union of Chambers and Commodity Exchanges of Turkey, Technology Development Foundation of Turkey
Period	2015-2018
3. Development of Cloud Program for SMEs	
Policy	IT will be employed in order to improve efficiency of businesses, particularly SMEs. In this context, use of cloud computing services will be supported. Necessary legal and administrative arrangements will be made for development and widespread use of cloud computing services.
Description	In order to enable SMEs to benefit from cloud computing services, a program will be implemented to deliver infrastructure and software services

	for SMEs through cloud computing and awareness raising activities will be conducted in this respect.
Responsible and related agencies	Small and Medium Sized Enterprises Development Organization (R), Ministry of Science, Industry and Technology, Turkish Standards Institution, The Union of Chambers and Commodity Exchanges of Turkey, NGO's
Period	2015-2016
4. Establishing Software Sector Working Group	
Policy	IT policy making process will be improved, cooperation among public and private sectors and NGOs will be ensured in setting and implementing these policies.
Description	Software Sector Working Group will be established where relevant public agencies and representatives from software sector will meet regularly, practices will be reviewed and steps to be taken by public bodies will be determined.
Responsible and related agencies	Ministry of Science, Industry and Technology (R), Ministry of Development, Ministry of Transport, Maritime Affairs and Communications, Ministry of Finance, Ministry of Economy, Ministry of Customs and Trade, Ministry of National Education, Ministry of Health, Ministry of Environment and Urban Planning, Undersecretariat for Defence Industries, Undersecretariat of Treasury, Revenue Administration, Universities, Vocational Qualifications Authority, Small And Medium Sized Enterprises Development Organization, Scientific and Technological Research Council of Turkey, Turkish Labor Agency, Turkish Standards Institution, The Union of Chambers and Commodity Exchanges of Turkey, NGO's
Period	2015-2015
5. Promoting Content Development in FATİH Project	
Policy	In the context of FATİH Project, a competitive environment will be created for development of innovative applications to be used in tablets and smart boards. Content generation will be encouraged so as to ensure sales of content also in international markets.
Description	Content development will be promoted within FATİH Project. A competitive environment will be created to enable development of innovative applications to be used in tablets and smart boards. Incentives and supports that are provided for content development will also aim sales in global markets.
Responsible and related agencies	Ministry of National Education (R), Ministry of Economy, Scientific and Technological Research Council of Turkey, NGO's
Period	2015-2016

6. Ensuring Expansion of IT Companies to Global Markets	
Policy	Our IT exports will be increased by focusing on areas such as security, defense, healthcare, telecommunications, business practices, education and digital games in line with Turkey's current export capacity and global trends. An ecosystem will be shaped around firms having access to international markets, and actions will be taken to attract global IT vendors in a way to increase Turkey's share in high value-added services in the global value chain.
Description	Necessary work will be carried out to ensure expansion of IT companies to global markets, especially to ones in our region. In this context, support will be provided in priority areas and an ecosystem will be created around international and domestic companies that have access to global markets.
Responsible and related agencies	Ministry of Economy (R), Ministry of Science, Industry and Technology, Ministry of Customs and Trade, Ministry of Foreign Affairs, Investment Support and Promotion Agency, Turkish Standards Institution, Eximbank, The Union of Chambers and Commodity Exchanges of Turkey
Period	2015-2016
7. Preparation of Game Industry Strategy	
Policy	Gaming industry, game development activities in particular, will be supported and necessary actions in this respect will be taken in accordance with a strategy and action plan to be determined.
Description	Game industry will be analyzed in detail with industry and university representatives, game industry strategy that will support development of the sector will be prepared accordingly and an action plan to be formulated in line with this strategy will be implemented.
Responsible and related agencies	Metutech (R), Ministry of Economy, Ministry of Science, Industry and Technology, Ministry of Development, Ankara Development Agency, Universities, Turkish Developing Sports Branches Federation, NGO's
Period	2015-2016
8. Introducing Location-Independent Supports for Software Companies	
Policy	Similar to supports provided in Technology Development Zones, location independent supports will be provided to software industry. Number of R&D centers in IT industry will be raised.
Description	Support for software industry will become location-independent.
Responsible and related agencies	Ministry of Science, Industry and Technology (R), Ministry of Finance, Ministry of Development, Technology Development Zones Association, NGO's

Period	2015-2015
9. Increasing Domestic Value-Added in Smart Devices	
Policy	Local value added and exports of IT industry will be increased and actions will be taken for efficient management of IT policies.
Description	Focused R&D support, tax incentives and sectoral regulations will be implemented to increase domestic value-added in smart devices manufactured for the internal market as well as to ensure their export.
Responsible and related agencies	Ministry of Science, Industry and Technology (R), Ministry of Economy, Ministry of Finance, Ministry of Transport, Maritime Affairs and Communications, Ministry of National Education, Ministry of Development, Undersecretary of Treasury, Information and Communications Technologies Authority, Scientific and Technological Research Council of Turkey, Investment Support and Promotion Agency, Turkish Standards Institution, NGO's
Period	2015-2018

Broadband Infrastructure and Sectoral Competition

10. Transition to Regional Regulation Approach	
Policy	In order to improve fiber access infrastructure and reduce digital divide, regional regulation and investment models will be adopted in places which significantly differ in terms of infrastructure diversity, speed, quality, socio-economic circumstances, competition and penetration.
Description	Instead of country-wide regulations, an approach aiming to take different regulatory steps on a regional basis will be adopted where substitution of supply and demand of internet services varies regionally.
Responsible and related agencies	Information and Communications Technologies Authority (R), Ministry of Transport, Maritime Affairs and Communications, NGO's
Period	2015-2015
11. Establishing Fiber Access Support Program	
Policy	In order to increase prevalence of next generation access networks, investments undertaken by operators will be partially supported by government. Operators will be encouraged through universal service fund to invest in broadband infrastructure where it is not sufficiently profitable to build. Universal service fund will be used appropriately and efficiently.
Description	A program will be introduced to support fiber access network investments in regions where building such networks is not economically viable. The program will be financed primarily through universal service revenues.
Responsible and related agencies	Ministry of Transport, Maritime Affairs and Communications (R), Ministry of Finance, Information and Communications Technologies Authority, NGO's
Period	2015-2018
12. Reviewing the Regulatory Framework	
Policy	Regulatory framework in electronic communications sector will be reviewed; new regulations will be introduced with participation of interested parties.
Description	Considering electronic communications industry, an impact analysis study will be carried out to evaluate developments and needs that emerged after the introduction of Electronic Communications Act in 2008 and subsequent secondary legislations. A new regulatory framework will be determined accordingly with the participation of related parties and proper monitoring of results will be ensured.
Responsible and related agencies	Information and Communications Technologies Authority (R), Ministry of Transport, Maritime Affairs and Communications, Turkish Competition Authority, NGO's

Period	2015-2016
13. Adoption of Ex-ante Regulatory Impact Analysis	
Policy	Ex-ante and ex-post regulatory impact assessments of regulations will be conducted in electronic communications sector in order to better evaluate their impact on the industry, and participatory mechanisms will be developed for this purpose.
Description	In order to anticipate medium and long term effects of regulations in the electronic communications industry prior to introducing such regulations, principle of regulatory impact analysis will be adopted and enforced legally.
Responsible and related agencies	Information and Communications Technologies Authority (R), Ministry of Transport, Maritime Affairs and Communications, NGO's
Period	2015-2016
14. Preparation of National Broadband Strategy	
Policy	National broadband strategy that is compatible with Information Society Strategy will be prepared. This strategy will determine broadband targets for 2018 and will detail how they will be achieved.
Description	National broadband strategy will be prepared, which determines minimum broadband access speed across the country for 2018, high-speed internet access targets for households as well as policies and actions to be implemented.
Responsible and related agencies	Ministry of Transport, Maritime Affairs and Communications (R), Ministry of Development, Information and Communications Technologies Authority, Turkish Competition Authority, NGO's
Period	2015-2015
15. Allocation of Spectrum Resources	
Policy	Spectrum policy will be reviewed in terms of fair sharing, effective competition, access costs, technological advancements, speed and quality. In this context, unused resources will be allocated to operators in a technology neutral way.
Description	Spectrum resources in 900 and 1800 MHz band, which are not currently allocated to mobile operators, will be made available in accordance with 4G policies to be determined and the principle of effective competition in the market. Technology-neutral use of these resources will be ensured.
Responsible and related agencies	Ministry of Transport, Maritime Affairs and Communications (R), Information and Communications Technologies Authority

Period	2015-2016
16. Transition to 4G Mobile Broadband	
Policy	Taking into account the experiences of transition to 2G and 3G technologies, legal, administrative and technical work for 4G authorizations will be completed in a way to maximize value-added this technology offers.
Description	In order to provide 4G electronic communications services and to deploy these services throughout the country, necessary technical work will be conducted, liabilities of operators to be authorized will be determined, procurement and authorization process will be completed by 2016.
Responsible and related agencies	Ministry of Transport, Maritime Affairs and Communications (R), Information and Communications Technologies Authority
Period	2015-2016
17. Promoting Domestic 4G Electronic Communications Equipment	
Policy	Necessary steps will be taken to manufacture next generation network equipment domestically. In this context, domestic production will be supported.
Description	Measures will be taken to domestically manufacture infrastructure components that are necessary for 4G electronic communication services. To this end, call-based support will be provided for domestic production by means of Ministry of Transport, Maritime Affairs and Communications' R&D fund.
Responsible and related agencies	Ministry of Transport, Maritime Affairs and Communications (R), Ministry of Science, Industry and Technology, Scientific and Technological Research Council of Turkey, Information and Communications Technologies Authority, Undersecretariat of Defence Industries
Period	2015-2018
18. Initiating 5G R&D and Standardization Activities	
Policy	R&D work related to 5G mobile broadband infrastructure equipment will be initiated and participation in 5G standards development process will be ensured.
Description	In parallel with development of 5G standards; R&D activities in the international arena will be followed closely and participation to those activities on behalf of our country will be encouraged. In order to enable domestic manufacturing of 5G electronic communications equipment, R&D resources will be allocated to promote national industry in this field. On the other hand, considering the advantage of standardization-production relationship, process to determine standards for 5G will be closely

	monitored and participation in international activities will be ensured.
Responsible and related agencies	Ministry of Transport, Maritime Affairs and Communications (R), Ministry of Science, Industry and Technology, Information and Communications Technologies Authority, Scientific and Technological Research Council of Turkey, Turkish Standards Institution, NGO's
Period	2017-2018
19. Forcing Installation of Internet Infrastructure in Buildings	
Policy	In order to reduce fiber access infrastructure costs and encourage investments, standards for indoor communication infrastructure will be determined; regulations will be made to promote sharing this infrastructure and to set responsibilities of property owners.
Description	Fixed internet infrastructure in newly constructed buildings will become mandatory. Technical specifications and regulations, which would make installation of broadband internet infrastructure in building mandatory, will be implemented and overseen.
Responsible and related agencies	Ministry of Environment and Urban Planning (R), Ministry of Transport, Maritime Affairs and Communications, Ministry of Interior, Information and Communications Technologies Authority, Local Governments
Period	2015-2015
20. Supporting Installation of Internet Exchange Points	
Policy	Measures will be taken to position Turkey as an international data communication hub. In this context, legislative work necessary for establishing internet exchange points will be completed; incentives such as tax exemptions, space allocation and energy support will be granted in order to attract international investment in this field.
Description	Necessary measures will be taken to ensure traffic exchange of international internet service providers in our country. In this context, incentives and supports will be provided such as tax exemption, land allocation and energy support.
Responsible and related agencies	Ministry of Transport, Maritime Affairs and Communications (R), Information and Communications Technologies Authority, Revenue Administration
Period	2015-2015

Qualified Human Resources and Employment

21. Updating ICT Curriculum in Universities	
Policy	ICT curriculum provided at high schools and universities will be improved so as to meet needs of ICT sector; emerging professions will be addressed as a priority in ICT education. To this end, consultation groups will be formed with the participation of academicians and private sector representatives; ICT curriculum of universities will be updated regularly and achieved progress will be shared with public.
Description	Quality of ICT education in higher education will be improved in order to have graduates with the qualifications needed in the ICT sector. In this context, recommendations for changes in the curriculum with the purpose of effective functioning of the sector and meeting its demand will be presented to universities by advisory groups that are formed with the participation of academicians and private sector representatives.
Responsible and related agencies	Higher Education Council (R), Universities, NGO's
Period	2015-2016
22. Updating ICT Curriculum in Vocational High Schools	
Policy	ICT curriculum provided at high schools and universities will be improved so as to meet needs of ICT sector; emerging professions will be addressed as a priority in ICT education. To this end, consultation groups will be formed with the participation of academicians and private sector representatives; ICT curriculum of universities will be updated regularly and achieved progress will be shared with public.
Description	Emerging qualification needs in the ICT sector will be monitored by an advisory group on vocational high schools, which will be formed by the participation of Ministry of National Education and private sector representatives. Recommendations for curriculum changes regarding needed qualifications will be submitted to the Ministry by this group. ICT curriculum in vocational high schools will be updated regularly in accordance with these recommendations.
Responsible and related agencies	Ministry of National Education (R), Universities, NGO's
Period	2015-2016
23. Development of ICT Education Cooperation Program between Private	

Sector and Educational Institutions	
Policy	In order to meet human resource needs of ICT sector, cooperation among educational institutions and private sector will be promoted. To this end, this cooperation will be enhanced in order to close the gap between qualifications and readiness to work of new graduates and expectations of private sector. In that regard, regulations will be put into force regarding issues such as encouraging private sector to establish research centers at universities and improving effectiveness of internships and graduating projects.
Description	In order to help closing the gap between qualifications and job readiness of university graduates and expectations of the private sector, partnerships between the private sector and educational institutions will be developed. In this context, providing scholarships, internship and part-time jobs to university students by firms, lecturing of private sector representatives at universities, making research and establishing research centers with cooperation of the private sector and universities will be prioritized. Measures will be taken towards the implementation of these partnerships and necessary legislation will be prepared.
Responsible and related agencies	Higher Education Council (R), Ministry of Development, NGO's
Period	2015-2016
24. Increasing Effectiveness and Dissemination of On-the-Job Training	
Policy	On-the-job training will be improved and expanded. In this regard, support mechanisms will be established for compensating expenditures of the private sector regarding this kind of training and relevant legislation will be prepared.
Description	Competencies of ICT sector employees will be improved through vocational trainings. In this context, support will be provided for vocational training programs organized by relevant NGOs.
Responsible and related agencies	Ministry of Labor and Social Security (R), The Union of Chambers and Commodity Exchanges of Turkey, NGO's
Period	2015-2017
25. Implementing Non-Formal Vocational ICT Trainings	
Policy	In order to increase employment in our country through ICT, informal training programs will be provided in cooperation with private education

	institutions based on an assessment regarding training topics and relevant stakeholders to cooperate with. 10 thousand individuals will be trained annually to this end.
Description	Non-formal education programs will be organized to raise ICT competency level of citizens having at least high school attainment. In this context, training programs will be organized in ICT fields such as mobile application development, computer-aided design and web page design, which are demanded by other sectors using ICT in addition to ICT sector itself. In this context, non-formal vocational ICT training will be provided to 10 thousand people per year.
Responsible and related agencies	Turkish Labor Agency (R), Ministry of National Education, Local Governments, The Union of Chambers and Commodity Exchanges of Turkey, NGO's
Period	2015-2018
26. Improving Capacity of ICT Departments in Higher Education	
Policy	Number of faculty members teaching ICT will be increased to expand supply of human resources in this field; in this context, study abroad scholarship programs will be developed and Turkish academicians, who live abroad, will be encouraged to return to Turkey.
Description	Measures will be taken to improve capacities of ICT departments in higher education. Associate and undergraduate programs that lack enough number of academicians will be determined and supported by allocating additional staff as well as introducing additional master's and doctoral scholarship opportunities abroad.
Responsible and related agencies	Higher Education Council (R), Ministry of Development, Ministry of Finance, Ministry of National Education, Scientific and Technological Research Council of Turkey, NGO's
Period	2015-2018
27. Improving English Proficiency in ICT Education	
Policy	English skills of trainees in the field of ICT will be improved. In this context, regulations will be made in order to update the curriculum and provide sufficient number of instructors so as to equip higher education students with necessary English skills.
Description	Actions will be taken to increase quantity and effectiveness of English classes in associate and undergraduate ICT programs.

Responsible and related agencies	Higher Education Council (R), NGO's
Period	2015-2018
28. Creating ICT-Supported Remote Working Conditions	
Policy	In order to provide new employment opportunities through ICT, investments that create employment through remote working such as call centers will be encouraged, particularly in developing regions. These incentives will aim at increasing the employability of disadvantaged groups as a priority.
Description	ICT-supported remote working conditions will be created and thus especially disadvantaged groups will be included in the labor market. To this end, necessary measures will be taken for remote working in the public and private sector. In addition, awareness of employers and employees about remote working will be raised.
Responsible and related agencies	Ministry of Labor and Social Security (R), Social Security Institution, State Personnel Department, NGO's
Period	2015-2017
29. Developing a Program to Attract Skilled Labor from Abroad	
Policy	Regulations will be implemented to attract qualified IT professionals from abroad to Turkey. In this context, industry specific privileges regarding citizenship and work permits will be considered. These regulations will be introduced especially to neighboring countries in the region.
Description	A program will be implemented in order to attract skilled labor from abroad that will support development of IT sector, especially from countries with which Turkey has geographical, historical and cultural links. In this context, promotional activities on living and working conditions in our country, especially in Istanbul, will be carried out and necessary legislative changes will be made in areas such as citizenship and work permits.
Responsible and related agencies	Ministry of Labor and Social Security (R), Ministry of Foreign Affairs, Ministry of Interior, Ministry of Economy, Presidency for Turks Abroad and Related Communities, Social Security Institution, NGO's
Period	2015-2018

Diffusion of ICT into the Society

30. Creating the Digital Divide Index	
Policy	ICT access and usage status of individuals and their skills will be measured more effectively. In order to measure ICT access, use and skills, a digital divide index will be developed that will enable development of focused policies for disadvantaged groups in terms of age, income level, gender, physical conditions and residential location. Currently conducted field studies will be improved in a way to measure individuals' digital skills.
Description	A digital divide index will be developed to measure deviation of individuals in specific groups (low-income group, middle-aged or above, disabled, women, rural population, citizens in less developed regions etc.) from average population through sub-indexes such as accessibility, device ownership, use and benefit.
Responsible and related agencies	TURKSTAT (R), Ministry of Development, Ministry of Transport, Maritime Affairs and Communications, Ministry of National Education, Ministry of Family and Social Policies, Information and Communications Technologies Authority, Universities, NGO's
Period	2015-2015
31. Dissemination of ICT Hardware and Software for the Disabled	
Policy	ICT access of disabled persons will be improved. In this context, people with disabilities who need special software and hardware to access ICT will be supported to acquire these products and services.
Description	In line with a study on number of people who need special software and hardware in order to access ICT, type of their disabilities and necessary software/hardware and their price; level and methodology of support will be determined considering needs, type of disability and income level of beneficiaries. Accordingly, legislative work will be completed to promote necessary software and hardware for particularly visually and physically disabled people and awareness-raising activities addressing them will be carried out with the support of NGOs.
Responsible and related agencies	Ministry of Family and Social Policies (R), Ministry of Development, Ministry of Finance, Ministry of Transport, Maritime Affairs and Communications, Turkish Standards Institution, Universities, NGO's
Period	2015-2015

32. Updating the Curriculum for Raising ICT Awareness	
Policy	Appropriate use of ICT will be promoted. In this framework, education curriculum will be enhanced in a way to reflect positive economic, social and cultural impact of ICT when used properly. Awareness raising applied content will be included in the curriculum to mitigate risks of inappropriate use of ICT.
Description	Primary and secondary school curricula will be enriched to emphasize positive economic, psychological, social and cultural implications of effective usage of ICT. Awareness-raising content will be added to the curriculum against risks of inappropriate use of ICT. Awareness-raising training against risks will also be practical to increase effectiveness. Copyright infringement over the internet will also be considered in the context of update of the curriculum.
Responsible and related agencies	Ministry of National Education (R), Ministry of Family and Social Policies, Ministry of Culture and Tourism, Radio and Television Supreme Council, Universities
Period	2015-2016
33. Dissemination of Internet Access	
Policy	For reducing digital divide, poor families will be provided with free limited internet access.
Description	Low-income families who do not have internet access because of relatively high access prices, lack of awareness etc. will be identified. Families with students will be considered as a priority. These families will be provided with capped internet access service through public funds.
Responsible and related agencies	Ministry of Family and Social Policies (R), Ministry of National Education, Ministry of Finance, Ministry of Transport, Maritime Affairs and Communications, Information and Communications Technologies Authority, NGO's
Period	2015-2018
34. Developing Turkish Digital Content and Applications	
Policy	In order to contribute to development of digital content in Turkish, educational digital content and applications that encourages individuals to use ICT will be offered.

Description	Demographic characteristics such as age, sex, labor force status, education and occupation of individuals who do not use the internet and scope of content that can be developed for these groups will be determined. Digital content and applications in the determined scope will be obtained from private sector or existing content owned by public institutions will be compiled. This content will be shared via the Education ICT Infrastructure (EBA).
Responsible and related agencies	Ministry of National Education (R), Ministry of Food, Agriculture and Livestock, Ministry of Environment and Urban Planning, Ministry of Forestry and Water Affairs, Ministry of Family and Social Policies, Ministry of Health, Presidency of Religious Affairs, TURKSTAT, Turkish Radio and Television Corporation, Universities
Period	2015-2016

35. Building Public Information Centers in Local Governments

Policy	Access of individuals to ICT will be improved. In this context, service delivery will continue in active public internet access centers (PIACs), particularly in public libraries. Of these centers, operating within local authorities and newly established ones will be configured as Public ICT Centers (PICs). In the establishment of PICs, prioritized development provinces determined within the scope of regional development policies and rural areas will be prioritized. PICs will be supported through public funds. In addition to provision of access opportunities at PICs, training will be delivered to improve digital skills without competing with private training institutions. Guiding content will be created for these programs and activities of these centers will be reported to the public regularly.
Description	Legislative work aimed at providing support to local governments to open Public Information Centers (KBM) will be completed. For non-formal education that will be provided in these centers, guiding content will be prepared. Activities of these centers will be regularly reported and shared with the public.
Responsible and related agencies	Ministry of Transport, Maritime Affairs and Communications (R), Ministry of Interior, Ministry of Development, Ministry of National Education, The Union of Municipalities of Turkey, Local Governments
Period	2015-2018

36. Improving Conditions of Internet Cafes

Policy	Internet cafes' conditions will be improved, particularly regarding physical

	conditions, in order to serve for all individuals.
Description	Opening and operation standards of internet cafes regarding workplace, personnel, service delivery etc. will be determined. Internet cafes meeting these standards will be classified according to specific criteria. For games played in internet cafes, age-related permission mechanisms will be applied. Necessary measures will be taken to use internet cafes for non-formal education in regions where needed.
Responsible and related agencies	Ministry of Family and Social Policies (R), Ministry of Interior, Ministry of National Education, Presidency of Telecommunication and Communication, Municipalities
Period	2015-2015

Information Security and User Trust

37. Enactment of Cyber Security Law	
Policy	Legal, technical and administrative infrastructure will be created for information security. In this context, audit, standardization and coordination of authority and responsibilities regarding both public and privately owned information systems and critical information infrastructure will be regulated by law and institutional structures specific to this area will be created. Necessary measures for protection of critical information infrastructure against potential attacks will be taken. Awareness raising activities will be conducted in order to build information security culture at institutional and individual level. International cooperation in information security will be strengthened. National Cyber Security Strategy and Action Plan (2013-2014) will be implemented effectively and updated in line with technological trends and needs.
Description	Works on Draft Cyber Security Law will be finalized promptly; institutional set-up and secondary legislation will be completed.
Responsible and related agencies	Ministry of Justice (R), Prime Ministry, Ministry of Transport, Maritime Affairs and Communications, Ministry for EU Affairs, Scientific and Technological Research Council of Turkey, NGO's
Period	2015-2015
38. Enactment of Legislation on Privacy of Personal Data	
Policy	Studies for legal infrastructure and secondary legislation regarding personal data protection will be completed. A balance between economic aspects of the issue and privacy of personal data will be sought to this end and studies will be conducted with a participatory approach. Initiatives will be launched to raise awareness of personal data processing organizations and individuals whose data is processed. Measures regarding collection, processing and disposal of personal data will be taken through a study that identifies data processing life cycle of public authorities processing personal data.
Description	Data Protection Authority will be founded and secondary legislation will be prepared after the enactment of Draft Law on Personal Data Protection.
Responsible and related agencies	Ministry of Justice (R), Ministry of Health, Ministry for EU Affairs, Information and Communications Technologies Authority, Banking Regulation and Supervision Agency, Universities, NGO's
Period	2015-2015

39. Preparation of Strategy and Action Plan for Combatting Cyber Crimes	
Policy	In order to effectively counter newly emerging IT related crimes, National Cyber Crime Strategy will be put into force to improve coordination among institutions with a mandate to fight cybercrime. This Strategy will be prepared in line with the Cyber Security Strategy and Action Plan and its implementation will be overseen by the Cyber Security Council. Necessary activities in this field will be carried out to improve international cooperation, which is of great importance in the fight against cybercrime.
Description	A strategy for combatting cybercrimes will be prepared in order to effectively tackle newly emerging cybercrimes and necessary steps will be defined through an action plan.
Responsible and related agencies	General Directorate of Turkish National Police (R), Ministry of Justice, Ministry of Transport, Maritime Affairs and Communications, Presidency of Telecommunication and Communication, Ministry of Interior, Ministry of Foreign Affairs, The General Command of the Gendarmerie
Period	2015-2016
40. Increasing Awareness on Safer Use of Internet	
Policy	Measures will be taken to increase public awareness regarding safer use of internet. In this context, awareness campaigns will be carried out by public institutions, private sector and NGOs.
Description	Necessary works and campaigns will be conducted to increase awareness on appropriate use of internet and ensure user trust with a special emphasis on children and youth.
Responsible and related agencies	Presidency of Telecommunication and Communication (R), Ministry of Transport, Maritime Affairs and Communications, Ministry of Family and Social Policies, Ministry of Youth and Sports, Ministry of National Education, Radio and Television Supreme Council, Scientific and Technological Research Council of Turkey, General Directorate of Turkish National Police, NGO's
Period	2015-2018
41. Foundation of Specialized Courts for Cyber Crimes	
Policy	Specialized IT courts will be established to strengthen the fight against cybercrime; necessary measures will be taken to increase competency of judicial staff working in these courts.

Description	Specialized courts will be established for trial of cybercrimes; judicial processes of this type of crimes will be followed by expert judges and prosecutors.
Responsible and related agencies	Ministry of Justice (R), High Council of Judges and Prosecutors
Period	2015-2015

ICT-Supported Innovative Solutions

42. Development of Smart Cities Program	
Policy	Measures will be taken for transformation into smart cities. For this purpose, strategy and targets will be set; policies for integrated operating principles and necessary governance models will be determined. Smart city applications will be prioritized in metropolitan and urban transformation regions and a roadmap will be created in this regard. Intelligent transport systems will be built and coordination among implementations of different institutions will be ensured.
Description	Strategies and targets will be set in order to implement smart city solutions and disseminate them. In this context, the strategy will define areas, targets, methods of stakeholder participation and necessary financing model for realization of smart city solutions. To this effect, introduction of standards and R&D activities in line with them will be supported. Moreover, public procurement will be used effectively to commercialize developed technological products and pilot implementations on living laboratories will be carried out. In this respect, smart city implementations will be supported through public resources, particularly İller Bank's resources for local governments.
Responsible and related agencies	Ministry of Environment and Urbanization (R), Ministry of Development, Ministry of Health, Ministry of Transport, Maritime Affairs and Communications, Ministry of Energy and Natural Resources, Ministry of Forestry and Water Affairs, Ministry of Science, Industry and Technology, Ministry of Interior, Ministry of Finance, İller Bank, Revenue Administration, Scientific and Technological Research Council of Turkey, Turkish Standards Institution, Housing Development Administration, Disaster and Emergency Management Authority, Development Agencies, Local Governments, Universities, NGO's
Period	2015-2018
43. Supporting Smart Applications	
Policy	Call-based support will be provided for development of smart applications using public data that is produced by central institutions and local authorities.
Description	High value-added services, especially mobile and geographical ones, will be developed and provided to citizens by using public data that is produced through projects of public agencies, particularly the Spatial Address Record System. In this context, projects to be developed by private sector and universities using public data in areas like health, transport, building, energy, disaster and water management will be supported through calls based on

	the priorities set by Development Agencies. In this way, creativity of private sector and universities will be combined with public data to produce value-added innovative solutions.
Responsible and related agencies	Ministry of Development (R), Ministry of Interior, Ministry of Health, Ministry of Transport, Maritime Affairs and Communications, Ministry of Environment and Urbanization, Ministry of Energy and Natural Resources, Ministry of Forestry and Water Affairs, Disaster and Emergency Management Authority, Development Agencies, Local Governments
Period	2015-2018
44. Development of Living Laboratories Program	
Policy	Living lab approach will be adopted in development and commercialization of high-tech products. In this context, environment where citizens participate in the innovation process will be built.
Description	Living laboratory, which accelerates commercialization of newly developed products with the inclusion of citizens in the innovation process, will be described conceptually; its principles will be set and coordination methods among different laboratories will be defined. Moreover, in line with these principles, pilot implementations of living laboratories, smart city pilot projects in particular, in different parts of cities will be realized.
Responsible and related agencies	Ministry of Science, Industry and Technology (R), Ministry of Development, Revenue Administration, The Scientific and Technological Research Council of Turkey, Development Agencies, Local Governments, Universities, NGO's
Period	2015-2018
45. Ensuring Integration of e-Health Records	
Policy	Use of health data efficiently and sharing it in conformity with information security and privacy policies will be ensured. In this context, complete entry of electronic health records by healthcare units and sharing this data with relevant parties including the patients themselves will be ensured in line with information security and privacy principles. Moreover, standards for e-health services and devices will be determined and effective interoperability and compliance with international standards will be provided.
Description	Formation of detailed electronic health records by health institutions and sharing of these records with relevant parties including patients themselves in accordance with information security and privacy principles will be ensured. In this context, electronic health records and insurance declarations of treatments will be entered to the system through a shared application. Thanks to this shared registration mechanism, integration between health and social security systems will be achieved and detailed

	electronic health records will be collected.
Responsible and related agencies	Ministry of Health (R), Social Security Institution, Turkish Public Hospitals Institution, Turkish Institute of Pharmaceuticals and Medical Devices, Public Health Institute of Turkey, Health Institutions
Period	2015-2016
46. Realization of e-Health Standardization and Accreditation	
Policy	Use of health data efficiently and sharing it in conformity with information security and privacy policies will be ensured. In this context, complete entry of electronic health records by healthcare units and sharing this data with relevant parties including the patients themselves will be ensured in line with information security and privacy principles. Moreover, standards for e-health services and devices will be determined and effective interoperability and compliance with international standards will be provided.
Description	In order to identify standards for applications and equipment regarding e-health services and ensure interoperability and compliance with standards, works on data model, data sharing model, interface and security standards, data confidentiality, accreditation of applications and equipment, etc. will be completed in accordance with international standards.
Responsible and related agencies	Ministry of Health (R), Ministry of Science, Industry and Technology, Ministry of Development, Turkish Public Hospitals Institution, Public Health Institute of Turkey, Turkish Institute of Pharmaceuticals and Medical Devices, Turkish Standards Institution, Turkish Accreditation Agency, The Union of Chambers and Commodity Exchanges of Turkey
Period	2015-2015
47. Disseminating Integrated Care Services	
Policy	Use of ICT in healthcare will be increased. ICT-assisted remote healthcare applications will be used to improve quality of life of citizens. In this context, in order to disseminate integrated care services, quality, scope, delivery and pricing mechanism of these services will be redesigned.
Description	ICT-supported remote health and care services will be used to increase citizens' quality of life. In this context, quality and extent of services, delivery methods and refunding mechanisms will be revised to disseminate integrated care services, through which health, social and self-care services are provided together.
Responsible and related agencies	Ministry of Health (R), Ministry of Family and Social Policies, Social Security Institution, Turkish Public Hospitals Institution, Public Health Institute of Turkey, Local Governments, NGO's

Period	2015-2017
48. Developing Green ICT Program	
Policy	ICT will be used as an effective tool to increase energy efficiency and protect the environment. In this context, green ICT implementations will be promoted to reduce negative impacts of ICT and other sectors on the environment. Use of green ICT in public institutions will be increased. Green ICT awareness will be raised in all segments of the society, private sector will be supported through incentive mechanisms and necessary qualified human resources will be developed.
Description	Green ICT strategies for different sectors will be formulated, targets will be set and a number of green ICT implementations will be realized in accordance with these targets. Within the frame of this program, green procurement in both public and private sector will be promoted, energy efficiency in public buildings will be increased, green data centers will be built, smart production systems will be supported and awareness increasing measures will be taken.
Responsible and related agencies	Ministry of Energy and Natural Resources (R), Ministry of Development, Revenue Administration, Ministry of Science, Industry and Technology, Ministry of Transport, Maritime Affairs and Communications, Ministry of Environment and Urbanization, Public Procurement Authority, Council of Higher Education, Local Governments, NGO's
Period	2015-2018
49. Big Data Pilot Implementation in Public Sector	
Policy	Economic value of big data will be released. To this end, big data implementations will be developed in the public sector particularly in areas such as social security, healthcare, taxation, security and statistics. Necessary measures will be taken in order to promote innovative applications based on M2M usage.
Description	Big data pilot implementations will be realized by public agencies. Introduction of big data pilot implementations in social security area by using public data and thus creating success stories will lead diffusion of these technologies in Turkey.
Responsible and related agencies	Social Security Institution (R), Ministry of Health, Scientific and Technological Research Council of Turkey
Period	2015-2016
50. Open Access to Digital Cultural and Scientific Information	

Policy	Access to cultural heritage and scientific information will be improved through ICT. Coordination and standardization of planned and ongoing digitization activities in information centers such as libraries, archives and museums will be ensured, cultural assets stored in these centers will be digitized and easy access to them through different platforms will be achieved. In addition, a clear national policy will be formulated to enable open access to scientific information.
Description	A mechanism will be established to enable coordination of existing and planned digitization activities in libraries, archives and museums, to set standards and to ensure compliance with them. Standardized digitization of cultural properties and works in museums and libraries and digitization of cultural heritage possessed by citizens will be supported. Potential of new technologies and equipment will be examined in terms of citizen's access to digital works and contents in libraries and museums and their participation to enrich the content.
Responsible and related agencies	Ministry of Culture and Tourism (R), Prime Ministry, Council of Higher Education, Scientific and Technological Research Council of Turkey, Turkish Standards Institution, Universities, Local Governments, NGO's
Period	2015-2017

Internet Entrepreneurship and e-Commerce

51. Completing e-Commerce Legislation	
Policy	Legislation, directly or indirectly, related to functioning of e-commerce will be finalized and implemented. In this context, secondary regulations under the Law No. 6563 on the Regulation of Electronic Commerce will be implemented.
Description	In order to create a secure and reliable e-commerce environment and to remove legal barriers, secondary regulations will be issued and necessary measures will be taken in areas such as taxation, consumer rights, privacy of personal data, intellectual property, secure payment systems etc. in the context of Law on the Regulation of Electronic Commerce no. 6563.
Responsible and related agencies	Ministry of Customs and Trade (R), Ministry of Justice, Ministry of Development, Ministry of Finance, Ministry of Transport, Maritime Affairs and Communications, Ministry for EU Affairs, Banking Regulation and Supervision Agency, Central Bank of The Republic of Turkey, NGO's
Period	2015-2016
52. Founding Internet Entrepreneurship Support Center	
Policy	A financial and infrastructure support program for internet startups will be designed; supports will be monitored and evaluated on a regular basis.
Description	In order to trigger proliferation of Turkish internet companies that will create high value-added and employment, a center will be founded that will provide finance, consultancy and infrastructure support for internet startups and SMEs.
Responsible and related agencies	Small and Medium Enterprises Development Organisation (R) Ministry of Science, Industry and Technology, Ministry of Development, Ministry of Customs and Trade, Ministry of Economy, NGO's
Period	2015-2017
53. Preparing e-Export Strategy	
Policy	Domestic e-commerce companies will be encouraged to expand abroad by using e-commerce as an important export channel. Turkey will be transformed into an e-commerce hub, especially for neighboring countries and nearby markets.
Description	In order to increase Turkey's good and service exports through e-commerce,

	especially to countries with geographical, historical and cultural proximity to Turkey, a strategy and action plan will be prepared and put into action.
Responsible and related agencies	Ministry of Economy (R), Ministry of Customs and Trade, Ministry of Development, Ministry of Foreign Affairs, Revenue Administration, The Union of Chambers and Commodity Exchanges of Turkey, Turkish Exporters Assembly, NGO's
Period	2015-2015
54. Developing Internet Entrepreneurship Culture Program	
Policy	In order to develop and spread internet entrepreneurship culture; entrepreneurial networks, domestic/international events, projects and business idea competitions and similar activities will be promoted. In formal education, entrepreneurship programs will be developed and implemented in cooperation with NGOs.
Description	Programs will be developed and implemented to overcome the cultural difficulties that hinder Turkey's entrepreneurship potential and to direct this potential to internet entrepreneurship, which requires relatively less capital investment and fits well to Turkey's dynamic population.
Responsible and related agencies	Ministry of Science, Industry and Technology (R), Ministry of National Education, Council of Higher Education, Ministry of Development, Turkish Radio and Television Agency, NGO's
Period	2015-2016
55. Developing e-Commerce Monitoring and Evaluation System	
Policy	An infrastructure will be developed in order to closely monitor and evaluate e-commerce in Turkey and in the world; research will be conducted to understand the dynamics of the market.
Description	Indicators and statistics that will enable monitoring of developments in e-commerce both in Turkey and the world will be identified in detail, compiled and evaluated.
Responsible and related agencies	Ministry of Customs and Trade (R), Ministry of Development, Ministry of Finance, Ministry of Transport, Maritime Affairs and Communications, TURKSTAT , Central Bank of The Republic of Turkey, Revenue Administration, Turkish Postal Service, The Banks Association of Turkey, The Interbank Card Center, International Transporters Association, NGO's
Period	2015-2015

56. Founding Acceleration Centers in Universities for Internet Entrepreneurs	
Policy	In order to promote institutionalization of internet initiatives and improve their contact with investor networks, accelerator centers will be established particularly at universities and their cooperation with technology development zones will be ensured.
Description	New acceleration centers will be founded and managed in coordination with technology development zones in order to realize new internet business ideas, to institutionalize internet startups and to ensure their contact with investment networks.
Responsible and related agencies	Ministry of Science, Industry and Technology (R), Universities, Ministry of Development, Scientific and Technological Research Council of Turkey
Period	2015-2017
57. Forming Trust Mark System for e-Commerce Sites	
Policy	e-Commerce trust mark system will be created in order to ensure a safer online shopping environment.
Description	A trust mark system that will indicate compatibility of e-commerce sites with standards will be formed; a structure for certification and supervision will be formulated in order to overcome customer concerns regarding online shopping, increase the volume of e-commerce, rise quality of services and reduce informal economy.
Responsible and related agencies	Ministry of Customs and Trade (R), Turkish Standards Institution, Turkish Accreditation Agency, Banking Regulation and Supervision Agency, NGO's
Period	2015-2016

User-Centric and Effective Public Services

58. Provision of User-Centric e-Government Services	
Policy	Achieving efficiency and adopting a user-oriented approach from design to implementation in e-government service provision is the main objective. In this context; needs and expectations of citizens and enterprises will be analyzed, public business processes will be simplified accordingly and services will be re-designed in a way to maximize benefit to the user. Similarly, e-government services will be employed as a tool to improve transparency, reliability, accountability and participation in public administration.
Description	Necessary measures will be taken to provide user-centric e-government services. In this context; guidelines will be prepared to lead public agencies in designing and sustaining e-services, other tools will be refined or designed to move e-services to the e-Government Gateway in order to ensure one-stop and integrated service delivery and to build one-stop-shop offices for disadvantaged people who face difficulty in accessing e-government services. Moreover, information and advertisement activities will be organized to increase e-government service use. In order to make e-government services more user friendly, "User-Centric e-Government Services Provision Guideline" will be prepared and kept up-to-date. Information security standards will be set to ensure security in provision of e-government services. Compatibility of e-government services such as web sites and mobile applications with these standards will be ensured. Necessary mechanism will be established to monitor compatibility of e-government services with this guideline and to update it. Moreover, the "Guideline for Websites of Public Agencies (2006)" will be renewed in line with user-centricity principles by TÜBİTAK (Scientific and Technological Research Council of Turkey). Websites of public agencies will be updated in accordance with this guideline. e-Government services provided will be moved to the e-Government Gateway, starting from those services that comply with pre-determined criteria. Central and local government services determined according to specific principles such as exceeding a certain transaction volume will be re-engineered. Mobile e-government services that are still rare in Turkey will be improved quantitatively and qualitatively in accordance with the "User-Centric e-Government Service Provision Guideline". One-stop-shop offices or more accessible channels like telephone will be continued to use for accessibility of disadvantaged people to e-government services. In this context, existing means will be improved.

	Individuals and enterprises will be informed and made aware of e-government services to improve their uptake by using all kinds of media.
Responsible and related agencies	Ministry of Transport, Maritime Affairs and Communications (R), Office of Prime Minister, Ministry of Development, Ministry of Interior, Radio and Television Supreme Council, Scientific and Technological Research Council of Turkey, Turkish Radio and Television Agency, Turkish Standards Institution, Turkish Satellite Communications and Cable TV Operations Company, Union of Municipalities of Turkey, NGO's
Period	2015-2018
59. Developing City Management Information System	
Policy	In order to ensure fast, reliable and economically sustainable provision of city services, integrated urban management information system, which increases the efficiency of local services, ensures effective coordination in this respect and serves transparency, participation and accountability principles, will be developed for 81 provinces.
Description	Services pertaining to cities and city residents as well as service providers will be identified. Services provided by local governments and local branches of the central government for various purposes will be integrated. In order to deliver faster, healthier and economically sustainable city services, integrated city management information systems, which will ensure efficiency and effective coordination in service provision of municipalities and central government agencies and will maintain principles such as transparency, participation and accountability, will be developed at first for pilot regions and then for all 81 provinces.
Responsible and related agencies	Ministry of Interior (R), Ministry of Transport, Maritime Affairs and Communications, Ministry of Development, Ministry of Environment and Urbanization, Ministry of Health, Ministry of Energy and Natural Resources, Ministry of National Education, Ministry of Culture and Tourism, Ministry of Science, Industry and Technology, Disaster and Emergency Management Authority, İller Bank, Local Governments, Union of Municipalities of Turkey, Universities, NGO's
Period	2015-2018
60. Preparing Institutional ICT Strategies	
Policy	e-Government project management capabilities of public institutions will be improved, competencies of public IT departments will be enhanced, benefits of public IT employees will be bettered and IT specialist post will be created. Especially in public institutions carrying out large-scale e-government projects, an approach to prepare IT strategy consistent with corporate

	strategic plan will be adopted.
Description	Public agencies, including local governments, will prepare periodic ICT strategies compatible with their existing institutional strategic plans through a pre-determined program. ICT strategy will cover such components as investments for e-government service provision, technology preferences, institutional capacity, saving plans, cost and benefits, work plan, etc. Strategy will also include IT vision and targets based on citizens served, governance, technical infrastructure and security of existing investments as well as content, schedule, amount and financial effects of planned investments. Law no. 5018 will be amended to force public agencies to prepare ICT strategies and relevant secondary regulations will be made. These regulations will cover local governments having 50,000 or more population.
Responsible and related agencies	Ministry of Transport, Maritime Affairs and Communications (R), Ministry of Development, Ministry of Finance, Ministry of Interior
Period	2015-2015

61. Regulating Employment of Public ICT Workers

Policy	e-Government project management capabilities of public institutions will be improved, competencies of public IT departments will be enhanced, benefits of public IT employees will be bettered and IT specialist post will be created. Especially in public institutions carrying out large-scale e-government projects, an approach to prepare IT strategy consistent with corporate strategic plan will be adopted.
Description	In order to increase ICT capacities of public agencies, ICT personnel employment system, which differs between and within public agencies, will be simplified and made fairer. Furthermore, outsource-based employment, part-time employment and personnel exchange between agencies will be explored. ICT Expert and Assistant Expert positions will be created in the public sector; personnel to be employed in these positions will be hired through competency exams that measures necessary qualifications. Moreover, a method will be developed to enable recruitment of these personnel among agencies.
Responsible and related agencies	State Personnel Presidency (R), Prime Ministry, Ministry of Finance, Ministry of Transport, Maritime Affairs and Communications, Public Servant Unions, NGO's
Period	2015-2015

62. Encouraging Use of Open Source Software in Public Sector

Policy	Use of open source software (OSS), particularly PARDUS, will be expanded in the public sector and support will be provided to public institutions in this context. Private sector side of the OSS ecosystem will be strengthened.
Description	A strategy will be prepared addressing use of open source software in the public sector with the support of relevant parties. New open source software will be developed or existing open source software will be supported in needed areas; PARDUS, national open source operating system, will be disseminated in public agencies. Besides, a mechanism that enables universities to participate in open source software development activities will be formulated. Furthermore, an information portal will be built in order to increase use of open source software that has many advantages, where open source software strategy, recent developments in open source environment and activities can be followed. Open source software products will be checked against security flaws and secure products will be made available through this portal. Besides, installation and usage guides for open source software available on the portal will also be prepared and published. These works will be undertaken with close partnership with Scientific and Technological Research Council of Turkey.
Responsible and related agencies	Ministry of Transport, Maritime Affairs and Communications (R), Ministry of National Defense, Scientific and Technological Research Council of Turkey, Ministry of Development, Universities, NGO's
Period	2015-2018

63. Establishing Public ICT Competency Center

Policy	e-Government project management capabilities of public institutions will be improved, competencies of public IT departments will be enhanced, benefits of public IT employees will be bettered and IT specialist post will be created. Especially in public institutions carrying out large-scale e-government projects, an approach to prepare IT strategy consistent with corporate strategic plan will be adopted.
Description	Public ICT Competency Center will be established in order to increase institutional capacity for formulation and management of ICT projects. The Center will provide support for those demanding public agencies, including central administration and local authorities, in identification of requirements for projects, in writing documents of terms of reference, in the process of technical decisions and in project management issues. Center's education and on-the-job training activities will increase competencies of public workers in several areas such as ICT project processes, principles for user-centric design, process re-engineering and sharing of best practices. Furthermore, sharing of information on best practices and institutional experiences through an electronic platform will support dissemination of information and thus increase effectiveness of ICT investment processes.

	Besides, the Center will undertake responsibility in other areas such as preparing project management guidelines and developing new project processes like agile methodology. The Center will not perform as a contractor in implementation of projects other than consultancy, training and guidance roles defined for itself.
Responsible and related agencies	Ministry of Transport, Maritime Affairs and Communications (R), Scientific and Technological Research Council of Turkey, Turkish Satellite Communications and Cable TV Operations Company
Period	2015-2015
64. Building Government Cloud Computing Infrastructure	
Policy	Government cloud will be implemented in accordance with a strategy to be prepared. In this context, public data centers will be consolidated, necessary R&D activities related to cloud computing will be conducted, relevant technical, administrative and legal infrastructure will be created and government application platform will be implemented.
Description	A cloud computing infrastructure will be built for public agencies. In this context, a roadmap will be set to integrate public data centers initially and at the same time to conduct R&D studies and to form principles, foundations and standards for both cloud computing infrastructure and for those solutions and technologies that will run on this platform, such as thin client. Shared applications of public agencies will be prioritized and conveyed to the government cloud. An easy to integrate public application platform, through which public agencies are able to lease services, will be established.
Responsible and related agencies	Ministry of Transport, Maritime Affairs and Communications (R), Scientific and Technological Research Council of Turkey, Turkish Satellite Communications and Cable TV Operations Company, Turkish Standards Institution
Period	2015-2018
65. Preparing Geographic Information Strategy and Action Plan of Turkey	
Policy	Policies related to production and sharing of geographic data and its use in decision-making processes will be determined, an action plan will be prepared in accordance with those policies and necessary regulations will be implemented. Lack of coordination in public GIS investment projects will be addressed and duplicate investments will be avoided.
Description	Policies to produce and share geographic information will be identified, an action plan in compliance with these policies will be prepared and necessary legal regulations will be issued. National geographic information systems

	(GIS) software, primarily open source GIS software, will be supported.
Responsible and related agencies	Ministry of Environment and Urbanization (R), Ministry of Forestry and Water Affairs, Ministry of Food, Agriculture and Livestock, Ministry of Transport, Maritime Affairs and Communications, Ministry of Interior, Ministry of Science, Industry and Technology, Ministry of Customs and Trade, Ministry of Economy, Ministry of Finance, Ministry of Energy and Natural Resources, Ministry of Development, Ministry of Culture and Tourism, Ministry of Health, Turkish Naval Forces Command, General Command of Mapping, TURKSTAT, General Directorate of Land Registry and Cadastre, Scientific and Technological Research Council of Turkey, Disaster and Emergency Management Authority, İller Bank, Turkish Satellite Communications and Cable TV Operations Company, Local Governments, Universities, NGO's
Period	2015-2015
66. Improving Effectiveness in Public ICT Procurement	
Policy	Demand consolidation and other public procurement methods will be developed in order to reduce the cost of procurement of ICT products and services in the public sector. Necessary changes in public procurement legislation will be made to improve efficiency in public procurement of ICT products and services.
Description	Legal and administrative regulations for public procurement will be reviewed and amended accordingly to simplify procurement of ICT products and services (software, hardware, services, consultation, data digitisation, etc.). These regulations will be supportive for local industry and SME's as well as promoting use of open source software. Alternative financing models, primarily public private partnership (PPP) model, will be evaluated in terms of applicability in Turkey, considering international examples as well, in order to develop new ICT projects with higher budgets and maintain existing ones. Moreover, intra and inter agency shared procurement system will be established to increase savings in purchases.
Responsible and related agencies	Ministry of Transport, Maritime Affairs and Communications (R), Ministry of Development, Ministry of Finance, Ministry of Science, Industry and Technology, Public Procurement Authority, Small and Medium Enterprises Development Organisation, State Supply Office, Turkish Standards Institution, Universities, NGO's
Period	2015-2017
67. Sharing Public Data	
Policy	Policies regarding sharing and re-use of public data will be designed; legal

	and administrative arrangements will be made to enable use of public data by third parties for new value-added products and necessary technical infrastructure will be created in this respect.
Description	Public data held and produced by public agencies, including local governments, will be made available to third parties for development of value-added services and hereby emergence of new enterprises, transparent public administration and more scientific studies considering personal data privacy, security and trade secrets. To that effect, necessary legal and technical infrastructure will be established, open data catalog will be prepared for sharing public data with third parties and making it available for re-use and consultancy services will be provided to public agencies for data sharing. Studies will be carried out to increase awareness of public agencies regarding data sharing.
Responsible and related agencies	Prime Ministry (R), Ministry of Finance, Ministry of Transport, Maritime Affairs and Communication, Ministry of Development, Ministry of Environment and Urbanization, General Directorate of State Archives, TURKSTAT
Period	2015-2018
68. Developing ICT-Supported Participation Program for Public Policy Making	
Policy	Measures will be taken to promote participation in public policy formation and decision-making processes; ICT-supported public participation applications will be developed.
Description	In order to increase user-centricity and effectiveness in public service delivery, a Program that will improve participation in public policy making, including policy decisions, legislative regulations and service delivery processes, will be initiated; ICT-supported participatory applications in public administration will be developed.
Responsible and related agencies	Prime Ministry (R), Ministry of Development, Universities, NGO's
Period	2015-2018
69. Reviewing e-Government Legislation	
Policy	Existing legal and administrative arrangements will be reviewed and amended as needed to ensure user-centricity in public services, to reduce administrative burdens on citizens and enterprises and to increase efficiency of public institutions carrying out e-government projects.

Description	Necessary administrative and legislative regulations that will increase user-centricity and effectiveness in public service delivery will be identified and implemented.
Responsible and related agencies	Prime Ministry (R), Ministry of Transport, Maritime Affairs and Communications, Ministry of Development, Ministry of Finance, NGO's
Period	2015-2016

70. Benefiting from Mobile Platforms and Social Media in e-Government Services

Policy	Social networks and mobile technologies will be used effectively in e-government service delivery.
Description	Mobile technologies and social media opportunities will be effectively utilized in e-government service delivery. In this regard, a guideline will be prepared for public agencies, prioritized services will be moved to the mobile platform according to a schedule and mobile services and social media usage will be steadily developed taking users' demand into consideration.
Responsible and related agencies	Ministry of Transport, Maritime Affairs and Communications (R), Turkish Satellite Communications and Cable TV Operations Company
Period	2015-2018

Horizontal Topics

71. Developing Information Society Research Program	
Policy	R&D and innovation efforts in the information society domain will be supported.
Description	A program that will support scientific studies on information society and increase use of these studies in public policy making will be implemented.
Responsible and related agencies	Ministry of Development (R), Ministry of Science, Industry and Technology, Ministry of Transport, Maritime Affairs and Communications, Council of Higher Education, Scientific and Technological Research Council of Turkey, General Directorate of Credit and Dormitories Agency, Universities, NGO's
Period	2015-2018
72. Developing Information Society Monitoring Program	
Policy	Transformation of Turkey into an information society will be monitored and evaluated effectively.
Description	Monitoring and evaluation of information society transformation process will be performed transparently; focused studies will be undertaken in necessary areas.
Responsible and related agencies	Ministry of Development (R), TURKSTAT, NGO's
Period	2015-2016