CLUSTER REPORT

ANKARA

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ABSTRACT

This document presents the cluster analysis study conducted in Ankara Region for the NICE project. Brief introduction of the Ankara Region, some facts and figures about the ICT sector and policies in Turkey and in Ankara Region are outlined. Information about the Ankara cluster is provided in detail. The document will be useful within the studies to be conducted for the Comparative Cluster Analysis Study.

CONTENT

1 EXECUTIVE SUMMARY

With the widespread use of Information and Communication Technologies (ICT), demand to and production of these technologies are increasing all around the world. Companies and governments are investing more in ICT than before to increase their productivity, gain competitive advantages across the global markets and make the provision of public services more efficient and transparent. ICT has also become a part of daily life of individuals and is used for several purposes such as communication, entertainment, education and others. 1990's have witnessed to an unprecedented increase in the share of ICT in total investment and consumptions, and in return, with the help of ICT, productivity gains and economic growth in many countries.

Although, ICT sector in Turkey had been negatively affected by the 2001 financial crisis, there are signs that the sector is recovering very rapidly and targeting even higher growth rates than expected. The new government, which came into force in late 2002, has managed to change the outlook of the economy in 2003 and is giving additional optimistic signs for future economic advancements. Turkish government is aware of the opportunities ICT offers and has taken measures to improve ICT production and R&D in order to increase exports as well as to meet domestic market needs.

Regarding the distribution of ICT companies in Turkey, mainly they are concentrated among three regions, Istanbul, Ankara and Izmir. According to a study conducted in 2004 by Interpro, leading sectoral media and organisation group, the distribution of top 500 ICT companies in Turkey is as follows; 343 companies (%68,6) in Istanbul Region, 77 companies (%15,4) in Ankara Region, 19 companies (%3,8) in Izmir Region and the remaining 61 companies (%12,2) in other regions.

ICT companies located within Ankara region are mainly concentrated in three technoparks. METU-Technopolis, Ankara Cyberpark and Hacettepe Teknokent are the three most important and largest technoparks in Ankara that are located in close proximity to one another in three prominent universities in Turkey, METU, Bilkent University and Hacettepe University, respectively. With regard to their location three science parks enhance better relationships and collaborations with the public research institutes in R&D studies based on information and technology development and have a very high accessibility to the city center and the main residential cores of Ankara. As the result of the informal network formed between these three science parks, Ankara ICT Cluster of technologically advanced and international companies, research and academic institutions were formed by bringing them together into an ecosystem that promotes and creates new types of synergies between scientific and the entrepreneurial communities working on ICT.

2 THE REGION

Ankara was declared to be the Capital City of new Turkish State, later the Turkish Republic in October 13, 1923. It is in the northwest of Central Anatolia.

Ankara, in population, is the second biggest city of Turkey, has 24 counties and 926 villages. Nearly 88% of 3.203.362 population live in the city, 12% live in villages. The Municipality of Ankara was first established in 1924, then in 1984 Ankara Greater Municipality together with 8 provincial municipalities were founded.

Ankara is the second among most-migrated cities and a migration rate of 8.4% is expected. According to the growing data of 1990 and 2000, the population is expected to be 4.645.022 in 2010.

Ankara is known for the multitude of universities and research organisations it it home to. There are 10 universities, 55 research institutes and 172 research centres located within the region. The universities include the following, several of them being among the most reputable of the country:

- Ankara University
- Atılım University
- Baskent University
- Bilkent University
- Cankaya University
- Gazı University
- Hacettepe University
- Middle East Technical University
- TOBB Economics and Technology University
- Ufuk University

130.000 people have been studying and approximately 12.000 academics were employed at the universities in Ankara as of 2003. There are 3 science parks and 2 incubation centres operating in the universities of Ankara. METU-Technopolis and KOSGEB Technology Development Centre in Middle East Technical University, Ankara Cyberpark and Incubation Centre in Bilkent University and Hacettepe Teknokent in Hacettepe University The ICT is the leading focus sector among companies operating in these science parks. Being the capital city, Ankara also hosts all the public institutions and government organisations.

Before the Republic, Ankara was a 30.000 population city. Main economic resources were stock-breeding and agriculture and trade was limited to the exchange of products of such activities. During the first years of the Republic, a "dense period" started. In order to build a city which can serve as a Capital, intensive lower and upper structural activities started and activated the commercial life. Then, some small workshops started manufacturing structural materials. After 1923 Governmental Industrial Organizations such as MKE, Sumerbank

and Etibank were founded and they built their factories in Ankara. Foundations of small subcontractor companies encouraged migration to Ankara. Thus industrialization and population explosion enhanced each other. Today Ankara is mentioned among industry oriented cities in terms of economical activities.

Wood and furniture industry of Ankara has a great importance in Turkey. At the beginning of the Republic there were very few industrial foundations like beer factory (1925), cement factory (1926) and gunpowder factory (Elmadağ) . Recently the number and kinds of industrial establishments have increased. Now there are pasta, flour, vegetable oil, milk product, sugar, beer, cement, tractor, agricultural machinery, engine, paint, brick, forest products, furniture, metal goods, and textile industries in Ankara.

With the need for the national software development solutions, some important defense industries were started to be built in Ankara by 1980s. Tusaş Aerospace Industries, Inc., TAI, is the biggest of these. TAI was founded in 1984 as a Turkish-American joint venture. ICT industry with the influence of defense industry has a significant place in Ankara, Defense industry, with qualified manpower and the potential in it, has created big companies in Ankara; FMC-Nurol Defense Industries, Inc., Aremsan Electric Machinery Industry and Trade Ltd., Barış Electric Industry, Inc., Roketsan, Inc., and Marconi Communication, Inc. In additon to those defense industry companies, there are many ICT companies located in Ankara that are currently active on many e-goverment projects within the context of e-Transformation Turkey project.

3 ICT SECTOR

3.1 OVERVIEW OF THE NATIONAL ICT SECTOR

With the widespread use of Information and Communication Technologies (ICT), demand to and production of these technologies are increasing all around the world. Companies and governments are investing more in ICT than before to increase their productivity, gain competitive advantages across the global markets and make the provision of public services more efficient and transparent. ICT has also become a part of daily life of individuals and is used for several purposes such as communication, entertainment, education and others. 1990.s have witnessed to an unprecedented increase in the share of ICT in total investment and consumptions, and in return, with the help of ICT, productivity gains and economic growth in many countries.

Although, ICT sector in Turkey had been negatively affected by the 2001 financial crisis, there are signs that the sector is recovering very rapidly and targeting even higher growth rates than expected. The new government, which came into force in late 2002, has managed to change the outlook of the economy in 2003 and is giving additional optimistic signs for future economic advancements. The Government is aware of the opportunities that ICT sector offers and launched e-Transformation Turkey project in order to realize the transformation to an Information Society. In a broader context, perhaps, the most significant impact on ICT would come from the fully liberalized telecoms sector starting from January 1, 2004. There are no more monopolies in telecoms sector in Turkey since the beginning of 2004. Turk Telekoms exclusive rights on voice transmission and infrastructure expired on this date. As stipulated by the law, other operators can operate in every segment of telecoms sector by obtaining a license from the Telecommunications Authority (TA).

2005 has been a year when mobile telecommunications attracted the greatest amount of foreign investment in three transactions worth a total $14.4 billion. The privatization of Turk Telekom, the former fixed phone line monopoly, and the entrance of Vodafone, the world's largest mobile phone company, to Turkey through its purchase of Telsim with a $4.5 billion offer changed the industry's landscape. Majority shares of Turk Telekom were transferred to the Oger Telecoms Joint Venture Group for $6.5 billion. Further, Alfa Group acquired 3.22% share in Turkcell, Turkey's number one mobile phone services company under a deal of $3.3 billion.

Key players, which merged with the world's leading mobile operators, are now closely watching the competition and quality of their services. With the entry of giant global players, the market is expected to continue to grow at full speed through introduction of new services and products. Recent M&As pose significant growth opportunities in almost all segments of the market over the next 10 years. Much of the past infrastructure upgrade has been in network digitalisation and modernization. Future upgrades are expected to focus on increasing bandwidth and the implementation of next generation networks to cater for growing broadband usage and broadband services. As for the regulatory issues, MNP, 3G licenses, new legislations regarding MVNO and new Electronic Communications Law will be hot topics on Telecommunications Authority's agenda in 2006.

Telecommunications market was worth $17.7 billion in 2005, with carrier services the major element in this. The market grew 16% in 2005 compared to 2004 as the new fixed line backbone companies and ADSL systems are established.

Privatization of Turk Telekom is one of the key components of the government policy geared towards establishing a competitive market structure in all segments in order to help increase service quality and number of innovative and value-added services while reducing costs. Consequently, the market has been going through a restructuring phase designed to facilitate competition since 1994, when the mobile telephone services were liberalized. Other two components include the following:

- **Full liberalization:** In 2000, Turkey embarked on the shift from a classical state-dominated telecommunications sector to one structured and regulated in broad accordance with the EU directives. The Telecommunications Law Number 4502 of 2000 led to the establishment of the Telecommunication Authority - the first sector specific regulator in the country. With this, licensing criteria was made publicly available and the policy-making and regulatory functions of the government were separated. The monopoly of Turk Telekom in voice communication and infrastructure formally ended in January 2004. On one hand the Telecommunications Authority is working hard on drafting regulations to further liberalize and regulate the market and to harmonize the relevant regulation with those of the EU, while on the other hand market players are entering into different segments of the market benefiting from the liberalization efforts.

- **Legislative alignment with the EU acquis**. As the country prepares itself for the accession, a new set of laws and regulations has been introduced, which has been encouraging for the telecommunication market's new entrants. The National Program for the Adoption of the EU's Acquis includes a detailed program for the measures Turkey will take to harmonize its telecommunication legislation with that of the EU.

3.1.1 Issuance of new licenses for value added services

Several private firms have obtained licenses for the introduction of new telecommunication services and over 220 40 Turkish private sector companies have obtained various licenses, including 44 long distance telephony service provider licenses. Some of the others are in the process of signing an interconnection agreement with Turk Telekom. The operators licensed by Telecommunications Authority (all of which have not necessarily launched service provision) are:

- Authorization Agreement: Turk Telekom (This will be converted to a concession agreement at the end of the privatization process)
- Concession Agreement: GSM operators Turkcell, Telsim and Avea
- Satellite Communications Licence: 23 operators
- Satellite Platform Licence: 1 operators
- GMPCS Mobile Telephony License: 5 operators
- Licence for Data Transmission over Terrestrial Lines: 22 operators
- Long Distance Telephone Service Licence: 44 operators
- PMR/PAMR Service Licence: 52 operators

- Internet Service Provider (ISP) Authorization: 128 operators

3.1.2 PSTN and Telecommunications Hardware Market

Until 1980 fixed telephone line penetration was barely 2.5%. With new investment in the 1980s, Turk Telekom raised penetration to current levels– making Turkey's PSTN network the fourteenth largest in the world and the fifth largest in Europe by subscriber volume by early 2000s, although revenue per subscriber is still very low. Half of investments were spent on digitalizing telephone exchanges, while other major investments included three communication satellites and an internet backbone. However PSTN investments slowed down as GSM networks were launched.

Further PSTN penetration is not expected while Turk Telekom aims to expand at data and value added services: Turk Telekom has been aggressively marketing ADSL targeting 1 million subscribers.

The hardware market should be expected to develop as domestic demand flourishes as the market fully liberalizes. In 2004 the telecommunications equipment market was an estimated $1.9 billion in, showing indications of rebounding to its pre-economic crises (2000-2001) size of $2.9 billion.

3.1.3 GSM Market Still Booming

This is still an attractive market with a mobile penetration rate of just 55% and expected extension of 3G services providing considerable business potential. Introduced in 1986 by Turk Telekom, mobile penetration boomed in 1994 with the granting of full licenses to Turkcell and Telsim. The third GSM player is Avea – a joint venture between Is Bank and Telecom Italia Mobile. Mobile subscribers increased from 34.4 million in 2004 to 43 million in 2005. Turkcell is the market leader with a market share of 63%, followed by Telsim with 22%. The expectation is that the mobile subscribers will reach to 51 million in 2006.

Although about half of the market represents a mature market, the duration for model changes has come down to 1.8 years and this, together with a young and growing population and the ever-increasing level of national wealth, has placed Turkey on the list of top investment destination for the telecoms industry. Mobile telecommunications have proven that Turkish market provides foreign investors with unpredictable growth opportunities that outperformed other markets with similar size and income.

TELECOMMUNICATION INDICATORS, 2000-2005
Million

	PSTN Subscribers	Penetration %	Internet Users	GSM Subscribers
2000	18.4	28	2.5	15.1
2001	18.9	28	3.5	18.7
2002	18.9	27	4.3	22.7
2003	18.9	27	6.0	27.7
2004	19.1	27	10.2	34.4
2005	19.0	26	15	43.0

Source: Telecommunications Authority, State Planning Organisation

3.1.4 Market Size

Telecommunications market looks sizeable with a total 21.5 million telephone lines and about 43 million mobile subscribers. It is growing at full speed and poses significant growth opportunities in almost all segments over the next 10 years.

The ICT market was estimated to total $17.7 billion in 2005. Telecommunications was worth $13.8 billion, with carrier services the major element in this. The IT market added a further $3.9 billion. The ICT is increasing its share in GDP and this growth is expected to be faster in the following years. In 2005, carrier services and telecommunications equipment together have a share of 78% in total ICT market. As the new fixed line backbone companies and ADSL systems are established, the telecommunications market is estimated to worth over $16 billion in 2006, with a growth rate of 17.4% over 2005.

The IT market is relatively small with a share of 22% and is dominated by hardware sales. 50% of Turkish IT market was made up of hardware and 33% by services in 2005. Turkey has one of the fastest growing IT markets of the world. When compared to developed countries, Turkey has still has a very low PC ownership ratio around 10). 50% of the population is under the age of 25. 37 million are between the ages of 15 and 44. This segment of the population offers a high potential in terms of consumption of technology products not only computers) and accessories. Accordingly, growth of computer sales in Anatolian cities has been remarkable over the recent years.

BREAKDOWN OF ICT MARKET, 2003-06
$ million

	2003	**2004**	**2005**	**2006 e**
IT hardware	1,540	1,767	1,980	2,300
Software	393	452	542	645
Services	847	1,121	1,290	1,440
Consumer	90	113	134	150
Information Technology	**2,870**	**3,455**	**3,946**	**4,535**
Telecommunication equipment	1,263	1,663	1,900	2,100
Carrier services	7,329	10,151	11,900	14,100
Communication Technology	**8,592**	**11,815**	**13,800**	**16,200**
Total	*11,462*	*15,270*	*17,746*	*20,735*

Source: Interpro

The market has experienced double- digit growth over the past five years except during the 2001 economic crisis. Before the 2000-2001 twin economic crisis, yearly desktop PC sales –the figure considered representative of the sector as a whole- were 550,000 to 650,000 PC-equivalents. In 2001 the IT demand shrunk by 60% to 70%. In 2004 the sector has finally rebounded to reach the year 2000 figures and in 2005, surpassed the long-pronounced “one million PC per year” strategic target. Considering the no-name products, which account between 30-40% of total market recently, the demand for PC was estimated as over 2.2 million in 2005.

PC SALES, 2002-04
units

	2002	2003	2004	2005
Desktop	344,000	516,000	710,000	1,030,000
Labtop	68,000	140,000	221,000	570,000
Total	412,000	656,000	931,000	1,600,000 (1)

(1)With no-names taken into account, this exceeds 2.2 million

Source : IDC

There is no manufacturing in Turkey of the principal components of computers - mainboard, hard disk, RAM, graphic card, processor, monitor, mouse, keyboard and case. Local manufacturing activity is limited to assembly. There are long-term prospects for Turkey becoming strong in software exports. The current share of software in total market is 14%, which is far below worldwide averages. IT sector views software as its strategic growth segment for exports.

Although, Turkey has a relatively big ICT market, its ICT production is not satisfactory. Most of the inputs such as hardware, software and computer equipment are imported, and the high skill base in IT tends to be used as an assembly shop by multinationals. Imports comprised 96% of the ICT foreign trade in 2000, declining to 85% in 2005.

ICT MARKET BALANCE, 1990-05
$ million

	1990	2000	2002	2003	2004	2005
Demand	2,975	11,341	10,150	11,462	15,270	17,746
Production	2,394	7,590	8,481	9,599	12,460	13,932
Imports	614	3,898	1,788	2,432	3,455	4,637
Exports	33	147	119	569	645	823

Source : SPO, Interpro

Key telecommunication infrastructure equipment vendors, Ericsson, Siemens, Alcatel and Nortel, are the top fixed line and GSM infrastructure equipment providers. The major software suppliers include Microsoft, IBM, Logo, Oracle, SUN Microsystems and Likom, while hardware providers include Beko, Vestel, Escort, Dell, Hewlett Packard, Avea and Epson. Operators of mobile telephony services are Turkcell, Telsim and TT&TIM (a merger of Aycell and Aria).

3.1.5 Foreign Trade

Exports of the ICT sector are much lower than its imports, corresponding to some 17% of imports in 2005. This signifies a huge gap of approximately $4 billion in the ICT foreign trade.

As regards the telecommunications sector, the increase in imports had been driven by the booming demand for mobile handsets starting from 1994 when GSM was introduced. On the other hand, the local telecommunications sector, because it was oriented to the needs of PTT/ Turk Telekom, long lagged behind other sectors in exports. As Turk Telekom reduced its purchases in the 1990s, manufacturers were driven to find new markets, continuously increasing their exports.

ICT FOREIGN TRADE, 2004-05
$ million

	2004	2005
Telecommunication		
- Exports	603	765
- Imports	1,911	2,340
Information technology		
- Exports	42	58
- Imports	1,544	2,297
Total		
- Exports	645	823
- Imports	3,455	4,637
- *Balance*	*-2,810*	*-3,814*

Source: TESID (The Turkish Electronics Industrialists Association)

In addition to the detailed information and facts about the national ICT sector, the structure of the national and regional ICT sector is shown below:

	Total Turn Over (million €)		Number of Employees	
NACE Categories	National	Regional	National	Regional
30.3 - Manufacture of Office Machinery and Computers	1.691,2	253,6	NO DATA AVAILABLE	
31.3 - Manufacture of insulated wire and cable	1.200,0	180,0		
32.2 - Manufacture Telecommunication Equipment	1.520,0	228,0		
32.3 – Manufacture of Consumer Electronics	2.800,0	420,0		
33.2 - Manufacture of Instruments and Appliance	N/A	N/A		
33.3 - Manufacture of industrial process control equipment	N/A	N/A		
64.2 – Telecommunication Services	20.560,0	3.084,0		
72 – IT Services	4.622,4	693,3		
TOTAL	32.393,6	4.859,0		

The data regarding the number of employees for the ICT sector are not available. Also there were no data available for the "manufacture of instruments and appliance" and "manufacture of industrial process control equipment" categories neither in the national and nor in the regional level. It can be seen from the figures that the telecommunication services together with telecommunication equipment have the largest share of %70 within the Turkish ICT market.

The ICT sectors share in the Gross Domestic Product (GDP) is shown below:

	National GDP/Head		Regional GDP/Head	
	Total (million Euro)	ICT Sector's Share (%)	Total (million Euro)	ICT Sector's Share (%)
1999	174.147,31	4,34	13.823,50	8,92
2000	215.896,42	5,54	17.973,83	10,52
2001	163.991,06	6,50	12.422,45	11,81
2002	193.474,81	6,18	15.091,04	12,08
2003	214.270,99	5,64	16.713,14	10,84
2004	243.229,98	5,31	18.971,94	10,21
2005	291.598,25	5,11	22.744,66	9,82

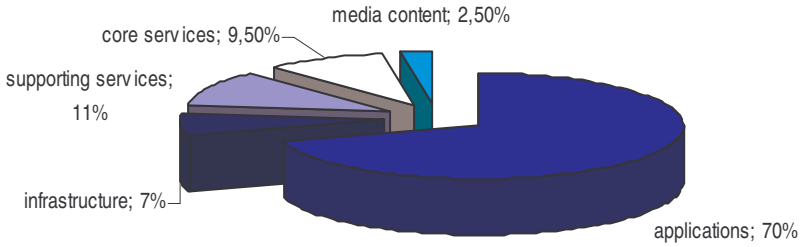
3.2 Overview of the regional ICT sector

Although there are no specific data available in terms of regional ICT sector, in the previous part the structure of the ICT sector and the ICT sectors share in GDP with regard to the Ankara region were underlined. It can be observed from the above table that the ICT sector has a share of approximately 10% within the GDP of the region.

Mainly the ICT sector companies in Turkey are concentrated among three regions, Istanbul, Ankara and Izmir. According to a study conducted in 2004 by Interpro, leading sectoral media and organisation group , the distribution of top 500 ICT companies in Turkey is as follows; 343 companies (%68,6) in Istanbul Region, 77 companies (%15,4) in Ankara Region, 19 companies (%3,8) in Izmir Region and the remaining 61 companies (%12,2) in other regions.

The distribution of companies among subsectors in Ankara Region are as follows; companies dealing with business applications, individual and customised software development and embedded systems comprise the largest group with 70%. The companies providing supporting services like consulting services comprise 11% infrastructure services like operating systems and telecommunication devices comprise a percentage of 7%. 9,5% of the companies is working as Internet providers, ASPs and network operators and the remaining 2,5% is working on media content.

Ankara Region - distribution of companies in ICT sector



As it was underlined before the Turkish Government is aware of the opportunities that ICT sector offers and launched an e-Transformation Turkey project in order to realize the transformation to an Information Society. With the advantage of being located close to the public organisations and government institutions, the companies located in Ankara Region are working on business applications, individual and customised software projects mainly on those e-government projects.

4 ICT CLUSTER

4.1 EVOLUTION OF THE ICT CLUSTER

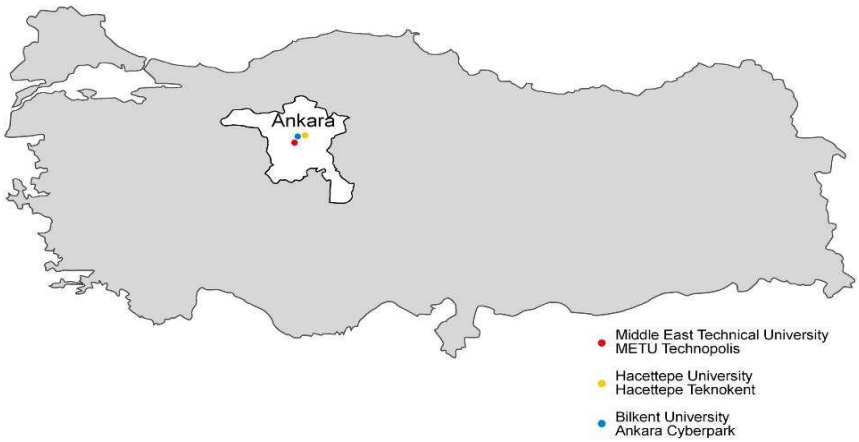
- The Computer Engineering Departments in universities within Ankara Region were seeded back in 1970s to teach courses and to train qualified human labour in computer science discipline. By the end of 1970s a large qualified human labour pool was already formed.
- By the 1980s the government purchasing and procurement on software issues were on the spotlight. The government was purchasing software from the companies outside the region. These companies were not developing the software but they were just selling the software in a way they were the vendors of some world known software solutions.
- Realizing the software demand potential of the government, some entrepreneurs (qualified and well-trained computer engineers) started to establish small ICT companies within the region in order to develop software solutions. By the end of 1980s those small companies started developing in-house software for the government purposes.
- In addition to those Undersecretariat for Defense Industries in Ankara was established in 1980s. Undersecretariat for Defense Industries was the responsible and authorized body for the purchasing and procurement of military softwares.
- After having established an Undersecretariat for Defense Industry, in 1990s national ICT companies, developing national solutions for the defense industry (Havelsan, Aselsan, Meteksan System…) were started to be established within the region. These companies were the purveyors of both the military organizations and the government. By the end of 1990s a defense industry cluster was formed within the Region. This cluster was a naturally formed one without any administrative or management body.
- In 2000s technoparks have been established, in order to facilitate university - industry collaboration for the companies mainly dealing with R&D and developing software. Those who operate in these privileged areas exempted from income, corporate and value-added taxes. By the year 2004 there were three technoparks established within the region. The establishment of those are then resulted in the formation of the Ankara ICT cluster.

4.2 STATUS QUO

4.2.1 Clusters Structure & Competitive Position

METU-Technopolis, Ankara Cyberpark and Hacettepe Teknokent are the three most important and largest science parks in Ankara that are located in close proximity to one another in three prominent universities in Turkey, METU, Bilkent University and Hacettepe University, respectively. With regard to their location three science parks enhance better relationships and collaborations with the public research institutes in R&D studies based on information and technology development and have a very high accessibility to the city center and the main residential cores of Ankara.

As the result of the informal network formed between these three science parks, Ankara ICT Cluster of technologically advanced and international companies, research and academic institutions were formed by bringing them together into an ecosystem that promotes and creates new types of synergies between scientific and the entrepreneurial communities working on ICT.



METU-Technopolis (METUTECH) is the first and the largest science park in Turkey. It supports the creation of synergy between industry, university and public institutions through infrastructural/structural opportunities developed for academicians, researchers and companies using/producing technology. Studies for METU-Technopolis project were started by the Middle East Technical University in 1987.After investigating some Science Parks in United States, a pre-feasibility study was prepared in 1988. Following this, METU-SMIDO Technology Development Center (TEKMER) was founded in 1992 as an incubator in association with Small and Medium Size Industries Development and Support Organization (SMIDO). The successful results attained in METU-SMIDO Technology Development Center had subsequently fortified the idea of forming a techno park.

After the preparation of the development plan of METUTECH in 1997, the construction process started and the first two buildings were put into service in 1998. In the year 2001, when The law of Technology Development Regions no. 4691 was issued, METUTECH was declared as an an “Technology Development Region” by the law. Following the issue of the Law, METUTECH Technology Development Region has developed rapidly and by the end of 2005, 60.000 m2 enclosed area was realized in which more than 150 companies conducting Research-Development studies and having activities based on the ultimate technology; innovation, creativity and knowledge. METU-Technopolis, located in METU Campus, on 110 ha with a 40 ha construction area and approximately 200.000 m² of enclosed area, is 7 kms far from the city center of Ankara, lies in the western corridor of the main development axis of the city. It is connected to the main transportation arteries from more than one junction point.

Combining METU’s research capacity and information pool with the innovative capacity of entrepreneurs, METUTECH has created a moment in Turkey’s technology accumulation, It has become a successful model with its management experiences and projects for the formation of both the legal frame and the development of other science parks in Turkey. METUTECH hosts over 150 companies 75% of which are SMEs. The existing company profile of METUTECH is based on software development, IT, defense and electronics industry. The incubation center of METU-Technopolis serves 38 micro sized companies; most of which are spin offs from Middle East

Technical University. At present, METUTECH is not only the largest science park of Turkey but is a model that is appropriated by many newly developing science park administrations and they benefit from the experiences of its management company in their development processes.

Ankara Cyberpark is a science and technology park, which is established jointly by Bilkent University, which is the best private university in Turkey, and its affiliate Bilkent Holding, which has many companies with software development and R&D functions. While Cyberpark is established within the Bilkent University campus area, its proximity to the two other universities, METU and Hacettepe University, constitutes a great advantage to the companies carrying out software and research development. Ankara Cyberpark contributes to the economical and scientific development of the country by converting the scientific researches into technological products as well as preventing the brain migration by offering attractive job opportunities to high qualified graduates and researchers. Ankara Cyberpark Inc. which is founded in 2001 and announced as Technology Development Region in 2002 proved that it is the fastest growing technopark in Turkey with the more than 150 technology-based tenant companies and approximately 1000 R&D personnel. Cyberpark also has a technology incubator within Cyberplaza buildings that supports startups and new entrepreneurs/graduates in developing their innovative R&D projects into marketable products.

Hacettepe Teknokent, the science park being in Southwest part and 14 km far away from Ankara city center has been established within the borders of Hacettepe University, Beytepe Campus. The science park besides being within Hacettepe University, and being closer to the Turkey's two well-known universities (METU and Bilkent University), is another perfect region for the realization of university-industry collaboration. The park has been established within the framework of the law no. 4961 '' Technology Development Regions''. The development and software studies, directed to technologic product, are realized with the provided collaboration between university and industry, and resulted new projects are implemented within the science park. The investment of the Hacettepe Teknokent was realised at the beginning of the year 2003. The zone was activated with by the end of the year 2005 with more than 200 researchers in 25 high-tech companies. Hacettepe University has gained success in development studies with its faculties, engineering and medicine, in national and international platform. Hacettepe Teknokent is planned as a complex, to produce mainly new product, technology, and software. There is an organic contact with the education and technology centers because of being within the border of university campus naturally. The professional and specialist training of the employed persons and collective development studies will be the part of university-industry collaboration.

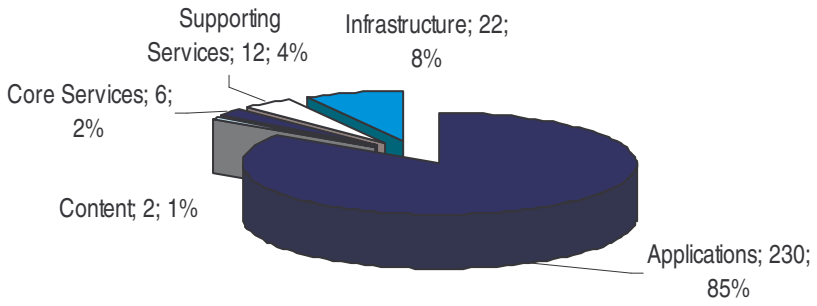
In total there are more than 330 companies located within the Ankara ICT cluster. Approximately 80% of these companies are developing software for the government organisations and private institutions. Having a closer look at the structure of the cluster:

There are more than 260 ICT companies operating within the Ankara ICT cluster;

	Number of companies	% Share
Applications	230	84,56

Content	2	0,74
Core Services	6	2,21
Supporting Services	12	4,41
Infrastructure	22	8,09

Distribution of ICT companies located wthin Ankara ICT cluster



The three most important and well-known universities of Turkey and more than 100 research institutes working on various topics, 3 science parks and 3 incubation centres which are ready to share their existing know-how and experience are within the boundaries of the cluster.

As it was underlined before, following the Technology Development Regions Law in 2001, the first technopark in Turkey (METU-Technopolis) was put into complete service by the year 2002, then in the year 2003 the establishment of Ankara Cyberpark was completed and in the year 2005 Hacettepe Teknokent was established. The financial figures obtained from the ICT companies operating – the share of Ankara ICT cluster in the national and regional GDP per head) in these technoparks are summarized in the table below.

	National GDP/Head		Regional GDP/Head	
	Total (million Euro)	ICT Cluster's Share (%)	Total (million Euro)	ICT Cluster's Share (%)
1999	174.147,31	-	13.823,50	-
2000	215.896,42	-	17.973,83	-
2001	163.991,06	-	12.422,45	-
2002	193.474,81	$1,15 \times 10^{-8}$	15.091,04	$1,47 \times 10^{-7}$
2003	214.270,99	$2,39 \times 10^{-8}$	16.713,14	$3,07 \times 10^{-7}$

2004	243.229,98	1,84 x 10^{-8}	18.971,94	2,35 x 10^{-7}
2005	291.598,25	2,59 x 10^{-8}	22.744,66	3,32 x 10^{-7}

The electrics, electronics and computer development studies are extremely important for the defense industry centered in Ankara. The continued development collaboration, between the public and private sectors, and the three founder universities and the leading technoparks will be improved increasingly within the cluster. The science targeted studies, made till now, will be directed to commercial wares production.

The enterprises, working in computer software and science, information-internet technologies, portal construction-operation, simulation, electronics, meteorology, geographic information system, medical software and etc. sectors, can be supported for all kind of development studies and advisory services by technical infrastructure and academic potential of universities. The expected result of collective realized projects in many sectors is to bring out fundamental, applied, statistics, financial and etc. new software products. It is important that the products must be good and with high quality in order to be demanded not only in national market, but also in international markets.

The requirements of the new and high technologies for day by day growing and empowered industry of the Ankara city are more important, because of the competition with other cities. Especially moving the investments, concerning software and information technology sectors, to Ankara is important strategic target of the Ankara city, in order to be the leader and center of software and information technology in the future.

4.2.2 Factor Conditions

ICT companies located within the region primarily benefit from the support of the technoparks, their experiences, existing infrastructures and resources, prestigious positions at national and international arena, and their tight relationships with public and private sector. Besides, participating within the region offers lots of research, social, cultural and sports opportunities to the companies.

Services provided by the technoparks give out opportunities which enable companies to be a part of the global market in a competitive manner by holding their shares in the production of innovative and high value added products. These services can be categorized under three different program types; that are, training programs, consultancy services, and value added services. Training programs comprise of the 75% of the total amount of value added services, whereas consultancy services on international marketing, technology transfer, IPR (Intellectual Property Rights), international legal advising, and funding comprise of the 15% of these services. Other areas of services include events, travel, catering, and etc.

- **Site Management Arrangements:** Site management services provided include facility management, data and telecommunication services, security, landscaping, and management services, etc.

- **University Facilities:** The three prominent universities within the region (METU, Bilkent University and Hacettepe University) have close collaborations and a lot of business works with many institutions in different sectors. The experienced work force of each university, a total of 4,500 academics, 40,000 students, and also powerful research infrastructure of 100 research centres and almost 250 university laboratories can facilitate the establishment of strong cooperation between universities and companies.

- **Financial Services:** Incentives for the development of R&D activities provided by the Technology Development Regions Law, and funding opportunities provided by institutions as Technology Development Centre of Small and Medium Industry Development Organisation, The Scientific and Technological Research Council of Turkey, and Turkish Technology Development Foundation as well are the financial services offered in the region.

- **Other Facilities:** There are shopping malls, movie theaters, concert and theater halls, restaurants, sports centers, medical center, schools and residence facilities within an area of 15 kms. in diameter.

Entrepreneurs and organizations that execute works mostly in software development based on advanced technology, innovation, creativeness and knowledge are welcomed to be a member of the cluster.

The applications are evaluated by an arbitrary committee consisting of three-independent experts specialized in the activity areas of the company. The opinions of the experts are evaluated by the Steering Committee. The companies that the experts express a positive opinion are accepted following the Steering Committee's approval.

In the selection of the companies wishing to act in the cluster, sectors were determined taking the industrial profile of Ankara into account along with the resources of the university and the competitive advantages it possesses. In this sense, ICT, electronics, aerospace, environment, bio-technology, nano-technology, advanced materials are the privileged sectors.

Drawing on the potential of the three Universities in the area with 40,000 students, (including 70% of all Turkish graduates in the fields of electrical, electronic engineering and computer sciences) Ankara ICT Cluster will be developed and promoted as an outstanding location to attract international companies particularly in the IT and electronics sectors.

4.2.3 Firms' Strategies, Structures and Rivalries

There are four main groups of companies exist within the cluster regarding their qualifications: Companies that are considerably large in scale that can create R&D and technology production (mature companies); start-ups (with the priority of those that qualify that are qualified as spin-offs and entrepreneurs); public and private research centres, NPO's and NGO's; and persons and companies that provide the parties with supporting products and services.

The profile preferred within these companies should be innovative-technology based, and inclined to cooperate with the other parties, primarily with the university. Being involved in research and development activities, and

possessing a reasonable amount of managerial, financial, and human resources are preliminary qualifications that are expected. These companies should also possess the qualifications of being respectful to the environment, human rights and social justice.

The companies dealing with business applications, individual and customised software development and embedded systems comprise the largest group with 85%. These applications are mainly focused on e-government, e-learning, simulation and GIS applications. The companies providing consulting services, infrastructure services like operating systems and telecommunication devices comprise a percentage of 12.5%. The remaining 2.5% is working as Internet providers, ASPs and network operators. More than 70% of companies located within the cluster are SMEs.

The members of the Ankara ICT cluster are interlinked through joint projects, informal interactions and other organisations like the joint events, conferences and training programs. The main cooperation areas within the cluster are information and communication in various matters, research and development in joint project development. Together with the competition between the cluster members in a minor extent, the client/subcontractor relationship between them is very dominant. There are also partner relationships in joint project development and collaborative networking between the members.

Although there are good relationships and collaborations between the members of the cluster, there are no outward linkages realised.

4.2.4 Strength & Weaknesses

Strengths

ICT companies located within the region primarily benefit from the support of the technoparks, their experiences, existing infrastructures and resources, prestigious positions at national and international arena, and their tight relationships with public and private sector. Besides, participating within the region offers lots of research, social, cultural and sports opportunities to the companies.

Proximity to High Quality Human Resources: Middle East Technical University, Bilkent University and Hacettepe University, the three leading universities in Turkey provide significant human resources for the cluster members particularly concerning the graduates of Electronic and Computer Engineering departments, who are in the top segment according to the university examination, as well as its competent academicians, who are pioneers in various research areas.

Profiles of Existing Companies: There exist more than 330 companies (%80 of which are ICT companies) and about 5000 highly qualified researchers employed by the ICT companies located within the cluster. That generates a critical mass to attract other companies in ICT sector.

Advanced Technology and Telecommunication Infrastructure: The advanced telecommunication infrastructure of the region provides uninterrupted and fast communication services with the outside environment,

which is a vital element for the ICT companies. Moreover, the existing technological infrastructure gives pace and support to the research and development activities.

Services: A broad range of qualified services are provided to meet the demands of the cluster members, encourage their activities and improve their living standards. Some of these services are: incubation center services, marketing, sales, access to financial resources and grants, counseling & training, life-long learning, ISP services, reception, postal and cargo services, accounting office services, conference services, security, maintenance, repair & landscaping services, restaurant/shops, sports and health club, medical care, fire extinguishing, travel agency, guesthouse, tenants club, agencies, financial service, heating and lighting services, cleaning services, telephone, insurance, stationary supplies and infrastructure supplies.

University-Industry, Industry- Industry Collaboration Insight: The three universities have had close collaborations and business relationships with many organizations in different sectors. Hosting more than 330 companies within the region form different sub-sectors facilitates the creation of strong inter-company links and synergies between companies.

Legal Supports: A new law, named "Technology Development Regions Law-Law No: 4691", which was accepted on June 26, 2001, provides important compensations to the tenant companies. Various incentives, tax exemptions and waiver mechanisms introduced in the law create important potential opportunities and benefits to universities, academicians and companies that have R&D activities and/or are developing software in technoparks. Accordingly, the participants are excused form the corporate taxes for the revenues generated by software development and R&D activities until 31/12/2013. In addition, the wages of the R&D and software development personnel of the technopark companies are exempt from any taxes until 31/12/2013. The companies can also benefit from the other government supports determined by the law.

Proximity to Government Institutions: Since the region is located within the boundaries of the capital city of Turkey, this proximity will induce more collaborative and target oriented activities with the public institutions and organizations will be an important factor during the ICT policy development studies in the very near future.

E-Government Projects (e-Transformation Turkey Project): By the development of e-government projects, it has become a current issue for the software companies to form branches. Being involved in Ankara ICT cluster structure will provide the software companies with many advantages such as forming collaborations with other software companies and then together taking part in large-scaled projects within this structure.

Weaknesses

National ICT Policies: Turkey still has no national ICT strategy or policy which would integrate the full range of programs and interventions in this field. The foundations have been laid for continued development in the ICT sector and in the establishment of a comprehensive legislative and regulatory framework.

Informal Network of ICT Companies: The Ankara ICT Cluster was formed as the result of the informal network of three science parks, there is no legal administrative or authorised body for the management of the cluster.

Lack of Communication between Members: Although there are good business relationships and collaborations between the members of the cluster, there is still room for more efficient communication both formal and informal between the companies.

4.3 Organisational framework & Cluster Management

The Ankara ICT Cluster was formed as the result of the informal network of three science parks. Although there is no legal administrative or authorised body defined for the management of the cluster, METU-Technopolis is acting as the managing organisation of the cluster.

Within the framework of Regulation No.4691, regarding Technology Development Regions, Teknopark A.S is the management company of METU-Technopolis. Teknopark A.S. is the first degree responsible juridical body in realizing the vision and goals of METU-Technopolis. Teknopark A.S. was founded in 1991 as a private non-profit company ten years before the issue of the Law of the Technology Development Regions and played an active role in the preparation of the law due to its experiences in the development of Science Park in Turkey.

The charter members of Teknopark A.S. are The Middle East Technical University Development Foundation (65%), Middle East Technical University (5%), Ankara Chamber of Industry (5%), Bleda A.S. (15%), EBI A.S. (5%), TR.NET (5%). The management company of METU-Technopolis is responsible both for the application of the strategies and programs with regard to the science park management specified by the Executive Board and for creating the synergies between technoparks within the cluster, in a way responsible for managing the Ankara ICT cluster.

There are seven full-time people employed within METU-Technopolis responsible for the cluster management. The general director spending 15% of his time for the cluster management is the sole responsible person of Teknopark A.S.'s performance, METUTECH's development and the management of the Ankara ICT Cluster.

- The facility development coordinator spending 50% of his time for the cluster management is responsible for the new construction activities, land appropriation, specification of rent figures and infrastructure planning.
- The networking coordinator spending 50% of her time for the cluster management is responsible for the development of joint projects and collaborations among the parties and for international relations. She is also responsible for enhancing the collaboration with the technoparks within the cluster.
- The clients relations coordinator spending 50% of his time for the cluster management, is responsible from the continuous rendering of services in the required high quality fashion to the members, from the administrative duties and monitoring of all contracts.
- The public relations representative spending 100% of her time for the cluster management is responsible for the promotion and marketing activities of the cluster.

The two people responsible for accounting and finance devote 100% of their time in cluster management and are responsible from the accounting records of the cluster.

The cluster management is both funded by the national government (5%) and by its members (95%) with regard to the basic funding. When the project funding is considered, a 50% fund is realized from the European Commission.

The annual budget for the cluster management for the last three years period can be summarized as follows:

	Annual Budget		
	Total (Euro)	Personnel (Euro)	Share of Personnel Costs (%)
2001	222.868,68	9.529,14	4.27
2002	403.931,94	41.924,35	10.37
2003	895.632,21	70.206,97	7.83
2004	1.140.409,88	85.699,26	7.51
2005	2.215.046, 75	121.436,89	5.48

With the mission of helping companies to become competitive in global economy by providing them value added services at affordable cost, besides providing daily services of physical and R&D infrastructural services, technology consulting services and cooperation with universities and research centers are the responsibilities of the cluster management. METU-Technopolis also manages and organizes events, workshops, conferences, training programs, start-up consulting and lobbying activities on an infrequent basis. Moreover it is active for fostering co-operation between cluster members, monitoring the cluster management and positioning of the cluster nationally and internationally.

As of today, METU-Technopolis manages 30 national and international projects. The company has a wide level of knowledge and practice in project management, from scheduling to book keeping, coordination and control. Most of these projects have multi partners, from universities to industry, NGOs etc.

In 2004, METU-Technopolis established one of the two innovation relay centers of Turkey (IRC-Anatolia) in cooperation with Ankara Chamber of Industry and KOSGEB. It is financed by the European Commission and covers eight provinces of Turkey. The main purpose of the IRC is to provide Turkish SMEs with international technology transfer and collaboration opportunities. Through its IRC-Anatolia network, METU-Technopolis has dynamic links and ongoing projects with national and international research communities and SMEs. One of the most important projects that METU-Technopolis is managing is the 'Regional Innovation Strategies for Mersin' which is the first project initiated to develop regional innovation strategies in Turkey which is also financed by the European Commission under the Sixth Framework Programme (FP6).

The other FP6 projects in which METU-Technopolis actively participates are 'SME- Intelligence Network for Co-operation in E-Health Roadmapping Events and projects' (SINCERE) project, addressing to coordinate the action plans and strategies aimed at increasing research and strengthening competition and growth in E-Health sector at EU level. Additionally, METU-Technopolis is also the partner in three other EU projects, 'The Development, Validation, Testing and Dissemination of a Professional and Sustainable SME TTT Stage Gate methodology to produce profitable innovation collaborations with large companies and RTDs (SME8InnovGate), "Researching Inequality through Science and Technology" (ResIST) and "IP for Innovation" (ip4inno) addressing to increase understanding and usage of intellectual property (IP) by SMEs, which are being discussed with the Commission under FP6. In addition to those EU funded projects, various training projects and international marketing projects are also managed by METU-Technopolis.

METU-Technopolis creates an excellent R&D environment in providing companies with the funding opportunities provided by institutions as Technology Development Centre of Small and Medium Industry Development Organisation, The Scientific and Technological Research Council of Turkey, and Turkish Technology Development Foundation on the national level and by the European Commission within the context of Framework Programs on the European level.

5 POLICIES

Over the last decade there have been significant developments in Turkey in formulating strategies and policies to maximise the benefits of Information and Communications Technology (ICT). These have included the establishment of an Internet Council, the Public Internet Services Council (Kamunet), the e-Commerce Coordination Council (ETKK) and finally a Telecommunications Council.

However Turkey still has no national ICT strategy or policy which would integrate the full range of programs and interventions in this field. Turkey's well-developed physical infrastructure in telephone technology, radio and TV broadcasting, places it an advantageous position for realizing the human development benefits expected from ICT. The foundations have been laid for continued development in the ICT sector and in the establishment of a comprehensive legislative and regulatory framework. In addition, for the first time, the Government has earmarked significant financial resources for the "e-transformation" of Turkey. **E-Transformation Turkey Project** aims to accelerate Turkey's transition to information society. It was launched as part of Turkey's commitment to join the European Union and to leverage Turkey's potential to become an important player in the global arena.

E-TRANSFORMATION TURKEY

Since the previous government took place in December 2002, there is a new approach that urges public institutions to take necessary measures in order to remedy long-term problems, like financial stability, public management, social security administration, agriculture, and manufacturing. These actions on the most needed areas of inte rest are combined in **Urgent Action Plan** (UAP), which takes place in the core of 58th and 59th Governments' Programs. As part of Urgent Action Plan's Public Management Reform Section, information society is declared among the highest priority issues. In this context, **e-Transformation Turkey Project** was launched to foster the evolution and to coordinate information society activities, which were previously carried out under different topics by different institutions. Responsible institution for this specific project is identified as **State Planning Organization** (SPO), which is affiliated to the Prime Ministry. SPO is responsible for overall coordination of countrywide economic and social development programs, allocation of funds to public investment projects, and advising to the Government. The time frame set for e-Transformation Turkey Project is 6 months for an Action Plan and continuous for the entire project term. Prime Ministry, NGOs, and all public institutions are identified as affiliated organizations for this project.

To clarify the objectives and principles of the project, a Prime Minister's Circular, dated February 27, 2003 has been issued. According to this Circular, the objectives of e-Transformation Project are as follows:

- Policies, laws, and regulations regarding ICT will be re-examined and changed if necessary, with respect to the EU acquis; eEurope+ Action Plan, initiated for the candidate countries, will be adapted to Turkey.

- Mechanisms that facilitate participation of citizens to decision-making process in the public domain by using ICT will be developed.
- Transparency and accountability for public management will be enhanced.
- Good governance principles will be put in place in government services through increased usage of ICT.
- ICT diffusion will be promoted.
- Public IT projects will be coordinated, monitored, evaluated and consolidated if necessary in order to avoid duplicating or overlapping investments.
- Private sector will be guided according to the above-mentioned principles.

A NEW COORDINATION UNIT: INFORMATION SOCIETY DEPARTMENT

In order to realize these objectives and to ensure the success of the project, a new coordination unit, **Information Society Department**, within SPO is established. This Department is responsible for the overall coordination of the project. Before this project was launched, lack of efficient coordination between institutions made the progress slow and ineffective. For the first time in Turkey, a dedicated department has been named as the coordinator of information society activities, and we believe that this unit will play a crucial role in the success of the project.

To increase the participation and the level of success, an **Advisory Board** with 41members has been established. This consulting body consists of the representatives of public institutions, non-profit organizations, and universities. The Board had its first meeting at the end of May 2003 to discuss and elaborate the Short Term Action Plan. The meeting was chaired by Deputy Prime Minister and Minister of State who was designated as the e-Minister.

In line with the government's schedule, the initial focal point in this project will be the **Short Term Action Plan** (STAP), which covers 2003-2004, for implementing specific tasks. There are 73 action items under 8 sections. The STAP is pending for approval of the government.

STAP's vision and goals

Actions aiming to establish interoperable and secure online information services have the first priority in STAP. Besides, actions in STAP are in line with actions of Urgent Action Plan that covers restructuring of public management, increasing efficency in public services, and introducing citizen-oriented services. Also, eEurope 2005's goals and harmonization of Turkish legislation to EU acquis has been taken into account. First action of STAP is the determination of an "Information Society Strategy", which encompasses every part of society and maximizes national benefits and value added. This strategy will enlighten Turkey's transformation from labor-intensive society to information society, and from traditional production-consumption economy to knowledge economy.

Besides the Strategy, STAP has the following main topics:

- Legislation regarding regulatory and legal framework,
- Technical infrastructure and information security,
- Education and human resources for planning of required human capital,
- eGovernment for introducing electronic services to citizens without bureaucratic barriers,
- Standards for integrated and interoperable services,
- eHealth, which is one of the important thematic issues in eEurope,
- eCommerce for the development of eBusiness environment, especially for SMEs.

As in the preparation phase, the implementation of STAP and all other related activities will be coordinated by Information Society Department and be open to every contribution in order to successfully achieve the ultimate goal; to transform Turkey into an information society.

Other coordination activities of information society department are as follows:

- eEurope: eEurope+ and other related programs for candidate countries have so far fostered the efforts in dealing with social, economic, and technical aspects of information society. In this respect, EU's initiatives and common goals have affected member and candidate countries positively in terms of stepping up the efforts and collaborating on specific issues. In Turkey, Information Society Department has been chosen as the overall coordination unit for eEurope Initiative. To fulfill the objectives of e-Transformation Turkey Project, there is a strong emphasis on eEurope 2005's goals and harmonization of Turkish legislation to EU acquis. During the preparation of STAP, priorities of eEurope 2005, such as broadband, security, eInclusion, eBusiness and public services are all taken into account, and each of them has been covered with several actions.

- IDA: EU's IDA (Interchange of Data Between Administrations) Program will enable us to actively participate and share best practices in eGovernment projects among EU member and candidate countries.

- eContent: Turkey is a member of EU's eContent Program. It aims to support production, development, and dissemination of European digital content.

6 CONCLUSIONS

As it was mentioned before Ankara ICT Cluster was formed as the result of the informal network of three science parks. Although there is no legal administrative or authorised body defined for the management of the cluster, METU-Technopolis is acting as the managing organisation of the cluster. With the managerial experience of METU-Technopolis, innovation and R&D capacity of the region, financial resources, effective networking between parties and commitment of the management, an excellent R&D and synergy environment are provided for the members of the cluster.

With the mission of helping companies to become competitive in global economy by providing them value added services at affordable cost the core competencies of Ankara ICT cluster management can be summarized as the strong links with the companies via good communication skills, organic relationships with the universities through innovation and R&D capabilities, its not for profit structure together with its reputation among regional and national bodies.

A wide range of qualified services are provided to meet the demands of the cluster members, encourage their activities and improve their living standards together with the organization of the events, consulting services, university collaborations, lobbying and monitoring of the cluster. Within the context of monitoring activities, turnover figures, export figures, change in the workforce, information about the R&D projects, joint projects realized between cluster members, IPR issues and allocated research funds are all being examined.

While trying to switch off the deficits in international marketing, EU based networking and weak managerial relationship among the member companies through the know-how and experience of “mentoring” clusters, it will be a great honor for METU-Technopolis to share its managerial experiences providing qualified services and successful monitoring of the cluster members with the other participating regions in cluster management workshops.