

National Report of Hungary 2009

Knowledge Economy Maturity – Position, Efforts and Results

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Prof. dr. Maria Raffai
Széchenyi István University, eMail: raffia@sze.hu

The today's situation in Hungary can be characterized as a slowly increasing governmental influence and activity after the withdrawal in the last years [7]. With participating and realizing different European Union (EU) projects great leap forward can be in sight. The program for building up a Knowledge based Information Society is yet actively continuing; the main purpose is to modernize public services for the different parties (citizens, business, administration, governmental institutes), to support the SMEs in using up-to-date information and communication technologies, and to increase the level and wide-spreading of digital literacy and Internet penetration. It is also high time to change the way of thinking and living of the Hungarian population! This paper reports the present Hungarian situation, with pre analyzing the different indicators and with comparing/placing the country regarding to the information/knowledge economy maturity.

The Current Situation in Hungary

ICT Infrastructure

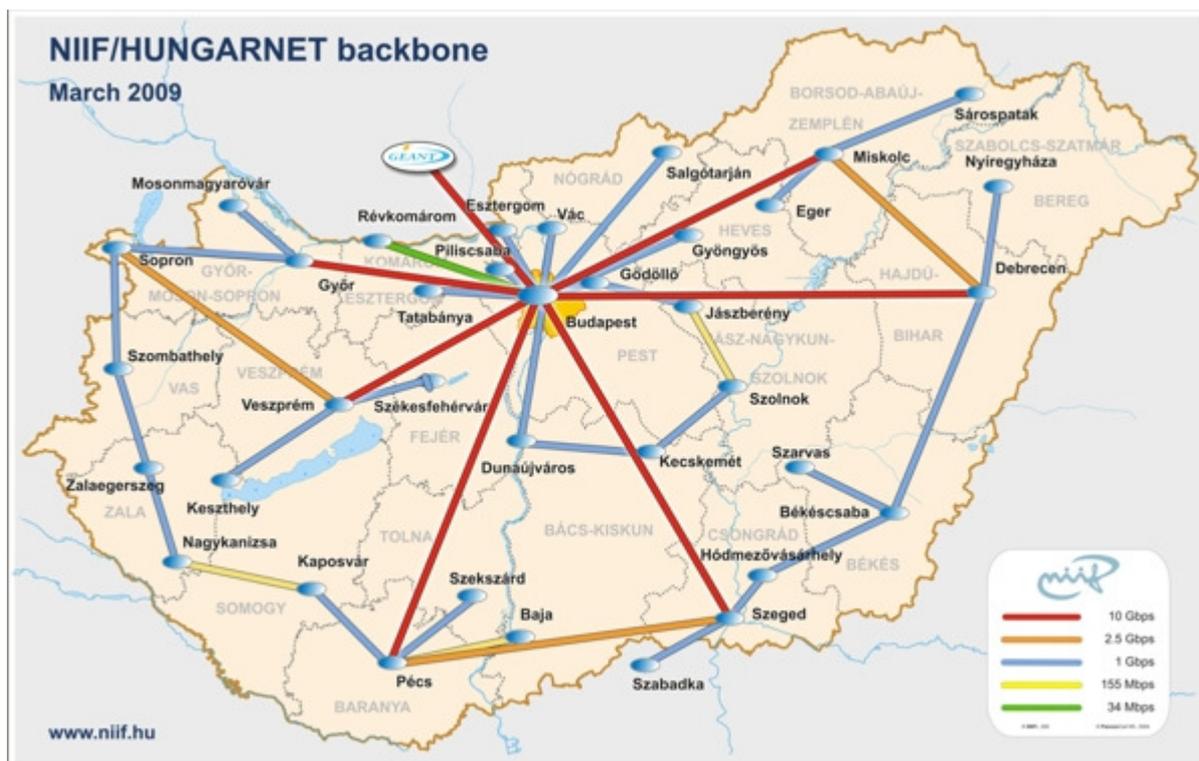
The Academic and Community Network

The framework for the development and operation of the research network in Hungary is the National Information Infrastructure Development Program (NIIF) that covers the entire Hungarian academic, research and public collection community by providing them with

- an integrated computer networking infrastructure and on the basis of that,
- a wide range of communication, information, and co-operation services,
- leading-edge environment for networking applications and
- advanced framework for content generation and provision.

The mission and basic task of the NIIF network is to provide all Hungarian universities and other academic institutions, research and development organizations as well as public collections with country-wide and international computer networking connectivity and services. The main goal is to put Internet access at higher education institutes', research centers' and population's disposal [1]. The Program is financed mainly by the Hungarian government; the development, the operation of the network and the services are executed by the NIIF Institute. The network-based up to date communication and co-operation facilities, especially those for joint research and education activities with domestic and foreign partners, as well as for accessing the relevant information both in the areas of academic, scientific, and library activities, are available for about 500 institutions with more than 700 access points throughout the country.

The Program is closely co-operating with Hungarnet, the association of the users' community. The NIIF Program, in accordance with the international practice, plays a leading role in the development and introduction of most advanced networking technologies in Hungary. By this way it fulfils a deterministic function in the nation-wide development of the information and communication technologies. While providing an up to date and competitive infrastructure for the academic and research community (see Figure 1), the Program also serves by piloting new networking technologies and applications for the widest development efforts in the country.



Source: [1] (March, 2009)

Figure 1. Backbone network topology

(only the wide bandwidth Hungarian country connections are marked)

The HBONE is a separate telecommunication network, that consists of a robust core and the regional centre routers connected to core routers directly or indirectly. The bandwidth between the main cities and Budapest and also the international connections is 10 gigabit/sec. The bandwidth of the other connections is characteristically 1 gigabit/sec and there are also some lower speed connections in the backbone network. NIIF offers the following Main Services for registered NIIF member institutions:

- Main services
 - Internet access: HBONE, ADSL, Dialup
 - Registration services: Domain name registration service; IP address domain allocation; E-mail
 - Webhosting
 - User homepage
 - Other (ftp, news, time)
- Additional services: database services; server hosting; mailing list
- Multimedia: VoIP, video archive, videoconference
- Middleware services: key server, Certificate Authority (CA), Server Certificate Service, eduoam, CSIRT, LDAP directory service
- Supercomputing: grid, storage, supercomputers

Winding up the backwardness of the small Hungarian settlements and giving more possibilities to access to the internet the government invested in developing public Internet access points throughout the country. Beside the academic and community network there have been developed more than 3.000 eMagyarország Internet access points, public WiFi stations in cafés, restaurants, public institutions, 439 public computer centers (Teleház) in the small towns and villages, and we also build digital towns as well. But sorry to say there is no Internet access in almost 20% of the Hungarian settlements till now [7]!

Knowledge Economy Maturity

The maturity of the knowledge economy in a given country can be measured on different ways and even by different indicators. The main general measurement for characterizing and rating the countries is the Knowledge Economy Index (KEI) that takes into account whether the environment is conducive for knowledge to be used effectively for economical development. The key component of KEI is the Knowledge Index (KI) that shows the ability to generate, adopt and diffuse knowledge. It is a simple average of the normalized scores of a country or region on key variables in three economical pillars: *education*, *innovation* and *ICT*. The KEI is calculated by the KI and the *economy incentive and institutional regime*. This latter component is based on the values of Tariff and Nontariff Barriers, Regulatory Quality and the Rule of Law. Let us see these indicators ranking Hungary among the European countries and worldwide!

Indicators, Placing

The Hungary's maturity ranks the country **in general** (KEI) into the **27th placing** in the world (see the Table 1). It is joyful that we could move 5 places ahead the rank related to the last years. The analysis of the statistical data and figures can be a good snapshot about the Hungarian situation.

Table 1 Hungary's Knowledge Economy Maturity in figures

	rating	change in rating	Hungary 2009	Hungary 1999	Western EU/diff	World /diff
KEI: Knowledge Economy Index	27.	+5	8,00	7,39	8,76/-0,76	5,95/+2,05
– KI: Knowledge Index	30.	+1	7,88	7,60	8,78/-1,10	6,19/+1,69
• ICT	35.	+2	7,70	6,76	8,78/-1,08	6,22/+1,48
• Innovation	25.	+4	8,21	7,71	9,27/-1,06	8,11/+0,10
• Education	34.	-1	7,73	7,53	8,29/-0,56	4,24/+3,49
– Economic Intensive Regime	25.	+14	8,35	7,55	8,71/-0,36	5,21/+3,14

Source: [9]

The ICT, *Information and Communication Technology* index is the simple average of the normalized scores on Telephone-, Computer- and Internet-penetration (per 1000 people). The Internet World Stats ranks the countries into groups according to the Internet users, broadband connections and Gross Domestic Product (GDP). The Hungary's Internet Penetration index is 52,5%, with that the country is the 47th in the world rank. As comparison the highest Internet Penetration Rate is 92,3% (Greenland), the world average is 23.8%. The number of the Internet users is 5,215,400 (Hungary has about 10 millions inhabitants, the GDP/year is \$19,800), and we have 1,428,700 Broad subscribers [5].

It is a pity, that the index of *Education and Human Recourses*, that is the simple average of the normalized scores on adult literacy rate, secondary and tertiary enrollment, was decreased in the last years, namely in the last ten years we could step only two places ahead. In order to get some impressions about the level of IT skills of the Hungarian population, about the opinions and/or aversion to the computers it is remarkable and useful to analyze the surveying results. The Bell Research Inc. has been publishing reports already since 8 years on about the 15 or over years old Hungarian population's customs and skills related to the computers and network usage [2]. Although the majority of the population goes along with usefulness and necessity of computers, and they also are convinced that the Internet makes easier the work and the daily life, there are many people who resist the computers and also the Internet thinking that the usage of the IT tools are not absolutely necessary Analyzing the surveying results it is apparent that most of the inhabitants are not aware even the basic IT terms related to PCs (see Table 2).

Table 2. Opinions about the computers and the Internet

Opinions	The computers make easier the people's life	It is an advantage to use Internet	The Internet pushes out the TV and the newspapers	There is a need for knowing and using the Internet	The Internet helps to get in contact each other	The Internet is unreliable and risky to use			
Source [6]	62,9%	56,8%	51,7%	47,9%	44,8%	28,3%			
Knowledge of terms ¹	Internet	eMail	virus	PC	Win	SW	firewall	OS	HW
Ratio	79,6%	68,1%	57,3%	56,7%	55,2%	46,9%	45,7%	42,5%	39,1%

The *innovation system* is the simple average of the normalized scores on three key variables: Total Royalty Payments and Receipts, Patent Applications granted by the US Patent and Trademark Office and the Scientific and Technical Journal Articles. These variables are available in two forms one scaled by population (weighted) and in absolute values (not weighted). The statistics shows that the innovation index was improved for Hungary four places ahead. It is a nice result, that the *economy incentive and institutional regime* index improved a significant increase in the last years → we could step 14 places ahead!

Computing in households

The Hungarian households are increasingly connected to the Internet; 87,5 % of the connected ones have broadband. The analysis show slow growth of internet penetration, but looking behind the averages it becomes also evident that there are underdeveloped settlements without any Internet access [8]. The index of on-line activity: buying goods and services on the Internet, doing on-line banking is under the average, and there are underprivileged people who need more help to close up. The figures below mirror the Internet penetration and the usage of computers.

PC usage:

No usage of computers 53%
Use of computers 47%

Usage in the future:

Do not believe 76%
Conditional 18%
No answer 6%

Reasons of refusal:

Do not need 53,6%
No interest 46,2%
Too old to use it 45,7%
No skills 19,7%
No facilities 13,7%
Too expensive 12,3%
General fear of it 9,8%
No time 9,6%
It is not safety 2,7%
No answer 3,2%

Entertainment Computing:

TV 96,5%
Video recorder 58,3%
desk DVD 41,9%
analogue camera 39,6%
digital camera 36,8%
play station 19,4%
home movie 6,9%
portable player 4,8%
digital video camera 3,9%
plasma TV 2,7%

Computers in households:

Only desktop 87%
Desktop and portable 6%
Only portable 7%

Age of household computers:

6 years or older 15%
3-5 years old 42%
Newer than 3 years 37%

Internet penetration:

No PC no Internet 54%
PC without Internet 10%
PC with Internet 36%

PC usage frequency:

Daily 51%
More during a week 26%
Weekly 10%
More in a month 6%
Monthly or rear 4%
No answer 3%

Target of usage:

Hobby, special interest... 76,8%
Learning, information 68,7%
Playing 66,8%
Working 33,6%

¹ Abbreviations: PC: personal computer, Win: Windows, SW: software, OS: Operating System, HW: hardware

ICT in the Economy

The position related to computers, network and application usage in the enterprises ranks Hungary far below the average. Although 12% of the turnover is generated by eCommerce, the share of selling and/or purchasing among enterprises is the lowest one in EU². In the last years the indicators are decreasing; selling goods on-line indicator is 4% (EU: 16%; Hungary's rank 22), purchasing on-line indicator: 7% (EU: 28%; rank 23). Most of the enterprises do not integrate their internal business processes; the index ranks the country to the 25. place in EU [4]. For our greatest regret the eBusiness indexes, the ratios of sending/receiving invoices is only 5% (EU: 21%; rank 27), exchanging business documents automatically is 19% (EU: 25%; rank 21), using analytical CRM is 5% (EU: 17%; rank 25). For details see the Table 3 and the figures below (Source: [4]).

Table 3. The computer and Internet penetration ratios of Hungarian enterprises

	Note-books	Data transfer market	International data transfer	Usage of Complex systems	Usage of Business SW	Internet access	Own-Home-page
Large enterprise	19,6%	69%	38,7%	47,3%	94,2%	59,8%	76,9%
Middle sized companies	16,5%	19%	14,2%	42,1%	89,5%	57,6%	74,6%
Small sized companies	17,2%	12%	3,9%	41,6%	63,7%	65,2%	58,3%
Micro enterprises	24,9%	na	na	22,8%	na	42,7%	20,4%

Business flow support:

Selling.....	57,1%
Finance.....	53,2%
Waging system.....	54,8%
Supply chain mgmnt.....	40,9%
Capacity planning.....	38,4%
Management reports.....	21,8%

Data transfer technologies:

IPvPN/IPsec.....	36,1%
Telephone line.....	35,3%
Hired connection.....	27,8%

Outsourcing services:

Application mgmnt.....	67,9%
Application services.....	39,9%
Transaction processing..	27,6%
System services.....	19,5%
Infrastructure.....	17,1%
Business processes.....	9,5%

Target of the investments:

Workplaces change.....	47,6%
Change of klient software	36,8%
Network development....	46,9%

Website/content develop.	27,1%
Application development	40,2%

Investment issues:

Financial, economical.....	56,7%
Bad decisions.....	23,9%
Lack of resources.....	19,4%
Different interests.....	18,6%
Disadvantageable return	11,6%

The situation looks a little bit better by analyzing the eGovernment indicators. The indicator of the basic public services fully available on-line for citizens ranks Hungary to the 14. place in EU; 15% of the population uses these services (rank 15), 11% fills the downloadable forms electronically (rank 14). The position of the enterprises is not as much favourable as the populations' attitude; the indicator of using eGovernment services ranks Hungary only to the 23. place.

Despite the difficulties Hungary has a relatively large ICT sector that amounts approximately to 20% of the exports, which the country is ranking into the third place in European Union with. In order to reach the objectives defined in the National Strategy for Information Society Hungary has to carry out actions had been defined in different programs:

- Spreading digital culture in civil and business sphere: giving basic computer knowledge and skills on every age and on educated level;
- Programs for supporting economy and politic: eCommerce, on-line banking, eGovernment, eAdministration, open universities,
- Legal background: codifying Law for Data Protection, Digital Signature (e.g. digital tax confession),

² The European Union has 30 member societies

- High quality CS/IS/IT³ courses on different levels,
- Increasing the role of the professional civil organizations such as JvN CS, VISZ⁴, INForum: by arranging trainings, preparing and publishing popular educational materials, IT-books, TV-programs (e.g. University of Knowledge), teaching how to use the ICT, how to live, learn and work in the Information Society,
- Széchenyi Program, New Hungary Program (Új Magyarország Program) that helps SMEs to invest ICT and eBusiness solutions,
- R&D&I⁵: government-supported programs for developing and using the most up-to-date ICT solutions, financed research centers in business,
- Digital content on the Web: Digital Library of National Cultural values, digital Database, digital maps of Hungary and its cities etc.

IS/ICT Knowledge and Skills

Talking about the education of IT, it is needed to distinguish two different approaches. One of them is the training of children, students and non IT specialists, who have to obtain the knowledge and skills necessary for using the information technology as a tool in their daily life: in learning, working, getting information, communicate and play/amuse. The other approach is the education of IT professionals.

Getting IT Skills

In the last years almost 20% of *primary schools* have been equipped with computers and got Internet access: the ratio of computers in the schools is 18,5% that despite of our efforts it shows significant lag related to the other countries (e.g. 61,4% in EU). Teachers were acquired training with IT so it has become possible to give basic computer skills in optional groups. Beside the IT trainings the main target is to use computers as a technical school equipment and Internet as the source of excavating information and to update the teacher's knowledge.

In the *secondary schools* there is Internet Access already everywhere; a subject on IT knowledge and IT skills is presented by qualified teachers and it is already obligatory, and the teachers majoring not in IT use computers in different subjects as a presentation tool. There was a successful program, the *Sulinet Program* that has supported the teachers and students with computers given them the opportunity to purchase computers and other digital tools without paying the 25% VAT.

Beside the official and obligatory education system (primary and secondary schools) there are several programs in Hungary that aims to spread digital literacy and culture that gives special IT skills to people in different forms and on different ways [TV programs, forums, courses, popular books, ECDL certification (see in the paragraph *Programs of JvN CS*) etc.].

IT Professionalism

The Hungarian Higher Education Reform (HE Reform) started in 2003, is based on Bologna process. The members –both academicians and officers of Administration– of the Bologna Committees on different levels transformed the whole higher education system from the traditional type into a three level system (BSc, MSc, PhD) in concept, structure and competences (see Peter Dobay's paper with the title: Bridging The Gap: New Business-MIS Degrees In Hungarian HE [3]). We are getting already closer to the end of this changeover process and we definitely see the problems, the difficulties we meet, and I can unambiguously say that the double load of the teachers (teaching parallel the traditional and new courses) and the lack of motivation and conditions hinder the high quality of the education. Let us see only some of the problem-components!

³ CS/IS/IT: Computer Science/Information Science/Information Technology

⁴ VISZ: Alliance of Chief Information Officers

⁵ R&D&I: Research, Development and Innovation

- lack of resources (professors, rooms, labs) for teaching parallel both traditional and three-level system,
- the education/training quality is very different in the various universities and colleges,
- the applicants come from different places with different educational and cultural background,
- the walk-through criteria between the traditional and the new systems are not correctly and unambiguously defined,
- there is a great diversification among the EU-countries in culture, in financial and infrastructural facilities, and also in supporting systems inside and outside the institutes.

The Role of JvN Computer Society

JvN CS in General

The John von Neumann Computer Society (JvN CS) established in 1968 (Hungarian acronym: JVN CS) has about 2.300 individual and over 100 company members. The JVN CS is managed by the Board (it was newly elected in 2009) that consists of a president (academician Gabor Peceli, rector of the Budapest Technical University), the past president (Peter Bakonyi), five vice presidents and the executive director (Istvan Alfoldi).

In order to perform the declared mission the Society cooperates with professional forums such as Hungarian Section of IEEE, CEPIS and ISACA, and different Hungarian Professional Associations (e.g. IVSZ, MATISZ, HTE). Beyond taking part in research projects, giving reports on scientific and development works and discussing educational programs, JVN CS is active participant of the Hungarian IT professional life. The professional work that covers most areas of computer science both theoretical and practical runs in local organizations that are active in 8 counties and in 4 cities all over Hungary and in 19 active professional communities. The commitment of the JvN CS to perform a knowledge based economy is improved by its main goals that focus on

- the assistance and cooperation in scientific research and development activity,
- the education, IT-skills development, spreading IT culture,
- the IT professionalism,
- the protection of the Hungarian cultural heritage,
- the digital equal opportunities: computer literacy program also for underprivileged/handicapped people,
- the promoting the Euro-Atlantic Integration and last but not least
- the assisting talented youth.

Programs of JvN CS

The JVN CS plays definitive role in specifying and creating the info-communication parts of the national program named as New Development Plan of Hungary. This advisor support covers the tasks of reviewing official documents and giving proposals to the draft of new laws.

As one of the leading professional civil organizations in the ICT field, JVN CS is actively participating in coordination of professional and political initiatives for promoting digital equal opportunities, for dissemination of nation-wide computer literacy by creating an action plan based on a wide-scale national cooperation. The successful *Digital Equal opportunities* (DE!) program, dealing with issues like e-Inclusion, digital literacy, assisted living etc. is connected to the Hungarian eInclusion program, being part of the similar initiative of the European Union, coherent with the Lisbon principles⁶ and the i2010 strategy. The successful DE! Conferences based on a wide range political and professional consensus are organized in every year.

One of the main activities of JVN CS is the international *ECDL* (European Computer Driving Licence) program for digital literacy, highly contributing to the i2010 goals of a competitive knowledge-based Euro-

⁶ The Lisbon's objective is to make the EU the most competitive, knowledge-based economy in the world by 2010.

pean society and economy. By the end of 2008 there were already more than 400 accredited ECDL Centers active with altogether 340.000 ECDL registrants. The nationwide importance of this activity is proven by several results: (1) in the secondary schools the students may get the ECDL certificate as part of their final examination (Matura), (2) the program helps to train handicapped people for using computers as an effective tool and gives them chance for an active life, and (3) the ECDL has received official accreditation in several areas of Adult Education (e.g. civil servants etc.)

The *Internet Fiesta* (organized worldwide by the Internet Society) took place from 23. March to 31. March 2009. again in Hungary emphasizing the role of libraries supporting the population in making use of the Information Society services. Beside the Internet Conference, different joint events were organized all over the country with both professional and financial support of JVN CS and with the active participation of its local branches. The programs focused mainly on presenting the way of electronic administration and the services of eGovernment, but the most popular interest was still taken in interactive games.

Attending to the *talented young people* on different ways is the stressed task of the Society. In order to select the most qualified students JVN CS organizes national competitions [e.g. Challenge24 Programmers Competition in May 2009, Competition Tihamer Nemes (managed from November 2008 to March 2009 in different levels of qualifying), Application Programmers' Schools Contest, Logo Programming Competition (2.588 participants from 168 schools) etc.]. Besides organizing competitions, JVN CS helps to start carrier of the graduates; it operates a Junior Forum, supports the scientific research of the students (e.g. it awards the best students of the Scientific Students' Conference) and gives possibility for meeting employers.

The JVN CS Expert Competency Committee reviews in every year the best professionals in different fields of IT, and maintains a list of the approved persons. In 2008 altogether 147 qualifications were made for 95 IT-professionals (one professional can have more than one qualification).

Conclusion

Summarizing the performed programs, the results we have already achieved and our placing in the global Information/Knowledge based Society, we have to state that we have excellent professionals, communities who feel responsibility for development of Hungary, we have good programs that help to perform the Information Society and to improve the knowledge economy, that we have already done a lot, **but** there are important tasks left which are necessary to solve in order to better our position in the world ranking. It is needed to increase the Internet penetration, the level and wide spreading of digital literacy and we need to take much more intensive part in the international programs.

References

- [1] Acceptable Use Policy (AUP) of NIIF/Hungarnet – http://www.niif.hu/en/acceptable_use_policy_aup_niifhungarnet 04-11-2009 (04-11-2009)
- [2] Bell Research Inc.: Report on the Hungary's ICT Position – 2009
- [3] Dobay, P.: Bridging The Gap: New Business-MIS Degrees In Hungarian HE – 4th IT STAR Workshop November 27-28, 2009, Rome, Italy
- [4] Europe's Digital Competitiveness Report – Volume 2: i2010 ICT – Country Profiles Commission Staff Working Document, Brussels, 04.08.2009
- [5] Internet World Stats: List of Countries Classified by Internet Penetration Rates – <http://www.internetworldstats.com/list4.htm#high> (04-11-2009)
- [6] Kelenhegyi, P.: Skills and Training – The Big Book of ICT Market – ITbusiness Source books, 2009
- [7] Raffai, M.: Knowledge Economy and IT-Education in Hungary – Digital Literacy and IT Professionalism – NISE'2008 Conference, Gödöllő, Hungary, 2008.
- [8] The Big Book of ICT Market – ITbusiness Source books, 2009
- [9] The World Bank: KEI and KI indexes; http://info.worldbank.org/etools/kam2/KAM_page10.asp (04-11-2009)