FACTORS AND IMPACTS IN THE INFORMATION SOCIETY
A PROSPECTIVE ANALYSIS IN THE CANDIDATE COUNTRIES

REPORT ON THE CZECH REPUBLIC

EEIP, a.s.

Coordinator and editor of the final version: PhDr. Vladimír Čermák
Authors: PhDr. Petr Brynda, Mgr. Linda Hofmanová,
Mgr. Kateřina Držková, Mgr. Dita Fuchsová, Bc. Kryštof Mejstřík,
Bc. Kateřina Holická, Bc. Tomáš Merkner

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PREFACE

The Institute for Prospective Technological Studies (IPTS) of the Directorate General Joint Research Centre of the European Commission contracted the International Centre for Economic Growth, European Centre (ICEG EC) to act as the coordinator of a consortium of 11 research institutes to carry out this project.

The main objective of the project was to provide a series of national monographs studying the development of the Information Society (IS), including both the positive and negative impacts, in each of the candidate countries. These monographs offer an assessment of the strengths and weaknesses of each country regarding the development of IS, and a view on their possible outcomes; both strongly rooted in factual quantitative data. They provide a clear, contextualised, multi-factoral and multi-causal picture of the input factors that contribute to the success or failure of IS developments, and the relevant output parameters that support mid- and long-term impacts on economic growth, employment and other relevant aspects of the future of each country. Each monograph concludes with a set of alternative scenarios for the development of IS in that country.

This report was carried out by EEIP, a.s, Prague, and aims to study the factors and impacts of the Information Society in the Czech Republic. The report reflects the research results, comments and opinions of the team of authors. It does not necessarily reflect the opinion of the European Commission. It is organised around 9 themes – economy, demography, government policies, industrial development and competitiveness, relevant economic activity, IST penetration rates, institutional capacity and regulatory background, education, and culture. The section on each of these themes concludes with a specific SWOT analysis. Finally, a general diagnosis is made of the Czech Republic's potential for IS developments, followed by a brief section on possible scenarios for the future and policy recommendations.

A Synthesis Report was also prepared by the Project Coordinator, the International Centre for Economic Growth, European Centre (ICEG EC), on the basis of all the country studies. This offers an integrated and prospective view on the future outlook for the Information Society in the Candidate Countries and can be found on the FISTE (Foresight in Information Society Technologies in Europe) website: http://fiste.jrc.es/

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Czech Republic member of the Consortium: EEIP, a.s., Národní 981/17, 110 08 Praha 1 – Staré Město, Czech Republic, Tel.: +420 224 232 754, Fax: +420 224 238 738, E-mail: mail@eeip.cz,
Web page: http://www.eeip.cz/
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LIST OF ACRONYMS

2G	Second Generation
3G	Third Generation Mobile Telephony (also called UMTS in Europe)
ABT	WTO Agreement on Basic Telecommunication
ADSL	Asymmetric Digital Subscriber Line
ARES	Administrative Register of Economic Entities
ARPU	Average Revenue Per User
ATM	Automatic Teller Machine
ATM	Asynchronous Transfer Mode
B2B	Business-to-Business
B2C	Business-to-Consumers
BIC	Business and Innovation Centre
BSP	Billing and Settlement Plan
CAD	Computer Aided Design
CAM	Computer Aided Manufacturing
CASS	Cargo Account Settlement System
CATV	Cable Television
CBC	Cross-Border Cooperation
CC13	The 13 countries Candidate Countries in process of joining the European Union: Bulgaria, the Czech Republic, Cyprus, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovakia, Slovenia, Turkey
CD-ROM	Compact Disc Read Only Memory
CDS	Data Services Centre
CEE	Central and Eastern European (countries)
CEFTA	Central European Free Trade Area
CESNET	Czech National Research and Education Network
CNB	Czech National Bank
CNC	Computer Numerical Control
COMECON	Council of Mutual Economic Assistance
CPI	Consumer Price Index
CR	Czech Republic
CRM	Customer Relationship Management
CSSI	Czech society of system integrators
CTO	Czech Telecommunication Office
CZK	Czech Crown (currency)
CZSO	Czech Statistical Office
ČAV	Czech Academy of Sciences
ČT	Český Telecom
DD	Digital Divide
DSL	Digital Subscriber Line (xDSL includes various types of DSL)
DTP	Desk Top Publishing
EAS	Enterprise Application Suite

EBRD	European Bank for Reconstruction and Development
EC	European Commission
ECDL	European Computer Driving License
EDGE	Enhanced Data Rates for GSM Evolution
EDI	Electronic Data Interchange
EFTA	European Free Trade Area
EICTA	European Information and Communication Technology Association
EITO	European Information Technology Observatory
EMU	European Monetary Union
ENEA	Europe, Near East and Africa countries
ERO	Energy Regulatory Office
ERP	Enterprise Resource Planning
ESIS	European Survey of the Information Society
ETF	European Training Foundation
EU	European Union
EU15	The present 15 member states of the European Union
EUR	Euro (currency)
EUTELSAT	European Telecommunication Satellite Organization
FDI	Foreign direct investment
FEL ČVUT	Faculty of Electrical Engineering of the Czech Technical University
GA	Grant Agency
GATT	General Agreement on Trade and Tariffs
GDP	Gross Domestic Product
GPRS	General Packet Radio Service
GPS	Global Positioning System
GSM	Global System for Mobile communications
HDI	Human Development Index
HSCSD	High Speed Circuit Switched Data
HTML	Hypertext Markup Language
ICEG EC	International Centre for Economic Growth, European Centre
ICT	Information and Communication Technology
IDG	International Data Corporation
IFC	International Finance Corporation
ILO	International Labour Organization
IP	Internet Protocol
IPTS	Institute for Prospective Technological Studies
IRIS	Integrated Regional Information System
IS	Information Society
ISCED	International Standard Classification of Education
ISDN	Integrated Services Digital Network
ISO	International Organization for Standardization
ISP	Internet Service Provider

ISŠ	Integrated Secondary School
IT	Information Technology
ITA	Information Technology Agreement
ITC	Information Technology Committee
ITU	International Telecommunication Union
JRC	Joint Research Centre of the European Commission
Kbps	Kilo Bits (thousand) per Second
LAN	Local Area Network
LFD	Labour Force Surveys
LLU	Local Loop Unbundling
LRIC	Long Run Incremental Costs
Mbps	Megabits (million) per Second
MFF UK	Mathematical-Physical faculty of Charles University
MI	Ministry of Informatics
MIS	Managerial Information System
MIT	Ministry of Industry and Trade
MMS	Mobile Multimedia Messaging
NGO	Non-Governmental Organization
NMT	Nordic Mobile Telecommunication System
NRA	National Regulatory Authority
NTP	National Telecommunication Policy
OECD	Organization for Economic Co-operation and Development
OTE	Electricity Market Operator
PAIS	Public Administration Information Systems
PASNET	Prague Academic Scientific Network
PC	Personal Computer
PIN	Personal Identification Number
PPI	Producers Price Index
PPP	Purchasing Power Parity
PSTN	Public Switched Telecommunication Network
QSR	Quality System Review
R&D	Research and Development
RDC	Regional Development Centre of the Czech Republic
REP	Registered Electronic Mail
RIO	Reference Interconnection Offer
RIS	Regional Information Systems
RPIC	Regional Consultancy and Information Centres
RUO	Reference Unbundling Offer
SIM	Subscriber Identification Module
SME	Small and Medium-sized Enterprise
SMS	Short Message Service
SOŠ	Secondary Technical Schools

SOU	Secondary Vocational Schools
SPIS	Association for information society
SSC	Shared Service Centre
TBT	WTO Technical Barriers to Trade
Telco	Telecom operator
TEN	Trans-European Network
TFT	Thin FET Transistor Screen
TLD	Top-Level Domain Administrator
TV	Television
UMTS	Universal Mobile Telecommunication System
UN	United Nations
UNDP	United Nations Development Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
US	United States
US$	US dollar (currency)
USO	Universal Service Obligation
ÚTIA	Ústav Teorie Informace a Automatizace (The Research Institute for Information Theory and Automation)
VAT	Value Added Tax
VIT	Public Information Terminal
VOŠ	Higher Professional School
VSAT	Very Small Aperture Terminal
WAN	Wide-Area Network
WAP	Wireless Application Protocol
WLL	Wireless Local Loop
WTO	World Trade Organization
WW	World War
xDSL	Various types of Digital Subscriber Line (ADSL, HDSL, VDSL, etc.)

COUNTRY PROFILE

Country data

Picture 1: Location of the Czech Republic in Central Europe.

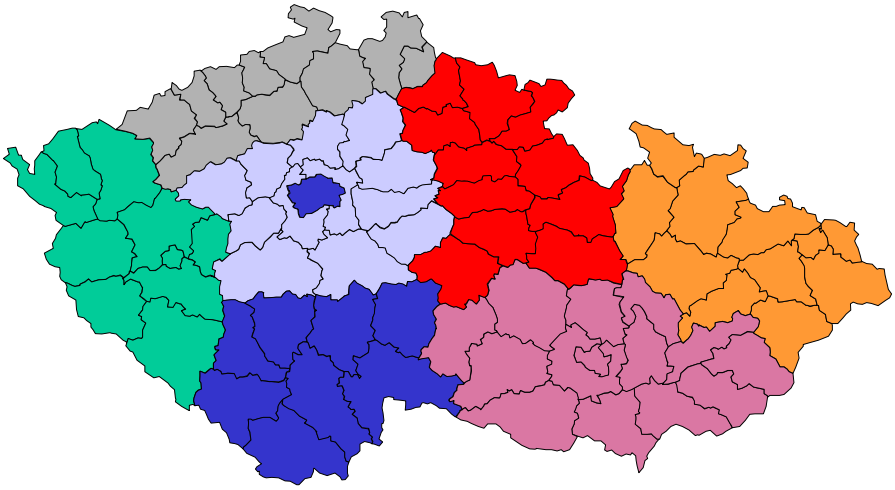
General data	
Population (2001) (million)	10.2
Area (Sq. Km)	78 866
Per Capita GDP (2002) (US$, PPP)	15 797
GDP (change 2001-2002)	2%
GDP Distribution	
Agriculture (2002)	6.00%
Industry and Construction (2002)	39.60%
Services (2002)	54.40%
Merchandise Trade (US$)	
Exports (2002)	45.28 billion
Imports (2002)	46.90 billion
International Reserves (as at end of 2002) (US$)	21.83 billion
Currency Units, 2002 (Czech Koruna – CZK)	US$1.00 = 32.74
	EUR1.00 = 30.81
Penetration of IT	
Color TV/100 (2000)	35.90
Telephone/100 (2002)	35.87
PCs/100 (2001)	13.60
Mobile Cell Phone/100 (2002)	84.00
Share of IT in Merchandise Trade	
Export (2002)	6.70%
Import (2002)	6.40%
National Information Infrastructure	Partially completed
National IT Policy	Yes
Accession to ITA/WTO	Member of WTO, OECD, CEFTA, ILO, NATO, EAP

Table 0.1: General country data.

Regional division of the Czech Republic

The Czech Republic or formerly western part of Czechoslovakia has been divided into regions. Their appearance changed several times; these changes were significant. After changeover from the communist regime there were 7 regions in the Czech part (6 geographical regions + the capital of Prague) and 3 regions in the Slovak part.

Picture 2: Regional division of the Czech Republic in 1993, regions and districts.



However, these regions were dissolved in the middle of the 90s and only districts remained. Discussions on reintroduction of regions had been conducted since then, in 2000 the law on regions was passed and in 2001 14 regions (13 geographical regions + the capital of Prague) were reintroduced. These regions do not form NUTS 2, which receive financial sourcing from EU Structural Funds, therefore also 8 artificial NUTS 2 regions were set up. The Czech Republic as a whole forms one NUTS 1.

Statistical observation and research is performed on the level of NUTS 3, where in each regional capital a subsidiary of the Czech Statistical Office is located. For EU funding purposes the data are recalculated also to NUTS 2 figures as well, but their explanatory power is derived from inferior regional division (since no NUTS 2 statistical offices exist).

Picture 3: Regional division of the Czech Republic in 2003, NUTS2 and NUTS3.

Picture 4: Regional division of the Czech Republic in 2003, regions (NUTS3) and districts (NUTS4).

Abbreviation	NUTS 3		NUTS 2	
	Czech name	English translation	Czech name	English translation
PHA	Hlavní město Praha	The capital of Praha	Hlavní město Praha	The capital of Prague
STČ	Středočeský kraj	Central Bohemia	Střední Čechy	Central Bohemia
JHČ	Jihočeský kraj	South Bohemia	Jihozápad	South-West territory
PLK	Plzeňský kraj	The region of Plzeň		
KVK	Karlovarský kraj	The region of Karlovy Vary	Severozápad	North-West teritory
ULK	Ústecký kraj	The region of Ústí nad Labem		
LBK	Liberecký kraj	The region of Liberec	Severovýchod	North-East teritory
HKK	Královéhradecký kraj	The region of Hradec Králové		
PAK	Pardubický kraj	The region of Pardubice		
VYS	Vysočina	Czech-Moravian Highlands	Jihovýchod	South-East territory
JHM	Jihomoravský kraj	South Moravia		
OLK	Olomoucký kraj	The region of Olomouc	Střední Morava	Central Moravia
ZLK	Zlínský kraj	The region of Zlín		
MSK	Moravskoslezský kraj	Moravia-Silesia	Moravskoslezsko	Moravia-Silesia

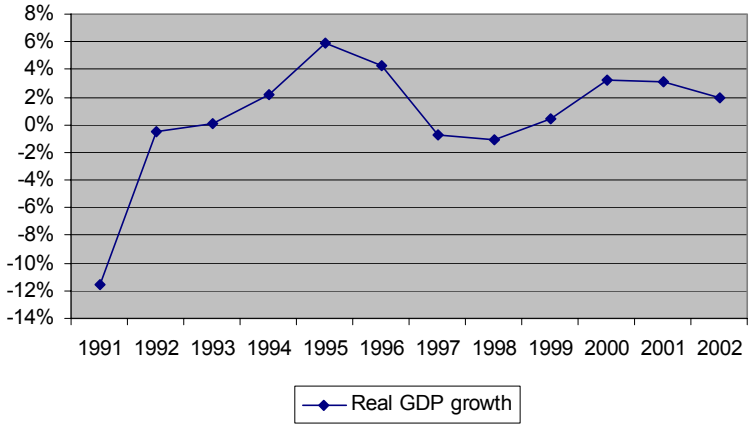
Table 0.2: Guide to regions.

A NATIONAL AND REGIONAL ECONOMY

A.1 Economic growth

Economic growth slowed down only slightly in 2002 showing that the Czech economy is able to cope relatively well with both significant strengthening of the exchange rate and economic stagnation in the EU countries relatively well. It has been affirmed that the impact of the devastating August 2002 floods was of no principal macro-economic importance on economic growth. For 2002, an increase in GDP in constant prices was at some **2 %.**

Graph A.1: Real GDP growth.

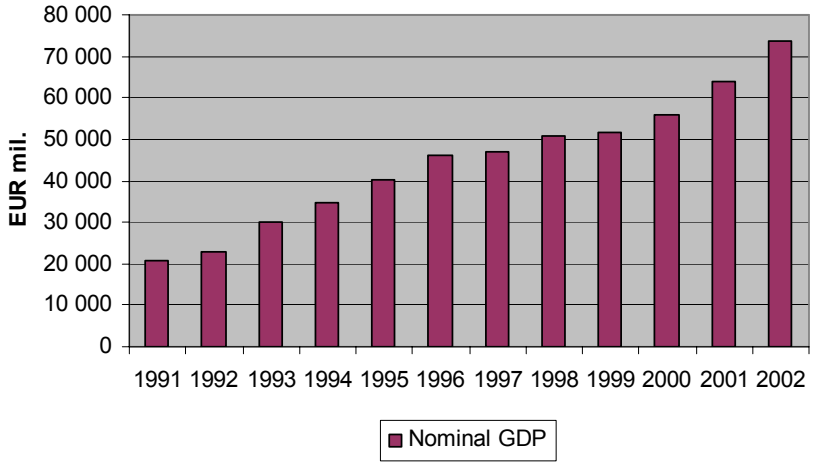


Source: Czech Statistical Office.

In 2003 the previous dynamics of the Czech economy's output is expected to recover again This recovery is based on an expected increase in the production potential, and it is the consequence of an overcoming of the economic slowdown in the main trading partners' countries and is partly also due to an increase in demand eliminating flood damages. Growth of GDP is estimated at approximately 3.3 %.

Nominal GDP grew steadily in the last decade. See Graph A.2:

Graph A.2: Nominal GDP (EUR million).



Source: Czech Statistical Office.

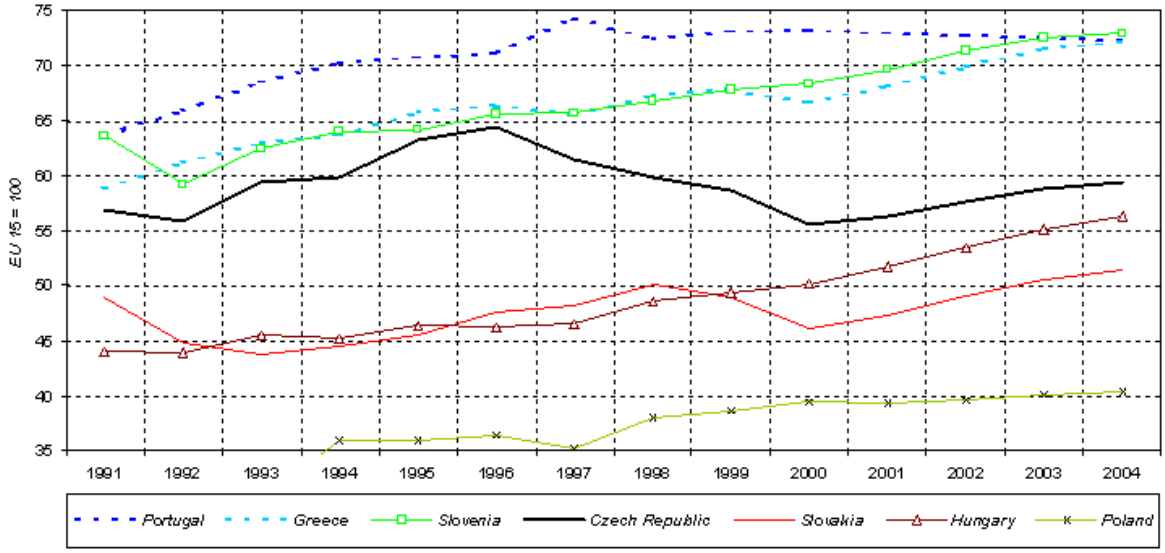
When comparing economic levels of different countries it is recommended to use purchasing power parity, which is a method of measuring the relative purchasing power of different countries' currencies over the same bundle of goods.

This overview incorporates the results of the Comparison Project on purchasing power parities and international comparisons of real GDP for 1999. Data for 2000 and 2001 are taken and extrapolated on the basis of OECD papers while from 2002 onward real exchange rates are used based on the calculations provided by the Ministry of Finance.

It can be estimated that PPP-adjusted gross domestic product of the Czech Republic per capita reached approximately USD 15 000 in 2002, which corresponds to some **58 % of EU-15 economic levels**. In comparison with the two least developed EU countries, Portugal and Greece, GDP per capita is approximately 20% lower in the Czech Republic. Other Central European candidate countries (excluding Slovenia) have lower economic performance in comparison to the CR.

The development of the Czech Republic's economic convergence towards the EU states is unbalanced in the medium term due to **big fluctuations** in the economy's dynamics in the nineties.

Graph A.3: GDP per capita using purchasing power parities.

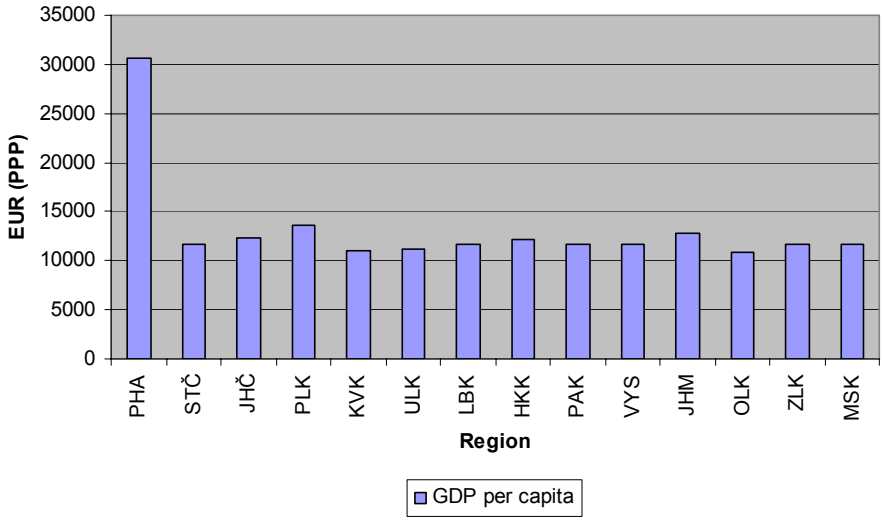


Source: Ministry of Finance.

A.2 Regional GDP comparison

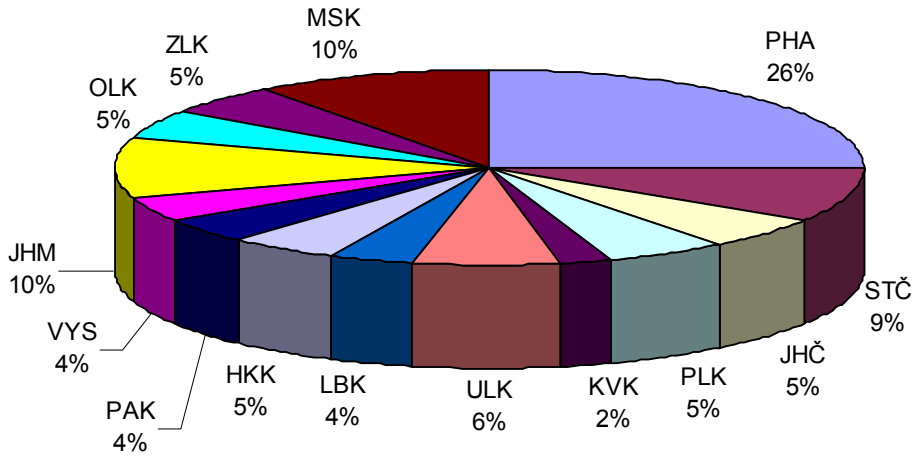
The highest GDP per capita is being steadily achieved in the capital of Prague (PHA). This is the only region (NUTS 3) and territory (NUTS 2) in the Czech Republic, which will be exempt from most of the EU structural funds financing. According to the latest Cohesion Report Prague will be only partially eligible for Objective 2 Funds in the period 2004 – 2006.

Graph A.4: Regional GDP per capita (EUR - PPP) - year 2001.



Source: Czech Statistical Office.

Concerning the regional contribution to GDP, obviously the largest share comes from the capital of Prague (the region with highest GDP per capita) and largest population.



Graph A.5: The share of regions on country's GDP - year 2001.

Source: Czech Statistical Office.

A.3 Supply side of growth: contribution

The increase in industry production at the end of 1999 was followed by an even faster growth in 2000. This development was positively influenced by the economic growth in neighboring countries, which was partly explained by an increase in exports to Germany as well as to other developed countries, but also an increase in exports to transition economies. Positive influence arises from increased productivity of companies controlled by foreign investors and their investment activities. On the other hand the development in industry was negatively influenced by:

- **Scarcity of financial sources for enterprise operations**. Many privately owned companies are still to a large extent dependent on equity financing only, which, in consequence of high risk premia charged by the banks, leads to their undercapitalization of these privately owned companies.
- **Ambiguous ownership**. Many large enterprises were privatized through so called "voucher method", which intended to transfer their ownership to the general public. However, many investors placed their vouchers into investment funds, many of which specialized on rent seeking, in Czech slang "tunneling" of the companies.
- **Reluctance of banks to grant credits**. Almost all banks are in the hand of foreign strategic investors. After implementation of standard credit assessment methods and risk management many enterprises have been virtually cut off from bank credit. It especially concerns those heavily indebted companies and enterprises privatized through voucher method.

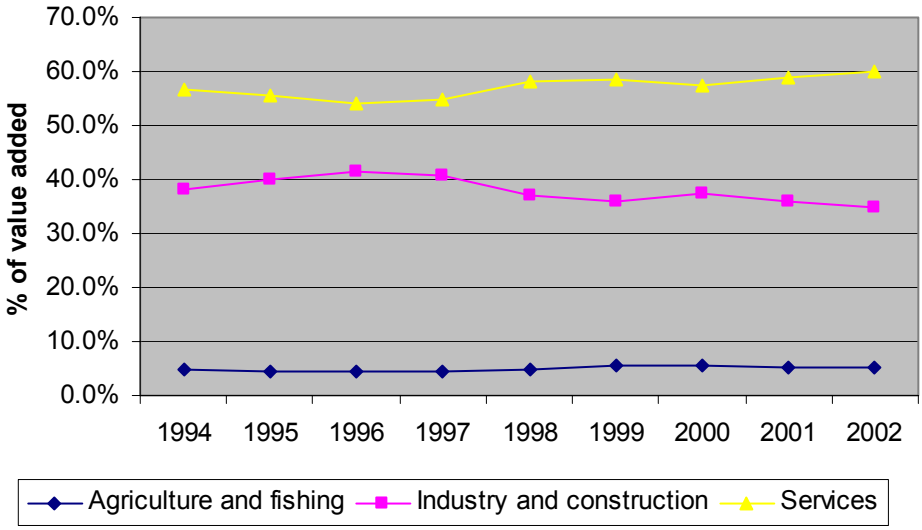
Year	Real GDP	Net taxes on GDP	Gross value added						
			TOTAL	*Agriculture, fishing*		*Industry and Construction*		*Services*	
	EUR mil.	EUR mil.	**EUR mil.**	EUR mil.	% of VA	EUR mil.	% of VA	EUR mil.	% of VA
1994	38 274	4 000	**34 274**	1 868	5.4%	14 448	42.2%	17 958	52.4%
1995	40 257	4 586	**35 671**	1 764	4.9%	15 766	44.2%	18 141	50.9%
1996	42 357	5 043	**37 314**	1 901	5.1%	17 352	46.5%	18 061	48.4%
1997	39 924	4 740	**35 184**	1 760	5.0%	16 245	46.2%	17 179	48.8%
1998	39 111	4 768	**34 343**	1 922	5.6%	14 434	42.0%	17 987	52.4%
1999	38 529	4 717	**33 812**	2 174	6.4%	13 865	41.0%	17 774	52.6%
2000	41 204	4 983	**36 221**	2 219	6.1%	15 405	42.5%	18 597	51.3%
2001	44 381	5 368	**39 013**	2 299	5.9%	15 967	40.9%	20 747	53.2%
2002	50 053	5 989	**44 064**	2 654	6.0%	17 446	39.6%	23 963	54.4%

Source: Czech Statistical Office, National Accounts (ESA 1995).

Notes: GDP measured in fixed prices of 1995.
Data before 1994 unreliable, different method of indirect taxation existed.
Exchange rate CZK/EUR used as yearly averages.

Table A.1: Real GDP - supply side.

Graph A.6: Real GDP - supply side.



Source: Czech Statistical Office.

A.4 Demand side of growth: contribution

Expenditures on final consumption of households represent the most dynamic component of economic growth. They are partially boosted by repairs of damaged real estate and by purchases of durables to replace the ones destroyed by flooding but principally they reflect a dynamic growth of wages with low inflation and low interest rates. Part of consumption is realized at the expense of savings by utilization of various forms of consumer credits. Rate of growth of household consumption was 3.95% in 2002 and is estimated at some 4.0% in 2003. The expected rise of 5.1% in household consumption in current prices in 2003 should have a favourable impact on the revenue side of the general government accounts.

Investment activities of non-financial sector stagnated more or less in 2002, reflecting dropout of development investment in companies forced to give priority to repairs of production capacities damaged by floods. The 2002 growth of investment amounted to 1.3% and was pulled mainly by the household sector (construction of dwellings). In 2003 an increase should reach some 3.0%. Growth of fixed capital formation will depend, to a large extent, on intensity of inflow of foreign direct investment (except privatization) and will be generated also by foreign-controlled firms. New investments should be mostly export-oriented, strengthening the economy's supply side, productivity and competitiveness. At the same time, they will lead to a rise in prices on external markets and thus to an improvement of terms of trade.

Government consumption (including methodological effect of purchase of L-159 subsonics) increased by 5.74% in 2002 and should grow by approx. 1.0% in 2003.

The dynamics of economic growth in 2003 can be endangered by non-fulfilment of assumptions regarding recovery in the EU countries. Imbalance of public finance remains to be the most serious risk in the medium term.

The fast growth of expenditures of the government sector results from both the compensation of transformation institutions' cost and the growth of mandatory expenditures, which is still showing high dynamics. Growth of these expenditures limits room for realization of government spending priorities.

The **budget deficit** reached EUR 1.48 bn or **4.5% of GDP** in 2002. The deficit must be pushed down in the nearest future, so that the Czech Republic fulfils the Maastricht criteria applicable to the state budget deficits (max. 3%) before entering the EMU.

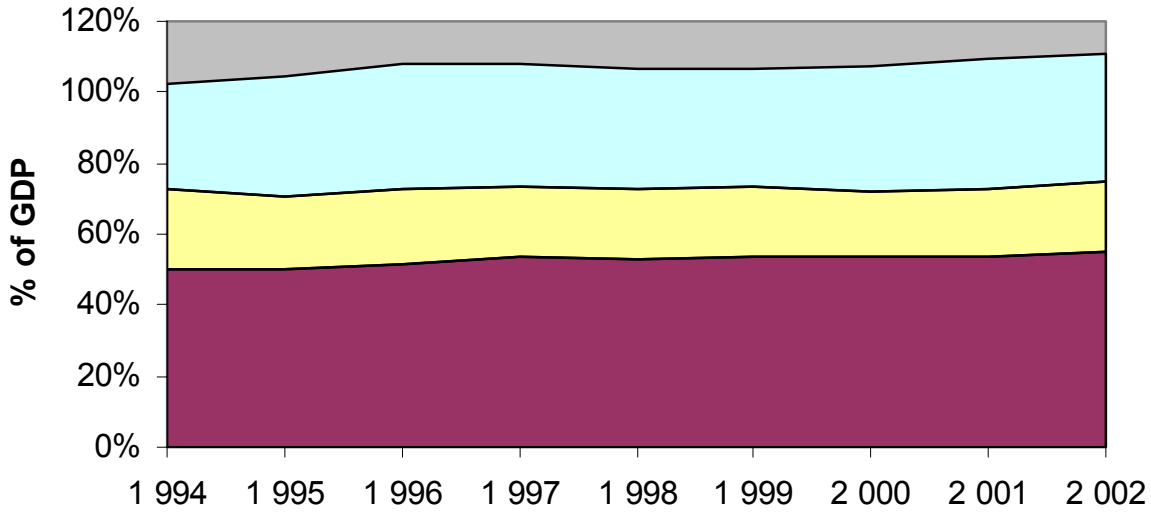
General government deficit has impact also on growth of **public debt** amounting **19.9% of GDP in 2002** and growing in year-on-year terms by 1.2 percentage points.

Year	Real GDP	C - private		G - governmental		I - gross domestic		NX - net export	
	EUR mil.	EUR mil.	% of GDP	EUR mil.	% of GDP	EUR mil.	% of GDP	EUR mil.	% of GDP
1994	**38 274**	19 207	50.2%	8 685	22.7%	11 275	29.5%	-893	-2.3%
1995	**40 257**	20 175	50.1%	8 296	20.6%	13 701	34.0%	-1 915	-4.8%
1996	**42 357**	21 969	51.9%	8 678	20.5%	15 014	35.4%	-3 304	-7.8%
1997	**39 924**	21 367	53.5%	7 903	19.8%	13 805	34.6%	-3 150	-7.9%
1998	**39 111**	20 773	53.1%	7 526	19.2%	13 311	34.0%	-2 499	-6.4%
1999	**38 529**	20 759	53.9%	7 503	19.5%	12 673	32.9%	-2 406	-6.2%
2000	**41 204**	22 001	53.4%	7 737	18.8%	14 356	34.8%	-2 890	-7.0%
2001	**44 381**	23 854	53.7%	8 480	19.1%	16 073	36.2%	-4 027	-9.1%
2002	**50 053**	27 428	54.8%	9 919	19.8%	18 010	36.0%	-5 305	-10.6%

Source: Czech Statistical Office, National Accounts (ESA 1995).

Notes: GDP measured in fixed prices of 1995.
Exchange rate CZK/EUR used as yearly averages.

Table A.2: Real GDP - demand side.



Graph A.7: Real GDP - demand side.

Source: Czech Statistical Office.

Negative trends in public finance development will be seen also in 2003. General government deficit including net lending is estimated at CZK 166.3bn (EUR 5.2 bn) or 6.9% of GDP; when excluding net lending it will amount to CZK 171.3bn (EUR 5.35 bn), i.e. 7.1% of GDP. Public debt is expected to be CZK 578.2 bn (EUR 18.1 bn) **in 2003**, its ratio rising by 4.2 p.p. to **24.1% of GDP** compared with 2002 and reaching thus the highest level since 1993. Deficits of public budgets stem from persisting problems on their revenue and expenditure sides.

Compared to 2001, consolidated tax quota increased slightly - 36.6 % of GDP. With given structure of tax burden, elasticity of tax revenues in relation to GDP is still low compared with EU countries, which can be seen in the insufficient response of tax quota to changes in economic cycle. The government has recently started to prepare a tax and pensions reform. Total revenues of the general government reflected mainly development of privatization proceeds, which grew in 2002 by 2.8

percentage points to 5.6 % of GDP compared with 2001, hence reaching thus the **maximum within the entire privatizations process.**

The tax reform shall be based on the following principles:

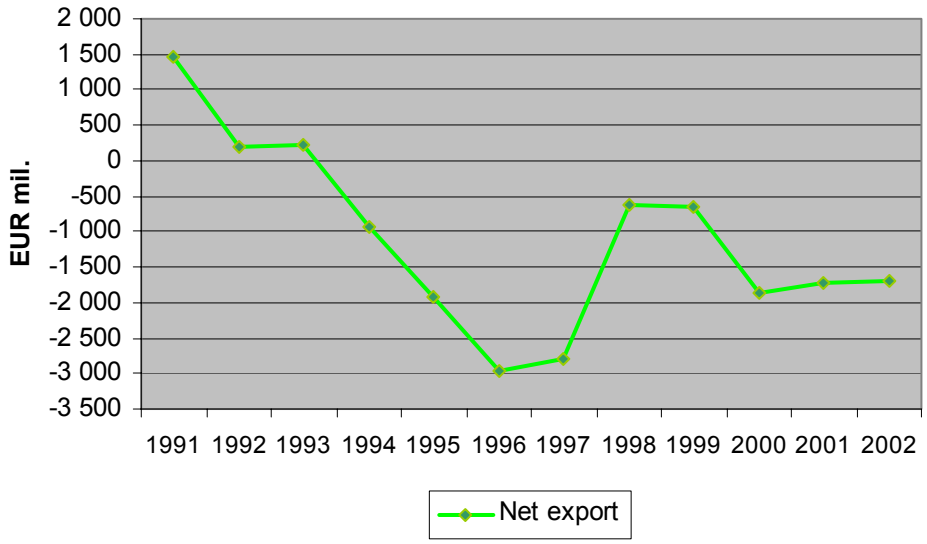
- **Direct taxes** shall not be increased.
  - The corporate income tax shall fall until 2005 to 24%.
  - The natural person income tax shall not be changed, but deductible allowances will not be indexed.
- **Indirect taxes** shall compensate for growing public deficit:
  - VAT rates will not be changed, but most of services will be transferred from 5% rate to 22% (e.g. also telecommunication and Internet services).
  - Excise taxes on fuels, tobacco products and spirits will be increased significantly.
- For **reduction of tax evasion** entrepreneurs with cash receipts will have to be equipped with cash registers. Cash payment will be allowed only to certain limit. The threshold for VAT registration will fall.
- Some **subsides will be eliminated** or reduced (housing saving, mortgages subsidies…).

The pension reform shall be based on the following principles:

- Increasing the pensioning age (in progress).
- Retaining the social contribution rate.
- For younger age groups compulsory pension saving (not yet implemented).
- Reduction of the calculation base for pensions (i.e. decreasing of newly calculated pensions).

Last component of the demand side of GDP growth – **net export** (i.e. total exports of goods and services less total imports of goods and services) – turned in 1993 into negative values and since then has remained negative. This unfavourable evolution may mostly be attributed to the exchange rate development (due to a steady real appreciation caused by a higher domestic than foreign inflation rate) and the development of economies in the major export countries (especially stagnation in Germany). The situation was even aggravated by the adverse change of raw material prices. The latest fall in 2000 was caused by the continuing real exchange rate appreciation which also influenced the trade balance development significantly in 2001 and 2002.

Graph A.8: Net export (EUR million).



Source: Czech Statistical Office.

A.5 Changes in employment

A comprehensive quantitative description of the situation on the labour market is impeded, to a large extent, due to a methodological change in labour force surveys (LFS)[1]. Presently, labour market is characterized by high rigidity of supply side reflected in high and growing level of registered unemployment in spite of relatively dynamic economic growth. Among major factors these should be mentioned:

Low regional mobility. It partially stems from social habits and traditions in the Czech population. Czech people are not used to moving (changing their residence) in order to find a job, this only concerns highly skilled and well paid workers. Approximately 60% of Czech citizens live in the place where they were born. Also, housing rent regulation contributes to this phenomenon, it is almost impossible to find housing in bigger cities at affordable prices. The scope of the housing market is therefore limited to flats constructed recently and to flats which were privatized. We can observe that demand exceeds supply significantly. The situation is completely different from the Anglo-Saxon countries, which might also be correlated to the difference religion to some extent.

Low professional mobility. Czech employee is reluctant to change its qualification and rather lives on unemployment benefits than to change his profession. This also concerns less qualified workers.

Difficulties in starting and closing business. The startup is very difficult due to slow commercial registers, the necessity to get permission from numerous authorities, inflexible banking sector. The closing is not easier; bankruptcy proceeding last years and composition is unfortunately very uncommon resolution of indebtedness.

High labour-law protection of employees. The most visible examples are the ban of temporary jobs for fresh graduates, the expected prohibition of having more jobs, the abuse of sickness benefits etc.
Also persistent endeavour on the side of the social democrat government to increase the minimum wage inhibits the willingness of enterprises, especially in structurally affected regions, to offer new jobs.

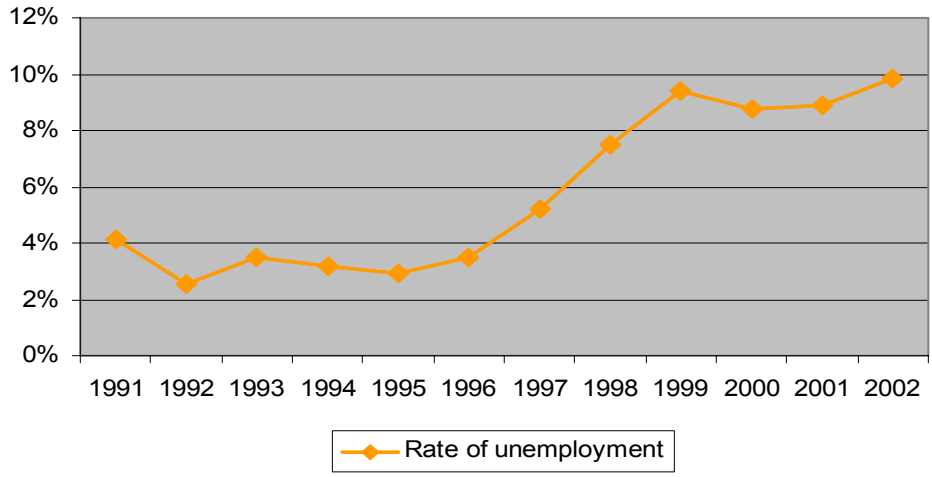
Employment *(LFS definitions)*. Besides economic growth and implementation of programmes of active employment policy targeted at increasing employability, local effects of foreign investment inflow will have positive impact on employment. Admittedly, foreign green-field investments will create only a limited number of jobs as they are aimed mostly at high-tech and high-productivity activities but they will bring secondary indirect positive effects. On the other hand, impacts of ongoing restructuring and delayed effects of the 2002 appreciation of the Czech crown will have adverse effects. As regards structure of employed persons, further increase in number of self-employment and in principle stabilization of wage earners can be expected.

Unemployment *(registered by employment agencies)*. Rate of registered unemployment reached almost 10 % i.e. **9.8% in 2002.**

[1] *Harmonization of a questionnaire with Eurostat standards since the first quarter of 2002 has entailed, inter alia, posing a question, whether the person concerned worked for pay or other remuneration at least one hour in the period under consideration, on front-end position. This arrangement compared with the previous period had presumably psychological effect on respondents and changed outputs in 2002 by shifting part of the persons from the category of the unemployed to the category of the employed, mostly self-employed people.*
This fact results in a significant decrease of the rate of unemployment in LFS with an increase of rate of registered unemployment, which, in our opinion, has no economic interpretation. Impact of growth of LFS employment is also reflected statistically in some slowdown of growth of rate of registered unemployment, as it is part of denominator in its calculation.

Graph A.9: Rate of unemployment.

Source: Ministry of Social Affairs, Czech Statistical Office.



According to LFS data, rate of registered unemployment including also people, who are not seeking a new job actively, is increasing. Also the possibility that some of the unemployed are active in shadow economy cannot be excluded. Nevertheless, unemployment turns to be a chronic phenomenon with very negative social and economic consequences.

Number of unemployed keeps rising in 2003 moderately exceeding the ten-percent level, especially due to the following factors:

- **Unfavourable economic environment** (fiscal reform, slow recovery of Western European economics, strong domestic currency…),
- **Low adaptability of some groups of jobseekers** (unwillingness to re-qualify, negligible territorial mobility, unemployment benefits in combination with incomes from shadow economy exceeding offered wage in legal sector, absenteeism…),
- **Discrepancy of supply and demand in qualification structure**, which is evident especially in problem regions. Fresh graduates only partially match labour demand.

These problems could even deepen if new measures to make the labour market more flexible are not adopted. Economic pressure on growth of productivity of labour will further increase demands on quality and preparedness of existing or newly engaged staff, resulting in dismissal of workers failing to meet rising demands.

However, the Ministry of Labour and Social Affairs does not expect problems with **agriculture/subsistence unemployment**; agriculture workers or rural inhabitants never represented significant portion of inhabitants. Most of agricultural workers released from bankrupt cooperatives found their occupation in industry, or have been pensioned. There is according to available data no important group of inhabitants relying on autarky agriculture.

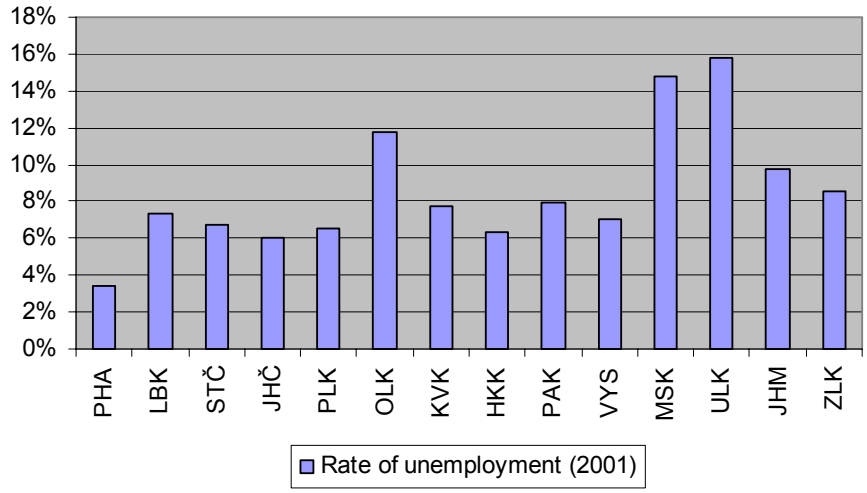
Of course the data of unemployed receiving unemployment benefits does not represent the total number of unemployed. If one is unable to find a job within a certain period of time, he or she is removed from the job office database and the payment of unemployment benefits is terminated. He or she is then transferred to a social security office and receives social benefits. However, it does not change his or her status in the meaning of LFS as unemployed if he or she still actively searches for a job. The only other group that could be ranked into **hidden unemployed** (with no available data) are discouraged workers. The Czech statistical office does not use this category, nevertheless, as of 2001 there were 30 thousand of men economically inactive for other reasons and very similar number of women (34.5 thousand). There are certainly some hidden unemployed within this group, but there are

no available statistical observations concerning this phenomenon. Therefore we might infer that this is not the key issue on the Czech labour market.

Key issue for the increasing unemployment in the Czech Republic is the **social security system,** which in its current fashion has unfavourable impacts on the labour market. The protection of certain groups of employees is exaggerated (pregnant women, fresh graduates, workers with adverse attitude towards work…), on the other hand some groups miss these advantages (disabled are almost always unemployed since the penalty for refusing them is negligible…). The job cuts in larger scope need to be approved by trade unions, which discourages season employers. Also the frequent abuse of sickness benefits discourages some employers to provide jobs; this has been the case with Japanese investors, who have never seen such a phenomenon before. However, the Czech government is currently preparing new social policy together with a tax reform, which might increase the flexibility of the labour market.

The Graph A.10 shows differences in unemployment between regions of the Czech Republic. In general, the unemployment rates are higher in the north of Czech Republic due to problems connected with heavy industry concentrated in these regions. Regional differences in rate of unemployment will continue to persist due to their character and structure of the labour force.

Graph A.10: Rate of unemployment by regions (2001).

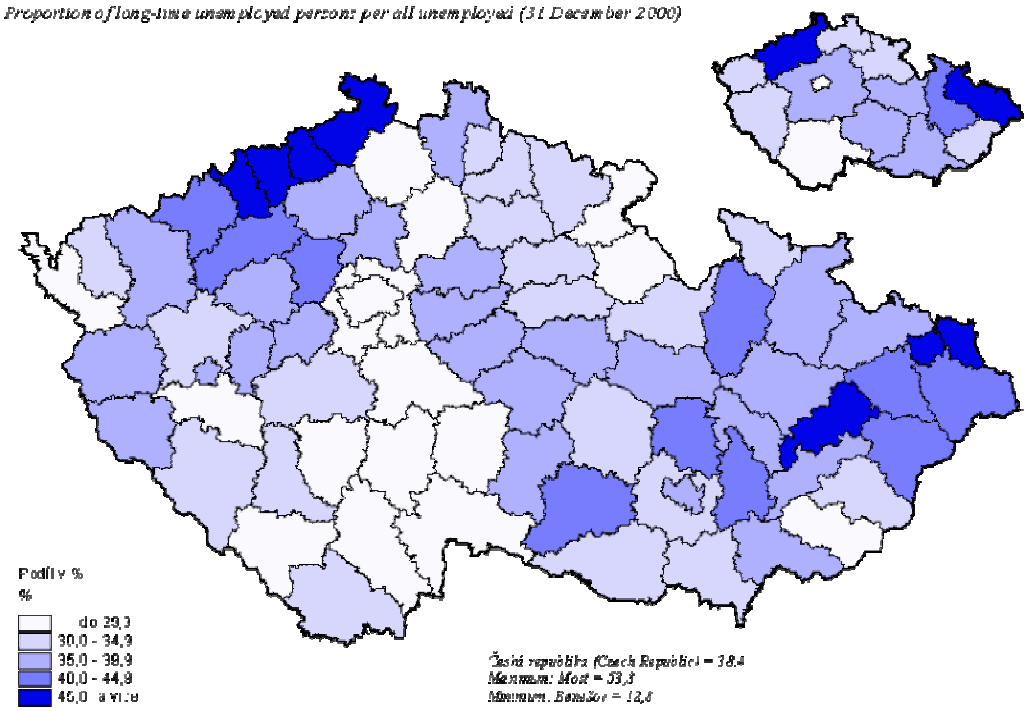


Source: Czech Statistical Office.

Tendencies for long-term unemployment increase in the case of higher age categories and in the case of disabled people. The structure of unemployment shows specific alarming elements: the unemployment increases in the category of young people, especially graduates, people with low education, women with children and people pertaining to Roma minority and disabled people. Long-term unemployment reached 4.3 % (EU 15 = 3.6 %) in 2000.

Concerning the regional distribution, the highest shares of long-term unemployed among those unemployed in the particular region are reached in the regions with high general unemployment rate. This reflects the idea that in the region with moderate unemployment rate the labour market virtually absorbs those willing to work.

Picture A.1: Proportion of long-term unemployed on all unemployed (2000).

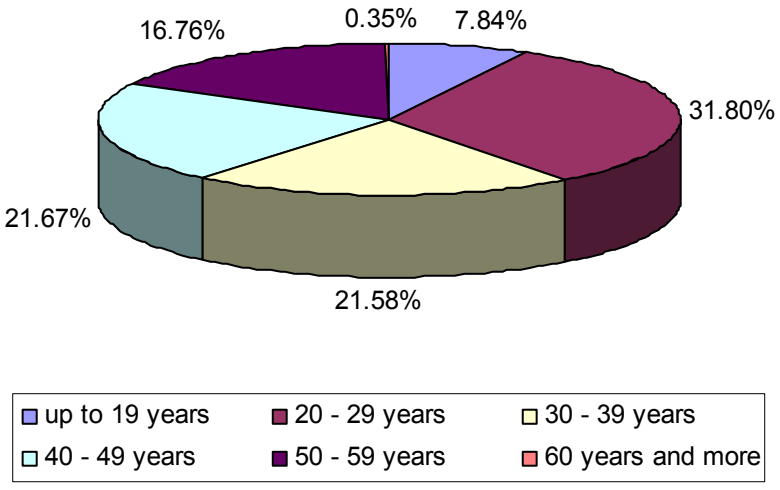


Source: Czech Statistical Office.

Significant part of the unemployed people comes from the category of young workers between 20 and 29 years of age. Since this age span forms a relatively large part of the population, this in turn contributes to a high level of overall unemployment. Generally, people having graduated have problems finding jobs; the other factor that raises unemployment further in this category is the level of the minimum wage that does not motivate employers to provide jobs to young people with no relevant experience.

Graph A.11: Share of different age groups on unemployed (2001).

Source: Czech Statistical Office.

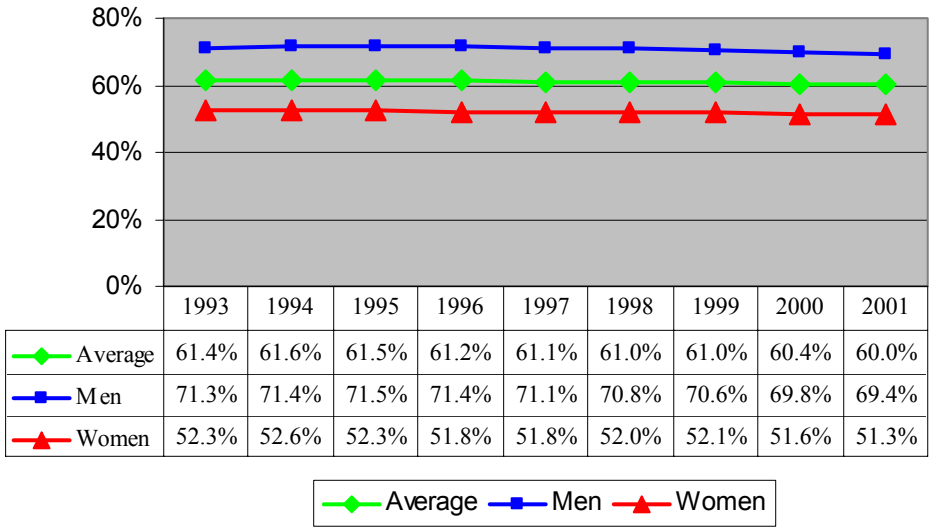


A.5.1 Changes in labour supply

Labour supply (participation rate) remains steady. In recent years it fluctuates between 60% and 61%. The participation rates of men and women are very different, in the case of men it is slightly below 70% and in the case of women slightly above 50%. The reasons are apparent: longer life prospects together with lower pensioning age, the different participation level at education, longer maternity leave for women, and the relatively large share of housewives.

Graph A.12: Participation rate (2001).

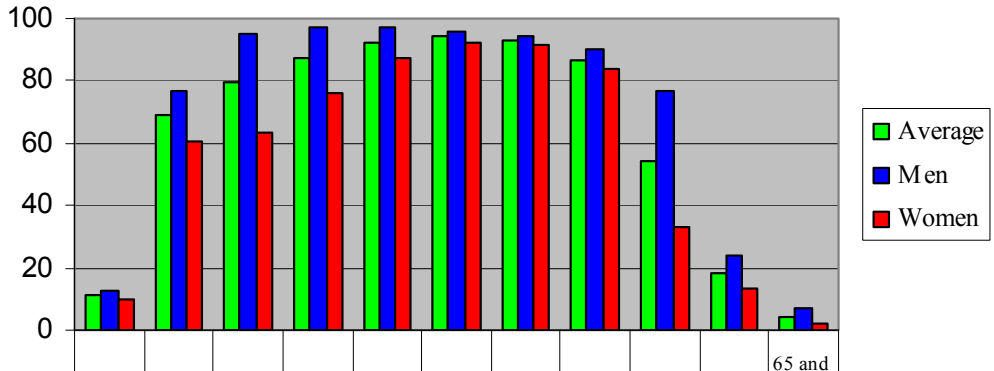
Source: Czech Statistical Office



	1993	1994	1995	1996	1997	1998	1999	2000	2001
Average	61.4%	61.6%	61.5%	61.2%	61.1%	61.0%	61.0%	60.4%	60.0%
Men	71.3%	71.4%	71.5%	71.4%	71.1%	70.8%	70.6%	69.8%	69.4%
Women	52.3%	52.6%	52.3%	51.8%	51.8%	52.0%	52.1%	51.6%	51.3%

As apparent from Graph A.13, the participation rate of men is greater in all age groups. The differences are largest in the age groups 20-24, 25-29, 30-34 (longer education, prolonged maternity leave) and 55-59 (earlier pensioning – on average 55-56).

Graph A.13: Participation rates in different age groups (2001).

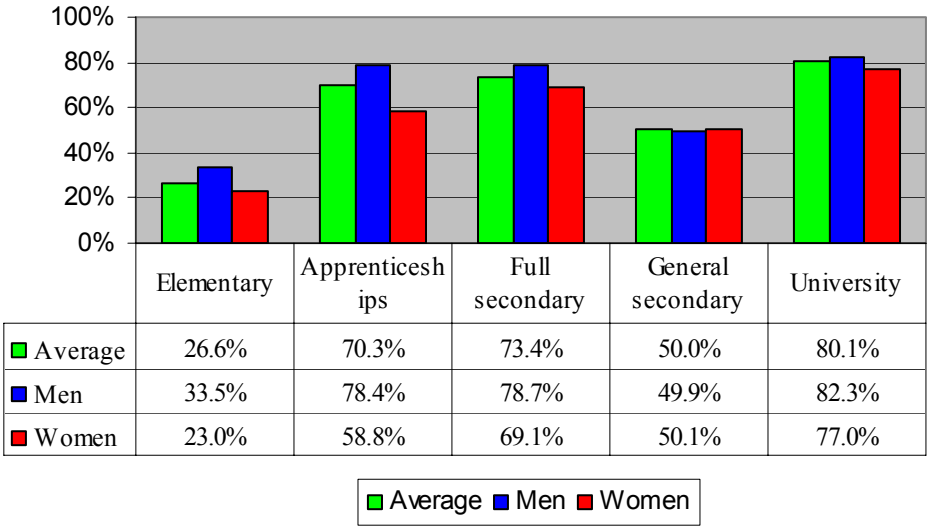


	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	65 and more
Average	11.6	69.0	79.6	87.0	92.3	94.2	92.8	86.9	54.3	18.2	4.0
Men	12.9	76.9	95.0	97.5	97.3	96.1	94.1	90.4	76.9	24.1	6.8
Women	10.1	60.7	63.7	76.1	87.0	92.3	91.5	83.5	33.3	13.1	2.2

Source: Czech Statistical Office.

However, the difference between men and women participation rates is significant only for lower educated ones; in the case of university graduates and those with secondary general education (grammar schools) there is virtually no difference.

Graph A.14: Participation rates according to education (2001).



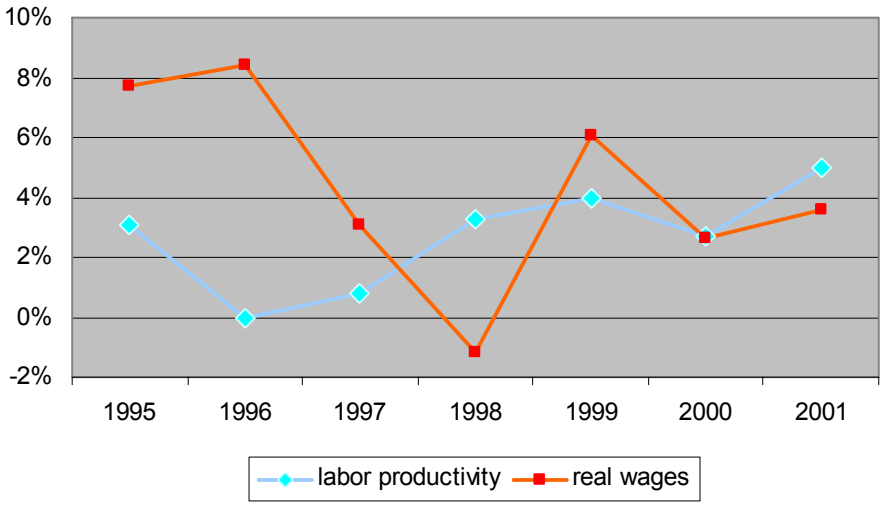
	Elementary	Apprenticeships	Full secondary	General secondary	University
Average	26.6%	70.3%	73.4%	50.0%	80.1%
Men	33.5%	78.4%	78.7%	49.9%	82.3%
Women	23.0%	58.8%	69.1%	50.1%	77.0%

Source: Czech Statistical Office.

A.5.2 Changes in labour productivity

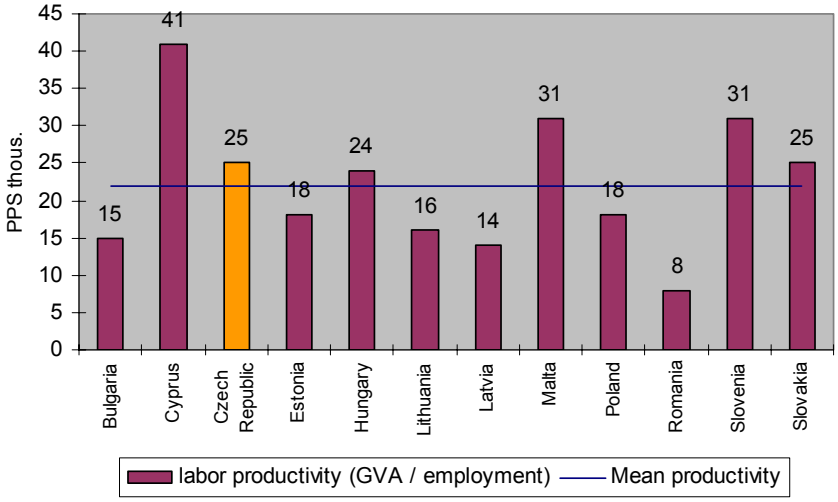
Labour productivity has been rising continuously in the last decade, except for the year 1996. The excess growth of real wages in comparison to labour productivity was prevailing in the first part of the last decade, which was a consequence of unsuccessful privatization, immaturity of social partners and government passivity. The development of real wages in comparison to the labour productivity was more favourable in the last 5 years.

Graph A.15: Changes in labour productivity and wages.



Source: Ministry of Industry and Trade, Czech Statistical Office.

With respect to regional comparison of labour productivity in CC13 the Czech Republic stands together with Slovakia on the fourth-fifth place with Gross Value Added of 25 thousand PPS[2] per employee per year. Cyprus displays the most productive figures, with 41 thousand PPS of Gross Value Added per person; Malta and Slovenia follow with 31 thousand PPS. Romania was the last one with 8 thousand PPS; the data for Turkey are not available. The mean labour productivity amounted to 22 thousand PPS and therefore the Czech Republic is slightly above average.

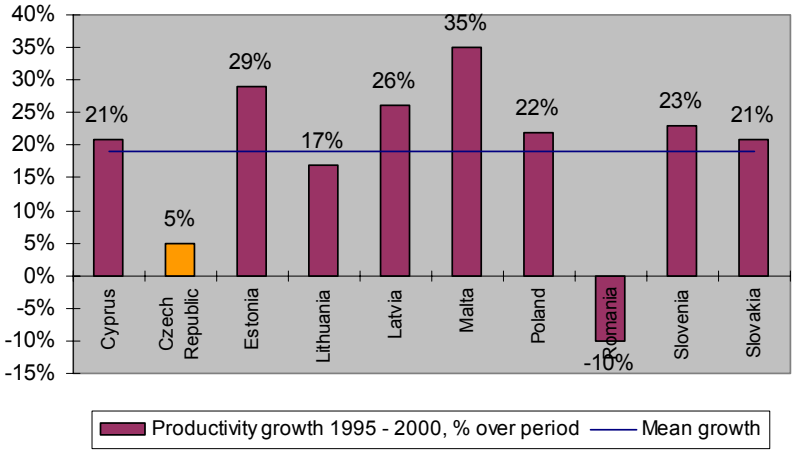


Graph A.16: Labour productivity comparison in CC13 (year 2000).

Source: Eurostat, Theme 2-17/2002, Candidate Countries' National Accounts.

Although the labour productivity level of the Czech Republic was favourable, the growth rate in the period 1995-2000 is significantly below average (19%) with only 5%[3] and therefore it is the last one from countries exhibiting positive growth. This may be also attributed to structural weaknesses of the Czech economy, especially persisting over-employment.

Graph A.17: Labour productivity growth comparison in CC13 (1995-2000).



Source: Eurostat, Theme 2-17/2002, Candidate Countries' National Accounts.

[2] The basis of the estimates in PPS are the 1999 European Comparison Programme results published by OECD/Eurostat. GDP-level Purchasing Power Parities are used to calculate figures in PPS.

[3] This figure is different from cumulation of growths in the Graph A.15 due to PPS conversion.

A.6 Major structural changes

A.6.1 Employment by sectors

Trend of decreasing share of employment in primary and secondary sector and increasing employment in tertiary sector continues. The share of employment in the tertiary sector currently exceeds 55%.

	year	1993	1994	1995	1996	1997	1998	1999	2000	2001
Agriculture and fishery	thousand	501	437	423	395	373	353	325	311	293
	%	10.3%	8.9%	8.5%	8.0%	7.6%	7.2%	6.8%	6.6%	6.2%
Industry and construction	thousand	1 967	1 979	1 979	1 975	1 942	1 906	1 835	1 798	1 833
	%	40.4%	40.2%	39.9%	39.7%	39.3%	39.2%	38.5%	38.0%	38.6%
Private services	thousand	1 335	1 432	1 491	1 534	1 555	1 541	1 524	1 508	1 492
	%	27.4%	29.1%	30.0%	30.9%	31.5%	31.7%	32.0%	31.9%	31.4%
Public services	thousand	1 071	1 078	1 069	1 067	1 066	1 066	1 081	1 114	1 132
	%	22.0%	21.9%	21.5%	21.5%	21.6%	21.9%	22.7%	23.6%	23.8%
TOTAL		**4 874**	**4 927**	**4 963**	**4 972**	**4 937**	**4 866**	**4 764**	**4 732**	**4 750**

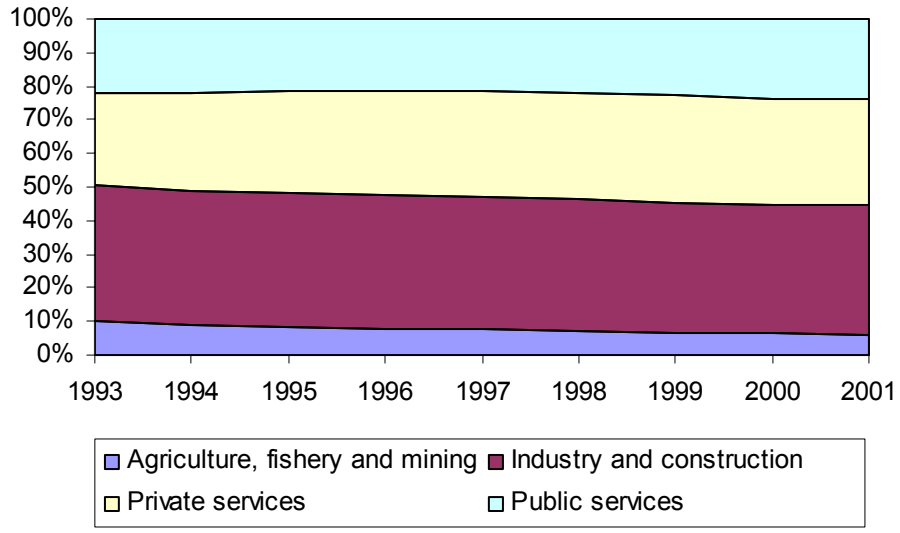
Source: Czech Statistical Office.

Table A.3: Employee shares according to sectors.

Despite the above-mentioned development the share of tertiary sector in CR lags behind the developed countries (the EU countries reach on average almost 66 %). This sector is perspective in the absorption of labour force in so-called quarter sector (strategic services, IT technologies, eBusiness) and rise of its share in employment is expected in the near future.

The **first signs of the quarter sector** appearance are well visible. One of the Czech cellular operators (Český Mobil) has already located its **development facilities** in cooperation with Ericsson at the Czech Technical University Prague.
A **global dispatching centre of DHL**, a worldwide fast transportation company, will be opened in Prague in 2004 employing many hundreds of PC software developers and administrators.

Graph A.18: Employment by sectors.

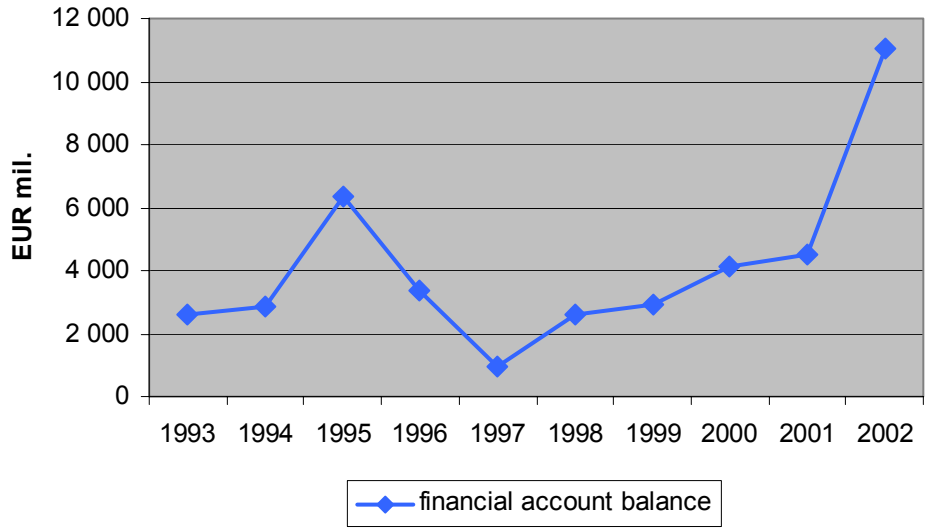


Source: Czech Statistical Office.

A.7 Changes in cross border capital flows

The financial account of the Czech Republic has almost always recorded high positive values. In the period 1994 – 1997, when the exchange rate was stable and interest rates were multiples of their Western counterparts most of foreign investment consisted of portfolio investment and direct lending. However, the trend of last five years is completely different with prevalence of **foreign direct investment**. Since every country now competes for foreign investment, it is partially also a success of the Czech agency CzechInvest promoting FDI. The jump in 2002 was caused by already mentioned privatization of the entire Czech gas industry (Trangas etc.) with a single investment of EUR 4.3 bn.

Graph A.19: Financial account balance (EUR million).



Source: Czech National Bank.

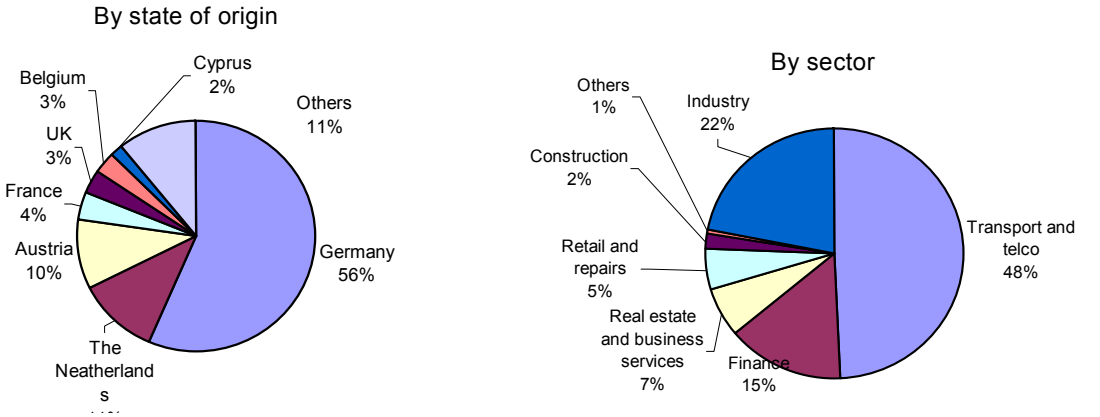
A.7.1 Foreign direct investment

Cooling of the world economy has weakened capital movements in the world. This affected above all investors from the USA and Japan and their willingness to worldwide investment (especially to Europe). However, in the Czech Republic strong inflow of direct foreign investment continued also in 2002 and rose by 28.7% in comparison to 2001 up to ca 8 437 million USD. It was the highest yearly inflow of FDI in the last decade that was strongly influenced by the privatization of the whole Czech natural gas industry (company Transgas – the monopoly importer of natural gas and eight natural gas distributing companies) to a German utility company RWE. Without the influence of this privatization the y-o-y FDI would have fallen down by 30%.

The sale of Transgas also strongly influenced the territorial and sector structure of FDI. In 2002, more than 56% of this investment originated from Germany, followed by Netherlands with notably lower share (11.3%) and Austria (9.6%).

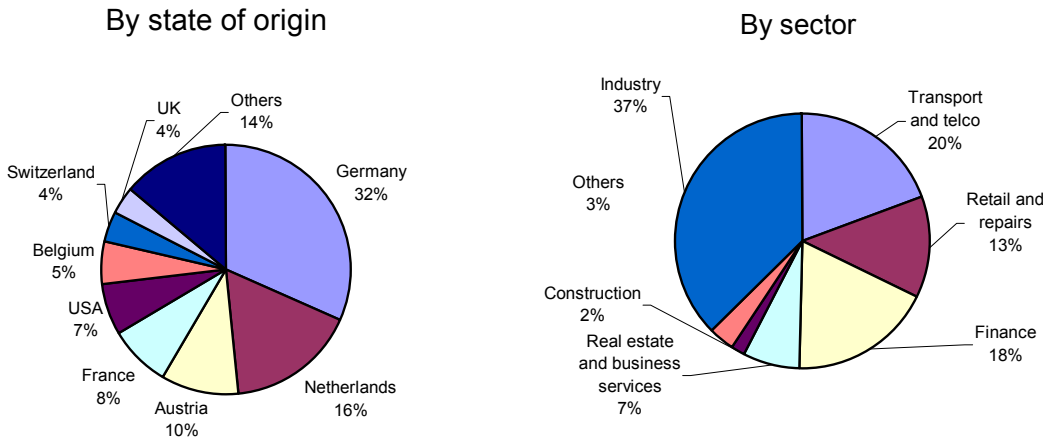
Concerning sector structure, more than half of the FDI was directed to transport and communication, nearly 15 % to financial and insurance sectors and 5% to trade and repairs. Only 22% was directed to non-business non-financial sector.

Graph A.20: Structure of FDI in 2002.



Source: Czech Statistical Office

In 1993-2002 Czech Republic received ca EUR 35.1 bn of FDI out of which almost one third originated from Germany (31.6%), the Netherlands at the second place with 16.5%, followed by Austria with 10.2%, France with 7.9% and USA with 7%. In sector division, ca 60% of FDI was directed to services, industry participated on total FDI inflow with 37.4%.



Graph A.21: Structure of FDI in 1993-2002.

Source: Czech Statistical Office.

The processing industry gained between 1993 and 2002 ca EUR 10.9 bn. of FDI and participated on total inflow with ca 37%. In this aggregate of industry the major part of FDI flow was directed to vehicles manufacturing, electricity and optical appliances construction, machine and equipment construction, metal and metal goods, food and tobacco and to production of glass, ceramic, porcelain and construction materials.

CzechInvest is the agency subordinated to the Ministry of Industry concentrating on the system of investment incentives and support of the development of industry zones.

A.8 Conclusion and SWOT analysis

The Czech economy has reached quite balanced macroeconomic position, which was preceded by high fluctuation in the transformation of the nineties. Czech economic growth is highly dependent on the performance of the western European countries. Close future development will be mostly influenced by the economic cycle in Germany and other surrounding countries.

Some structural and unsolved issues remain, e.g. pension and tax system reform, slow judicature, weak law enforcement (lengthy corporation establishment, obstacles to real estate transfer, insufficient protection of creditors, inefficient prosecution of white-collars crime etc.). Structural problems might be one of the reasons of high unemployment.

The accession to EU is expected to be a foreign investment-fostering event. FDI has shaped the performance of economy in recent years. FDI is aimed at automotive industry, transport and telecommunication, finance, retailing and also electronic devices manufacturing.

In 2002 devastating floods affected Czech economy, but no severe economic unbalances were caused. The condition of the economy and its performance is obviously also determined by the governmental ICT policies. For example, implementing computerized systems for state administration would (or will) foster transparency and lower transaction costs of tax payments.

A.8.1 Summary

- Czech economy does not grow much faster than other EU 15 Member States.
- GDP in PPP is at about 58% of the EU average
- Foreign companies show significant positive influence on capital inflow, labour productivity and implementation of IT.
- Public debt is not a serious problem so far.
- Public finance deficit is a problem.
- Unemployment is growing and fluctuating around 10 % level.
- Real wages are continuously growing, labour productivity lags behind it decreasing competitiveness of the Czech labour force.
- FDI level is high in recent years due to investment incentives and large privatization projects.
- Regional disparities are largely due to former industrial geographical distribution.

A.8.2 SWOT

Strengths	Weaknesses
• **Stable economic environment.** • **Developing market and its possible growth.** • **Flexible economy.** • **Strong FDI.** • **Traditionally industrial country, having inherited the rather dynamic parts of the ex-Czechoslovak industry.**	• Low domestic capital. • Imbalance of public finances. • Unfinished restructuring. • Social state, large state administration. • Appreciation of the Czech crown. • Growing long-term unemployment. • Export dependency on specific markets (Germany).
Opportunities	**Threats**
• EU accession. • Close economic relations to Germany. • Possible growth of demand connected with high growth of real wages. • Intensive FDI flows.	• Costly implementation of EU Acquis. • Recession in Western Europe. • Growing labour costs in comparison to other CCs. • Unemployment. • Pending pension reform.

A.8.3 SWOT IS

Flexible economy is an important factor of IT. We have to take into consideration that the trends in IST are not always going in the predicted direction. For example, Internet boom and fall we experienced recently showed us that not everything expected in IT is going to happen. So, we suggest that Czech economy, which bears certain level of flexibility due to recent transformation, could absorb shocks brought by changes in world IST tendencies.

Strong FDI. The firms with foreign capital are generally more exploiting new technologies. They are bringing new technologies from abroad. The spillover effects cannot be expressed well only in numbers, but in qualitative-educational way. Also, foreign firms do handle with intellectual property rights more in a western manner.

EU accession will definitely have also its IST influence. Administration in the Czech Republic is not on the same technological level as in the EU and the accession will require updating or replacing of obsolete administration systems.

Public Financial imbalance might prevent public authorities in entering costly ICT-related projects on infrastructures, education, eGovernment, taxation schemes, etc.

Low domestic capital can cause domestic producers fall behind the fast technologic evolution in the world, closing the door to the world markets and loosing competitiveness. Once they lose the world pace it is virtually impossible to catch up again.

Unfinished restructuring is certainly significant when new technologies or systems are being implemented and are incompatible with the old ones. But, this can also be an advantage. For example, we have seen that out-of-date fixed telephone network can foster mobile telephony boom.

Growing labour costs. Low wages were always a good incentive for foreign investors. Once the Czech wages are close enough to the level of wages in the EU countries, the advantage is over and it surely makes some investors leave.

B NATIONAL AND REGIONAL IS POLICIES

B.1 Institutional settings and their influence on IS policies

The Czech Republic appeared on the world's map in 1993 after splitting of the former Czechoslovakia. Between 1948 and 1989 Czechoslovakia was part of the Communist block led by the Soviet Union.

After the beginning of the transition wave Czechoslovakia remained a federation consisting of two states: the Czech Republic and the Slovak Republic. At each level (federal, state) there was a legislature (parliament), executive body (the government) and judicial branch (supreme court).

The Parliament on the federal level was a two chamber one; the first chamber (the house of people) was elected in the whole federation in equally large districts, so that its composition reflected different number of inhabitants in each respective republic. The second chamber (the house of nations) had the equal number of members from each republic. The Parliament on the national level was a one-chamber one. Each chamber of each parliament was elected on the basis of proportional representation.

After the establishment of the Czech Republic all the federal bodies were dissolved, and the bodies at the national level became the only ones. Until 1998 the parliament was a single chamber one, in 1998 Senate was added, which is elected through more-round majority election.

Nevertheless, concerning the **bodies relevant more for IST sector**, much more important are executive bodies. In the government these departments are of key importance:

- Ministry of Informatics (established 2002),
- Ministry of Transport and Telecommunication,
- Ministry of Industry and Trade.

Also **other ministries** have some importance as policies related to IST are being compiled almost by each department:

- Ministry of Education (coordinates diffusion of IST in education etc.),
- Ministry of Interior (protection of personal data, ID card development, unification of all public information systems),
- Ministry of Regional Development (regional IST policies),
- Ministry of Finance (tax returns over Internet etc.).

Outside the government there are other state authorities relevant for IST:

- Czech Telecommunication Office,
- The Office for Protection of Economic Competition ("Anti-monopoly office").

To **briefly assess the functioning** of these institutions, several aspects need to be taken into consideration:

- **Commitment and human resources.** Now it seems that the most committed institution of the above-mentioned ones is the newest – the **Ministry of Informatics**. It comments all evolutions on the IT and telecommunication market, and according to opinion pools, it is trustworthy. Its staff is young and enthusiastic. However, its opponents consider it to be purely public relations institution. Other ministries have IT and all information related aspects as their by-products, also its personnel is sometimes incapable and without relevant knowledge. From non-governmental institutions the best equipped and with good reputation is the **Czech Telecommunication Office**.

- **Budget.** The budgets of traditional ministries exceed that of the new one, however, only fraction of them is devoted purely to IT. In the best financial position with relation to IT we consider to be the **Czech Telecommunication Office** and the Ministry of Education (programme Internet for Schools). The resources of the Ministry of Informatics are scarce.
- **Implementation of their decisions.** The implementation capabilities are best developed at the **Czech Telecommunication Office** with clear vision and powers. On the other hand the most problematic ministries are that of education, regional development and interior; the visions of which are less apparent and their decisions are sometimes blamed for corruptive behaviour.
- **Enforcing laws or norms.** The most active in the field of proposing new legislation is the **Ministry of Informatics**. However, these legal norms do not have extensive field of activity and are not considered to be the key ones. On the other hand the **Czech Telecommunication Office** does not issue many proposals, but in most cases they concern companies with turnovers in billions of CZK (like amendments to the Telecommunication Act).

B.2 Chronological description of all national and regional IS policies

The **general information policy** was adopted in May 31st, 1999 under the title "The State Information Policy - The Road towards an Information Society." The information policies in other sectors are based on it and follow to the general policy into particular details. On April 25th, 2001 the Czech Republic approached also the **action programme eEurope** promoted especially by Romano Prodi. The state **information policy in education** has been set as its conception on April 10th, 2000, which is subdivided into two stages. The **Action Plan for the State Information Policy** approved on May 31st, 2000 contains concrete measures necessary for building up the Information Society. The **National Telecommunication Policy** was announced on 26th April 1999 to open up the telecommunication sector to the free market.

Other state policies obviously also have an impact on the development of the Information Society, but they cannot be called as pure IS policies. Among them belong the conception of **regional policy** in the Czech Republic that also supports the informatization of regions and national S&T and R&D policy till 2010 and it was approved on 6th January 2000.

B.2.1 General policy

The **national IS Policy** has been adopted by the government of the Czech Republic as a resolution No. 525 of May 31st, 1999. It contains all the important measures concerning the support of the Information society and its subtitle is "The State Information Policy - The Road towards an Information Society."

The government's strategic document specified the **following eight basic priorities**:

1. To achieve **information literacy** by all citizens,
2. To put into practice the citizen's right of **direct access to information,**
3. Using information technologies to improve the services pr**ovided to public by the public administration,**
4. To build a **communication infrastructure** as a pre-requisite for the development of an Information Society,
5. To ensure **trustworthiness, security and order** in the specific conditions of the Information Society, with the use of electronic identifiers and the provision of personal data protection,
6. To foster the conditions for the development of **eCommerce** in the Czech Republic, as a necessary pre-condition for its integration into the global economy,
7. To foster a **transparent business environment** and to subject the management of public funds to public control,
8. To ensure the **stability and security** in the Information Society.

An integral part of the conception of the national information policy and its application is **international co-operation**. The main objective is the gradual integration of the Czech Republic in the global process of the emerging Information Society. The first priority is co-operation with the EU, NATO and OECD.

Among the **most important issues** the state information policy deals with are:

- **Personal data protection**,
- **Information democracy**, which will allow for cheap and easy access to public information by the public,
- **Electronic data exchange** among the public administration bodies (IDA),
- Development of **eCommerce.**

All of the priorities referred to in national policy are compatible with acquis communautaire.

B.2.2 eEurope initiative

The Czech Republic has reflected to Prodi's initiative "eEurope". According to the resolution of the government No. 405 of April 25th, 2001 the Czech Republic approached the action programme eEurope. The goals the domestic administration adopted are as follows:

1. European Youth into the Digital Age,
2. Cheaper Internet Access,
3. Accelerating eCommerce,
4. Fast Internet for Researchers and Students,
5. Smart cards for Secure Electronic Access,
6. Risk capital for high-tech SMEs,
7. Participation of the Disabled,
8. Healthcare online,
9. Intelligent transport,
10. Government Online.

B.2.3 Education

The state information policy in education has been set by the **Conception of the state information policy in education**, which the government of the Czech Republic adopted as a resolution No. 351 on April 10th, 2000. This resolution assigns the Ministry of Education to elaborate and annually update the schedule of realization of the Conception detailed into individual programmes of support of education for information literacy.

The Conception lays down the objectives in the field of the information literacy of teachers, students, citizens, public administration and state employees and health care and library employees. The fulfilling of objectives and tasks of the Conception is within competence of individual ministries.

The plan of the realization of the state information policy in education is subdivided into **two stages**. **The first stage** deals with the issue of information technology literacy at schools:

B.2.3.1 Objectives

1. Establish the conditions of an **effective ICT implementation** into elementary and secondary schools, specialized schools and apprenticeships education and reach "**information literacy**" of the school leavers until 2005.
2. Until the end of 2001 at least **70% of** elementary and secondary **schools**, specialized schools, apprenticeships and higher schools should have at least **one schoolroom equipped with high performance multimedia computers** open to students and teachers

also beyond the scope of classes. Each schoolroom should be connected to Internet. Remaining **30% of schools** should have at least one **high performance multimedia computer connected to Internet.**

3. ICTs should become **day-to-day instrument of 75% teachers** until the end of 2005.
4. To create conditions at schools for **effective life long education** of citizens in the ICT field until the end of 2005.

The gradual implementation of the targets is planned over a **five years time span** subject to available budget with the following plan:

Targe ts	2001	2002	2003	2004	2005
Percentage of schools with a schoolroom equipped with multimedia computers connected to internet	70%	90%	100%	100%	100%
Percentage of teachers using ICT services	30%	55%	75%	75%	75%
Percentage of pupils using ICT services	100%	100%	100%	100%	100%

Table B.1: Targets of information policy in education.

The plan is divided into **three projects** with following budgets:

Table B.2: Budget of the three projects of the plan.

Project		2001	2002	2003	2004	2005	TOTAL
		EUR th.	EUR th.	EUR th	EUR th	EUR th.	EUR th.
Project I	Information literacy	9 524	12 698	13 778	11 587	10 254	57 841
Project II	Education SW and IT sources	6 349	7 619	6 873	2 508	1 905	25 254
Project III	Infrastructure	41 905	34 921	33 619	19 873	17 619	147 937
Coordination center		660	635	635	349	292	2 571
Total budget of 1st stage		**58 438**	**55 873**	**54 905**	**34 317**	**30 070**	**233 603**

B.2.3.2 Project 1: Information literacy – targets

- 75% of teachers should reach basic user capabilities. Teachers should be tested and should acquire internationally valid certificate **ECDL Start** (European Computer Driving License).
- Motivate schools in the field of ICT use.
- 25 % teachers should be educated to a more sophisticated level.

B.2.3.3 Project 2: Education SW and IT sources – targets

- Integrate ICTs into education and day-to-day operation of schools through the network connection installed at schools.
- Establish conditions for creative searching and new methods of work and learning in the information environment.
- Spread well-proven ways, algorithms and instruments for broader usage from foreign experience.

B.2.3.4 Project 3: Infrastructure – targets

- Within 5 years, Internet access and selected services of information and communication infrastructure should be available to all teachers and at least 8% of pupils.
- All schools should be equipped with an adequate local area network. This should be realized within 3 years.

The plan of **the second stage** deals mainly with the issues of **further education of the public** in information technologies and further improvement of information literacy of the public. The **key objectives** are focused on the following projects:

1. Framework for integration of ICT into the system of **life long education** and provision of information infrastructure.
2. Conditions for **improvement information literacy of public administration employees and librarians**. Promote public information **services of libraries** and establish access to the information from the public administration to citizens.
3. Establishment of conditions for improvement **information literacy of citizens**, especially **disabled, unemployed and handicapped ones and** those in **structurally affected regions.**

B.2.4 The objectives of other ministries:

The **other ministries do not have their own particular IS policies**, but their objectives are to some extent interconnected with the general IS policy (like Ministry of Interior – eGovernment, Ministry of Culture – ICT in libraries, Ministry of Healthcare – healthcare online, Ministry of Labour and Social Affairs – re-qualification in ICT fields and life long education…). Their objectives will be therefore only briefly mentioned:

B.2.4.1 Ministry of Culture – Public information sources of libraries

The main objective is innovation of public information sources of libraries on the IST basis. Public services shall be focused on provision of public access points including access to public administration information, support to life-long training, provision of information for support of tourism and document intermediation for R&D and cultural heritage preservation.

B.2.4.2 Ministry of Labour and Social Affairs

The Ministry of Labour and Social Affairs intends to specialize on achievement of IT literacy of persons, whose approach to up-to-date technology is limited. The target groups are the disabled persons, the old aged pensioners, unemployed and citizens in structurally affected regions.

B.2.4.3 Ministry of Interior

Ministry of Interior focuses on implementation (together with the Ministry of Informatics) of eGovernment, informatization of public administration and improvement of communication of local authorities with central administration bodies. It also intends to educate public administration employees in IS skills.

B.2.4.4 Ministry of Justice

The main objective of the information policy of the Ministry of Justice is the establishment of the **Justice Academy** providing (among others) education in IS related subjects to judicial and legal expectants, judges and public prosecutors, officers of the probation and mediation service and employees of the Ministry of Justice.

B.2.5 Action plans

The **Action Plan for the State Information Policy** (approved by the resolution of the Government No. 527 of May 31st, 2000) contains concrete measures necessary for building up the Information Society. The projects are divided into the eight framework programmes as defined in the IS policy:

Table B.3: Action Plan of the State Information Policy.

State information policy (SIP) priority	eEurope+ targets [National Action Plan (AP) eEurope+]	Action Plan of the State information policy
I. Information literacy	1. Cheaper, faster, safer internet 2. Investment into people and capabilities	**Framework program Information Literacy** Project Information Literacy Project public information services of libraries Project public administration employees education
II. Information democracy	2. Investment into people and capabilities 3. Internet use support	**Framework program electronic public administration** Program public information services / information sources Project deed collection Project official boards of courts Project monitoring of land-use planning Project IS of research and development Program communication channels for citizen's contact with public administration Project public information service Portal Public administration contact points Kiosks Project e-health Punishment register
III. Development of public administration information systems (e-government)	0. Accelerated realization of fundamental elements of the information society 2. Investment into people and capabilities 3. Internet use support	**Framework program electronic public administration** Program electronic services of public administration Project reference interface Project metasystem of public information services Project reengineering Project registers Project documents circulation among central administration bodies Project national geographic infrastructure
IV. Communication infrastructure	0. Accelerated realization of fundamental elements of the information society 1. Cheaper, faster, safer internet	**Framework program electronic public administration** Program electronic services of public administration Project communication infrastructure
V. Trustworthiness, security and order in the IS and personal data protection	1. Cheaper, faster, safer internet	**Framework program electronic public administration** Project IS security in public administration Program persons' identification Project Electronic identifiers
VI. E-commerce	3. Internet use support	**Framework program e-commerce** Program Green book on e-commerce Program Accreditation infrastructure **Framework program electronic public administration** Program public information services / information sources Project IS of public procurement
VII. Transparent business environment	3. Internet use support	**Framework program electronic public administration** Program public information services / information sources Project Integrated system for entrepreneurship and export Project IS of intellectual property Project Monitoring of structural funds
VIII. Stability and security in the	3. Internet use support	**Framework program electronic public administration** Project crises management

B.2.6 Regional IS policies

The basic conceptual document of regional policy in the Czech Republic until 2010 is "**The Czech Republic's Regional Development Strategy**" which the Cabinet approved in July 1999. One of the objectives in the implementation phase of the strategy secures support for regional development in terms of information.

In order to provide information on various aspects of regional economic development and to support development programmes the Ministry for Regional Development established in 1997 the Regional Development Centre of the Czech Republic (RDC). One of the principal tasks of the RDC is to

provide support for regional development in the area of information systems through co-ordination of the construction of **Regional Information Systems** (RIS) in the individual regions. RIS are primarily oriented not only towards economic development of the regions but also towards other aspects of regional development (cultural, tourism, etc.).

The RIS, which will be set up in the regions where CBC (cross border cooperation) Phare programmes are not active, will be financed, where possible, from another EU programmes, from the state budget, or from the RDCs own resources. In the course of fulfilling the coordinating role in the RDC the view has prevailed that it would be useful to build up, apart from the RIS, which are individual information systems, an umbrella central information system, which would integrate RISs. This **Central Information System** has been designated as the Integrated Regional Information System (IRIS)

B.2.7 Telecommunication Policy

A **National Telecommunication Policy** (NTP) was announced on 26th April 1999 to open up the telecommunication sector to the free market. The objective of NTP was to provide good quality, reliable telecommunication services comparable to those existing in the developed EU countries, and to integrate the Czech Republic into the 21st century global information society. The NTP is based on European regulatory telecommunication sector reforms.

The Czech Republic ratified the Agreement on Basic Telecommunication Services to implement liberal telecommunication principles and open all its telecommunication markets by 1st January 1998, except voice telephony (by 1st January 2001). Individual licenses are required for public infrastructure provision, broadcasting, transport services and public voice telephony. All other services are required to meet the provisions of the commercial licensing law and general licenses issued by the regulator.

B.2.7.1 The key features of the policy are:

- **To accomplish liberalization of the telecommunication market.**

All the telecommunication markets have been liberalized since 1st January 1998 with the exception of the voice telephony. The progress in the field of liberalization of the voice telephony has been made with the introduction of the carrier selection facility in July 2002. The Czech Telecommunication Office has granted prefixes to all operators that intend to enter the market in July 2002. The legal framework for the number portability facility is set in the Telecommunication Act and effective since January 2003. Currently reference offers on local loop unbundling (LLU) are presented to the Czech Telecommunication Office and therefore the Czech telecommunication market has the same liberal features as the markets in the EU.

- **To provide universal service**

The universal service is defined in the Telecommunication Act as the right of connection to the public telephone network at fixed location, provision of information services on subscriber numbers, payphone services and special measures for disabled. There might be more providers of universal service, however so far it has been only the incumbent Český Telecom. The additional costs of the US provider are covered from contributions of other operators.

- **To establish an autonomous national telecommunication regulatory authority**

The Czech Telecommunication Office has been set up on the basis of the Telecommunication Act No. 151/2000 Col., on July 1st, 2000 as an independent state administration office within the competence of the Government of the Czech Republic in the field of the telecommunication regulation.

- **To open network provision, to facilitate entry of new businesses into the market and thus expose the incumbent Český Telecom under competition pressure**

As mentioned above, several steps leading to greater competition have been made. Even though since July 2002 call-by-call carrier selection has been introduced and in January 2003 number portability and number pre-selection feature, the competition is still weak and the position of Český Telecom is very firm. However, in August 2002 the government decided to privatize the state's majority stake in Český Telecom, which should help improve the competitive environment.

B.2.8 R&D sector policies

On January 6th, 2000 the Czech Government approved the National S&T and R&D policy. The National policy is in harmony with the existing EC legislation. It contains also a proposal of establishment of national programmes especially in the field of oriented research. The Czech Republic welcomes "The Communication of the Commission: Towards European Research Area" and is ready to participate in the actions proposed by the Commission.

The policy promotes among others R&D in the field of ICT especially through the Czech Academy of Sciences (ČAV – Česká akademie věd) and Grant Agency (GA – Grantová agentura); financial resources are allocated annually to different research programmes. The most important receivers of financial sources are Research Institute for Information and Automation (ÚTIA - Ústav teorie informace a automatizace) and Mathematical-Physical faculty of Charles University (MFF UK). With respect to cybernetics and numerical control the faculty of Electrical Engineering of the Czech Technical University (FEL ČVUT) is involved. For further details see section D.5.5 on Academic R&D.

B.3 Results and evaluation

The most **important objectives** of the government were set forth in the state information policy and the action plan eEurope+.

B.3.1 State information policy

The targets of the former are being implemented as follows:

Information literacy by all citizens is still only an objective, some improvements have been reached in **education sector** and through re-qualification secured by job offices.

Citizens are able to get **direct access** to **information** only from certain offices; electronic registered mail with state authorities is still just a challenge. Concerning local authorities, the situation depends on enthusiasm of the clerks – some municipalities post on the web whatever they have, some towns do not have their webs at all. The situation is nevertheless continuously improving, partially also thank to pressure from the Ministry of Informatics.

Public administration eServices are thus also limited, and coordination sometimes fails - it always depends on the staff and management of offices. **Transparency over state funds** through electronic means belongs to the same category as direct access to information – it is ridiculous to require direct access to public fund allocation if many state run programmes in this field are suspect of corruption…

In the field of **personal data protection**, an independent supervisory authority has been formed - the Office for Personal Data Protection. Its activities are well visible and contribute predominantly to personal data misuse prevention.

Within the scope of the development of the **Public Administration Information Systems** (PAIS), **data exchange among the public administration** bodies will improve the efficiency of public administration. They are also going to be gradually integrated into the Trans-European telematic networks. The Czech Republic actively participates in the **IDA II** programme.

In the field of **eCommerce**, the EU framework has been adopted into national legislation through the Act No. 227/2000 Col. on **electronic signature** and amended with the Acts No. 226/2002 Col. and 517/2002 Col.

B.3.2 eEurope initiative

The results of eEurope initiative are not easy to assess, as it seems evident that most of achievements described below **would have happened otherwise** as well. We can not deny that some push is necessary, where it is required to make state authorities move, it is surely the case of education of teachers, fast Internet at universities (TEN networks) or healthcare online (individual healthcare accounts function only at the largest and stately owned health insurer!).

Therefore it is probable that success stories attributed to eEurope would be achieved anyway as a private, profit seeking initiative (flat Internet rate, ADSL, eCommerce – always the similar cases), and

the state proclaims it as filling of the objectives of eEurope initiative. The overall assessment of eEurope's impact on Czech IT literacy is ambiguous; but the same judgment can be made on any state policy… Even if it does not help, it does not make anyone worse off. Lets summarize the individual bullets:

1. European Youth into the Digital Age

The development in this field is based on the State Information Policy in Education. The most important achievement was equipment of 3 500 schools with Internet connected computers (programme "**Internet for Schools**"); nevertheless everything has its "but" – currently the public assignment is prosecuted by the police with corruption suspicion.

Other favourable development is improvement of information literacy of teachers and obligatory **ECDL Start** will force the teachers to achieve some degree of information literacy.

2. Cheaper Internet Access

Current efforts in the Czech Republic are aimed in three directions:

- The dominant operator, Český Telecom, a.s. has introduced a special Internet rate, which is advantageous for longer connections,
- In 2003 ADSL has been commercially launched,
- In 2003 first GPRS flat rate was introduced.

Apparently all these achievements would have happened despite the existence of the eEurope initiative. Current (September 2003) **approval of increased VAT on telecommunication from 5% to 22%** since 2004 is surely not in line with any IST supportive proclamations.

3. Accelerating eCommerce

A number of Cabinet measures have been prepared. The key is the Electronic Signature Act No. 227/2000. However eCommerce is still not a day-to-day practice either as B2B, or B2C with exception of large companies with trustworthy trading counterparts.

4. Fast Internet for Researchers and Students

The Czech Republic has taken part thus far in all European initiatives within the scope of TEN and is prepared to continue to do so in the future.

5. Smart cards for Secure Electronic Access

A project is in preparation under the name of "The Utilization of Electronic Identifiers in the Public Administration" with the objective of setting up the data, legal, standardization and organizational conditions for the issuance of electronic identifiers to the public and to organizations as a follow-up to the Electronic Signature Act.

6. Risk capital for high-tech SMEs

On the basis of the eEurope initiative, a working group responsible for this area exists.

7. Participation for the Disabled

On the basis of the eEurope initiative, a working group responsible for this area exists.

8. Healthcare online

A project titled "Electronic Form of Medical Reports" is being prepared with the objective of setting up the legal, technological, standardization and security conditions for the utilization of medical documentation in an electronic form and for the facilitation of electronic communication at the level patient-physician (health facility) - health insurance company – pharmacy.

9. Intelligent transport

Apart from the timetables of public means of transport (IDOS mentioned in next chapters) there are no important achievements in this field.

10. Government online

First attempts of communication with state authorities by electronic means are being made. Some simpler tax returns may be handed over the Internet and commercial and land registers have been placed on the web as well. Problems might be seen regarding the willingness of citizens to communicate electronically and regarding the IT literacy of state servants.

B.3.3 Education

The results of the state policy in education are ambiguous. On one hand, equipment of schools with computers connected to Internet was necessary and no one questions it. The other side of the coin is the selection method of the implementation company, the allocation of costs and the results.

So far all the resources for the programme "Internet for Schools" have been exhausted, but not all target schools are now equipped with Internet capable PCs, as it had been expected before. One billion CZK (i.e. EUR 31 million) was spent on teachers' wages instead of hardware. The public procurement procedure of this project is now under the police prosecution.

The overall results are not that black. Teachers are eventually forced to improve their IT literacy, which will not be based on some weak evaluation method, but on the internationally recognized certificate "ECDL Start". The new minister of education intends to reassess all the programmes and hopefully the future development will not only improve IT literacy of pupils and teachers, but also save public finance.

B.3.4 Telecommunication Policy

The telecommunication policy currently covers all questions regarding telecommunication market and in most aspects it copies the patterns in developed markets. Since the incumbent Český Telecom is still under majority state ownership, the independence of the Czech Telecommunication Office is sometimes questioned. The privatization is scheduled to take place either in 2004 or 2005 and therefore the state administration needs to have the company in good financial position.

However, if the CTO officers really favour the state interests and not those of consumers and other market participants, it is not the fault of the telecommunication policy itself, it cannot solve the issues of conflict of interests. The problems are sometimes seen in velocity of implementation of the policy: the liberalization of voice telephony was postponed several times and regulation of ADSL broadband market (CATV is not regulated) is also lagged. Anyway, if CTO is about to protect the interest of customers, one would expect its opposition against imposing higher VAT rate on telecommunication services (from 5% to 22%), but no protests have been ever seen…

To conclude: CTO is a typical state authority, which cannot ignore other state interests. Its personnel are quite well qualified and seem to know what they do.

B.3.5 R&D sector policies

The results of policy in R&D sector are not convincing; one of the reasons might be the **brain drain from the state-run research institutes to the private** (especially foreign) development facilities. Despite the grants from the Grant Agency devoted to research at universities, students of ICT fields prefer working part time with a software/hardware developer on a profit basis. The situation probably will not change shortly as the prospective financing is limited due to budget cuts (but to a lesser extent than to other fields). Nevertheless it is questionable whether the state-run research promotion is efficient anyway; maybe better a mean of R&D promotion is the attraction of knowledge based FDI through CzechInvest, which already takes place (DHL logistics…).

The results of information policies in other sectors are not so apparent, therefore just briefly:

B.3.5.1 Ministry of culture

Libraries even in smaller municipalities are gradually being equipped with Internet terminals. The book catalogues are being put in electronic form, and sometimes book reservations can be made over the web form.

B.3.5.2 Ministry of labour and social affairs

Together with the Ministry of Education courses for unemployed are performed at very reasonable rates (EUR 3) – see further chapters.

B.3.5.3 Ministry of interior

As mentioned above, first steps in eGovernment are being made and some public registries are published through Internet.

B.3.5.4 Ministry of justice

This is similar case as with the Ministry of Interior – e.g. commercial register has been on the web since 1998.

B.4 Specific important actors

B.4.1 Association for information society (SPIS)

SPIS was founded i**n March 1998** as a professional association of firms active in the field of ICT (Information and Communication Technologies). Since September 1998 SPIS has been a **member of EICTA**, which brings together national associations from 14 European countries.

EICTA is the official spokesperson for the IT industry on a national and international level and as such is a partner for the European Union, OECD, WTO, GATT and other institutions. Since March 1999 SPSI has been a collective member of **The Chamber of Commerce of the CR,** since May a member of **The Association of Industry and Trade of the CR**.

The main goal of the Association is the promotion of information society. SPIS wants to raise awareness of **the importance of modern information technologies** as the basic instrument for building an effective state administration, necessary structures for the integration of the Czech Republic into European structures, and increasing the competitiveness of Czech firms. In its activities, the Association would like to expedite the rise of a truly global information society.

Forty-nine companies are Association members (20 founding members), representing the most significant subjects operating on the Czech market of information and communication technologies. These firms represent an industry, which is enjoying problem-free growth, is tremendously dynamic, constitutes a substantial part of the economy (annual turnover amounts to 7.6% of GDP in 2000), and above all creates interesting possibilities for the future. Members of the Association employ several thousand people, affect other hundreds of thousands, and bring in annual sales of roughly CZK 150 billion (EUR 4.7 billion).

B.4.2 Czech society of system integrators (CSSI)

Czech society of system integrators incorporates organizations and individuals supplying or using information technologies and information services (firms, institutions, universities). Among major objectives of CSSI belong development, management and operation of information systems, new economy and management of economic and other subjects. CSSI analyzes and publishes current conditions and trends at information technologies market both in the Czech Republic and abroad.
The aim of the society from the very beginning was to exchange information and opinions in the field of information systems and information and communication technologies. CSSI has established the magazine System Integration, organizes conferences System Integration and delivers seminars all over

the Czech Republic. Currently it offers also extensive presentation possibilities of ICT firms, their services and products in integrated and comparable form on its web site.

B.5 Conclusion and SWOT analysis

The Czech Republic partially lags behind several other CEE countries with respect to the existence of information and telecommunication policies. The first general information policy had not been adopted until 1999.

Despite the late adoption of the general policy and subsequent policies in individual departments one should appreciate it: it refers strongly to the eEurope initiative and sets the goals compatible with those in ICT developed countries. The departmental policies in most cases refer to IS objectives; among most visible are those in education, telecommunication and eGovernment promotion.

However, the implementation of the policies sometimes widely diverges from the policies' objectives:

- **Educational policy** – due to budget cuts the development of ICT in schools is limited, hardware supplied to schools with no experience and without software, nontransparent tender procedure for general supplier selection,
- **Telecommunication policy** – due to pressure from the incumbent fixed lines operator the full liberalization delayed until 2003. The independence of the regulatory office (Czech Telecommunication Office) is sometimes questioned,
- **eGovernment** – first steps are being taken, but its services are not commonly used.

B.5.1 Summary

- General ICT policy adopted in 1999, mainly in line with EU policy,
- Interdepartmental effort, with potential coordination through the new Ministry of Informatics,
- Partnerships and financing still unclear, including at regional level,
- Strong focus on information literacy improvement,
- ECDL ("driving license") in future necessary condition for teachers,
- First services of eGovernment already in operation,
- Public information systems are still underdeveloped, no register unification,
- Late telecommunication liberalization led to the development of mobile networks,
- Czech Telecommunication Office as an independent regulatory body,
- Amendments to the Telecommunication Act will allow for a greater degree of competition.

B.5.2 SWOT

Strengths	Weaknesses
• **Relatively good infrastructure.** • **eEurope conformity.**	• Limited services of eGovernment. • Lagged competition in fixed lines. • IS rhetoric prevails over political commitment. • Inefficient fund allocation.
Opportunities	**Threats**
• New Ministry of Informatics. • The role of professional NGOs.	• Insufficient implementation and awareness. • Budget cuts.

B.5.3 SWOT IS

Several IS policies are approved, but the **general ones sometimes lack the content** for implementation and **specialized polices are often prone to lobbyism** and corruption (example:

Internet for Schools). Sometimes **interest of other state bodies prevail** (delayed liberalization of telecommunication to get higher privatization proceeds).

Relatively good condition of **infrastructure** allows for easy implementation of the ICT policies. High penetration rates of voice telephony, academic networks etc. support the intentions of policy makers.

eEurope conformity with expected EU accession will improve the participation of citizens in the state administration and the data exchange of local authorities with EU central authorities will lead to a greater efficiency of the state.

However, **limited services of eGovernment** prevent the on-line population from the participation of citizens in administration and hinder the measures for administration costs saving.

Lagged competition in fixed lines is partially due to the government's privatization efforts, which, nevertheless rather caused mobile network growth and decline of fixed lines users.

The ICT community in the Czech Republic places hopes in recently established **Ministry of Informatics**. Its activities have been so far very progressive and IS promoting (like eSignature).

Non-governmental organizations incorporate the specialists from ICT sectors and often comment proposals of ICT related legislation. Their views are quite often adopted.

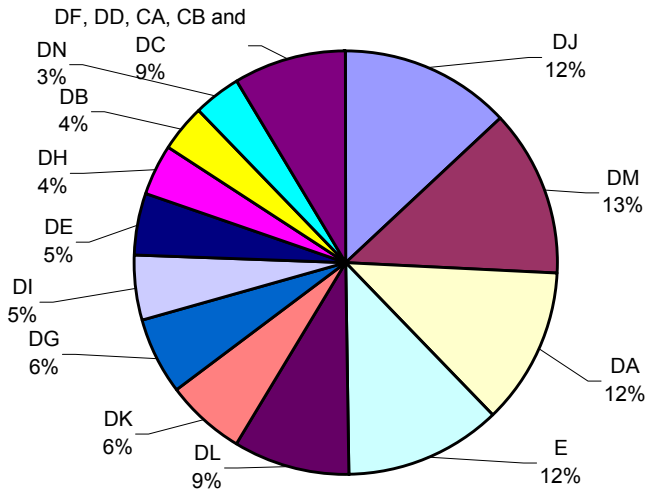
Unfortunately Czech public is still insufficiently **aware** of advantages from using **ICT** and therefore the pressure on **implementation** is very limited.

The **endeavour of the government for balanced budget** threatens implementation of expensive measures and ICT literacy might be thus hardly achieved. Already approved **VAT growth for telecommunication services from 5% to 22%** will rather inhibit the development of the information society.

C INDUSTRIAL DEVELOPMENT AND COMPETITIVENESS

C.1 Structure of industrial production

The structure of industrial production has substantially changed in the early nineties, which was caused by a complete restructuring of the Czech industry going from a centrally organized system to a decentralized capitalism. The basic trends were the decline of overall industrial production caused by several major problems as low productivity, over-employment, unclear corporate governance of the Czech economy etc.



Industry	Abbreviation	EUR mil.	%
metallurgy and metal products	DJ	7 940	13.1%
means of transport production	DM	7 675	12.7%
food processing and tobacco industry	DA	7 343	12.1%
Electricity, gas and water production and distribution	E	7 281	12.0%
electric and optical instruments	DL	5 254	8.7%
machinery and equipment for further production	DK	3 839	6.3%
Chemicals and rubber	DG	3 428	5.7%
glass, ceramics, china and construction materials	DI	3 101	5.1%
pulp & paper, printing industry, publishing	DE	2 774	4.6%
rubber and plastic production	DH	2 376	3.9%
textile and clothing industry	DB	2 235	3.7%
processing industry stated not elsewhere	DN	2 110	3.5%
coking, oil refining, nuclear fuel production, radioactive elements and compounds processing	DF	5 291	8.7%
wood processing industry	DD		
exploitation of energy raw materials	CA		
exploitation of other raw materials	CB		
leather processing industry	DC		
TOTAL		**60 646**	**100.0%**

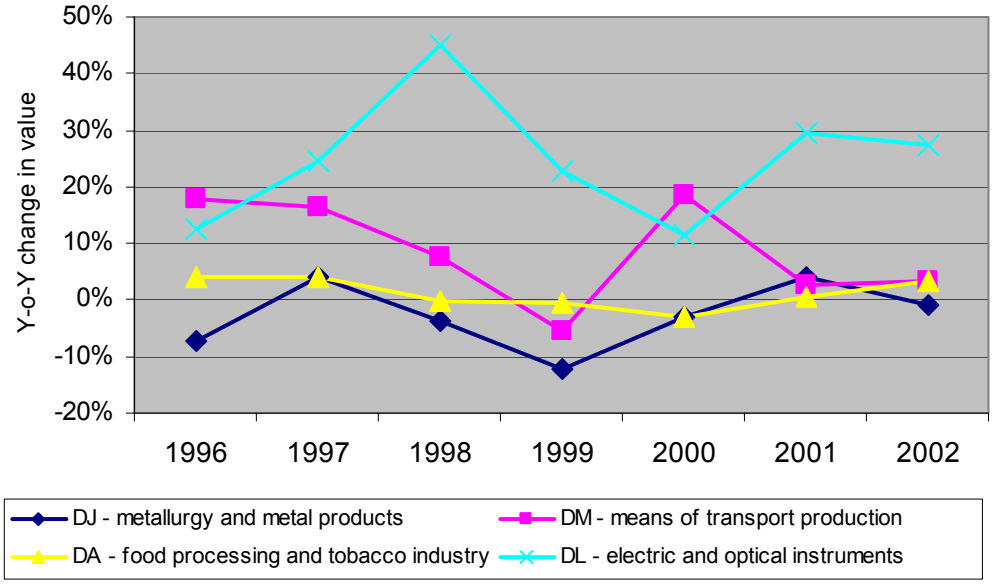
Graph C.1: Structure of the Czech industrial production (2000).

Source: Czech Statistical Office.

The current structure of the industry is depicted in Graph C.1. Though the major field of industry is still **metallurgy and metal products**, the second largest sector, a foreign investment-fostered sector, is the production of the **means of transport**. Food processing, tobacco industry and electricity, gas and water production are stable parts of industrial production due to their nature. **Electric and optical instruments** is a fast growing sector and at the same time it is a very important part of overall industrial production.

At the end of the nineties the Czech industry after several years of basic consolidation started to follow trends similar to developed countries. However, the scopes of individual industrial branches still lag behind due to lower overall performance. Generally this meant an abandonment of traditional industries like leather or raw materials processing and meant a substantial switch towards middle and partly high technologies.

Graph C.2: Recent development of Czech major industries.



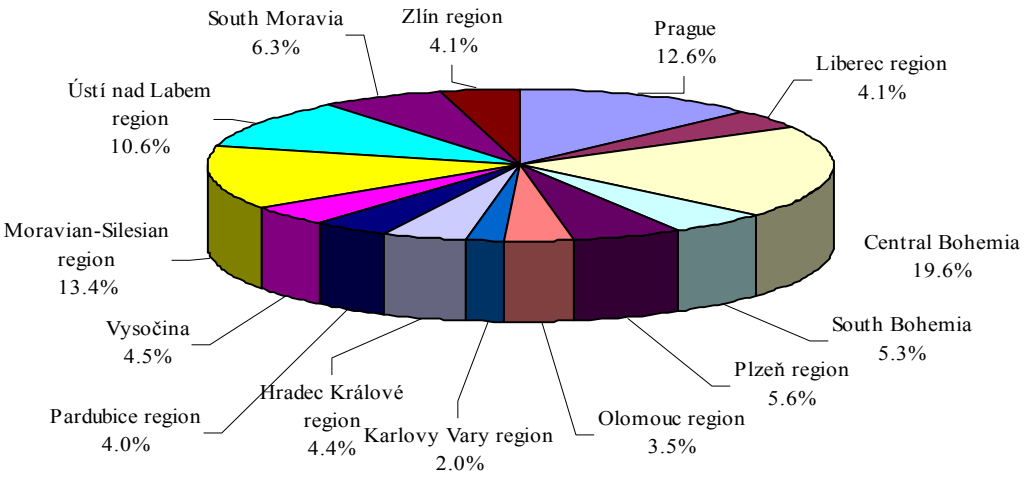
Source: Czech Statistical Office.

Value added per employee is growing; it has risen by 13.9% in 2000, by 14.4% in 2001 and by 16.2% in 2002. This positive development is not caused by a stable growth in value added but by a decrease of employment in industry. Furthermore, value added in industry has declined by 0.8% in 2002 in comparison to 2001.

C.2 Main regions of industrial production

The key regions of the Czech Republic are Central Bohemia, Moravia-Silesia, Prague and Ústí nad Labem regions. Former coal mining industry still affects the local economy (high representation of metal processing and mining industries) and society patterns (low education level and high unemployment) in Moravia-Silesia and Ústí nad Labem region The importance of the capital Prague and surrounding Central Bohemia in industrial production is evident. Naturally the size of the population in each region is closely correlated with the level of local industrial activity.

Graph C.3: Regional industrial production (% of 2001 value).



Source: Czech Statistical Office.

C.3 Declining and rising sectors of industry and services

The overall year-on-year growth in industrial production has decelerated from 6.5% in 2001 to 4.8% in 2002. Foreign owned firms continue having an important influence on the growth of the industry, which is caused by their growing performance.

From the information supplied in quantitative section C.1, basic features of the development of industrial sectors can be derived using average growth of production (in currency units), standard deviation of production growths in period 1996 - 2002 and latest development of production in each sector in 2002.

Table C.1: Development of industry according to sectors.

Properties of y-o-y changes in value of industrial production in 1996-2002

Sector	Avg. 1996-2002	Standard deviation	2002 development
DL - electric and optical instruments	24.8%	10.5%	27.5%
DH - rubber and plastic production	13.6%	3.0%	18.6%
DM - means of transport production	8.7%	8.5%	3.3%
DN - processing industry stated not elsewhere	7.1%	4.7%	2.6%
DK - machinery and equipment for further production	7.0%	7.3%	2.6%
DE - pulp & paper, printing industry, publishing	4.4%	4.3%	2.8%
DD - wood processing industry	4.4%	5.3%	6.1%
DI - glass, ceramics, china and construction materials	4.2%	1.9%	4.0%
DA - food processing and tobacco industry	1.2%	2.6%	3.5%
DG - Chemicals and rubber	1.1%	2.2%	0.3%
CB - exploitation of other raw materials	1.0%	7.3%	7.2%
DF - coking, oil refining, nuclear fuel production	0.1%	10.9%	3.8%
DB - textile and clothing industry	-1.6%	7.1%	-1.4%
CA - exploitation of energy raw materials	-1.6%	6.2%	-2.0%
DJ - metallurgy and metal products	-2.7%	5.5%	-1.0%
DC - leather processing industry	-18.4%	9.5%	-27.3%

Source: Czech Statistical Office

Electric and optical instruments sector is growing at a high rate. Thanks to foreign investment this sector reaches continual growth, mainly in production for exportation. Dynamic growth was marked in the production of office equipment and computers. This sector experiences large variations in its growth.

Another fast growing sector is **rubber and plastics production** with significant representation of foreign owned firms, too. Production of plastic parts for home electronics has largely increased which in turn influenced the production of the whole sector.

Means of transport production sector is the second largest industrial sector and it increased by 3.3% only during 2002. The deceleration is caused by recession in neighbouring Germany, which is the major foreign purchaser of its production. Its average growth of 8.69% over the period and continuous deceleration shows that this sector might have recently depleted its growth potential.

Processing industry not stated elsewhere, machinery and equipment for further production sector, pulp and paper, printing industry, publishing are stable in the seven-year horizon.

Wood processing industry grew remarkably at a rate of 6.1% during the last year, but the sales fell by 1.4%. Declining demand in Germany and Austria caused problems with low sales. This sector was also influenced by growth of production with higher value added in wood processing.

Glass, ceramics, china and construction materials sector, chemicals and rubber sector, coking, oil refining, nuclear fuel production sector are stable. The chemical industry is influenced by the worldwide low prices of chemicals and a low EU demand.

Food processing and tobacco industries are stable, also because of their nature.

Exploitation of other raw materials sector grew by 7.2% in 2002 thanks to mining of sand and stones for construction. The demand for these products increased because of extensive floods in August 2002. This sector is not expected to grow at a high rate continuously.

Textile and clothing industry declined by 1.4%. This sector encounters low demand and cheap foreign competition. Also, recent floods influenced this sector.

The new nuclear power plant Temelín caused a decrease of demand for energy raw materials (mainly brown coal) used for generating energy in coal-powered power plants. This eventually made the **exploitation of energy raw materials sector** decline.

Metallurgy and metal product industry production decreased by 1%, especially due to restructuring efforts.

Leather processing industry long-term decline is mainly caused by cheap imports (mainly from China).

Table C.2: Typical industries in regions.

Region	Typical industries
Prague	The dominant enterpreneural activities of Prague belong to the third sector - i.e. services. Most of financial and administration institutions have there its headquarters. There are also located knowledge-based industry branches as pharmaceuticals or electronics manufacturing.
Central Bohemia	Typical feature of Central Bohemia is mainly developed agricultural and industrial production. The fundamental industries are engineering, chemistry and food industry. Skoda Mlada Boleslav became a company of international importance
Liberec	Among the most developed industries are glass, costume jewellery, engineering, plastic production and processing together with processing industry which has close ties with automobile production. Traditional textile industry lost its dominant place as a result of the downfall during last couple of years.
Hradec Kralove	The processing industry has always been dominant in the region, the major branch being the textile industry
Pardubice	Processing industry has the decisive influence, which gross value added has gradually increased. Similar development, but with smaller figures, could be noticed in the building industry as well.
Karlovy Vary	Production is concentrated around Cheb and Sokolov basins. Karlovy Vary region is among the most damaged landscapes in the whole Czech Republic. In the region there is the highest concentration of spas in the Czech Republic
Pilsen (Plzen)	The most important positions belong to food processing industry and electro-technical industry. Among the most important food processing companies in the region are Plzensky Prazdroj a.s. (brewery owned by SAB) or Stock Pilsen a.s.
South Bohemia	The South Bohemian region is an rural area with dominance of processing industry. Temelin nuclear power plant recently put into operation is located in South Bohemia region.
Usti nad Labem	The industrial importance of the region is given by the rich mineral sources and the power and chemical industries connected with the coalfields. The economical activities (in the past aimed especially at the coal mining, power industry and chemistry) has had negative influence on the environment.
Moravia-Silesia	Industry is the main employer in the region, and is especially concentrated in the conurbation around Ostrava and Karvina. The coal mining, metallurgy and power productions prevail, with significant concentration of heavy engineering
Olomouc	Olomouc region is mainly industrial and the highest employment can be found in heavy and building industry. Dominant positions in economy have the companies in processing industry, general engineering, metalwork industry, electrical and optical equipment productions.
Zlin	Agricultural and industrial production, mainly processing industry.
The South Moravia	It is traditionally important and diversified industrial production area. The major industrial branch is engineering. Textile, food, chemical and pharmaceutical production has a long-established tradition. Mineral mining, leather and power engineering industries are also represented in the region
Vysocina	Nearly all branches of industry are well represented in the region but general engineering and metalworking and automotive sectors are dominant. Other major industries include wood processing, furniture, textiles and clothing and food processing. Electronic components sector is growing.

C.4 Changes in the structure of services

After 1989 the services sector experienced its boom. The economy started to adjust to the structure of Western Europe countries. The primary sector had dominated the secondary and tertiary one. Thus fundamental changes had to occur so that the Czech Republic converged to the EU countries. The main change was the decline in the weight of the primary sector and a sharp increase in the weight of the tertiary sector. This trend still continues but the dynamics decreases. Following data shows situation in 1997-1999 when retail sales reached in turn CZK 393 944 million (EUR 12 310 million), CZK 421 245 million (EUR 13 163 million) and CZK 442 033 million (EUR 13 813 million) with annual growth indices 1998/1997 106.9 and 1999/1998 104.9.

In 2002 the performance in different service sectors recorded a wide variance. Retail sales (+2.7%) and communications (+3.4%) compensated for falls in the other categories, but their growth was too weak to prevent an overall slowdown, to just 0.6%. The main factors affecting the sector were:

- A fall in car sales (-2.0% y/y), which hit the retail segment,
- A fall in tourism (since Q2/02), thus preceding the August's floods, but exacerbated by them,
- Downturns in transportation markets, with air travel down (-10%) because of decline in tourism, railways (-1%) and continual turn to other means of transport,
- The near-saturation of the mobile-phone market (88% penetration), cutting the rate of growth in customers from 60% to 25%,
- An efficiency drive, leading to cuts in out-sourcing (e.g. advertising) and investment by companies.

Table C.3: Real annual change of services 2000-2002.

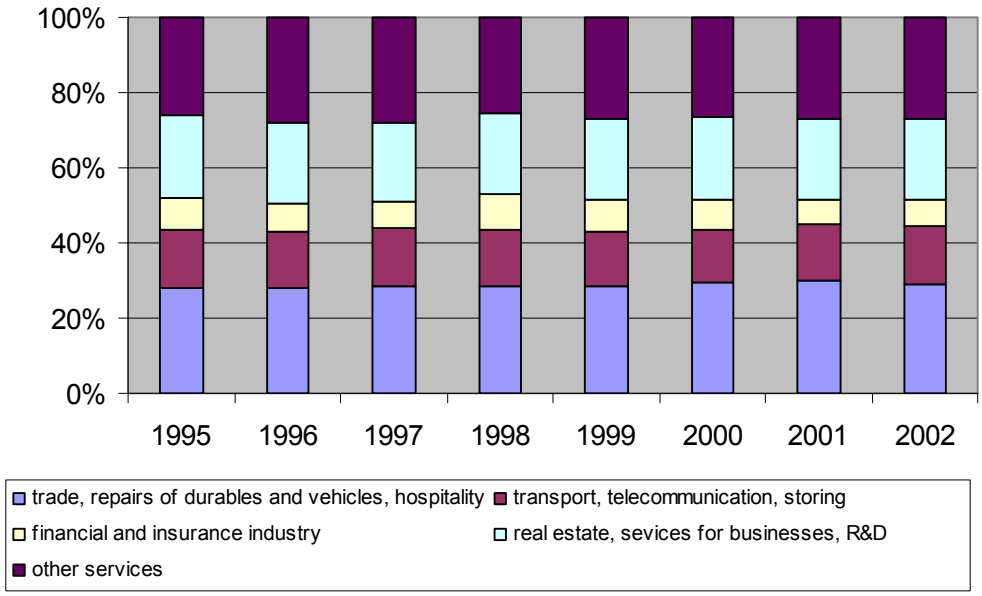
Categories/Annual change, real terms (%)	2002	2001
Retail	2.7	4.3
Catering and accommodation	-3.7	1.2
Transportation	-2	4.1
Communications	3.4	16.9
Data-processing	-2.2	6.5
Business services	-3.1	0.1
Total market services	**0.8**	**4.4**

Source: Czech Statistical Office

These factors should remain important in 2003 as well. Some (small, ca 2-3%) recovery in car sales is expected and tourism should not fall as heavily, providing boost potential to caterers and hotels. However, communications should slow down further because of the limited growth potential (in fact, a y/y downturn could be seen, particularly in the first quarter 2003). The efficiency drive will continue, limiting the chances of revival in data-processing and business services.

Structure of services has remained the same in the last four years (see Graph C.4).

Graph C.4: The structure of services.



Source: Czech Statistical Office.

C.5 Changes in investment

The main trends in investment are shown in table C.4. As expected, the sharpest growth of investment had been until 1996 when it lost its dynamics. The positive growth appeared in 2000 – 2001 while in 2002 the investment climate fell under the influence of decelerating dynamics of economic growth. After the period of high investment activity in 2001 it fell sharply.

The **key features of industrial investment** in 2002 were:

- In raw materials exploitation significant decline in environmental investment occurred, especially on re-cultivation after coal mining,
- There was a decline in investment activity in energy sector after the Temelín nuclear power plant was launched,
- Manufacturing industry investment declined because of discontinued investment in automotive factories.

The decline in **gross intangible investment** could be remarked, too.
It is a tedious task to distinguish, which sectors are investing in ICTs and to identify the way major investors use the investments due to the lack of data, which are at disposal mostly in aggregated form. The conclusion would thus be just a subjective estimate one, not well-founded by data.

	1995	1996	1997	1998	1999	2000	2001	2002
Gross investment (CZK bn.)	470.0	536.7	547.4	552.6	534.1	588.7	642.3	640.5
previous period=100%	133.6	114.2	102.0	100.9	96.7	110.2	109.1	99.7

Source: Czech Statistical Office.

Table C.4: Gross investment.

One of the most important issues for the Czech industry has been foreign direct investment. The main trends and structure are presented in table C.5. The highest increase in FDI was (since 1989) achieved in 1999. The highest amount flowed from the EU countries. The rank of countries did not change much.

Concerning the branch structure, the highest amount of capital was directed to trade, financial intermediation and insurance sectors, transport and telecommunication, electricity production and transmission. The participation of foreign investors increased also in distribution grids due to their privatization. The interest of investors is concentrated mainly in Prague (due to foreign capital in financial institutions and in telecommunication).

EUR mil.	1993	1994	1995	1996	1997	1998 *	1999 *	2000 *	2001*	2002* 1)
Nonmanufacturing										
Agriculture, hunting, and forestry	2	1	6	0	6	7	6	9	32	12
Mining and quarrying	12	18	18	6	0	15	234	83	41	-261
Electricity, gas, and water supply	20	73	31	128	332	211	313	223	301	365
Construction	56	91	53	97	34	43	14	109	87	95
Trade, hotels and restaurants	34	30	114	226	110	745	1 378	595	786	466
Transport, storage and communications	3	8	1 044	147	1	313	185	276	921	4 832
Financial intermediation	120	117	53	26	264	497	1 412	1 012	1 767	1 956
Real estate and business activities	0	0	0	0	37	303	395	812	509	580
Education	0	0	0	0	0	0	0	1	1	0
Health and social work	0	0	0	0	6	19	3	18	2	15
Other social and personal services	0	0	0	0	0	18	110	44	4	26
Total	**247**	**339**	**1 319**	**629**	**791**	**2 172**	**4 049**	**3 182**	**4 451**	**8 085**
Manufacturing										
Food and tobacco	196	60	94	58	83	113	337	191	275	289
Textiles, wearing apparel, and leather	1	1	2	18	13	88	43	74	115	63
Wood, paper and publishing	0	0	0	65	90	76	195	56	167	163
Refined petroleum and chemicals	16	37	70	267	45	53	370	323	122	200
Nonmetallic products	42	51	137	49	15	156	296	125	171	102
Basic metals and metal products	0	0	0	0	70	284	173	271	96	286
Machinery and equipment	57	247	360	54	14	300	424	1 140	900	682
Recycling and other manufacturing	0	0	0	0	30	76	46	42	-2	15
Total	**312**	**395**	**663**	**511**	**362**	**1 146**	**1 884**	**2 222**	**1 845**	**1 801**
Country										
Western Europe										
Belgium	27	28	19	46	50	42	1 293	57	180	177
Denmark	2	4	9	9	3	22	40	112	175	21
France	29	65	130	16	90	127	218	252	1 718	431
Germany	70	353	439	199	347	855	1 219	1 433	1 466	5 021
United Kingdom	0	32	41	67	174	310	98	171	484	268
Italy	10	10	1	72	-32	24	44	39	-2	88
Netherlands	26	5	569	207	119	748	1 061	1 123	1 059	1 771
Austria	47	68	67	166	84	370	782	800	295	1 050
Sweden	10	16	17	45	79	-62	119	160	23	63
Switzerland	12	33	525	44	42	100	332	247	196	-123
Canada	17	0	0	0	0	-4	10	168	81	-25
United States	218	33	78	202	88	477	545	328	273	287
Japan	0	4	0	31	10	21	5	50	33	152
Other	91	83	86	38	100	289	169	464	317	707
Total	**559**	**734**	**1 982**	**1 140**	**1 152**	**3 317**	**5 933**	**5 404**	**6 296**	**9 886**

1) preliminary data

Source: Czech National Bank

Table C.5: Foreign Direct Investment by Industry and Country, 1993-2002.

C.6 Specific sectors' market size and value (ICT industry)

The Czech Republic remains the most dynamic ICT market in Central and Eastern Europe, with the highest ratio of IT spending to GDP (3.8 %) in the region: a figure that is comparable to many Western European countries. In 2001, ICT expenditure rose to EUR 5.0 billion, up by 9.0 % year on year. Market growth is being driven in part by higher spending on communications technology. While the growth was primarily due to increased spending on software and services, a moderate recovery is now taking place in the country's hardware market.

Table C.6: Value of the Czech ICT market.

ICT market value	1999	2000	2001	2002	2003E	00/99	01/00	02/01	03/02
	mil.EUR	mil.EUR	mil.EUR	mil.EUR	mil.EUR	%	%	%	%
Server systems	154	168	177	190	205	9.1%	5.4%	7.3%	7.9%
Workstations	9	6	5	4	3	-33.3%	-16.7%	-20.0%	-25.0%
PCs	287	306	333	351	386	6.6%	8.8%	5.4%	10.0%
Add-ons	107	106	110	113	122	-0.9%	3.8%	2.7%	8.0%
Computer hardware	557	586	625	657	716	5.2%	6.7%	5.1%	9.0%
Copiers	42	34	36	35	36	-19.0%	5.9%	-2.8%	2.9%
Other office equipment	27	24	26	28	31	-11.1%	8.3%	7.7%	10.7%
Office equipment	69	58	62	64	67	-15.9%	6.9%	3.2%	4.7%
Mobile telephone sets	119	253	245	94	75	112.6%	-3.2%	-61.6%	-20.2%
Other end user communications equipment	57	46	46	47	49	-19.3%	0.0%	2.2%	4.3%
End user communications equipment	176	298	290	141	124	69.3%	-2.7%	-51.4%	-12.1%
LAN hardware	100	108	121	129	135	8.0%	12.0%	6.6%	4.7%
PBX, key systems and circuit switching equipment	165	137	125	119	117	-17.0%	-8.8%	-4.8%	-1.7%
Cellular mobile radio infrastructure	330	422	452	429	409	27.9%	7.1%	-5.1%	-4.7%
Packet switching and routing equipment	61	61	58	60	62	0.0%	-4.9%	3.4%	3.3%
Other datacom and network equipment	74	68	76	88	98	-8.1%	11.8%	15.8%	11.4%
Datacom and network equipment	729	796	833	824	821	9.2%	4.6%	-1.1%	-0.4%
Total ICT equipment	1 531	1 738	1 811	1 686	1 728	13.5%	4.2%	-6.9%	2.5%
System software	133	153	174	198	224	15.0%	13.7%	13.8%	13.1%
Application software	122	139	162	188	215	13.9%	16.5%	16.0%	14.4%
Software products	255	292	336	385	439	14.5%	15.1%	14.6%	14.0%
IT services	534	581	653	736	839	8.8%	12.4%	12.7%	14.0%
Telephone services*	900	847	849	871	880	-5.9%	0.2%	2.6%	1.0%
Mobile telephone services	687	938	1 124	1 191	1 277	36.5%	19.8%	6.0%	7.2%
Switched data and leased line services	77	104	126	148	170	35.1%	21.2%	17.5%	14.9%
CaTV services	46	56	65	72	83	21.7%	16.1%	10.8%	15.3%
Carrier services	1 710	1 945	2 164	2 281	2 410	13.7%	11.3%	5.4%	5.7%
Total ICT	4 029	4 556	4 964	5 089	5 417	13.1%	9.0%	2.5%	6.4%
Total IT	1 612	1 721	1 894	2 075	2 308	6.8%	10.1%	9.6%	11.2%
Total telecommunications	2 417	2 836	3 070	3 013	3 109	17.3%	8.3%	-1.9%	3.2%

Source: EITO 2002

The Czech telecom market was opened to liberalization at the beginning of 2001. The growth in mobile services over the last few years is set to continue moderately over the next several years, but the expansion in fixed-line penetration has all but stopped. The Czech Republic leads the CEE region in terms of mobile penetration, exceeding 84 % in 2002.

In the software market, domestic enterprise application suite (EAS) vendors are slowly being squeezed out of the market, with only one local firm among the top ten players. In the past year, the discrete[4] and process manufacturing industries have been the number one and two sources of ERP (Enterprise Resource Planning software) spending in the Czech Republic. Accounting remained the most popular functional area of EAS software, followed by industry-specific modules.

Expansion of the Czech IT services market is being driven by (1) the proliferation of IT in businesses, (2) the need for high availability and always-on infrastructure, (3) the widespread use of packaged office automation applications (particularly ERP applications at larger sites), (4) the proliferation of Internet, and (5) a continued need for networking.

[4] Discrete manufacturing includes industries that transform semi-finished products into final products.

C.7 International cooperation and competition

The turn of economic climate enabled an involvement of the Czech economy in the international cooperation. In fact, the EU countries generated prerequisites for the dynamic development and in the past decade they increased considerably their competitive edge vis-à-vis the East and Central European countries, including the Czech Republic.

Manufacture of office machines and computers: Development of exports of computer technology products (NACE 30) and share of the Czech Republic on deliveries of CEFTA to the EU countries in 1997-2001 is shown in table C.7.

Table C.7: Share of the CR on deliveries of CEFTA to the EU countries.

EUR th.	1 997	1998	1999	2000
From CEFTA	877 001	1 520 551	2 305 673	2 541 454
Year-on-year index	x	173.4	151.6	110.2
Of which CR	90 979	201 287	188 541	248 489
Year-on-year index	x	221.2	93.7	131.8

Source: Panorama of the Czech industry Eurostat

Competitiveness of the production as per NACE 30 in 1997-2001 can be quantified in comparison with the position of transitive countries (CEFTA) on EU markets.

According to the indications of Eurostat **the overall exports of computer technology** products were at the amount of 9.8% of exports of the commodity as per NACE 30 of CEFTA countries. Indicator 00/99 documents the growth of exports of computer technology products at the rate of 31.8%.

Manufacture of electrical machinery, apparatuses and electrical equipment demonstrates a permanent growth and development. Production assortment comprises products, equipment and parts, electro-assembling and reparation works. The majority of the branch's production is directed into fixed capital as machinery. Most enterprises of the branch have been already privatized, prevailingly by foreign capital.

Foreign capital has already entered all sectors of the branch. As a result of foreign capital entry, production programmes have been modernized and new products introduced into manufacturing, being able to compete at foreign markets. It is often the case of products assembled from imported parts.

The main causes of the Czech lagged position are especially the assortment structure where the products with lower value added still prevail, and in the decline in scientific and research working places, which resulted in the lower innovation dynamics.

Position and development of this branch can be well compared with the CEFTA countries that seek membership in the European Union. In 1994 the Czech share in exports of CEFTA countries into the EU countries oscillated around average 25%. In 1999 this share rose to 29.3% and in 2000 to nearly 29.7%. Only Hungary reached a greater share of exports from CEFTA countries into the EU (30.2 % in 1999).

Decreasing expenditures on research and development represented one of the austerity measures of enterprises in the course of restructuring. Research and development working places suffered from the lack of financial means, which resulted in the loss of their original purposes; some even ceased to exist. At present reverse development takes place. Firms contact research working places asking for development of new products that they are not able to ensure by their own capacities. Especially solutions requiring minimal costs and

involving minimal demands on investments are sought after since enterprises have not own sufficient financial means. Development of new products or updating of existing ones, and their introduction into manufacturing are now rather a question of their efficiency and economic profitability.

In Manufacturing of radio, television and communication equipment data from Eurostat show that in 2000 export of the branch 32 production from the Czech Republic to the EU countries made 18% of exports of CEFTA countries. Index 00/99 documents an impressive growth of exports of the branch 32 production from the CR by 76%. Share of export of electronic components from the CR to the EU countries in 2000 made 61.5% of exports of the branch 32 production.

Business subjects in the Czech Republic passed through a dramatic transformation in the second half of 90s. Restructuring did not only mean property, financial or organizational re-arrangements; it was a transition to the client-orientated approach. TESLA SEZAM, which succeeded to attain top parameters of the production economy, is an example of this approach. A continuous operation process has been introduced. MOTOROLA QSR (quality system review) became a basic system of management. The TESLA SEZAM division of quality assurance takes care of methodical management of the processes, in harmony with standards ISO 9002, QS 9000, ISO 14001. Besides certification auditors, the TESLA SEZAM production is also being audited by consumers (world producers of computers and electronics, i.e. IBM, MOTOROLA, THOMSON, SIEMENS, PHILIPS, CANON, NOKIA) and clients from automotive industry (VALEO, DELCO, VISTEON).

The domestic market for **measuring instruments, process control, medical and optical instruments, watches and clocks** is fully comparable with foreign markets. In the majority of product ranges supply exceeds demand. With strong international competition such as Siemens, Philips, Schneider Electric, Asea Brown Boveri and others, domestic producers are competitive only in manufacturing of selected assortment of regulation technology, instruments and components and in final production of sterilizers, dental X-ray apparatuses, furniture and surgical instruments and optical elements with higher share of mechanical work.

For competitiveness of Czech producers on foreign market the growth of value added is the fundamental issue. This is contingent on application of science and research in product innovation and on higher share of software equipment.

As compared with CEFTA countries the total share of the branch in exports into EU has increased by more than 39% as compared with 1997 with 8% advance in 2000 as compared with 1999.

C.8 Regional cross country agreements

The Czech Republic was one of the original members of the WTO. It became a member of the OECD in 1995 and has six other agreements in force: Czech-Slovak Customs Union, the EU Association Agreement, CEFTA, EFTA, as well as agreements with Romania and Slovenia. Trade is conducted with other Central and Eastern European countries within the framework of the Central European Initiative. The Czech Republic has applied for accession to European Union and the restructuring and strengthening of its various institutions is in progress. Trade is conducted on most favoured nation basis and the country has liberal trade rules. Implementation of Uruguay Round tariff commitments has already begun.

C.8.1 Information Technology Agreement

The Czech Republic is a signatory to the Information Technology Agreement with extended staging. The ITC (Information Technology Committee) team observed that the reduction of customs duty had been put in place and the agreement ratified. The Czech Republic supports the concept of an Information Technology Agreement II, although this subject is still under consideration and has yet to be agreed upon. The issues under discussion would broaden the scope of ITA (Information

Technology Agreement) to include more product headings and issues of TBT (WTO Technical Barriers to Trade) such as certification conformity to standards and self-declaration by manufacturers etc.

C.8.2 Agreement on Basic Telecom Services

The Czech Republic was a signatory to the Basic Agreement in February 1997. To meet the obligations of the ABT (WTO Agreement on Basic Telecommunication) and to liberalize the telecommunication sector, a National Telecommunication Policy was evolved. For electronic commerce, the necessary legislation relating to digital signatures, data security, fair competition etc. are under consideration.

C.9 Major sectors of innovation activity

Innovation and technological restructuring represents a direct jump to the most modern technologies available. For example, the thorough modernization of Czech telecommunication achieved in the last five years potentially enables every household accessing Internet over the phone line. An explosion of mobile phone opens additional wide opportunities, e.g. for m-commerce and the use of Internet for other services.

The process of globalization, and the openness of the Czech economy, forces the restructuring Czech companies either to apply the knowledge-based technologies, or to absorb them via international links (becoming a part of multinational companies).

Education at secondary and university level has improved and become substantially more oriented toward application of modern technology, as well as modern managerial know-how.

Application of knowledge-based technologies (predominantly by foreign capital) has resulted in re-shaping of organizational structures, outsourcing of peripheral activities, improvement of marketing, and a steep increase of the share of high-skilled jobs in total employment. The impact on corporate governance and corporate culture is important as well. The macroeconomic indicators reflect these effects; the share of export of high-value-added goods has increased, and now represents 57 % of Czech exports towards the OECD area (in 1993, this share was below 40 %).

However, only a few (large) firms are investing relatively intensively in innovation. Compared to the EU, there seems to be a smaller share of innovative small firms. Thus the scale of innovative activities is limited and confined to a narrow circle of large firms.

The table C.8 summarizes the most important facts from the **questionnaire survey** (with 3 600 participants) realized by the Czech Statistical Office. The survey dealt with four types of innovations – **technical innovations, new product innovation, innovation of product and innovation of process.** The survey showed that there were 29 % innovating companies in 1999 – 2001 (that is **29 % of companies in the Czech Republic introduced some of four mentioned innovations**). 30 % of them belonged to the processing industry, 26 % to the sector of services. To summarize, in the Czech Republic **the percentage of innovating companies (29%) remained far below average of the EU countries**.

The **highest part of innovations belonged to chemical industry**, the **lowest part belonged to textile and leather industry**. As for the services, the leader was R&D sector, transport and telecommunication sector had the lowest number of innovations. **Bigger companies innovated more**. Total costs spent on innovations in 2001 achieved CZK 48 bn. (EUR 1.5 bn) 45 % of these costs were spent on acquisition of machinery, expenditures on intra-company R&D assumed the second place. Among the most important sources of innovation companies identified the incentives coming from customers (46 %) and inner company sources (44 %). Universities or scientific institutions achieved only 7%, which indicated separation of science and work practice. Among the most important limiting factors belong high innovation costs and lack of financial sources with excessive economic risks.

Conclusion: Gathered data show that Czech companies lag behind the EU countries in number of innovations. The main limiting factor is unfavourable financial situation of Czech companies. Increase in innovation potential would surely result in improving of competitiveness of Czech companies.

Table C.8: Structure of expenditure on innovation.

Innovation expenditure in 2001	Structure of expenditure on innovation														
	intramural R&D		acquisition R&D		machinery and equipment		other external knowledge		training		market introduction		design		TOTAL
	mil. CZK	%	mil. CZK	%	mil. CZK	%	mil. CZK	%	mil. CZK	%	mil. CZK	%	mil. CZK	%	
Total for the Czech republic	**10 581**	**22.0**	**3 887**	**8.1**	**21 500**	**44.8**	**4 452**	**9.3**	**1 273**	**2.6**	**5 147**	**10.7**	**1 201**	**2.5**	**48 041**
Mining and quarrying	4	2.1	7	3.7	167	88.8	1	0.5	3	1.6	2	1.1	4	2.1	188
Manufacturing total	6 392	19.9	2 654	8.3	16 995	52.9	2 375	7.4	613	1.9	2 339	7.3	786	2.4	32 158
Food, beverages and tobacco	160	8.6	40	2.1	1115	59.9	181	9.7	21	1.1	236	12.7	108	5.8	1861
Textiles and leather	219	17.2	12	0.9	780	61.3	66	5.2	11	0.9	125	9.8	59	4.6	1273
Wood, pulp and printing	45	1.2	53	1.5	2728	75.4	627	17.3	7	0.2	135	3.7	21	0.6	3617
Coke and chemicals	703	24.3	113	3.9	1349	46.7	222	7.7	14	0.5	394	13.6	96	3.3	2891
Rubber and other non-metallic	714	16.7	370	8.6	2803	65.4	88	2.1	30	0.7	227	5.3	51	1.2	4283
Basic and fabricated metals	394	10.3	920	24.1	1490	39.1	867	22.7	16	0.4	93	2.4	32	0.8	3813
Machinery and equipment	1 534	33.3	159	3.5	1 921	41.7	67	1.5	28	0.6	828	18.0	70	1.5	4 607
Electrical and optical equipment	1 118	21.8	169	3.3	3 097	60.3	65	1.3	451	8.8	135	2.6	101	2.0	5 136
Transport equipment	1 452	35.4	797	19.5	1 298	31.7	172	4.2	30	0.7	136	3.3	211	5.2	4 097
Manufactoring NEC and recycling	53	9.1	21	3.6	414	71.4	20	3.4	5	0.9	30	5.2	37	6.4	580
Electricity, gas and water supply	120	8.4	149	10.4	998	69.5	99	6.9	14	1.0	45	3.1	12	0.8	1437
Services total	4 062	28.5	1 077	7.6	3 338	23.4	1 976	13.9	643	4.5	2 760	19.4	396	2.8	14 252
Wholesale trade	539	18.3	278	9.4	666	22.6	159	5.4	76	2.6	1145	38.9	81	2.8	2944
Transport, storage and communication	537	14.0	217	5.7	1922	50.1	462	12.0	268	7.0	413	10.8	20	0.5	3839
Financial intermediation	350	10.5	224	6.7	255	7.7	1210	36.4	69	2.1	1021	30.7	195	5.9	3324
Computer and related activities	1 000	65.2	87	5.7	153	10.0	76	5.0	54	3.5	117	7.6	46	3.0	1 533
Research and development	1 403	71.8	264	13.5	175	9.0	23	1.2	10	0.5	34	1.7	45	2.3	1 954
Architectural and engineering activities	147	33.9	2	0.5	61	14.1	27	6.2	163	37.6	26	6.0	8	1.8	434
Technical testing and analysis	86	38.4	5	2.2	106	47.3	19	8.5	3	1.3	4	1.8	1	0.4	224

Source: Czech Statistical Office.

C.10 Trade balance of ICT

The overall **trade balance of ICT is adverse** in all years under investigation, however, since 2001 it is slowly improving. The major item of the trade statistics is Components, which basically includes parts of electronic devices. PC-manufacturing plants using imported parts are the main reason for the negative trade balance in Components.

The item Consumer has reached positive numbers. This reflects strong foreign investment in Consumer electronics plants in recent years. Important items (whether in export or import) are mainly TV sets, devices for reproduction of music, radio receivers, cameras and musical instruments.

Similar positive changes can be seen in the item of electronic data processing, where the change was even more sudden than in Consumer electronics. After several years of more than EUR one billion deficit the surplus in 2002 reached EUR 527 million.

A large negative item was the item Radio, including radio telecommunication devices (e.g. mobile phones).

Item software seems to be unimportant one, but it is obvious that the low level of imported software was not caused by low imports but by accounting standards or a customs error.

Table C.9: Trade balance of the ICT sector (million EUR).

	1996	1997	1998	1999	2000	2001	2002
Components	-253	-205	-373	-338	-639	-1 814	-2 550
Consumer	-198	-187	-132	-145	15	346	160
Electronic data processing	-1 157	-1 061	-1 051	-1 118	-1 272	-1 344	527
Office machinery	-55	-58	-46	-46	-43	-46	-42
Radio	-158	-175	-177	-258	-510	-346	-172
Telecommunications	-720	-693	-576	-603	-912	-169	-132
Software	58	-57	-44	-71	-81	-106	-23
TOTAL	**-2 484**	**-2 437**	**-2 400**	**-2 582**	**-3 442**	**-3 478**	**-2 233**

Source: General Directorate of Customs.

C.11 Major actors of ICT industry

C.11.1 Telecommunication: fixed network

Table C.10: Fixed network communication licenses.

C.11.1.1 Český Telecom

Operator	Date licensed	Operating license	Network	Telephone subscribers
Český Telecom	1994	Local, long-distance, international	PSTN/ISDN	3 842 000
Contactel	2000	Local, long-distance, international	PSTN/ISDN	0
Aliatel	2000	Local, long-distance, international	PSTN/ISDN	0
Rann Globalnet	1995	Local	WiLL	6 265
KPNQwest/GTS	1995	Local	MAN	4 500
UPC	1995	Local	HFC cable	3 200

Source: http://www.securities.cz/

Český Telecom, a.s., is the largest telecommunication company in the Czech Republic. The company operates telephony and electronic communication networks that cover the entire country, provides businesses and private households with data services, euroISDN, leased lines, Internet and added value

services. ČT's majority shareholders are the National Property Fund of the Czech Republic (state privatization agency) and the international consortium TelSource. Český Telecom holds a 51% stake in the Czech largest mobile operator Eurotel (analysts say the Eurotel share makes up two-thirds of Český Telecom's overall value). The 49% of Eurotel belonging to the other shareholder Atlantic West B.V. will be bought out until the end of 2003.

ISP and eBusiness activities are concentrated in Český Telecom's branch Imaginet and Internet OnLine, the agency MIA operates Internet advertising services and the company EDInet provides eSolutions services. In August 2001 ČT also picked up a stake in ASP1000, an application service provider. Český Telecom is one of the largest publicly traded companies in Central and Eastern Europe.

Český Telecom is the business's key player, but carrier pre-selection speeds up introduction of other real competitors into the sector. Because the carrier pre-selection feature of the network is available since the beginning of 2003, the share of the incumbent is still dominant. In the near future the competitors might acquire some positions in corporate telecommunication market, however, due to delayed local loop unbundling most of last miles will still be controlled by Český Telecom.

C.11.2 Mobile communications

In June 2003 there were more than 8.9 million mobile phone users in the Czech Republic. It means more than 88% penetration of the population. The oldest national operator – Eurotel, registered 3.993 million customers, competitor T-Mobile had in its network 3.607 million customers and the youngest one - Český Mobil in Oskar network – 1.338 million customers. The overall number of customers of all national mobile phone operators at the end of 2002 year is estimated to be around 8.60 – 8.63 million.

Company	Founded	Main Products	Employees 2001	Rev. 2001, mil.EUR	Ownership
eD´system Czech, spol. s r.o.	2000	PC, components, peripherals		243.99	CZE
FIC CZ s.r.o.	1991	PC	1 212	215.24	Taiwan
HEWLETT-PACKARD s. r. o.	1991	Servers, PC, printers, services	273	223.87	US
EXPERT & PARTNER	1991	PC	96	135.55	CZE
LEVI International a.s.	1995	PC components, GSM	67	99.73	Joint Venture
AT Computers a. s.	1998	distribution of IT, PC AutoCont	210	98.29	Joint Venture
ProCA spol. s r.o.	1993	distribution and manufacturing of PC	220	91.37	Joint Venture
Alcatel Czech	1991	ADSL, switching, FWA,	150	85.15	French
PVT, a.s.	1991	system integr., outs., ICT/IS	2 250	82.59	Polish

Source: http://www.securities.cz/

Table C.11: Top 10 ICT companies in the Czech Republic.

The companies in the full or partial Czech ownership have been mostly established as a **garage firms** producing PCs for local markets. Thanks to favourable market condition their market focus extended to the entire Czech Republic (AT Computers, ProCA…) or even to European markets (eD'system Czech, LEVI International…). Taiwanese suppliers of PC components sometimes entered these companies so as to increase their registered capital and secure their sales (AT Computers).

The company FIC CZ is a Taiwanese greenfield investment producing PCs in large series for worldwide markets. Hewlett-Packard is rather a sales representation achieving large turnovers through sales of PCs and peripherals. Alcatel Czech is also rather a marketing company with no local manufacturing facilities selling switching centres, telecommunication technologies, ADSL etc.

PVT used to be a major local ISP and system integrator. In privatization, which took place in 2003, the majority stake in the company was sold to a Polish IT company.

Operator	Ownership structure
Český Telecom	51,1% National Property Fund, 27% TelSource N. V., 6,48% KPN Telecom B. V., 15,42% other investors
Contactel	60% TCP Solutions, 40% České Radiokomunikace
Aliatel	40% RWE Com GmbH&Co.oHG, 10,33% JCE, 10,33% JME, 10,33% SME, 10,33% ZCE, 9,33% SCE, 9,33% PE
Eurotel	51% Český Telecom, 49% Atlantic West B. V.
T-Mobile Czech Republic	60,77% Cmobil B.V., 39,23 České Radiokomunikace
Český Mobil	96,2% TIW Czech N. V., 3,8% other investors

Source: http://www.securities.cz/

Table C.12: Ownership structure of the telecommunication companies.

C.12 Past and future of ICT

Czech Republic had traditionally been a country with **strong industrial fundaments**. Before World War II it specialized on heavy engineering, machinery production, arms and also some light industries like clothing, glass and china. The COMECON has defined the role of the national economy within the communist block in a way even more underlining the before WW II evolution: reduction of light industries and specialization on heavy engineering and machinery production.

The economy **did not specialize in ICT products**; the task to develop computers and other information technology apparatuses was devoted to Bulgaria, East Germany, Poland and Hungary. Therefore at the beginning of the transformation the Czech economy suffered from several structural weaknesses:

There is an **absolute lack of any modern knowledge-based industries**. Only exceptionally, some companies were comparable to western technology standards, but these formed isolated islands with no spillover effects on the rest of economy. It especially concerned companies active in production of military technologies (radars, plane navigation, arms…). Quite logically spillovers from these industries would have been considered a criminal offence.

No link existed **between basic research and its business application**. The country lagged behind advanced economies in the numbers of university students. The situation improves in the case of university graduates, but the question whether applied research and basic research somehow converge would not have ultimately positive answer.

The **infrastructure** required for modern ICT and other knowledge-based technologies was underdeveloped. In this case the tremendous development of all ICT networks overcome the earlier drawback.

Over the whole transition decade, the country has been struggling with **lack of capital.** Despite government initiatives and established working groups SMEs still lack financing and the ICT industry is still to a large extent dependent on FDI inflow.

Nevertheless, the transformation of the Czech economy also offered some strong **potential advantages** for the absorption of new technologies. Relatively well educated labour force, infrastructure… and other factors already mentioned contributed to huge amounts of FDI inflows. This attracted many foreign investors in ICT field. We expect that **this trend will continue**, but not in the same pattern.

In recent years (1998-2003 – investment incentives) especially **ICT manufacturers** were attracted: Philips (TV screens), Matsushita (TV sets), Sagem (GSM phones), Siemens (railway electronics and relays), FIC (computers…) and many others. These industries are **labour intensive** despite use of automated technology and **do not need many university-degree developers**. If the trend of **growing real wage** will continue, which is general expectation after EU accession, these producers will logically **move eastwards**.

The **Czech state authorities promote investment of more knowledge based** investors: in 2004 DHL will open in Prague a large dispatching centre with hundreds of software developers, Logica extends its software development centre and other projects are underway.

To conclude: even though investors in ICT manufacturing were (partially still are) welcome and their existence was necessary in certain periods of transition, they are not a panacea to the Czech economy. In the future more knowledge based industries and especially services (software development…) will prevail.

C.13 Role and presence of multinationals and/or foreign companies

The presence of multinational companies is obvious from the top players in ICT market. Their presence and the process of globalization force the restructuring of Czech firms.
Foreign direct investment remains a notable driver for the regional ICT market, particularly in the key market segments.

Well-visible example is the transformation of the branch of computer technologies, which brought about important changes in the Czech industry. Since 2002 production centres of multinational PC manufacturers produce and export their overall production. FOXCONN CZ Pardubice produces Compaq computers in a new production plant. The decisive part of production is exported to the ENEA countries (Europe, Near East and Africa). Just in March 2003 there were produced 270 000 pieces of computers (in 2002 over two million of computers was produced with turnover EUR 1.2 bn).

Sun Microsystems, Logica, Honeywell, Geac and others develop applications in telecommunication, Internet, industrial processes and security systems.

Hewlett-Packard, S3 and others carry research and development in the Czech Republic, often in cooperation with Czech universities.

IBM was granted investment incentives for a new Expert Solutions Centre to serve their larger clients. The Centre is now being built in Brno, the Czech Republic's second largest city, destined to become the Czech Silicon Valley.

Prague is increasingly being considered for potential Shared Service Centres and regional headquarters. Accenture has set up its pan-European SSC, Philips opened its regional headquarters and Siemens runs a centre for purchasing and logistics services covering several Central and East European countries.

C.14 Conclusion and SWOT analysis

The Czech industry has changed substantially since 1989 - the beginning of the transformation. Generally it meant change from extensive to intensive industry, a move from industry to services. Heavy industry remains to be the largest sector of industry, however already the second, and just a little smaller, is a modern sector - means of transport production, followed by food processing and energy sector. The present structure of the Czech industry is the one of a standard developed country. We expect some further turn to machinery and electrical and optical instruments – sector with important foreign investments.

With respect to regional structure, main industrial regions are Central Bohemia, Moravia-Silesia and Prague. Prague with Central Bohemia is a natural industrial heart of the Czech Republic with the metropolis and two major rivers. Moravia-Silesia is an industrial centre predestinated by large black coalmines.

The most dynamic sectors of industry are electric and optical production and rubber and plastic production. Both of them grow fast because of FDI inflow. Automotive industry is loosing its pace and grew only by 3.3% in 2002.

Structure of services has not changed in recent four years.

ICT industry size is quite significant in comparison with other CCs. Domestic software firms are under a squeeze of a highly competitive market.

The Czech Republic is highly competitive in electronics and electric apparatuses manufacturing.

Industrial evolution during the transformation period was largely predetermined by weaknesses of central planned economy of former Czechoslovakia.

Multinationals are having increasing influence on the Czech industry because of large foreign investment. The Czech Republic is still considered as a good place for FDI, which could change because of increasing labour costs and increasing incentive-offering competition among CEE and Asian economies. On the other hand unit labour costs are still competitive in comparison with its West European counterparts.

C.14.1 Summary

- **Metallurgy and metal products, means of transport production** and food processing and tobacco industry are the leading sectors of the Czech industry.
- **Employment in industry decreases**, value added per employee grows.
- **Central Bohemia, Moravia-Silesia and Prague** are the most important industrial regions.
- **Electric and optical instruments** and rubber and plastics production sector are the most dynamic ones.
- The **basic structure of services remains the same** over years.
- **ICT industry in the Czech Republic is dynamic**.
- ICT industry is competitive thanks to **FDI**.
- ICT industry was largely negatively influenced by the past.
- The **influence of multinationals** is substantial for the Czech ICT industry.

C.14.2 SWOT

Strengths	Weaknesses
• Strong industrial tradition, • Successful transformation into a modern western-style economy, • Important and still growing ICT industry, • Role of FDI, • Openness of economy.	• Still existing low-value added activities in ICT industry, • Dependency on FDI, • Innovative activity concentrated in a small number of companies, • Insufficient overall innovation activity in business.
Opportunities	**Threats**
• Forthcoming privatization of remaining state owned firms, • Continuing strong FDI, • Progressive recuperation of business R&D activity, • Further development of the ICT industry in such areas as electronic and optical production.	• High dependency on brown coal energy – environmental threat, • Change in sentiment of foreign investors after depleting investment incentives.

C.14.3 SWOT IS

Strong industrial tradition is an important advantage among CC13 since it helps to implement new technologies and generally attracts FDI into the manufacturing sector. It provides also incentives for enrolment into technical education in spite of its current decline. We therefore infer that the Czech Republic is not on the way towards a traditional service economy, but it rather keeps its structure.

Openness of the economy is a competitive feature of ICT industry. It ensures that products manufactured in the Czech Republic will be easily distributed abroad.

Continuing FDI could ensure further dissemination of technology by foreign capital.

Insufficient overall innovation activity in business threatens the overall competitiveness of the economy in the context of the enlarged European Union. The innovation activity shall therefore be more promoted by the state.

Change in sentiment of foreign investors after depleting investment incentives would be a fatal threat to the Czech manufacturing sector, especially in the case of the automotive industry with its employment share of almost 10%. First examples already appeared in the ICT industry – Flextronics, Philips.

Forthcoming privatization of remaining state owned firms is an important challenge to the economy. There are currently two privatization deals underway (a chemical company Unipetrol and an incumbent telco operator Český Telecom). If the transactions are successful, the spillover effects to other sectors can be expected, in particular into ICT manufacturing.

D RELEVANT ECONOMIC ACTIVITIES FOR IST APPLICATIONS

The IST applications in the Czech Republic are not a completely recent phenomenon even though their extension to all conceivable areas has happened in the last ten years. During the **communist regime**, the IST applications were centralized and performed on mini-computers (i.e. very large). **Electronic data processing came to day-to-day life** of average inhabitants in the 80s. The first examples were:

- **centralized account administration** of citizens' current accounts at Česká spořitelna (that time the only bank allowed to serve retail segment) through computers
- SIPO (**centralized cash collection** for utility payments) by Česká pošta (Czech post company)
- **electronic handwriting recognition** for mail sorting at Česká pošta

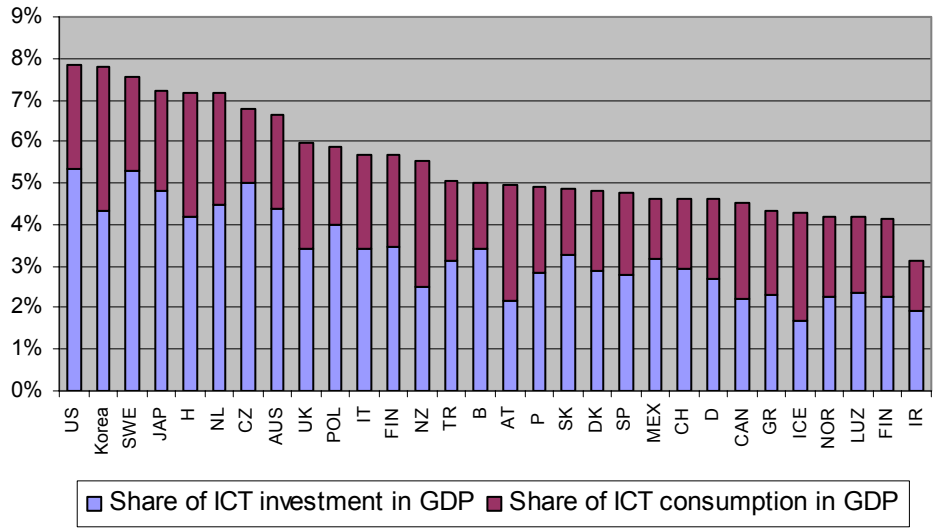
First **computers in science and academic institutions** were installed at the beginning of the 70s. Again they were large and due to their shortage academics / students had to provide the machines with **punched cards** to save computer time.

At the industrial sectors the computers have not been installed massively as office equipment, but for **electronic machine controlling** (CNC machines in engineering – computer numerical control). Even though the army had some interest in using the computers, no evidence on special computer development for army needs is known to us.

But this is the history with limited relevance for today. The expenditure pattern on ICT related goods and services changed completely and resembles **spending habits in more developed OECD countries**. Total spending of households and companies on ICT goods amounted as of 1999 to 6.8% of GDP (ranked 7th among OECD 30), out of which investment reached 5.0% (ranked 3rd), but consumption only 1.8% (ranked 25th).

Graph D.1: Investment in and consumption of ICT as a share of GDP, 1999.

Source: OECD, Purchasing Power Parities Database, March 2002.



D.1 ICT in industry

D.1.1 ICT related investment in industry

As expected, ICT is very much present in industrial enterprises. In recent years complete upgrade of information technologies was a pre-condition for keeping the market position. At the beginning of the 90s the market boom especially concerned the workstations and standalone PCs:

- **Small entrepreneurs** with few employees needed PCs to keep accounts, stock or workforce, sometimes PC substituted electric typewriter. Due to the small size of such companies there was no need for networking.
- **Large companies,** especially state owned bought PCs as they considered them to be the key to success without even knowing the purpose for such an investment. Even though they intended to have their "network", the lack of experience on the side of system integrators sometimes led to a waste of expenditures. This was a time for "gold miners" at the hardware market with margins reaching sometimes even more than 100%. When looking at table C.11 with the 10 largest ICT companies at least 4 of them (LEVI International, ProCa, AT Computers, Expert & Partner) and possibly others following these top ten earned enough resources in these times to be able to start mass PC production with hundreds of million turnovers.
- **There was almost no market with legal software,** until 1995 any computer reseller offered the customer to have Windows, Office or other chosen programmes saved on the hard drive. The software crime has been actively prosecuted after most flagrant cases were presented in media.

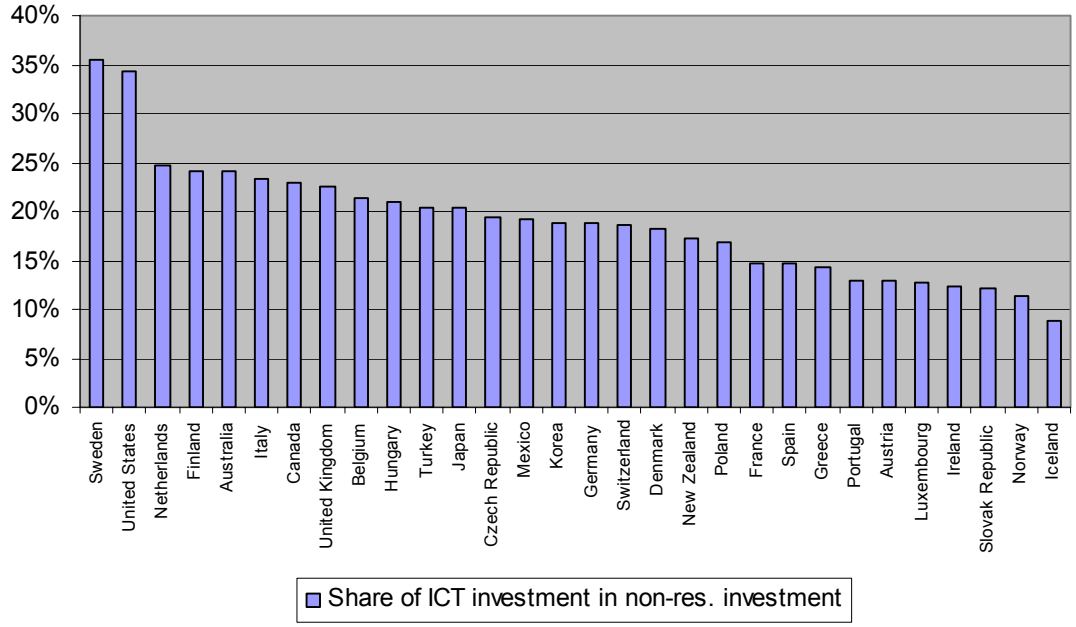
Interest in networking was not brought about by the Internet itself, but it was probably due to the appearance of foreign companies transferring their practice to the Czech Republic. Novell, Unix and other network systems have been in place since ca 1992. Internet appeared in the Czech Republic one year later, in 1993 raising even more interest in networking hardware and software. However, Internet had not been considered as means of production until recently; its corporate use in the second half of the nineties was very limited (not to mention any kind of eCommerce).

Current corporate ICT expenditures are aimed especially at:

- **System integration** (every large company considers implementation of SAP or BAAN),
- **Network security** (firewalls, configuration of servers),
- **Gigabyte Ethernet** for acceleration of network throughput,
- Substitutions of CRT monitors with **flat screens** (TFT),
- In the SME sector upgrade of dialup with some kind of **broadband,**
- Almost every bank more or less successfully started **Internet banking,** applications are mostly tailor-made by local subsidiaries of worldwide software companies (i.e. not simply transferred from more developed countries),
- **eCommerce** (even small retailers),
- **EDI – electronic data interchange** – large companies (especially multinationals) employ just in time system. The most visible example is the production chain of the automotive industry (Škoda carmaker) with immediate production according to supplied specifications and volume.

The Czech Statistical Office unfortunately does not regularly collect data on ICT related investment into all branches of industries, it is a too fine distinction (only data on construction works / machinery / means of transport etc. are available). The data on ICT investment are to some extent available from OECD, their drawback is that they are out of date. Nevertheless they have some information value.

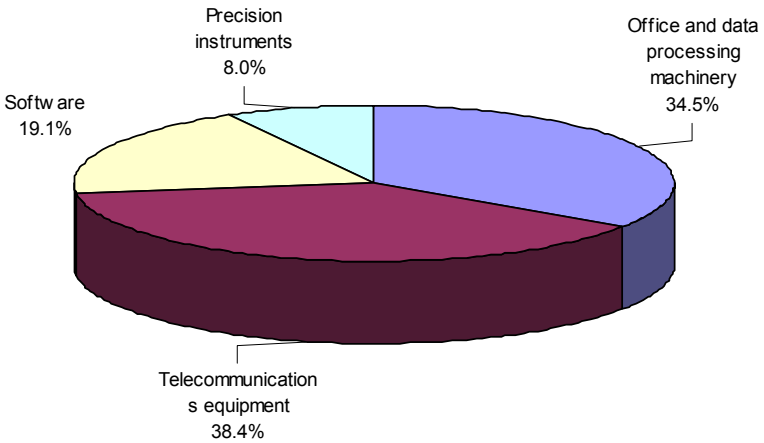
Graph D.2: Share of ICT investment in total non-residential gross fixed capital formation, 1999.



Source: OECD, Purchasing Power Parities Database, March 2002.

As visible in Graph D.2, the Czech Republic proportion of ICT investment on total investment amounts to 19.47%. This is slightly above OECD average (18.97%) and ranks 13th place among OECD 30. As already mentioned, the Czech Republic assumes the 3rd rank when ICT investment share on GDP is measured. This disproportion can be attributed to above-average overall investment rates. More than one third of ICT investment was devoted to telecommunication equipment (38.4%) and office and data processing machinery (34.5%) – see Graph D.3 and table D.1.

Graph D.3: Composition of ICT investment in the Czech Republic (1999).



Source: OECD, Purchasing Power Parities Database, March 2002.

Table D.1: Share of ICT investment in total non-residential gross fixed capital formation, 1999

	Office and data processing machinery	Telecommunications equipment	Software	Precision instruments	Share of ICT investment in non-res. investment
Sweden	9.20	7.86	15.14	3.26	35.47
United States	7.69	4.91	14.05	7.64	34.29
Netherlands	15.28	4.51	4.01	0.95	24.75
Finland	5.31	6.20	9.80	2.84	24.14
Australia	7.88	4.07	10.05	2.10	24.10
Italy	7.64	6.99	5.61	3.02	23.27
Canada	0.99	12.28	8.60	1.55	23.00
United Kingdom	9.10	6.67	4.05	2.70	22.52
Belgium	9.46	7.33	3.74	0.92	21.44
Hungary	8.80	6.99	0.94	4.27	21.00
Turkey*	5.11	10.92	0.04	4.39	20.46
Japan	6.74	6.44	5.20	1.96	20.35
Czech Republic	**6.72**	**7.47**	**3.73**	**1.55**	**19.47**
Mexico*	0.39	13.70	0.00	5.20	19.29
Korea*	1.63	14.53	0.00	2.72	18.88
Germany	6.15	5.96	3.80	2.82	18.73
Switzerland*	5.68	5.52	0.00	7.50	18.69
Denmark	8.14	2.96	5.50	1.68	18.29
New Zealand	7.44	4.45	3.67	1.63	17.18
Poland	3.11	9.21	1.16	3.31	16.79
France	3.67	4.39	5.40	1.29	14.76
Spain	3.42	3.85	4.47	3.00	14.73
Greece	4.32	8.45	1.21	0.25	14.23
Portugal*	8.08	3.29	0.00	1.53	12.90
Austria	3.58	4.29	1.75	3.25	12.87
Luxembourg*	4.37	6.79	0.00	1.63	12.79
Ireland	3.72	2.74	2.21	3.75	12.42
Slovak Republic*	4.60	4.83	0.19	2.44	12.06
Norway*	5.40	2.48	0.00	3.48	11.35
Iceland*	5.53	2.77	0.00	0.50	8.80

* Software data not available

Source : OECD, Purchasing Power Parities Database, March 2002

D.1.2 Financing of investment in ICT sector

Before privatization the banks have not mastered elementary financial and risk management and between 1990-1997 they succeeded in lending ca EUR 15 bn with no recovery prospects. The funds were available **without collaterals**, just on the basis of the business plans. Therefore SMEs were not cut from bank financing either and it is worth to mention that this policy of cheap money allowed some of them to expand.

However, **ICT companies did not rely on bank financing**; as software development is not a capital-intensive activity anyway. Even the gold rush of 1999-2000, that took place in the US (Yahoo, AltaVista…), does not have many Czech counterparts. The only visible case was the sale of ca 30% of the largest Czech search engine Seznam to Swedish Spray for ca USD 10 million. But banks in ICT have never been involved.

Currently the Czech banking sector is (with one exception) in hands of strong foreign owners:

- **Komerční banka** – largest corporate lender owned by Societe Generale Bank, France.

- **Československá obchodní banka**, after merger with Investiční banka, is strong both in retail and corporate banking. Owner: KBC, Belgium.
- **Česká spořitelna**. Strongest retail player, owned by Erste Bank, Austria.
- **Živnostenská banka**, a smaller bank with important position at corporations, owned by UniCredito, Italy.
- **GE Capital bank** (formerly Agrobanka), after bankruptcy sold to GE Capital, US. Strong in retail.

The management was forced to implement new methods of risk management, which virtually cut off companies with no history from bank financing. Therefore, it is now impossible to base any startup company on bank credits. Even a company active in such a dynamic industry like ICT has to wait until it has some 3 years track record with loan application. Of course there exist some venture funds, the success stories of such financing are not frequent.

D.1.3 Government assistance to ICT companies

The system of government assistance for the development of technology focusing upon the needs of **small and medium companies** determines the development and implementation of information technologies as one of three main trends of the TECHNOS Programme, an annual selection programme organized by the Ministry of Industry and Trade.

An indispensable prerequisite of the process of developing Information Society is the utilization of **eCommerce** in these companies. The enhancement of targeted and systemic co-operation of the government administrative with the business public for the benefit of speeding-up the introduction of electronic commerce and the utilization of information technologies complies with the activity of the National Discussion Group that started its activities in October 1999.

D.1.4 Measures for SMEs

The main measure in this field is the development of a network of information institutions for SMEs (to considerable extent with the support from the PHARE programme), which already cover the greatest part of the Czech territory at present. The most important are the following:

- Network of Regional Consultancy and Information Centres (RPIC), by the end of 1999 there were 22 of them,
- Network of Business and Innovation Centres (BIC); five of them existed by the end of 1999,
- Network of Euro Info Centres, (7 by the end of 1999).

D.1.5 Investment in the ICT sector

The investment in **ICT manufacturing** (not only for ICT related goods/services) had in the past years always growing trend with annual growth rates even exceeding 60% (2000/1999). However only small fraction of this investment was devoted to **office, accounting and computing machinery** (13% - 2000/1999), which is due to large foreign investment in audio, video and telecommunication equipment manufacturing (Panasonic, Philips, Sagem…).

The investment in **telecommunication** (78% of total ICT investment) has no clear-cut trend, its peak value amounted to EUR 1 369 million in 1997, which is in line with digitalization of the complete Český Telecom network. Since then the investment exhibited falling trend, but since 2000 the recovery is visible with new investment into **mobile and fixed competitors' network**.

Computer and related activity sector is still relatively small amounting to EUR 84 million in 2000. The largest proportion (44%) was invested into **software consultancy and supply**.

The development is influenced especially by the largest group, **telecommunication**, and therefore the overall **trend** in the period in question **is ambiguous.**

Table D.2: Gross fixed capital formation of the ICT industry.

	1995	1996	1997	1998	1999	2000
	mil. EUR	mil. EUR	mil. EUR	mil. EUR	mil. EUR	mil. EUR
ICT manufacturing	..	..	93.68	115.67	162.63	267.68
of which office, accounting and computing machinery	2.01	2.44	1.87	5.72	6.97	34.94
Telecommunications	..	..	1 369.21	1 099.66	734.29	1 252.34
Computer and related activities	..	..	52.85	46.43	76.13	84.11
of which software consultancy and supply	..	..	36.51	25.02	38.56	37.15
Other ICT services	..	..	..	..	..	..
Total ICT sector	**..**	**..**	**1 515.74**	**1 261.75**	**973.05**	**1 604.13**

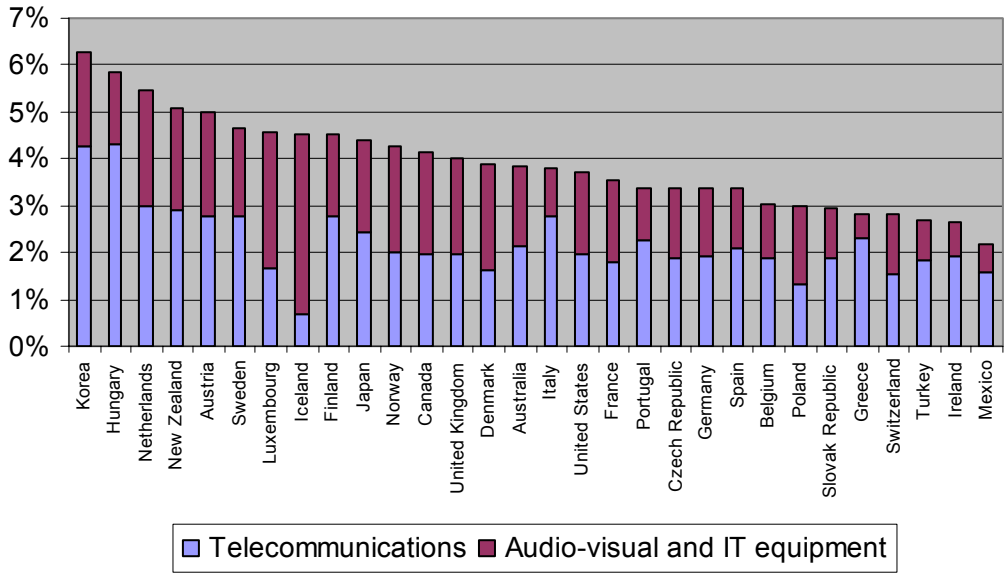
Source: OECD, Measuring the Information Economy 2002, based on Czech Statistical Office.

D.2 ICT expenditures in households

Unlike the very good position of the Czech Republic in share of ICT investment in GDP, the Czech households still significantly lag behind the OECD average in the case of ICT consumption (OECD average = 2.2% of GDP or 3.9% of total household consumption). The ICT consumption of Czech households amounts to 1.8% of GDP (25th rank) or 3.4% of total household consumption (20th rank). The difference in ranking is due to a lower proportion of household consumption on GDP (higher investment expenditures and government spending). The structure of ICT spending is nevertheless similar to OECD average: 56% on telecommunication (OECD average 57%) and 44% on audio-visual and IT equipment (OECD average 43%). Further facts on ICT in households may be obtained from chapters E (penetration rates) and I (culture).

Graph D.4: Share of consumption on ICT in total household consumption, 1999.

Source: OECD, Purchasing Power Parities Database, March 2002.



D.3 ICT investment in services

Most of the content of previous paragraphs was heavily based on the data from OECD issued in 2002, but related to the state as of 1999. These indicators on ICT investment in the economy do not distinguish between ICT investment in industry and services. Since similar data can not be obtained from the Czech Statistical Office either, we just limit ourselves to summarizing the investment in bullets:

- **ICT in finance services**

The sector has been completely refurbished. Most of the banks have already implemented SAP system. eBanking systems, mostly supplied from local subsidiaries of worldwide software companies, allow access to most banks. Czech banks installed 2 630 cash machines (expectation as of end December 2003) and issued 5.3 million payment cards (end December 2002).

- **ICT in transport**

Most of the investment was related to air transport (on-line air ticket issue, extension of the Prague airport). Other mass transport has not invested that heavily; services to customers are still provided in a similar way (only railway allowed card payment at selected stations). Some ICT investment was certainly necessary during reconstruction of railway corridors, especially signalization (however, no data on ICT investment are available).

- **ICT in post offices and logistics**

All 3 400 post offices are equipped with PC terminals. Registered mail through Internet is commercially provided. Large worldwide dispatching services gradually refurbish their IT base (SAP implementation instead of less renowned systems), DHL logistics intends to construct a logistics centre in Prague in 2004 at total cost exceeding EUR 500 million.

- **ICT in telecommunication**

Telecommunication belong to the most prominent target of ICT investment. Within 1995-2003 the incumbent Český Telecom completely digitalized its fixed lines, three GSM operators covered almost the entire area of the Czech Republic and provide services to more than 8.8 million subscribers.

- **ICT in the health services**

Even though the situation of individual physicians with respect to ICT investment largely depends on their willingness to pursue such investments, the situation improves in this sector as well. Hospitals are mostly connected to Internet, health insurance companies process the data electronically. There is also some visible effort to process the patients' health documentation with two pilot projects: IZIP and Smart Cards (see chapter E).

For closer reference on ICT related services please consult chapter E.

D.4 ICT in public administration

The state administration devotes significant sources to development of ICT. Its key objectives are devoted to **eight basic priorities**:

- **Information literacy**. The prominent programme for achieving information literacy at school leavers "Internet for Schools" (described in chapter B and E) has expected capital expenditure at approximately EUR 150 million, out of which most belong to ICT related good / services. Also job offices have budget for re-qualification of long-term unemployed in ICT fields, with budget dependent on needs and possibilities.
- **Direct access to information.** Within this priority several registers accessible through Internet have been created:
    - **Commercial register.** Its establishment in 1998 was financed through the ordinary budget of the Ministry of Justice so as to decrease the workload at the commercial courts. It is provided free of charge.
    - **Cadastral register**. Since July 1st, 2003 all land maps and land books have been digitized and accessible through the web for a fee smaller than that charged at the office itself.
    - **Customs registers**: all the data on exports and imports are available from the Directorate of Customs through the web free of charge.
    - **Communist agents** register operated by the Ministry of Interior.
    - **VAT and tradesmen register** (ARES) operated by the Ministry of Finance.

- **Services provided by the public administration.** The most important representative applications are those provided by the Ministry of Finance (see the frame).
- **Communication infrastructure**. Public Administration Information Systems (**PAIS**) (under development) will improve the efficiency of public administration and ensure electronic data exchange (IDA) among the public administration bodies. Gradual integration into the Trans-European telematic networks is expected. Among others the Ministry of Finance operates its own network FINET (see the frame).
- **Trustworthiness, security and order and personal data protection**. For this purpose an independent supervisory authority has been formed - the Office for Personal Data Protection
- **eCommerce** especially requires promotion of eSignature issue and public market places. The Ministry of Informatics proposes new acts and amendments within the scope of its budget.
- **Transparent business environment**. No data on filling this objective are available, sometimes seems to be ignored.
- To ensure the **stability and security** in the Information Society. No data on filling this objective are available.

Public services provided by the Ministry of Finance

The **Ministry of Finance** devotes particular attention to the modernization of communications between the public and the government, particularly in the tax area, where a project of **electronic communication with the financial offices** is in the process of implementation. At the first stage of this project the road tax return, real estate tax return and VAT return may now be filled electronically.

Among other automated information systems (such as the **Automated Tax Collection System, Customs Information System, Automated Budget Information System and Automated State Budget Accounts Systems**) the MF operates an **Administrative Register of Economic Entities** (ARES). ARES provides data on the registration of economic entities from the individual source registers for the tax administrators and for the general public.

The Ministry of Finance has set up **FINET**, its own communication network, which links all of the department's workplaces, and provides their access to the Internet and through FINET-MAN there is also a communication linkage with some other governmental and public administration bodies. The Ministry of Finance's FINET trunk communication network thus presents the conditions for the development and effective utilization of information technologies within the scope of the department as well as for co-operation with information systems of other governmental and public administration agencies.

D.5 R&D expenditure

The **governmental promotion of Research and Development** follows the National S&T and R&D policy approved by the Czech Government on January 6th, 2000. The National policy is in harmony with the existing EU legislation. It contains also a proposal of establishing national programmes especially in the field of oriented research. The Czech Republic welcomes "The Communication of the Commission: Towards European Research Area" and is ready to participate in the actions proposed by the Commission.

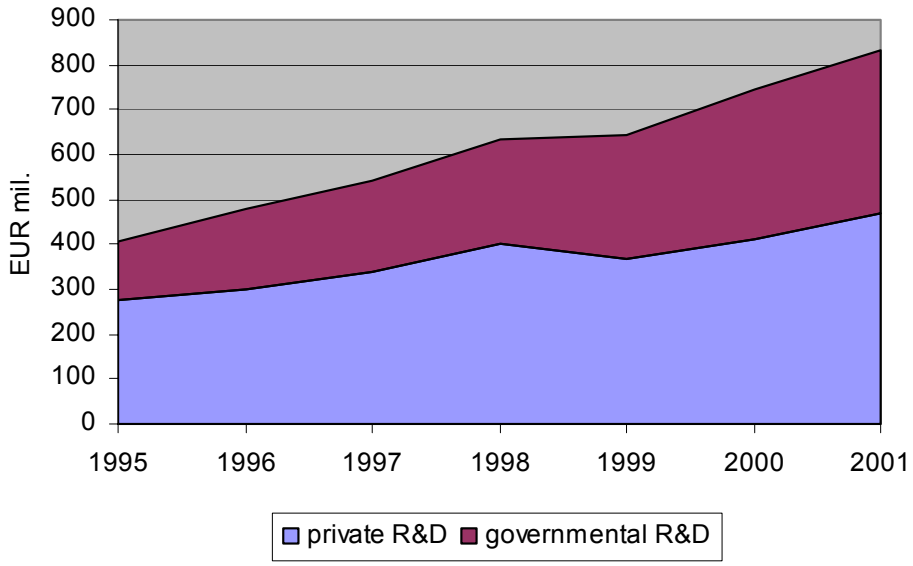
D.5.1 Private and public R&D expenditure

The general trend is in the direction of **values comparable to those in advanced countries**. Particularly remarkable is a steady growth in state participation in the financing of research and development, including that conducted by private enterprises (on the basis of public procurement proceeding).

In sum it may be concluded from the trends noted thus far, that the **government and its agencies have been showing greater activity** tending towards improvement in the situation in research and development, than the R&D entities themselves, particularly in the private enterprise sector. However, this statement does not hold in 2001, when the fiscal budget saving measures were implemented.

The trends described so far are depicted in Graph D.5 and table D.3.

Graph D.5: Private and public R&D expenditures.



Source: Czech Statistical Office.

The total expenditures for R&D increased in 2001 by 12% (private R&D expenditures by 14% and governmental by 9%). This trend was not usual in the past years, when the representation of the government on total R&D expenditures grew only steadily. In 1995 private R&D expenditures amounted to 68% of total R&D (i.e. public sources to 32%) and in 2001 private sector share shrunk to 56% (i.e. public sources to 44%). The average annual growth rate of R&D expenditures between 1995 and 2001 amounted to 12.6% (private R&D 9.2% and public R&D 18.4%).

	1995	1996	1997	1998	1999	2000	2001
Government R&D	132	180	207	233	273	331	362
Business R&D	276	298	337	399	368	413	469
TOTAL R&D	**408**	**478**	**544**	**632**	**641**	**744**	**831**
Government R&D (% of GDP)	0.33%	0.39%	0.44%	0.46%	0.53%	0.60%	0.58%
Business R&D (% of GDP)	0.69%	0.65%	0.72%	0.79%	0.71%	0.75%	0.75%
TOTAL R&D (% of GDP)	**1.02%**	**1.04%**	**1.16%**	**1.25%**	**1.24%**	**1.35%**	**1.33%**

Source: government budget - CZSO (the questionnaire VTR 5-01), GDP from 9.10. 2002.

Table D.3: Expenditures on R&D by sectors (EUR million)

D.5.2 R&D expenditures by field of science

The industry with the highest R&D expenditure was **engineering** with an overall R&D expenditure of almost EUR 0.5 bn in 2001. The second most expensive field were **natural sciences** with total investment less than EUR 200 million. Other sciences required much less expenditures. However, the **representation of the government** on total expenditure was different in each field of science: in the field of humanities the government share exceeded 93%, in social sciences 88%, but governmental promotion of engineering was much weaker (representing only 23%).

These figures confirm that the government invests its sources in the fields of science, where the return of invested finances is less probable (such as in humanities or social sciences). However, the government is much less willing to promote profit seeking R&D like that in engineering.

Concerning the relation of operational expenditures and capital expenditures, the most capital intensive R&D was performed in natural sciences (15%), the least capital intensive R&D proved to be in humanities (less than 7%).

Table D.4: R&D expenditure by field of science and type of costs - year 2001.

Field of science	Total expenditure	of which from government	Non-investm. expenditure	of which from government	Capital expenditure	of which from government
	EUR thous.	EUR thous.	EUR thous.	EUR thous.	EUR thous.	EUR thous.
Natural sciences	192 203	133 095	162 146	114 424	30 057	18 671
Engineering	499 860	118 014	451 274	95 516	48 585	22 498
Medical sciences	52 481	40 274	45 845	34 199	6 636	6 074
Agricultural sc.	41 060	29 103	37 159	27 364	3 900	1 739
Social sciences	16 608	14 729	15 443	13 799	1 164	930
Humanities	29 200	27 179	27 229	25 498	1 971	1 680
Total	**831 411**	**362 393**	**739 097**	**310 800**	**92 314**	**51 593**

Source: Czech Statistical Office.

D.5.3 R&D expenditures by socio-economic objectives

More than **62%** of **intramural R&D expenditures in the business sector** (financed either by private or public financial means) was devoted to **industrial production** (EUR 347 million). The second most important objective of R&D was **infrastructure** with EUR 49 million (less than 9%). Other objectives are even less relevant.

But the **government representation** again rather balances the initiative of the private sector than complements it – the most government-favoured objective is **human health** (48% participation), the least favoured **industrial production** (only 6%).

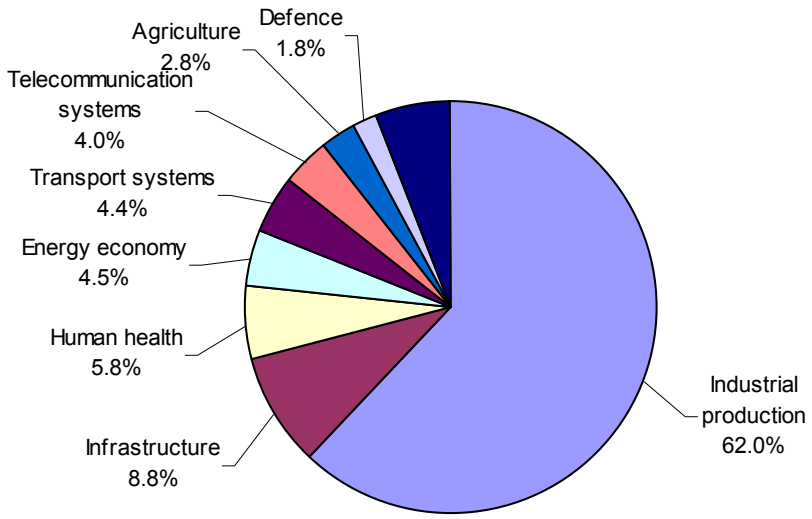
For details see the table D.5 and the Graph D.6.

Table D.5: R&D expenditures by objectives (EUR thousand) as of 2001.

EUR. thous	Intramural expenditure	%	of which from government	%
Industrial production	346 588.74	62.0%	21 248.51	30.9%
Infrastructure	49 180.65	8.8%	4 382.33	6.4%
Human health	32 175.10	5.8%	15 295.31	22.3%
Energy economy	25 311.97	4.5%	4 468.88	6.5%
Transport systems	24 444.47	4.4%	1 661.44	2.4%
Telecommunication systems	22 423.85	4.0%	1 510.75	2.2%
Agriculture	15 528.01	2.8%	7 012.70	10.2%
Defence	10 103.19	1.8%	3 213.89	4.7%
Other civil research	32 819.53	5.9%	9 868.97	14.4%
Total	**558 575.51**	**100.0%**	**68 662.79**	**100.0%**

Source: Czech Statistical Office

Graph D.6: Intramural R&D expenditure by objectives (%) as of 2001.



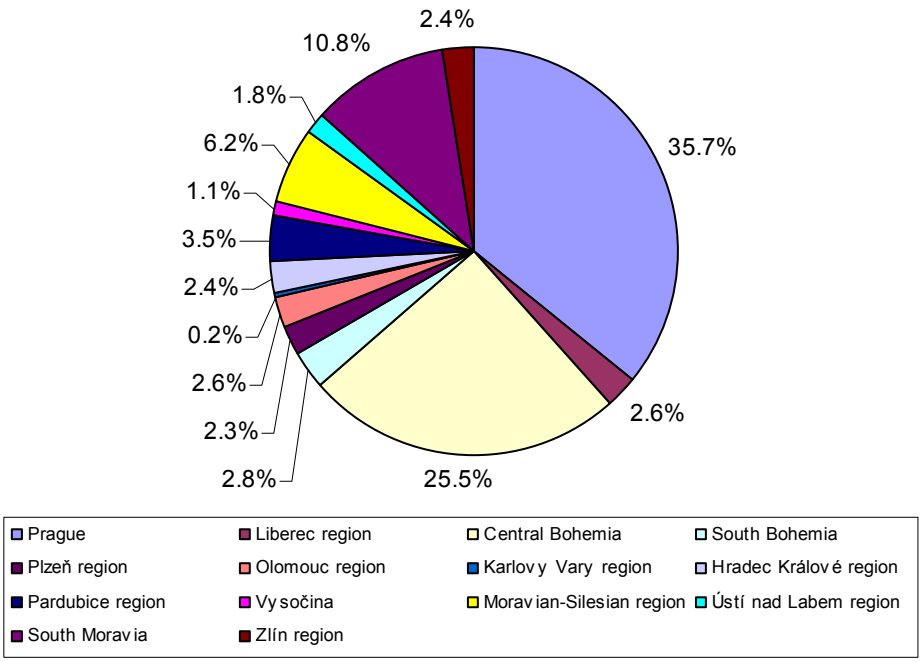
Source: Czech Statistical Office

D.5.4 Regional aspect of R&D – distribution

The dispersion of research and development expenditures in individual regions of the Czech Republic is very heterogeneous. The region with most R&D expenditures is the capital of Prague (35.7%) followed by Central Bohemia (25.5%). The reason for Prague having a disproportionately large share of R&D is due to the region's tradition of having research institutes, and having most of the prominent universities there. Prague also attracted intensive capital inflow in knowledge intensive fields (software engineering, medical sciences, chemicals). Strong position of Central Bohemia is caused especially by intensive FDI in automotive industry and its suppliers' chains.

The region with the least R&D is Karlovy Vary region (0.2%), the region with least inhabitants, and Vysočina region (1.1%), a traditional agricultural area. See Graph D.7.

Graph D.7: Regional dispersion of R&D expenditures (2001).



Source: Czech Statistical Office.

Other properties of R&D expenditures in the Czech Republic in 2000-2001, especially sorting by industries (NACE) can be obtained from the table D.6:

Table D.6: Research and development in 2000-2001 - basic indicators according to NACE.

	R&D employees (average number)		R&D employees (full-time equivalent)		Domestic R&D expenditure, total (EUR thous.)		R&D non-investment expenditure (EUR thous.)		Acquisition of fixed assets (EUR thous.)		Wages incl. other personnel costs as % of total domestic R&D expenditure	
	2000	2001	2000	2001	2000	2001	2000	2001	2000	2001	2000	2001
Total	**48 004**	**48 575**	**24 198**	**26 107**	**743 815**	**831 411**	**647 752**	**739 097**	**96 063**	**92 314**	**29**	**30**
out of which:												
A - Agriculture, hunting and forestry	**250**	**215**	**146**	**131**	**2 135**	**2 034**	**2 103**	**1 989**	**32**	**45**	**33**	**35**
C-E - INDUSTRY	**12 338**	**11 424**	**7 348**	**7 190**	**300 233**	**343 445**	**267 673**	**323 764**	**32 561**	**19 681**	**25**	**23**
C - Mining and quarrying	**28**	**30**	**16**	**12**	**1 141**	**1 517**	**757**	**1 019**	**384**	**498**	**11**	**9**
D - Manufacturing	**12 294**	**11 375**	**7 329**	**7 172**	**299 057**	**341 839**	**266 880**	**322 655**	**32 177**	**19 183**	**25**	**23**
Manufacture of food products; beverages and tobacco	82	73	52	43	2 470	1 932	1 964	1 758	506	174	25	24
Manufacture of textiles	184	96	108	60	2 211	1 718	1 946	1 375	265	343	31	28
Manufacture of wearing apparel; dressing and dyeing of fur	.	141	.	112	.	1 730	.	1 727	.	3	.	38
Tanning and dressing of leather; manufacture of luggage, handbags, saddlery, harness and footwear	.	.	.	.	.	.	.	.	.	.	.	.
Manufacture of pulp, paper and paper products	.	.	.	.	.	.	.	.	.	.	.	.
Publishing, printing and reproduction of recorded media	16	26	5	13	117	139	114	139	3	.	31	34
Manufacture of coke, refined petroleum products and nuclear fuel	.	.	.	.	.	.	.	.	.	.	.	.
Manufacture of chemicals and chemical products	1 416	1 226	917	866	30 726	29 710	28 190	25 909	2 535	3 801	29	32
Manufacture of rubber and plastic products	280	339	175	196	6 331	5 358	5 406	5 000	925	357	32	43
Manufacture of other non-metallic mineral products	249	431	130	253	6 537	13 011	4 787	12 047	1 751	964	17	13
Manufacture of basic metals	555	360	216	134	12 975	8 439	12 493	7 191	482	1 248	16	15
Manufacture of fabricated metal products, except machinery and equipment	603	561	339	344	9 182	11 754	8 011	10 459	1 170	1 295	29	26
Manufacture of machinery and equipment n.e.c.	2 691	2 485	1 466	1 464	39 916	37 125	34 149	33 950	5 767	3 175	33	33
Manufacture of office machinery and computers	**17**	**24**	**14**	**17**	**194**	**209**	**194**	**201**	**.**	**8**	**55**	**70**
Manufacture of electrical machinery and apparatus n.e.c.	**830**	**720**	**420**	**416**	**11 083**	**11 969**	**10 124**	**10 374**	**959**	**1 595**	**32**	**30**
Manufacture of radio, television and communication equipment and apparatus	**604**	**678**	**370**	**420**	**10 572**	**14 540**	**10 025**	**14 011**	**547**	**529**	**43**	**30**
Manufacture of medical, precision and optical instruments, watches and clocks	**594**	**544**	**322**	**326**	**5 769**	**7 133**	**4 939**	**6 640**	**830**	**493**	**44**	**39**
Manufacture of motor vehicles, trailers and semi-trailers	2 579	2 527	1 889	1 846	132 083	173 951	117 836	170 637	14 247	3 314	18	15
Manufacture of other transport equipment	1 083	964	574	555	20 882	20 879	19 267	19 086	1 614	1 793	30	29
Manufacture of furniture; manufacturing n.e.c.	288	125	173	78	6 023	1 391	5 504	1 319	519	72	38	54

Source: Czech Statistical Office

D.5.5 Academic R&D

Most of the academic research is being realized at **universities and at the Czech Academy of Sciences** (ČAV CR). In 2001 almost 1 600 projects were running at universities, over 1 400 at the AV CR, 1 000 by natural and legal persons. Most of the projects in 2001 belonged to the area of Technology and Engineering (938), followed by Social Sciences (797), Medicine (778), Mathematics and Physics, Biology and Chemistry.

Substantial part of **university research** is carried out by the Charles University in Prague. Other important players are the České vysoké učení technické (ČVUT - Technical University Prague), followed by Masarykova Univerzita Brno and Univerzita Palackého Olomouc.

The research projects are **financed** mostly by the **Ministry of Education, Ministry of Industry and Trade, Grant Agency, Academy of Sciences and Ministry of Health**.

The Czech universities also take part in lots of **international programmes of R&D**. Among the programmes, where mostly EU countries participate, belong the **EUPRO**, **COST**, **EUREKA**, **KONTAKT** and **INGO**. The Czech universities have also concluded several agreements with foreign universities and other institutions about cooperation in research.

D.6 Technical innovations in different sectors

D.6.1 Patents

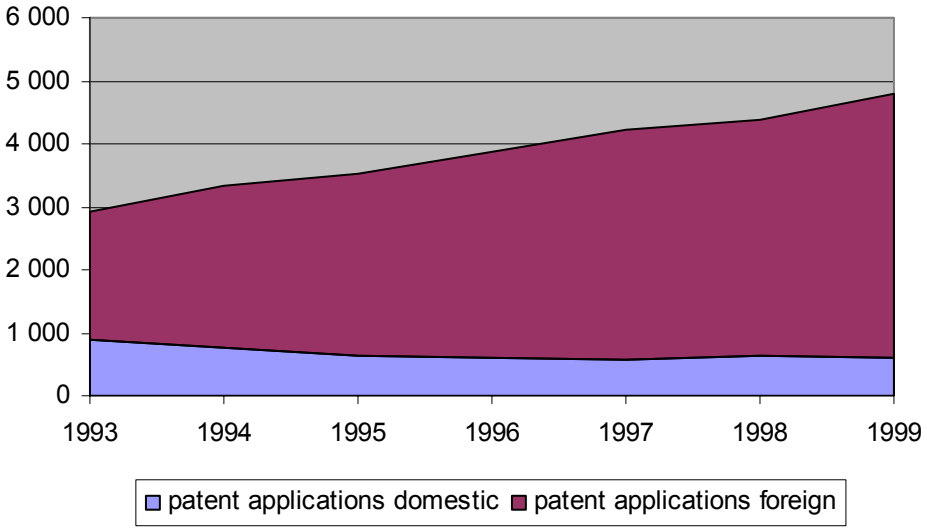
The number of patent filling (the data from the Czech office for protection of intellectual property) is evident from Graph D.8. The overall number of filled application continuously rose (from 2 933 in 1993 to 4 797 in 1999 – average growth rate 8.5%). However, the composition of fillings has changed completely. In 1993 30% of them were domestic applications, but by 1999 domestic applications were only 12.5%! This seemingly unfavourable trend has several explanations:

- **Growing private R&D expenditures** are directed to **foreign owned companies** and applications are being made on behalf of foreign (parent) companies,
- **Growing competition** on worldwide R&D market together with more costly R&D subjects (biotechnology, medical technologies…) pushes marginal efficiency of R&D expenditure down,

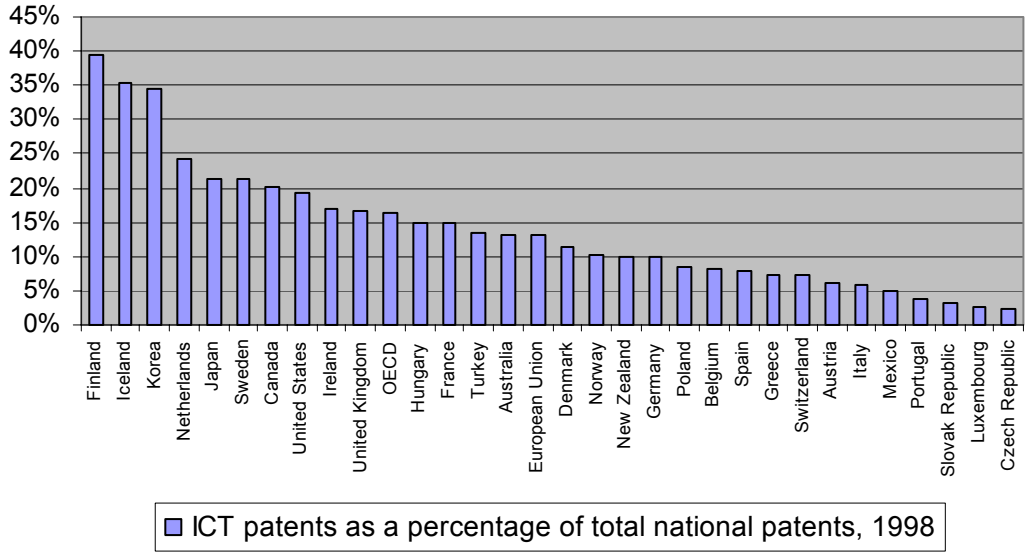
  and finally
- **Inefficient allocation of public R&D expenditures** together with **brain drain** (less efficient scientists work in more costly way).

However, we do not believe that the last point is accurate since most of R&D expenditures were made by private entities. Moreover, closer international cooperation makes irrelevant who is the actual applicant of the patent filling.

Graph D.8: Domestic and foreign patent applications.



Source: Czech office for protection of intellectual property.



Graph D.9: ICT patents as a percentage of total national patents for 1998.

Source: OECD, Patent database, March 2002.

In Graph D.9 depicting the proportion of ICT patents on all patents, it can be seen that the Czech Republic took the last place among 30 OECD countries with only 2.2%. The appearance of a trend that could reverse this unfavourable position in subsequent years is nevertheless unknown to us.

D.6.2 Licenses

The Czech Republic is not strong in license trading. In 2001 it purchased 123 new licenses (864 in total) and sold 117 new licenses (463 in total). This does not look that bad, however, since the received license fees (EUR 8.6 million) were nearly 8 times smaller than paid fees (EUR 67.7 million). Production under licenses is very important in the Czech economy amounting to more than EUR 1.4 bn. See table D.7:

Table D.7: Purchase and sale of licenses in the year 2001.

	Purchase of licences		Sale of licences	
	Total	out of which new	Total	out of which new
Closed licence agreements (number)	864	123	463	117
of which on patents and utility models (number)	95	21	122	29
Licence fees (EUR thous.)	67 745	8 741	8 603	3 733
of which for patents and utility models (EUR thous.)	18 122	677	210	44
Material imports for licence production (EUR thous.)	383 727	22	x	x
Payments from state sources (EUR thous.)	237	192	x	x
Licence production (EUR thous.)	1 413 156	14 067	x	x

Source: Czech Statistical Office

The **trend in license fees is also unfavourable**: in 1997 the fees for purchased licenses[5] were roughly 3.5x greater than revenues from sold licenses. Since then the fees paid for purchased licenses rose roughly 2.7x, but the fees received for sold licenses increased by 15% only.

Purchase of licenses	**1997**	**1998**	**1999**	**2000**	**2001**
Concluded agreements on purchase of licences	267	357	536	988	864
out of which: licences purchased in current year	35	105	137	171	123
Licence fees for purchased licences (EUR thous.)	25 450	44 362	199 353	53 343	67 745
out of which: for lincenses purchased in current year	2 590	17 784	7 668	12 426	8 741
Sale of licenses	**1997**	**1998**	**1999**	**2000**	**2001**
Concluded agreements on sale of licences	245	449	659	738	463
out of which: licences sold in current year	26	71	86	112	117
Licence fees for sold licences (EUR thous.)	7 487	6 971	18 103	11 159	8 603
out of which: for lincenses sold in current year	510	1 685	4 964	2 549	3 733

Source: Czech Statistical Office

Table D.8: Licenses 1997 - 2001.

D.6.3 Innovations

The innovation expenditures in 2001 amounted to EUR 1 410 million. In the ICT industry the most innovation intensive industry was the electrical and optical equipment industry (10.69% of total innovation expenditures). The innovation expenditures into computer and related activities accounted to 3.19% of total innovation expenditures.

Innovation expenditure in research and development (with no particular attribution to ICT R&D) amounted to EUR 57.33 mil (4.07% of total innovation expenditures). See the table D.9 (excerpt from the table C.8):

[5] The total license fees paid or received in current year are not a cumulation of fees for the entire duration of a license, but amounts actually paid in the respective year only.

Table D.9: Innovation expenditures in 2001 - ICT and R&D.

	intramural R&D	acquisition R&D	machinery and equipment	other external knowledge	training	market introduction	design	TOTAL			
	EUR mil.	EUR mil.	EUR mil.	EUR mil.	EUR mil.	EUR mil.	EUR mil.	EUR mil.	%	%	%
Total for the Czech republic	**310**	**114**	**631**	**131**	**37**	**151**	**35**	**1 410**	**100.0%**	x	x
Manufacturing total	**187.54**	**77.87**	**498.64**	**69.68**	**17.99**	**68.63**	**23.06**	**943.52**	**66.9%**	**100.0%**	**x**
Electrical and optical equipment	32.80	4.96	90.87	1.91	13.23	3.96	2.96	150.69	10.7%	16.0%	x
Services total	**119.18**	**31.60**	**97.94**	**57.98**	**18.87**	**80.98**	**11.62**	**418.16**	**29.7%**	**x**	**100.0%**
Computer and related activities	29.34	2.55	4.49	2.23	1.58	3.43	1.35	44.98	3.2%	x	10.8%
Research and development	41.16	7.75	5.13	0.67	0.29	1.00	1.32	57.33	4.1%	x	13.7%

Source: Czech Statistical Office.

D.7 Conclusion and SWOT analysis

The Czech Republic is on a leading **position with respect to ICT consumption and investment.** Due to high investment rates its position with respect to ICT investment itself is even better. The investment on ICT in industry now specializes in these fields:

- **system integration**
- **network**
- **gigabyte Ethernet**
- **flat screens** (TFT)
- upgrade of dialup to **broadband**
- **Internet banking**
- **eCommerce**
- **EDI – electronic data interchange**

In the beginning of 90s there was almost no market for legal software, now the **overall software piracy rate fell bellow 60%** (in corporate sphere even smaller) and legal software use becomes a habit.

The **access of ICT companies to financing is difficult** after privatization of all Czech banks with implementation of adequate risk scoring. There are some **venture funds** promoting SMEs in the field of ICT, but their effect is not clear. Fortunately this business is not capital intensive, but knowledge intensive, which does not inhibit competitiveness. SME complement larger software companies with accounting or other office related and specialized software packages.

There are certain ways of **government promotion of SMEs**. The government assists them with development of technology through TECHNOS programme. eCommerce is considered to be a key element for SME economy. National Discussion Forum aims at enhancement of ICT use in the business sector. Main measures are partially funded from the PHARE programme.

Concerning the ICT in households, due to relatively **lower share of consumption** on GDP their spending share on ICT is not that high. However the structure of household ICT expenditures resembles the OECD average.

In the field of ICT in **public administration** the state information policy is followed with a clear priority: **education**. Other areas are less pronounced, but are not inexistent. For example, the Ministry of Finance (MF) pays attention particularly to eTaxation (road tax, VAT tax returns…) focusing on cost saving on the side of both taxed subjects and tax administrators. The MF also operates subject register allowing access to public databases of enterprises. The MF utilizes communication network FINET connecting all workplaces of MF.

The state participation in R&D expenditures is growing, even though it is forming a smaller part (more than one third of total R&D expenditures). Most of R&D expenditures is spent in Prague and Central Bohemia reflecting the fact that largest part of foreign investors first enters these regions. The portion of patents applied for by domestic applicants is falling amounting to some 13% of total applications. The trend in license trading is adverse as well with falling revenues from sale of licenses and growing cost of licenses purchased.

D.7.1 Summary

- High ICT investment rates,
- ICT consumption still below OECD average,
- Government support for development and implementation of ICT,
- Automated systems of public administration,

- Business subjects' registers,
- FINET – state information network,
- R&D expenditure growing (especially governmental),
- Patent applications,
- License trading with adverse balance,
- Innovations in electrical and optical equipment industry.

D.7.2 SWOT

Strengths	Weaknesses
• Role of major companies, and of foreign ones in particular. • Growth in total R&D expenditure, reaching EU levels. • Good communication infrastructure. • Government support of SMEs. • IT systems of public administration.	• Underdeveloped eCommerce. • Slow growth of private R&D. • Share of foreign over domestic patents show possible misbalance of efforts
Opportunities	**Threats**
• Focus on eGovernment. • Impact of Lisbon target of 3% R&D expenditures	• Growing costs per patents (possible inefficiency in R&D). • Uneven geographical R&D distribution.

D.7.3 SWOT IS

IT system of public administration will make its operation more efficient, with less frictions and shall result in cost reduction both on the side of public administration and businesses. Among first examples is ARES, the subject register and tax related systems.

Fast communication networks are a necessary condition for serious research and academic community. The Czech Republic, with EU assistance, can benefit of it.

Nevertheless, **underdeveloped eCommerce** is apparent in all sectors. It is due to conservative approach of consumers and too cautious use of payment cards.

Focus on eGovernment together with EU accession shall make the administration costs fall and the state administration shall become more efficient. It should also make the governmental bodies more transparent, which might result in reduction of corruption.

E IST PENETRATION RATES

E.1 IST in telecommunication

	1995	1996	1997	1998	1999	2000	2001	2002
Fixed line penetration - households (%)	40.3	49.0	60.0	69.7	72.5	71.9	68.6	66.8
Fixed line penetration - inhabitants (%)	23.7	27.3	31.8	36.3	37.5	37.7	37.5	35.9
Share of fixed network digitalization (%)	17.9	32.8	50.0	64.0	76.7	85.7	93.9	100.0
Number of payphones per 1000 inabitants	2.0	2.6	2.8	2.9	2.9	2.9	2.8	2.8
Total number of ISDN subscribers (th.)						122	261	389
Mobile phones penetration (%)	0.5	1.9	5.1	9.4	18.9	42.3	68.2	84.0
CATV penetration - households (%)								33.0
Color TV set per 100 households	95.8		104.9	109.0	112.3	115.8		
Number of PCs per 100 inhabitants				9.7	10.7	12.1	13.6	
Number of PCs at home (% of households)					14.2	17.8		28.0
Number of PCs with internet per 100 inh.					6.8	9.7	12.2	
Number of internet hosts (th.)	21.9	40.8	56.9	86.5	122.3	160.0	215.5	

Source: Czech Statistical Office, Ministry of Transport and Telecommunications

Table E.1: Telecommunication penetration rates.

E.1.1 Fixed Lines

The market for fixed lines has been fully liberalized since 2003 including number portability and carrier pre-selection feature. However, almost 100% of last miles belong to the incumbent Český Telecom. The market share of the previous is smaller, since the alternative fixed lines operators focus on attracting large corporate users. Other fixed lines operators (relying on carrier pre-selection or call-by-call carrier selection) are Tele2 (especially international and long-distance calls), Contactel (subsidiary of Tele Danmark), Aliatel (subsidiary of German utility giant RWE), GTS Czech, Czech On Line (subsidiary of Telecom Austria) and UPC (cable TV operator). The industry is in a dynamic evolution with no clear market shares.

The penetration rate in 2002 dropped slightly compared to 2001. The highest fixed line penetration rate of household is achieved in the capital Prague (more than 90% of households), the lowest rate is in South Bohemia (less than 60%). However, Český Telecom is now ready to install a new fixed line anywhere within a reasonable time frame, hence now the penetration is limited by low demand due to mobile phones competition. The regional differences of mobile phones are not statistically observed since the vast majority of mobile phones has pre-paid SIM cards with no personal registration.

The total number of telephone stations decreased from 3 842 million to 3 661 million, out of which 389 thousand were ISDN lines growing by almost 50% in comparison to 2001. Due to the use of fixed lines for dialup Internet connection, the total number of outgoing minutes of use per one fixed line increased 7 % to 274 minutes a month. Nowadays, the network is fully digitalized.

The trend is that fixed lines are becoming mainly used for Internet connection rather than voice services (dial-up Internet connection represented 53% of the total 5.8 billion of outgoing minutes in the first half of 2003). Thus we can assume that the future of fixed lines can be seen mainly in non-voice services whereas the share of voice services will be declining as the increasing use of mobile phones reduces the need for fixed lines.

E.1.2 Mobile Phones

At the end of 2002 the penetration rate reached 84% (87% in July 2003) in contrast to 68% at the end of 2001. By the end of 2003 the penetration rate in the Czech mobile phone market is expected to be about 90%. Czech mobile GSM operators state the coverage of inhabitants to range between 98% (Český Mobil) to 99.5% (Eurotel). In the case of out-of-date system NMT the coverage approaches

almost 100% of inhabitants (of course less if territorial coverage is in question). Remote or less populated areas are in many cases still covered by only some of the three operators.

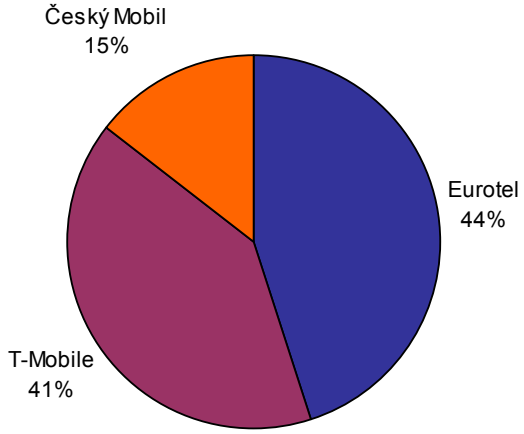
In 2002 the local mobile operators registered 1.6 mil new telephone numbers. The total number of mobile phones in the Czech Republic is 8.6 million. The real number of mobile owners is estimated to be 10 - 15% lower because some people use the services of more operators.

Table E.2: Number of Mobile Network Operators.

	1995	1996	1997	1998	1999	2000	2001	2002
Number of Mobile Network Operators	1	2	2	2	2	3	3	3

Source: Czech Telecommunication Office.

Graph E.1: Mobile phones market shares (January 2003).



Source: Press monitoring at www.securities.cz.

With three service providers on the market (ownership structure – see subchapter C.11.2), the competition is severe. Eurotel mobile phone operator raised the number of its clients by 650 000 to 3.89 million by the end of 2002. Eurotel now has more clients than its parent company Český Telecom, which operates about 3.75 million fixed lines. T-Mobile Czech Republic, formerly Radiomobil, increased the number of its clients by 660 000 by the end of 2002. At the end of 2002 it had a total of 3.51 million customers. Český Mobil is estimated to have a total of 1.2 million clients, having nearly 400 000 new ones in 2002.

With 84 mobile phones per 100 people at the end of 2002, the Czech Republic was among the countries with the highest mobile penetration in Central and Eastern Europe. The only country with a higher share was Slovenia, with 85 phones per 100 persons. Romania has the lowest mobile penetration, amounting to 23%.

E.1.3 General packet radio services (GPRS)

The largest Czech mobile network operator, Eurotel introduced GPRS Internet connection without any time and capacity limitations on April 1st 2003 under the name Data Nonstop. Users pay EUR 31 a month for the Eurotel service. Eurotel's rival T-Mobile offered flat-fee tariffs without time and capacity limitations for GPRS Internet connection as of May 5th 2003, however in September 2003 this offer was discontinued with imposing of data limits. Therefore now T-Mobile does not have a tariff without time and capacity limitations and according to its press department is not preparing such a tariff.

Due to mobility and no connection time limitations GPRS is mainly used for always-on email and WAP. The biggest disadvantage of GPRS compared to other connection types is that its speed is much affected by network traffic. When there are a lot of users on the same transmitter, as in highly populated areas, the connection speed can drop precipitously and thus GPRS cannot consistently offer high-speed connection.

E.1.4 Universal mobile telecommunication system (UMTS)

In the Czech Republic, two mobile network operators - T-Mobile and Eurotel - hold UMTS licenses. Each paid CZK 3.5 billion (EUR 1.1 billion) for its license, this to be paid for over 20 years. What they won in return was the opportunity to offer new services based on third-generation mobile technology, or UMTS. Its chief and most valuable virtue is that it allows faster data transfer, ranging from 144 Kbps to 2 Mbps.

This gives operators the means to introduce new services like video streaming and video conferencing. In financial terms, the new services are expected to increase profits. Analysts expect that the revenue from data services will contribute about 30 % to companies' annual turnover by 2005.

But Eurotel said it isn't planning a massive launch of UMTS services. The switch to UMTS handsets still depends on customer acceptance of their prices, which will certainly be higher than those of GSM phones. The services are expected to be launched in urban centres first, Prague and Brno being the first two cities by the end of 2004. The license requires operators to provide a 90 % coverage of Prague by January 2005. The third mobile network operator Český Mobil (running the GSM network Oskar) is not interested in offering UMTS services because of the enormous costs of buying the UMTS license and building up a network. It argues that 90 % of the services that UMTS is expected to deliver can be handled by standard GSM.

E.1.5 Internet Penetration

Some 2.732 million people **got connected** to Internet in the Czech Republic in February 2003. In January 2003 a total of 35%[6] of people over 15 years old living in the Czech Republic were connected to the Internet; the increase in penetration is therefore very dynamic since as of December 2001 it amounted only to 13.6%[7]. About 80% of young people between 15 and 18 years of age use the Internet in the Czech Republic. In the age group between19-23 years 74% use Internet and in the age group between 24-30, Internet penetration is 68%.

Approximately 33.2% of the inhabitants get connected to the Internet from their work, over 23% access the Internet at their friend's or neighbour's place, 19% at an Internet cafe, 17% from their home, and 13.5% at school[8].

E.1.6 ADSL

The first offers of Internet connection through ADSL started to appear in the Czech Republic at late February and early March, 2003 and as of May 2003 Český Telecom had wholesale ADSL contracts with 17 Czech carriers. ADSL prices, including VAT and the lease of a modem, begin at EUR 44 - 50 a month in the Czech Republic.

High-speed Internet connection through the ADSL is available mainly in Prague, Brno and Ostrava, but the service will be gradually offered in all regional capitals and major towns in the country. Currently ADSL can be used by 44% of fixed line users and this share should increase to 60% by the middle of 2004.

[6] Press monitoring at http://www.securities.cz/.

[7] Information Society Statistics 4-17/2002 by Eurostat.

[8] Opinion poll that was carried out from September to December 2002.

Six weeks after ADSL technology became accessible (mid April 2003), five Internet providers have made more than 900 connections of broadband Internet access using this technology. As of April 15th 2003, Český Telecom registered 7 085 requests, and the number of accepted orders for ADSL has exceeded 3 670. At the press conference on October 22nd, 2003 Český Telecom announced to install 13 000 ADSL sockets (also including customers of other operators who are now purchasing services from Český Telecom), of which roughly 40% are corporate users (i.e. 5 200) and 60% households (i.e. 7 800).

According to surveys, Český Telecom is offering ADSL at the lowest speed in Europe but at a price matching the European average. Therefore compared with offers involving a similar speed, ADSL in the Czech Republic appears to be among the most expensive in Europe. A comparison of the minimum ADSL prices charged by dominant carriers in Europe (in EUR, without VAT) is provided in table E.3.

Table E.3: Minimum ADSL prices charged by dominant carriers in Europe.

Country	Company	Speed (kbit/s)	Flat charge (EUR/month)
Great Britain	BT	512/256	19.95
France	France Telecom	1000/128	30.00
Belgium	Belgacom	3000/128	32.68
Portugal	Portugal Telec.	512/128	34.95
Netherlands	KPN	256/64	35.95
Austria	Cyber Tron	512/64	39.00
Germany	DT	768/128	41.66
Czech Republic	**Český Telecom**	**192/64**	**42.42**
Hungary	Matav	384/64	45.60
Denmark	TDC	256/128	58.14
Swithzerland	Swisscom	512/128	85.00
Norway	Telenor	1000/256	96.96
Poland	Telekomunikacja P.	512/128	189.62

Source: Czech Telecommunication Office, June 2003.

In response to studies comparing ADSL services, the Czech Telecommunication Office started to contemplate on price regulation of high-speed Internet connection via ADSL. This could lead to a price cut.

On the basis of the request from the Czech Telecommunication Office, Český Telecom from September 15th 2003 increased the transmission speed to 512/128 kbps with unchanged monthly price of EUR 44 (VAT excluded), however with EUR 12.5 surcharge (VAT excluded) per each 10 GB above the 10 GB limit. Moreover it started the aggregation of the ADSL lines in case of households (ratio:1:50), and corporations (ratio:1:20). If there are many heavy users aggregated together, the maximum achievable speed obviously falls down significantly.

E.1.7 Cable TV

High-speed Internet connection offered by cable TV providers is an alternative to ADSL connection (similarly to ADSL, it is provided in bigger cities only). Approximately 1 million households have CATV socket. There is a virtual duopoly on the CATV market (UPC Czech Republic and TESmedia/Intercable CZ) with some 100 local CATV operators that have only a small market power. UPC Czech Republic provides CATV services to approximately 265 000 households and TESmedia / Intercable CZ provides it to 180 000 households.

Both large companies keep on improving the services and are gaining on classic telecommunication operators. The small CATV competitors do not provide Internet access. TESmedia has increased its basic speed from 64 kilobytes to 100 kilobytes, with prices remaining unchanged at EUR 31 and EUR 37.5 per month. The price of the offer for corporate users was decreased, while the speed accelerated recently. The same evolution was recorded in the case of UPC Czech Republic as well.

There are no public data on the number of households with Internet connection over the CATV, but in expert's opinion the total number is ca 25 thousand households with an 80% market share of UPC (i.e. 20 thousand) and with a 20% market share of TESmedia (i.e. 5 thousand).

E.1.8 Internet terminals

Český Telecom is planning to extend its network of Public Information Terminal (VIT) to 300 by end of 2003. 32 of these terminals are now in operation, and a further five to ten should be installed soon. Info-terminals enable Internet access, sending SMS, telephones and e-mail.

Most of these terminals are placed in schools, at train stations, airports, and at gas stations. The most visited ones are the terminals in information, shopping or amusement centres, where the average time spent on a terminal is approximately 1 500 minutes per month. Users pay for this service by Trick multi-purpose chip cards. Some information is free of charge, based on the decision of the operators of the individual facility – for example the information system of a city or of an employment office.

The public information terminals are financed from charges paid by their operator (20%), payment of end users of telecommunication services (10%), and 70% of the revenues should be covered from advertising.

Český Telecom started installing public information terminals in autumn 2001. The terminals are supplied by King Products & Solutions, which is a part of Ascom Group. The construction of Internet kiosks is also codified in the State information policy and the Action plan of its realization, as one of the means of citizens' communication with the public administration.

E.2 IST in transport

E.2.1 Timetables of public transport – system IDOS

In accordance with the Act on road traffic (No. 111/94) since October 26th 2001 the company CHAPS spol.s.r.o. (Ltd) has been authorized by the Ministry of Transport of the Czech Republic to run the National Information System of the public line passenger transport timetables called IDOS.

The IDOS is an information system containing **data on transport connections**. It enables to search for the optimal connection for changes of lines and for further or previous connections, to obtain information about departures or arrivals or detailed information about connections. Some timetables are interconnected, which means that the place of possible change, footpath distance at change points or allocation of stops for municipalities and town parts are defined within them.

This system offers **timetables of the following transport operators**:

- **Czech Railways** and other private railway transport operators,
- **Railways of the Slovak Republic** and **European railway transport operators,**
- **National and international bus transport operators,**
- **Municipal public transport** companies of selected towns in the Czech Republic,
- **Czech Airlines,**
- Some **international airlines,**
- Selected operators of **water transport** in the Czech Republic.

E.2.2 Automatic Seat Reservation Ticket System AMS

Automatic Seat Reservation Ticket System provides online offer of seat reservation tickets for majority of transportation companies.

E.2.3 Other applications in transport

Czech Republic entities are members of numerous global billing and reservation systems such as **IATA's billing and settlement plan** (BSP) for passenger agents and cargo account settlement system (CASS) for cargo agents. Affiliates of international companies from the field of transport such as Lufthansa, Air France or DHL offer common electronic services such as **electronic tickets** or **package tracking** on the Internet. **Czech railways** also offer some online services like booking or looking up connections or train locations.

E.3 IST in financial services

Basically all major Czech banks offer direct banking services such as Internet banking or mobile phone access (the first and largest **exclusively online bank** was **eBanka**, which launched its services in 1998 and had nearly 257 000 clients at end of June 2002). The number of direct banking transaction is increasing rapidly (the growth is also stimulated by increased charges for over-the-counter banking transactions).

E.3.1 Statistics

In March 2003, a total of 410 000 clients of **Komerční Banka** (that is one in every three clients, a 64% y/y growth) used some of the direct banking services. Phone banking services were used by 300 000 clients, the number of Internet banking users reached 85 000. PC Banking has attracted 25 000 users. KB does not provide GSM Banking. The bank's management plans to boost the number of direct banking users to 600 000 until end of 2003, which is half of its clients. Clients made two-fifths of all orders by telephone or via Internet, representing CZK 70 million (EUR 2.2 million), a y/y increase of 40%.

A total of 415 400 **GE Capital Bank** clients used some form of direct banking services in March 2003. GSM Banking was the most popular product in the bank's portfolio and has been used actively by 163 412 people since October 2002. At the end of 2003, the bank wants to be number one in GSM banking and Internet banking.

Česká Spořitelna had 572 000 direct banking subscribers in March 2003. 360 000 of them use telephone banking, 120 000 use Internet banking, 70 000 use GSM banking and 22 000 use PC banking. In 2003, ČS plans to increase the number of Internet banking users by more than 100% and the number of all clients using direct banking to a total of 1 million.

	2000	2001	2002
Cards in circulation (million)	4.4	4.7	5.3
ATMs	1 641.0	1 909.0	2 350.0
Cash withdrawals from ATMs (CZK billion)	97.0	234.0	292.5
Non-cash payments by cards (CZK billion)	26.1	43.4	51.4

Source: Czech Society for Payment Cards, MUZO, a.s.

Table E.4: Payment cards in the Czech Republic.

	May 2002	December 2003 est.
Česká spořitelna	988	1 100
Komerční banka	380	500
ČSOB	230	420
GE Capital Bank	242	350
Other	200	260
TOTAL	**2 040**	**2 630**

Source: Czech Society for Payment Cards, MUZO, a.s.

Table E.5: ATMs by networks.

E.3.1.1 Information about payment card transactions

Komerční banka has recently started to offer the possibility to be informed about the transaction carried out via the payment card. Immediately after the transaction the client will see on the display of his/her mobile phone the sum deducted from the account. The service is automatically set for all users of the Internet and phone banking and Komerční banka provides it for free.

E.4 IST in postal services

In the reaction to the increasing importance of Internet services, Česká pošta (Czech state owned supplier of postal services with decisive market power) started to offer electronic equivalents to standard postal services in the recent months.

For example in February 2003 Česká pošta made available to the public an electronic alternative to ordinary registered mail, using a technology that has been mainly developed ČP.

The new electronic mail programme can only work between senders and receivers who are both signed up for the service. The cost of a basic **Registered Electronic Mail (REP)** package starts at EUR 19 per year and includes a monthly 100-megabyte limit of transferred data, or around 1 800 registered e-mails per month.

REP allows the delivery of e-mails or data packages through the post office network with an official confirmation that it arrived at its final destination. Česká pošta is the only authorized provider of this service in the country so far.

REP operates on a client-server basis. A special software application is provided that works on most platforms like MS Windows 98/2000/XP, Mac OS or Linux, and no special hardware or other technical equipment is needed to use the technology. Messages or data are sent to Česká pošta's server using personal codes and an **electronic signature** (now issued by an authorized company). Česká pošta then notifies the receiver that his or her mail is ready to be picked up. Software developer ICZ provided coding and encryption for the system, and Sybase provided the application server.

According to the Ministry of Informatics Česká pošta should also start to offer Internet access in its branch offices. All 3 400 post offices in the Czech Republic have computer equipment and two thirds of these are connected through a data network.

E.5 IST in major manufacturing sectors

The presence of IST in manufacturing is dependent to a large extent on the **industry concerned** and on the **size of the enterprise**. Its applications are most developed in the case of the most **progressive industries**. The Czech Statistical Office does not collect data on IST applications across different industries (the cross-sectional data are available in much more aggregated appearance) and IST

applications themselves can only be judged on the overall industry sector level. Some databases are compiled at Eurostat, OECD or EITO, but such data are almost always outdated with time series ending in 2000 or even before.

Therefore we decided to provide the reader with a brief, and possibly rather arbitrary judgments on **IST applications in different industries**, which is based on personal experience, rather than on independent data. Nevertheless, we think that this could also shed some light on the question under investigation.

The **IST in industry** is basically concentrated into these applications:

- **Voice telephony**. Larger companies with several locations established either their own IP telephony network, or have reserved a virtual private network with resources provided by a telecommunication operator in order to save telecommunication fees.
- **Internet connection, communication and network security**. More than 90% of businesses use Internet as a means of production.
- **Management information systems.** Almost each larger industrial company invested in SAP, BAAN or other MIS. System integration, often including also direct banking modules, is one of key IST applications in industry.
- **CAD, DTP and new product development**. Companies in automotive, chemical and electrical apparatus industries develop their products on computers. Publishers design their products on DTP systems.
- **Computer control of manufacturing facilities**. Companies in mass production industries (chemical, automotive, tobacco, metal processing. etc) have their production lines controlled by computers.
- **Contact with (prospective) customer**. Three approaches can be seen:
    - **Web presentation** (passive approach) is used by almost all companies having Internet access (90% of total).
    - **B2B**: According to the Czech Statistical Office, 34% of companies realized at least one electronic purchase in 2002 (which is close to EU levels), compared to 22% in 2001.
    - **B2C**: Business to customer direct channel is not important as a link between a large corporation and a household customer, but especially between small retailers (with no physical premises) and household customers.

The following text is devoted to the situation in individual industries with respect to IST applications we observe there:

E.5.1.1 Electric and optical instruments

This industry is now mostly in hands of **strong foreign owners**. Therefore the companies had to adopt not only the corporate structure of the parent company, but also its IST applications. Since most of R&D is performed at the parent companies, IST in the Czech Republic is often limited to: telecommunication, accounting and reporting systems according to parent company, systems for machinery controlling (of course all the machinery in such enterprises is ICT itself).
Almost always these companies use email communication, less frequently also some B2B (e.g. suppliers of components to assembly lines). B2C systems are of less relevance since these companies are not involved in retailing.

E.5.1.2 Means of transport production

The most progressive industry in IST use is the means of transport production industry. So far there is one final product manufacturer (Škoda Auto in Mladá Boleslav producing over 500 000 cars a year, Volkswagen group), the Toyota-Peugeot plant in Kolín is under construction and Hyundai intends to construct a new assembly plant in Žatec as well.

This industry was progressive in IST use even in the Communist regime – in 1988 when a new model of a car ("Škoda Favorit") was launched, the complete **car body manufacturing was robotized** and after acquisition by Volkswagen in 1991 their engineers were surprised that their own plant are not equipped in such a modern way. The designing and testing of the cars was even at that time completely based on **computer simulation**. Of course its main purpose was to represent the shop window of the Communist block. The entry of Volkswagen did not mean any abrupt change in production technologies. Especially **management information system** was introduced.

The growth of car production fed the development of **automotive part** sector. Later, in the second half of the 90s when the management of the company itself was well mastered, the Volkswagen engineers decided to implement an **on-line communication with all key suppliers**. Now ordering of parts, reclamations, requirement for product changes and billing is all made over **electronic data exchange**. The supplier, who had not implemented it, would have been erased from the key suppliers list. Škoda Auto also operates its own B2C system allowing car personalization designed from offered modules that include exterior and interior features as well as engine selection to predefine for manufacturing.

The entry of the **two other carmakers** may provide more incentives for ICT investment among the industry suppliers and hence the success story of automotive industry may continue.

E.5.1.3 Metallurgy and machinery production

The machinery industry during the socialist era was mostly concentrated in **several conglomerates** (Škoda, Vítkovice, ZPS, ČKD…). With few exceptions of companies where foreign visitors were introduced the companies were out-of date. The development of new products has been mostly made without any IST. After the decline of communism the privatization of this sector was not very successful and was mainly done through the **voucher method**. Many interest groups have fought each other within the companies with little interest in the future of production. Therefore almost each of the above-mentioned ones went bankrupt.

Some companies were liquidated due to the bankruptcy, some sold to foreign owners while the destiny of others had not yet been resolved. The IST in these companies of course exists, but not as developed as in the previous two industries.

We have no information on either B2B or B2C applications in this industry. Obviously **electronic communication** is an everyday practice of this industry as well.

E.5.1.4 Chemicals and plastics industry

Key Czech chemical companies belong to the Unipetrol holding, which shall be privatized in 2004. All companies have **invested in the last ten years hundreds of millions of EUR** with three priorities: environment, new production technology and ICT.

Even though the production of the industry grows, the headcount falls. This can be attributed to employment of **computer controlled production facilities**, supplied by licensors like Mitsubishi chemicals, Du Pont etc. Every large company has now **management information systems** (SAP has the strongest position, but some of the companies still have local management software). The companies are accustomed to electronic communication, some of them are in such a degree of development that they **outsource data processing** (they purchase high performance computers' machine time and have their data transmitted by high – speed networks for remote processing).

New products design is performed by specialized software. Some of the companies have established B2B communication with its business customers.

E.5.1.5 Pulp and paper, printing industry, publishing

Pulp and paper processing industry basically consist of three large corporations (Frantschach Pulp Štětí, Biocel Paskov and JIP Větřní) and several smaller ones. The size of the three large companies

allows for mass production with implementation of **computerized machinery controlling**. Other companies, much smaller than these three, use ICT to a lesser extent.

Printing and publishing now belongs to foreign (especially German) owners and quite logically all the routine works is automated and performed on ICT with **DTP systems**.

E.5.1.6 Wood processing industry

Due to low margins wood-processing industry is in a very difficult financial situation. Its investment is if not stopped then severely restricted. Computerized manufacturing is a very rare case here, new product development is performed using **traditional methods**.

Some wood processing companies have their **web pages** with description of their assortment, B2B or B2C applications are not in place.

E.5.1.7 Glass, ceramics, china and construction materials

Most of the industry is in foreign hands. The **development of new products** is performed on computers with software imported from parent companies. The companies have almost always their **web pages**.

Construction material companies sell their products through direct channels (**B2B**) to their customers (i.e. businesses), manufacturers of sanitary facilities sometimes allow the design to be individualized or ordered over the web. China and glass companies in some cases sell their goods directly to final customers (**B2C**).

E.5.1.8 Food processing and tobacco industry

Food industry is mostly in the hands of domestic owners and the adoption of foreign management information systems is less frequent than in other industries. **Computerized controlling** of production lines is a must to fill hygienic regulations. B2C is virtually non-existent, B2B is performed by large producers.

The largest tobacco industry company has been privatized by Phillip Morris, which among others also brought about installation of new **computerized production lines** and foreign management and accounting systems. Concerning direct selling channels, the case of food industry is valid here as well.

Concerning new product development no data is available.

E.5.1.9 Exploitation of raw materials

Mining companies are in most cases in domestic hands. Due to the specificity of their production technology the field of ICT application belongs to **administration and customer interface**. The larger companies (especially coal mines) operate some B2B systems and contact with final customers (case of brown coal as heating fuel) is secured through **web pages**. In some cases companies employ special **geological software** for future exploitation projections.

E.5.1.10 Textile, clothing and leather processing industry

The financial position of this industry is very difficult since there are many companies in bankruptcy or they are lagging with payments to their suppliers. The ICT in this industry was implemented to a lesser extent than in previous cases, and mostly involve only **administration systems** by local software developers (including personnel, invoicing and stock management facilities).

The only publicly known companies that design their clothing on **CAD systems** are Oděvní závody Prostějov and Kras Brno. Some other companies, not in financial difficulties, are simply too small to benefit from economies of scale by computer-controlled mass production and they specialize in tailor-made clothing.

E.5.1.11 Network industries

Network industries are sophisticated users of IST in most of their activities, because they have to interconnect their production, distribution and sales. For instance **Czech Electricity Market Operator** (OTE) launched in 2003 the central information **exchange system for electricity** producers, distributors and customers. The new Data Services Centre (CDS), to be operated by the company Logica for 6 years, should facilitate administrative work related to transfer of clients from one electricity distributor to another. OTE believes that the project will streamline short-term transactions on the electricity market.

All Czech gas and electricity distributors have installed **SAP** as their management information system. The Czech dominant electricity generator ČEZ has also installed SAP, other smaller players in most cases as well.

E.6 IST in public administration

In the field of public administration numerous projects are supervised mainly by the Ministry of Informatics. Since 2001 various documents for government and other institutions can be submitted electronically.

E.6.1 Taxes

Since March 2003 value added taxpayers can submit their tax returns via the Internet using electronic signature. VAT returns are submitted on a monthly basis, therefore the electronisation of the process brings about greater relief in comparison with income tax, where returns are submitted once a year.

Simultaneously, taxpayers may submit via the Internet and with the use of electronic signature also documents concerning road tax and real estate tax.

Electronic signatures are issued by První certifikační autorita for EUR 22. The price should drop hand in hand with the expansion of ICT technologies and in the future it could be offered free of charge.

Electronic income tax returns are planned for 2004. The process of enabling electronic communication with the state will continue. For example, extracts from the Land Register are available on the Internet since July 2003.

E.6.2 Electronic Markets

The Office for Public Information Systems (ÚVIS) has granted licenses to 3 companies to run electronic marketplaces for public administration subjects, among them Economy.cz with the AllyGeM market, PragoData with Český Trh market, and RIDEA Distribution. Since September 2002, public administrations have been obliged to use the electronic marketplaces for information technologies orders under CZK 2 million (EUR 63 thousand). In November 2002, public administration subjects carried out 798 transactions totaling CZK 57.8 million (EUR 1.8 million) through B2B Centrum and CenTrade marketplaces.

E.6.2.1 CenTrade

About 730 users from 255 offices have already registered with the electronic market CenTrade, the second place where members of the state administration can buy equipment of information technology for up to CZK 2 million. (EUR 63 thousand). Altogether 311 companies are listed as suppliers. Electronic marketplace CenTrade has facilitated business transactions worth CZK 500 million (EUR 15.6 million) in 2002. Over 80 companies use the system and its shareholders are Český Telecom, Citicorp and SAP ČR. Since September 2002, CenTrade has been one of the two marketplaces used by public administrations to purchase information technology equipment.

E.7 IST in health services

E.7.1 IZIP Project

The objective of the IZIP (Internet Access to Patient's Medical Information) Project is to place the medical database of the patient-insuree upon his wish into the public information network - the Internet. The database consists of selected parts of medical documentation written into IZIP by the attending physician. Only the patient has access to data for reading in IZIP. However, he or she can designate which other person will have the right to view the data. Therefore, every health-care facility, which obtains the appropriate consent of the patient, can share general information on provided care.

By April 22nd, 2003, 67 323 users registered themselves in IZIP.

E.7.2 Smart Cards

PHARE projects involving the utilization of smart cards for the electronic identification of persons, under the name Mácha 1 and Mácha 2 were intended for the use of the Ministry of Health and the General Health Insurance Company (Czech largest health public insurer). A smart card was designed, including its appearance and contents. The card is used as the insured person's health insurance identification card. Ambulances, hospitals, some physicians as well as pharmacies were equipped with card readers. At this stage approximately 10 000 smart cards have been issued to Litoměřice residents. The Ministry of Labour and Social Affairs has joined the campaign with a separate Phare project entitled "The Use of Smart Cards in Welfare Services." The Social Security Administration data are stored on the otherwise unused part of the smart card from the Mácha project. Measures have been taken to ensure that Social Security Administration employees are able to read and utilize only the part that belongs to the host application.

Conversely, the insurance company employees or health personnel do not have access to this part. The two applications are being developed and assessed separately. The advantage of the joint utilization of the card is a reduction in purchasing costs of the cards for the individual participants while securing identical and correct personal data. Besides client cards, professional cards have been issued as well. They permit access to data or to parts of applications based on the focus of the customer; for example, they permit correcting the personal identification data, etc. For the future the project anticipates the linkage of the personal identification function to the population registers. The Ministry of Labour and Social Affairs is considering the introduction of smart cards for welfare recipients in the West Bohemian region as a follow-up to the project for on-line access of Social Security Administration contact locations to the central benchmark database.

The confidential information on a patient is stored on the smart cards encrypted and patient has to insert his personal PIN. Therefore if the patient does not agree with sharing the information with other persons, he does not have to.

Concerning the individual health account at the largest Czech health insurer Všeobecná zdravotní pojišťovna, all the data are stored on the secure server with password protection and access is granted apart from the insured himself only to persons in the insurance company dealing with such data anyway.

E.8 IST in educational services

E.8.1 Internet for schools

This project was approved by the government in 2000 with the aim of providing Internet connection to all school in the Czech Republic. However administrative and financial problems hinder its proper implementation. The initial plan assumed that the project would cost the state around EUR 234 million in the first four years. Teacher training would cost EUR 63 million, and EUR 25 million. was

earmarked for an educational portal from which all schools could download educational programmes for free. None of these projects, though, has been completed yet.

The largest portion of the money - over EUR 141 million - went to the project's general contractor, the consortium Český Telecom - AutoCont, for supplying the Internet connection and the computer hardware respectively. In 2002 each of the roughly 6 500 elementary and secondary schools in the Czech Republic was supposed to have at least one computer with Internet access. At present, Internet is accessible at only half of them (3 620 schools).

The Ministry of Education also runs a number of projects that should improve the IT infrastructure, provide educational software and increase IT literacy of teachers.

E.8.2 IT Literacy Programme

The new Ministry of Informatics started a new national IT education programme on February 4th, 2003 with subsidized courses in computer literacy offered by Intel. The aim of the project is to enable all those who are interested to learn the basics of using a computer, and basic orientation on Internet. The two-hours intensive courses have been designed so that even people who have not yet come into contact with computers would be able to follow them. The number of participants is limited to ten per course, so that individual attention can be paid to each of them. The course costs only EUR 3, and the organizers contribute another EUR 3. Organizers expect that approximately 30 000 people will show their interest in the courses in 2003. Besides the courses for complete beginners, the Ministry of Informatics and Intel will also organize courses for advanced users, who have had some basic experience with computers, but have no practical experience with Internet.

E.8.3 High Speed Internet Research Networks

The Czech Republic already has 2.5 Gbps connections to the GEANT network (European research network) and is therefore close to the EU on this front.

CESNET (Czech National Research and Education Network), established in 1996 by all universities of the Czech Republic and the Czech Academy of Sciences, has recently upgraded the CESNET 2 connection to the Internet from 155 Mbs to 622 Mbs. CESNET's main goals are operation and development of the Czech NREN, research and development of advanced network technologies and applications and increased public awareness about advanced networking matters.

E.8.3.1 TEN telecom and TEN-34

The European Commission was invited to promote the provision of the necessary co-funding support to allow partners in CEECs to participate in EU TEN-Telecom projects, and in TEN-34. The national research and education network of the Czech Republic (CESNET) was connected to the TEN-34 interconnection network and is now connected to TEN-155 (the successor of TEN-34).

E.9 IST in households

As already mentioned, only 17% (i.e. ca 540 000) of the Czech population has Internet access at home (28% have a PC at home). The largest share of households with Internet access currently uses dial-up connection, which means an analogue modem or an ISDN modem. According to the press survey, the use of broadband connection was very rare (25 000 through CATV – i.e. 4.6% and 7 800 through ADSL – 1.5%). Representation of other technologies like frame relay or wireless access has so far been negligible. The remaining households (93.9%) are restricted to dialup access. Some 40% of households connected via dialup spend more than CZK 500 (ca EUR 16) a month for Internet access.

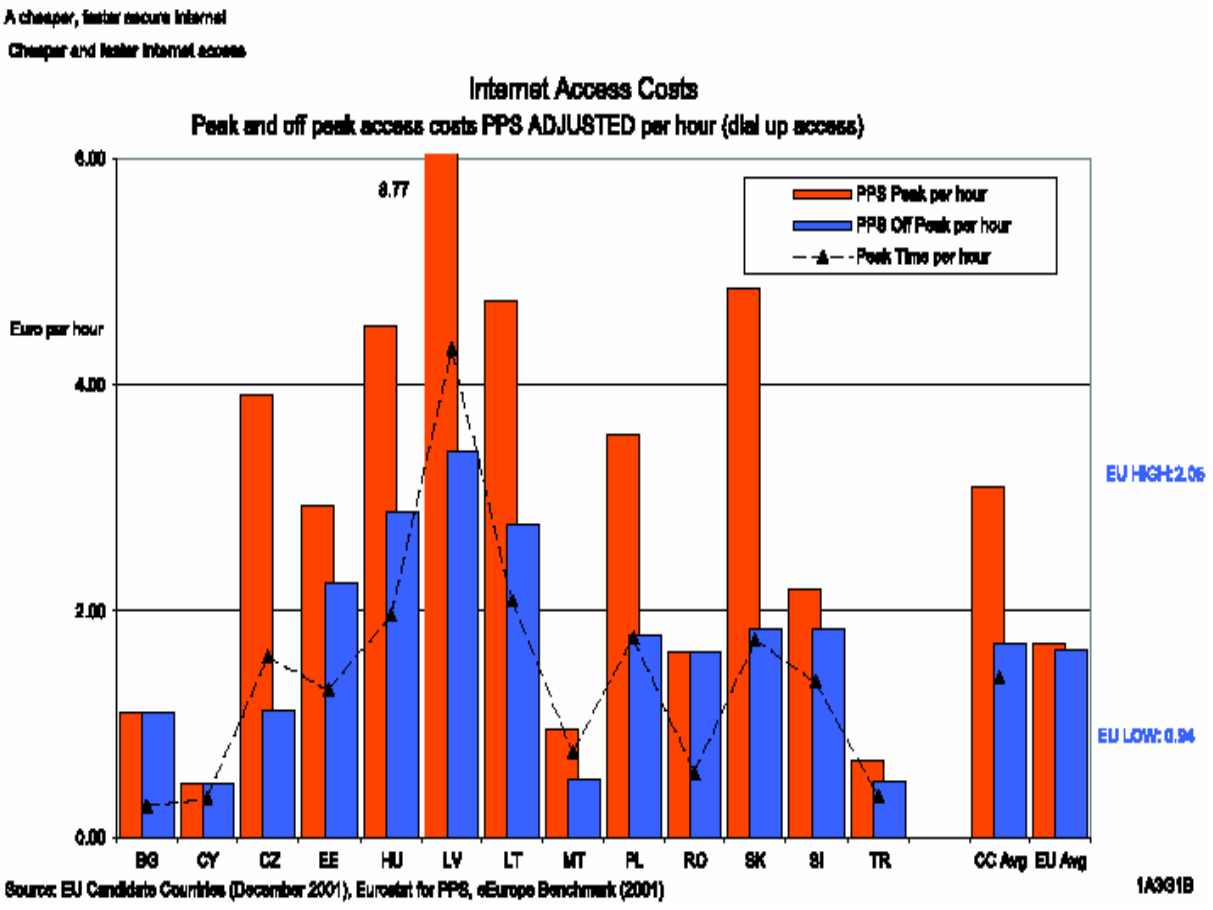
Table E.6: IST penetration rates in households.

	1995	1996	1997	1998	1999	2000	2001	2002
Fixed line penetration - households (%)	40.3	49.0	60.0	69.7	72.5	71.9	68.6	66.8
Fixed line penetration - inhabitants (%)	23.7	27.3	31.8	36.3	37.5	37.7	37.5	35.9
Number of payphones per 1000 inabitants	2.0	2.6	2.8	2.9	2.9	2.9	2.8	2.8
Total number of ISDN subscribers (th.)						122	261	389
Mobile phones penetration (%)	0.5	1.9	5.1	9.4	18.9	42.3	68.2	84.0
CATV penetration - households (%)								33.0
Color TV set per 100 households	95.8		104.9	109.0	112.3	115.8		
Number of PCs at home (% of households)					14.2	17.8		28.0
Number of PCs with internet per 100 inh.					6.8	9.7	12.2	

Source: Czech Statistical Office, Ministry of Transport and Telecommunications

The main reason for rather low Internet household penetration is the relatively high cost of Internet connection. As illustrated by the Graph E.2 and in subsection E.1.6 on ADSL, the prices for connection in peak hours are higher than in many other European countries. However further introduction of ADSL and other high-speed data technologies should make the Internet connection much more affordable for households.

Graph E.2: Internet Access Costs.



E.10 Conclusion and SWOT analysis

Mobile phones penetration is high and overall Internet penetration is sufficient in comparison to CC 13 (however households' Internet penetration is still low compared to EU).

There are **three mobile telephony providers** ensuring **efficient competition** in mobile telephony market. GPRS is being largely implemented but on the other hand the **UMTS** technology is not expected to have large market influence in the close future.

There are ca 13 000 ADSL users. Its **price for the same transmission speed is higher** than in EU and the Czech Telecommunication Office contemplates its regulation. Other broadband Internet connection is secured over CATV with some 25 000 connections.

Usage of Internet is usually confined to **information services**, B2B and B2C still lack the confidence of general public. This factor bears several problems. For example, Internet in transport services is usually limited only to serving general information or providing reservation, but it is not broadly used for buying tickets. The reason for limited on-line ticket purchasing may also be seen in low penetration of embossed or Internet payment cards.

IST in financial services is dominated by **phone banking**. Fewer clients use Internet and GSM banking, however this number is increasing because Internet and GSM banking are becoming much cheaper than visiting the bank in person. The largest Czech retailing bank **Česká spořitelna with its Internet banking application** now acquires dozens thousands of new on-line users, which is in line with its excessive fees for banking in its branches over-the-counter.

The degree of development of IST applications in the **manufacturing sector** is dependent on the type of the industry and also the ownership structure. The foreign owned companies invest more than those domestically owned, and preferred sectors are **automotive and electrical apparatuses industries**. Most important applications are **communications, management information systems and production controlling**.

Czech post is setting up an ambitious project of **Registered Electronic Mail,** which is used especially by larger corporations.

Many IST projects are being planed in the **public sector**, but only partial goals have been achieved so far. One of the reasons is the lack of IT literacy among public servants and that the other is the cost of an electronic signature, EUR 22. The **taxes-via-Internet** system was put into effect in the beginning of 2003 and pilot projects in health service cards and eLiteracy were also launched.

Summing this up and comparing to eEurope 2005 we can conclude:
Governmental strategies of eLearning, eGovernment and eHealth are compatible with the eEurope 2005 and are being developed. Nevertheless the speed of convergence to the goal critically depends on the amount of expenditures and time spent on them. In other words, it is too soon to assess whether the state policy goes in the sufficient pace.

E.10.1 Summary

- High mobile phone penetration in the CR.
- Internet penetration is one of the highest among CC13, but dialup Internet access at peak and ADSL are one of the most expensive in Europe. Usage of cable TV for Internet access is increasing, but access locations are limited.
- GPRS is widely used. UMTS implementation is dubious.
- Usage of ICT technologies in financial services is wide.
- Industry uses IST for communication, MIS and production lines controlling.

- Electronic channels are used for web presentation, B2B, but not usually for retail (B2C).
- IST in public sector could experience lags.

E.10.2 SWOT

Strengths	Weaknesses
• Very high mobile telephony penetration. • High Internet penetration compared to other CC13. • High IST use in progressive industries (automotive).	• Prejudices against Internet payments. • High costs of dialup Internet access in peak hours. • Insufficient government commitment when executing ICT projects. • Almost no IST in old industries.
Opportunities	**Threats**
• Growth in B2C retailers penetration. • EU accession opportunities. • Successful implementation of IST in education.	• Lags in governmental implementation of IST and corruption. • FDI outflow. • IT illiteracy.

E.10.3 SWOT IS

High penetration in mobile telephony is definitely a strong ICT factor. Mobile telephone is currently being used by more people and more intuitively than Internet. The services of mobile phones are directly paid, thus the incentive for the service providers to develop mobile phone based technologies and services is strong.

High Internet penetration is simply the key factor of IST development.

Low B2C penetration in Internet and **prejudices against making Internet payments** among general public are in our opinion two sides of the same coin. When the problem with **credibility and security** of Internet payments are resolved then an Internet retailer boom could be expected. There are also other problems, than **payment intermediation**, but this **is a primary barrier to the B2C** market in the Czech Republic.

There is a variety of opportunities for the Czech IT economy after **joining the EU**. E.g. its location and subsequent low transport costs are competitive advantage for logistics of Internet shops.

High cost of Internet access is a great barrier to further Internet development. Obviously this affects all subsequent sectors concerning Internet.

Serious problems can be seen in some **governmental projects**, like troublesome project Internet For Schools. It turns out that the state is too often slow and inflexible which causes lags in project realization and lowers efficiency.

F INSTITUTIONAL CAPACITIES AND REGULATORY BACKGROUND

F.1 Regulation of the infrastructure in the Czech Republic

F.1.1 Telecommunication

With about EUR 2.1 billion, the Czech telecommunication market is the fourth biggest market (after Turkey, Poland and Hungary) among the candidate countries (EITO 2002). The structure of the market shows a highly developed mobile market (54% share); the data market is also well developed with a 6% share (EITO 2002). Although the fixed line penetration rate is relatively high (about 36% inhabitant penetration and about 69% household penetration) the share of the fixed market has been gradually decreasing since 1996 when the first digital mobile license was issued.

Due to inflexibility of Český Telecom and a long waiting list for a fixed phone, **mobile telecommunication become direct substitute of fixed telecommunication.** These factors together with mobile phone as a device complementing image of success and mass implementation of prepaid cards led to a dramatic increase of the mobile market (88% penetration as of June 2003). We do not expect fixed communication to ever become a threat to mobile operators in the voice transmission business.

The telecommunication market in the Czech Republic is still undergoing liberalization. Český Telecom, the incumbent, had as of 2002 about an 86% share of national and international calls market (98.5% of local calls, 76.9% of long-distance and international calls, 85.5% of calls to mobiles) in terms of revenues (information provided by Český Telecom). Almost 60 alternative operators are present on the market. The competition is now becoming more severe since:

- The **network** of the fixed incumbent has been **fully digitalized,**
- **Carrier selection** has been introduced (as of July 1st, 2002) and **carrier pre-selection and number portability** has been introduced since January 1st, 2003,
- **Český Telecom is in the acquisition process of the remaining 49% stake in its mobile arm Eurotel** (the biggest mobile operator, so far 51% owned; completion in December 2003 at latest),
- **Privatization of Český Telecom is expected**. The last attempt (in 2002) to sell the state's stake (51%) hasn't succeeded. The privatization has been put off and the next step is expected in 2004 (see section F.3.1 on privatization).

F.1.1.1 National Regulatory Authority

The NRA in the Czech Republic in the field of telecommunication is **Český telekomunikační úřad** (the Czech Telecommunication Office - CTO). Its activities and institutional background are described below (section F.2.2 Institutional implementation capacities and regulators).

F.1.1.2 Licensing

Licensing in the Czech Republic is defined for the provision of public telephony services over the public **fixed telecommunication network**, for the provision of public telephony services over the public **mobile telecommunication network** and for the establishment and operation of the **public telecommunication network**. For all these licenses a one-off administrative fee of about EUR 3 500 is applied; no annual fees are applied. **Private networks are not subject to licensing**. The licensing regime is well defined. Licenses in the mobile market were issued already for all types of networks (analogue, GSM, DCS, UMTS).

F.1.1.3 Numbering

Numbering is the area that is almost transformed. Starting July 1st, 2002 carrier selection was introduced in the Czech Republic. Carrier pre-selection and number portability has been introduced as of January 1st, 2003. The underlying renumbering in the networks successfully happened in September 2002. The numbering fees for numbers and codes are set.

F.1.1.4 USO and Quality of Service

USO is imposed by law on the fixed incumbent operator who provides all basic services generally required by USO. **Quality of Service** is guaranteed and controlled according to ETSI standards and the fixed incumbent operator provides values of indicators to CTO. A USO recovery scheme is also applied; the recovered costs for year 2001 are calculated in level of approximately EUR 9 million (there are however only few of the USO loss making services included in this recovery schemes, e.g. the loss of payphone operations is missing) and is financed by all operators proportionally to level of their revenues.

F.1.1.5 Fixed Tariffs

Since the beginning of the 90s the process of so-called **tariff rebalancing** started. It meant that the distorted price structure of telecommunication services (cheap subscription fee and local calls, but expensive long-distance and international calls) should have been aligned with costs and adequate profit. Annually the Ministry of Finance (CTO did not exist) allowed certain price growth of the telecommunication services basket (approximately CPI) with higher growth prescribed for services provided for prices below their total costs and lower growth for services provided for prices above their total costs. This process was completed in 2001 when the subscription fee was set as CZK 299 (EUR 9.4) with CZK 90 (EUR 2.8) of calling credit for the most used plan "Standard". There are also other **calling plans for businesses and households** with different subscription fees, calling credit and minute fees. The prices of national calls are very similar to the EU average (mid 2002) and international calls are low in comparison to other candidate countries.

Český Telecom also offers cheaper plan for households "Mini" (CZK 199 or EUR 6.2) with roughly double minute fees and **barred carrier selection facility**. Český Telecom reports that the tariffs are still not fully rebalanced and even the standard subscription fee does not cover its fixed costs. Therefore the prices in the fixed telecommunication business are still to some degree regulated with price ceilings. Among them are subscription fees, installation fees and prices of other USO services. CTO also regulates prices of dialup access – Český Telecom had to consult the calling plan Internet 2003 with CTO. Nevertheless - due to competition - regulation of minute fees is virtually useless.

Even if Český Telecom raised significantly prices, not only CTO would challenge it, but also the Antimonopoly Office as an abuse of the dominant position. There were also other changes in charging carried out on request of the CTO. Until June 30th, 2002 the phone fees were charged on **the basis of units**, one unit cost for all services the same, but the duration of a unit was different (e.g. for Internet calls many times longer than for international calls). Since July 1st, 2002 the **time based charging system** is applied in the network of fixed incumbent operator with an applied minimum charge for a call.

To conclude: the minute prices for calling from fixed lines are lower than from mobile phones, but people condemn fixed lines for **monthly subscription fee** (most of mobile phones has prepaid cards with no monthly fee). However, the trend towards pre-paid cards now seems to reverse with **growing post-paid share** (with monthly subscription fee), which might also induce using fixed lines, where subscription fee is inevitable. Minute fees may - for some period - keep falling, but monthly fee is below European average and will probably stay the same if not rise.

F.1.1.6 Mobile services

Mobiles services in the Czech Republic are very well developed. Three operators with GSM/DCS licenses are competing on the mobile market with service revenues of about EUR 1.1 billion in 2001, which is also underpinned by the fact that the share of post-paid customers with higher revenues per

customer rises. The ARPU indicators (average revenues per user) for all operators (except of T-Mobile) are growing[9], since users learn, how to use more mobile phone based features (MMS, data, WAP…). The penetration rate reached 88% in June 2003 (in comparison to 68% at the end of 2001), which is the second highest penetration rate among candidate countries and is very close to the EU average. UMTS is also progressing as licenses were issued for the two biggest operators. The deadline for launching 3G services is set for the beginning of the year 2005 and with relatively weak obligations regarding the **required coverage**.

Thee CTO regulates in the mobile market the **quality of services**, but not the minute prices for outgoing calls. This only concerns **interconnection fees** for incoming calls. As Eurotel and T-Mobile have more than 40% market share each, they are both considered to have dominant position and therefore any significant price growth would be challenged by the Antimonopoly Office. However, severe competition makes this impossible.

F.1.1.7 Leased lines

Leased lines of all evaluated speeds (up to 155Mbit for national and 34Mbit for international) and lengths (up to 200 km for national) are provided in the Czech Republic. However price lists are available only for lines with speeds up to 2Mbit. Above this bit rate prices are calculated individually. The prices of leased lines are generally above average among candidate countries and above average in comparison to EU (mid 2002); a decrease may be observed with further competition in the data market. **CTO does not regulate this market,** only allocates frequency bands in cases when the connection is wireless.

F.1.1.8 Local access

Local access has not been liberalized yet. RUO (**Reference Unbundling Offer**) is not compulsory for the fixed incumbent. If the relevant law will be passed RUO is expected to become compulsory later. The competition in local access is still negligible.

There are currently no unbundled local loops. 4 wireless local loop (WLL) licenses have been granted to 4 operators but they are not used at this time and no future plans on usage of WLL are known.

However, it is important to note that there are more then 100 cable TV operators. The two largest CATV with some market power (UPC CR and TES Media / Intercable) are providing voice telephony services and Internet access to end users (the number of users is in neither case available). The penetration of households with CATV socket amounts to some 33% (some socket are out of use – estimates of them range between 100 – 200 thousand). The voice telephony services over CATV were only commercial experiments and the number of clients is estimated to be below 5 000 (no precise data). All these attempts occurred in urban areas (e.g. Liberec) and the pricing was very close to that of Český Telecom (i.e. approximately 5% below). Sometimes the voice services were provided **over wireless loop** (and therefore detached from CATV operation), which virtually excluded dialup traffic. Since these companies offer Internet over CATV, it would not be reasonable anyway.

Cable TV business has **not** been **regulated** so far even in the case of Internet access except for antimonopoly regulation (antimonopoly office once prohibited UPC from raising prices).

F.1.1.9 Interconnection

Interconnection is regulated by CTO. For both fixed and mobile operators the interconnection charges must be cost oriented, by using FDC cost standard and the historic cost base (the new LRIC methodology has been implemented in September 2002). The RIO (Reference Interconnection Offer) of the fixed incumbent was already published and 14 alternative operators are interconnected with Český Telecom but no access deficit charge is applied. The fixed to fixed interconnection charges are relatively high in the Czech Republic (1.25 eurocents in peak and 0.625 eurocents in off-peak VAT excluding as of September 2003) and above the EU average. On the other hand fixed to mobile

[9] Source: http://www.mobil.cz/

interconnection charges are among the lowest of candidate countries and also below the EU average (11.5 eurocents VAT excluding as of September 2003).

F.1.1.10 Internet

The Internet is relatively well developed in terms of relatively favourable Internet penetration (13.6%[10] as of 2001), number of ISPs (8 national out of 140 total, many of them providing Internet access without a fixed charge paid by end user to ISP) and number of hosts per inhabitant (21 hosts per 1000 inhabitants[11], which is the third highest rate among candidate countries, after Estonia and Malta). Internet access costs are relatively high, especially in peak time but the charges are decreasing, it is expected that higher competition from new operators which have started to provide their services using carrier selection will lead to further price reductions. The principle of sharing revenues is applied when the telecom operator passes part of the Internet access revenues to ISPs. The fixed incumbent operator is offering several Internet packages for more frequent Internet users.

The **state authorities do not regulate Internet**. The **allocation of the domain names** was performed by the Czech **top-level domain administrator** (TLD) **NIC**, since September 2003 competition in this field has been introduced and domains are offered by several domain administrators.

F.1.2 Electronic communication in the Czech Republic

F.1.2.1 Electronic signature

The **Law on electronic signature** was passed by the Parliament of the Czech Republic in October 2000. This law forms the legislative framework for the functioning of electronic communication and equalizes it with other forms of communication. The law specifies that in the sphere of communication with the state administration, a guaranteed electronic signature (based on personal certificate made by the accredited certification authority) must be used.

Electronic signature is based on so-called **two-way encryption** with a pair of keys, private and public one, by which the electronic signature is generated and verified. Generally, what is encrypted with a private key may be opened only with corresponding public key and vice versa. The private key is owned by the person who generates the electronic signature when sending a document. Public key is given to the recipient or to another person with whom the citizen intends to communicate with. The recipient is thus able to verify the electronic signature and the fact that the document was not changed within the transmission. The certificate made by a third credible person serves for verifying the identity of signing person.

Unlike secured electronic communication with business partners, where the rules of communication, safety and identification depend only on their agreement, the **eCommunication with state authorities requires using guaranteed electronic signature**. The guaranteed electronic signature is based on personal qualified certificate issued by an accredited certification authority. Electronic signature can be issued only to a natural person and therefore individual persons representing a corporation would have to be provided with electronic signatures for the signing of tax returns.

So far only one provider of certification services exists in the Czech Republic – **První certifikační autorita (First Certification Authority).** Two basic types of personal qualified certificates are offered: **Standard and Comfort**. In the case of Standard certificate the private key is saved in the computer of the person that generates electronic signature and therefore it is possible to generate the signature only on this computer. The price of this certificate with a one-year validity is CZK 700 (EUR 22). In the case of Comfort certificate the private key is saved on a **special chip** that allows for the generating of a signature on whatever computer.

[10] Information Society Statistics 4-17/2002 by Eurostat, 2002.

[11] Source: The Ministry of Transport and Telecommunication, state as of 2001.

The procedure for obtaining the signature is the following. An application for generating the private and public key is running on the First Certification Authority's web. After filling in the required data and saving it, with the public key the applicant has to visit in person an office of the First Certification Authority where his personal data are verified and where he receives the certificate. At the same time it is advisable to apply for the identifier at the Ministry of Labour and Social Affairs since this ministry was the first state authority capable of receiving its forms by electronic means. This identifier is then used also by the Ministry of Finance.

To conclude: At present with existing financial conditions the investment into the electronic signature is not very advantageous considering the possibilities of its utilization. But with respect to preparation of other state authorities for electronic communication (real estate register, customs authorities) the importance of electronic signature and electronic administration should grow.

F.1.2.2 eRegistry

Since 2001 all state authorities are obliged to establish an electronic registry, i.e. they must be able to **accept the documents in an electronic form, signed with an electronic signature**. The equipment of such an eRegistry must comply with standards of the Ministry of Informatics. Consequently the state authority is obliged to authorize its employees for **generating and verifying guaranteed electronic signatures**, provide them with qualified certificate, ensure the reception and sending of e-mail messages at the beginning and at the end of working hours and to **make public the list of electronic addresses of its eRegistries**, of **qualified certificates** of its employees and of **data formats** that the authority is able to accept. It should also be able to accept the documents and forms saved on technical data carriers.

Classical office counters should thus be amended by their electronic counterparts as a virtual registry established at every local or state authority that allows delivering various forms, documents or messages via the Internet. Submission of the application form should be easy for a citizen. Automatic guides should enable choosing the right form that the authority offers. The system should then verify whether the citizen has already been registered and if not, it should lead him to pages with the registration form. A person who has already been registered will be asked to enter the name and password after which the electronic form is shown.

The eRegistries should also work as a **bi-directional communication channel**: when the state servant needs some information, he could easily obtain it from the citizen. Moreover the eRegistries should allow making public the information on authority's electronic board.

The main problem now is that **most of the eRegistries do not satisfy even the elementary requirements** and quite **often they are not even established**.

F.1.2.3 eGovernment

Despite ostentatious proclamations of public administration informatization most of the state servants and offices are incapable of electronic communication. Fortunately the first signs of changing the situation have already appeared. The first application (2002) was, quite paradoxically, the **Ministry of Labour and Social Affairs**, where one can claim all his/her social allowances or benefits through electronic means. For those having no eSignature, but having Internet access, the 13 types of social security forms are provided on the ministry's website for downloading. Also all the changes related to receiving the benefits, like change of address, may be communicated this way.

A more important application was launched by the **Ministry of Finance**. The project of eTaxation was distributed into three periods:

- First period started in 2000. In this period it was possible to fill in the returns of road tax, **save it to the floppy disk** and together with a simple form of tax returns equipped with the signature of the taxpayer submit it to the tax office. Later this procedure was extended to real-estate tax.

- The second step was the possibility of sending a **data message** to a common technical equipment of the tax administrator. Data message was not equipped with guaranteed electronic signature and the taxpayer had yet to deliver the simple form of returns with his **own hand signature** to the tax office.
- The third period began in March 2003. Since then the tax returns on simple taxes (road tax, real estate tax and VAT) can be delivered to relevant tax offices **via Internet**. After one month of operation (April 2003) already 25 electronically delivered tax returns were accepted.

The Ministry of Finance expects that it should be possible to submit other tax returns in electronic form till the end of 2003 and from the beginning of 2004 this regime should be established also for **natural person income tax and corporate income tax** which are complicated for electronic processing due to the different types of obligatory enclosures.

Electronic communication is possible in specially defined cases also with the **Ministry of Interior** and the **Ministry of Informatics**. Even though the law on eSignature made the establishment of secured electronic communication with state authorities obligatory (with a specially defined way of secured communication - electronic registry – see above), only a conventional unencrypted electronic communication with other ministries is possible.

There are also applications in the **judicial branch**: the **Constitutional Court** in Brno allows solving simple cases entirely through Internet. Some good signs also appear in the local administration. The **district authority for Prague 1** has allocated each citizen one clerk, to whom all relevant documents for the district authority may be electronically sent, and the clerk distributes all citizen's requests to the appropriate places. Citizen can thus save time by avoiding the search for many officials, and the district authority saves money as well.

F.1.2.4 Registries of public administration

At present the structure of regulation of registries of state authorities is quite complicated. There are numerous registries, each of which is governed by its own legislation without necessary coordination. The law makes efficient and legal communication among state authorities impossible, since **the constituency of users of information administered by a registry is strictly determined**.

Most of the regulations does not explicitly establish the registry in an electronic form (even though majority already exists in an electronic form) and the data in electronic form is almost never legally binding for the state administration. The second issue is that the state registration and the administration places are quite shattered without mutual communication and quite often remain without the support of computer technology.

The government of the Czech Republic has approved the **reform concerning the registries of public administration**. This reform should include changes in the Public Administration Registries Law, Basic Registry of Economic Units Law and Basic Land and Real Estate Registry Law.

The proposal is based on general truth: the basic registries of public administration (as the core of the whole information system of public administration) can work well only as **one consistent entity**. The changes will require a complex legal regulation for administration of registries as a whole and special regulations for individual registries as well. The main objective of this reform is to create legislative conditions for efficient use of information administrated by different registries. This improves the present state where the same information is quite often required many times from citizens by different authorities and where the level of communication among these authorities is insufficient.

The establishment of an integrated system of public registries is closely observed by the **Office for Personal Data Protection**. The key issues that needs to be solved in this respect are:

- Well defined **access right** so that each office can access only data relevant for its activity,
- **Prevention of commercial use** of personal data, which happened in the past (e.g. at health insurance companies),

- **Monitoring and loging of activity** of any user accessing the registry,
- **Allowing access to data stored in the registries to the person concerned.**

F.1.3 Energy industry and utilities

The sector of **energy related utilities** comprises **electricity, natural gas and heating industries**. Since all related activities are performed in most cases in a **natural monopolistic environment**, their performance and prices are regulated. Until the end of 2001 the prices were directly set by the price decrees of the Ministry of Finance. Since beginning of 2002 a new Energy Regulatory Office was set up (see section F.2.4) with competencies to set the quality, price and volumes of energy related products and services. These prices are currently regulated:

F.1.3.1 Electricity sector:

- transmission of electricity at very high voltage level,
- distribution of electricity,
- treatment of renewable sources of electricity,
- prices of electricity for protected (captured) customers – i.e. especially households.

F.1.3.2 Natural gas industry:

- transmission of natural gas,
- distribution of natural gas,
- prices of natural gas for protected (captured) customers – currently all customers.

F.1.3.3 Heating industry:

- prices of the heat energy for households.

The **market with electricity will be fully opened from 2006 (currently opened for industry)** and with **gas for large industrial customers from 2005**. Opening of a gas market for households is still not planned. After leaving the prices of related media to market forces the area of regulation of the Energy Regulatory Office will be restricted to network services (transmission, distribution) and protection of renewable sources.

Concerning **water distribution and sewage disposal**, no relevant regulatory authority exists and these companies are only restricted to abuse their monopolistic position.

F.2 Institutional implementation capacities and regulators

F.2.1 The Office for Protection of Economic Competition

The Czech National Council by Act No. 173/1991 of April 26th, 1991 established the **Czech Office for Economic Competition,** which commenced its activity on July 1st, 1991. The Office was seated in Brno, not in Prague, the centre of all state administration bodies, which should be a declaration of independence of the new competition authority's decision-making. **In 1992 the Office was replaced by the Ministry of Economic Competition**. The change was justified by running economic transformation, and above all, by the role performed by the Ministry in the privatization process. This institutional setting allowed the Ministry **to interfere more effectively through its activity into the privatization process**.

At present the protection of competition in the Czech Republic is again institutionally secured by the **Office for Protection of Economic Competition** in Brno. The Office began its activity under this name **from November 1st, 1996**, following the activities of the former Ministry of Economic Competition, the competencies of which were fully transferred to a new office. The establishment of the Office emphasized the need to change the position of the central body of the state administration in

the area of protection of competition regarding the character of its activities, which was primarily investigation and sanction application. There have been so far no doubts about the independence and effectiveness of its work.

The range of activities of the Office and the position of its chairman are defined by Act No. 273/1996 on the Scope of Activities of the Office for the Protection of Economic Competition, as amended by Act No. 187/1999. The Office has been established to create conditions for protection and support of competition, and to exercise surveillance over public procurement and other activities defined by special acts. Based on Act No. 59/2000 on State Aid, the power of a monitoring institution for the state aid was transferred to the Office on May 1st, 2000.

The Office is the central body of the state administration, **fully independent in its decision-making activities**; none of the bodies of the state administration, including the Government, can interfere into the decisions of the Office and political control over its decisions is out of the question. The Office, however, is bound by Governmental Resolutions assigning both legislative and non-legislative tasks to it. The Office is headed by the Chairman, appointed by the President of the Czech Republic on the proposal of the Government. The Chairman's term of office is 6 years and no one can be appointed as a chairman for more than two successive periods. The Chairman of the Office must not be member of any political party.

The organizational structure of the Office involves a **section headed by the Chairman** and including Chairman's secretariat, **economic and personal department** and the **advisory body** for the Chairman's second-instance decisions consisting also from experts outside the Office. Other sections include **anti-trust section**, **merger department**, **public procurement section**, **state aid section**, **legislative department** and **European integration and international department**. The Office has **two General Directors,** one heading the **anti-trust section** and the other the **public procurement section**.

As of 2003 the Office's staff had 116 employees, including 42 lawyers and 38 economists. Recently the Office significantly increased the number of its employees in response to a large extension of the Office's responsibilities, especially in the areas of state aid monitoring, public procurement, and in preparation for entry into the European Union, and in response to the effort to introduce more severe punishment methods for serious violations of Competition Act.

The Office's major responsibility in relation to the Government of the Czech Republic is the regular submission of **annual reports** on the Office activities. The issuing of the annual report and the discussion by the Government is usually accompanied by a special press conference organized by the Office.

The Office's priorities include transparency of decision-making. The relevant measures include **publication of all decisions within the powers of the Office in the Office's Collection of Decisions and on the Internet pages** http://www.compet.cz/. Another manifestation of the Office's efforts to increase their decisions transparency has been the publication of Guidelines for Entrepreneurs on the control of concentration in accordance with the Competition Act. Recently the Office has been working on other methodological materials for businessmen and lawyers active in the relevant areas.

In relation to the Government of the Czech Republic there is another important responsibility of the Office, namely **its participation in the activities of Governmental advisory bodies and *ad hoc* inter-departmental commissions**, where there is a possibility to support the competition policy in the context of other state policies. The Office Chairman can also attend meetings of Governmental Committee for **European Integration** dealing with strategic and conceptual issues of the entry of the Czech Republic into the European Union. Due to **mandatory opinions of the Office required for privatization projects** (in the context of decision-making activities of the Commission for Privatization) the Office can support privatization principles in favour of competition.

We share the general opinion that the Office for Protection of Economic Competition is competent in its field, and managed to attract capable staff and so far no evidence of biased decision making has appeared. After EU accession it will surely become respectable counterpart of European antimonopoly offices.

F.2.2 Český telekomunikační úřad (The Czech Telecommunication Office)

Český telekomunikační úřad (the Czech Telecommunication Office – CTO), www.ctu.cz, was established in 1993 as the 6th Section of the Ministry of Economy. Since November 1996 the competencies of the Czech Telecommunication Office have been transferred into the Ministry of Transport and Communications. On July 1st, 2000 according to the provisions of the Act No. 151/2000 on Telecommunication, the Czech Telecommunication Office has been transformed into an independent **national regulatory authority** (NRA) outside of this ministry.

Like most other NRAs in candidate countries it is now financed from the state budget. CTO is engaged in licensing, USO (e.g. USO recovery plan), interconnection rules and charges (e.g. lowering the fixed-to-fixed interconnection charges in 2002), local loop liberalization (e.g. introduction of xDSL by the incumbent was postponed in 2002 due to its ignoring legal requirements on reference offer). It performs the management of frequency spectrum, number allocation, etc. CTO has almost 500 employees out of which 16 handle directly regulatory tasks. The transposition of acquis communautaire is supposed to be completed by January 1st, 2004.

The powers of the CTO are in some cases weakened by the government (especially the Ministry of Informatics), which is trying to keep the influence on the telecommunication market. The other issue challenging CTO's independence is the unfinished privatization of Český Telecom. This relates especially to the data transfer services, where the Czech Republic lags most behind in the EU. The effectiveness of the market could be also constrained by the delays in the decision-making by the CTO.

F.2.2.1 The key activities of the Czech Telecommunication Office

The Telecommunication Act sets the field of competence as follows:

- **Approving of telecommunication equipment**
  - Approves the equipment, sets the rules for approval, authorizes other persons for approvals.
- **Licensing**
  - Decides on granting / changing / withdrawing of telecommunication licenses including the obligation of provision of the universal service,
  - Decides on universal service measures and administers the universal service account,
  - Issues general licenses, registers persons active pursuant to general license and allows provision of new telecommunication services, for which no general license exists.
- **Interconnection of public telecommunication networks**
  - Decides suits concerning interconnection or access to the network,
  - Issues networking plans of public telecommunication networks.
- **Frequency band allocation**
  - Frequency spectrum administration,
  - Issues plan of frequency bands allocation (national frequency table),
  - Certificates the personnel operating special radio equipment,
  - Coordinates frequencies, frequency bands and controls their usage.

- **Numbering**
    - Administers national numbering plans,
    - Allocates numbers.
- **Price regulation**
    - Regulates and controls prices of telecommunication services and interconnection fees,
    - Issues price decisions and decides disputes.
- **Telecommunication services**
    - Modifies the conditions of provision of the provider if they contradict the Telecommunication Act,
    - Sets the rule of charging and billing,
    - Resolves complaints.
- **General obligations**
    - Performs state inspection,
    - Resolves disputes,
    - Prevents further operation of the network to those operators who do not comply with the quality standards,
    - Collects penalties and fees,
    - Proposes legislation changes,
    - Keeps international relations.

If we shall assess the activity of the Czech Telecommunication Office, the result might be a little ambiguous. Even though its staff, especially the technicians, are very capable, its decisions are well logically grounded and international coordination is well mastered, sometimes rumours appear contesting its independence.

It is especially pronounced in the case of Český Telecom, when the opening of the market was delayed several times. Even now, before the privatization of Český Telecom the issue of improving the governmental potential privatization proceeds is topical. The same appears in the case of setting of interconnection fees to mobile network, where rumors speak about lobbying by mobile operators.

F.2.3 Ministerstvo informatiky (The Ministry of Informatics)

Ministerstvo informatiky (the Ministry of Informatics - MI) has been set up on the basis of amendment of Act 2/1969 to become responsible for **information and communication technologies, telecommunication and postal services**. MI fully absorbed the competencies of the Public Information Systems Office (former department of the Ministry of Transport) and the competencies in the area of electronic signatures from the Personal Data Protection Office.

The ministry does not have much legal power since the existing legislation had not expected its formation. The ministry covers all information related activities in other sectors - it proposes legislation on eGovernment, protests against Český Telecom pricing, comments on laws concerning information technologies. However, it cannot force other ministries to perform some information related projects or to refrain from doing so. Therefore now the Ministry of Informatics can be seen rather as a coordinating agent, advisory body, proponent of new technologies to state administration, but not as a regular state administration body with sufficient powers (even punishing).

F.2.3.1 The ministry has 3 sections with specific competencies:

- **eGovernment**
    - Remote access to administrative issues/products (public administration portal/gate),
    - Support of development of ICT literacy,

  - Creation of legislation for eCommerce (White Book),
  - Preparation of legislation for eGovernment (Public Administration Registries Act),
  - Preparation of conceptions in the area of eGovernment.
- **Information system of public administration**
  - Creation of uniform, secured and shared communication infrastructure of state bodies,
  - Integration of information systems of public administration,
  - eMarket for the state administration.
- **Electronic communication and post services**
  - Preparation of legislation for telecommunication (Electronic Communication Act),
  - Responsibility for Česká pošta, s.p. (Czech Post, state enterprise), including the regulation in postal services,
  - Certification/accreditation of electronic signature certification authorities.

F.2.3.2 Following acts treat the main activities of the MI:

- Act no. 365/2000 on information systems of public administration,
- Act no. 151/2000 on telecommunication,
- **Act no. 29/2000 on postal services,**
- Act no. 227/2000 on electronic signature.

The Ministry of Informatics is a new state administration body and therefore its activities should be taken indulgently. There is no doubt that it is a committed office, that its staff is young, not inherited from other traditional ministries, well educated and enthusiastic. Its activities clearly aim at improving the information literacy of Czech citizens, establishing eGovernment applications and unifying public information registries.

But since it is a new actor, its competencies are not that well defined as in the case of other ministries. It proposes acts, comments everything that is related to information society, but its powers are very limited. It cannot impose punishments; it is even unable to force the state administration to have its eRegistries installed.

Among achievements should be included expected implementation of the flat rate for dialup access (hopefully since 2004), support with acquisition of the remaining stake in Eurotel by Český Telecom and support to the Ministry of Finance with eTaxation. To summarize, the Ministry of Informatics is one of the well performing ministries but with insufficient power.

F.2.4 Energy Regulatory Office (ERO)

ERO was established in January 1st, 2001 by the Energy Act No. 458/2000 approved on November 28th, 2000. It has 2 main sections: **licensing** and **regulation**.

The main tasks of ERO are the protection of customers, the support of competition in energy sectors, the support of production efficiency, transmission, transit and the distribution of energy. ERO was empowered to **license and regulate electricity, gas and heating businesses** and to prepare the **legal framework for opening of these markets**. Historically these activities were provided by departments of the Ministry of Finance (regulation) and the Ministry of Industry (licenses).

ERO is financed from the state budget; total sum for the year 2002 was CZK 115 million (EUR 3.6 million), the plan for 2003 is CZK 117 million (EUR 3.7million). ERO had 78 employees by the end of 2002 and plan for 2003 is 90.

The Energy Regulatory Office is a new state administration body as well as the Ministry of Informatics. However, unlike MI, the ERO's competencies are well defined in the Energy Act and it benefits from the balance between powers and responsibilities. Unfortunately it inherited staff from the ministries from which it overtook their agenda. Despite this, it performs its administrative activities well and so far not many complaints on its functioning have appeared.

F.3 Privatization policies

F.3.1 Telecommunication

F.3.1.1 Ownership of fixed incumbent and mobile operators

51% of the fixed incumbent operator **Český Telecom** is still owned by the state (National Property Fund). The biggest mobile operator (**Eurotel**) is now partially owned by Český Telecom (51%), but till the end of the year 2003, Český Telecom will acquire the remaining 49% from the consortium Atlantic West B.V. The two remaining mobile operators have foreign owners (see the table F.1).

Table F.1: Ownership structure of key telecommunication operators.

Operator	Ownership structure
Český Telecom	51,1% National Property Fund, 27% TelSource N. V., 6,48% KPN Telecom B. V., 15,42% other investors
Eurotel	51% Český Telecom, 49% Atlantic West B. V.
T-Mobile Czech Republic	60,77% Cmobil B.V., 39,23 České Radiokomunikace
Český Mobil	96,2% TIW Czech N. V., 3,8% other investors

Source: http://www.securities.cz/

F.3.1.2 Privatization of Czech telecommunication companies

There were only two Czech stately owned telecommunication companies, Český Telecom and České radikokomunikace. The privatization of the former is expected, the latter has already private owners.

F.3.1.2.1 Český Telecom

The intention to privatize the incumbent fixed lines operator Český Telecom was discussed at the government several times. There were three "waves" of privatization:

- **Voucher privatization**. Approximately 20% of the company's common stock was disposed to investors in the voucher privatization 1992-1993.
- **In 1994-5 the consortium Telsource** (consisting of KPN Telecom and Swisscom) entered the company with minority stake 27%. This transaction gave them **management rights** and between Telsource and state authorities existed so-called "**development agreement**". This contract allowed them to rebalance prices (described above) in exchange for filling the development criteria. Český Telecom was thus forced to invest and install fixed lines even in most remote areas (resembles to current USO). Quite paradoxically development plans expected penetration of households in 2001 exceeding 40%, which Český Telecom was unable to reach not due to its incompetence, but due to lack of demand. In the meantime KPN Telecom acquired itself an additional 6.48% at the stock exchange.
- **Since 1999 the governments have tried to dispose of its 51% stake.** When implementation was underway, due to a dramatic fall of telecommunication stock at all worldwide exchanges the privatization was stopped. It was restarted again in 2002 and the tender for the selection of a new owner was completed. The winning bid was that by the consortium lead by the Deutsche Bank. However, due to disputes with Telsource (which has some disposal rights

contractually guaranteed in the privatization agreement) and due to the low price offered the privatization was cancelled.

A new privatization round is expected in 2004 – 2005. For achieving of higher proceeds the acquisition of Eurotel will have been completed until 2003. The next privatization attempt will probably not be declared before a successful integration of Český Telecom and Eurotel, which undoubtedly would increase the revenues for the state.

F.3.1.2.2 České Radiokomunikace

The company České Radiokomunikace was far less important than Český Telecom. Its main activities were **transmission of TV and radio broadcasting** and **data transmission over radio loops**. It also operated its paging system, which after a growing mobile penetration lost its business case.

The company got a unique chance in 1996 when a tender for the second GSM operator was realized. The condition of the Ministry of Transport and Telecommunication was that the **winning operator had to be majority owned by a Czech company** active in the business. České Radiokomunikace joined its forces with the mobile subsidiary of Deutsche Telecom and their offer won the tender. Since then the most valuable asset of the company was the majority in GSM operator Radiomobil (now T-Mobile). In 2000 it sold ca 10% stake to the minority owner and for this transaction cashed some CZK 12 bn. (EUR 375 million). This enormous cash inflow was distributed through dividends. According to České Radiokomunikace the remaining stake (39.23%) has almost no market value and nothing but dividends can be expected.

The government then decided to privatize the cash free company. The bids were not attractive since the only business with guaranteed revenues (radio and TV transmission) was not a gold mine and the data transmission business was already conquered by other companies. The winning bid was by consortium led by Bivideon, which started to carve the company to **business units**. Each member of the consortium acquired assets it needed (TV transmitters, data network, paging, stake in fixed operator and ISP Contactel…).

This privatization was **not considered successful**. Minority shareholders often accused Bivideon of detrimental behaviour.

F.3.2 Gas and electricity sector

Both of these sectors were privatized in a similar manner. Starting the January 1st, 1993 new structures of these sectors were created. It proposed the split of the monopoly companies (one for gas and for electricity) into ČEZ, a.s. (Czech energy plants) and 8 regional distribution companies in case of electricity and into Transgas, a.s. and 8 regional distribution companies in case of gas. The stakes in regional distribution companies were privatized in the following way: about 45-49% was further kept by state bodies, 33% were distributed to local municipalities and rest was offered in the voucher privatization.

During the 90s the shares distributed via voucher privatization were gradually concentrated by large international investors such as Vattenfall, Bayernwerk etc. At the end of 90s the state "majority" was broken as the municipalities started to sell their stakes in these companies for no benefit was coming from the holding of these shares (no dividends etc). The state started to secure its majorities via hidden purchases of shares from municipalities through ČEZ and Transgas. Finally 3 state majorities were lost in electricity distribution companies and 2 in gas distribution companies.

The situation was different in the case of ČEZ and Transgas. In case of ČEZ only 1/3 of shares was offered in voucher privatization and rest was proposed to be kept by the state. Transgas was not even transformed into a joint stock company and remained the state enterprise through the whole 90s until May 2001, when it was transformed into the joint stock company to enable its privatization.

In 2000 the government finally decided to privatize both sectors in public tenders. The state announced in 2001 two tenders: one for the electricity sector containing all state stakes in 8 electricity distribution companies and in ČEZ and one for the gas sector containing all state stakes in 8 gas distribution companies and in Transgas. The privatization in electricity finally collapsed (low price offered in line with many binding conditions). In case of gas sector, RWE Gas (Germany) won the tender and the state totally disappeared from this sector. The only regulation is provided via the regulatory office and the industry ministry that have different responsibilities as assigned by the Energy Act (certification, licensing, regulation of prices, etc).

The failure of electricity privatization led to further restructuring in the sector. The state wanted to transfer all stakes in distribution companies to ČEZ to increase the price prior to the new round of privatization. The Antimonopoly Office decision had finally cancelled this transaction so only the consolidation of CEZ and 4 distribution companies were permitted and the remaining 4 are the subject of disposal. It is upon ČEZ to decide, how to organize this tender.

We can expect that the so called "SuperČEZ" (ČEZ + 4 distribution companies) will be privatized via a public tender. The governmental schedule for this transaction is 2004-2005.

F.4 Conclusion and SWOT analysis

The Czech telecommunication and IT market is the fourth largest among CC13. Its regulatory institutions are quite well developed. The telecommunication market is now fully liberalized with exception of local loop unbundling and bitstream access (the ČT's competitors do not have access to ČT's switching centres). However, the liberalization was late and was several times postponed, reportedly due to technical problems on the ČT's side. This was one of several causes why the cost of Internet access in the CR is higher than in EU15 (converted according to PPP). Implementation of broadband access was delayed, too; ADSL is commercially operated since March 2003.

The telecommunication market amendments have been prepared allowing for access to the ČT's infrastructure by its competitors (Local Loop Unbundling - LLU). Among the key driving actors is the newly established Ministry of Informatics striving for growing share of online population.

National regulatory authority for telecommunication is the Czech Telecommunication Office (CTO). It is responsible for licensing, numbering, interconnection fees setting and universal service obligation. Since the incumbent fixed lines operator Český Telecom (ČT) still remains in the state hands, CTO is sometimes blamed for biased price setting in favour of ČT, but nothing has been proven.

The regulatory authority, which is also relevant for ICT market, is the anti-monopoly office (AMO). It is active when approving mergers and acquisitions among ICT subjects (mainly large telecommunication companies), in the cases of state procurement (e.g. state information infrastructure).

The already mentioned Ministry of Informatics is also promoting electronic communication and especially the use of eSignature. It shall be an important instrument for communication with state authorities. However, it is only slowly accepted by the officials.

F.4.1 Summary

- Telecommunication market already fully liberalized.
- High Internet access costs and difficult broadband access (late implementation of ADSL and limited offers of CATV) inhibit on-line community.
- Czech Telecommunication Office regulates telecommunication: licensing, numbering, interconnection, USO.
- Antimonopoly office: approval of mergers & acquisitions, public procurement.
- Electronic communication promoted by the Ministry of informatics.
- Privatization of the state incumbent operator expected.

F.4.2 SWOT

Strengths	Weaknesses
• Size of the Czech market. • Good condition of networks. • Efficient and strong telcom companies. • EU compliant telecom regulation in place. • Independent regulatory authorities.	• Slow implementation of eGovernment projects. • Low commitment across the state administration. • Late implementation of broadband. • Ministry of Informatics, as a recent actor, may lack legitimacy or capacity. • High Internet costs. • Incumbent operator still state-owned.
Opportunities	**Threats**
• New Ministry of Informatics. • Privatization of ČT. • Liberalization of broadband. • CATV in urban areas (alternative Internet access). • Future of UMTS (alternative Internet access).	• Public budget cuts. • Missed privatization of ČT. • Risk of external influencing of regulators. • Growing prices of telecommunication due to VAT increase (since 2004 from 5% to 22%).

F.4.3 SWOT IS

Independent regulatory authorities secure sound development of the industry and the protection of consumers.

Efficient and strong telecommunication companies can afford new product development and their financial strength can prevent them from instability/inferior quality of services. This is strongly interrelated with **good condition of networks**.

Late implementation of broadband has forced many users to get connected only through dialup access and did not enable the use of some applications like multimedia. In combination with **high Internet costs** the online community is only slowly growing. It is often inferred that among main causes might also be the **state ownership of the incumbent fixed line operator.**

The activities of the **new Ministry of Informatics** are promising with its intention to spread electronic communication. The amendments of telecommunication act on **liberalization of broadband** can increase the number of Internet service users.

All innovations are threatened with **budget cuts** contemplated as a consequence of the current fiscal reform. Also the **risk of an external influence of regulators** exists due to state majority ownership of Český Telecom.

G EDUCATIONAL SECTOR

G.1 Management and Administration

Similar to other countries, the system of education in the Czech Republic consists of distinct levels. Within the institutional system of education, the **Ministry of Education** holds a wide range of authorities and responsibilities:

- Develops the **governmental policy** and strategy in education,
- **Drafts acts related to education** and controls the implementation of state administration in education,
- **Establishes and winds up state secondary and higher professional schools** (at present except schools established by the Ministry of Agriculture and the Police and Military schools),
- **Allocates funds** to individual districts,
- **Appoints and removes school directors**,
- **Issues regulations** concerning education.

At district level, the management of education is separated from the state administration. The **district School Offices** represent the **middle level of management**. By the virtue of law, these offices enjoy the major part of management and administrative power at the level of pre-school education, basic education and also at the level of secondary schools. The **district School Boards** have the status of autonomous bodies representing the parents and pupils. The **Czech School Inspectorate** is a body of state administration, established by the Ministry to undertake **inspection activities**.

Since 1990 **higher education institutions enjoy full autonomy** in determining their curriculum and organization of studies. They are decisively controlled by their autonomous academic bodies. Evaluation is performed by the **Accreditation Commission** established by the Czech government. For **higher education** institutions, the administrative role of the Ministry is reduced to their **funding** and the performance of **registration procedures**.

G.2 Description of the School System

G.2.1 Elementary education

Elementary School (ISCED 1,2) encompasses **primary and lower secondary education**. The compulsory schooling for children comprises 9 years (since 1996, when it has been re-extended from 8 years).

G.2.2 Secondary education

On orderly completion of compulsory schooling, practically the entire age group proceeds to some type of **secondary education**. Pupils with higher intellectual potential may sit entrance examinations for **long grammar schools ("Gymnasia")** upon completing the fifth or seventh grade of an Elementary School.

In the opposite case, **if pupils lag behind** the usual progress of teaching, they may be allocated to **special 9-10 year schools**, to **cramming 10 year schools** or to **specialized schools for handicapped pupils**, where teaching progresses at a lower pace. Pupils who leave elementary schools earlier due to their inadequate performance may undergo training for simple jobs in **1-2 year vocational courses** with a modified curricula, offered by **Apprentice Schools**. Another option is a 1-3 year training for simple jobs offered by newly established **Practical Schools**.

Secondary schools (ISCED 3) provide **upper secondary education**. All those who have successfully completed Elementary School may apply for admission and sit entrance examinations. The usual entry

age is 15. The **Gymnasium** provides **four-, six- and eight-year courses** of complete secondary general education, terminated by a **Maturita examination**, which entitles the graduates to apply for admission to **higher professional school or higher education institution**.

Secondary Technical Schools (SOŠ) provide secondary technical education, mostly in **four-year courses**. They prepare students for **professional jobs** and the four-year study completed by a **Maturita examination** also qualifies them to apply for **higher education**.

Secondary Vocational Schools (SOU) offer secondary vocational education for worker professions and for professional jobs. Their programmes include **theoretical teaching and practical training**. The entire training **takes 1-4 years** and is completed by a **final examination**. A **small proportion** of pupils attends four-year training courses completed by a **Maturita examination**, which also qualifies for application for further studies.

A new type of secondary school are **Integrated Secondary Schools** (ISŠ), which offer vocational programmes typical for **secondary vocational schools**, as well as technical programmes typical for **secondary technical schools**.

SOŠ, SOU as well as ISŠ offer two-year courses of **follow-up studies** (ISCED 3) for the graduates from three-year vocational programmes not completed by a Maturita examination. This enables students to acquire **complete secondary vocational education with a Maturita examination**.

Higher Professional Schools (VOŠ - ISCED 5), usually entered by youth aged 19 offer 2 - 3.5 years specialized in-depth study programmes, preparing the students for **qualified professional jobs**. A successful completion of secondary education along with a Maturita examination qualifies students to apply for admission. VOŠ thus represent a **non-university alternative to university higher education**.

G.2.3 Tertiary education

At present this includes **universities and institutions of higher education** (with university status - ISCED 6,7). They accept students based on a successful entrance examination, usually at the age of 19 and offer three levels of education:

- **Bachelor's studies** (ISCED 6), which takes 3-4 years and focus either on **professional training** or on the first level of higher education. It is completed by a Bachelor's examination.
- **Master's and Engineer's education** (ISCED 6), which focuses on the acquisition of theoretical and practical experience needed for intellectually demanding jobs and usually takes 5-6 years. It is completed by a final state examination, along with the defense of a diploma thesis.
- The highest level is **postgraduate doctoral studies** (ISCED 7), which prepares for creative scientific work. It takes at least 3 years and is completed by a defense of a dissertation thesis and a rigorous examination.

The establishment of **non-state schools**, i.e. **church schools and private schools** (with the right to provide education against partial payment) was allowed as early as 1990, which **terminated state monopoly in education**. The situation of higher education institutions changed twice in a revolutionary manner by the Higher Education Acts of 1990 and 1998. The former provided the higher education institutions with considerable autonomy and launched the process of study differentiation according to length. The latter further enhanced this autonomy by the de-etatisation of higher education institutions (affording them the **status of public institutions**), granting them their own property, accentuating study differentiation and enabling the establishment of private higher education institutions).

The **higher education** institutions are situated mostly in the **biggest towns**. There are **24 public universities** in the Czech Republic of which: 8 are located in Prague, 5 in Brno, 2 in Ostrava (others in Plzeň, Olomouc, Hradec Králové, Pardubice, Opava, Liberec, Zlín, Ústí nad Labem, České

Budějovice). Most of the **29 private universities** have their seat in Prague, few in Brno or other big cities and just 4 or 5 in a smaller town (usually because of connection with an industry or enterprise located there). Additionally there are 4 state military universities (in Praha, Hradec Králové, Brno and Vyškov). Over one-third of the university students study in Prague, approximately one-sixth in Brno; and Ostrava, Olomouc and Plzeň follow.

Table G.1: Education system in the Czech Republic.

Pre-school education		**1998/99**	**1999/00**	**2000/01**	**2001/02**
kindergartens	children	302 856	290 192	279 838	276 438
	number of schools	6 028	5 901	5 776	5 642
	teachers	25 296	24 484	23 800	23 345
Elementary education		**1998/99**	**1999/00**	**2000/01**	**2001/02**
elementary schools	pupils	1 082 000	1 071 000	1 057 000	1 028 000
	number of schools	4 099	4 068	4 032	4 263
	teachers	65 370	67 678	68 155	67 594
Secondary education		**1998/99**	**1999/00**	**2000/01**	**2001/02**
Gymnasia (grammar schools)	students	126 137	127 500	137 110	136 729
	number of schools	355	345	347	346
	teachers	10 284	10 749	11 502	11 665
Secondary Technical	students	191 512	180 114	211 399	210 387
	number of schools	879	826	813	804
	teachers	17 584	17 296	19 414	19 581
Special	students	71 961	72 808	71 520	70 048
	number of schools	1 365	1 418	1 359	1 388
	teachers	10 032	10 460	10 430	10 567
Secondary Vocational	students	171 575	186 327	190 186	197 229
	number of schools	614	583	568	565
	teachers	9 220	9 751	10 042	10 669
Higher Professional	students	29 566	31 073	26 605	26 670
	number of schools	166	165	163	164
	teachers	2 764	2 917	2 679	2 738
Tertiary education		**1998/99**	**1999/00**	**2000/01**	**2001/02**
Universities	students	174 229	183 954	207 260	219 514
	number of schools	23	23	24	24
	teachers	13 292	13 260	12 791	13 322
	out of which professors and associates	4 346	4 550	4 203	4 537

Source: Czech Statistical Office.

Note: Only state operated universities are included.

G.3 Current enrolment structure

The **shrinking of the child population**, which should, according to demographic projections, be of long duration, makes the number of freshmen at specific education levels fall. It is expected, that the number of pupils at Elementary Schools will fall from 1 028 thousands in 2001 to 890 thousands in 2005 and about 760 thousands in 2010.

The demographic situation was **destabilized by the pro-natality measures of the 70s**. The crest of the natality wave launched in the 70s attained secondary schools in 1989. At present this age group is graduating from higher education institutions. The age groups corresponding to secondary schools started dropping steeply in 1993.

The expected length of schooling increased by 1.2 years during the 90s, reaching the level of 15.1 in 1999, which means, that the **Czech Republic lagged behind the average of the EU countries by 2.2 years**. Thanks to the demographic trends and some measures of the Czech government at the end of the 90s, the expected length of schooling rose by further 1.3 years to 16.4 in 2002.

G.3.1 Secondary education

The average length of the secondary education rose between 1995 and 2001 by only 1% (from 3.53 to 3.57 years). The **development of the tertiary education supports substantially the participation in secondary schooling**, especially in favour of the secondary schools finished with a **Maturita** examination (entitling to enroll in tertiary education).

As a result of the establishment of private schools in the period from 1989/1990 to 2001/2002 the number of **gymnasiums** increased from 223 to 346 and the number of secondary technical schools from 375 to 804. The average school size in terms of the number of students fell and the school network became significantly **less effective**. This among others implies the impossibility to provide some specialized subjects due to unavailability of teachers at particular schools, a higher administration cost per student; and the size of an average school is simply below the minimum efficient scale.

But later, mainly because of the **demographic development** and **economical measures**, the number of schools as well as students has been falling steadily. The number of students entering the secondary schools dropped from 152 174 in 1995 to 141 635 in 2000.

Shift also occurred concerning the structure of the secondary schooling. The share of young people admitted to secondary schools who finish with a **Maturita** and to secondary vocational schools have changed markedly. While at the beginning of the 90s it was 40:60 (i.e. most students enrolled in **vocational schools**), the ratio today stands at 60:40, **with 18% share of gymnasiums**. The **participation rate** in the Czech Republic has been increasing and nowadays **95%–98% of the 15 year-olds enroll in secondary schools**. Nevertheless it is significantly lower than the average of EU member states or OECD countries, particularly in the case of the 18 year-olds.

Although the participation indicators in the relevant age group are not brilliant, it is possible to state that **in 1996 92% of the population of the Czech Republic in the 25–34 age cohort had at least secondary education**, while the average of OECD countries is 71%. Even in the age cohort of 24–64 the share of the population with at least secondary (upper secondary in term of ISCED) education is 83% in the Czech Republic, while the average of the OECD countries is 60%.

The **growing rate of satisfaction** of demand for studies has at present attained the following figures: 56% applicants are admitted to **gymnasiums**, 77% of applicants to **secondary technical schools** and 87% of applicants to **vocational schools** with a **Maturita** examination. Practically anyone who wants to study can enroll in some secondary school.

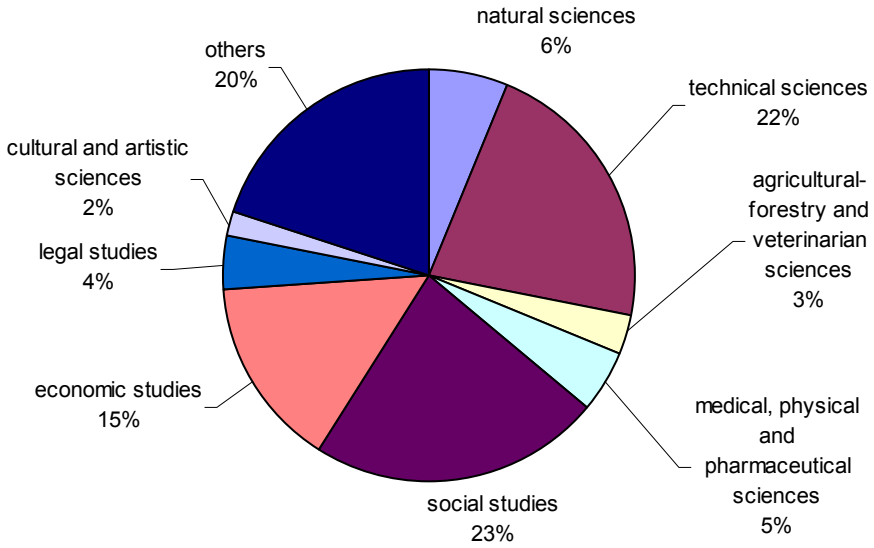
The branch structure of the Czech education system had been **planned for prevalence of engineering branches**. In the 90s **the number of students in engineering branches fell considerably** and the number of students in **economic and service branches increased**. For instance, the number of students enrolled in mechanical engineering branches of vocational schools dropped to about one third in the course of 7 years and those enrolled in building branches dropped to one half, etc. On the other hand about 40% of all young people was enrolled in economic and service branches of technical schools. The drop of interest in industrial and handicraft vocations has resulted in the fact that particularly **the capacities of vocational schools are not exploited sufficiently**.

G.3.2 Tertiary education

The total number of regular students of tertiary (or post-secondary) level between 1989/90–2000/01 grew steadily and almost doubled. The **proportion of university students is 88%**, the rest are students attending non-university institutions.

Some branch changes mentioned in the section dealing with secondary schools can be observed also in the **demand for tertiary education**. They include e.g. a **drop of interest in technical (engineering)** education and an enormous **rise of interest in economics and legal studies**.

Graph G.1: Structure of students in tertiary education, by area of training (2001).



Source: Czech Statistical Office.

Table G.2: Students and graduates at Czech universities in 2001.

Field of study	Students		Graduates of universities
	Public universities	Private universities	
TOTAL	**205 192**	**7 268**	**29 428**
Natural sciences	**15 181**	**184**	**1 849**
Mathematics	1 710	-	239
Geology	561	-	74
Geografy	1 541	-	164
Chemical sciences	1 645	-	207
Bilogy	2 239	-	390
Environmental sciences	962	-	125
Physics	1 310	-	141
Information technologies	5 213	184	509
Technical sciences - engineering	**32 802**	**-**	**4 063**
Mining and metal processing	2 609	-	362
Mechanical engineering	13 255	-	1 399
Electronics, computers, telecommunications	12 229	-	1 503
Technical chemistry	3 557	-	575
Food processing engineering	1 152	-	224
Technical sciences - other	**23 858**	**37**	**2 668**
Textiles and clothing	1 253	-	245
Wood processing	626	-	94
Architecture	1 794	-	243
Construction industry	11 339	-	1 218
Transport	3 196	-	354
Special technical fields	5 567	37	511
Polygrafics and cartographics	83	-	3
Agriculture, forestry and veterinary medicine	**7 999**	**-**	**1 067**
Agriculture and forestry	6 989	-	976
Veterinary medicine	1 010	-	91
Health care and pharmacy	**12 912**	**109**	**1 886**
Medicine	7 118	-	834
Pharmaceutical	1 547	-	271
Health care	4 247	109	781
Social sciences	**60 961**	**6 146**	**10 509**
Philosophy and theology	7 645	-	960
Economics	38 743	5 064	7 448
Legal sciences	9 542	773	1 306
Other social sciences	5 031	309	795
Social sciences and services	**46 864**	**792**	**6 494**
History	2 212	-	244
Publicistics and libraries	1 968	264	238
Philology	5 760	-	612
Sports	3 351	-	283
Pedagogics and education	31 879	528	4 932
Psychology	1 694	-	185
Fine arts	**4 615**	**-**	**892**
History of arts	1 464	-	131
Used arts	3 151	-	761

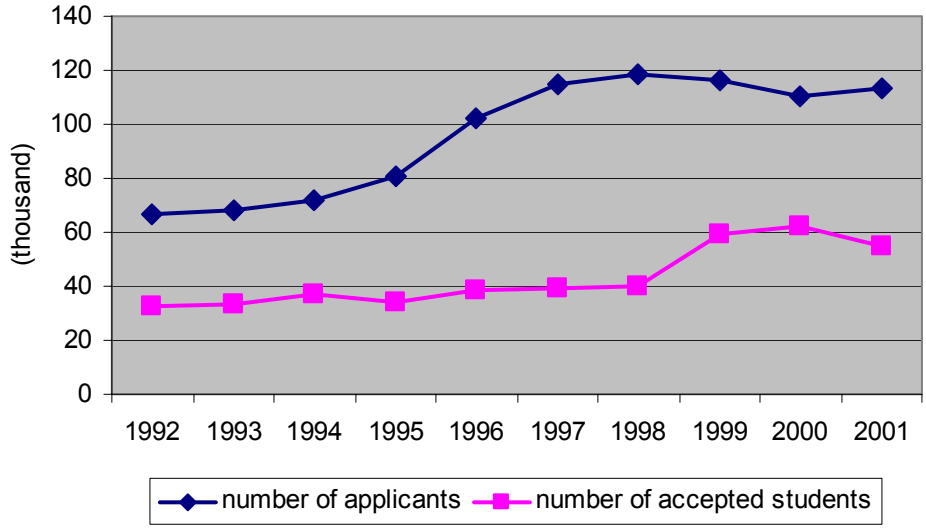
Source: Czech Statistical Office.

Although **several new universities** were established in the Czech Republic (particularly in regional centres), their capacity is still unsatisfactory, because interest in tertiary studies has been increasing faster. At the end of the 80s the number of students interested in enrolment amounted to some 30% of secondary school graduates. At present this figure rose to 52%.

The rate of satisfaction of interest in university education was below 50% for several years. In 1994/95 it exceeded 50% and has been decreasing till 1997/98. In the 2001/02 it amounted to over 57%. The rate of satisfaction of students interested in study at higher professional schools was 68%.

Graph G.2: Number of university applicants (in thousands).

Source: Czech Statistical Office.



The **participation rate of the 19 to 24 year olds in** the Czech **tertiary education** has been growing and in 2001/02 accounted for **29.8%.** Emerging higher professional schools – responding to the growing demand for higher education in the Czech Republic – contributed to this acceleration.

In spite of the described growth, the **differences between the Czech participation data and analogous EU or OECD data in the 19–24 age group are even greater than in the lower age groups**. The present development indicates a considerable lag of the Czech Republic behind the aforementioned groups of countries and without its reversal the lag would increase probably even more in the future. One of the main goals of the Czech educational policy is to enable half of the 19-year olds in any year to enter some type of tertiary education by 2005.

On the other hand, the indicators of **achieved tertiary education** are much more favourable than suggested by the participation rate. In 1996 11% of the population of the 25–64 age group completed tertiary education; in the 25–34 age group it was 12% of the population. The achievement of the required target that 13% of the 30 year-olds should achieve tertiary education on the level of long university programme in 2005 is assured already by the numbers of new students enrolled in universities at present.

The **non-university sector** is fairly new. The shortage of pupils in secondary technical schools resulted in introduction of a great number of **higher professional schools**.

Fresh **secondary school graduates** represent some 60% of all applicants for universities and 80% of applicants for higher professional schools. The average age of students enrolled in universities and higher professional schools is a little **over than 19 years**. The applicants of 24 years and over cohorts

represented less than 3.3% in 1997/98. The dropout rate is very low. The period of studies is longer than before 1989, but it is only partly due to study failures.

The **number of graduates from the tertiary schools was growing** between 1990 and 1999. In 2000/01 8 thousands of students graduated from higher professional schools.

G.3.2.1 Focus on engineering

Table G.3: Students and graduates of engineering at Czech universities in 2001.

Field of study	Students		Graduates of universities		Number of students per one graduate
	Total	%	Total	%	
TOTAL (all study fields)	**212 460**	**100.0%**	**29 428**	**100.0%**	**7.2**
Technical sciences - engineering	**32 802**	**15.4%**	**4 063**	**13.8%**	**8.1**
Mining and metal processing	2 609	1.2%	362	**1.2%**	**7.2**
Mechanical engineering	13 255	6.2%	1 399	**4.8%**	**9.5**
Electronics, computers, telecommunications	12 229	5.8%	1 503	**5.1%**	**8.1**
Technical chemistry	3 557	1.7%	575	**2.0%**	**6.2**
Food processing engineering	1 152	0.5%	224	**0.8%**	**5.1**

Source: Czech Statistical Office.

Note: All engineering students studied at public universities.

The **engineering studies recorded a significant fall** in the 90s. Share of engineering students on total number of students amounted in 2001 to 15.4% (see the table G.3). This number does not seem to be threatening the competitiveness of the Czech engineering. Nevertheless there are many "buts":

- The **share on total number of graduates** was 13.8% only, which corresponds either to higher dropout rate, or longer study periods
- **Number of students per one graduate** (similar indicator) reached in the case of mechanical engineering 9.5. This obviously does not correspond to average study length.
- Technical universities are often sought after by those **not capable of enrolling to humanities**, especially legal or business studies. If the technical universities want to keep their students, the demands on students must obviously go down.
- In **the first grades there are many enrollees** just for the sake of having the student status so as to avoid the military service. It is said that on average in the second grades only half of the first year students remains.

Even though the figures on total enrolment in engineering studies does not seem that bad, **technical skills go down** (unfortunately there is no such an indicator). In the transformation period many thought that engineering is dead; the contrary is true.

G.3.3 Adult education

Adult education – like in other countries – is considerably diversified in the Czech Republic as well. We distinguish three components of adult education, namely:

- **Basic literacy** programmes,
- **Retraining** programmes,
- **Job-related** education.

The share of labour force without any education is negligible and 85% of it is employed. The **illiteracy rate** of the Czech population over the last 15 years was **below 0.5%.** For this reason this category is not considered the essential group on which the endeavor to improve lifelong learning should concentrate.

Basic literacy programmes, therefore, are **not very frequent** in the Czech Republic. The need of basic literacy programmes has not been felt for a long time. The people who would need them have

been finding jobs without any problems for years. However, the unemployment in this group increased substantially and if its members are interested in improving their situation, they have adequate opportunity to do so. If they are not interested in education, there is no pressure to stimulate their interest. The number of **illiterates includes most frequently mentally handicapped persons** who are almost uneducable, the members of the ethnic Roma minority and immigrants.

The development of the individual education types differs considerably. In the education programmes terminated with a **Maturita** examination (ISCED 3A) the numbers of participants gradually fell as the availability of regular (day) education increased. Their **rising numbers since 1995/96** can be attributed to the improved offer used by schools to make up for the loss of one form of regular (day) studies. The numbers of participants in **follow-up courses** rose steeply until 1997, when this type of education was restricted by the Ministry of Education by financing rules because it was the **segment** of the education system with the **highest drop-out rate** – as many as half of the students did not complete their studies.

The numbers of **part-time adult students** in **higher education** institutions slightly decreased in the 1990s. The demand for it reduced also with the development of the possibility of regular (day) studies. However, this state proved temporary only and the demand is now being satisfied mostly by new **regional faculties** (founded in 1990s). On the other hand some faculties with a tradition of part-time studies (Faculty of Law, Charles University, University of Economics, Prague) did not resume part-time studies.

Even though real literacy is not an issue, there is certainly other threat to unemployed – **IT illiteracy**. Therefore the Ministry of Informatics started a **national IT education programme** with subsidized courses in computer literacy. The aim of the project is to enable all those who are interested to learn the **basics of using a computer, and basic orientation on Internet**. The **two-hour intensive courses** have been designed so that even people who have not yet come into contact with computers would be able to follow them. The number of participants is limited to ten per course, so that individual attention can be paid to each of them. The course costs only EUR 3, and the organizers contribute another EUR 3. Organizers expect that approximately 30 000 people will show their interest in the courses in 2003. Besides the courses for complete beginners, the Informatics Ministry will also organize **courses for advanced users**, who have basic experience with computers, but have no practical experience with Internet (reference – section E.8.2 on IT literacy programmes).

G.4 Education level of population

G.4.1 Education level according to age

The most numerous group among the Czech population is that having **secondary education without a Maturita**, i.e. apprenticeship. Its representation is strongest for people between 30-59, i.e. those in the productive age. The second strongest group is of those having secondary education with a Maturita – they belong mostly to the age group 15-44.

Holders of a **university degree** are mainly represented in the age group 30-44 (global maximum); this education was uncommon for older generations and younger ones still had not enough time to achieve it. Elementary education is strongly represented on both tails – for younger citizens since they had no time to achieve higher education, and for older ones because of former educational habits.

Table G.4: Educational levels according to age groups.

Education level		ISCED	education in the age group				
			average	15 - 29	30 - 44	45 - 59	60 -
Without education or with pre-school education		0	0.23%	0.32%	0.26%	0.11%	0.23%
Educated	Elementary	1, 2	21.57%	29.94%	7.12%	14.60%	35.10%
	Secondary without maturita	part of 3	37.88%	28.85%	43.36%	45.03%	34.50%
	Secondary with maturita	part of 3, 4	30.77%	35.32%	35.20%	29.66%	21.89%
	Tertiary	5, 6	9.50%	5.52%	14.01%	10.55%	8.26%
Not found		N/A	0.05%	0.06%	0.06%	0.04%	0.02%

Source: The Office for Information in Education.

G.4.2 Education levels for men and women

There are **significant differences between educational levels for men and women**. There are much **less women with university degree** than men (almost 4 percentage points difference), the contrary holds for **secondary education with a Maturita** with prevalence of women. Apprenticeship (i.e. secondary education without Maturita) is the most typical education for men. Vast difference exists in the case of elementary education, where there are almost twice as many women with only this education level than men.

Education level		ISCED	education for men / women		
			average	men	women
Without education or with pre-school education		0	0.23%	0.20%	0.26%
Educated	Elementary	1, 2	21.57%	15.31%	27.40%
	Secondary without maturita	part of 3	37.88%	45.84%	30.47%
	Secondary with maturita	part of 3, 4	30.77%	27.23%	34.05%
	Tertiary	5, 6	9.50%	11.36%	7.77%
Not found		N/A	0.05%	0.06%	0.04%

Source: The Office for Information in Education.

Table G.5: Education levels according to sex.

G.4.3 Tertiary education for men and women

As already mentioned, there is a significant **difference between the share of men and women holding a university degree**. The table G.6, however, shows that the **situation is completely changing**.

In the **youngest age group observed (15-29) the share of women is even greater** (of course also because women usually study university within less years than men). For older generation the difference grows with an enormous gap in the oldest age group with 60 and more years.

Table G.6: Tertiary educated according to age and sex.

	tertiary educated				
	average	15 - 29	30 - 44	45 - 59	60 -
Average	9.50%	5.52%	14.01%	10.55%	8.26%
Men	11.36%	5.19%	15.48%	12.38%	13.69%
Women	7.77%	5.86%	12.48%	8.78%	4.50%

Source: The Office for Information in Education.

G.5 IT related education

IT related education is to some degree provided at all educational levels. However, as a separate field of study / schooling it is only important for two types of educational institutions: **secondary technical schools** and at **tertiary education**.

At other educational institutions specialized IT fields are nonexistent; apprenticeships do not provide such a sophisticated education and grammar schools specialize on preparation for further education.

G.5.1 Secondary technical schools

There are two types of secondary technical schools providing IT related education:

- Technical schools of **electrical engineering** (Střední průmyslová škola elektrotechnická – SPŠE). Students at these schools are educated in all fields of electrical apparatuses manufacturing, design, repairing, computer programming, apparatuses certification etc. In the year 2001/2002 they provided education to 21 024 students, i.e. ca 10% of secondary technical schools students.

- **Transport and communication** secondary technical schools. Only part of these schools is IT related, since there are also schools specialized in transport and logistics. In the year 2001/2002 they had 4 049 students (1.9% of total).

Table G.7: IT related secondary technical schools.

Field of study	Students		Previous year graduates	
	Number	% of total	Number	% of total
TOTAL	210 387	x	49 147	x
Electrical engineering	21 024	10.0%	3 948	8.0%
Transport and communications	4 049	1.9%	671	1.4%

Source: Czech Statistical Office.

G.5.2 Tertiary education

The **education of information technologies** has at the level of the tertiary education very strong fundaments. More than 11.7% of total university students (25 209) studied in 2000/2001 IT related fields. The most represented branch is **electronics and informatics**, especially at technical universities. These fields of study clearly **lead to technical schools of electrical engineering** rather than to grammar schools (gymnasia).

Informatics (3 071 students) is especially taught at **non-technical universities** (faculties of mathematics or universities of economics). The fact, that only 92 students studied **education of informatics** (at faculties of pedagogy) is alarming; probably education of IT subjects at elementary and secondary schools might also be secured by persons without necessary qualification.

Table G.8: IT related university students in 2000/2001.

Field of study	total		study level		
	number	%	bachelor	master	doctoral
Total university students	**215 207**	**100.00%**	**40 186**	**157 302**	**17 719**
Total IT related students	**25 209**	**11.71%**	**2 829**	**19 542**	**2 838**
Electrotechnics and informatics	12 756	5.93%	652	10 791	1 313
Informatics	3 071	1.43%	650	2 203	218
System engineering and informatics	1 944	0.90%	364	1 517	63
Mathematics	1 616	0.75%	136	1 170	310
Applied informatics	1 613	0.75%	595	947	71
Physics	1 584	0.74%	119	968	497
Military electrical technologies	743	0.35%	10	650	83
Informatic engineering	578	0.27%	18	480	80
Applied sciences and informatics	573	0.27%	35	450	88
Applied mathematics	527	0.24%	198	274	55
Education of Informatics	92	0.04%	0	92	0
Cybernetics and controlling technics	60	0.03%	0	0	60
Applied physics	52	0.02%	52	0	0

Source: The Office for Information in Education.

G.6 Match of labour supply and labour demand

G.6.1 Rate of unemployment according to the level of education

As stated in the table G.9: education is the key factor of fighting for unemployment almost irrespectively of what field of study one selects. The rate of unemployment falls with the level of education one achieves; this not only reflects to the match of study field with the needs of potential employer, but also to the flexibility and possibility of reskilling. Both these features are contained in the education level.

Table G.9: Unemployed fresh graduates according to the education level.

Secondary education	Graduates 1998	Graduates 1999	Graduates 1998-9	Number of unemployed	Rate of unemployment
Apprenticeship w/o maturita	56 475	9 509	65 984	17 447	**26.4%**
Apprenticeship with maturita	28 577	20 253	48 830	8 674	**17.8%**
Secondary Technical	52 832	49 613	102 445	16 474	**16.1%**
Higher Professional	2 994	6 581	9 575	1 144	**11.9%**
Tertiary education	**Graduates 1998**	**Graduates 1999**	**Graduates 1998-9**	**Number of unemployed**	**Rate of unemployment**
Universities	23 043	23 381	46 424	2 525	**5.4%**

Source: The Office for Information in Education.

G.6.2 Rate of unemployment according to the field (tertiary education)

Despite the lowest overall rate of unemployment for university graduates there are still some discrepancies in the labour market. More than 10% unemployment rate was registered for **wood processing, mining, transport and environmental protection and agriculture** follows by 9.9%.

On the other side of the table there are **information technologies** or **pharmaceuticals** with almost zero unemployment. Table G.10 shows interesting examples of fields of study relevant for ICT. As could be expected, information technologies absorb all graduates. However, even despite proclamations of shortages in the number of engineering graduates there was an **above average unemployment rate for both electrical and mechanical engineering graduates**! Unlike frequent discussions on surplus of **economics graduates** their rate of unemployment was **below average**…

How to conclude? That **employability of each one does not depends directly on the field of study**, but also, for example, on his or her flexibility and willingness to the further acquirement of knowledge. As already mentioned, students of engineering often do not study these sciences because of their interests, but because no humanities faculty enrolled them… The result is obvious.

Table G.10: Unemployment of university graduates.

	Graduates 1998-9	Unemployed graduates	Rate of unemployment (%)
Total	**46 424**	**2 525**	**5.44**
Information technologies	365	-	**0.00**
Economics	12 412	532	**4.29**
Mathematics	621	37	**5.96**
Electrical engineering, ICT	2 723	178	**6.54**
Mechanical engineering	2 560	203	**7.93**

Source: The Office for Information in Education.

G.7 Foreign languages

Lots of children start to learn some basics of English (or another foreign language) already in the pre-education stage (this possibility is given in many kindergartens). The **compulsory English (or German**) education begins in the **fourth class** of the elementary school (at the age of approximately 10) and in the first two years should comprise three lessons a week. In the remaining years of the elementary school, the distribution of lessons depends on the director of the school, as well as the eventuality of adding another foreign language (which is typical for specialized schools with extended foreign languages education).

In the **secondary schools**, studying of one foreign language (mostly English) is a must. Vast majority of secondary schools educate two languages, this is always the case in grammar schools (gymnasia).

On the level of **higher education**, the attitudes are diverse. Except for the studies concentrated on language education, there are usually **2-4 semesters obligatory** (the vocabulary in the given area of studies being stressed).

Thus, **majority of the young population is able to use English** at least in some basic situations. With a reach of a higher level of education the knowledge usually gets better. There are **no precise statistics on knowledge of languages**, but the facts are as follows:

- The most frequent foreign language among the population is **English**. Its knowledge (at least partial) is estimated for approximately 30% of the population. With older age its knowledge falls to less than 10%, in the case of younger generation it can reach even 50%.
- **German** is spread among the older generation, who remembers it from the time of the Nazi occupation. Its approximate knowledge may be around 15-20%. It is the second most taught language at schools.
- **Russian** was obligatory at all grades of education during the communist regime. The polls do not have convincing results since people are ashamed of knowing a "socialist" language. But attention to it is now given at certain fields due to the development of trade relations with Russia.
- **French** is spoken by less than 5% of population. It is the third most taught language at schools.

Additionally, there are lots of **language courses**, which people can attend voluntarily. Many companies also organize or pay language courses for their employees in order to improve their qualifications.

The knowledge of foreign languages is improved by foreign study periods and traveling. The **international mobility of students and teachers** is very extensive and it has been developing very fast, being supported by several international partnership agreements. It has been supported since 1990 by the programme TEMPUS, which later enabled the Czech universities to take part in the educational programmes within the EU (especially SOCRATES/ERASMUS). Very important step was signing the Lisbon convention in April 1997, which facilitates closing bilateral agreements with regards to recognizing the achieved education since February 2000.

G.8 ICT in schools

The Ministry of Education is currently (2002-2005) running a project to **educate the teachers in the field of information technologies**. Another project has been launched to support buying and using of the educational software by schools. The last Ministry's project concerns the connection of schools to the Internet (already mentioned in "Internet for Schools"). At the end of year 2002, 3 620 schools have been connected within the project, which received more than 25 240 computers.

G.8.1 Elementary schools

Almost **all elementary schools** are now **equipped** with a **classroom for education of information technologies**. The already described programme "Internet for Schools" introduced PCs with Internet to 3 620 schools, the rest has equipped themselves. There is a centralized network for Internet access operated by the coordinator of the project.

At **elementary schools** there is an obligatory subject **Informatics** taught since the fifth grade. Pupils learn how to control the most frequent software installed at a usual PC (Windows, Microsoft Office…). In addition to this there are subjects taught by using IT aids: geography, biology, physics and chemistry. IT is obviously also used for languages education. The software used for entirely pedagogic purposes is in most cases of domestic provenance, frequently even made by teachers themselves.

Many schools make their IT systems also available to pupils out of the scope of the lessons for hobby groups like programming, computer games, browsing Internet…

G.8.2 Secondary schools

At secondary schools the situation **depends on the study field** they offer. Each secondary school is equipped with classrooms for education of information technologies. The connection to the Internet is obvious, mostly secured through own sources.

Secondary technical schools of **business administration** provide lessons on **bookkeeping** on computers, **typewriting** courses and advanced courses of the **office software** use, and sometimes web pages design courses as well.

Mechanical and electrical engineering schools provide lessons of programming, desktop publishing, web pages design and also specialized software lessons (like design of circuits, calculations of material mechanical properties…).

At **grammar schools classes of informatics are also compulsory** with a specialization on office work programmes; programming or web page design are voluntary in most cases.

G.8.3 Universities

All Czech **universities are equipped similarly as their West European counterparts** and connected to the Internet with fast research network TEN-155.

The education of ICT subject depends on the study field of each particular university. The **humanity schools**, **business administration** and **economics** schools have only basic compulsory informatics lessons; subsequent courses are voluntary. But many other courses are taught with ICT aids as well: statistics, marketing, economic modeling.

Technical schools have many compulsory subjects with IT tools: programming, circuit design, desktop publishing…etc.

Since most software used by university students at home is not legally purchased, there are many cases when software corporations allow students to purchase their software for almost negligible prices – Microsoft (Office for EUR 33), AutoCAD, StatSoft. To what extent these offers are used is unknown.

Microsoft also promotes software development for its Windows through making available the **source code of Windows** (currently out-of-date version NT 4.0 is available to the Czech Technical University). Development of communication network software is promoted by Český mobil, the smallest GSM operator, which established at the Czech Technical University its development centre. Similar situation was the assistance to Masarykova Universita Brno by T-Mobile.

At several universities there are also developed IT applications like **enrolling online**: for example at the **University of Economics Prague** all students have to pre-register for subjects they wish to study, according to their demand the number of courses is set and then all courses can be enrolled over the web. Many universities also make it possible to **access their libraries** and **order book loans online**.

G.9 Conclusion and SWOT analysis

The Czech system of education is similar to that in other countries in continental Europe. Children at the age of 6 enter the elementary schools, which lasts 9 years. However, most gifted pupils leave elementary schools after the fifth or seventh grade and study secondary grammar schools (so called "Gymnasiums").

Secondary schools comprise Gymnasiums, secondary vocational schools and apprenticeships (now often converted into Secondary intergraded schools). Formerly only a minority of pupils take any school after leaving the exam called "Maturita", necessary pre-condition for admission to a college or a university. Due to the lower birth rate and market behaviour of secondary schools school-leaving exam is passed by majority of the population.

The rate of participation at tertiary education is steadily growing. Approximately 50% of secondary school students are interested in admission to a tertiary education institution, however, only one half of

them is satisfied. Therefore the participation rate at tertiary education fluctuates slightly above one quarter of the population.

Life long education is still underdeveloped and only small fraction of the population takes part in it. ICT related education accounts to significant proportion of all students with excellent career prospects. ICT at schools is under development and due to current ministerial programmes the equipping of schools with information technologies is relatively fast.

G.9.1 Summary

- Rather conservative approach at lower grades of education.
- Growing share of population with school leaving exam "Maturita".
- Little interest and success rate in technical education.
- Relatively high dropout rate.
- Life long education still to be developed.

G.9.2 SWOT

Strengths	Weaknesses
• High literacy rate. • Tradition in technical education. • Growing participation rates in tertiary education. • International mobility of students at tertiary level. • Education of women grows.	• Imbalance between demand and capacities at the tertiary level. • Lag in participation rates in the tertiary education. • Partial mismatch of education opportunities and labour market. • Conservative approach to education (memorizing).
Opportunities	**Threats**
• Development of ICT related education and business studies. • Attraction of young teachers to schools. • Continuous pressure for reforms: demand for tertiary education, budgets, etc.	• Little interest in technical fields. • English language illiteracy of older generation. • Inefficient allocation of education budget.

G.9.3 SWOT IS

Tradition in technical education attracts foreign investment in the ICT sector, like computer manufacturing. It also enables software engineering and development of telecommunication services.
Slow reactions on labour market requirements and a **conservative approach** in education lead to slow adjustment to informatization of the world and ICT related fields of study have been overlooked for a long time.

Development of ICT related education will be very essential for becoming an information economy and improving the international competitiveness of the Czech Republic.

Little interest in technical fields and attractiveness of social sciences, law and economic studies might be fatal since redistribution and rent-seeking can hardly contribute to economic growth.

English language illiteracy of older population makes communication in foreign controlled companies difficult. It also freezes international trade and interpersonal relations.

H DEMOGRAPHIC AND SOCIAL STRUCTURE

The transformation process in the Czech Republic in the 1990s has influenced and importantly changed living conditions of individuals and social groups. This was followed by **diversification of demographic and social structures**. The changes in demographic behaviour can be characterized by the fall in marriage and birth rates. The main causes are:

- **Democratization** that allows a freer choice of a living style,
- **Growing uncertainty** about future development.

Widening social differences have been rising due to growing inequalities in material conditions and in the life styles (in their educational and cultural characteristics). Next possible sources of this differentiation include also the introduction of market relations and privatization or widely accepted liberal ideas. This part is thus dedicated to basic changes in the given areas and their links to the transformation process.

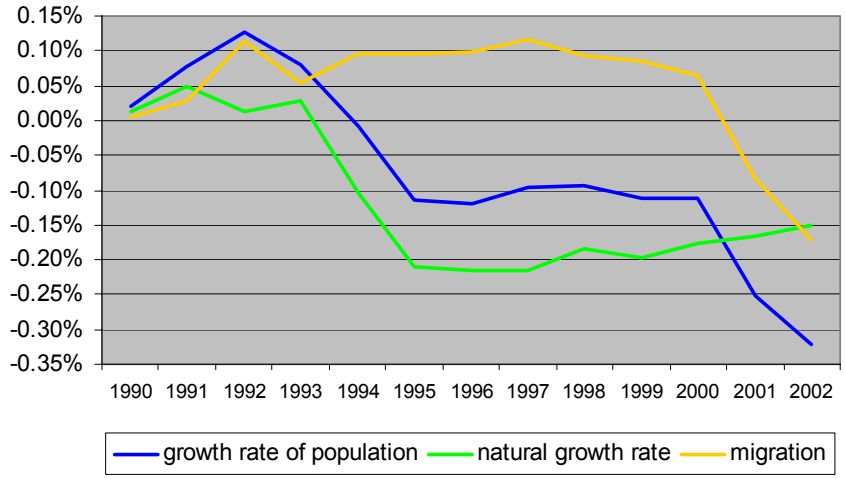
H.1 Population trends in the Czech Republic

H.1.1 Birth rates

Since 1994, the population of the Czech Republic has been falling. It has now about 10.3 million inhabitants, but the estimate for year 2015 is 10 million or even slightly less. The natural increment in the population has been lowering since 1980s mainly due to fall in birth rate. In the 1990s the decline in the birth rate has sped up even more. The total fertility lowered from 1.92 in 1985 to 1.14 in 2000. The Graph H.1 depicts the following trends in the population:

- The **natural rate of population** (with some exceptions) was falling since 1991 to 1996. Since then there is a slight upward trend, and since 2002 the situation might improve due to postponed maternity of women born in 70s.
- The **migration rate** was in observed years strictly **positive** (even more than 0.1%). The trend changed in 2001 after approving stricter legislation.
- **Overall growth** rate is the sum of the above rates. Until 2000 migration partially counterbalanced natural fall, since then both rates are negative and underline negative overall growth rate.

Graph H.1: Growth rate of population 1990 - 2001.



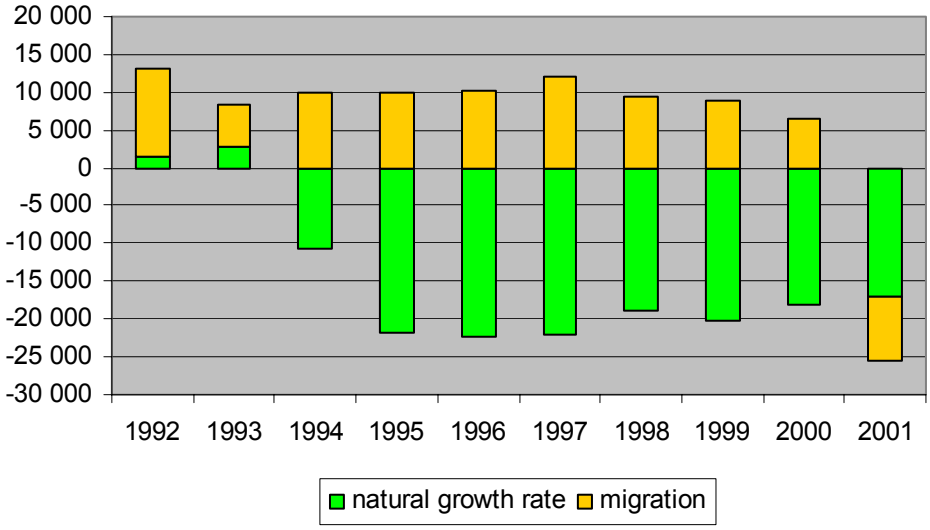
Source: Czech Statistical Office.

The Graph H.2 converts the growth rates to absolute figures (i.e. multiples by the population). The trend of **positive natural growth** rate in the beginning of the 90s was the extension of the trend

typical for communist regimes, which through subsides, apartment allocation, significant allowances and other methods supported having children. These inherited benefits ceased to exist approximately in 1992-3.

Since 1994 (first year with negative natural rate) women started postponing their maternity due to extended opportunities (traveling, career, foreign studies) and also due to housing shortage. Net migration was always positive with an exception in 2001, when the legislation made more difficult to acquire permanent stay permit.

Graph H.2: Structure of the growth rate of population in the Czech Republic.

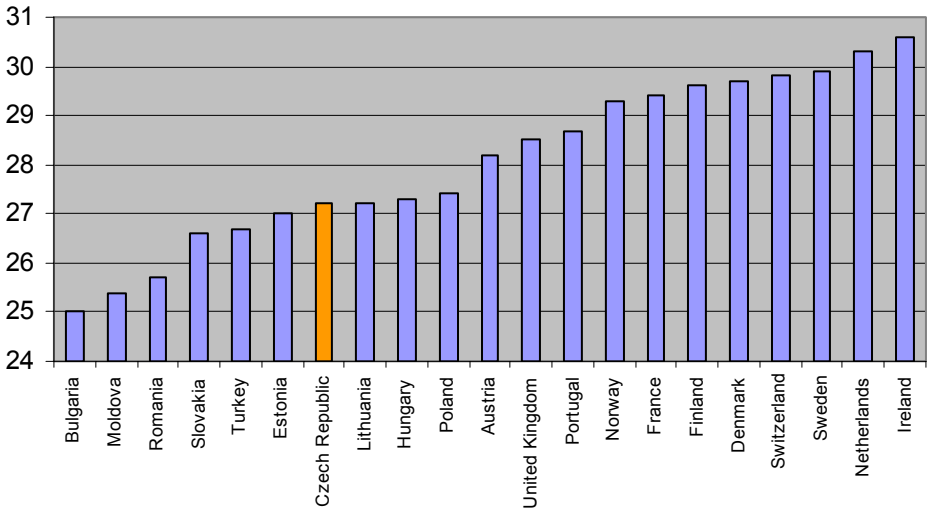


Source: Czech Statistical Office.

H.1.2 Changes in family behaviour and its reasons

The trend mentioned above was mainly caused by the break in the long-term stereotypes in demographic behaviour. From the 1950s to 1990s, family behaviour in the Czech Republic was characterized by high marriage rates (around 93 % for men and 96 % for women), with people starting a family and having their first children at a young age. In 1990s, the fall in marriage rate could be observed. From 1991 to 1998 there was an increase in the total number of single people (by 3.9 % to 29.3 % for men and by 3.7 % to 19.8 % for woman), while the number of married people has fallen. **The proportion of married people in the youngest part of the population has been decreasing fast and as a consequence also the number of their children they have had.** The average age when women have their first children has been increasing. Comparison between several European countries as of 2000 is captured in the Graph H.3. As apparent, the age of EU women when having first children is still by 2-4 years greater than in the Czech Republic (ca 27 years). This **trend might** for some time **continue** due to longer period of studies, active participation in labour force (and more qualified) and self-realization out of scope of *traditional role of woman* in a society.

Graph H.3: Female average age when having their first children, 2000.



Source: Czech Statistical Office.

There are more factors fuelling this trend. On the one hand - **greater opportunities** for young people to find their place in the society and to fulfil their ambitions, **changes in the value system** including democratization of partner relationship and alternative forms of partner cohabitation, **growing individualism** and the need for personal success, weakening of the values of the conformity and social control, women emancipation, **improving level of education** (higher levels of education both raise women professional goals they want to achieve and contribute to women having higher requirements in their choice of partner) or the affordability of quality contraception. On the other hand there is **increase in costs of living, costs of children and their education**, **lack of affordable housing** or insufficient state support for young families with children. Thus today the decision on marriage and starting a family is freer but also a more responsible act.

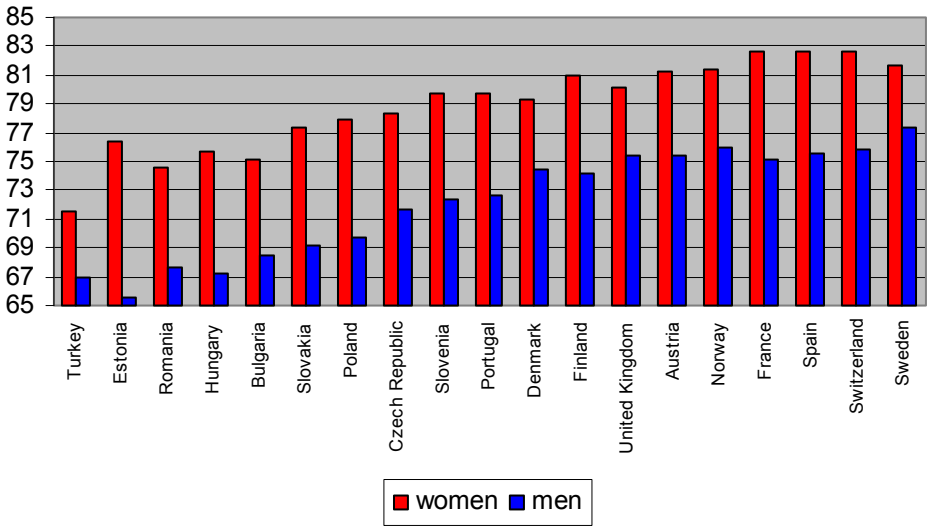
The existence of one-parent families has also been an important part of the Czech population and their number and proportion has been rising mainly with a divorcee at the head of the family (instead of widows or widowers).

As was said before, until 1990 the reproductive behaviour in the Czech Republic was marked by a high fertility rate at the start of the reproductive period with two-child family prevailing. Although the two-child model continues to dominate family planning, it is expected that fewer women will fulfill their plans than in the past. The next evolution will be influenced by the overall climate in society – what value will be placed on marriage and motherhood and whether the climate will support the merging of women's interest in the private sphere as mothers and wives and in the public sphere as participants of economic life.

H.1.3 Mortality

The negative natural growth of population is accompanied with **decline in mortality** rate. Although the life expectancy in the Czech Republic lags behind that of the Western countries, the situation has been getting better since 1990. Comparison with other European countries is shown in the Graph H.4.

Graph H.4: Life expectancy as of 2000.



Source: Czech Statistical Office.

The improvement in mortality was brought about mainly by the improvement in the quality of the medical care and in the quality of environment. The main factor in the improvement in the life expectancy is the fall in death rates in the older groups.

From the point of view of the main causes of the death, the fall in mortality from circulatory system diseases and diseases of the respiratory and digestive systems plays the most important role in the trend mentioned above. On the other hand, the mortality from malignant tumours has remained on the high level.

H.1.4 Consequences of the above mentioned factors

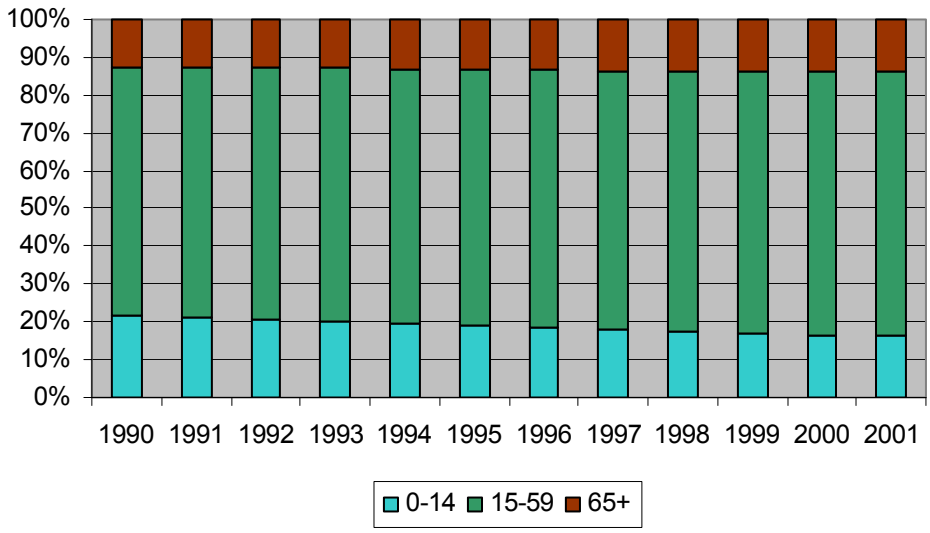
The population shrinkage in the Czech Republic brings about the prospect of permanent decline in the population by natural flux and leads to population ageing that even cannot be compensated by external migration, which is for the last two years negative. This process of demographic ageing and all the social and economic impacts brought by it seem to be inevitable. As was said above, it is caused by the decline in natality and prolonging of the average life at the same time, which leads to more numerous age cohorts entering post-productive age.

The proportion of the population in productive age is now relatively high because it contains two sizeable generations – people aged between 40 – 54 and between 20 – 25. As the first of these generations passes into the post-productive age and the size of young population shrinks, the main change to the age structure will be an increase in number of people in post-productive age with its consequences of **growing fiscal burden, declining number of workers, changing consumption patterns and demand, increasing health costs, necessity of extending capacity of health care institutions etc.** This development must be reflected in **increased demand on the pension system and the social security system, placing greater burden on the productive population.** The problems mentioned above are expected to culminate in **fifties** of this century. Nowadays the Czech government has been preparing **fiscal reform**. Its aim is to cope with the growing deficit of public finance. Within the effort to lower the deficit this reform should include measures concerning **social security system**. These measures are even now regarded as insufficient.

The key properties of the planned pension reform shall be increasing the pensioning age to 63 (or even 65) for both sexes (with a year per each child deductible for women), limiting the calculation base (not including the secondary education years), compulsory pension saving for younger generations and making earlier pensioning more disadvantageous. But the final model has not been selected yet.

Graph H.5: Age distribution (1990-2001).

Source: Czech Statistical Office.



The Graph H.5 and table H.1 show the age distribution of the Czech population and the rate of dependency. This rate is measured as a number of old[12] people divided by the size of productive population.

Table H.1: Rate of dependency.

Rate of dependency (%)	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
demographic	32.0	31.6	31.4	31.2	31.5	31.7	32.1	32.9	33.7	34.4
legislative	35.0	34.1	33.4	32.7	32.3	31.9	31.8	31.7	31.7	31.7
effective	36.3	36.8	38.3	39.7	40.4	40.6	40.1	40.9	41.9	42.7

Source: Czech Statistical Office.

It is apparent that the demographic rate, which is closely connected with birth and death rates, rises. The legislative rate shall be prevented from rising due to the **increased pensioning age**. However, effective rate still rises, which corresponds to high rates of earlier pensioning. Permanently growing (i.e. effective rate) share of pensioners is obviously expensive to afford. There might be some solutions, which, nevertheless, only partially solve the situation:

- **Higher social contributions** for unreformed pay as you go system. This method decreases standards of living of current productive population and provides incentives for shadow economy.
- **Pension reform** with pensions on subsistence minimum and compulsory pension saving. This system also decreases standards of living of current productive population

[12] demographic rate of dependency - takes into account people above 59 years of age
legislative rate of dependency – looks at the prolonging of the pensioning age
effective rate of dependency – numerator is the number of old-age pensioners paid by the state

(compulsory saving), current pensioners have not saved and do not have resources. Therefore current productive population would have to contribute to both systems, which is almost similar to previous proposal with both drawbacks mentioned.

- **Raising the pension age**. This of course sounds like a good solution. Currently unemployment rate among productive population exceeds 10% and no one knows where the jobs for today's pensioners might be found. The IST related knowledge among older generation is generally insufficient and therefore it is difficult to imagine any employment related to IST. Besides it if a person in pensioning age is IT literate, he or she even today continues working as a consequence of low pension!
- **Raising participation rates**. The participation rates are not low, overall rate exceeds 60% (see the section A.7.1) with women participation exceeding 50%. If no new methods of labour participation are found, improvement might be hardly achieved. These new methods might be ICT related, e.g. women at maternity leave could telework, but so far it is not a general practice.
- **Decreasing unemployment**. Objective of each politician.

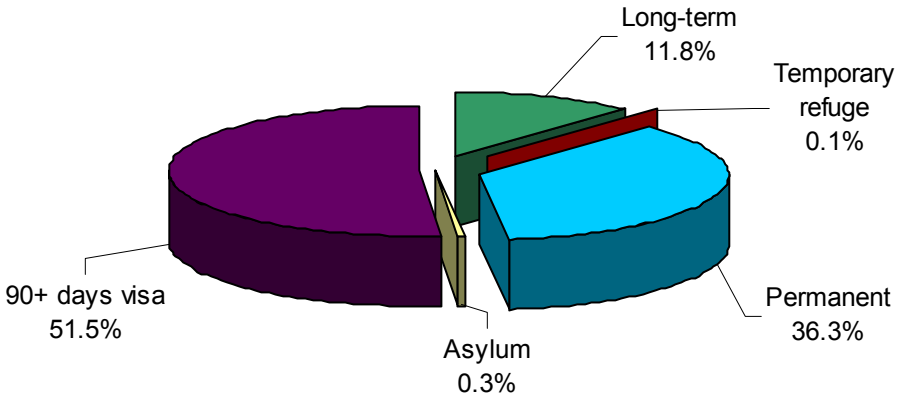
Next consequence of the demographic facts mentioned above is that the total number of households has been rising faster than the population and it is expected to rise despite the present population shrinkage. This is because of the **preference for single-generation and two-generation households.** As the population ages, adult children prefer living alone and independently and while the marriage rate falls, there is an **increase in the number of one-person households.** This trend further supports factors listed above that contribute to changes in demographic behaviour models. The main priorities of young people change towards their careers and freer lifestyle.

H.2 Migration

H.2.1 External migration

Due to its position, the Czech Republic became very attractive as a transit country and as a destination for immigrants as well. That is why only this country experienced positive rate of external migration among the East European countries. Now the foreigners make up for 2 % of the population in the Czech Republic. The structure of foreigners according to the type of stay in the Czech Republic is shown in Graph H.6.

Graph H.6: Foreigners by category of stay (2000).



Source: Czech Statistical Office.

H.2.1.1 Net external migration 1990-2002

In the course of the period of 1990 - 1999 in total about 124 thousand people immigrated to the Czech Republic and 42 thousand people emigrated. The growth gained by the external migration amounted to approximately 82 thousand people. The biggest movements across the state borders occurred in the years 1990-1992 when the split of federal Czechoslovakia was anticipated. The **net migration** was strongest in the last federal year 1992 with significant inflow of Slovaks to the Czech Republic. However, moving between both countries was very intensive also in previous years with flows roughly counterbalancing one another.

1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
624	2 876	11 781	5 476	9 942	9 999	10 129	12 075	9 488	8 774	6 539	-8 551	12 290

Source: Czech Statistical Office.

Table H.2: Net external migration 1990-2002 to the Czech Republic.

The negative balance of the net migration in 2001 is a consequence of the change in the methodology. Until 2000 the statistic included only people with permanent residence. Since 2001 statistics have also included people with **long-term residence**. Therefore at the beginning of 2001 the **number of foreigners registered at the foreigner's police** grew by those with **long-term residence** (not permanent) permit only. At the same time the criteria for **long-term residence were tightened up** which led to the withdrawal of many **long-term residence** permits. In 2002 the situation has consolidated and significant positive number of net external migration indicated that **obtaining long-term residence permit is still easier than obtaining permanent residence permit**.

H.2.1.2 Migration to the Czech Republic

The most immigrants to the Czech Republic come from Slovakia, the states of former Soviet Union, Vietnam and Germany.

Table H.3: Number of immigrants by country.

	2000	2001
Slovakia	2 826	3 078
Ukraine	1 213	2 799
Vietnam	312	2 211
Russia	433	726
Germany	537	470
Poland	102	456
United States	395	279
Others	1 984	2 899

Source: Czech Statistical Office.

The following text describes the main reasons of staying in the Czech Republic for each group of immigrants:

H.2.1.2.1 Slovakia

After the split of Czechoslovakia there was a one-off wave of migration from Slovakia to the CR, which was often motivated by the rise of xenophobic nationalism in the new Slovak Republic. The strongest current motives for migration include education, skilled job opportunities and unskilled, but better paid, manual work. Traditional migrants to the CR are Slovak students because of the possibility of studying at Czech universities for free. The Czech Republic benefits from Slovak intellectual potential.

Most Slovaks currently live in the CR are those who settled on the Czech territory before 1993 and so they are not really foreign immigrants. Better economic and social situation, almost non-existent language barrier, common history and cultural proximity make the CR a natural destination for Slovaks.

H.2.1.2.2 States of the former Soviet Union

Citizens of the former Soviet Union form another group of immigrants who are currently among the most frequent long-term residence permit holders or asylum seekers. In the case of Russians and Ukrainians the reasons for seeking asylum are primarily economic. Citizens of republics in the Caucasus region often leave their homes because of the unstable political situation, the war conflicts or persecution on ethnic or other grounds. A further increase of immigrants from this group may be expected particularly from western parts of the former Soviet Union.

H.2.1.2.3 Vietnam

The arrival of the Vietnamese has economic roots, as well. This migration was the result of an arrangement between the communist North Vietnam and the communist Czechoslovakia. The first wave came as early as the 1960s. The main inflow took place in the 1970s and 1980s. This was the Vietnamese government's way of repaying the Czechoslovakian assistance during the Vietnam War. After 1990 a group of Vietnamese emigrated to the CR from Germany. Their relationships with the Czechs, if any, are business-related. The second generation of Vietnamese pursues education and integration into the Czech environment. This group may be expected to gradually expand due to strong family ties within the Vietnamese community.

The reasons for migration **from other Asian countries** are similar to those of Vietnam. The largest group of them now is running a business in the Czech Republic (36.4%), permanent residence permit was issued to 23%, reunification of families was reason for 22.1% of them and 11.2% participates in corporation or other legal person. Employment (3.1%), study or training (2.1%) as well as other reasons (2%) are minor reasons.

H.2.1.2.4 Western Europe and North America

Temporary migrants in the CR also include foreigners from **Western Europe and North America**. They work in international companies based in the CR. Others came to the CR in the early 1990s to experience a different culture and social environment. Those who stayed form a specific community making their living predominantly by teaching English.

According to the Czech Statistical Office the most important reasons are reunification of families (30% - most of them are re-emigrants), 25% employment (in most cases highly skilled), participation in corporation or other legal persons (16%) and running their business (14%). Permanent residence permit was issued to 12%, study period or training was reason for 1% and other reasons indicated 2%.

H.2.1.3 Migration to the Czech Republic in terms of regional distribution

Immigration into the CR is largely concentrated in Prague, which is a European multi-cultural city. It is primarily a destination for those foreigners who are beneficial to the CR. Entirely different situation exists in other regions. The foreigners coming there, if any, are often less accepted from the point of view of assimilation requirements. Other regions have less experience with foreign nationals than Prague; the only exception is the area bordering Germany and Austria with short-term shopping or entertainment-related visits. Border regions also face the problem of quasi-legal trade and tax-free zones, which are associated with short-term cross-border visits by Germans and Austrians.

H.2.1.4 Migration of Czech Citizens abroad

Since the origination of the CR (1993) the reason for the migration abroad is mostly work related. The major motive is to achieve higher real income standard (or overall living standard) abroad, than the one existing in their home environment. Additional motive is to obtain professional (specialist) experience and to improve language skills. To a certain, but small extent personal reasons are involved as well (partner and family relationships, ideological concepts, etc.).

In 2001 almost 20 thousand Czech citizens left the country to seek work abroad. According to a research project undertaken by Pricewaterhouse Coopers in 2001 the most preferred destination for living and working is the European Union, in particular Germany and Austria.

Table H.4: Czech nationals working in EU countries (2000).

Country	Number
Austria	3 735
Belgium	77*
Finland	29
France	870*
Germany	8 800*
Great Britain	510
Italy	2 300*
Ireland	956
Netherlands	625
Portugal	2
Sweden	253
Denmark, Luxembourg, Spain	N/A

* Approximate number

Source: Czech Statistical Office.

Table H.5 shows the development of the number of Czech citizens working in Federal Republic of Germany.

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
total	12 256	4 342	4 474	3 832	2 796	2 397	2 670	3 805	4 168	3 902
IT Specialists	*	*	*	*	*	*	*	*	249	305

Source: Czech Statistical Office.

Table H.5: Czech citizens working in Federal Republic of Germany.

Within the period 1993 –2002 there was a general decline in the number of emigrants (from the original number of 12 256 in the year 1993 to 3 902 people in the year 2002). This trend is similar for Austria.

In the third row we can see number of IT specialist employed in the Federal Republic of Germany in years 2001 and 2002. The reason for emigration of IT specialists out of the country is in general due to economic reasons. The same reasons make IT researches migrate from academia to the private sector.

H.2.1.5 Public support for immigration

In 2003 the Czech government started an experiment, which aimed to **support the immigration of highly skilled** (not only with IT skills) **people** from other European countries. So far the programme intends to attract people from Bulgaria and several ex-Soviet Union countries.

There are relatively strict conditions: age 25-35, at least completed secondary education, ability to find labour… and many others. According to press messages it is easier to ignore the programme and immigrate relying only on oneself. Reportedly this programme does not make anything easier. Its achievements have not yet been evaluated, but probably it will not bring any pleasant surprise.

H.2.1.6 Roma minority

The Roma minority is probably the most numerous nationality minority. During the last census held in 2001 only **12 530 inhabitants** proclaimed to belong to the Roma minority. However, this number does not mean almost anything. The members of the Roma minority do not claim to be Roms unless an accusation of racial discrimination issue is in question. This unwillingness stems from many reasons:

- They are ashamed to be Roms,
- During World War II the registers of Roms allowed Nazis to easily deport Roms to concentration camps,
- If they are half-breeds of the majority population and Rom, they consider them to belong to the majority population.

Their numbers are not statistically observed at all. Educated guesses often speak about **300 thousand**. Most of them are immigrants from Slovakia, Hungary and Romania, since only some 600 survived the WW II. They inhabit especially the northern regions - North Bohemia (Ústí nad Labem region) and North Moravia (Moravia-Silesia region), but they live all over the Czech Republic.

This minority suffers from various serious problems. The key issues are the **education** and the ability to coexist with the majority population. Other problems are based on it: unemployment, crime, drug abuse and alcoholism. The majority population does not make their life easier, the prejudices against Roms support insufficient education and unemployment. Unfortunately there is **no efficient policy** how to integrate them or how to be able to respect their diversity.

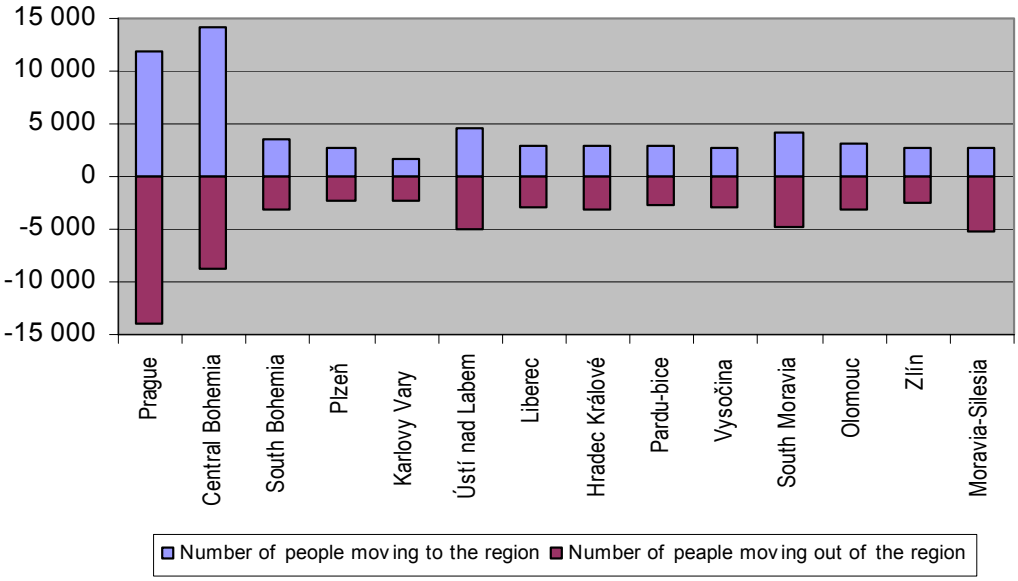
H.2.2 Internal migration

Internal migration in the Czech Republic is very low. Its scope has been slightly falling since 1980s and in 1990s it has continued to decrease much more sharply. The number of people that have moved

house in the last ten years has not exceeded 2.6 % of the population per year. This means that on average people move once per 40 or 50 years.

Before 1990, the population grew mainly in towns with large stock of housing. Since 1990, the trend has taken the opposite direction mainly because of the changes in the affordability of housing. Smaller municipalities in the vicinity of large towns thus now record flux of inhabitants. Negative consequences of the low territorial mobility could be seen most evidently in the labour market. The most frequent reasons for moving "following a family member" or "housing reasons" only confirm this fact.

Graph H.7: Internal migration in 2001.



Source: Czech Statistical Office.

Typical trends in internal migration in the Czech Republic are the outflow of people from Moravian-Silesian region (balance of net migration is –2 372) and the outflow of people from Prague to the Central Bohemia region. Negative migration balance in Prague –2 023 is unusual from the long-term and also international point of view. However this trend can be explained by an increase in housing development around Prague in the region of Central Bohemia.

H.2.3 Mobility

Regions with the lowest balance of net migration are usually the ones with the highest rates of unemployment. This confirms that migration trends are responsive to regional labour market indicators. On the other hand migration appears to be constrained by the following factors: insufficient capacity for temporary migrating workers, insufficient difference between existing and potential wage that should compensate additional costs and the malfunctioning housing market. Due to the manufacturing house market tenants in high-unemployment areas cannot find affordable housing in more dynamic regions.

H.3 Regional structure

Because the Czech Republic is a small country, the regions do no differ much from the demographic point of view. The most notable differences are emphasized below.

Regional structure of population in the Czech Republic is the result of a long-term evolution. It reflects the consequences of the two world wars, the transmigration in border regions after the Second World War. It also follows the pattern of the following investments into housing and industry according to

the central economic plans. These factors caused the different age and social structure mainly in Moravia-Silesia, North Bohemia and other border regions.

Regional population trends follow the population trends in the whole country. The next part will, thus, be dedicated to a short comparison of the Czech regions.

With regard to the increment in population since 1950, the highest increase was achieved in Moravia-Silesia (47%), the region of Karlovy Vary (26%) and the region of Zlín (25%). The lowest one was reached in the regions of Plzeň, Central Bohemia and Hradec Králové (in total 5%).

Population dynamics increased from the fifties to the seventies in all regions. After these extreme years population declined, most sharply in the Moravia-Silesia region. The region of Liberec and Zlín lost their dynamics in two last decades, Prague in the last decade. In Central Bohemia (due to migration to the borders of Prague) and in the region of Karlovy Vary the growth of population recovered in the last decade.

Average age has been raising in all regions in 1995 – 2000, most in the region of Karlovy Vary and Moravia-Silesia. The lowest value was achieved in the region of Ústí nad Labem.

As for fertility rates, there are small differences among the regions. The lowest value is naturally in Prague. Other regions with high fertility rate can be divided into two groups:

- The first one consists of the region of Ústí nad Labem, Liberec and Moravia Silesia (they have in common higher proportion of Roma minority population),
- The second one involves the region of Pardubice, Czech-Moravian Highlands and the region of Hradec Králové with the core of rural districts.

The average age when females have their first children also increases in all regions. The highest age is in Prague, the lowest is in the region of Ústí nad Labem.

The mortality rates are highest in the region of Ústí nad Labem, the region of Karlovy Vary and Moravia-Silesia. The lowest rates are in the region of Hradec Králové and Prague.
The most important facts are summarized in the table H.6.

	Density of population per km^2	Urban population (%)	Population in age of 0 - 14 (%)	Population in age of 65 and more (%)	Total increase in population	Life expectancy - males	Life expectancy - females
Prague	**2 339**	**100.0**	***13.4***	**16.2**	***-10 358***	**73.6**	**79.0**
Central Bohemia	102	***54.9***	16.0	14.3	**2 340**	71.7	78.0
South Bohemia	***62***	64.5	16.6	13.6	-725	72.4	78.5
region of Plzeň	73	67.0	15.7	14.3	-1 204	72.2	78.1
region of Karlovy Vary	92	81.4	16.7	***11.9***	-719	70.7	77.0
region of Ústí nad Labem	154	79.8	16.9	12.2	-930	***70.2***	***76.6***
region of Liberec	135	78.5	16.9	12.8	-851	71.3	77.9
region of Hradec Králové	115	68.5	16.3	14.5	-1 563	72.6	**79.0**
region of Pardubice	112	61.7	16.8	14.0	-1 085	72.7	78.6
Czech-Moravian Highlands	75	57.9	**17.3**	13.8	-976	72.7	78.7
South Moravia	159	63.8	16.0	14.3	-3 494	72.3	**79.0**
region of Olomouc	124	57.1	16.5	13.6	-1 226	71.5	78.6
region of Zlín	150	60.7	16.5	13.7	-963	71.4	78.8
Moravia-Silesia	228	76.9	17.2	12.4	-3 837	70.4	77.9

Source: Czech Statistical Office

highest values - bold
lowest value - bold itallic

Table H.6: Regional key demographic indicators (2001).

H.4 Conclusion and SWOT analysis

Transformation process has importantly influenced the living conditions in the Czech Republic. Democratization and growing uncertainty (as a key factor of capitalist economy) caused birth and marriage rates to fall.

The Czech Republic is facing a serious problem of the **ageing population**. The strong post war population is about to enter into pensioning age, which causes severe problem with the **state social security** financing.

Czech population experienced **improvement in life expectancy** thanks to the progress in medical care quality and environment.

The net **migration to the Czech Republic was positive until 2001**, and after the change in methodology became negative (switch from permanent residence registering to long-term residence permits). Most numerous immigrants are from Slovakia, Ukraine and Vietnam. Most important purposes of stay of immigrants are business, study and employment, however, it is different for those coming from Asia and Europe. Current data confirm that immigration does not resolve the old-population problem unless more efficient measures for immigration promotion are implemented.

Domestic inhabitants migrate especially **due to employment**; Czechs work abroad for achievement of higher standard of living, to obtain professional experience and to improve language skills. Special group of Czechs working abroad are **IT specialist**; German government supports working permits issue for people with such qualification and Silicon Valley of USA is also very attractive for young programmers. However, permanent brain drain is currently not an issue as IT specialists often return home with relevant experience gained abroad.

Internal migration is still not a very frequent phenomenon for several reasons: the regulation of apartment rents causes housing shortage. Mortgages are spreading but the market has not yet been developed, citizens are unwilling to change residence even if they have lost their jobs (presumably due to generous social benefits) and they show a conservative attitude towards moving. However, people do migrate, especially from Moravia-Silesia (high unemployment) to Prague or Central Bohemia their reasons are generally the same: higher wage/better employment opportunity.

H.4.1 Summary

- Democratization and uncertainty influenced population development.
- Czech society lacks young population.
- Personal individualism grows.
- External migration trends not clear, most immigrants from Slovakia, former Soviet Union, Vietnam.
- Internal migration low due to housing shortage and low labour flexibility.
- ICT workers (esp. software engineers) migrate to Germany and USA.

H.4.2 SWOT

Strengths	Weaknesses
• Progress in medical care. • Alternative opportunities for women.	• Negative growth rate of population. • Ageing population with lagging ICT capacities. • Little internal mobility. • Hostile attitude towards foreigners (xenophobia).
Opportunities	**Threats**
• Support of immigration. • Return of experts from Germany and USA. • Teleworking of women raising participation rate. • Birth rate supported by the government.	• Collapse of the social security system. • Growing regional disparities. • Unsolved Roma minority problem.

H.4.3 SWOT IS

Old population problem could be defined as a weakness for IS development. Young people are prone to absorb new technologies more quickly and naturally.

The most important opportunity in ICT related field is the **return of experts** from Germany and USA, where they have been invited and granted working permits. To some extent also **attraction of experts from less developed countries** might be beneficial, but this is less probable.

I CULTURAL AND SOCIOLOGICAL DATA

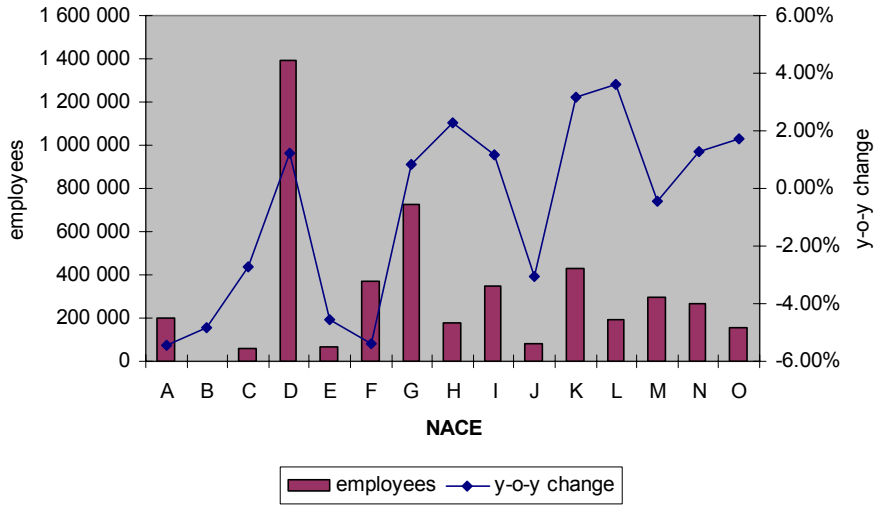
I.1 Changes in employment structures

I.1.1 Employment structure as of 2001

In the 2001 the largest part of the population was employed in the **manufacturing sector** (29.25%). The second strongest sector was **trade and repairing** with 15.23% representation and the third one was **services for corporations** (including real estate and renting) accounting to 9.01% of total economy employees. These three sectors absorb more than half (53.49%) of the economy's human resources. Other sectors are obviously weaker – among others also **sector I** (transport, storage and communications), which includes most of ICT related services (7.31% employees).

Graph I.1: Employment according to NACE in 2001 and its y-o-y change.

Source: Czech Statistical Office.



A = Agriculture, hunting and related service activities
B = Forestry, fishing
C = Mining and quarrying
D = Manufacturing
E = Electricity, gas and water supply
F = Construction
G = Trade, rep. of mot. vehicles and pers.and househ.goods
H = Hotels and restaurants,
I = Transport, storage and communications
J = Financial intermediation and insurance
K = Real estate, renting and business activities
L = Public administration and defense; compul.soc.security
M = Education
N = Health and social work
O = Other community, social and personal services
P = Private households with employed persons
Q = Extra-territorial organizations and bodies

I.1.2 Trends in the employment structure

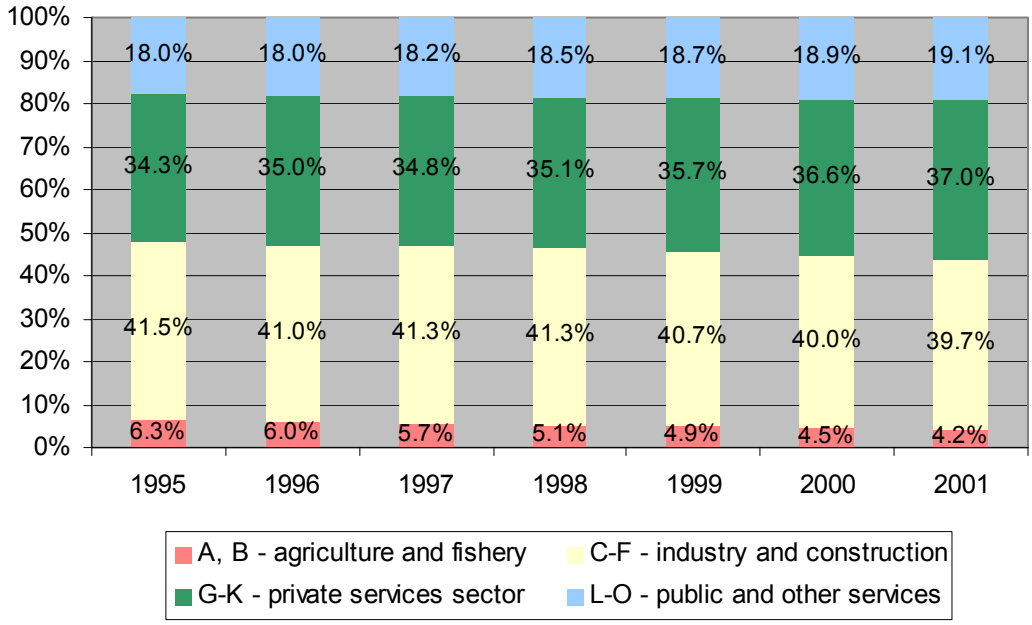
As apparent from the Graph I.2, in the years 1995 – 2001 we may observe the following **trends in employment**:

- **Important fall in representation of the primary sector** (agriculture, and fishery) from 6.3% to 4.2% with annual average growth rate –6.39%.
- **Slight fall in representation of the secondary sector** (industry and construction) from 41.5% to 39.7% with annual average growth rate –0.72%. The employment in manufacturing itself

(not depicted in the Graph) rose between 1995-2001 from 28.8% to 29.2% (annual average growth rate 0.24%).

- **Employment in the private sector services rose from 34.3% to 37%** (annual average growth rate 1.25%). The ICT related employment in subsector I (transport, storage and communications) rose from 7.1% to 7.3% (annual average growth rate 0.52%).
- **Employment in public sector services rose from 18.0% to 19.1%** (annual average growth rate 1.04%).

Graph I.2: Changes in employment structure in 1995 - 2001.



Source: Czech Statistical Office.

We may conclude that **employment in industry** (small decline) and manufacturing **is stable** (negligible growth) and the growth of employment in both public and private services was achieved at the expense of the primary sector (agriculture and fishery) and mining (subsector C – fall from 1.8% to 1.2%).

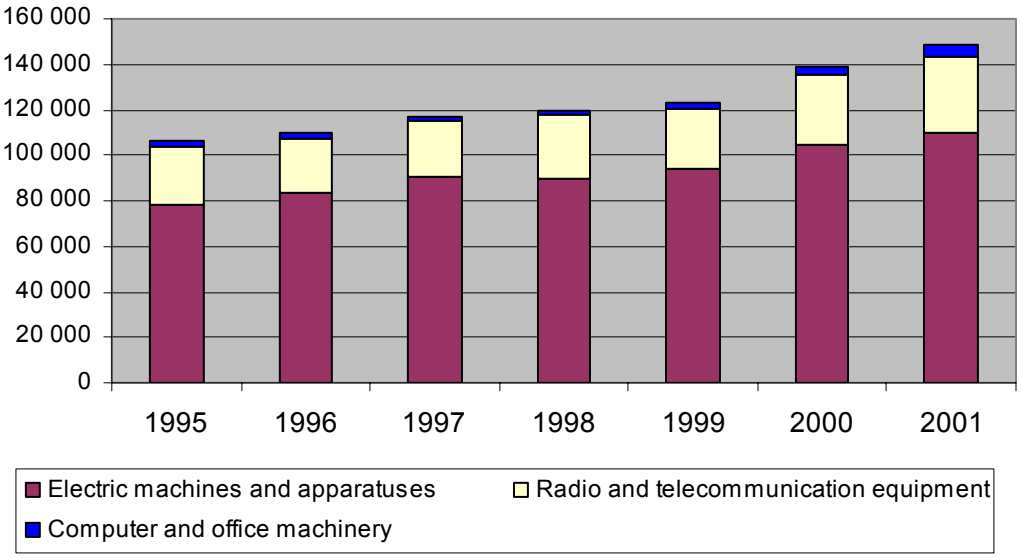
I.1.3 Employment in ICT

The Czech Statistical Office provides data on employment in NACE 2 structure, which allows separating ICT manufacturing and IT services. Even more detailed division (like employees in system integration companies, programmers…) is unfortunately unavailable.

I.1.3.1 Employment in ICT manufacturing

The employment in ICT manufacturing grew over the period 1995 – 2001 from 106.7 thousand employees to 148.8 thousand employees (average growth rate 5.7%). The **fastest growing is the computer and office machinery manufacturing** industry (from 3 218 to 5 881 employees, average growth rate 10.6%). Therefore we may conclude, that the size of ICT manufacturing grows and the structure is moving towards data processing equipment.

Graph I.3: Number of employees in ICT manufacturing 1995-2001.



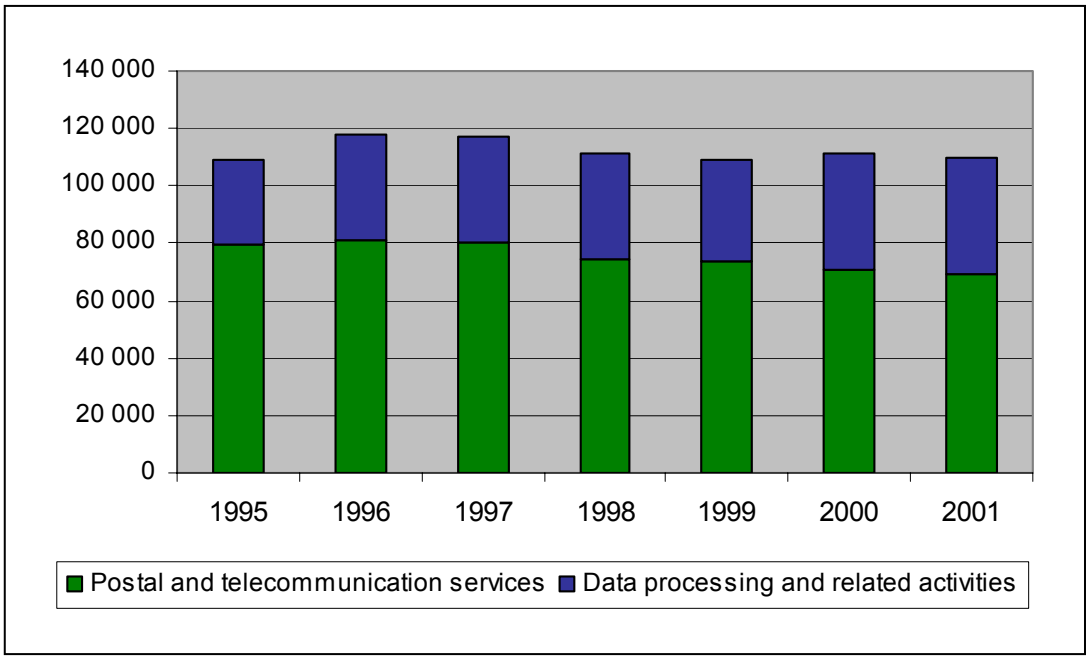
Source: Czech Statistical Office.

I.1.3.2 Employment in IT services

The employment in IT related services was growing approximately in the first half of 90s, and achieved its **local maximum in 1996 with 117.7 thousand employees**. Since then the employment keeps falling due to the fact that the major telecommunication and postal companies are being **restructured** and so released their employees, especially those without a university degree. The employment in posts and telecommunication fell from 79.8 thousand to 69.6 thousand, (i.e. average growth rate –2.3%).

On the other hand, employment in data processing and related activities follows a growth trend (from 29.2 thousand to 40.3 thousand, average growth rate amounts to 5.5%). We may conclude that the total employment in the IT and postal services was falling, but now it is probably **stabilized**. The trend in structure is favourable with growing proportion of data processing. These results are however biased by including also postal services and logistics into telecommunication, the exclusion of which might partially offset falling overall IT services employment.

Graph I.4: Number of employees in IT services 1995-2001.



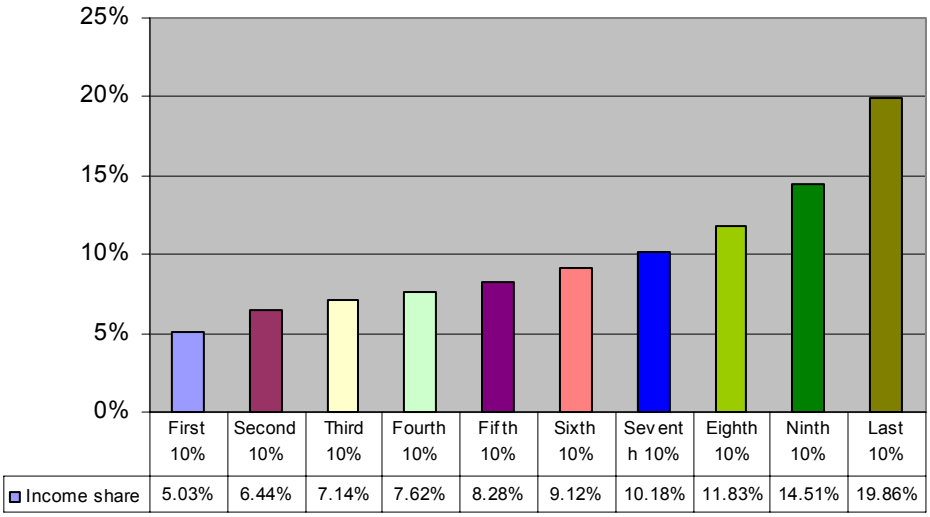
I.2 Income distribution patterns

I.2.1 Income distribution

The Graph I.5 describes the distribution of income in 2001. The richest 10% of population's share on total income (19.86%) is approximately 4 times as large as the share of the poorest one (5.03%). The richer half of the population receives 65.5% of total income. This distribution pattern roughly copies the distribution of income in Western Europe.

Graph I.5: Income distribution in 2001 (in % of gross total income).

Source: Czech Statistical Office.

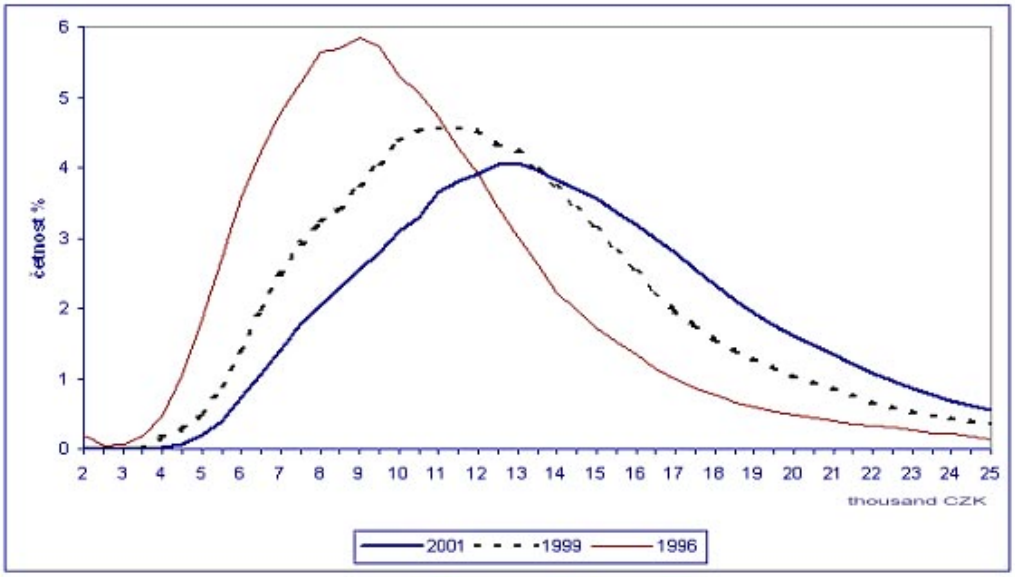


I.2.2 Development of income distribution

The curves in the Graph I.6 describe the income distribution in 1996, 1999 and 2001 with **density functions**. The incomes are not normally distributed due to the existence of the minimum wage – the left hand tail of the curve is limited by it, whereas there is no upper boundary. Because of this fact the average salary is higher than most frequent salary (which was about EUR 265 in 1996, EUR 312 in 1999 and EUR 382 in 2001). The percentage of employees with the salary lower than average is thus more than 50% (63% in 1996; 64% in 1999 and 65% in 2001).

This is also in line with another fact. The curve in 1996 is much more pointed than those from 1999 and 2001 (and the curve from 1999 more than 2001). This means that the dispersion (variability) of incomes is growing and the share of population with incomes ranging around the mean (average) income by certain limits is falling. Therefore average wage is losing its explanatory power and rather most frequent wage range should be used (with % of population receiving it).

Graph I.6: Distribution of income in 1996,1999 and 2001.

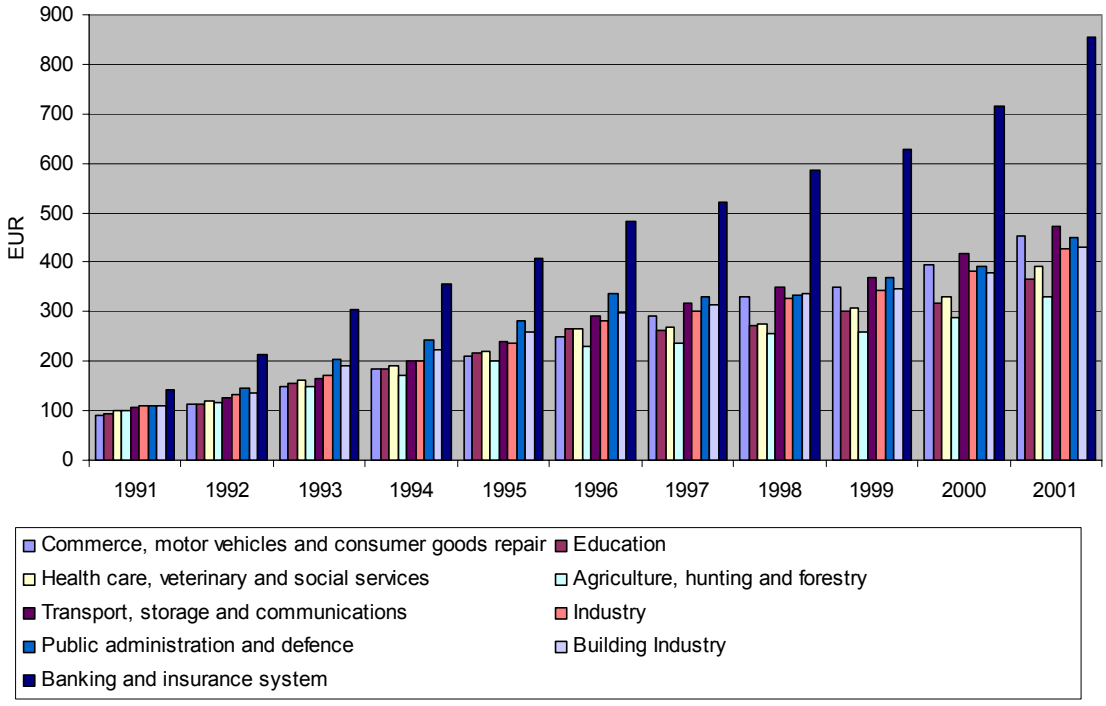


Source: Czech Statistical Office.

I.2.3 Wages in different industries

The Graph I.7 describes the development of wages in the main sectors of the economy. In 1991 the highest salaries were in the banking and insurance system sector; the wage differentiation was strengthening during the whole transition period.

Graph I.7: Average gross monthly wage 1991-2001.

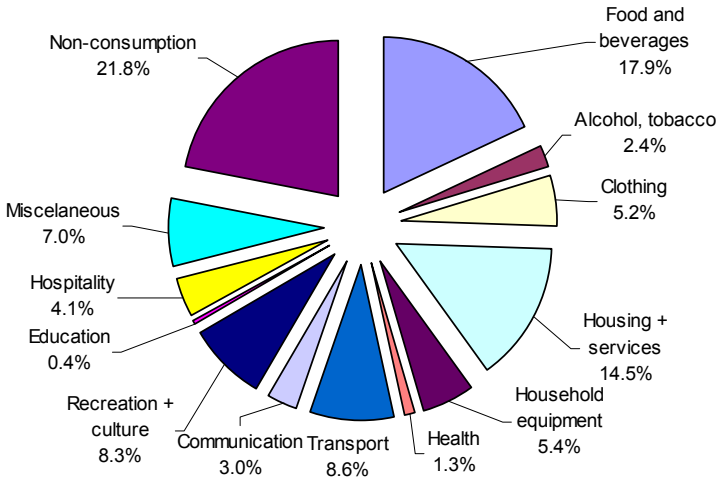


Source: Czech Statistical Office.

I.3 Consumption patterns

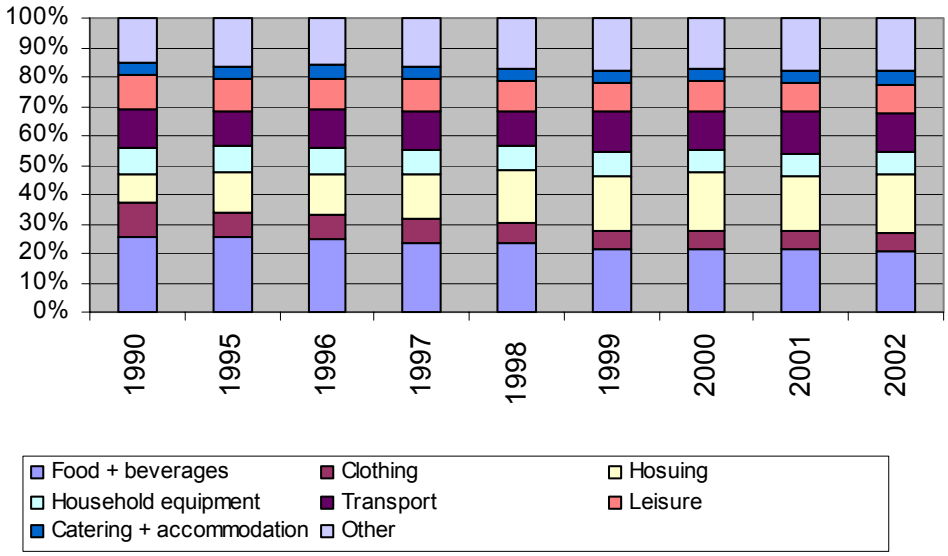
The most important consumption expenditure of a typical Czech household is **food and non-alcoholic beverages** (17.9%). The second most important is housing and related services (like heating and water charges) with 14.5%. Non-consumption expenditures (like savings…) with 21.8% are also very important.

Graph I.8: Gross money expenditures (%) in 2002.



Source: Czech Statistical Office.

The Graph I.9 describes the development of the average household consumption expenditures in the period 1990 – 2002. Despite still persisting regulation of rents, there is an apparent trend of **growing expenditures on housing**. Nevertheless, the key contribution to it has the deregulation of energy prices. Expenditures on telephone equipment and services (included in item "transport" in the Graph) are increasing. However the growth rate decreased in 2002. The expenditure **share on food and beverages is continually falling** which corresponds to the improved living standards and the subsequent higher expenditures on other items.



Graph I.9: Household's consumption expenditures in 1990-2002.

Source: Czech Statistical Office.

I.4 Cultural patterns

I.4.1 Sport

According to a survey of leisure-time activities nearly 21 % of the Czech respondents listed attending on sports matches as a preferred leisure-time activity. Among the other most favoured leisure activities there is staying at home and watching television. Czech respondents, however, also scored relatively high in terms of more active leisure pursuits, especially gardening or do-it-yourself works and sports or fitness activities.

One significant difference between the Czech Republic and other states in Central and Eastern Europe included in the survey (Hungary, Poland, Romania and Russia) was the number of the people who enjoyed visiting restaurants or pubs. This number was below the average.

I.4.2 Libraries

Average number of books borrowed in libraries per inhabitant is around 6 a year. The number of books in libraries as well as the number of libraries decreased in 2002. This decrease is probably due to floods in the CR. Visiting libraries is not a common habit of the population. Typical visitors are students searching for study materials, pensioners saving on book purchases and women on maternity leave. The CR population prefers to work on weekend cottages, gardening, taking trips or staying at home and especially watching TV.

Table I.1: Libraries, books and borrowings in the Czech Republic.

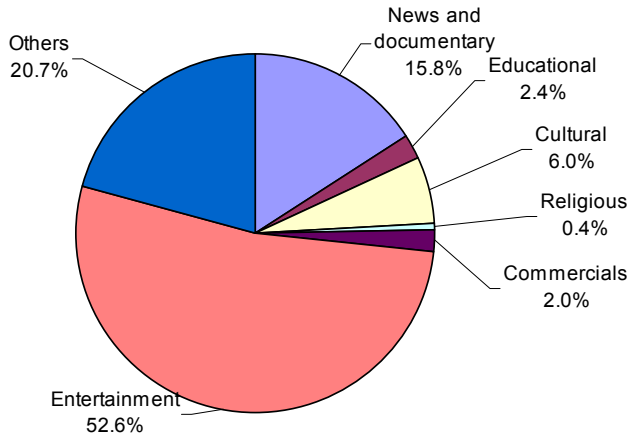
	2001	2002
Number of libraries	**6 081**	**6 043**
Number of books in libraries	**41 302 470**	**40 390 813**
Non fiction	12 703 258	12 260 679
Fiction	27 582 714	27 152 884
Others	1 016 498	977 250
Book borrowed in libraries	**64 093 766**	**62 628 307**
Non fiction	23 558 913	23 138 838
Fiction	38 726 390	37 291 277
Others	1 808 463	2 198 192

Source: Czech Statistical Office.

I.4.3 Television

The most frequent type of programmes on TV are entertaining programmes. This group includes programmes about sport, plays, popular and classical music and literature.

Graph I.10: Structure of programmes broadcast on TV in 2002.



Source: Czech Statistical Office.

The table I.2 shows the increasing trend in the number of entertaining and cultural programmes. On the other hand number of news, journalistic, documentary and educational programmes are decreasing.

	2000	2001	2002
News, journalistic and documentary	7 139	4 049	3 895
Educational	866	633	585
Cultural	646	1 131	1 488
Religious	113	83	109
Commercials	887	1 329	499
Entertainment	12 413	12 770	12 981
Others	2 104	4 345	5 110

Source: Czech Statistical Office.

*Data referring to public television broadcasting institutions. Private TV broadcasting company NOVA gave no consent for its data release.

Table I.2: Number of programmes broadcast on TV.

	man*	woman*	overall*
1997	202	224	215
1998	204	221	213
1999	181	212	197
2000	180	207	194
2001	189	215	202
2002			205

Source: Czech Statistical Office.

* in minutes per person and day

Table I.3: Average time spent by watching TV in 1997 - 2001.

The average time that people spend by watching TV was falling in the period 1997 – 2000. Since then a **growth trend** appears with an overall average time spent by watching TV, reaching almost **3.5 hours a day**.

I.4.4 Radio

Similar to the structure of programmes on TV the **entertaining** programmes prevail in programme structure on radio. **News** is very frequent on public radio as well. The situation is different for public and private radio stations:

Table I.4: Structure of programmes broadcast on public and private radio stations in %.

	1998		1999		2000		2001		2002	
	Public	Private	Public	Private	Public	Private	Public	Private	Public	Private
News	43.30	9.00	46.10	9.50	45.90	9.40	42.52	9.39	47.35	7.02
Educational	1.60	0.70	2.20	1.00	1.30	1.10	1.45	1.17	0.96	0.31
Cultural	4.20	5.40	4.00	3.50	6.00	2.50	3.79	2.48	3.32	0.96
Religious	1.00	0.00	0.90	0.10	1.00	0.30	1.10	0.27	0.84	0.19
Commercials	0.20	5.20	0.40	6.50	0.40	6.20	0.33	6.20	0.59	5.67
Entertainment	39.00	50.00	38.80	45.50	38.50	58.60	43.73	58.58	40.71	73.93
Other	10.70	29.70	7.60	33.90	6.90	21.90	7.08	21.91	6.22	11.92

Source: Czech Statistical Office.

Public radio stations are obliged to keep their statutory purpose. Since there are several public radio stations, and each specializes on different topics, most of these topics would be uninteresting for private broadcasters. Therefore public radio stations specialize on providing **news**, interviews, opinions (47.35%), **entertainment** (40.71% which also includes classical music) and cultural programmes (3.32% including also radio performances of theater plays). Commercials (0.59%) are limited by the broadcasting act.

The focus of the private radio stations are completely different. 73.93% of their broadcasting is made up of entertainment (especially popular music). Only 7.02% concentrates on the news (this includes local humor as well). Since these stations are profit orientated they offer a significantly higher percentage of the commercials (5.67%).

I.5 Role of NGO's

In 2002 there were over 50 000 NGOs registered in the Czech Republic. The vast majority (96%) of them are civic associations[13], while the rest is foundations, public benefit organizations, and church related organizations. It is estimated that one-third of the civic associations are inactive.

The non-profit sector accounts for approximately 3% of the total employment in the Czech Republic.

Approximately a third of the non-profit organizations operates at a local level, a third at the regional level and a third at the national or international level.

In 2000, the Czech government provided NGOs with approximately EUR 88 million of support, which went primarily to sport activities, social services, health protection, culture, protection of minorities' rights and environment. On average, NGOs receive 39% of their funding from the government, while a quarter of NGOs receive over half of their funding from the government.

The flow of foreign funding into the Czech non-profit sector has decreased to roughly a quarter of its 1997 level, which has caused serious problems for organizations that were established and extensively

[13] Organizations associating people with same interests / hobbies – e.g. sport, culture.

funded from foreign resources, particularly those working in the fields of human rights and environment.

Recently, NGOs have begun to discuss the need for an umbrella organization to represent the entire non-profit sector and to act as a partner in negotiations with the government and the Parliament.

There are already several regional and sector based coalitions. Umbrella organizations covers:

- Health and social care,
- Environment,
- Environmental education,
- Human rights,
- Children & youth,
- Community development,
- Foundations, information services.

I.6 Evolution of access to basic infrastructure / equipment

I.6.1 Transport infrastructure

I.6.1.1 Road network

As of January 2002 there was 55 427 km road network, 517 km are motorways, 6 091 km are 1st class roads and 2 637 km are international routes and roads of national significance.

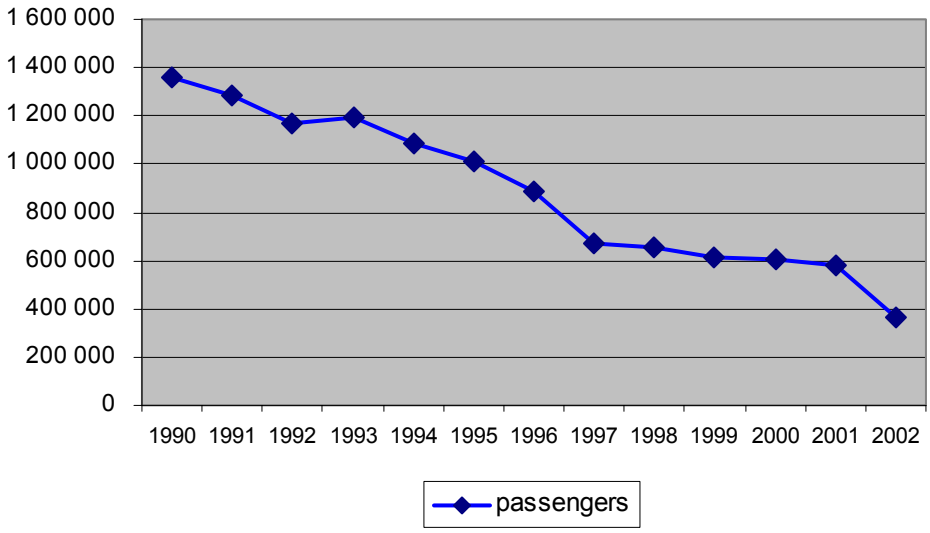
	1995	1997	1998	1999	2000	2001
Total road and motorways network	**55 500**	**55 394**	**55 394**	**55 432**	**55 408**	**55 427**
of which European road network, type E	2 655	2 655	2 655	2 655	2 644	2 637
Motorways in operation	414	486	499	499	499	517
State roads	55 086	54 908	54 895	54 933	54 909	54 910
of which I. Class roads	6 459	6 264	5 993	6 005	6 031	6 091
Local roads	66 449	72 300	72 300	72 300	72 300	72 300

Source: Czech Statistical Office.

Table I.5: Road network.

By the year 2010 the government plan to double the motorway network to 1 020 km. The new construction project, the D47 highway from Lipník nad Bečvou in North Moravia to the border with Poland (part of a new international motorway system linking the Baltic states with Western Europe) should be launched by the end of 2003. If the government approves the proposed plan, the highway would be fully operational in 2008 and would cost around CZK 80 bn – 85 bn (EUR 2.6 bn – 2.7 bn). The importance of private means of transport rises at the expense of public passenger road transport (see the Graph I.11).

Graph I.11: Passengers transported by public road transport (1990-2002).



Source: Czech Statistical Office.

I.6.1.2 Railway network

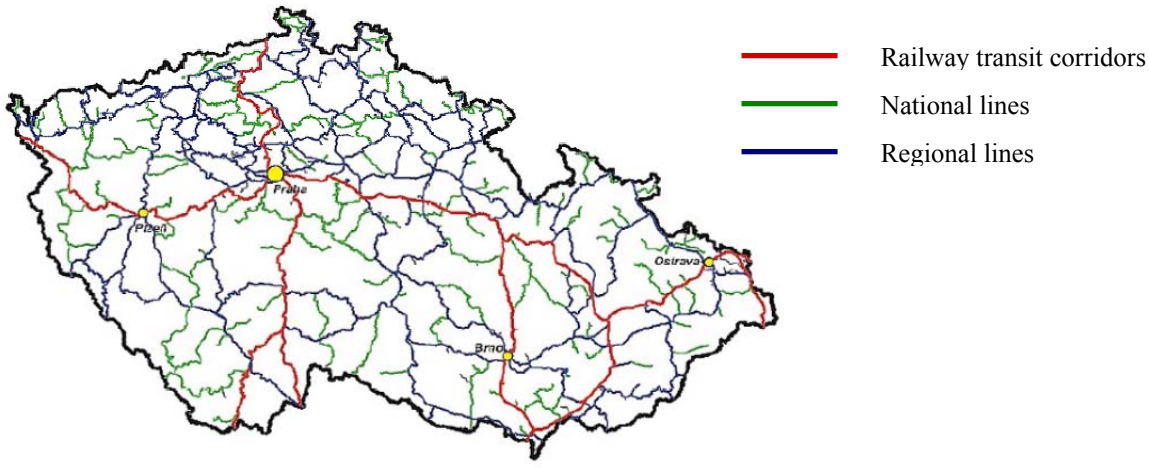
As of 2001 the Czech Railways operated 9 523 km of track and a total of 2 843 railway tracks has been electrified. The importance of passenger railway transport was continually falling in the 90s reaching local minimum in 1999. Since then there are some **positive trends** (especially in 2003 when new tariff structure was set up).

Table I.6: Length of operated railways track (in km).

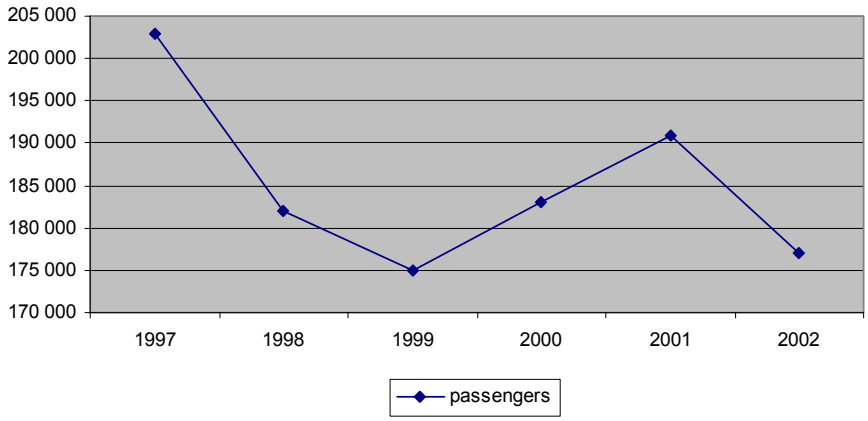
	1995	1996	1997	1998	1999	2000	2001
Railway track	9 435	9 435	9 430	9 430	9 444	9 444	9 523
of which electrified	2 743	2 859	2 859	2 859	2 894	2 843	2 843

Source: Czech Statistical Office.

Picture I.1: Railway network in the Czech Republic.



Graph I.12: Number of passengers transported by railways (1997-2002).



Source: Czech Statistical Office.

I.6.1.3 Air transport

Czech Republic has 11 public international airports and some 60 domestic airports. The main network comprises airport in Prague. Airport in Prague is served by over 50 airlines that connect Prague with over 100 destinations.

I.6.1.4 Waterway traffic

The Czech Republic has only one major inland water route, the Labe waterway from Chvaletice to the German border and further down Hamburg seaport. All other navigable stretches are local waterways totaling to 324 km. There are nine public ports with trans-shipment points on the Labe waterway.

I.6.2 Utilities

I.6.2.1 Water supply and sewage disposal

The share of inhabitants supplied by public water works is strongly dependent on the region they live. It reaches an average of 89.8% with maximum in the capital of Prague (99.6%) and minimum in Central Bohemia (74.8%). The rest of inhabitants, mostly those living in their own houses, are supplied from wells. Of course this raises the question on hygienic conformity or potential contamination of the water.

The situation is similar to the connection to the sewage disposal, but with lower shares of connected inhabitants. Overall penetration amounts to 77.4% again with maximum in Prague (99.2%) and minimum in Central Bohemia (59.3%). The rest of inhabitants has either their own purifying plants or sewage reservoirs. Due to potential environmental damages construction of purifying plants and connection of more inhabitants is supported from EU funds (like ISPA).

Table I.7: Water supply and sewage disposal penetration rates.

Region	Total number of inhabitants	Supplied with water from public waterworks		Inhabitants connected to sewage system	
		Number	% of total	Number	% of total
Czech Republic	10 200 774	9 156 120	89.8%	7 899 320	77.4%
Prague	1 158 800	1 154 000	99.6%	1 149 000	99.2%
Central Bohemia	1 125 735	842 120	74.8%	667 620	59.3%
South Bohemia	624 778	556 380	89.1%	528 830	84.6%
Plzeň region	549 369	446 300	81.2%	419 730	76.4%
Karlovy Vary region	303 761	282 520	93.0%	252 580	83.2%
Ústí nad Labem region	819 442	787 900	96.2%	671 000	81.9%
Liberec region	427 418	374 000	87.5%	290 410	67.9%
Hradec Králové region	548 698	483 970	88.2%	395 470	72.1%
Pardubice region	506 849	464 700	91.7%	339 860	67.1%
Highlands	517 959	453 010	87.5%	410 320	79.2%
South Moravia	1 122 759	1 039 150	92.6%	877 650	78.2%
Olomouc region	637 401	561 610	88.1%	468 630	73.5%
Zlín region	593 458	509 780	85.9%	443 010	74.6%
Moravia - Silesia	1 264 347	1 200 680	95.0%	985 210	77.9%

Source: Czech Statistical Office.

I.6.2.2 Electricity

According to the valid Energy Act each consumer has right to be connected to the electrification system. Therefore penetration rates are not surveyed, and due to the existence of real estate for recreational purposes, the number of installed household takeoff places (ca 4.7 million) exceeds the number of households (approximately 3.2 million).

I.6.3 Broadcasting

Public radio and TV programmes are broadcasted by the company České radiokomunikace (see section F.3.1 on privatization). The company provides the following data on **territorial and inhabitants coverage**:

The **coverage with public radio broadcasting** (only Český rozhlas stations) fluctuates in the range 66%-99% (inhabitant coverage) and 55%-99% (territorial coverage). The best coverage is achieved in AM range since AM signals broadcast better in mountainous landscapes (like that of the Czech Republic).

Table I.8: Radio broadcasting coverage.

Program	Modulation / frequency band	Coverage CR [%]	
		area	inhabitant
Český rozhlas 1 Radiožurnál	AM	61	65
Český rozhlas 1 Radiožurnál	FM	96	97
Český rozhlas 2 Praha	AM	99	99
Český rozhlas 2 Praha	FM	55	66
Český rozhlas 3 Vltava	FM	90	93
Český rozhlas 5 Regional broadcasting	AM	-	-
Český rozhlas 5 Regional broadcasting	FM	94	95
Český rozhlas 6	AM	81	89
Český rozhlas 7 Foreign broadcasting	AM	-	-
Frekvence 1	FM	88	92
Radio Impuls	FM	88	92

Source: České radiokomunikace, a.s.

The **coverage of inhabitants with TV broadcasting** is higher than in the case of radio broadcasting (of course since TV is transmitted in higher frequency ranges). The public TV stations (i.e. Česká televize) covers 96%-97% inhabitants and 92%-93% of the territory.

Table I.9: TV broadcasting coverage.

Program	Coverage CR [%]	
	area	inhabitant
Česká televize - ČT 1	93	97
Česká televize - ČT 2	92	96
TV NOVA	95	98
PRIMA TV	61	73

Source: České radiokomunikace, a.s.

I.6.4 Medical care

The inhabitants of the Czech Republic face no difficulties accessing the medical care. The average number of physicians per 1 000 inhabitants reaches 3.72 and average number of beds in medical establishments per 1 000 inhabitants amounts to 11.14. Currently the process of **health care restructuring** is underway, which also focuses on the reduction of redundant establishments (especially hospitals in small towns).

Table I.10: Basic indicators of the health care as of 1999.

Indicator as of 31/12/99	Total	Establishments		
		State	Private	Other
Number of physicians	37 989	14 182	22 672	1 134
per 1000 inhabitants	3.72	x	x	x
Number of other medical employees	107 213	58 349	46 141	2 723
Number of beds in medical establishments	113 605	75 691	34 512	3 402
per 1000 inhabitants	11.14	x	x	x

Source: Czech Statistical Office.

I.6.5 Household equipment

According to the survey performed in 2002 by the Czech Statistical Office the households were equipped (or wishing to equip themselves) as stated in the table I.11. What is especially remarkable is that even though PC penetration was only 20.1%, there were other 17.86% households wishing to purchase PC, if they had enough financial resources. The situation of internet accession is even more dramatic. It was available to 9.29% of households and 20.2% of household only wished to have it. Therefore it seems that many people are wishing to use IT technologies, but significant part of them cannot afford it.

Table I.11: Household equipment.

	Households equipped with	Wishing to equip, but cannot afford
Fridge	98.48%	0.74%
Color TV	96.28%	1.56%
Automatic washing machine	80.35%	6.46%
Freezer	75.02%	6.93%
Fixed phone line	68.97%	5.87%
Microwave oven	54.74%	13.05%
Car	52.90%	13.48%
Videorecorder	46.44%	13.56%
Mobile phone	45.92%	11.29%
PC	20.10%	17.86%
Cottage	12.80%	19.15%
Internet access	9.29%	20.20%
Dishwasher	6.81%	20.79%
Laundry dryer	2.92%	14.90%

Source: Czech Statistical Office.

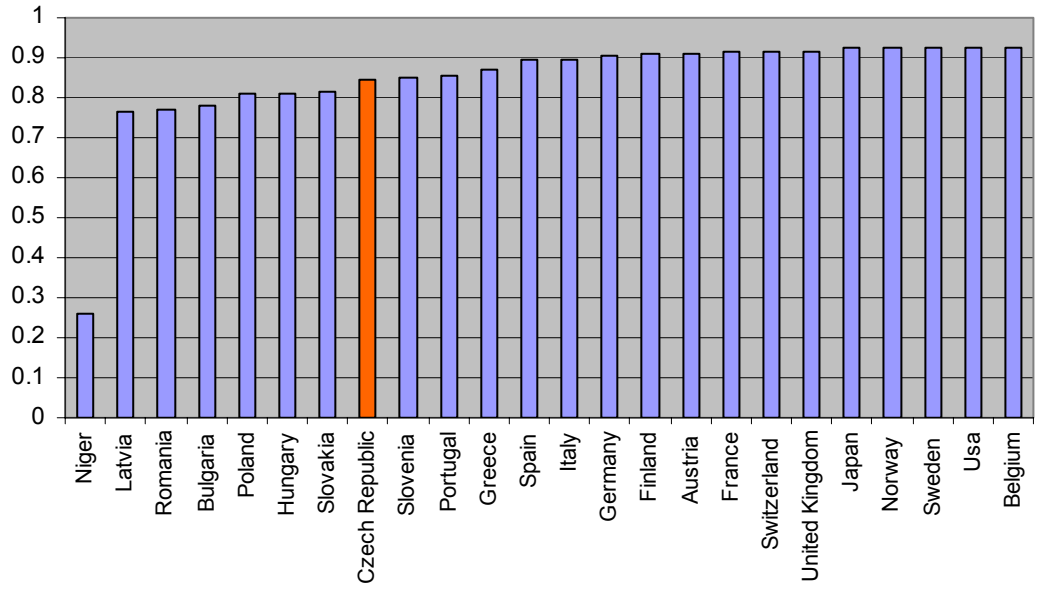
Note: The data in the table I.11 are based on the poll and might differ from figures obtained during the 2001 census or other research.

I.7 Standards of living

Transformation process in the Czech Republic brought a lot of economic and political changes – in the field of economy, the restoration of market relations and the private sphere, in the field of politics, democratization of the conditions for active participation, for the availability of information and for broadening the possibilities in education. This had to be reflected in the changes in the professional and class structure of the population. The main changes have been taking place in the formation of the middle classes and the class of the elite. Most frequent form of upward movement was starting an independent business. The current social structure can thus be characterized by breaking down the old social differences and by increasing the inequalities. This process was quite complicated. Creating a really achievable level of balanced chances came up against a number of barriers. One reason was that forty years of communism made many people unprepared to use the new opportunities.

For a measurement of the development it is possible to use HDI (Human development index), which is an index that looks at the influence of the rise, or fall in national incomes and that of the environment in which people can develop their full potential. The most basic capabilities for human development are to lead long and healthy lives, to be knowledgeable, to have access to the resources needed for a decent standard of living and to be able to participate in the life of the community. HDI is thus a composite index measuring average achievement in three basic dimensions of human development - a long and healthy life, knowledge and a decent standard of living. Graph I.13 shows the values of HDI in several European countries plus two of the most important economies in the world - U.S. and Japan - and Niger as a state with the lowest level of HDI. As it can be seen, the value of HDI in the Czech Republic is one of the highest among the Eastern European countries but still below the Western developed countries.

Graph I.13: Human Development Index in 2000.

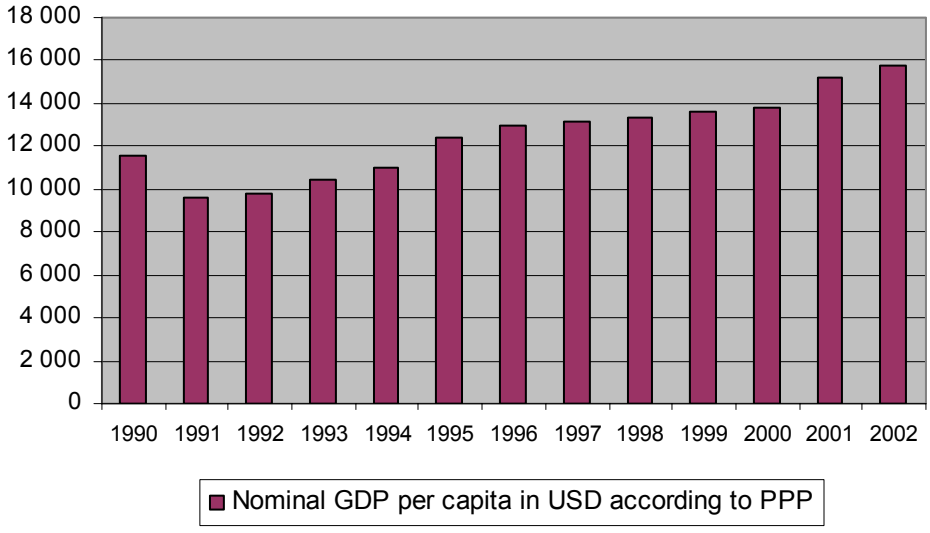


Source: United Nations Development Programme, www.undp.org

Other indicator that might shed some light on last years' development is GDP per capita converted to USD (or EUR) according to purchasing power parity. We may observe a steady growth since 1991, which is also reflected in **continuous improvement in standards of living**.

Graph I.14: Nominal GDP per capita in USD according to PPP.

Source: Czech Statistical Office, OECD PPP series.



I.8 Conclusion and SWOT analysis

The largest part of employees works in manufacturing. This portion has been in the transformation process roughly stable; services are becoming more important at the expense of the primary sector. In the ICT the most important subsector is ICT manufacturing, which still follows a growth trajectory. IT services are less important, and due to job cuts overall in telecommunication, IT services employment was falling. The structure of IT services is becoming more favourable with the growing share of data processing.

The distribution of incomes is not normal, but the first signs of middle class existence appear. The most important expenditures are for food, housing and leisure, and with the exception of housing (regulated – therefore lower fraction) follow the pattern of developed countries.

The cultural habits develop towards a healthier way, more people report to go out for sports, but alcohol consumption is growing and eating habits change only to some extent.

The access to infrastructure is well developed with full electrification of households, extensive road and railway network and sufficient TV and radio coverage. Even expected health sector reform will not worsen the access to medical care significantly.

The standard of living is improving as may be reflected by the human development index or steadily growing GDP in purchasing power parities.

I.8.1 Summary:

- Most important employer is manufacturing.
- ICT manufacturing is the greatest branch in the ICT sector.
- IT services employment falling due to telecommunication job cuts.
- Distribution of income and spending habits seem to copy patterns of the developed countries.
- Czech citizens are not reading fans.
- Access to infrastructure is well developed.
- Living conditions are improving.

I.8.2 SWOT

Strengths	Weaknesses
• Growing share of data processing in IT services employment. • Potentially favourable “infoculture”.	• Inflexible labour market. • Concentration of knowledge base in Prague.
Opportunities	**Threats**
• Public expenditures mobilized on transport infrastructures. • Ties with Germany • Housing rent deregulation.	• Growing alcohol consumption. • Housing shortage.

I.8.3 SWOT IS

Growing share of ICT (especially ICT manufacturing and data processing) as intellectually demanding employer will stimulate the demand for technical and mathematical education and thus increase the international competitiveness of the Czech labour force. Foreign investment into software engineering supports this idea.

Nevertheless the **inflexible labour market** hinders the movement of workers from labour-intensive jobs (especially in regions with high unemployment) to knowledge-based jobs, which, however, does not have a single cause.

ICT specialists are not severely affected by the **tense housing market** as their salaries make them possible to afford housing without troubles.

DIAGNOSIS REPORT

Macroeconomic position

The Czech economy has reached quite a **balanced macroeconomic position**, which was preceded by **the high fluctuations in** the transformation of **the nineties**. GDP per capita in purchasing power parity fluctuates around 58% of the EU15 average being the second highest in CC13 after Slovenia. In August 2002 **disastrous floods** devastated the Czech Republic, but **no severe economic imbalances** are apparent now. The replacement of flood-damaged property rather raised the demand for construction work, household equipment and industrial machinery.

The Czech economic growth is highly **dependent on the performance of countries of Western Europe**; their stagnation in 2001-2003 has affected many export industries. Close future development will be mostly influenced by the **economic cycle in Germany** and other surrounding countries. The GDP growth rate does not exceed the EU average significantly and therefore convergence to EU economies is still very slow.

There are very **strong regional disparities** with respect to the economic development; the capital of Prague GDP per capita (according to PPP) amounted in 2001 almost EUR 31 thousand, whereas GDP per capita in the most lagging behind region of Olomouc is below EUR 11 thousand. The access to **EU structural funds** will obviously have an influenced on this with probable exemption of Prague from most of the programmes.

Some structural and **unsolved issues** remain, e.g. **pension and tax system**, **slow judicature** and **weak law-enforcement**. High fiscal deficits of both central and local budgets do not allow quick adoption of the EUR due to non-fulfilment of the Maastricht criteria. The earliest term for EMU accession is 2009. Public debt is so far not an alarming issue, but cumulation of deficits pushes it up. Proposed **fiscal reform will negatively influence the development of information society**. VAT on information and telecommunication services will be 22% instead of 5% since 2004; education and research budgets will be also affected, but probably less than other areas. Proposed **pension reform** intends to establish compulsory pension saving and extension of the pensioning age.

Structural problems might be one of the reasons for **high unemployment**. The country average is currently **above 10%** with enormous **regional differences**, in the capital of Prague it is roughly 3%, but in regions with concentration of traditional industries (mining, heavy engineering, agriculture, textile industry…) it almost approaches 20%. The absorption of unemployed from old industries is difficult and with frictions due to their low level of education and inflexibility with respect to re-skilling or moving the residence. The **regulation of housing rent** also contributes to high threshold of wage difference for one willing to change the residence due to high differences between market and regulated rent. One of the threats the Czech Republic has to face is the lagging of the labour productivity behind the wage growth. This factor not only impedes international competitiveness, but also inflows FDI. Nevertheless one can question whether FDIs oriented just on the lower wage level in the target country are desirable for the economy if the wage growth will come definitely with the EU membership.

The accession to the EU is expected to be a foreign investment-fostering event. FDI has shaped the performance of economy in recent years. **FDI is largely aimed at manufacturing, telecommunication and transport.** Despite of it the companies in the ICT industry established through the FDI do not employ much of the staff released after bankruptcies of old industry enterprises; jobs in ICT are mostly knowledge based and this industry is not labour intensive. The most important foreign investors are from Germany (natural gas industry, automotive industry) and The Netherlands (telecommunication, retailing).

The governmental **ICT policies influence the condition of the economy** and its performance both on supply and demand side; implementation of ICT in education boosted **demand for ICT products and services** by some EUR 200 million, selection of state information system supplier and contracting it will have similar effects as well. The **supply side of the economy** benefits from decreased transaction costs and improved transparency. However, it is quite impossible to quantify it due to the complexity of the effects and transmission mechanisms.

Structural changes in the economy

The Czech economy has been **traditionally based on the prevalence of industry** over agriculture and services since the times of the Austrian-Hungarian monarchy. Its **structure partially changed in the 90s** and in 2002 the **weight of industry** with respect to the gross value added amounted to 39.6% and the weight of services was 54.4%. The importance of agriculture and fishery was negligible with 6%.

Heavy industry like steel works, machinery, weapon production has strong roots and hundreds of years lasting tradition. Even after WW II Eastern Block relied on Czechoslovakia as tank, machinery and car producer. However, the position in the field of ICT was much weaker: COMECON assigned the production of each country. The Soviet Union needed them to produce without regard on specific priorities and capabilities. Czechoslovakia was omitted as an important ICT producer. There was established a state concern TESLA (translation "light - current technology") with its factories all over the country producing almost everything from resistors to fire alarms. Import of ICT from developed countries was strictly limited and therefore all ICT was that of COMECON provenance. The areas, where the Czech ICT sector was competitive, were production of TV screens, record players, capacitors and heavy-current semiconductors.

After the decline of communism, Czech ICT companies in vast majority of the cases failed to accommodate to changed demand pattern and soon went bankrupt. Major part of the Czech economy changed substantially and switched from extensive to intensive industry and to services. However, due to path dependence and engineering tradition, machinery, metal processing and personal vehicle production still remain the most important industries. With respect to the regional structure of industrial production the **main regions are Central Bohemia, Moravia-Silesia and Prague**. Central Bohemia is specialized to car manufacturing and automotive parts production. Moravia-Silesia is strong in metallurgy and heavy engineering and in Prague and the surroundings, companies focusing on knowledge-based ICT are located.

The capital of Prague and with some exceptions also the region of Brno (second largest city) and Pilsen (close to the German border) have not only ICT assembly lines but **new product development**, research as well and thus they contribute to innovations. This factor is partially thank to the **country's highest concentration of university graduates** – in fact, these cities host the majority of the Czech universities and large proportion of graduates remains here. However, these regions are also attractive for graduates from other cities and contribute to **regional brain drain**.

FDI flows contribute to modern and ICT industry development only to a certain extent: foreign investors prefer well-educated and experienced labour force in engineering instead of changing and modernizing the structure of the economy. This especially attracts the **car making industry** and the **car component industry** investors. Already two major car producers have their production lines in the Czech Republic (**Škoda - Volkswagen** in Mladá Boleslav producing around 500 000 cars a year and **Peugeot – Toyota** in Kolín hoping to produce ca 300 000 cars a year after launching production in 2005). The decision to enter to the third producer (**Hyundai** manufacturing plant in Žatec with capacity of 200 000 cars a year) has not been made yet. Existence of two final product manufacturers (and possible entry of the third one) also attracted many **car component and car accessory producers**. Even though this investment was **not directed towards information technology industries**, its spillover effects are apparent:

- Assembly lines require just in time supply of components and therefore their suppliers need to communicate and share information with the producer. Subsequent **development of EDI** (electronic data interchange) was necessary.
- The production is in vast majority of the computer-managed operations (CAD/CAM systems) and even blue-collars need to have some ICT knowledge. **Support of education** on the side of Škoda - Volkswagen was inevitable – a **private college of engineering** with advanced education of computers was set up in Mladá Boleslav.
- Improvement of **telecommunication infrastructure** for data and voice transmission.

Even though car making is not entirely ICT based, there is no other sector having such an enormous impact on the information society development.

Although car making is the key Czech industry, FDI also flows to the ICT sector as electrical components and as apparatus manufacturing directly. This sector is quite significant in comparison to the CC13 average (the CR accounts for ca 10% of supplies of NACE 30 to the EU market) and the manufacturing of **electronics and electric apparatuses** is highly competitive. Almost the entire sector is in the hands of multinationals.

FDI is generously promoted by the state agency Czechinvest. All greenfield investors, no matter of which origin (even domestic – but they almost always do not qualify) are granted 5 - 10 years corporate income tax vacations, duty free import of technology. Moreover in structurally affected regions investors also benefit from the re-skilling of prospective employees. The only condition to qualify as a Greenfield investor is to invest a minimum of ca USD 10 million. This **FDI support is often challenged** by those entrepreneurs who do not meet the criteria for such a support. The opposition parties in the parliament condemn it as **FDI trading** and claim that if the economic decision of a foreign investor is only based on an incentive itself, only hardly can such a project outlast the duration of incentives. **Possible distortion of economic signals** on the side of foreign investors is partially confirmed by examples of Flextronics in Brno (leading OEM manufacturer) closing down its plant in 2002 and Philips in Hranice (screen plant) having stopped its production lines several times. As all these productions are not knowledge intensive, the **production plants can easily be moved eastward** if the production costs rise.

Quite logically if an investment is not so critically dependent on a marginal change in economic conditions as these examples and economic projections support location in the Czech Republic, these incentives are wasting of taxpayers' funds. Therefore **new strategy for attracting more sophisticated investors** will have to be found.

The example of a knowledge-based IT investment is expected to launch of **DHL logistics centre** in Prague by the end of 2004 with hundreds of system engineers and software developers. The investment shall total to EUR 500 million and the Czechinvest incentives obviously also apply to it. Whether or not DHL would invest if there were no incentives in place, is unknown.

IS policies

The **Czech Republic** had **lagged behind** several other CEE countries with respect to the existence of information and telecommunication policies until recently. The **first general information policy** had not been **adopted** until **1999**. The government's strategic document specified **information literacy** as a basic priority, promotion of **eGovernment**, development of **eCommerce** and **communication infrastructure**.

For implementation of these objectives the **Ministry of Informatics** was established in 2002. The ministry is free to check, but its resources, powers and responsibilities are limited since its existence **was not expected by the existing legislation.** The ministry is also **in dichotomous position** since it has to support the development of the information society, but it cannot undermine the business of the incumbent majority state-owned Český Telecomas well, especially in the light of expected

privatization. Among recent cases of its vain fight belonged ADSL Internet connection. But anyway, so far the existence of the MI has seemed to be useful, but the key issue is that **new legislation shall support its legitimacy**.

Electronic communication belongs to the fields regulated by the MI. Among its achievements in this field belong approved law on e**Signature** and law on **information systems of the state administration**. The certificates necessary for electronic communication are still issued by the sole certification authority at a cost of EUR 22. The act on eSignature made it obligatory for the state authorities to be able to communicate through secured e-mails (eRegistries), this measure remained to a large extent ignored. Even where eCommunication is established, **public awareness of its existence is limited** and citizens often prefer traditional approach.

Nevertheless the **first examples of eCommunication** may demonstrate favourable trends:

- The **Ministry of Labour and Social Affairs** allows the applications for social benefits to be submitted via eSigned email (but usefulness of this application is questionable),
- The **Ministry of Finance** established eTaxation (now for simple taxes, but later for other kinds as well). Its information system ARES provides extensive information on economic subjects,
- The **Ministry of Agriculture** started the operation of the Cadastral Register on the Internet,
- Several **courts** make it possible to solve simple cases over the Internet.

Concerning the **information systems of public administration**, so far the MI failed to unify various information systems used by different state authorities. Their incompatibility and simultaneous growing amount of information stored in these systems threatens fulfillment of this task later. Provided this task is successfully mastered one might avoid feeding different information systems of state authorities with the same data again.

The **National Telecommunication Policy** was approved in 1999 and its main objectives are to provide good quality, reliable telecommunication services comparable to those existing in developed EU countries, and to integrate the Czech Republic into the 21st century **global information society**. The NTP is based on the reforms of the European regulatory telecommunication sector reforms. They key features specified in the policy are liberalization of the telecommunication market, provision of the universal service, establishment of the regulator and exposition of the incumbent Český Telecom under competition pressure. The policy's key elements are being passed through the amendments to the **Telecommunication Act**. It is also linked to the general policy, especially in the objective of cheaper Internet access. The **telecommunication market is now fully liberalized** with **exception of local loop unbundling and bitstream access**. However, the liberalization was late and several times postponed, reportedly due to technical problems on the Český Telecom's side.

The relevant regulatory authority is the **Czech Telecommunication Office,** which overtook powers and responsibilities from the **Ministry of Transport and Telecommunication** and the **Ministry of Industry and Trade.** The office shall only follow the telecommunication policy, no state interests except of well-functioning telecommunication market, transparency and protection of its customers are to be reflected in its decisions. It is difficult to judge whether the state threatens its independence, at least no convincing evidence of it exists. Some consider this office too weak and in the hands of lobbying pressures, but generally no accusation of biased decisions has already proved.

The **IT policy in education** was approved as a document **Conception of the state information policy in education** in 2000. It specifies objectives in the field of information literacy of teachers, students, citizens, public administration and state employees, health care and library employees. The plan of the realization is divided into two stages: the first one deals with the issue of **information technology literacy at schools** and the second one with further education of the public, life-long education and **improvement of IT literacy among the general public** so as to **minimize the digital divide.**

The key programme of the IT policy in education is called **"Internet for Schools**"; it originally intended to equip 6 500 elementary and secondary schools with computers and Internet connection. In 2002 some resources dedicated to ICT were transferred for teachers' wages and after the equipment of 3 620 schools the budget was exhausted. Nevertheless one has to admit, that the remaining schools exempted from the programme had been equipped with computers from their own resources. This programme is also accompanied with the **scandalous atmosphere of corruption** since the provider was selected without any regular tendering procedure and after making the contract public extreme pricing policies appeared. The objectives in the first phase also focus on the improvement of **IT literacy of teachers** – each teacher will be required in the future to hold **ECDL Start** ("European computer driving license").

Within the objective of the second stage **life-long education** a programme of 2-hour courses for achieving basic IT literacy was launched. In several libraries **public access** Internet **points** were established.

All ICT policies **refer strongly to the eEurope initiative**, their objectives are linked to it. The policies of different state authorities related to information technologies often proclaim eEurope conformity; but sometimes it seems that such proclamations are necessary labels on "old" policies rather than eEurope initiative being a think tank for feeding and inspiring them. The **commitment of relevant state authorities does not seem to be credible enough.** This does not cast doubts on all ministerial policies, but growing VAT rate on telecommunication services from 5% to 22% is surely does not align with the eEurope 2nd objective "Cheaper Internet Access"…

Development in the information society

The **penetration rates** related to the development of information society are among the highest ones in the EU candidate countries in most cases.

The **fixed lines penetration reaches 67% of households** yet and is has been declining since the voice transmission business switched to mobile phone usage. Almost **all last miles loops belong to the incumbent operator Český Telecom**. Other operators have to use it through call-by-call carrier selection (since July 2002) or carrier pre-selection facility (since January 2003). The competition should also be promoted by the number of portability features (since January 2003). The incumbent has fixed costs nearly covered by the monthly subscription fee and the prices of calls charged by it are low, this severely affects the profit potential of alternative operators. Český Telecom had in 2002 about an **86% share** of national and international calls market (98.5% of local calls, 76.9% of long-distance and international calls, 85.5% of calls to mobiles) in terms of revenues. Its current market share is due to the already mentioned low features.

Fixed lines are used more for **data transmission instead of voice transmission**. Two types of data transmission over phone lines are possible: conventional dialup connection and ADSL. The cost of dialup connection in peak hours is higher than in most developed countries whereas in off-peak connection is generally cheaper; this motivates users to be online only during the evenings. Approximately **94% of online households are using dialup**, the rest broadband connection. Companies, which need to access the Internet also in peak hours need to look for other method of connection since dialup is for them uneconomical. Introduction of flat fixed rate for Internet access is being delayed for two years; it may possibly come in 2004, but the fee will be comparable to the broadband subscription fee.

ADSL is accessible for subscribers having last miles owned by Český Telecom only; currently over 40% switching centres allows ADSL traffic. The fee for the slowest **ADSL** for households reaches EUR 44 a month with download speed of 512 kbps – therefore it **is one of the most expensive, but also slowest** ADSL offered by major worldwide telecommunication companies. The Ministry of Informatics is trying to improve it, so far without any notable achievement. Cable TV operators offer

broadband over CATV in limited number of locations. As of September 2003 there were 13 000 ADSL subscribers and 25 000 CATV Internet subscribers.

PC penetration fluctuates around Internet penetration (some people use Internet from the employer's computer), but many PC home users do not have a modem. Existence of **digital divide**, especially between educated ones and not educated ones and between rich ones and poor ones hinders extension of eServices.

Mobile penetration rate is very high; in July 2003 it reached 88%, which is the maximum reasonable penetration, despite the fact that 10-15% of users have more SIM cards. There are three operators on the market and the competition is very fierce, especially after the launch of the third one, Český Mobil, in 2000. UMTS licenses have been allocated to the two largest operators for ca EUR 110 million each, both operators now doubt on economics of operating it. The coverage requirements are reasonable, at the beginning of 2005 only 90% of Prague shall be covered. The largest mobile operator is so far on 51% owned by Český Telecom, will become until the end of 2003 its 100% subsidiary.

IST in financial services are well developed, and banks are further promoting it with their fee policy. Direct banking (i.e. phone, GSM and Internet) was used in 2003 by almost 2 million financial service users; the most frequent method is phone banking. At the same period more than 5 million payment cards were in circulation.

Industrial corporations are frequent ICT users, the actual ICT investment depends on the specificity of each industry, its financial position and its influence on the potential **foreign ownership**. Most frequent ICT applications are electronic administration and management information systems (i.e. system integration), telecommunication, design of new products and contact with prospective customers. Almost **90% of the companies are connected to the Internet**, in the case of the largest ones this figure reaches 100%.

As already mentioned, the key industry of ICT users is the **automotive sector**. Due to its size and complexity most developed applications are there. ICT manufacturing industry is also very important, where the ICT usage is partially based on the tradition of its (foreign) owners. In chemical industry ICT increases labour productivity and secures controlling of the production chain without human control. Food manufacturing needs these systems to conform to the hygienic standards. Network industries often use ICT as a system for exchanging and balancing the flows of electricity / gas, charging and billing. Concerning use of eCommerce systems, **B2B is quite well developed**, especially in foreign controlled companies, but **B2C still lacks credibility and confidence** of general public.

Large ICT companies provide significant **discount on software to the public sector**, for example Microsoft software is given almost for free (priced at variable costs – i.e. costs of physical medium). One has to admit that this approach virtually drives smaller software manufacturers out of the market, however, it is much better to have some IT literacy with Microsoft software than nothing. This policy of huge discounts is also applied for **university students**, which obviously helps to fight the software piracy (being the lowest in Central and Eastern Europe).

IST in education is quite well developed, especially at the secondary and higher education level. The equipment of schools with ICT is comparable to their Western European counterparts, partially thank to the *controversial* programme "**Internet for Schools**". Therefore the average number of pupils per PC is falling, the problem is that the teachers are sometimes only **partly IS literate**. The courses on improvement of IT knowledge of teachers might solve it (also with ECDL requirement).

ICT specialized education at the secondary level is provided at **secondary technical schools** with focus on ICT manufacturing and development; their share amounts to approximately 12% of total students at secondary technical schools. At universities specialized branches of study exist with focus on **electrical and ICT engineering and informatics**; these fields of study are attended by approximately 12% of total university students. The Czech Republic is connected to the neighboring

countries by high-speed TEN networks, all universities are connected by the CESNET network, and Prague based universities by the PASNET network.

The **education level** of the Czech population is continually **improving**; this is especially the case of tertiary educated women. The employability of graduates from IT fields is excellent; current number of recent graduates **do not support the idea** of mismatch of labour supply and demand with **excess of economics graduates**. The issue to solve still remains the **knowledge of foreign languages**; English is mastered only by ca 30% of the population with high differences between age groups.

There are also held some subsidized **IT courses for unemployed** and sometimes they improve the employability, but their track record is not long enough for assessment. **Life-long education misses adequate tradition**.

The **cultural and consumption habits** of the Czech population support **massive use of ICT** at home, since the population spends much of its leisure time by watching TV or just staying at home. What already happened with the penetration of high mobile phones and enormous use of SMS might also appear in the case of the Internet. According to recent surveys **people are wishing to use ICT**, like PCs or Internet, but large portion of them **does not have sufficient financial resources**.

The **living expectancy** of the inhabitants in the Czech Republic is getting longer and therefore **the population is ageing**. Due to low birth and death rates the population is stagnating with prospective decline within a medium time range. The birth rate might to recover since the strong age cohorts were born in the 1970s and they are planning to have a family right now. The **government does not support marriages and the having of children** and the **housing crisis** makes having a family to be a very expensive project. Positive immigration in recent years counteracted against negative natural rate, this has changed in 2001 with the negativity of both natural rate and migration rate.

The **pensioning age** is also being extended to 63 in both sexes. Despite of it the **crisis in the pension system** is aggravating, the rate of dependency is growing and the gap in the pension account is widening. There is also a problem with employability of the older generation. This is a potential source for long run unemployment, social exclusion and digital divide of people not in the pensioning age, but also beyond the traditionally active age. The **increasing participation rate** might be one of the solution of the pension system gap, but the means for achieving it are still not in place. One source might be the untraditional methods of working (like teleworking of women on the maternity leave).

Fortunately no important reasons for emigration exist and therefore external **brain drain is negligible**. There are some offers from Germany and USA for IT experts to get working permits easily, but **no convincing evidence exists on massive escape**.

Even if some do emigrate, their future return might help to transfer the knowledge back to the Czech Republic. The Czech government is implementing measure to **promote immigration of experts** and other highly skilled people from less developed countries like Kazakhstan or Bulgaria. So far the results of the programme are invisible, and reportedly it does not make anything easier.

The **internal migration is still low** due to the traditional habits of the population (Czechs have adverse attitude towards moving their residence) and housing crisis. However, **first signs of increased mobility** appear with highly skilled people moving towards Prague or Central Bohemia. Concentration of graduates in Prague is four times higher than in some other regions; this fact might raise the question of **regional brain drain**.

The government faces the **Roma minority issue** – their birth rate is much higher than that of the majority population and therefore its proportion is gradually rising. Their educational level, living standards, cultural habits and attitude towards working are incompatible with traditional European habits; so far no policy has been approved to solve this issue. Evidently only the **increasing educational level** with some "**affirmative actions**" might to improve the situation by some degree.

SCENARIOS SECTION

The key question that this project should focus on is **not only the analysis of the current condition of the information society** in the Czech Republic. It shall also be a **prospective analysis** based on different factors and impacts influencing it. Since future conditions in the information society (but not only here) can be different, it is always useful to elaborate **more scenarios**.

However, exact quantification of the results is in some cases just a puzzle solving act and all the results are only for orientation; they might diverge from described figures significantly. The research institutes provide some numerical estimates of possible evolution of the state; however, they do not take into account different IT related impacts and factors as this project requires. Therefore **numbers can only be found in the baseline scenario**, the structure of which is a little different from the other three.

These scenarios were developed:

- **Baseline scenario** - following of current trends,
- **Public content push**,
- **Telecom radical liberalization**,
- "**ICT Innovation" push**.

Baseline scenario - following of current trends

The baseline scenario is based on the **continuation of existing trends**. The development of the information society will continue in its current way, possibly to some degree influenced by the **EU accession**. Since this evolution is expected not only by the general people, but also by various research institutes, **some quantitative estimates are available** for this scenario.

The Czech Republic is an industrial country, despite the fact that services create greater value added than industry. The CR is critically **dependent on the export of goods**, especially from the manufacturing sector. The trend in industry and especially ICT manufacturing might only be threatened by an excessive wage growth.

Public Policies

The baseline scenario is based on the continuation of **current policies** (i.e. especially the general policy approved in 1999, the initiative eEurope, IT policy in education and telecommunication policy).

- There will be some necessary changes in **IS policies** if they want to be trustworthy, currently they are rather abstract and only partially force the actors to follow them. Simple referring to **eEurope+** and claiming that the objectives are compatible with it is definitely insufficient. Hopefully the **Ministry of Informatics**, which is the youngest ministry, looking now committed, will get better public support and resources. Also we can hope that the EU accession and a better supervision on public funds limit corruption in the implementation of public funded ICT programmes.
- The development of **eGovernment** services will continue. In 2003 the **land registry** became web accessible, and until 2004 most of tax returns will be deliverable through the Internet. **Public registries** will be unified and eHealth services (programme IZIP – electronic documentation) will be an everyday practice. The number of clerks will rapidly go down and physical presence at the offices will decrease. **New identification cards** with microchips will substitute the existing ones. Information on personal data, health status, driving license will be stored on this and this will simplify all personal dealings with authorities. eGovernment over the network will be promoted even more, those submitting the tax returns electronically will benefit from comfort and ease. However, **eGovernment will be unable to completely**

substitute the traditional ways in the next years due to the existing **digital division** and some counters will still have to be retained.

- In the sphere of **eCommerce** more certification authorities will appear in the next years allowing competition in this field. Subsequent reduction of the price of eSignature will be inevitable.
- Unification of registries will require the setting up of a secure store and trustworthiness of its employees. Despite of it new risks appear in the **field of protection of personal data**. So far, most of the personal information was stored on separated databases or in the hardcopy version and criminal action was possible only through a physical breakthrough. Now this will also be possible through public networks and thefts of personal data like credit card numbers will surely appear more often.
- The **fiscal reform** reduced the funding of the Czech Academy of Sciences, Grant Agency and all universities for the next 5 years. **Public R&D** will therefore suffer and further **brain drain towards the private sector** can be expected. On the contrary **improved private R&D** will appear with all the probability and innovative actions will not be inhibited, because:
    - Transfer of scientists from sometimes inefficient public institutions to private enterprises,
    - FDI into knowledge based sectors (and closures of simple assembly plants),
    - E-administration and eGovernment frees the brain capacity of some administration employees allowing them to innovate instead of doing paperwork.
- The **Czech Telecommunication Office** will become a stronger state authority; despite being independent its budget is still determined by the government. Since the state incumbent operator Český Telecom is to be privatized in the next years, it will be able to decide in a more independent way and it will not be "obliged" to respect the state interests any more (dividends, privatization yields). **New methods of price regulation** of telecommunication companies and methods of cost attribution will be implemented for reducing the prices of telecommunication services.
- Until in the IT sector's new consolidation waves, mergers and acquisitions will appear, the rights of customers will be in question. Therefore the **strengthening of anti-monopoly regulation** and the education of its employees will be necessary.
- In the ICT field only one, but a very large **privatization transaction** can be expected, that of the Český Telecom. This sale may be somehow delayed due to the current unfavourable situation in the telecommunication business.

Results

Use of ICT in industry and public administration

ICT use in industry will record **steady growth**, especially for SME. Larger companies are already equipped with managerial information systems (MIS) like SAP or BAAN and will probably implement other modules, too. SME will not follow this path, like MIS is not suitable for smaller companies. They will rather employ some **e-procurement** systems, e-shopping and accounting systems.

Public administration will see the **reduction of its staff** because more efficient eGovernment will not need that many employees. Important job losses can be expected at tax offices, land registers, municipalities and business registers, and hopefully clerks will be employed in a more efficient way using more of their potential. The state programme for increasing the efficiency of public administration already exists, counting with a regular **annual staff reduction**, especially through pensioning. The practice of **informing citizens through SMS** to their mobile phones by the **municipalities** (already a pilot project) will be more and more common.

IST penetration rates

Generally, **fixed telephony penetration** is and will be falling, since it has been almost entirely substitutable by mobile networks. Fixed lines will be used more for the data transmission, in 2004 a flat rate for dialup might be offered. The **situation of alternative operators** is difficult and their comparative advantages are limited; the key area they intended to compete with the incumbent Český Telecom were international calls, but the incumbent's offer is very cheap.

Further **increase of mobile phone penetration is improbable** as it reaches something like 90% (10-15% subscribers use more operators). With the falling prices the number of minutes called per subscriber will grow at the expense of fixed lines. **Multimedia use of mobiles** will be very important, currently only a minority of the users have MMS capable phone, which shall change. **Data services** will also become the domain of mobile telephony; unlike the fixed operator, one of the mobile operators is already offering a **GPRS flat rate**. Faster connections, for example using EDGE, are not in the companies' business plans. **Two UMTS license**s are already allocated to the largest GSM operators with an expected network launch in 2005. However, the Ministry of Informatics is negotiating about a possible delay of the launch if the license fee is paid at once (currently an installment calendar exists).

Dialup connection is and will remain a dominant method of connection for householdsin the next few years, after 2005 it might be substituted by **broadband**. The incumbent Český Telecom is already offering a **broadband connection** (ADSL), but only 40% of fixed lines are technically suitable, the speed is the lowest in Europe and prices are at the European average (but at a lower speed). The Ministry of Informatics negotiates on the acceleration of the speed at the same price. **Higher speeds and price drops can be expected**. **Cable TV** is currently the most used broadband connection for households, but its importance will fade away with the development of ADSL.

New Internet services will appear in all sectors. The number of **eBanking** users will grow significantly due to fee structures of banks. Probably eBooking of seats in coaches and trains will be implemented soon in a similar way as the one already in operation for air traffic. Some **eLearning applications** will be launched, the target groups might be unemployed, housewives and certain extent like pensioners.

Reshaping and funding of R&D and education

Parallel to the EU accession **international cooperation is going to deepen**; at least one cannot conceive any other possibility. This will happen especially in education, cross border employment opportunities and better cooperation in R&D.

Macroeconomics

The Czech Republic is now on a **balanced GDP growth trajectory with growth rate of 2-3%.** Major structural adjustments have already accomplished in most cases and therefore no greater fluctuations from the internal reasons are to be expected. Some troubles can be expected on the side of net export – the Czech economy is highly export oriented and **stagnation in Western Europe leads to recession** of it. Budget cuts also lead to fall in governmental demand and therefore the growth will be kept by household consumption and partially investments. Development of mortgage banking allowing investment into own dwelling for many households it will be an important factor for the construction industryas well.

The Czech Republic currently meets **all the EMU criteria** in the field of the monetary policy, inflation and interest rates are low and the exchange rate towards EUR is stable. However, the fiscal policy is far from the Maastricht convergence criteria, especially due to the **high fiscal deficits**. Realistic assumption of adoption of EUR is therefore in 2009.

Even though in the 90s no **fiscal deficits** were admitted, **internal** (and well hidden) **indebtedness** grew. Now, during the social-democratic government, all old liabilities are gradually reflected in the

state budget and the deficit grows enormously; in 2003 it will reach some 9% of the GDP with even higher outlook for 2004. Some **fiscal reform is now passing** in the parliament, which shall stop growing the deficit after 2004. Its aim is to meet Maastrich convergence criteria in 2010. With respect to the Maastricht criteria the public debt does not raise concerns, the **unconsolidated debt is still around some 20% of the GDP**, but **the growth is too rapid**.

International competitiveness will be partially **eroded through inadequate wage growth** only partially counterbalanced by the labour productivity growth. Especially labour-intensive production plans suffering from Asian competition are unsustainable and might be driven from the market. On the other hand **the quality of Czech exports is continuously improving** and the same applies for the terms of trade. The EU accession will also attract investors in the fields, which are not so critically dependent on the wage rate (like IT services and not simple assembly plants, which are being moved eastwards). We are therefore optimistic on the destiny of the Czech international competitiveness.

Real exchange rate was continuously appreciating in 90s due to inflation rate difference. Now, with the inflation on the EMU average and nominal exchange rate stable the real exchange rate is stagnating. In the future the **nominal exchange rate** remains either the same, or slightly **appreciates**.
Foreign direct investment will be an important branch of development, but not in so large batches as in the last periods, when large privatization deals took place (Škoda Auto, Transgas…). We expect FDI to stagnate investment deals and lower average amount invested, especially in SMEs and IT companies.

The Czech Republic, as one of the more developed countries from CC13, will **not have access** to the same volume of funds from the EU as other countries. Some regions (Prague and possibly Central Bohemia) will not be entitled to draw finance from most of cohesion and structural funds as their GDP per capita is over the threshold, which would allow it. **Agricultural support** will also have strict limits and farmers will have to reduce the area of cultivated lands and the number of animals bred so to get money from the CAP.

Income will be distributed in a more uneven way and **social cohesion will deteriorate**. In combination with reduction of the welfare state this might contribute to some kind of social restless.
The welfare system in its current fashion is unsustainable. One cannot predict whether the necessary reforms will take place or not, but if not, then the **average pension will drop to a subsistence minimum with gradually growing employees' contributions**. Concerning other social benefits, today's generous system will be abandoned.

Human resources in the information society

The aging of the population will continue, but the worsening of the situation will not be dramatic. Young women who delayed the first child are now having babies, which increases the natality. However, better medical care will lead to longer life expectancy with a necessity of extending the pensioning age.

Emigration virtually does not exist, after opening of the EU labour market some outflow to the EU will appear. The Czech government has already implemented the **measure for the support of immigration** of highly skilled foreigners from Bulgaria and Kazakhstan, the results are to be expected.

The **most visible brain drain is the regional one since in Prague** the concentration of university graduates is four times higher than in some other regions. After the employment of EU **structural funds** this problem might be overcome. The second important brain **drain exists between the public and private sectors** – better state employees still leave the sector. Only massive allocation of funds to the public sector can turn it back, which is now improbable. The **last important brain drain is between research and business** sectors. It is still a very burning issue, and if R&D is not allocated enough resources, nothing could be done with it.

IST related skills are mastered well especially by the younger generation due to vast intergenerational digital divide. Almost everyone who is younger than 30 years is IT literate, in other age brackets the situation is ambiguous depending on willingness to learn, employment opportunities, education etc. We expect that **the skills will generally improve** with some contribution of the state IS policies, especially in education (Internet for Schools, training of unemployed, courses for state officers…).
Digital divide (DD), of course, exist in the Czech Republic too and there are roughly four types:

- **Countryside versus city** DD is not caused by inexistence of infrastructure, but rather by education level differences. EU structural funds can solve it only to some extent, we rather expect it to aggravate.
- DD between **old and young** is easier to remove, since specialized courses for older generation exist. Also this problem will virtually disappear by the time.
- DD between **rich and poor** depends on the social system. With budget cuts and planned introduction of tuition fees this source of DD will be even more painful.
- DD between **educated and not educated** is not easy to solve, no one is prevented from education. Those not willing to attend school will also ignore some IT technologies (not all IT – counterexample: mobile phones).

Probability and bottlenecks

This scenario is the **most probable**; it is de facto status quo with the extension of current trends into the future. Even the EU accession will probably not exert pressure on the state clerks sufficient enough to change their habits and implement polices in a more efficient way; eGovernment is of course not their interest since it leads to job cuts in the state administration!
What might be expected from sourcing the **EU funds** is a puzzle; EU pushes on the education of public servants and their sufficient remuneration, but no specific programme forcing establishment of the eGovernment is in place.

Public content push

The scenario **Public policy push** is based on expectations that the most important focus on IT services will be on the side of **public authorities**. For this to occur a more innovative behaviour than today it shall be visible from them.

This programme would have to be well coordinated, and the key role would be assumed by the **Ministry of Informatics**. Other IT policies, especially in education, telecommunication, public information systems and in social security system would have to be subordinated.

Public Policies

In the case of **public policy push** the state authorities would need to concentrate their efforts on the **eGovernment** applications. This will not only follow the already approved general and special IT policies, but also other measures would have to be implemented in these sectors:

- In the case of the **medical care** not only experimental programmes of **individual health accounts** would exist; it would become the general practice at all health insurance companies. Each one could pre-select the degree, to which his health is insured, whether or not certain medical care would be covered from the insurance, or by the patient himself. The support of eHealth services with a possibility of **consulting the physician through the Internet** makes significant savings through the reduction of routine medical work.
- **Social security** is expecting some reforming actions even today. However, many think that, this is not a reform, but just modification of the existing pay-as-you-go system. An IT related reform would obviously be only feasible if individual **compulsory saving** is implemented; i.e. each earner would have to locate some portion of his income into **savings funds**. The selection of the **fund administrator**, the way of treating the financial resources (conservative/more dynamic) might be realized online not to speak about the informational purpose of the Internet.

- **eTaxation** is already expected by the current legislation. In its final stage it is expected that all tax returns would be allowed to submit via Internet. One can imagine **interconnection of the taxation system with online advisory services** so that the **tax advisory** (and also individual's financial management, but it does not belong to eTaxation) could be realized on-line.
- **Education** shall also acquire various forms of **remote education** over IT services; it might help in the case of pupils in **remote areas**, which could in this way avoid the necessity of attending school in person (eLearning).
- **Local administration** might be pursuing opinion polls on projects to realize in each particular municipality over IT means. This shall also increase the **transparency of public funding** and subsequently lead to a greater degree of public confidence in local authorities.

Results

Impact on the country's economy

The **impact on the country's economy** is difficult to predict, since there are even no estimation of measures in the sphere of eServices already in place. All figures and numbers would just mean a puzzle solving. Of course **positive effect on the real economy** is to be expected, but to what extent this really occurs does not only depend on the commitment on the side of the governmental authorities but also on willingness of private subjects to accept new methods of administration.

Governmental bodies and levels of cooperation at regional level

With the introduction of **eGovernment** its structure might be **simplified**, the situation can be compared to the development of **direct banking**. Where thousands of clerks behind counters were necessary, there IT is in place now. Therefore it would involve **significant job cuts**, especially in the lower levels of administration.

The transparence of decision-making would obviously be increased if any new information would have to be posted on bulletin boards, the **temptation for corruptive behavior would become more risky**. Dealing with the state authorities would obviously become less time consuming.

Reshaping and funding of R&D and education

The R&D and education funding should become more transparent. This programme does not directly involve increased public spending on R&D or education. **Education with abundant IT use is not more expensive**; it might become even more efficient with less human resources needed! Despite of it the state would have to devote more resources to life-long education to minimize the social exclusion.

Role of private companies, unions, NGOs

With the reduction of the state administration the **private companies** will become more important actors of the economy than ever before. The structure of the government with the development of direct democracy (through cheap voting over IT) would become less hierarchical. With **less stress on central administration and hierarchy** unions and non-governmental bodies will become more important; what was already proclaimed in the past, establishment of the "**citizen's society**" may come true.

Evolution of financial tools and of funding capacity

With stress on the side of the central administration on eServices **spillover effects would also spread to the private sector**; financial sector will not be the exception. Further development of financial eServices or advisory can be expected. With the governmental support of SME they may become more innovative than today, as the Ministry of Industry and Trade already proclaims.

Major political issues

The major political issue becomes the **distribution of public finance**; on each allocation of finance from the state budget simple electronic voting could be declared. Other important issue will also be the **minimization of digital divide**, especially among young ones – old ones and rich ones – poor ones. On contrary digital divide between urban and rural populations will be less pronounced. The same will happen to the corruption.

Major economic sectors

Obviously positive impact might be expected in the case of **ICT manufacturing** (i.e. manufacturing of electronics and apparatuses) and **IT services** since all this system would have to be developed, equipped with technology and then operated by the qualified staff.

The impact on other industries is not clear – most industries are ICT users, but do not critically depend on the state administration and it electronization. Probably the stable situation will appear in the food and beverage industry and in textiles and apparel industry as well. The decline shall appear in petrol products since more efficient electronic administration reduces the necessity of visiting state offices in person. The reduction in transport services is also obvious.

Major groups of the population

The **digital divide between urban and rural populations shall decrease**; implementation of electronic means of communication makes an actual location or a seat of a citizen or a company less important than before.

This will not apply to digital divide between old and young generation; older ones still have less IT knowledge and if effective education in IT capabilities is not secured for them, it might be a critical cause for the failure of the entire eGovernment project. So far their IT illiteracy was not an important issue since all dealing with the state administration could have be performed also using traditional methods; if they will be restricted, then **older ones will be virtually cut off from the participation in the state administration**!

Major IS indicators

The success of eGovernment critically depends on the equipment of the citizens and state authorities with **computers and networking**. Internet connection in a household becomes a must. The alternative might be, due to high penetration of mobile phones, some method of **mGovernment** (state administration over mobile phones). However, in such a case there is no pilot programme so far.

Lisbon targets

The evolution of **GDP per capita** shall be only partially influenced by implementation of various methods of eGovernment. Of course, reduction of frictions shall lead to saving both on the side of the state authorities and citizens, reduction in the number of state administration clerks and their transfer to business sector may also have some influence, but no enormous effects can be expected.

Due to expected reduction of public administration staff the **labour productivity per person** shall grow by some degree; the question is whether the private sector will be able to absorb that many new employees.

The overall participation rate might to grow; the potential sources might be found especially for **women at maternity leave, inhabitants of rural area and also disabled ones**. Employability of pre-pensioned workers (55 to 64) would be definitively improved, since the public stress on using the eServices will improve their eLiteracy.

The total amount of **business investment** shall not change significantly; it rather changes its structure, i.e. from transportation to telecommunication, from office equipment to communication devices.

Increased **spending on human resources** will become inevitable on the side of the state and private companies; surviving without eLiteracy becomes inconceivable.

Spending in the R&D sector might be promoted by the state administration with increased participation in the private sector's projects or support of R&D at SMEs. With growing share of SME the **ratio of newly created and destroyed companies** (business demography) each year **will grow**, probably very significantly.

Long-term unemployment rate may be one of the territories where this policy should have some effects. With **obligatory IT literacy** the employment for the groups, where long-term unemployment especially appears (women with children, IT illiterate, rural inhabitants) becomes much easier. The same applies to regional cohesion with minimization of impact where the individual lives.

Probability and bottlenecks

This scenario is **not very feasible**; one cannot ignore the success rate of realization of current IT policies. The coordination body would have to be the Ministry of Informatics. Both the national monograph and diagnosis describe the Ministry of Informatics as a body of central government with **insufficient powers**. Therefore we do **not** expect that this scenario might happen **under the current legislation**.

Other threats are on the side of private actors and their willingness to accept new methods of administration. It is limited not only by their cultural habits with preference to negotiate with an authority in person, but also by **necessary technical infrastructure**. Even today when the range of eServices is limited many households would like to participate in IS, but due to financial constraints they cannot. Expected increase in VAT on telecommunication from 5% to 22% will make this situation even more difficult.

The bottlenecks can also be seen on the side of IT literacy among the public – it is **impossible to cut IT illiterate from the participation in administration** in a democratic state. Existing digital divide might be reduced, but never completely removed. The situation of IT literate oligarchy would not of course be the welcomed outcome.

Telecom radical liberalization

Public Policies

The key policies in the scenario "**telecom radical liberalization**" are completely different from those described in the policy stressing the necessity of public push for progress in the information society. This scenario clearly stresses **laissez-faire approach** with **minimization of the state intervention**. The key policies contained within this scenario are:

- Introduction of a **free and liberal market with all IST related goods and services**. This shall occur on several fronts:
    - **Liberalization of the telecommunication market**. This market is already to a large scope liberal. However, since the incumbent Český Telecom owns the infrastructure, its effective use by its competitors is hindered. **Local loop unbundling** must be one of its key features.
    - Introduction of **competition in the sphere of certification authorities** in issue of the eSignature. Currently only one authorized issuer of certificates exists, which leads to a monopoly pricing and limited offers. Competition shall subsequently **force the prices down** (but since the state influence will be limited, it will not be subsidized and therefore the price will not be zero).

- Introduction of **competition at the market with Internet domains**. So far only one registration authority existed (NIC), since September 2003 some competition exists, but it is too weak.

- **Privatization of the majority state-owned incumbent telecommunication operator Český Telecom**. Since the regulation of IST services may still contain other interests than the protection of customers, but also privatization proceeds or dividends, this transaction is very desirable. Even though such accusations have never proved, it is better to avoid them through successful privatization. Currently it is planned for 2004-2005 with no prospect of acceleration.
- **Protection of customers**. After withdrawal of the state from telecommunication companies a better position of consumers is not secured. Even after privatization the position of Český Telecom both in fixed and mobile business (through 100% in Eurotel) will be dominant. Therefore **effective regulatory authorities** will be necessary:
  - Despite the fact that the **Czech Telecommunication Office** belongs to better performing state authorities, its position shall be even firmer; private companies even now reportedly influence its decision through lobbying, privatization of Český Telecom might decrease the pressure on the CTO from the state, but increase it from the private entities. The most painful issue, for which its powers will have to be used, is the area of **interconnection fees**; it will have to find and then enforce a new methodology for interconnection fees to mobile networks.
  - **Antimonopoly regulation** works in the Czech Republic quite well, but after the privatization its competencies will be under even more severe tests. State owned telecommunication companies are performing mergers and acquisitions for various reasons (improvement of privatization proceeds through integration of Český Telecom and Eurotel…) but mostly without adverse effect on consumer. The actions of private actors will have to be observed more carefully, among other reasons also because they are usually more sophisticated.

With respect to other IS policies, **the state participation will not grow** and will be restricted to areas, where the state is already active. **All the issues mentioned above are partially contained in the existing state IS policies.** The state intends to privatize Český Telecom in 2004-2005, and we can **doubt that any quicker action is possible**. The market is liberalized with some exceptions… Therefore we think that the first issue to address is the finalization of the **telecommunication liberalization**. Better access to the Český Telecom's network may only be achieved through well-defined local loop unbundling. The Ministry of Informatics has already provided such a proposal to the Parliament.

Therefore we think that this scenario is nothing new with respect to issues addressed, but only to velocity. **In some areas it simply cannot be accelerated**, and there the results will correspond to the baseline scenario. Where any divergence appears the results are described.

Results

The country's economy, and its structure

Due to the liberalization of all markets affecting the information society the **boom in ICT manufacturing and IT services** may be expected. This will especially involve the field of fixed telecommunication and Internet services. Due to falling telecommunication fees the **demand for services provided online will rapidly grow** and traditional methods of business will be abandoned.

Governmental bodies and levels of cooperation at regional level

Even though this policy uses **less public resources directly**, its costs for the public sector are not negligible. The most expensive would be the improvement on the side of the **regulatory authorities** so as to keep the market as competitive as possible with maximal **protection of a customer**. Among

its other costs also belong the possible **fragmentation of the state administration**, if the IS policy will push on excessive decentralization.

Reshaping and funding of R&D and education

The funding of R&D will be even more dependent on **private subjects**. As described in the monograph, the state participation kept growing until 2001, since then it is falling. This trend will continue and **funds dedicated to academic research will be limited**.

If the IT policy in education fails to be implemented well, the threat of the **deterioration of the level of education of IT related subjects** is evident, especially at elementary education with greater demand for parents' resources.

Role of private companies, unions, NGOs

On contrary to decreasing the role of the government in the information society the importance of the private sphere, especially **enterprises, will grow**. Due to decreasing of telecommunication fees also **numerous virtual NGOs will appear**.

This evolution will obviously support the **development of the economy**, but the development of the society need not be only positive. The decentralization of the government and polices may contribute to **growing digital divide** among poor / rich and especially rural / urban inhabitants (telecommunication companies do not like to penetrate villages).

Major political issues

The key political issues will concern the **liberalization and then privatization** of the incumbent operator. Afterwards the **protection of economic competition and the consumer will have its indispensable position**. In consequence with probable decentralization of the state administration the **local authorities will obtain more powers**.

Major economic sectors

The **economic structure** of the Czech Republic including its geography **will not change significantly** if this policy option is selected. The **growth of ICT manufacturing** can be expected since with growing penetration rates more telecommunication equipment will be necessary. The foremost position of the **automotive sector** will not change, stability of food processing, apparel manufacturing and chemical will also remain irrespective of implementation of this policy.

Major groups of the population

The **telecommunication market** in the Czech Republic will be **in the hands of private companies and completely liberalized**. If the regulatory authorities do not behave adequately (for example if the **universal service obligation** is not redefined) then these digital divides will appear:

- **Urban / rural digital divide**. Telecommunication companies do not invest in rural areas if they are not obliged to. Exclusion of rural inhabitants from the information society is threatening if future USO does not include **broadband connection** as well.
- If CTO does not implement adequate **regulation of monthly subscription fee**, it will surely grow despite the competition (on contrary the minutes fee will fall). Due to deteriorated affordability of the fixed lines **digital divide between rich / poor ones** appears.
- Of course **educated / not educated digital divide** if public pressure on IT related education discontinues.

Major IS indicators

In spite of liberalization of telecommunication the **penetration rates for fixed telephony might not change or might even drop**, since current subscription fee still does not cover the fixed costs. However **broadband connection will become generally affordable** for all those having a fixed line.

Mobile penetration will not change until the market is virtually saturated. PC and Internet penetration will grow thank to the fall of their prices.

Lisbon targets

GDP per capita will probably grow due to better efficiency and lower price of communication. Labour productivity, especially for some office jobs, might grow since permanent Internet connection becomes affordable instead of dialup.

The participation rate might slightly grow since the **untraditional methods of work** (teleworking) will become available at a lower cost. This will **not concern those in pre-pensioning age** (55 to 64 years old) until there will be no pressure from the state on their eLiteracy.

The **rate of investment in industry** remains generally the same; in the case of alternative telecommunication operators it might partially grow with approximately the same fall in the case of the incumbent operator.

Spending on human resources, especially to education will probably **fall**; in best case it will remain the same. The participation of the state will be reduced with its decreased pressure on IT literacy.

Private R&D expenditures will probably stay the same. There can be expected some reduction in R&D at the incumbent telecommunication company due to limited resources. However R&D on the side of **alternative operators** and also SMEs may grow.

Until the SME segment is expected to become more important, the **ratio of newly created and destroyed companies each year shall grow**.

In the case of **long-term unemployment** only certain changes may be expected; due to better availability of online services and telecommunication allowing untraditional methods of employment **some might find employment**. But due to **aggravated digital divide** this indicator will **rather grow**. This will also contribute to **worse regional cohesion** with enormous differences in regional unemployment rates.

Probability and bottlenecks

This scenario is just a **modification of the baseline scenario** with **acceleration** of liberalization processes and privatization. One has to admit that some steps still need to be taken in the field of **liberalization of local loops,** but the Ministry of Informatics has already prepared the proposal of **amendment to the Telecommunication Act**. The **privatization** of Český Telecom is in the preparation phase with expected **timing for 2004-2005**.

It is difficult to imagine, how and to what extent this process could be accelerated, and if yes, probably only in the field of liberalization. Among its **drawbacks and bottlenecks** belong:

- Possible **increase in regional digital divide** (telecommunication companies will not be interested in implementing new services in rural areas) unless re-defined universal service obligation is in force. This means that USO would have to include broadband connection as well.
- **Reduction in the endeavor to implement ICT at schools** with greater responsibility on parents. The availability of ICT would be better thank to falling prices, but digital divide of poor families rather aggravates.
- **No public push on centralization of the state information systems** may cause fragmentation and less effective development in comparison to the **public push**.
- **Falling prices of telecommunication services** may **threat future investment** into the network infrastructure with many adverse effects (like in the case of electrification grid in the US).

- **If the regulatory authorities do not function well** it can lead to market collusions, less protected customers than ever before and also other adverse consequences may appear.

"ICT Innovation" push

The scenario ICT innovation push is based on **effective cooperation of the public and private sector**. Upon the government it is to elaborate a **special plan for development of ICT related innovations, R&D promotion and transfer of R&D knowledge to the manufacturing sector**. This will also involve modification of patent regulation and support measures for SMEs. All these public scenarios shall not be based upon the discretion of the government, but on **discussion forums with the representatives of the corporate sector**.

The basic aim of this scenario is **development and modernization** of all economic activities with full support of the government, especially achievements in the ICT manufacturing industry and IT services. The ultimate goals these policies could achieve are such product innovations that could be **competitive also beyond the area of the Czech Republic**

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Public Policies

Unlike the scenario counting on the liberalization of the corporate sector this scenario expects **elaboration of numerous and complicated state policies**:

- **Industrial policy** shall specialize on promotion of innovations. These measures need to be accompanies with tax allowances for innovating companies or even state subsidies for ICT exporting industries. Existing **investment incentives** should be intensified and better focused.
- **Governmental support of R&D** shall not be limited to academic research only (academy of sciences, universities), but also to the corporate sphere and promote private R&D through grants, promotion of venture capital establishments and state procurement of R&D intensive goods. The **transfer of R&D to industry** shall be supported by easier patent registration policy or more favourable conditions for new product certification.
- The **measures for SME support** shall especially focus on easier financing opportunities through bank guarantees, interest subsidies or direct state participation.
- The state should **purchase ICT goods and IT services** predominantly from domestic sources. If possible, impose import duties on ICT goods from selected countries.

Basically, all these policies should be **strictly selective** and stressing **promotion of knowledge based industries**. Among these policies will also belong certain degree of **protectionism** of industries not ready for foreign competition yet.

Results

The country's economy, and its structure

The country shall record after establishment of these policies a **dynamic growth**, especially in certain industries. The governmental promotion of knowledge intensive industries might lead to a **fall in representation of the primary sector** and extensive industry.

Governmental bodies and levels of cooperation at regional level

Apparently realization of these policies would require establishment of **additional state administration bodies**. They should be capable of dealing with entrepreneurs, understanding their and also the state interests, but on the other hand **independent enough** to be able to judge feasibility of any project in question. Since the corporations are being set up at the local level, this would probably also involve **local representations** of these promotion offices.

Reshaping and funding of R&D and education

The representation of public R&D was growing until 2001 and since then it grew slower than the R&D expenditures of private subjects. The governmental R&D was focused rather than on promotion

of private activities on academic research and social sciences. This would obviously have to be changed. The **governmental R&D expenditures** should not only be significantly raised, but also **redirected to support the endeavour of private entities**.

Concerning the education, the government would have to set the priorities together with the corporate sphere so as to **best match the labour supply and labour demand**. The state would much more contribute to re-skilling and establish **new branches of life-long education**.

Role of private companies, unions, NGOs

The role of **private companies** will be to certain a degree to be limited until the key decisions would have to be made in **cooperation with the government**. The same applies for unions and NGOs.

Evolution of financial tools and of funding capacity

The state would have to develop **new tools of R&D financing**. Apart from those already in place these should be established:

- Support of **public procurement** of domestic R&D intensive goods,
- **Guarantee for SMEs' loans** and subsidizing of interest payments,
- **Direct subsidies** to perspective industries.

In the light of current budget cuts the state would have to **reassess its priorities**; ICT might become one of them.

Major political issues

Among major political issues becomes the decision making on **redistribution of public funds**, **transparency issues**, methods of **cooperation** between the government and entrepreneurs and support to well-founded decision making on the side of the state authorities.

Major economic sectors

The most prominent economic sectors will become the most progressive and IT intensive ones: **ICT manufacturing, IT services, biotechnologies, chemical specialties** (pharmaceuticals) and **precise engineering**. The transfer of sources from extensive industries towards those R&D and ICT intensive will support the modernization of the entire economy. Thank to more selective behavior of the FDI promotion agency Czechinvest public sources will be saved on labour-intensive industries and will be transferred for intensive and more selective promotion of **knowledge-based industries**.

On the other hand, primary sector (agriculture, forestry) and extensive industries (metal processing, petrol processing, heavy chemicals) will record certain decline. Due to more energy economical production also electricity production and distribution would decline. The stable industries will remain food and beverages and apparel manufacturing.

Major groups of the population

The key issue for ability to participate in such a knowledge-based society is the **level of education** of the Czech society. The state authorities would have to concentrate effort to improve it, and especially **remove all types of digital divide**.

Major IS indicators

The state will also concentrate on **improvement of IT literacy** among the general public. Therefore resources will also be devoted to **raise penetration rates**, which are still not in line with foremost ICT countries. Therefore **broadband installation** would be promoted (which partially questions acceleration of Český Telecom's privatization) and **penetration with computers** could be subsidized (already a proposal on PC purchasing cost being a tax base deductible expenditure exists!).

With this support the fixed line penetration, broadband penetration and PC penetration will grow. The mobile phones penetration will remain the same.

Lisbon targets

During a certain period, when the productive sources will be transferred from old industries to ICT and R&D based industries, the **GDP per capita might be stagnating**. However, since then **major increase in both GDP per capita and labour productivity** can be expected.

The **participation rate of inhabitants may slightly grow** due to massive launch of IT related courses; thus homeworking through the Internet could become in certain fields a general practice. This can also help to certain extent improve the **employability of pre-pensioned** (55 to 64 years old) people, which are currently mostly IT illiterate. The same effect may be expected in the case of **long-term unemployment** – it is in some cases caused by IT illiteracy. Public expenditures on education will be especially focused on education in **IT fields**, knowledge of **foreign languages** and other knowledge intensive areas with increasing budget.

The governmental measures for investment promotion will obviously concern also **business investment** – it will be supported from various grants or subsidies. The same will apply for **governmental R&D participation**, but total amount of R&D expenditures shall grow as well.

Thank to the governmental support the **regional cohesion will significantly improve**; in regions with higher unemployment rates the government agencies will promote new investments.

The ratio of newly created and destroyed companies each year (**business demography**) will probably stay constant since the government will support only companies with long-term perspective.

Probability and bottlenecks

This scenario is the **least probable from all here mentioned**. It is quite improbable that the Czech state authorities would concentrate on one field and then without doubts follow the outlined strategy.

It would also become the **target of strong opposition** from the circles, to which the state support was not directed. Possible corruption, **misallocation of sources**, selection of uncompetitive industries as perspective ones… all these outcomes have already been seen in other countries, and **failures prevailed over successes**.

Among other negative factors would also belong too focused specialization with potential threats if worldwide crisis appears; in other words, the **Czech Republic needs a diversified economy** with representation of many industries, and its path dependence cannot be ignored. Last but not least all such governmental promotions would undoubtedly be **challenged by the EU** as public support, by WTO as compromising the worldwide trade…

This scenario based on effective cooperation of private and public sector is clearly unrealistic.

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ANNEX

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A. NATIONAL AND REGIONAL ECONOMY

Table A11: Real GDP growth

	Unit	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
real GDP growth	%	-11.61%	-0.52%	0.06%	2.22%	5.94%	4.29%	-0.77%	-1.04%	0.47%	3.25%	3.09%	1.96%

Source: Czech statistical office

Table A12: Nominal GDP level

	unit	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
nominal GDP level	EUR (million)	20 665	23 003	29 916	34 725	40 257	46 081	46 924	50 854	51 578	55 738	63 822	73 855

Source: Czech statistical office.

Table A13: PPP GDP (according to OECD)

	unit	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
PPP GDP (according to OECD)	EUR (million)	79 684	77 841	92 188	96 195	98 845	106 975	120 136	122 345	131 779	153 686	173 471	170 329

Sources: Czech statistical office, OECD.

Table A21: Supply side of growth: changes in major sectors of production

	unit	1995	1996	1997	1998	1999	2000	2001	2002
Agriculture + fishery	%	-4.87%	6.80%	-2.51%	10.29%	15.35%	-1.43%	-0.85%	4.39%
Industry + construction	%	9.91%	9.09%	-1.44%	-10.25%	-2.04%	7.28%	-0.80%	-1.22%
services, transport etc.	%	1.74%	-1.31%	0.14%	5.77%	0.77%	1.02%	6.78%	4.42%

Sources: Ministry of Industry and Trade, Czech statistical office.

Table A22: Demand side of growth: contribution: changes in C+I+G+NX

	unit	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
private consumption (C)	% y-o-y	-21.44%	8.82%	1.24%	5.57%	5.80%	7.94%	2.40%	-1.79%	1.92%	2.33%	3.77%	3.95%
private investment (I)	% y-o-y	-28.91%	8.28%	2.89%	18.49%	22.39%	8.62%	-3.20%	-2.60%	-2.90%	9.37%	7.16%	1.30%
governmental expenditures (G)	% y-o-y	-12.27%	-6.74%	3.65%	3.11%	-3.80%	3.69%	-4.13%	-3.80%	1.67%	-0.43%	4.91%	5.74%
net export (NX)	% y-o-y	N/A	-46.07%	-36.83%	-168.23%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Sources: Ministry of Industry and Trade, Czech statistical office.

Table A31: Rate of unemployment

	unit	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
rate of unemployment	%		4.13%	2.57%	3.52%	3.19%	2.93%	3.52%	5.23%	7.48%	9.37%	8.78%	8.90%	9.81%

Sources: Ministry of Social Affairs, Czech statistical office.

Table A32: Regional rate of unemployment

	unit	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Prague													3.39%	
Liberec region		0.53%				2.36%	2.45%	3.00%	5.16%	6.98%	7.77%	6.44%		
Central Bohemia													6.76%	
South Bohemia												5.82%	6.03%	
Plzeň region		0.65%				2.56%	2.19%	2.63%	4.23%	6.09%	7.43%	6.47%		
Olomouc region													11.78%	
Karlovy Vary region													7.76%	9.50%
Hradec Králové region												5.89%		
Pardubice region													7.93%	
Vysočina		0.77%					3.39%	3.99%	5.66%	7.51%	9.16%	7.48%	7.02%	
Moravian-Silesian region													14.77%	15.49%
Ústí nad Labem region													15.80%	
South Moravia		0.71%					2.92%	3.40%	5.37%	7.92%	9.85%	9.35%	9.73%	
Zlín region												8.14%	8.51%	

Sources: Regional statistical offices, Czech statistical office, Ministry of social affairs.

Table A33: Share of different age groups among the registered unemployed

	unit	1998	1999	2000	2001
up to 19 years	%	8.43%	4.84%	3.54%	7.84%
20 - 29 years	%	36.91%	37.69%	36.20%	31.80%
30 - 39 years	%	19.93%	20.89%	21.73%	21.58%
40 - 49 years	%	21.14%	21.86%	22.32%	21.67%
50 - 59 years	%	13.39%	14.54%	15.92%	16.76%
60 years and more	%	0.21%	0.18%	0.28%	0.35%

Sources: Ministry of Social Affairs, Czech statistical office.

Table A34: Participation rate

	unit	1993	1994	1995	1996	1997	1998	1999	2000	2001
participation rate	%	61.42%	61.62%	61.51%	61.24%	61.09%	61.03%	60.99%	60.40%	60.02%

Sources: Ministry of Social Affairs, Czech statistical office.

Table A35: Changes in labor productivity in industry

	unit	1993	1994	1995	1996	1997	1998	1999	2000	2001
changes in labor productivity in industry	%	1.00%	4.30%	3.10%	0.00%	0.80%	3.30%	4.00%	2.70%	5.00%

Sources: Ministry of Industry and Trade, Czech statistical office.

Table A41: Cross border capital flows: financial account balance

	unit	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
financial account balance	EUR (million)	2 586	2 848	6 363	3 341	958	2 608	2 890	4 156	4 498	11 044

Source: Czech National Bank.

Table A51: Exports and imports of ICT according to SITC

		unit	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
import	Automatic data processors incl. Peripheries	EUR (thousand)	423 414	471 019	573 849	587 604	543 020	588 451	597 761	795 939	1 281 073	1 677 817
import	Parts of office equipment and automatic data processors	EUR (thousand)	120 675	143 452	149 696	174 735	181 381	220 029	241 153	393 297	557 888	574 129
import	Telecommunication equipment incl. accessories	EUR (thousand)	233 624	303 851	418 471	604 297	601 243	523 541	635 779	1 158 937	1 064 587	952 062
		unit	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**
export	Automatic data processors incl. Peripheries	EUR (thousand)	37 493	47 705	60 300	62 222	81 877	133 593	132 667	231 373	705 023	1 933 691
export	Parts of office equipment and automatic data processors	EUR (thousand)	40 620	62 871	75 359	95 875	90 995	123 380	128 735	304 279	436 133	566 318
export	Telecommunication equipment incl. accessories	EUR (thousand)	50 065	83 000	99 856	127 475	123 642	98 730	162 058	345 580	674 021	718 142

Source: Customs statistics of the Ministry of finance.

C. INDUSTRIAL DEVELOPMENT AND COMPETETIVENESS

Table C11: Industrial production in current price, by sectors

	unit	1995	1996	1997	1998	1999	2000
CA - exploitation of energy raw materials	EUR (million)	1 512	1 567	1 511	1 420	1 281	1 391
CB - exploitation of other raw materials	EUR (million)	211	280	268	278	273	268
DA - food processing and tobacco industry	EUR (million)	5 765	7 233	7 513	7 528	7 051	7 343
DB - textile and clothing industry	EUR (million)	1 822	1 830	1 940	1 959	1 987	2 235
DC - leather processing industry	EUR (million)	421	503	338	323	272	261
DD - wood processing industry	EUR (million)	997	1 158	1 230	1 316	1 326	1 562
DE - pulp & paper, printing industry, publishing	EUR (million)	1 988	2 049	2 183	2 403	2 284	2 774
DF - coking, oil refining, nuclear fuel production	EUR (million)	1 529	1 379	1 363	1 014	1 115	1 808
DG - Chemicals and rubber	EUR (million)	1 933	2 603	2 724	2 784	2 716	3 428
DH - rubber and plastic production	EUR (million)	1 099	1 498	1 642	1 792	1 894	2 376
DI - glass, ceramics, china and construction materials	EUR (million)	1 804	2 277	2 408	2 492	2 598	3 101
DJ - metallurgy and metal products	EUR (million)	6 548	6 660	7 632	8 127	6 940	7 940
DK - machinery and equipment for further production	EUR (million)	3 043	3 598	3 914	4 349	3 547	3 839
DL - electric and optical instruments	EUR (million)	2 362	2 962	3 213	3 750	3 864	5 254
DM - means of transport production	EUR (million)	2 738	3 535	4 634	5 172	5 677	7 675
DN - processing industry stated not elsewhere	EUR (million)	1 447	1 496	1 704	1 704	1 774	2 110
E - Electricity, gas and water production and distribution	EUR (million)	6 660	6 464	6 298	6 566	6 575	7 281

Source: Czech statistical office.

Table C12: Value added per employee in industry

	unit	1994	1995	1996	1997	1998	1999	2000	2001	2002
value added per employee – industry	EUR (thousand)	8.164	10.375	13.116	11.277	11.883	12.281	13.986	16.004	18.601

Source: Czech statistical office.

Table C13: Industrial production - volume indices, by sectors

	unit	1996	1997	1998	1999	2000	2001	2002
CA - exploitation of energy raw materials	% y-y	99.8%	96.6%	95.1%	87.7%	109.8%	101.6%	98.0%
CB - exploitation of other raw materials	% y-y	107.1%	98.6%	94.0%	88.0%	109.5%	102.7%	107.2%
DA - food processing and tobacco industry	% y-y	104.1%	104.2%	99.9%	99.3%	97.0%	100.6%	103.5%
DB - textile and clothing industry	% y-y	92.8%	98.0%	98.7%	87.0%	111.9%	102.1%	98.6%
DC - leather processing industry	% y-y	95.2%	75.2%	70.6%	95.8%	80.1%	81.8%	72.7%
DD - wood processing industry	% y-y	99.1%	104.9%	97.6%	102.7%	115.3%	105.3%	106.1%
DE - pulp & paper, printing industry, publishing	% y-y	102.8%	112.2%	109.9%	100.7%	101.6%	101.1%	102.8%
DF - coking, oil refining, nuclear fuel production	% y-y	103.2%	99.9%	85.2%	86.9%	101.3%	120.2%	103.8%
DG - Chemicals and rubber	% y-y	103.5%	100.9%	103.7%	98.6%	97.7%	103.2%	100.3%
DH - rubber and plastic production	% y-y	110.9%	116.2%	112.0%	110.1%	115.5%	111.6%	118.6%
DI - glass, ceramics, china and construction materials	% y-y	103.6%	108.2%	102.0%	102.3%	105.3%	104.1%	104.0%
DJ - metallurgy and metal products	% y-y	92.8%	104.1%	96.1%	87.8%	96.8%	104.2%	99.0%
DK - machinery and equipment for further production	% y-y	106.8%	115.1%	103.7%	94.1%	109.8%	117.2%	102.6%
DL - electric and optical instruments	% y-y	112.5%	124.6%	145.1%	122.8%	111.5%	129.5%	127.5%
DM - means of transport production	% y-y	118.0%	116.3%	107.4%	94.6%	118.4%	102.8%	103.3%
DN - processing industry stated not elsewhere	% y-y	108.3%	104.6%	110.9%	107.9%	115.3%	100.3%	102.6%

Source: Czech statistical office.

Table C14: Industrial production by regions - value of production

	unit	1997	1998	1999	2000	2001	2002
Prague	EUR (million)				5 369	6 030	
Liberec region	EUR (million)				1 784	1 967	
Central Bohemia	EUR (million)				7 929	9 419	
South Bohemia	EUR (million)				2 311	2 566	
Plzeň region	EUR (million)	1 859	2 098	2 078	2 347	2 681	
Olomouc region	EUR (million)				1 597	1 687	
Karlovy Vary region	EUR (million)				835	939	991
Hradec Králové region	EUR (million)				1 873	2 133	
Pardubice region	EUR (million)				1 588	1 905	
Vysočina	EUR (million)	1 165	1 296	1 300	1 648	2 154	
Moravian-Silesian region	EUR (million)				5 775	6 419	
Ústí nad Labem region	EUR (million)				4 950	5 095	
South Moravia	EUR (million)	2 959	3 241	2 937	2 686	3 026	
Zlín region	EUR (million)				1 791	1 976	

Source: Czech statistical office.

Table C21: Changes in the structure of services

	unit	1994	1995	1996	1997	1998	1999	2000	2001	2002
trade, repairs of durables and vehicles, hospitality	EUR (million)	4 568	5 659	6 239	6 684	7 525	7 803	8 534	9 935	11 503
transport, telecommunication, storing	EUR (million)	2 752	3 057	3 284	3 571	3 968	3 843	4 197	4 960	6 139
financial and insurance industry	EUR (million)	1 900	1 776	1 682	1 598	2 521	2 341	2 330	2 149	2 780
real estate, services for businesses, R&D	EUR (million)	4 040	4 367	4 826	4 986	5 717	5 766	6 269	7 047	8 595
other services	EUR (million)	4 508	5 231	6 206	6 506	6 737	7 395	7 778	8 904	10 608

Source: Czech statistical office.

Table C31: Changes in investment - current value – total

	unit	1993	1994	1995	1996	1997	1998	1999	2000
investment - current value – total	EUR (million)	8 875	10 196	13 717	16 168	15 487	13 531	13 093	14 110
agriculture, forestry, hunting, fishery	EUR (million)	366	528	640	764	733	545	470	403
Mining	EUR (million)	266	297	233	241	252	245	172	229
processing industry	EUR (million)	2 409	2 766	2 920	3 396	3 697	3 089	3 628	3 768
electricity, gas, water supply	EUR (million)	1 085	1 188	2 504	2 200	1 973	1 816	1 708	1 559
Construction	EUR (million)	187	240	332	345	391	275	293	260
trade, repairs of durables and vehicles	EUR (million)	214	312	703	1 242	1 152	1 127	1 111	981
Hospitality	EUR (million)	56	59	142	161	100	137	106	117
transport, telecommunication, storing	EUR (million)	1 060	1 428	1 915	2 604	3 203	2 806	2 301	2 963
financial and insurance industry	EUR (million)	1 033	945	1 061	944	477	377	326	439
real estate, services for businesses, R&D	EUR (million)	643	464	685	986	955	962	1 054	1 149
public administration	EUR (million)	435	571	998	1 432	752	707	593	706
Education	EUR (million)	237	315	375	488	354	396	331	360
health care	EUR (million)	386	483	561	596	428	420	424	488
other public, social, personal services	EUR (million)	495	598	648	768	1 020	628	577	688

Source: Czech statistical office.

Table C41: Value of production in specific sectors (ICT industry)

	unit	1995	1996	1997	1998	1999	2000
ICT Manufacturing	EUR (million)			1 208	1 401	1 566	2 306
of which office, accounting and computing machinery	EUR (million)	66	67	35	101	123	216
Telecommunications	EUR (million)			1 614	1 914	2 101	2 607
Computer and related activities	EUR (million)			914	971	945	1 213
of which software consultancy and supply	EUR (million)			558	630	636	868
Total ICT sector	**EUR (million)**			**3 736**	**4 286**	**4 612**	**6 125**

Source: OECD.

Table C42: Specific sectors' market size (production less trade balance)

	unit	1997	1998	1999	2000
ICT Manufacturing	EUR (million)	2 614	2 778	2 997	4 137
of which office, accounting and computing machinery	*EUR (million)*	*93*	*147*	*169*	*259*
Telecommunications	EUR (million)	1 614	1 914	2 101	2 607
Computer and related activities	EUR (million)	1 498	1 536	1 574	1 928
of which software consultancy and supply	*EUR (million)*	*615*	*674*	*707*	*949*
Other ICT services	EUR (million)	447	458	522	896
Total ICT sector	EUR (million)	6 173	6 686	7 194	9 568

Sources: OECD, Customs statistics of the Ministry of finance.

Table C43: Trade balance of the ICT industry

	unit	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Components	EUR (million)	86	-95	-69	-253	-205	-373	-338	-639	-1 814	-2 550
Consumer	EUR (million)	-91	-136	-146	-198	-187	-132	-145	15	346	160
Electronic data processing	EUR (million)	-452	-485	-568	-586	-534	-530	-561	-639	-674	261
Office	EUR (million)	-47	-54	-60	-55	-58	-46	-46	-43	-46	-42
Radio	EUR (million)	-31	-39	-55	-158	-175	-177	-258	-510	-346	-172
Telecom	EUR (million)	-153	-179	-261	-313	-301	-243	-214	-298	-30	-38
Communication	EUR (million)	-140	-166	-264	-407	-393	-332	-389	-614	-139	-94
Computers	EUR (million)	-452	-484	-569	-571	-527	-521	-557	-634	-670	266
Software	EUR (million)	0	0	0	58	-57	-44	-71	-81	-106	-23
TOTAL	**EUR (million)**	**-1 281**	**-1 639**	**-1 993**	**-2 484**	**-2 437**	**-2 400**	**-2 582**	**-3 442**	**-3 478**	**-2 233**

Source: Customs statistics of the Ministry of finance.

D. PRESENCE OF THE MOST RELEVANT ECONOMIC ACTIVITIES FOR IST APPLICATIONS

Table D11: Domestic and foreign patent applications

	unit	1993	1994	1995	1996	1997	1998	1999
patent applications domestic	number	880	756	627	617	585	626	598
patent applications foreign	number	2 053	2 593	2 892	3 241	3 652	3 761	4 199
patent application total	number	2 933	3 349	3 519	3 858	4 237	4 387	4 797

Source: Czech office for protection of intellectual property.

Table D21: Regional distribution of R&D expenditures

	unit	2000	2001
Prague	EUR (million)	310	296.91
Liberec region	EUR (million)	21	21.37
Central Bohemia	EUR (million)	162	211.70
South Bohemia	EUR (million)	22	23.68
Plzeň region	EUR (million)	16	19.14
Olomouc region	EUR (million)	21	21.76
Karlovy Vary region	EUR (million)	1	1.99
Hradec Králové region	EUR (million)	17	20.11
Pardubice region	EUR (million)	24	29.12
Vysočina	EUR (million)	10	9.35
Moravian-Silesian region	EUR (million)	55	51.67
Ústí nad Labem region	EUR (million)	9	14.68
South Moravia	EUR (million)	62	89.82
Zlín region	EUR (million)	14	20.11

Source: Czech statistical office.

Table D22: Amount spent on R&D by private and public sector

	unit	1995	1996	1997	1998	1999	2000	2001
private expenditure on R&D	EUR (million)	267	274	332	408	415	467	497
governmental expenditure on R&D	EUR (million)	132	172	201	233	281	347	360
Total expenditure on R&D	EUR (million)	410	457	528	632	661	779	826

Source: Czech statistical office.

Table D23: Amount spent on R&D by sectors

	unit	2000	2001
agriculture, forestry, fishery	EUR (million)	2.14	2.03
exploitation of raw materials	EUR (million)	1.14	1.52
processing industry	EUR (million)	299.06	341.84
Electricity, gas and water supply	EUR (million)	0.04	0.09

Source: Czech statistical office.

Table D24: Amount spent on R&D in the ICT industry

	unit	2000	2001
Publishing, printing, reproduction of sound and video records	EUR (million)	0.12	0.14
Office machinery and computer production (incl. equipment for data processing)	EUR (million)	0.19	0.21
Radio, TV Sets and communication devices production	EUR (million)	10.57	14.54

Source: Czech statistical office.

E. INFORMATION SOCIETY TECHNOLOGIES (IST) PENETRATION RATES

Table E11: IST penetration rates

	unit	1995	1996	1997	1998	1999	2000	2001	2002
Fixed line penetration – households	%	40.3	49.0	60.0	69.7	72.5	71.9	68.6	66.8
Fixed line penetration – inhabitants	%	23.7	27.3	31.8	36.3	37.5	37.7	37.5	35.9
Share of fixed network digitalization	%	17.9	32.8	50.0	64.0	76.7	85.7	93.9	100.0
Number of payphones per 1000 inabitants		2.0	2.6	2.8	2.9	2.9	2.9	2.8	2.8
Total number of ISDN subscribers (th.)							122.0	261.0	389.0
Mobile phones penetration	%	0.5	1.9	5.1	9.4	18.9	42.3	68.2	84.0
CATV penetration - households (%)	%								33.0
Color TV set per 100 households		95.8		104.9	109.0	112.3	115.8		
Number of PCs per 100 inhabitants					9.7	10.7	12.1	13.6	
Number of PCs at home (% of households)	%					14.2	17.8		28.0
Number of PCs with internet per 100 inh.						6.8	9.7	12.2	
Number of internet hosts (th.)		21.9	40.8	56.9	86.5	122.3	160.0	215.5	

Source: Czech Statistical Office, Ministry of Transport and Telecommunications.

G. EDUCATIONAL SECTOR AND LABOR FORCE SUPPLY

Table G11: Number of students in tertiary education, by the area of training

	unit	1998	1999	2000	2001
natural sciences	1000 persons	12	11	16	14
technical sciences	1000 persons	48	53	58	54
agricultural-forestry and veterinarian sciences	1000 persons	10	7	8	7
medical, physical and pharmaceutical sciences	1000 persons	11	11	13	12
social sciences	1000 persons	86	93	10	100
cultural and artistic sciences	1000 persons	4	4	5	5

Source: Czech statistical office.

Table G12: Number of university graduates

	unit	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
university graduates	1000 persons	23.255	18.871	18.16	29.134	27.84	28.378	30.12	30.64			28.66	28.66

Source: Czech statistical office.

Table G13: Number of university applicants and accepted students

	unit	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
number of applicants	1000 persons	66.8	67.8	72.1	80.7	102.3	114.6	118.3	116.6	110.5	113.1
number of accepted students	1000 persons	32.6	33.7	36.77	33.9	38.59	39.445	40.305	59	62.2	54.5

Source: Czech statistical office.

Table G21: ICT - related education: number of enrolled students

	unit	2000	2001
enrolled students	1000 persons	9.627	8.266

Source: Czech statistical office.

H. NATIONAL AND REGIONAL DEMOGRAPHIC DATA AND PERSPECTIVE

Table H11: Age distribution

	unit	1998	1999	2000	2001
0-14	%	17.03%	16.61%	16.21%	15.89%
15-59	%	64.86%	65.17%	65.33%	65.49%
60+	%	18.11%	18.22%	18.47%	18.62%

Source: Czech statistical office.

Table H21: Growth rate of population

	unit	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
growth rate of population	% y-on-y	0.02%	0.08%	0.13%	0.08%	-0.01%	-0.11%	-0.12%	-0.10%	-0.09%	-0.11%	-0.11%	-0.25%	-0.32%
natural growth rate	% y-on-y	0.01%	0.05%	0.01%	0.03%	-0.10%	-0.21%	-0.22%	-0.21%	-0.18%	-0.20%	-0.18%	-0.17%	-0.15%
migration	% y-on-y	0.01%	0.03%	0.11%	0.05%	0.10%	0.10%	0.10%	0.12%	0.09%	0.09%	0.06%	-0.08%	-0.17%

Source: Czech statistical office.

Table H31: Human development index

	unit	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
descriptive + HDI (www.undp.org)	N/A	0.835					0.843					0.849

Source: United Nations Development Program.

I. CULTURAL AND SOCIOLOGICAL ASPECTS

Table I11: Changes in ICT employment

	unit	1995	1996	1997	1998	1999	2000
ICT Manufacturing	employees			53 000	52 000	52 000	58 266
of which office, accounting and computing machinery	employees	9 000	4 000	2 000	2 000	3 000	3 674
Telecommunications	employees			33 000	28 000	28 000	27 826
Computer and related activities	employees			38 027	36 329	35 284	39 735
of which software consultancy and supply	employees			22 837	20 294	21 779	24 925
Total ICT sector	employees			124 027	116 329	115 284	125 827

Source: OECD.

Table I21: Net external migration

	unit	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Czech Republic	migrants	624	2 876	11 781	5 476	9 942	9 999	10 129	12 075	9 488	8 774	6 539	-8 551	12 290

Source: Czech statistical office.

Table I22: Net internal migration

	unit	2002
Prague	migrants	5 463
Liberec region	migrants	266
Central Bohemia	migrants	6 661
South Bohemia	migrants	1 024
Plzeň region	migrants	832
Olomouc region	migrants	-611
Karlovy Vary region	migrants	408
Hradec Králové region	migrants	-125
Pardubice region	migrants	-65
Vysočina	migrants	-222
Moravian-Silesian region	migrants	-1 605
Ústí nad Labem region	migrants	1 365
South Moravia	migrants	-831
Zlín region	migrants	-270

Source: Czech statistical office.

Table I23: Immigration form specific countries

	unit	2000	2001
Russia	migrants	425	-334
Ukraine	migrants	1 203	-1 838
Slovakia	migrants	2 413	-5 633

Source: Czech statistical office.

Table I31: Income distribution

	Unit	2001
The first 10%	% of total gross income	5.03%
Second 10%	% of total gross income	6.44%
Third 10%	% of total gross income	7.14%
Fourth 10%	% of total gross income	7.62%
Fifth 10%	% of total gross income	8.28%
Sixth 10%	% of total gross income	9.12%
Seventh 10%	% of total gross income	10.18%
Eighth 10%	% of total gross income	11.83%
Ninth 10%	% of total gross income	14.51%
The last 10%	% of total gross income	19.86%

Source: Czech statistical office.