# Environment for R&D and Innovation in the Czech Republic

Jaroslav Doležal
Honeywell spol. s r.o.

National Councils for S&T Policy Meeting
Prague, Czech Republic, May 25-26, 2006

Honeywell

# Czech Republic: Just Few Facts …

# Czech Republic (... in the Heart of Europe)

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# Czech Republic – Insignia

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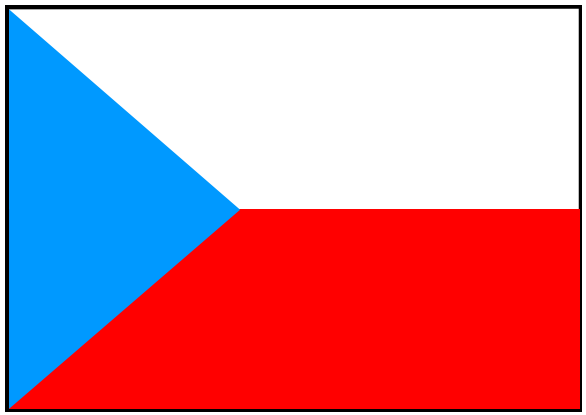

National Flag

National Emblem

Presidential Flag

# Historical Milestones

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- till 1918 Part of Austro-Hungarian Monarchy
- 1918-1939 Czechoslovak (First) Republic
- 1939-1945 World War II
- 1945-1992 Czechoslovak Republic (several stages)
- 1993- Czech Republic

- OECD member since November 1995
- NATO member since March 12, 1999
- European Union member since May 1, 2004
- Graduation among "developed" countries on Feb. 28, 2006
- Peers to compare – Hungary, Poland, Slovakia, Slovenia …

***Building Jointly New Europe***

# Basic Economic Data

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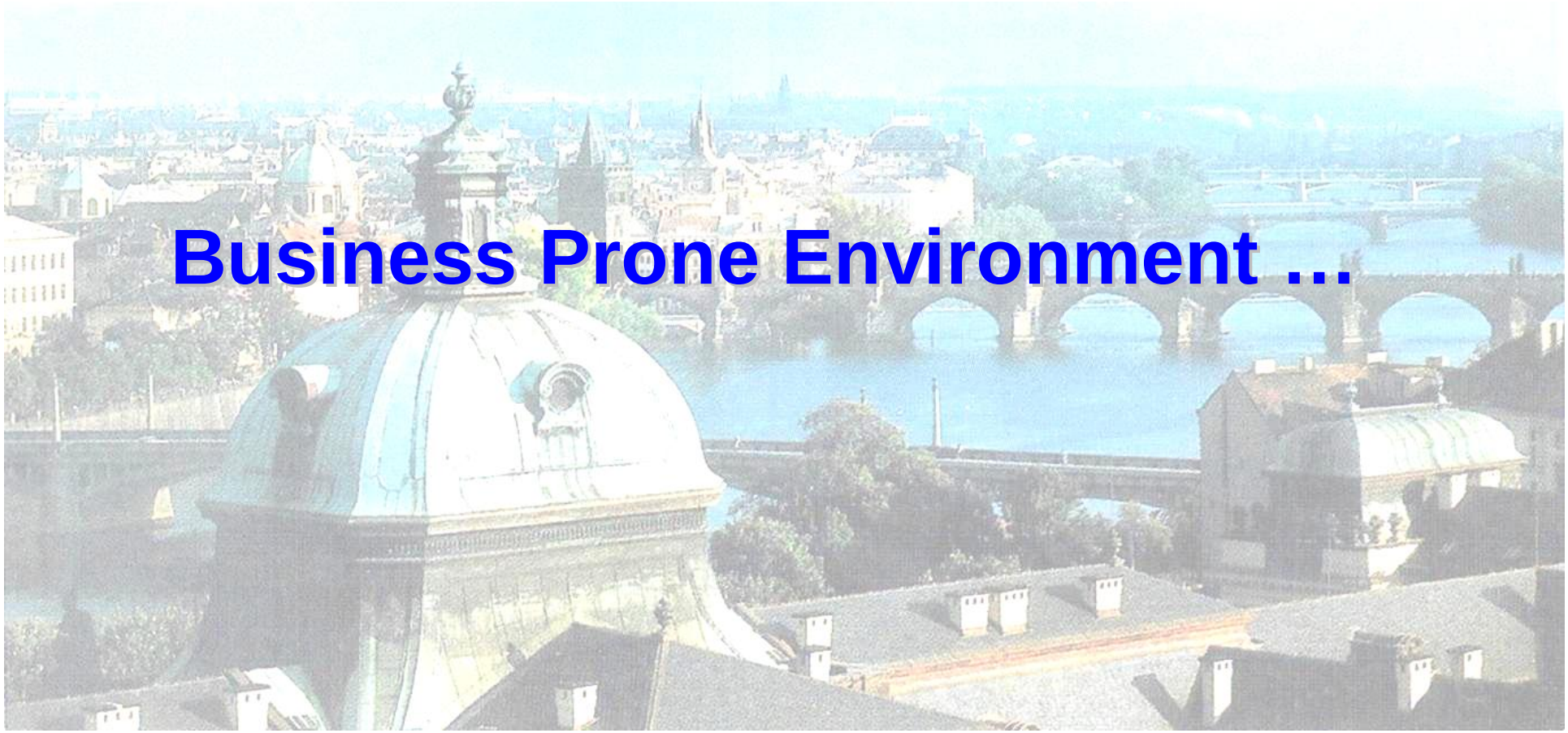
- GDP 2005 CZK 2,915 B
  GDP 2005 6 % growth

- Labor force: 5.2 million
- Average salary: 19,030 CZK/mn (approx US$ 790/mn)
- Unemployment: 8,9 % (average 2005)
- Inflation rate: 2.8 % (Dec. 2005)

## Highlights:

- Stable business and political environment
- Fast growing economy (excellent industry performance, export surplus, attractive investment target, off-shoring, etc.)
- Catching-up with EU 15 countries
- Qualified technically skilled workforce (education, creativity)
- Technology absorption (high) vs. innovation (growing) potential

***Added Value Activity Orientation***



# Business Prone Environment …

# 15 Years of Transformation

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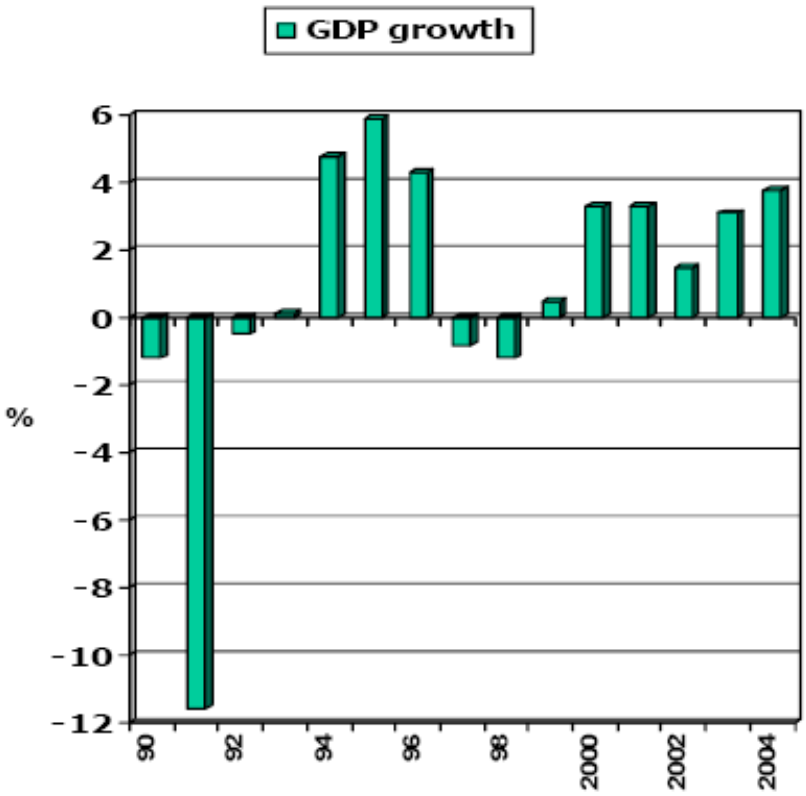
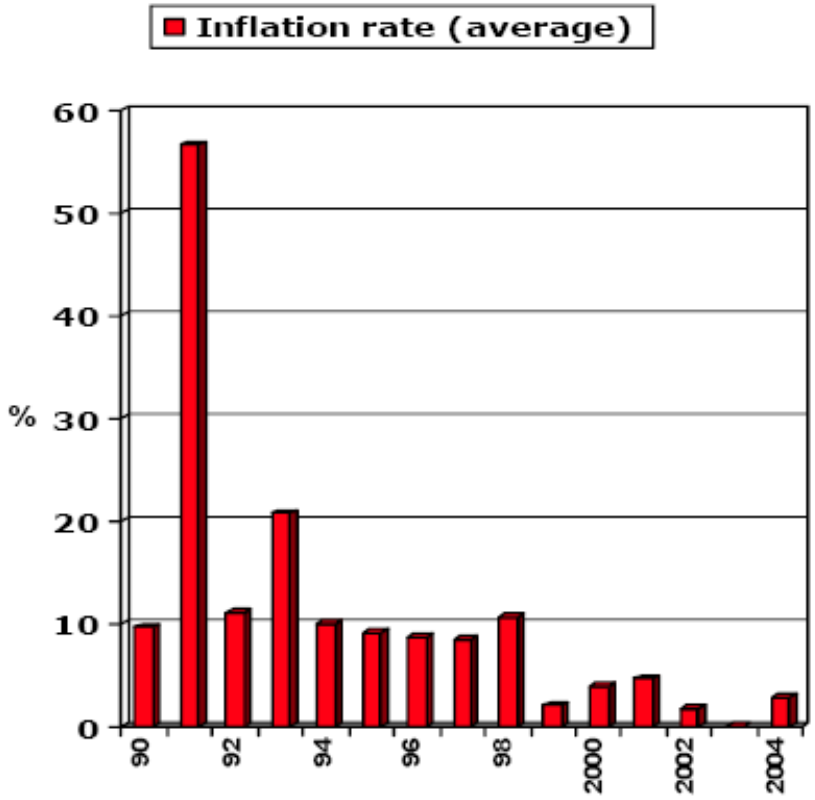
## Catch-up speed was moderate




## Macro-economic fundamentals stable




Source: Czech National Bank

# Decade of Change

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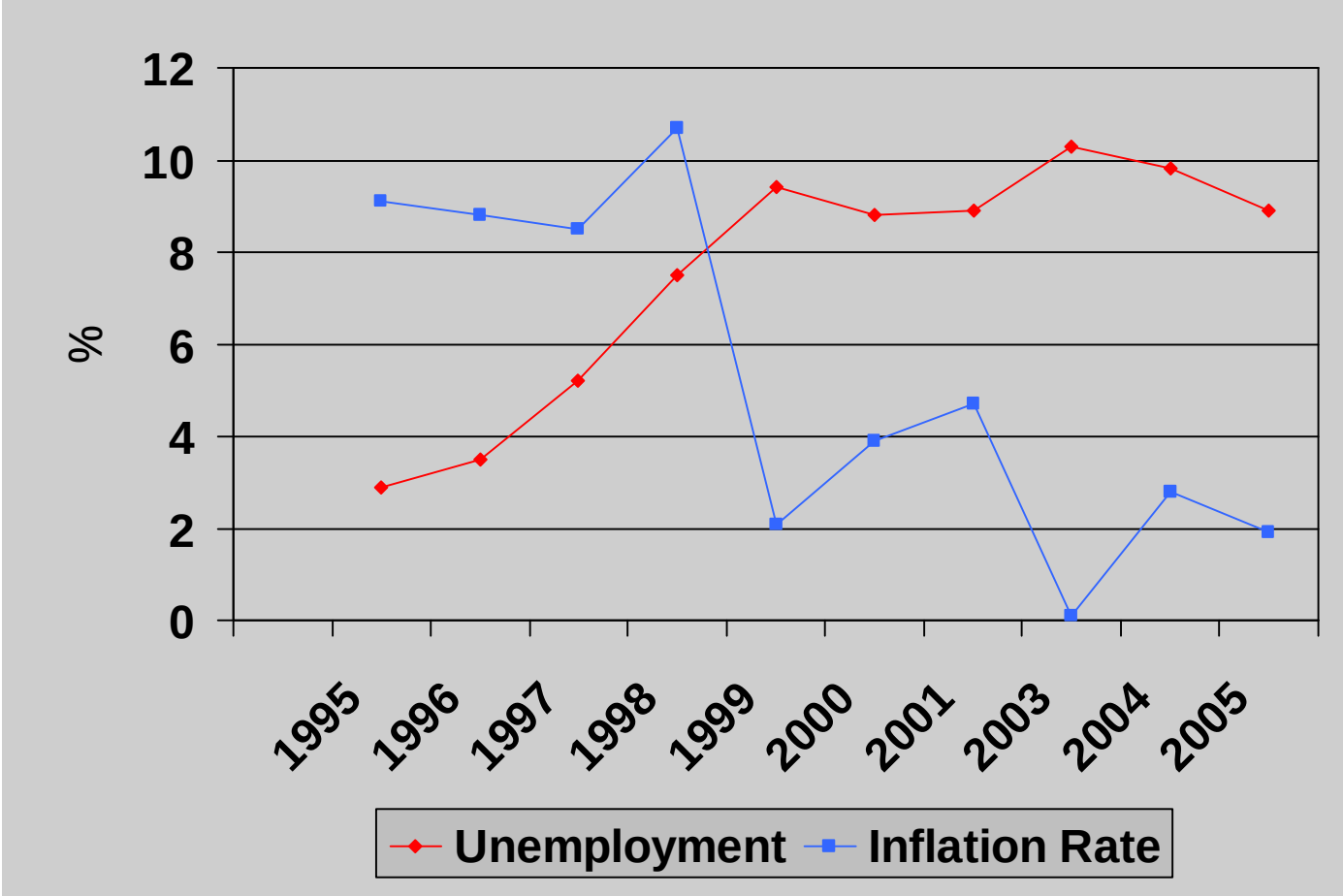


Source: Czech Statistical Office

***Remarkably Stable Business Environment***

# Foreign Direct Investment

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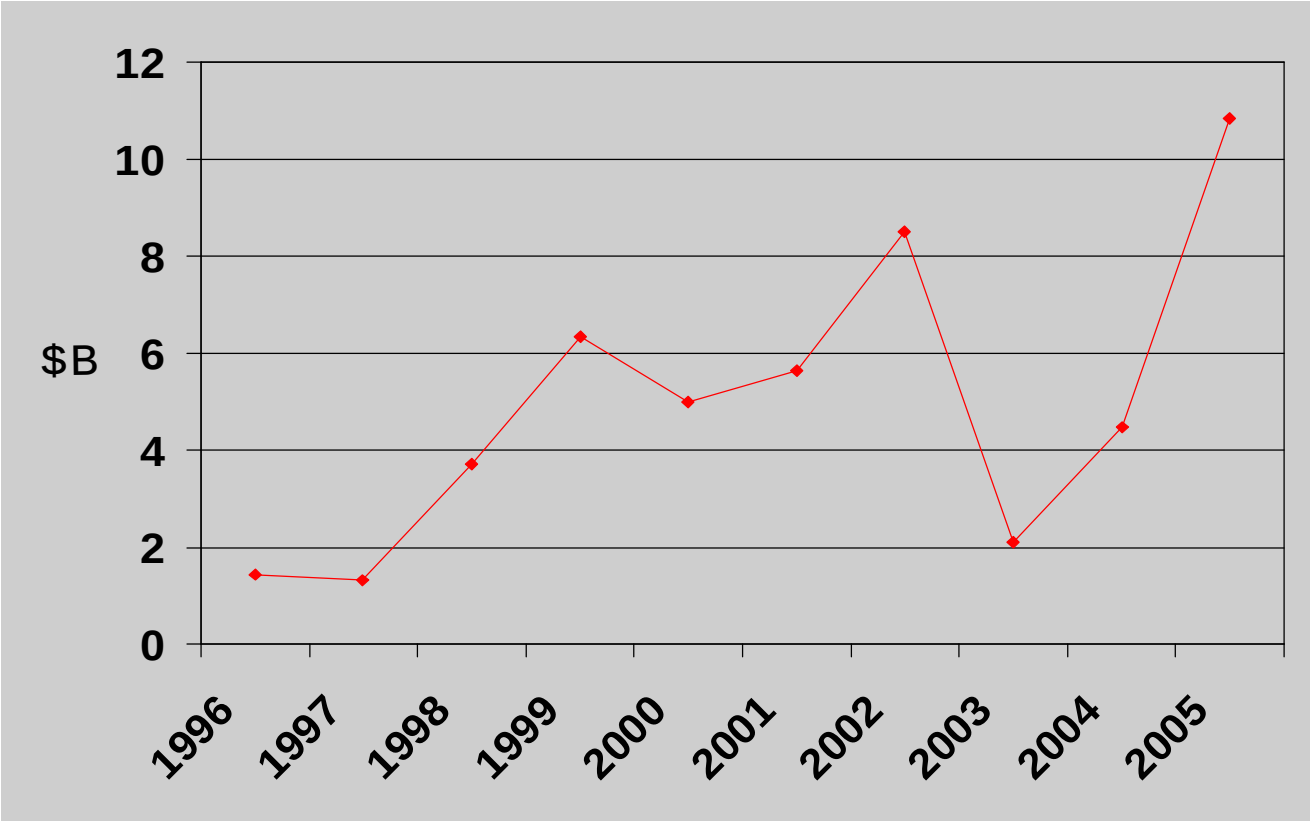
- **Cumulative FDI in 1993-2005: close to $58B**
- **Leader in FDI attractiveness, FDI per capita, human capital**




Source: Czech National Bank

***Paying Back Target Of Continuous FDI Inflow***

# Reasons to Invest (in the Czech Republic)

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- Historically well-qualified labor force (esp. technology area)
- Outstanding academic achievements (solid EU level)
- Good language skills (above regional peers)
- Low operational costs (below regional peers)
- Good telecom and overall infrastructure
- Support services sufficiently available
- Accelerated IT development (among highest in Europe)
- Prague – international city (education, culture, infrastructure) attractive for business and living
- Ongoing investment incentives (manufacturing, technology & shared service centers)
- Assistance to foreign investors via CzechInvest Agency – www.czechinvest.org
- Stepping stone for eastbound operations

***To Be In The Heart Of Europe At Low Risk!***

# Legal Investment Environment

Honeywell

- Non-discrimination
- 100% foreign ownership
- Free entry and exit
- Industrial zones/parks established countrywide
- Support and protection of investments
- Double taxation prevention treaties
- Full convertibility of Czech currency
- Acquisition of real estate by local subsidiaries of foreign companies
- Investment incentives program (manufacturing, technology/service centers)
- Harmonization with EU legal system – existing roadblocks gradually removed (Commercial Register, Bankruptcy Law, Labor Code)

***Improvement Steadily Continues ...***

# Technology & Innovation Tradition

# Basic Terminology (Oxford Dictionary)

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- **Information**
  - **Facts told, heard or discovered about sb/sth**
  - **Knowledge**
  - ***Information Technology***
- **Knowledge**
  - **The facts, understanding, information**
  - **Organized body of information shared by people in a particular field**
  - **Awareness of a fact or situation**
  - ***Knowledge Economy, Knowledge Society***
- **Innovation**
  - **Process of making changes, introducing new ideas, methods, etc.**
  - **New technique, idea, etc.**
  - ***Technology Innovation (EU definition)***

***Information – Knowledge – Innovation***

# Global Environment for R&D and Innovation

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- **Globalization priorities/targets**
  - Until 1990 – Sales & distribution globalization
  - Early 1990 – Production globalization
  - Late 1990 – Intellectual property globalization
- **Innovation (R&D activity output)**
  - Defining challenge for global competitiveness
  - Managing efficient exploitation of "Power of Location"
  - Change of Paradigm – from "restructure, low cost, etc." move to "get the best"
- **Innovation drivers – "Location Matters"**
  - Internal – Company processes (traditional thinking)
  - External – Environmental impacts (relationship, structures, info flows)
- **Innovative Capacity (assessed by US patents granted)**
  - Common innovation infrastructure
  - Cluster-specific innovation environment
  - Quality of linkages

See M.E.Porter, S.Stern: Innovation: Location Matters. MIT Sloan Mgmt. Rev., 2/2001

***From "Low-Cost" To "Get The Best"***

# R&D In Global Growth Economy

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- **Innovation New Characteristics**
  - **Continuous process and cannot be stopped and restart easily and take some time to show results**
  - **R&D model has shifted from supply side (institutional) to demand driven and market oriented – D(evelopment) matters**
  - **Technology transfer less used, researchers stay with a product all way to the market**
  - **Closer collaboration of researchers, partners and customers**
- **R&D Shaping Forces**
  - **Responsiveness to the market (keeping up with competitors)**
  - **Globalization (infrastructure and coordination cost need to be included)**
  - **Customer collaboration (demand-driven innovations)**

See Harnessing Innovation, An Economist Intelligence Unit white paper, 2004

***Harnessing Innovation ...***

# Innovation Relevant Observations – EU

Honeywell

- **Educational system satisfactory and basically of enough depth – build on it further**
- **University relationship to private sector rather weak (low flexibility, level of responsiveness) – wake up, differentiate, compete**
- **Entrepreneurial spirit and risk prone attitude still low – encourage, foster, motivate, reward**
- **Venture capital of limited impact – attraction via tax breaks, incentives, etc.**
- **Rather complex legislation and administration with many bureaucratic constraints – make it simple, not new agencies and bureaucrats**
- **Real innovation supporting environment is exceptional – foster competition of ideas, attract the best and their practices**

***Encourage – Facilitate – Motivate – Reward***

# Framework for Innovation – EU

Honeywell

- **Open and competitive markets**
- **Intellectual property rights, Community patent, etc.**
- **Entrepreneurship in innovative areas**
- **Cooperation between research and industry, clustering, poling, joint ventures, etc.**
- **Venture capital availability (incl. "business angels")**
- **University education back-up (more flexibility and application orientation)**
- **Legal framework back-up (less administration and regulation)**
  - **EU Framework Programme for R&D (6th and 7th)**
  - **EU plan of state aid for innovation**
  - **EU Charter for Researchers; Recruitment Code of Conduct**
- **2006 message: Education and research; Business potential; Employment promotion; Secure energy**

***EC Message: Time to Move Up a Gear!***

# Framework for Innovation – CZ (1)

Honeywell

- National R&D Policy 2004-2008
- Strategy for Economic Growth (2005)
  - Institutional environment for doing business
  - Financial resources
  - Infrastructure
  - Human resources
  - R&D and innovation
- Long-term R&D Priority Areas (2005)
- National Innovation Policy 2005-2010
  - Annual increase of R&D spending
  - Restructure of R&D spending
  - Support of private R&D investment via indirect measures
  - Enhancement of intellectual property rights use in R&D
  - Development of innovation infrastructure
  - Access improvement to financial resources for innovation

***National Lisbon Strategy Implementation***

# Framework for Innovation – CZ (2)

Honeywell

- National Development Plan (2007-2013)
  - Current state analysis (SWOT)
  - Implementation strategy
  - Orientation of operational programs
  - Financial resources for priority areas
  - Coordination and control of cohesion policy
- Operational Programs (2007-2013)
  - R&D for Innovation – Ministry of Education, Youth and Sports
  - Business and Innovation – Ministry of Industry and Trade
  - Human resources
  - Education
  - Environment
  - Transportation
  - Prague – Competitiveness & Adaptability

***Maximum Usage of Transition Period***

# Current Focus Areas (Recommendations)

Honeywell

- **OECD**
  - Further simplify administration to start the business
  - Increase number of university graduates
  - Use public R&D funds more effectively
- **EU (European Innovation Scoreboard)**
  - Improve educational system (secondary, tertiary)
  - Foster university links with private sector (PPP opportunity)
  - Better target innovation financing efficiency

**Notes (locally oriented):**

- Technology absorption (+) vs. innovation (-) – also due to FDI
- Change takes time, ROI in R&D cannot happen overnight
- Innovation mindset and methodology development
- Environment to promote, motivate and reward innovation

***Move Ahead of "Catching Up" Countries!***

# US-Czech HighTech Seminar May 18-19, 2006

Honeywell

- **Center for Strategic and International Studies**
  - Previously organized in Hungary and Polen
  - Sponsored by CSIS agency and local organizer CzechInvest
  - Support of Czech Government and R&D Council
- **Seminar Aim:**
  - Contribute to improvement of Czech innovation process
  - Identify new opportunities for High Tech priority growth areas
  - Increase of competitiveness to accelerate High Tech development
- **Approach: Share US experience in**
  - Rapid commercialization of High Tech products
  - Increased participation of private sector financing
  - Building viable and sustainable networks between university and industry subjects

***Further Cooperation Opportunity Open***

# US-Czech HighTech Seminar May 18-19, 2006

Honeywell

- **Agenda/Speakers included**
  - **Dr. G. Atkinson – Senior Advisor, Sciences and Technology, US Department of State**
  - **Dr. Ch. Woessner – Director, Technology, Innovation and Entrerpreneurship, U.S. National Academies**
  - **Dr. R. Sienkiewicz – Senior Advisor, Advanced Technology Program, National Institutes of Standards and Technology**
  - **Dr. L. Salicrup – Senior Advisor for International Activities, National Institutes of Health**
  - **Dr. V. Turekian – Chief International Officer, American Association for Advancement of Science**
  - **J. Baca – US Air Force Research Laboratory**
- **Highlights**
  - **Set of recommendations is being worked out**
  - **Follow-up agenda agreed (more specifically oriented)**

***"ONE SIZE FITS ALL" Dilemma***

# Research and Development Council

Honeywell

- **Legal background – Act No. 130/2002 Coll. On State Funded Research and Development Support**
  - Chairman: Jiří Havel, Deputy Prime Minister for Economy
  - Charter, Rules of Procedure, Advisory Bodies
  - Functional & Administrative Support – Office of Government
- **R&D Council details – see www.vyzkum.cz**
  - National R&D and Innovation Policy
  - Documents and Legislation
  - R&D Information System
- **Council Members**
  - Jiří HAVEL, Petra BUZKOVÁ, Milan URBAN, Vladimír VIKLICKÝ,
  - Josef BOUŠKA, Jaroslav DOLEŽAL, Martin JAHN,
  - Miroslav JANEČEK, František JEŽEK, Hana MARKOVÁ,
  - Vladimír NEKVASIL, Josef SYKA, Karel ŠPERLINK,
  - Ivan WILHELM, Petr ZUNA

***Advisory Body of the Czech Government***

# Basic Areas of Council Activity

Honeywell

- Clarifies long-term principle trends and proportions of the progress of research and development in the Czech Republic through its advisory bodies, which are expert commissions for individual areas of research and development,
- Carries out regular annual analyses and assessments of the existing state of research and development in the Czech Republic and comparisons with the situation abroad and submits them to the Government,
- Draws up medium-term proposals for research and development support and proposes the amount of funds to be assigned to research and development from individual budget chapters and their distribution,
- Prepares standpoints relating to materials submitted to the Government in the area of research and development,
- Deals with advisory bodies for research and development of the European Community and with the research and development councils of individual European Community member states and other countries,
- Fulfils the task of administrator and operator of the research and development information system and approves its regulations,
- Proposes the appointment and recalling of the Chairman and other members of the Presidium of the Grant Agency of the Czech Republic,
- Ensures the fulfillment of other tasks and duties stipulated by special legal regulations or assigned by the Government.

***Increased Role in Knowledge & Innovation***

# Major Current Council Agenda

Honeywell

- **Lisbon Agenda Impact – 2010 challenge**
  - 1% of GDP on R&D spending from public sources
  - 2% of GDP on R&D spending from private sources
- **Foster Supportive Legislation**
  - Business environment area (e.g. tax advantage)
  - Public private partnership area – remove hurdles and obstacles
- **Budget and financing**
  - Progressive level of R&D public support for 2007-2009
  - Institutional and targeted (program) support proportion
  - Focus on targeted and applied research and innovation
- **Priorities and Wider Coordination**
  - National Research Program II (2004-2008)
  - National Innovation Policy (2005-2010)
  - Operational Programs for Innovation
- **Educational & Promotional Aspects**
  - Foster technology education on all levels
  - Applied and entrepreneurial orientation

***R&D Output Critical for Competitiveness***

# State Budget Expenditures on R&D

Honeywell

## Historical Overview (in CZK)

| | Institutional | Targeted | Total |
|---|---|---|---|
| 1996 | 2 847 155 | 3 386 839 | 6 233 994 |
| 1997 | 3 335 451 | 4 217 740 | 7 553 191 |
| 1998 | 3 450 958 | 5 280 635 | 8 731 593 |
| 1999 | 4 860 979 | 4 810 593 | 9 671 572 |
| 2000 | 5 748 802 | 5 892 515 | 11 641 317 |
| 2001 | 6 871 116 | 5 706 875 | 12 577 991 |
| 2002 | 7 143 966 | 5 353 569 | 12 497 535 |
| 2003 | 7 885 640 | 6 034 945 | 13 920 585 |
| 2004 | 7 868 635 | 6 795 241 | 14 663 876 |
| 2005 | 9 363 587 | 7 094 318 | 16 457 905 |

***Insufficient Progress Dynamics!***

# State Budget Expenditures on R&D

Honeywell

## Mid-Term Outlook (in CZK)

| | Institutional | Targeted | Total | % GDP |
|---|---|---|---|---|
| 2006 | 9 562 801 | 8 614 932 | 18 177 733 | 0.59 |
| 2007 | 11 743 930 | 10 695 638 | 22 439 568 | 0.68 |
| 2008 | 13 182 431 | 12 596 074 | 25 778 505 | 0.73 |
| 2009 | 13 501 692 | 13 698 308 | 27 200 000 | 0.75 |
| | | | | |

***Proportion To Be Gradually Reversed!***

# Country Technology Flashback

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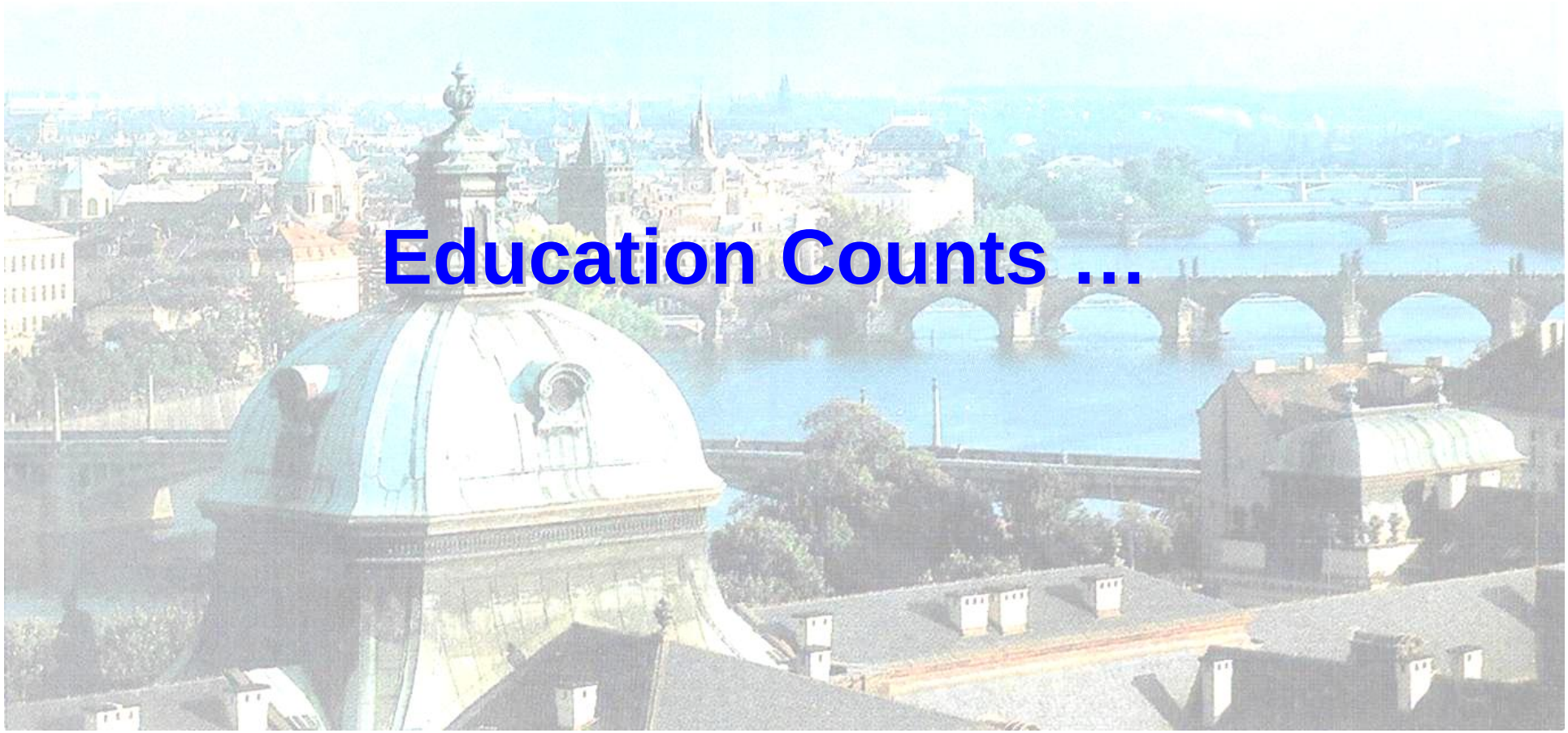
- **Country Technology Legacy**
  - Year 1707 – Czech Technical University starts in Prague
  - Until 1918 – Workshop of the Austrian-Hungarian Monarchy
  - Leading industrial country between WWI and WWII
  - East-block era – lack of contacts, necessity to improvize (+/-)
- **Selected Inventions**
  - Blood types (A, B, O)
  - Street trams
  - Kaplan turbine
  - Gel lenses
  - Jet weaving; technology for non-wovens Arachne
  - Microwave cooker
  - Anti-AIDS drugs

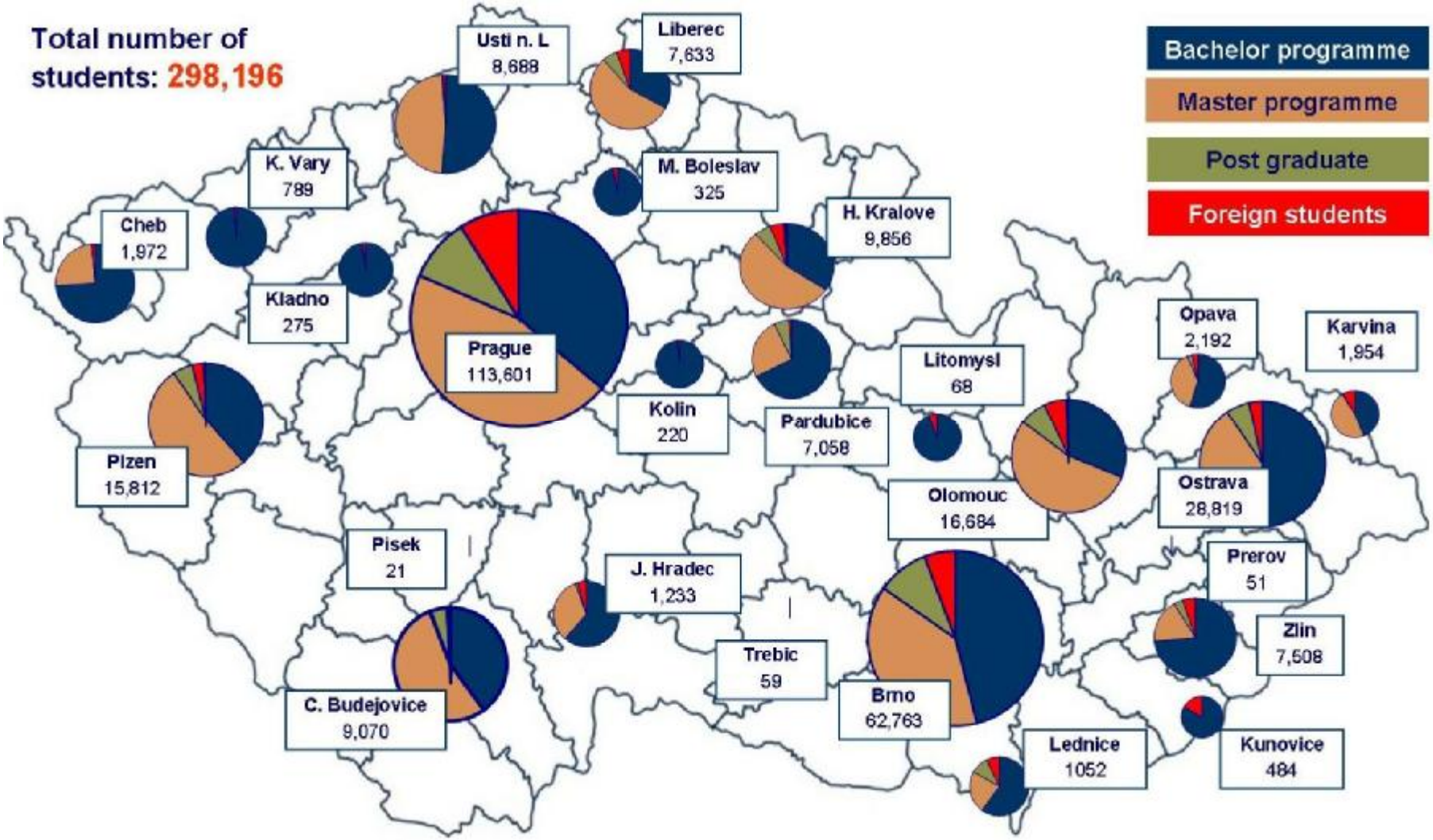
***This Is History: Now Look Jointly Ahead***



# Education Counts …

# University Education with Tradition

Honeywell

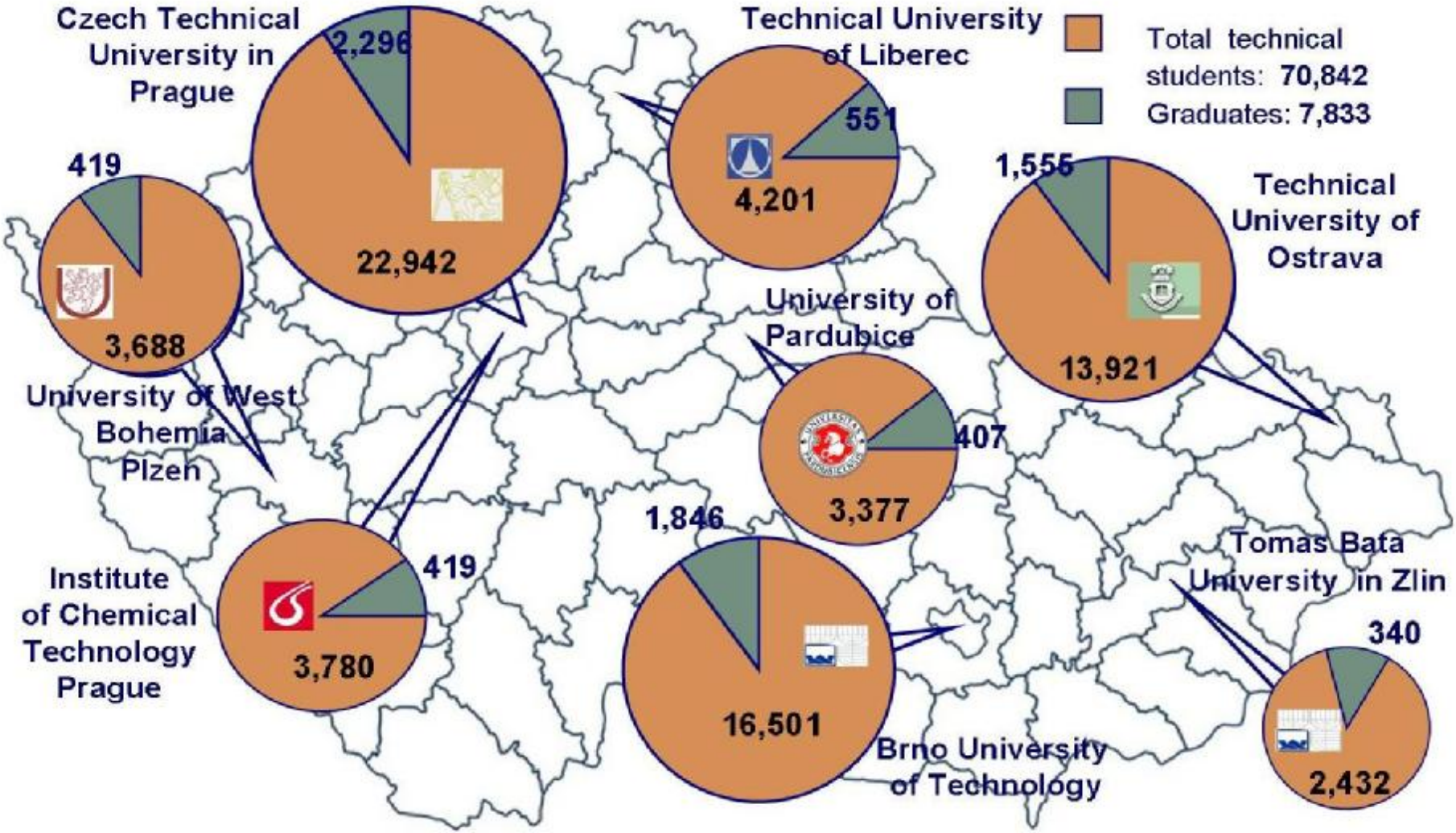



**Source:** Institute Information on Education, Statistical Yearbook, 2005; graph from CzechInvest

***Numbers To Be Gradually Increased!***

# Technical Education – Key to Innovation

Honeywell




**Source:** Institute Information on Education, Statistical Yearbook, 2005; graph from CzechInvest

***Motivation And Career Perspective!***

# Technical Education Highlights

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- MSc degree still preferred (BSc starting …)
- Fairly deep theoretical education (do not relax!)
- High computer/IT literacy (sw development)
- Engineers more thoughtful, some less entrepreneurial
- Sometimes language & soft skills to be developed
- High degree of loyalty during employment
- Long-term relationship/job preferred
- Technical content of job highly valued
- Flexibility steadily improving (fresh graduates)
- Timely address the best already during final grades
- Increasing government attention to technical education

***Knowledge – Not To Be Worn-Out By Usage***

# Honeywell International

# Company Overview

Honeywell

- **Recent History**
  - **1999 – Merger of Honeywell and AlliedSignal**
    - **Honeywell Inc. –** Control company since 1886
    - **Allied Signal** – Conglomerate dated back to 1920

Damper Flapper

Allied Chemical & Dye

  - **2000-2001 – General Electric attempt to acquire Honeywell**
    - Aerospace segment to be significantly strengthened
    - Take-over blocked by European Commission
  - **2002-2003 – New era of the company**
    - Deep restructuring and consolidation
    - Dave Cote takes over as CEO

- **Basic Facts**
  - **Based in Morris Township, N.J. USA**
  - **Employee number number of 120,000**
  - **Presence in nearly 100 countries across the world**

***More Details : www.honeywell.com***

# History in examples – since 1886

Honeywell

1886

Damper Flapper

1953

T-86 "Round" Thermostat

1986

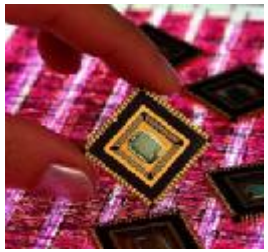
Avionics Systems

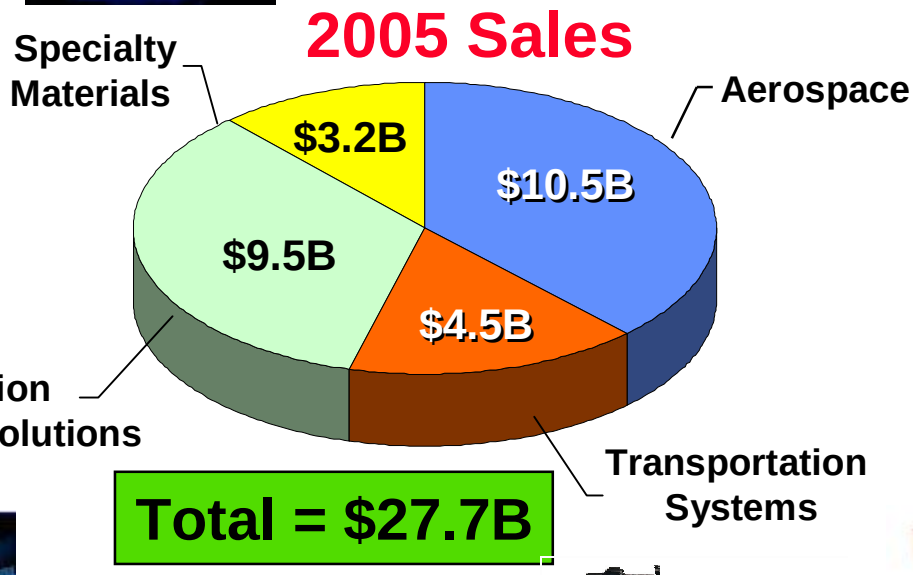
Více informací na [www.honeywell.com](http://www.honeywell.com)

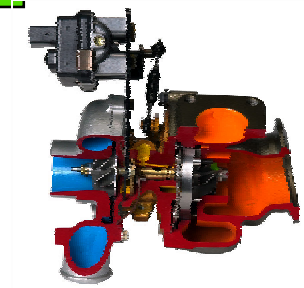
***From Flappers, Via Thermostats To Avionics ...***

# Honeywell Businesses

Honeywell







***Diverse Businesses, Technologies & Products***

# Honeywell Local Experience

- Presence & History
- Honeywell Technology
- University Relations

# Drivers and Expectations

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- **Why the Czech Republic?**
  - Qualified technically excellent workforce
  - Tradition of technical education and creativity
  - Cultural proximity
  - Geographical position and developed infrastructure
  - Business friendly and stable environment
- **What is expected:**
  - Availability of suitable workforce ready to cope with innovative and competitive environment
  - Flexibility and invention of our employees
  - Readiness to enhance personal qualification and skills
  - Communication, personal and managerial proficiency
  - Ability to efficiently cooperate in global environment
- **What is offered:**
  - Employment at global technological corporation
  - Mastering and use of up-to-date tools and methodologies
  - Career opportunity and growth

***Mobility – Flexibility – Passion – Performance***

# Honeywell History Czech Republic

Honeywell

- **Sales & Distribution**
  - 1962 – Sales representation via Austrian branch
  - 1991 – Honeywell Service & Engineering s.r.o.
  - 1995 – Honeywell spol. s r.o.
- **Research & Development**
  - 1993 – Prague Technology Center (today's Prague Laboratory)
  - 2003 – Global Design Center in Brno

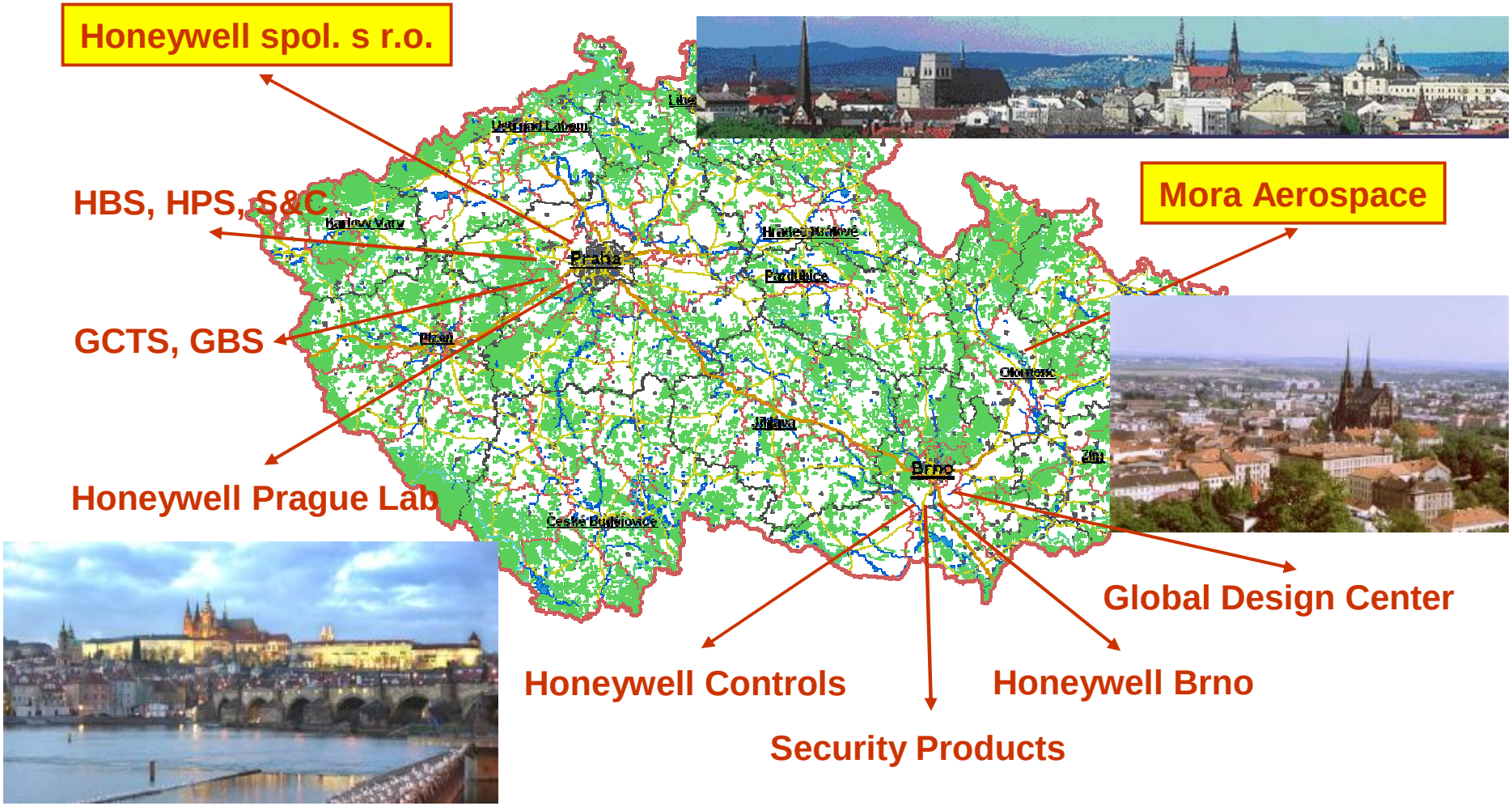
- **Manufacturing Units**
  - 2001 – Ademco Brno
  - 2002 – Mora Aerospace a.s.
  - 2002 – Honeywell Controls s.r.o.
  - 2003 – Security Products (Olympo Controls)
  - 2003 – Activity consolidation at new Brno facility

- **Shared Services**
  - 2004 – Global Credit and Treasury Services
  - 2004 – Global Business Services

***Honeywell Employs Over 2,000 People in CR***

# Honeywell in the Czech Republic

Honeywell




**Czech Republic: Key Honeywell Destination**

# Reasons to Invest in the Czech Republic

Honeywell

- **Initial conditions**
  - **Globalization of R&D and innovation**
  - **Sustainable growth in highly competitive environment**
  - **Cost efficiency of manufacturing and technology advancement**
  - **Enhancement of company presence in the region**
- **Enablers**
  - **Highly qualified, effective and innovative technical workforce**
  - **High standard of technical education**
  - **Long and successful history of industrial development**
  - **Political and economic stability, cultural proximity**
  - **Strategic geographical location and developed infrastructure**
  - **Appropriate business and investment environment**
  - **Investment support and incentives (CzechInvest role)**
  - **Positive reference of other investors**
  - **Hands-on experience with Honeywell Prague Laboratory**

***Technology Absorption and Innovation Prone***

# Honeywell Manufacturing

Honeywell

## Manufacturing Facilities

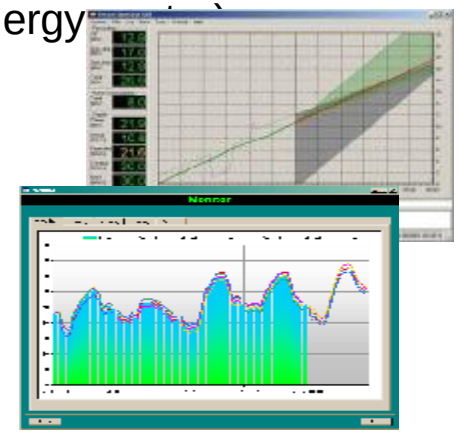
- **Mora Aerospace** (2002)
  - Location: Hlubocky near Olomouc
  - Aircraft engine components
  - Expansion since 2004
- **Honeywell – Brno** (2001)
  - Location: Brno - Cernovice
  - Security system components
  - Control products
  - Expansion since 2004
- **Honeywell Controls** (2002)
  - Location: Technology Park Brno
  - Automotive sensor technology
- **Security Products** (2003)
  - Location: Brno
  - Security solution integration

***Significant Expansions To Be Continued***

# Prague Laboratory (1993)

Honeywell

- **Research & Development Establishment**
  - **35 employees**
  - **Headquarters in US, links China, India**
- **Technology Focus**
  - **Process Control and Optimization**
  - **Data Centric Technology**
  - **ASIC Design (aerospace)**
- **Activity Highlights**
  - **Integrated knowledge intensive sw solutions**
    - Unified Energy Solutions (advanced solutions for power/energy
    - Decision Support Suite (data oriented decision support)
  - **Support of business units and customer projects**
  - **Patents, publications, lectures**
- **Cooperation with Czech Technical University**
  - **Direct personal links**
  - **Joint research projects**

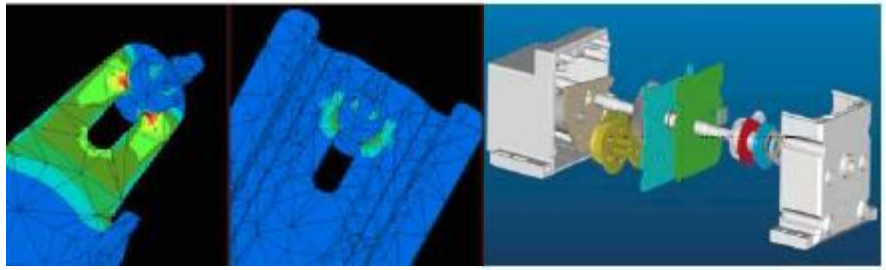


***First Honeywell R&D Unit Outside US***

# Global Design Center (2003)

Honeywell

- **Basic data**
  - Location: Brno, Černovická terasa
  - Employees: 230
- **Sponsoring Divisions**
  - Environmental and Combustion Control
  - Security Systems
  - Sensing and Control
  - Aerospace Electronic Systems
  - Turbo Technologies
  - SAP Support
- **Status**
  - Part of Honeywell Technology Solution Labs worldwide (US, China, India)
  - Corporate level technology support unit
  - Recruitment campaign continues
  - Close link to Brno University of Technology



***2003 Award: Investor Most Enhancing Qualified Labor***

# University Cooperation Strategy

Honeywell

## What Is Expected:

- *Company:* Influence of basic/special curricula based on market needs and technology developments
- *University:* Delivery of basic/special courses, degrees, incl. customized courses/certifications to companies

## What Makes Difference:

- Contacts, sponsorship, working relationship, trust building
- Recruitment, university job fairs, company open days, etc.
- Joint projects, R&D activities, consortia, spin-offs, start-ups
- Personal/staffing relationship, exchange stays, internships
- Long-term relationship, champions on both sides essential
- Selective and flexible approach for large companies and SMEs
- CTU Media Lab Foundation – to support students' innovative ideas and promote engineering career recognition

***Total Sponsorship of $300,000 in 2003-2005***

# Future Strategy in the Czech Republic

Honeywell

- **Continuation & Expansion of Existing Operations**
  - Manufacturing
  - Global Design Center
  - Prague Laboratory
  - Sales & Solutions
- **Building University Relationship**
  - Sustainable supply of technical talent
  - Long-term necessity and commitment
- **Coming Activities**
  - Aerospace
  - Transportation Systems
  - Specialty Materials
  - Shared services

***Czech Republic: Key To Honeywell's Growth***

# Areas for Discussion

# Government – Industry – Science Cooperation 1

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- **Role of governments in making link between expectations of business sector and needs of business on the one side and needs of feeling of research freedom and independency of research sector on the other side and in fostering link between R&D and innovation**

## Cooperation versus Freedom & Independence

- **Where have limitations been recognised for the freedom of university research? How is the independency of university and public research institutes limited, if any?**
- **Is there any responsibility or relationship between universities and/or public research institutes for state research policy and its priorities?**

***Foster Innovation and Technology Absorption***

# Government – Industry – Science Cooperation 2

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## Cooperation versus Freedom & Independence

- Which tools are used at national level for implementation of research priorities/strategy, which were set up by governmental sphere [if any], in research pursued by universities?
- How can the independence of research and the needs of governments been balanced?
- What is the role of academic institutions and their management in the process of recognizing of potential blockbusters?

***R&D Freedom versus Social Responsibility***

# Government – Industry – Science Cooperation 3

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## Government Role, Policies and Measures

- Which tools seem to be appropriate for strengthening the chain „research, development and innovation“? Which type of measures were identified as the most effective funding schemes (direct support) or e.g. tax deduction (indirect support) or other (platforms, clusters, …)?
- How did private sector participate on the preparation of measures and actions supporting the innovative behaviour of business sphere? Or was it first of all the activity of the government?
- Which tools can be used in order to encourage the under-funded business sphere to innovate? What are experiences of countries with those tools? How are they (or will have been) evaluated?

***State Support of Innovation Aspect***

# Government – Industry – Science Cooperation 4

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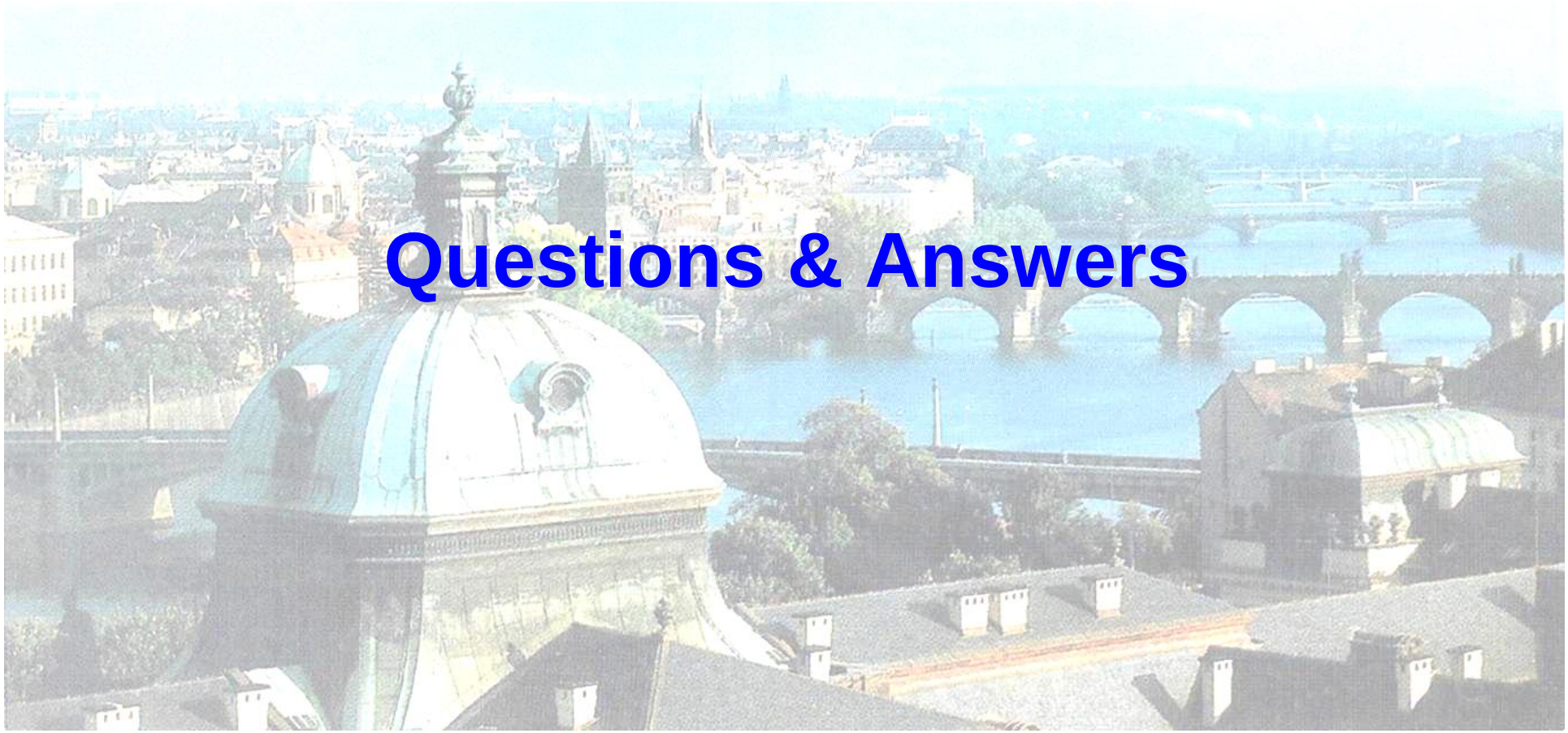
## Government Role, Policies and Measures

- Are countries of the opinion that a positive influence on innovative behaviour of private sector is possible and effective without threatening of market conditions?
- How can national research councils promote the innovation on the national level? Is there any possibility how to influence the innovation at European level?
- Should the system of R&D assessment also cover innovative potential of the scientific results?

***Manage or Lead in R&D and Innovation***



# Questions & Answers