Science, Technology and Innovation: A Key Driver for Economic Growth

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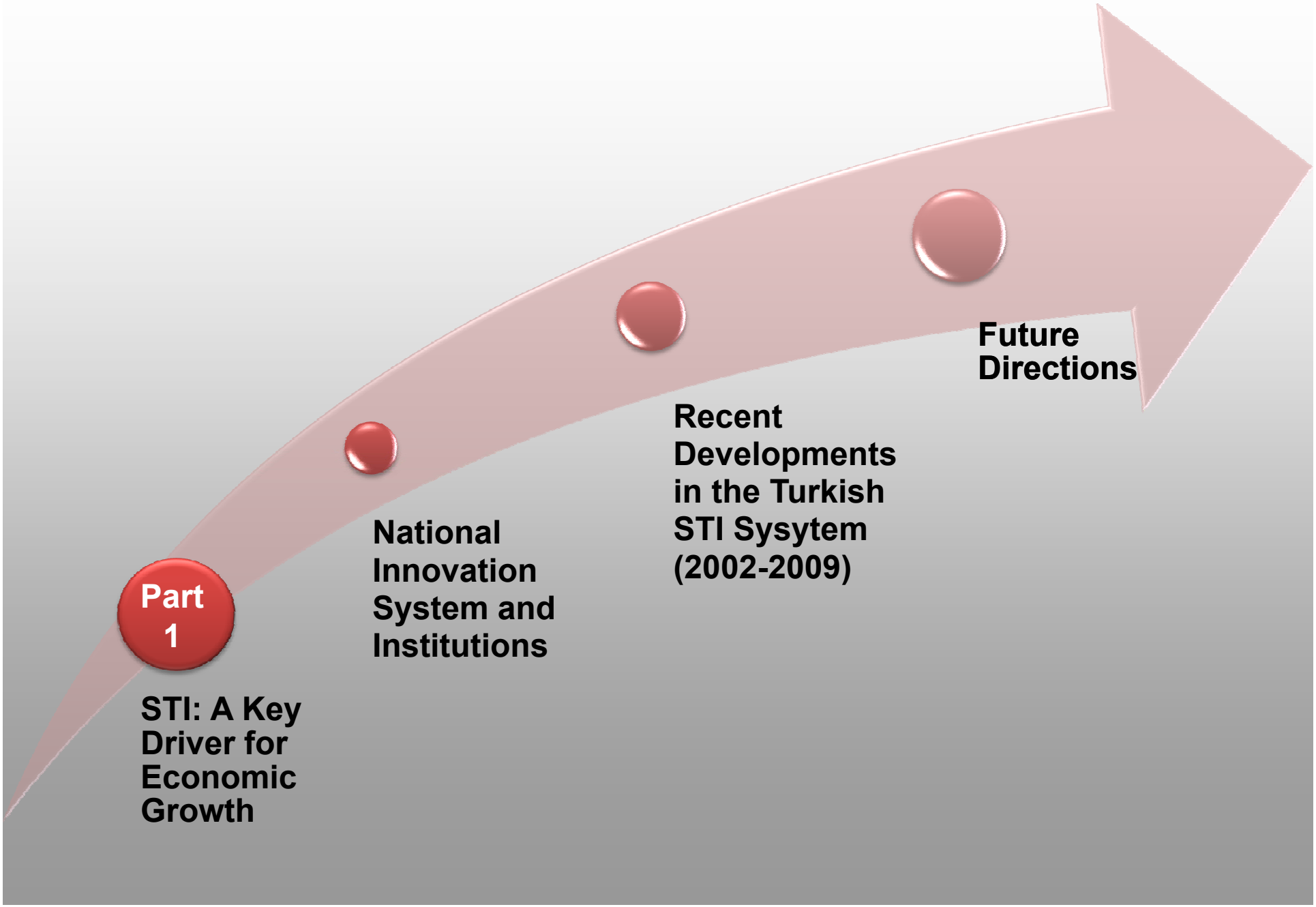
ITiCSE 2010, Bilkent University


Part 1
STI: A Key Driver for Economic Growth
National Innovation System and Institutions
Recent Developments in the Turkish STI Sysytem (2002-2009)
Future Directions

Science, technology and innovation,

is the **key** instrument for;

- **Smart Growth:** developing an economy based on knowledge and innovation
- **Sustainable Growth:** promoting a more resource efficient, greener and more competitive economy
- **Inclusive Growth:** fostering a high-employment economy delivering social and territorial cohesion*

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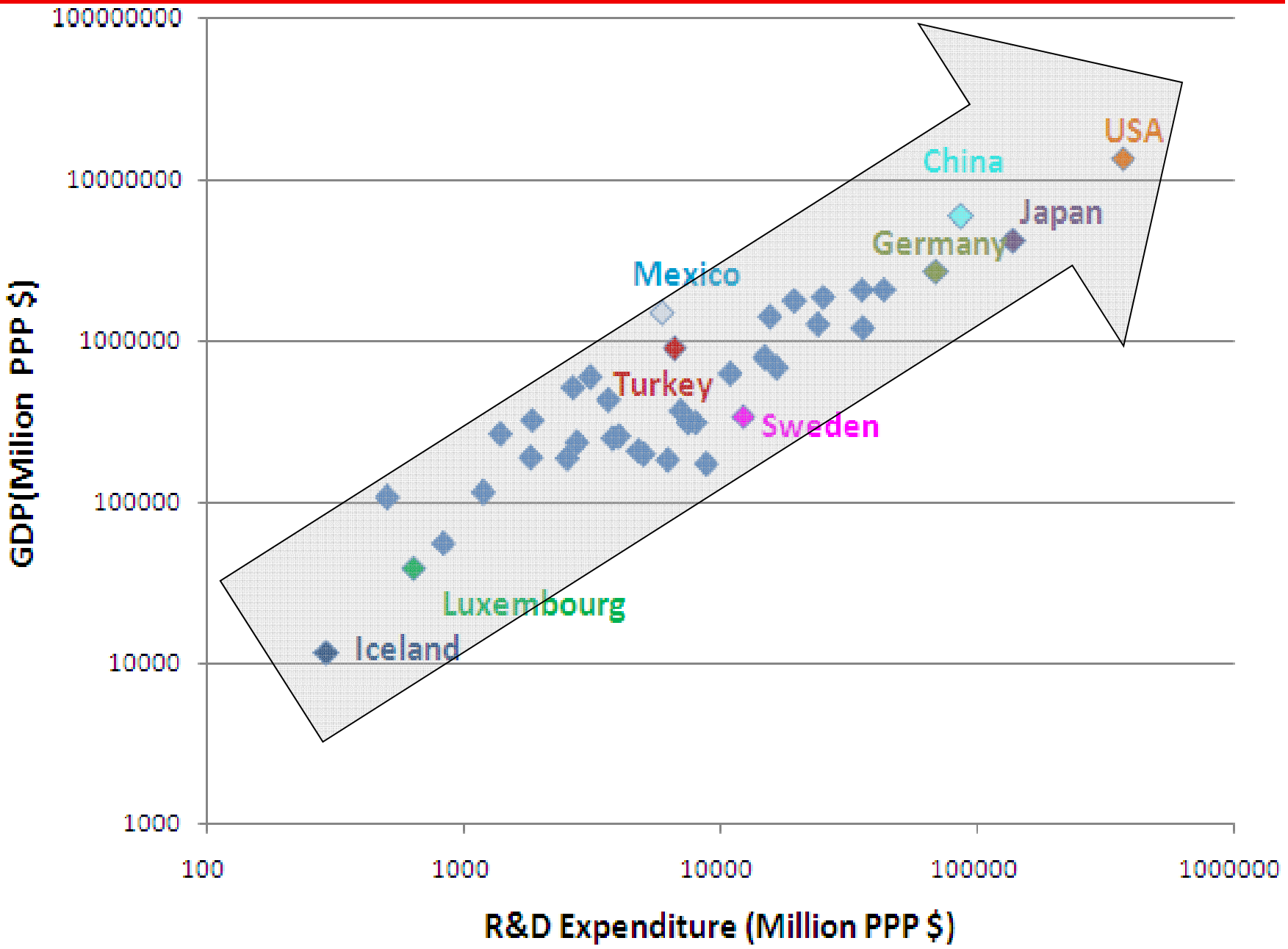
* EUROPE 2020 A European strategy for smart, sustainable and inclusive growth

R&D Expenditure GDP Relation (2007)



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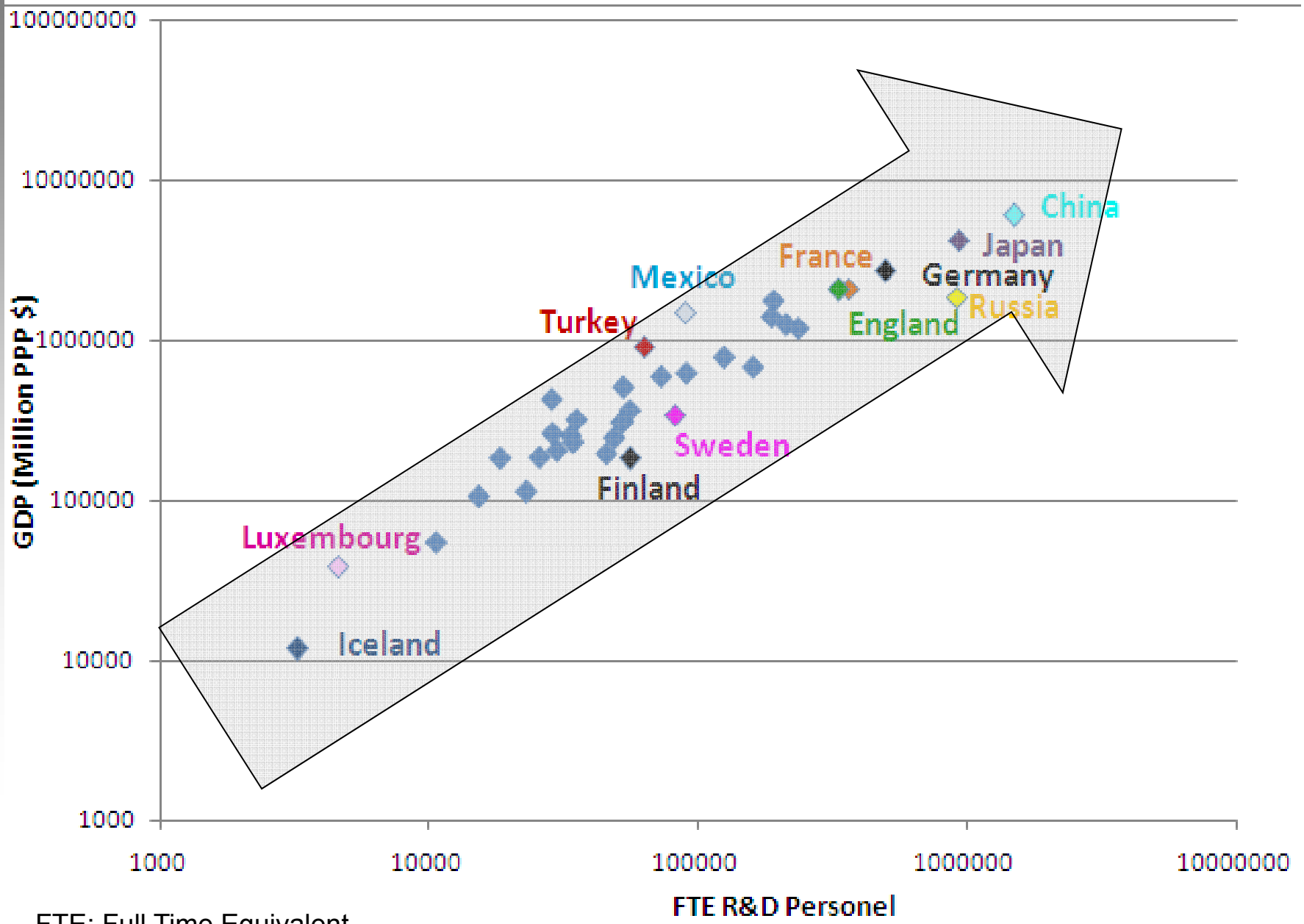
FTE R&D Personel GDP Relation (2007)



FTE: Full Time Equivalent

An Example: Germany's STI Approach*

Germany, where *Budget Deficit as a Percent of GDP* reached to a critical level of 3.3% in 2009, has stated the Financial Plan for the period up to 2014.

- According to the Plan (2011-2014);
- While there will be **€ 82 bn worth of cutbacks** for most sectors including Defense and Social Security,
- **an extra €12 bn** will be **provided only for the areas of Research, Education and Development** between now and 2013.

*The Federal Ministry of Finance , the Federal Statistical Office , BBC News

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Facts on Turkey for the year 2002

- Continuing effects of 2001 economic crisis
- Low level of public R&D funds
- Low share of industrial R&D

Performing Sector	2002 (%)
Academia	64
Industry	29
Public Institutions	9

- Low level of demand for innovation
- Increasing global competitive pressure on sectors with high export.

There was an urgent need to make a leap forward in the area of STI.

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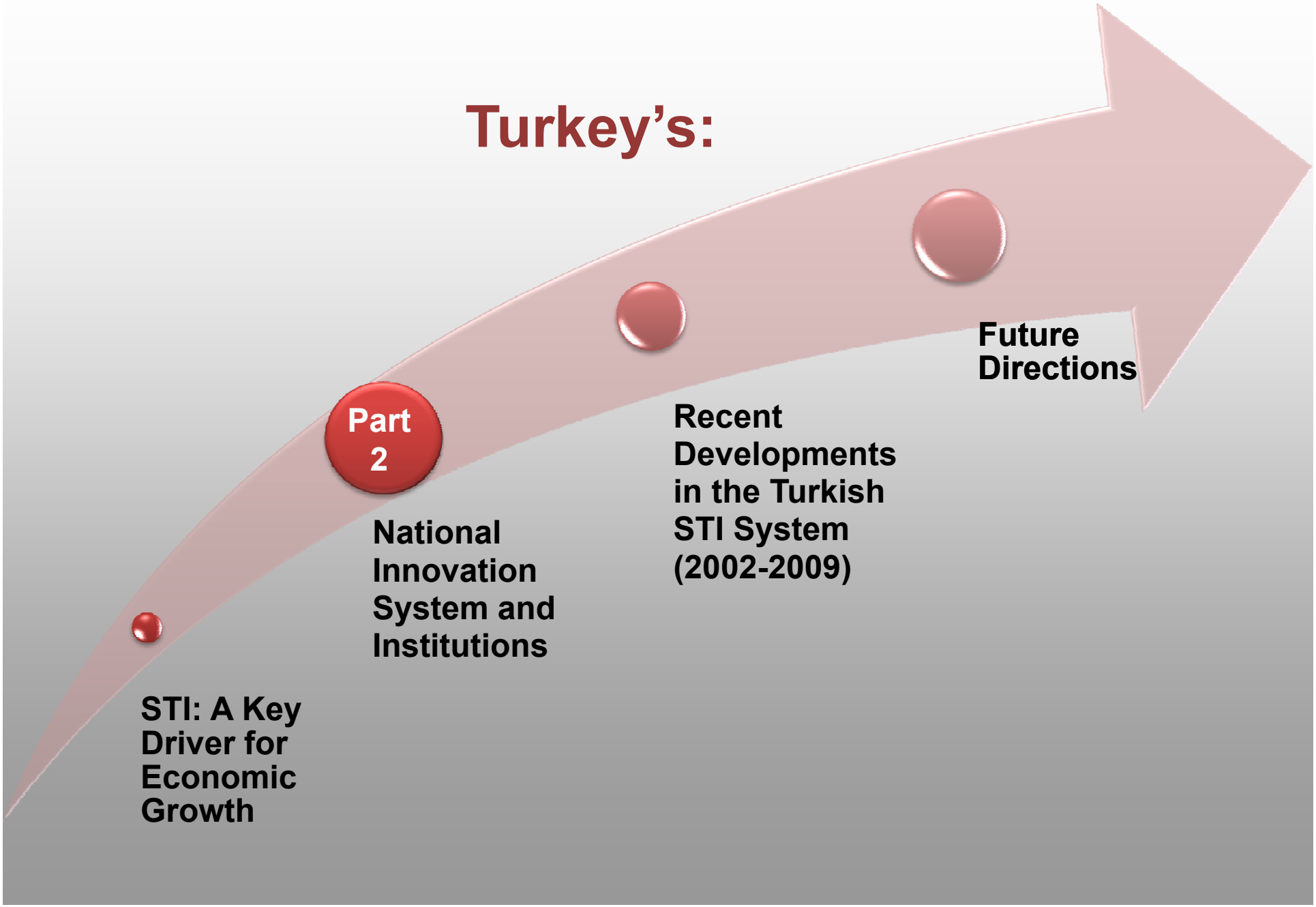
Turkey's:


Part 2
STI: A Key Driver for Economic Growth
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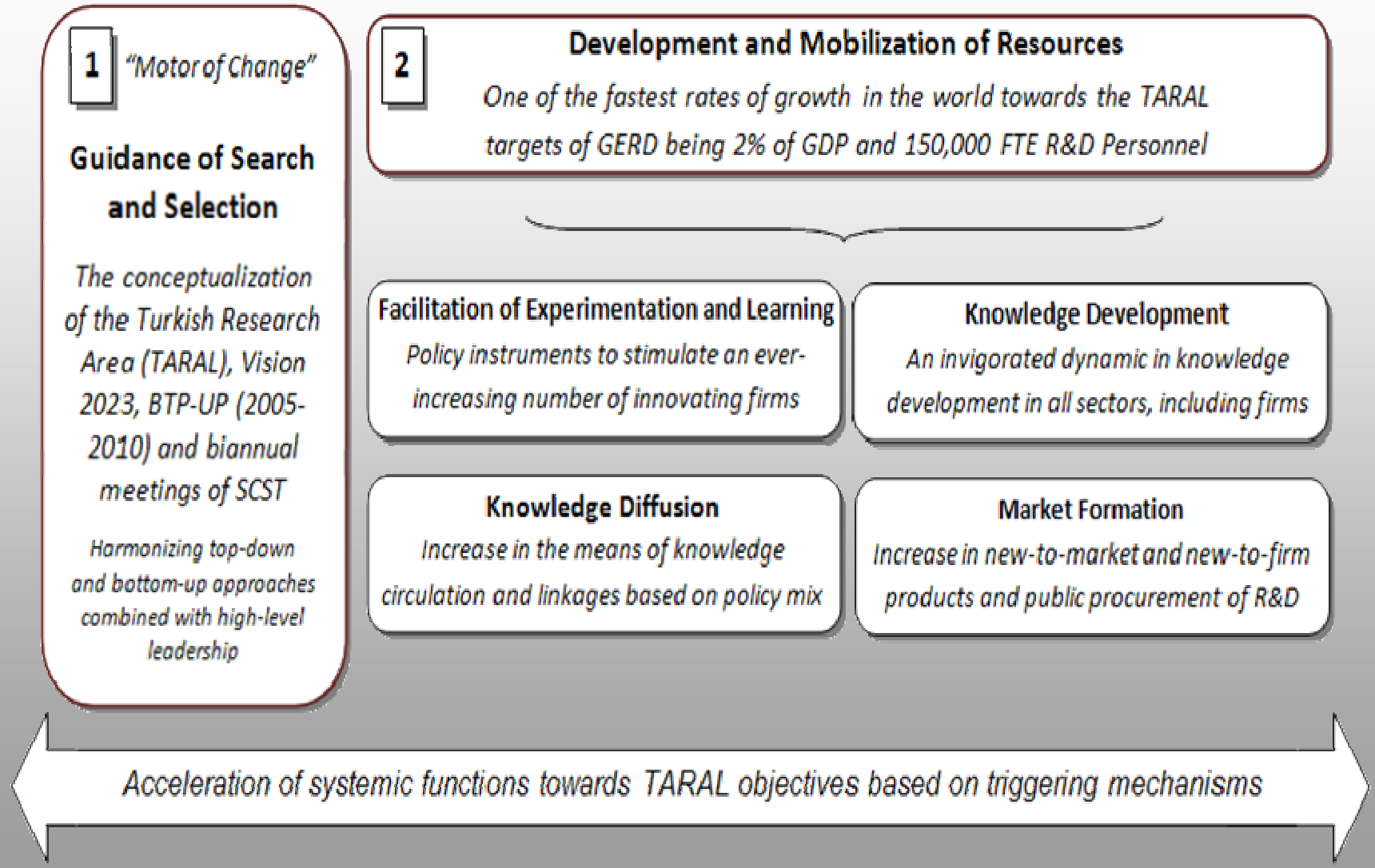
Turkish National Innovation System



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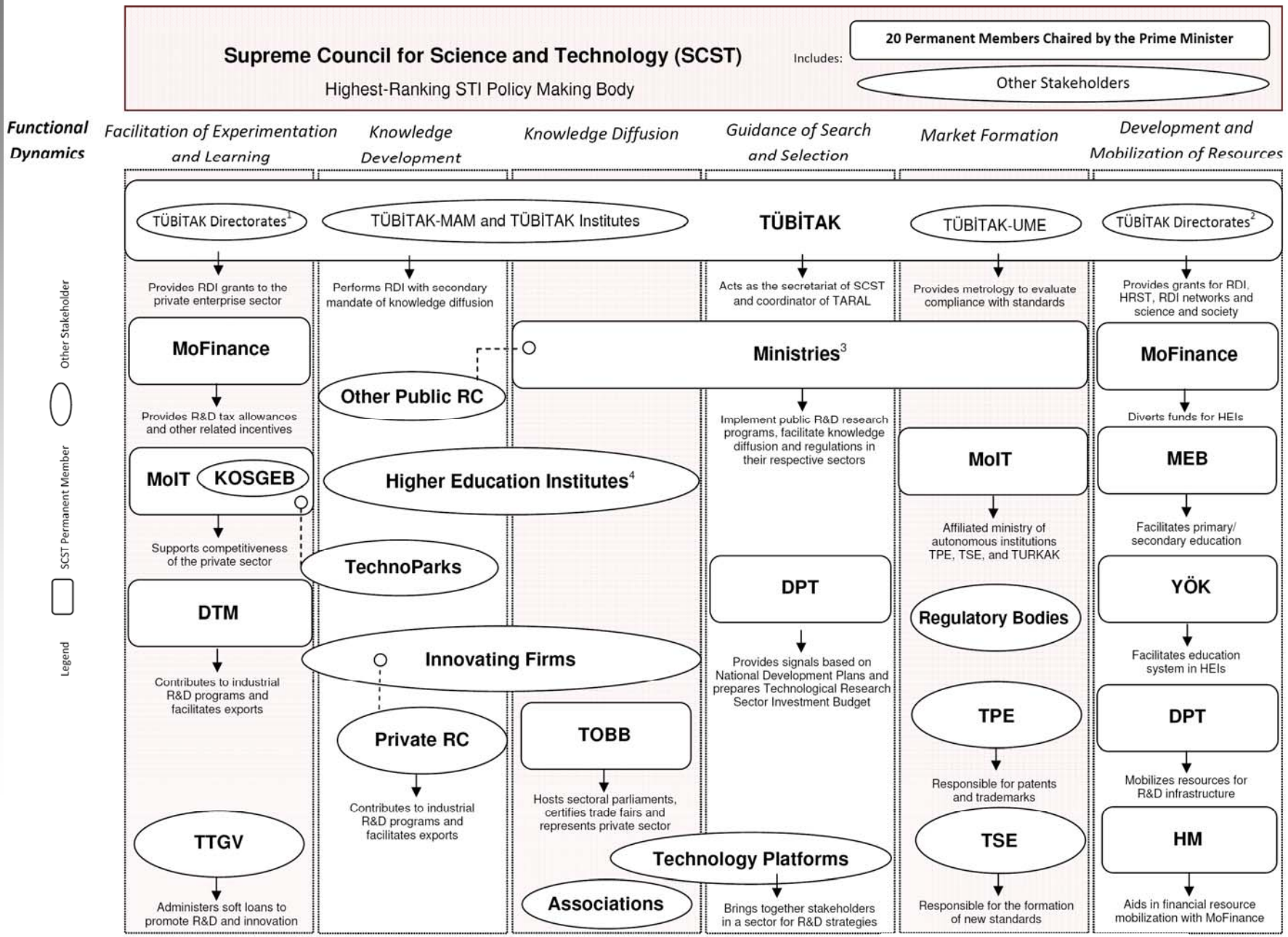
Main Actors of the Turkish NIS and Their Systemic Functions



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Turkish National Innovation System

The Turkish Model is the set of characteristics that are instigated to accelerate the systemic dynamics of STI to reach fast-paced levels of increase in STI indicators with a perspective towards future-oriented goals

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Turkish National Innovation System

Supreme Council for Science and Technology

BTYK / SCST

The Supreme Council for Science and Technology:

The highest ranking STI policy-making body in Turkey with the decision-making power for S&T and innovation policy.

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Turkish National Innovation System

Supreme Council for Science and Technology

Structure: 20 permanent council members headed by the Prime Minister with others invited with advisory capacity.

Represents: Over 100 different stakeholders from governmental bodies, higher education and private sectors.

Background: With eleven meetings in five years, the 19th and 20th meetings were realized in 2009.

Provides: An effective medium for diffusing developments on recent STI policies and establishing new decrees while increasing commitments for policy implementation.

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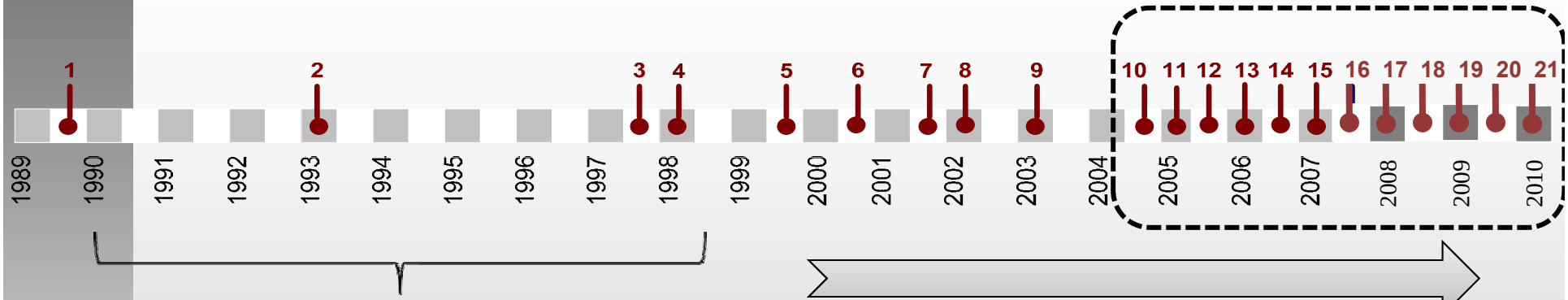
Turkish National Innovation System



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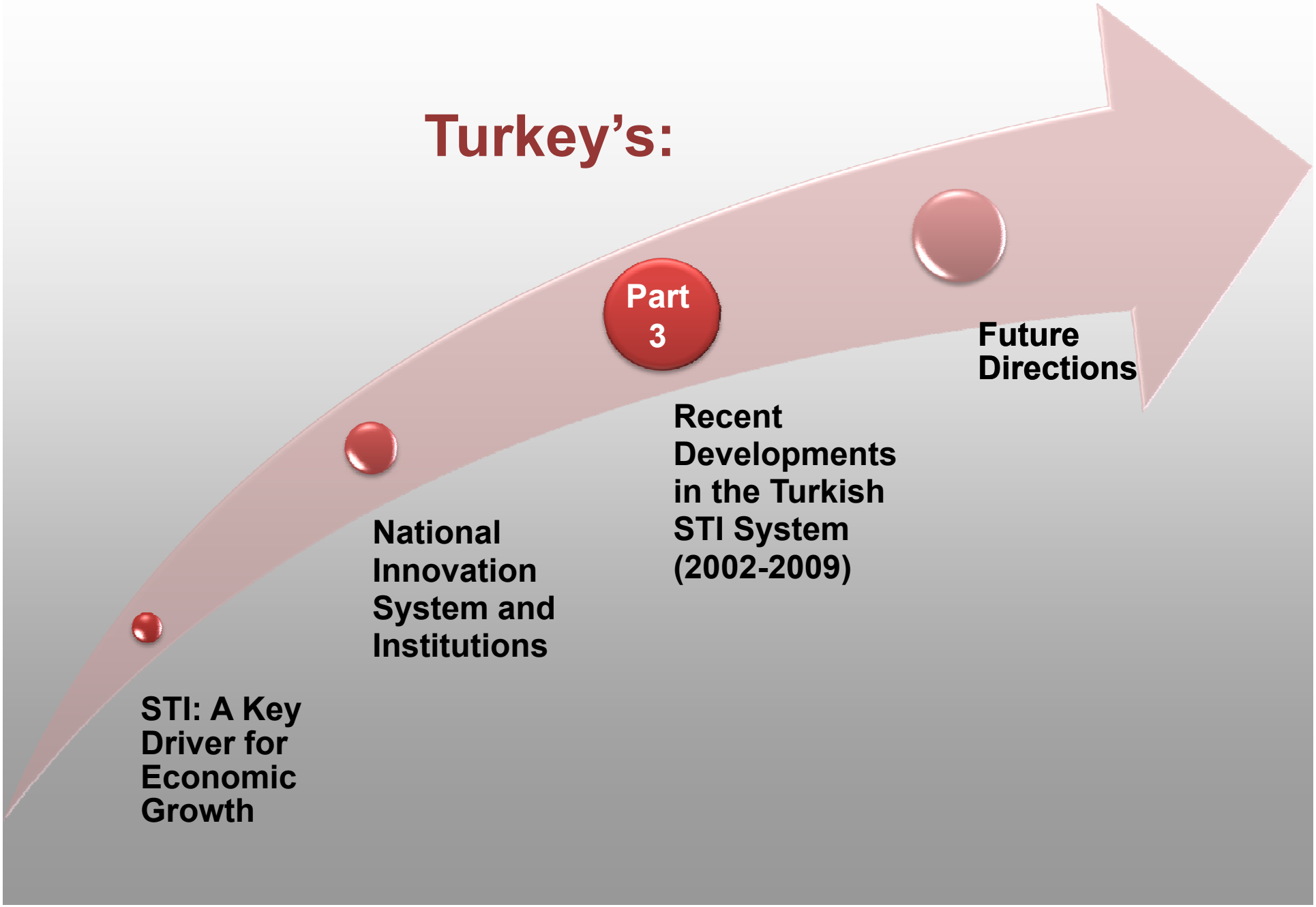
Turkey's: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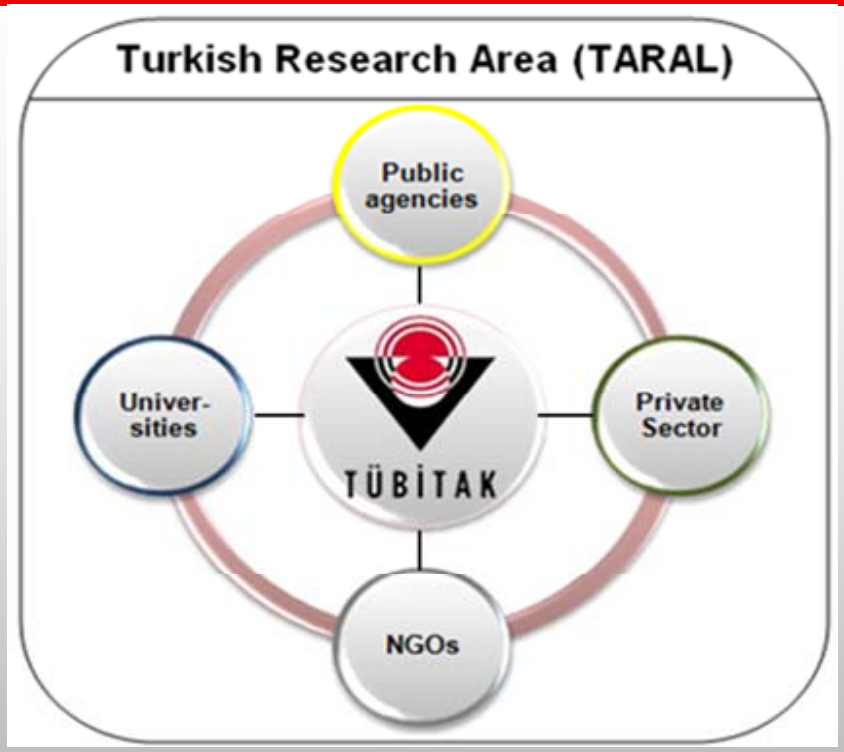
National Science and Technology Initiative

Aims
Objectives
Principles
Priorities



TARAL Objectives

1. To enhance **the quality of life**;
2. **Find innovative solutions** to societal problems;
3. Increase the **competitiveness** of the nation;
4. Foster and diffuse S&T awareness in society.

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Strategic Approach

- 9th Development Plan (2007-2013)
- Vision 2023: Science and Technology Strategies
- Launch of the Conceptualization of the Turkish Research Area (TARAL)
- Science and Technology Policies Implementation Plan (BTP-UP) 2005-2010
  - Diversification of public RDI programs in a policy mix
  - Triggering mechanism to accelerate systemic functions
- National Innovation Strategy (2008-2010)
- International S&T Strategy (2007-2010)

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GERD: Gross Domestic Expenditure on Research and Development

Resurrecting RDI in Turkey - Milestones

- Supreme Council for Science and Technology started to convene regularly.
- **Unity of jargon (OECD Frascati, Oslo and Canbera manuals have been adopted as references)**
- Strategic perspective, and concrete and motivating targets
  - Areas under the **Prime Minister's Initiative**
    - Developing Science and Technology Human Resources
    - Defense Research Program
    - Aerospace Research Program
    - Science and the Society Program
    - **Energy, Water and Food Strategies for 2011-2016**
- Devoting **financial resources** to this area
- Developing the necessary climate
  - Governance and legal infrastructure

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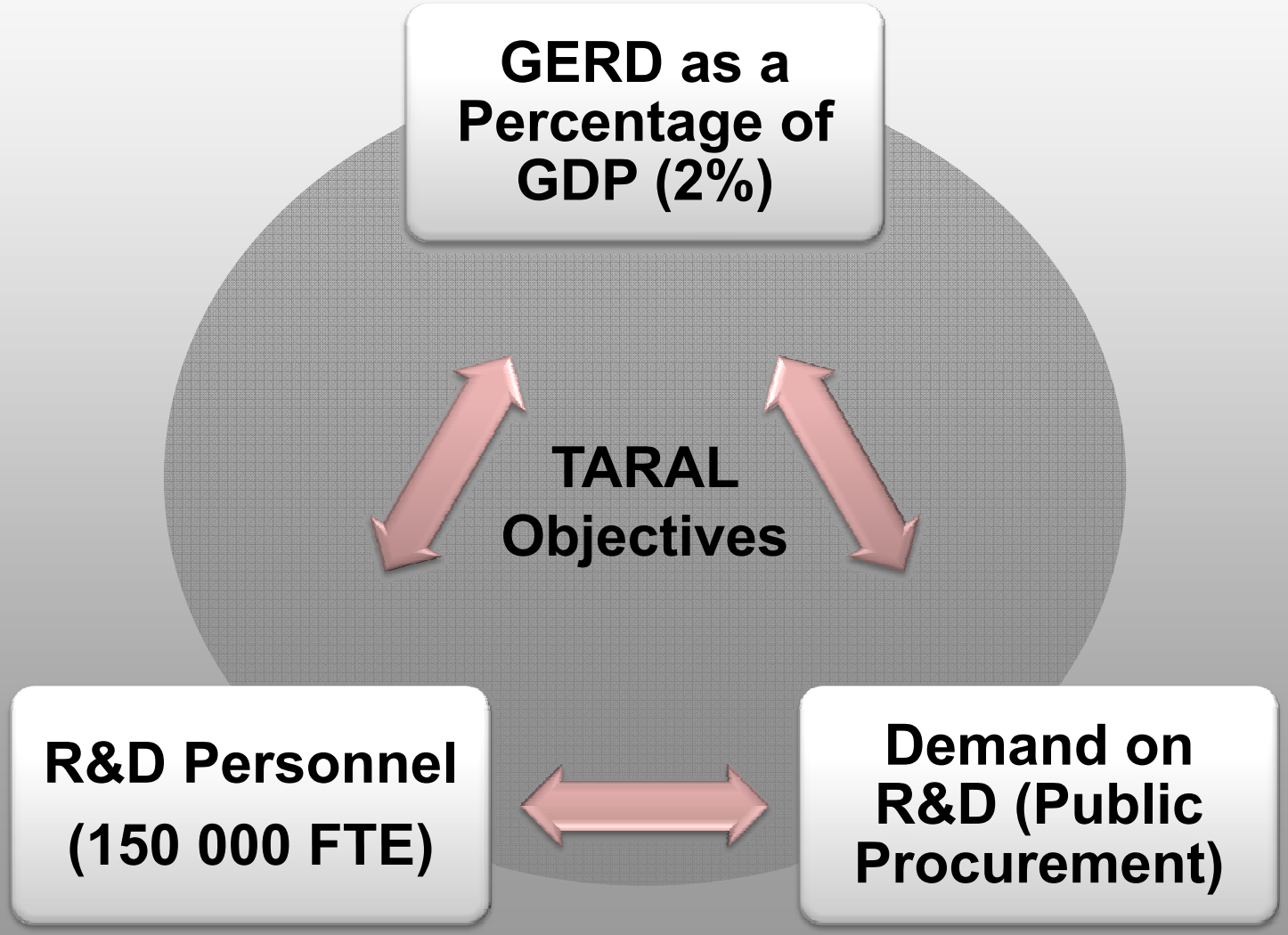
Commitment for Concrete Targets (2013)

Shared National Vision and Consensus



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The TRA targets provided **a stimulated environment for RDI** when combined with BTP-UP 2005-2010

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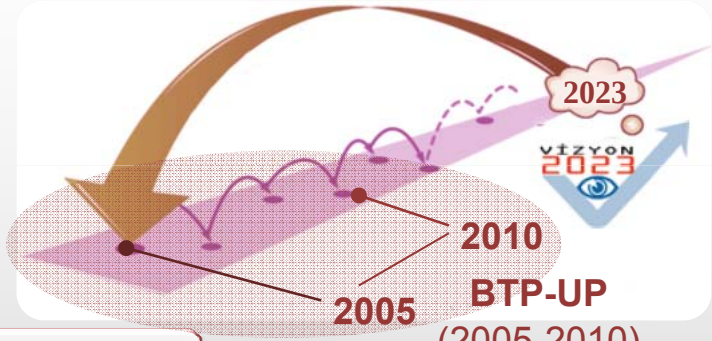
RDI: Research, Development and Innovation

BTP-UP (2005-2010)

The first plan aimed to springboard the country towards the long-term aims for 2023 based on Vision 2023.



Strategic Objectives

1. Increase S&T awareness in society and improve STI culture
2. Advance the quality and quantity of human resources for S&T
3. Support high quality, result-oriented research
4. Enhance the effectiveness of STI governance
5. Boost the S&T performance of the private sector
6. Improve the research climate and research infrastructure
7. Further the effectiveness of national and international networks

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Vizyon 2023 Project sets forth the aim of creating an ever-more innovative society in 2023, which marks the 100th anniversary of the foundation of the Republic of Turkey

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Foresight Panels of Vision 2023

10 Socio-Economic and 2 Thematic Panels

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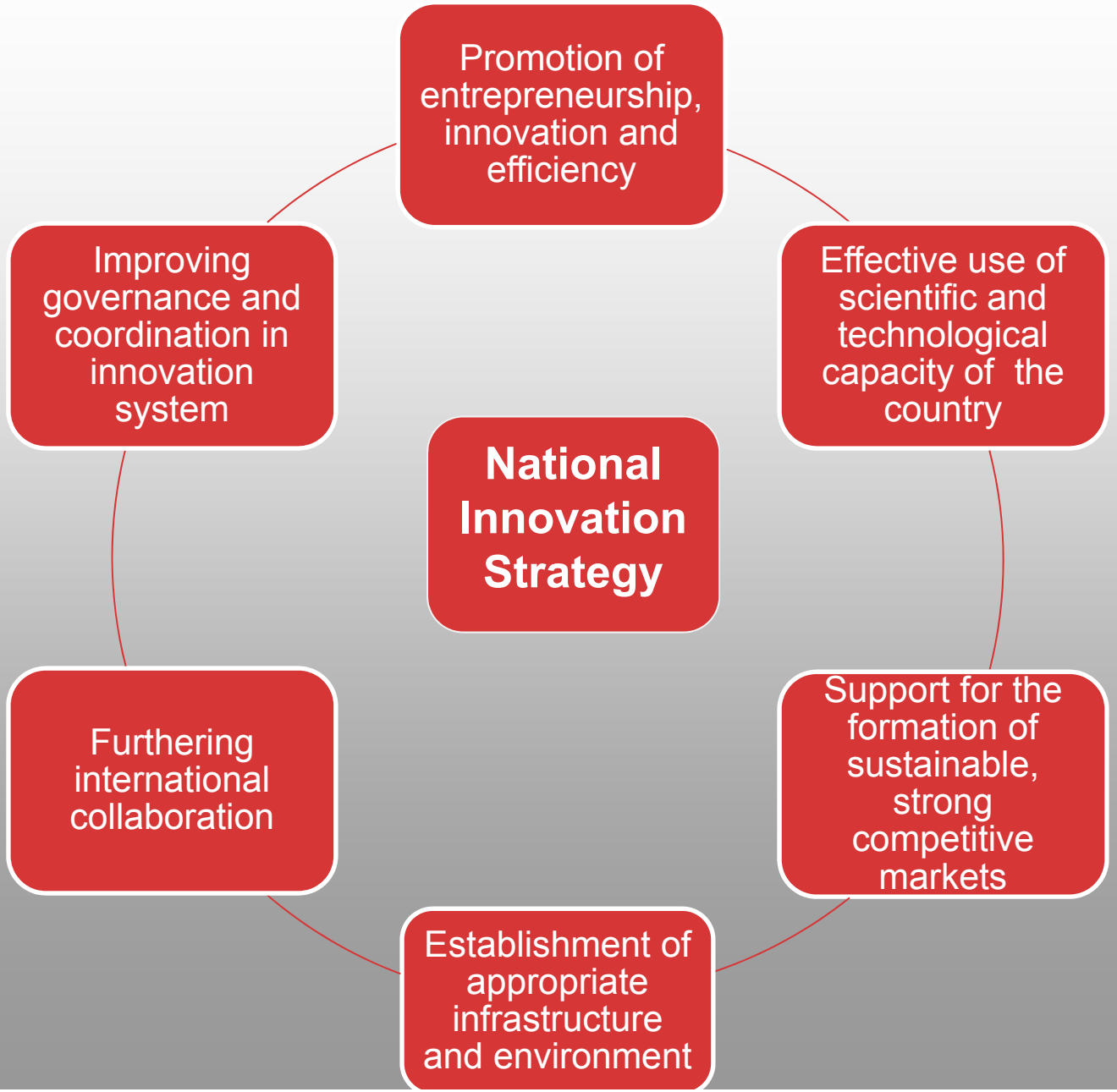
National Innovation Strategy (2008-2010)



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International STI Strategy (2007-2010)

1. Establishing strong STI relations with countries of political, economic, commercial, cultural, strategic etc importance for Turkey
2. Developing concrete, effective and sustainable cooperation frameworks with advanced countries in STI, taking steps to improve existing relations
3. Creating effective communication channels with scientists abroad, facilitating and encouraging their participation in STI activities in Turkey
4. Providing convenience for the firms active in STI to collaborate and invest with their international counterparts
5. Ensuring coordination in the STI activities of the TARAL stakeholders composed of public and private institutions, universities and NGOs.

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Harmonization of bottom-up and top-down approaches combined with high level leadership

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Developments in Science, Technology and Innovation

2004
National STI Targets

2005
- Social Human Sciences Support Prog.
- Vision 2023, Prior STI Areas,
- Space, Defense and Public Research Prog.
- Science and Technology Policies Implementation Plan (BTP-UP) 2005-2010
- Public R&D Subsidy (TRA Budget)

2006
- Accession to 7.FP
- International STI Strategy
- National Innovation Strategy

2007
- National Science and Technology Human Resources Strategy Preparations

2007
- Sectoral Technology Platforms: *Electrics and Electronics, Textile, Automotive, Metal, Marine, Agriculture, Energy, Medicine*

FTE Researcher Target of 2010 is achieved

2008
- R&D Tax Incentive Law
- HR Stakeholder Workshops
- HR Coordination Committees
- Science Center Call

R&D expenditures of the business enterprise sector outpaced the that of higher education sector

2009
- Decision of Science and Technology Policies Implementation Plan (BTP-UP) 2011-2016 Preparations

2010
Province-Level Innovation Platforms

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Examples of Policy Instruments

Industrial R&D Projects Grant Program (TUBITAK/DTM)

- The largest grant program for the R&D and innovation projects of the private companies (both large enterprises and SMEs)
- The grant ratio provided by this program can be up to 60% of a project's budget and the support duration of the projects is a maximum of 3 years
- Aiming to increase technology development capability, innovation culture, and competitiveness of Turkish companies

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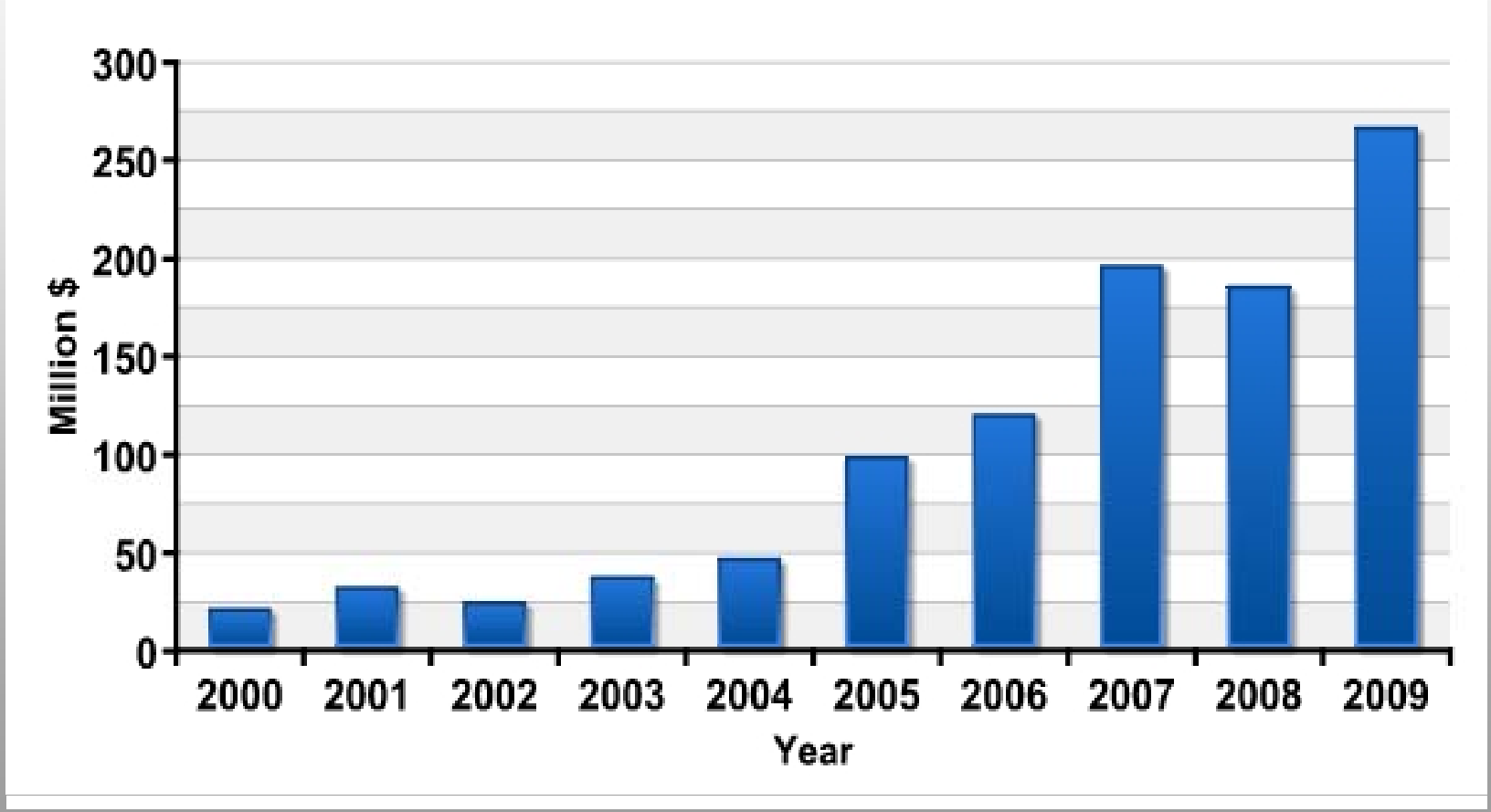
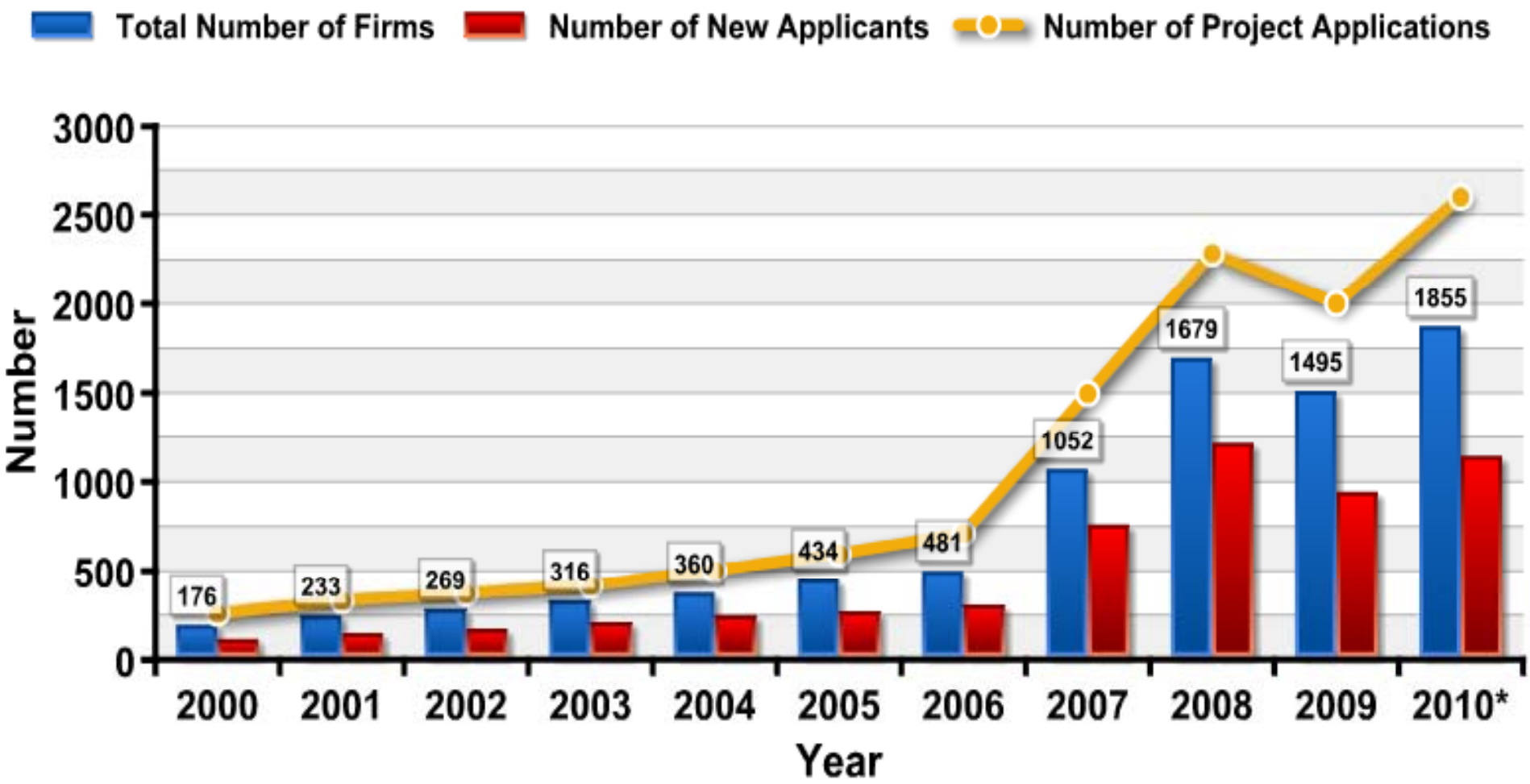
Examples of Policy Instruments

Industrial R&D Projects Grant Program (TUBITAK/DTM)



Distribution of total grants during 2000-2009 for all grant programs of TUBITAK-TEYDEB

Examples of Policy Instruments



The number of applicant firms and the number of project proposals during 2000-2009 for all of the Grant Programs of TUBITAK-TEYDEB for the industry

* Target for the year 2010

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Examples of Policy Instruments

Strengthening Demand for R&D and Innovation Through Public Procurement

- **Public Research Agenda:** within the frame of SCST decree (2005/5), aiming "to satisfy the R&D needs of public institutions and to foster R&D demand at societal level," public institutions are to develop research programs, including detailed content on schedule and cost.
- **Funding Program for Research Projects of Public Institutions :** aiming to address public institutions' R&D needs by encouraging partnerships between the industry, academia, and public research institutions.

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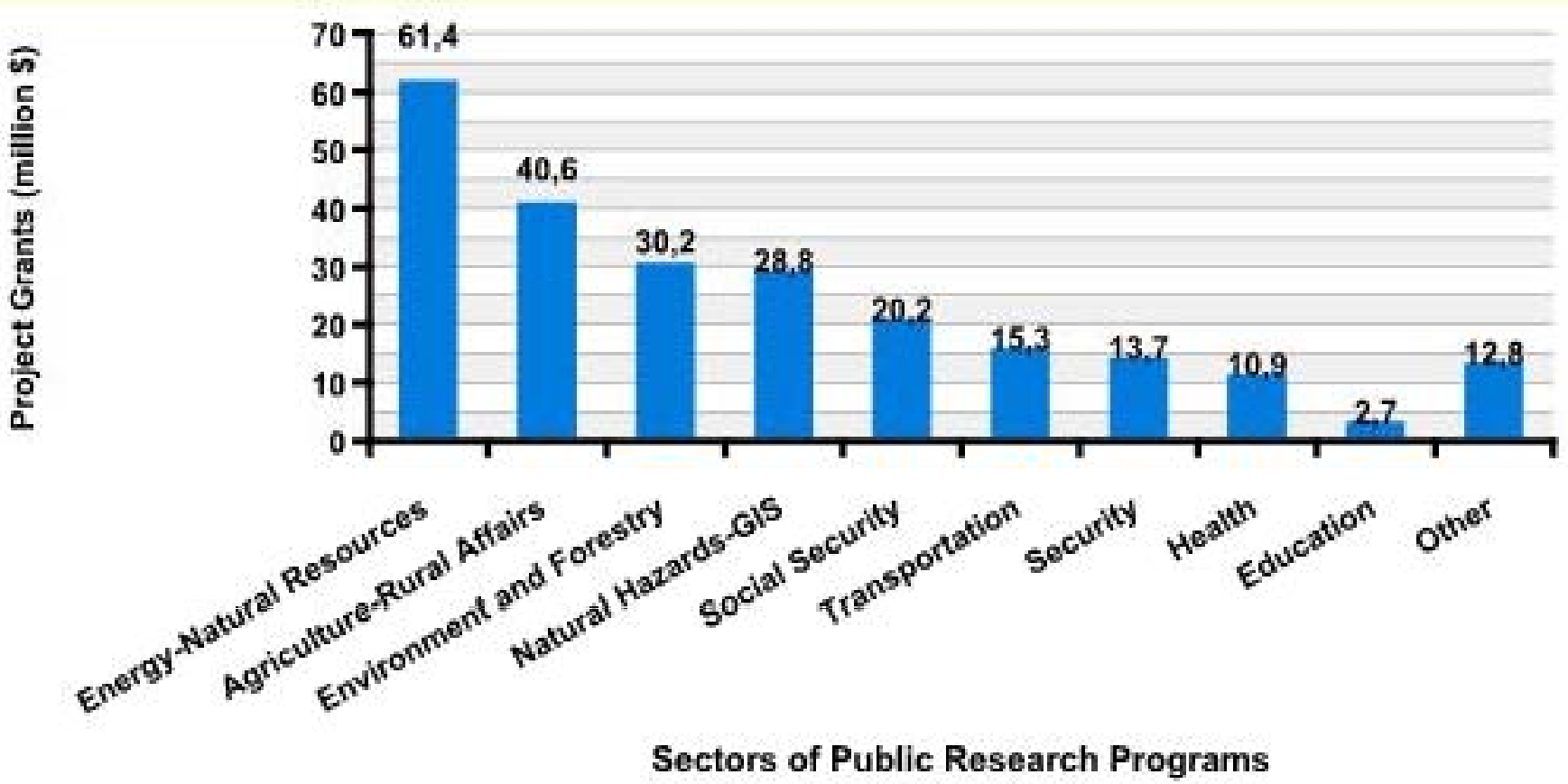
Examples of Policy Instruments

Strengthening Demand for R&D and Innovation Through Public Procurement



Distribution of Grants According to Sectors of Public Research Programs (including 2009)

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Examples of Policy Instruments

Stimulating R&D activities: New R&D Law

The new tax regime provides vast incentives for business R&D:

- Tax allowance has been increased from %40 to %100.
- R&D expenditures can be depreciated in the following 5 years by 100%.
- Additional allowance is provided to R&D centers employing more than 50 R&D personnel on a performance basis.
- Exemptions in income tax for R&D personnel employed in the private enterprise sector.
- Allowance is 90% for PhD holders, otherwise 80%
- The grant received from public or international R&D funds is exempt from income tax.

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Examples of Policy Instruments

Stimulating R&D activities: New R&D Law

Main Benefits:

- Enhancement of the scale of R&D performed by private sector, as well as contribution to increase in R&D expenditure of private sector
- Encouragement of the foundation of large R&D Centers within the industry
- Increase of the recruitment of R&D Personnal within the industry
- Contribution to the promotion of innovative enterpreneurship and pre-competitive cooperations
- To attract FDI for R&D

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Examples of Policy Instruments

Stimulating R&D activities: New R&D Law

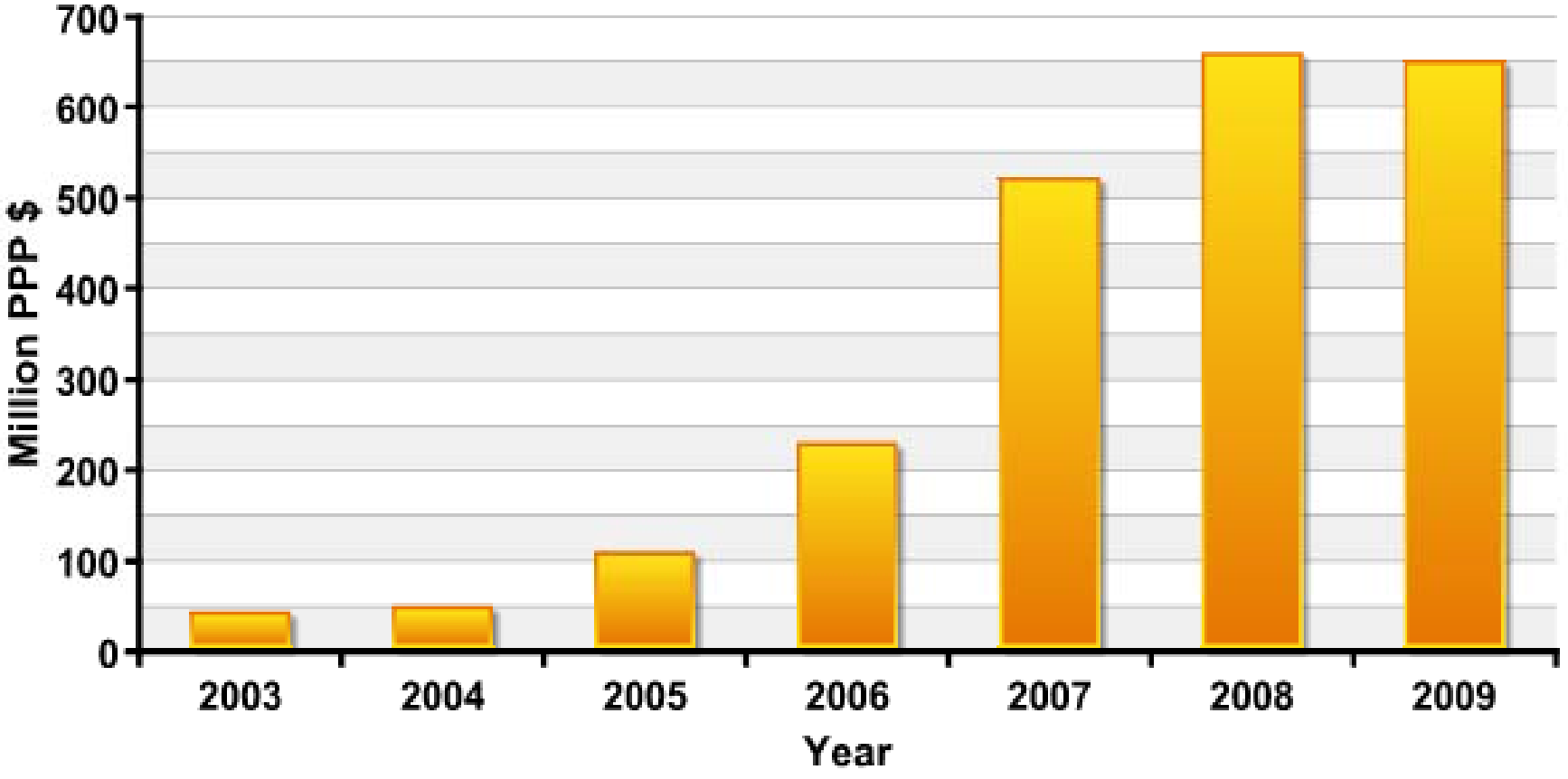
R&D Tax Allowance			Income Tax Withholding	
	2008	2009*		2009*
Number of Beneficiaries (Firms)	495	703	Number of Beneficiaries (R&D Personnel)	10969
Total Credit (Million $)	626	1308	Total with PhD Degrees	285

R&D Tax Allowance and Income Tax Withholding Based on Law No. 5746

*The numbers provided are as of December 2009
•Source: Ministry of Finance

Examples of Policy Instruments

TUBITAK Directorate of Science Fellowships and Grants (TUBITAK-BIDEB)



Annual Distribution of Grants for HRST (TUBITAK-BIDEB)

Examples of Policy Instruments

TUBITAK-ARDEB Programs in Support of HRST

- ***National Young Researcher Career Development Program***
  - PhD holders at the early stages of their research career.
- ***Global Researcher Support Program (EVRENA)***
  - National researchers to include **international experts** in their research. Turkish researchers living abroad may also benefit from this program.

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More than a Commitment:

Concrete Results

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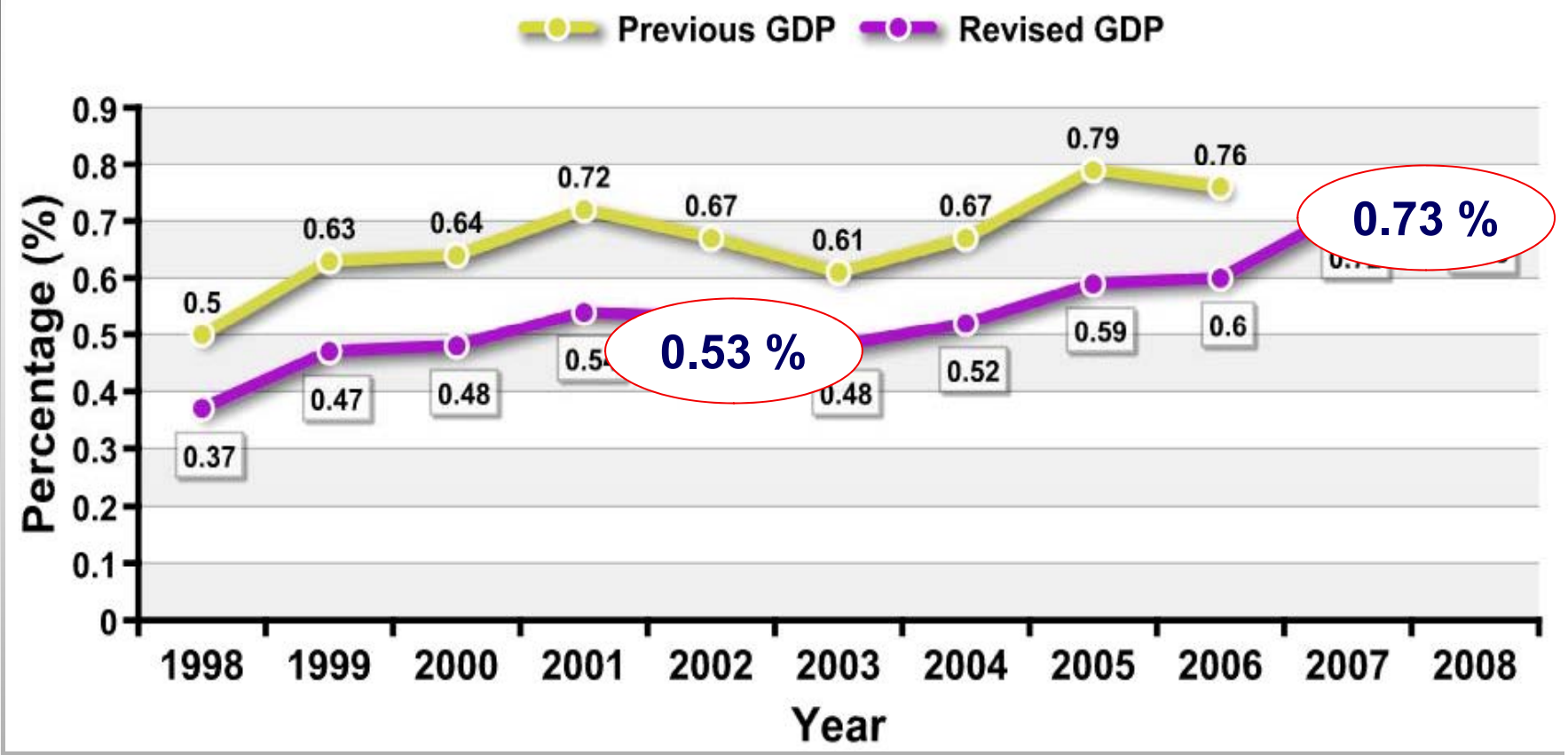
GERD as a Percentage of GDP



EU-27: % 1.76 **EU-15: % 1.88**

TR Target 2% by 2013

Source: TurkStat

Note: Gross salaries are used for the calculation of R&D labor cost in higher education sector after the year 2006 for values based on revised GDP. (Revised GDP was announced on March 08, 2008 by TurkStat)

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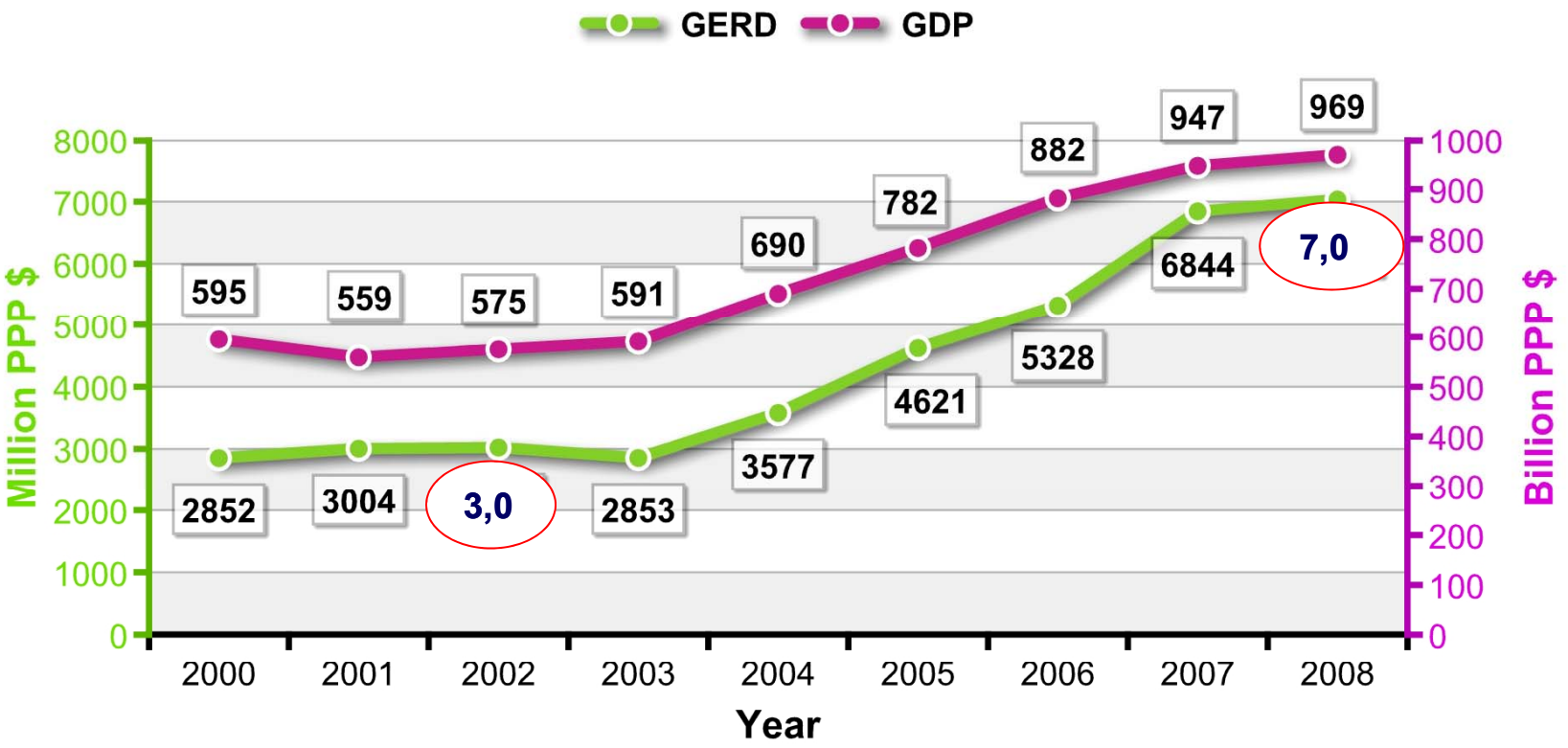
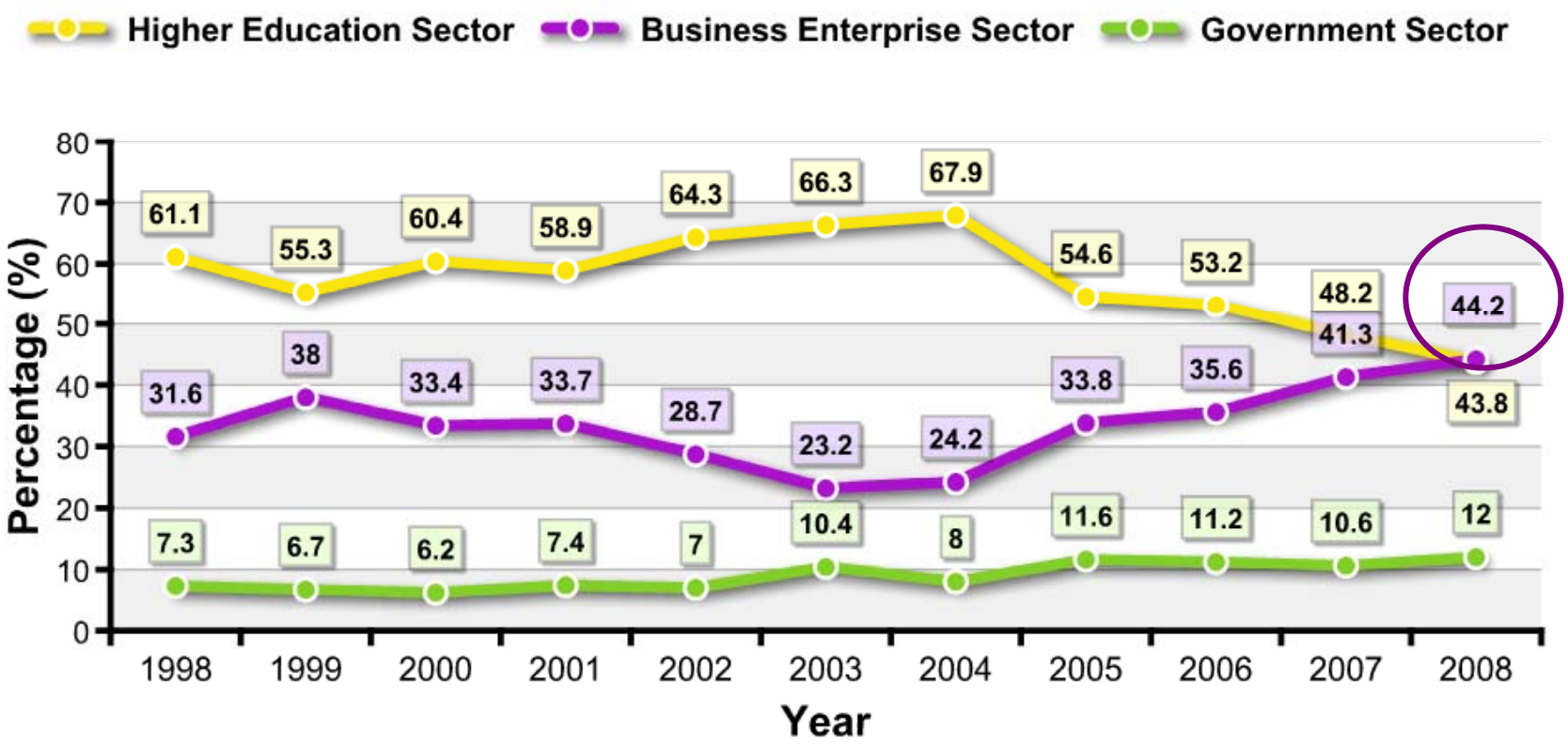
R&D Expenditures



Increased to 2.3 folds during 2002-2008

Source: TurkStat

GERD by Sector of Performance



Share of business enterprise sector surpassed the other sectors for the first time in 2008

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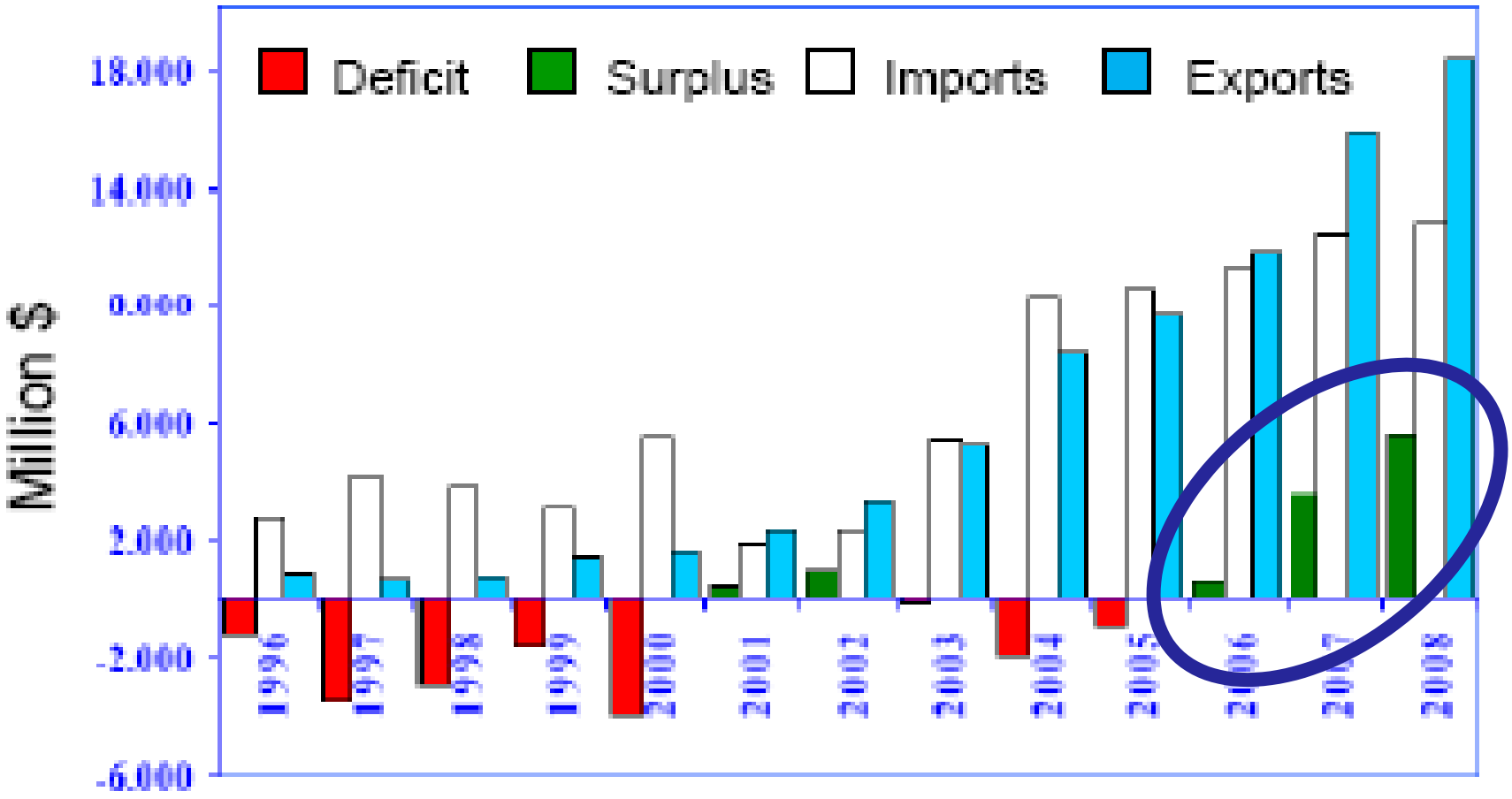
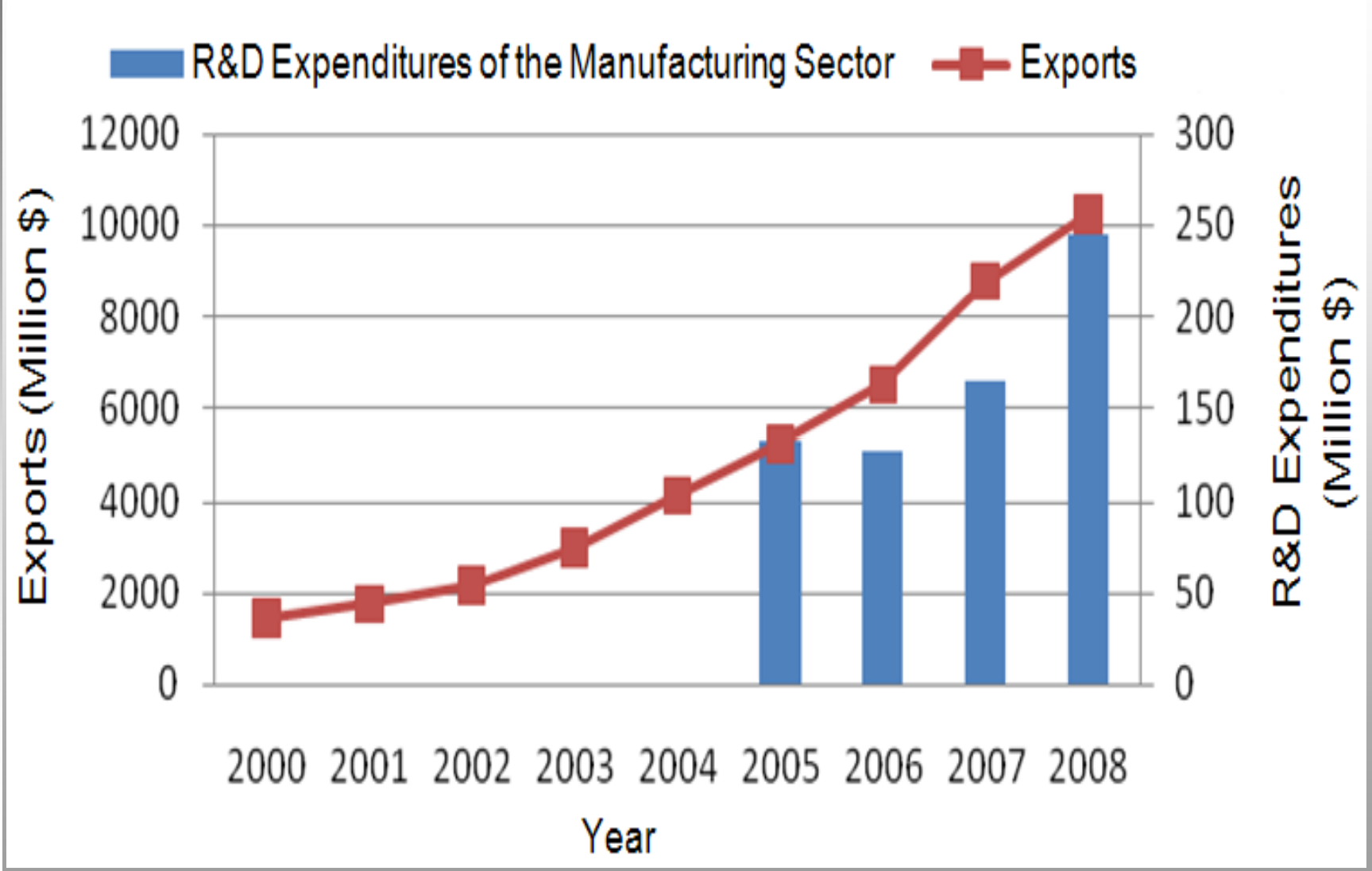
R&D Expenditures and Exports

Exports, Imports and Net Export Surplus of the Automotive Sector



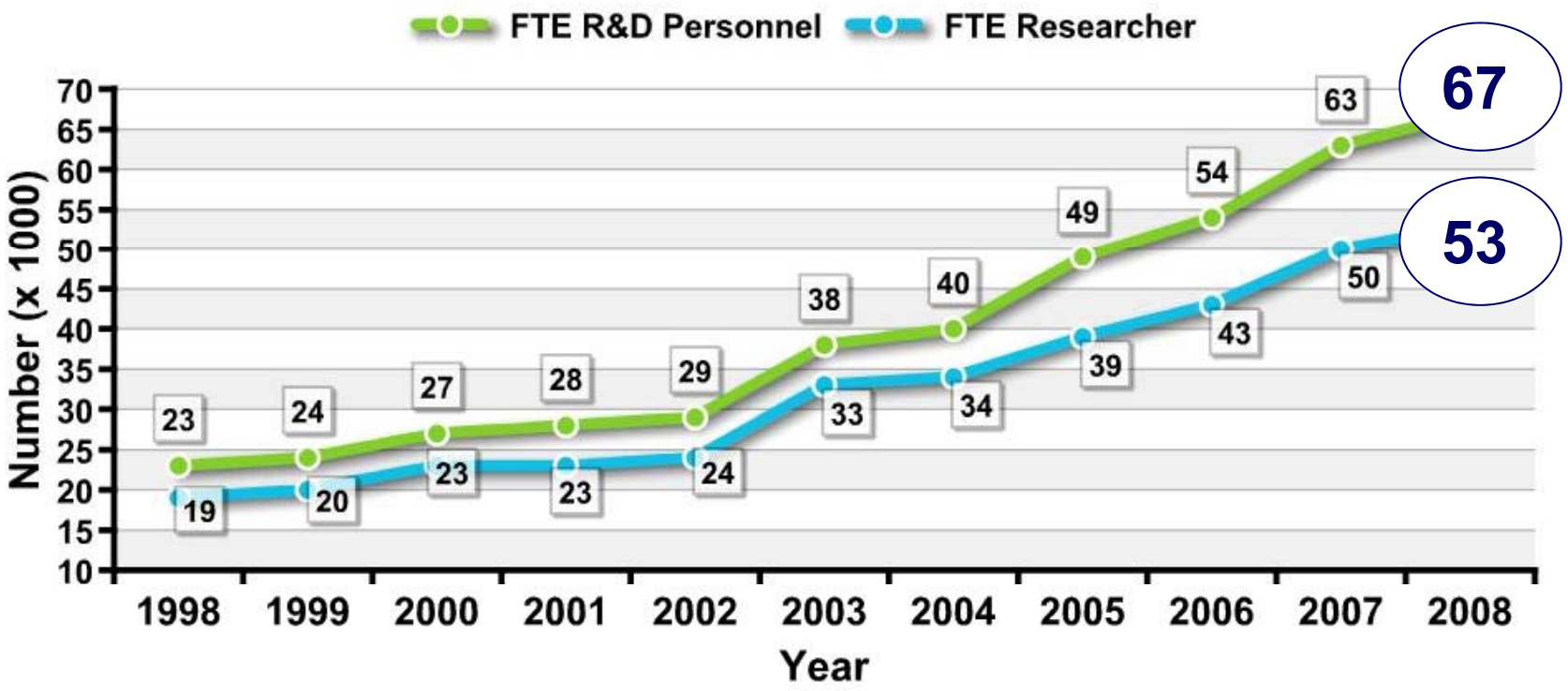
Source: Presentation of TEMSA A.Ş. in 19th Meeting of SCST

R&D Expenditures and Exports



Source : 20th Meeting of SCST
Note: R&D expenditures prior to 2005 not included

FTE R&D Personnel

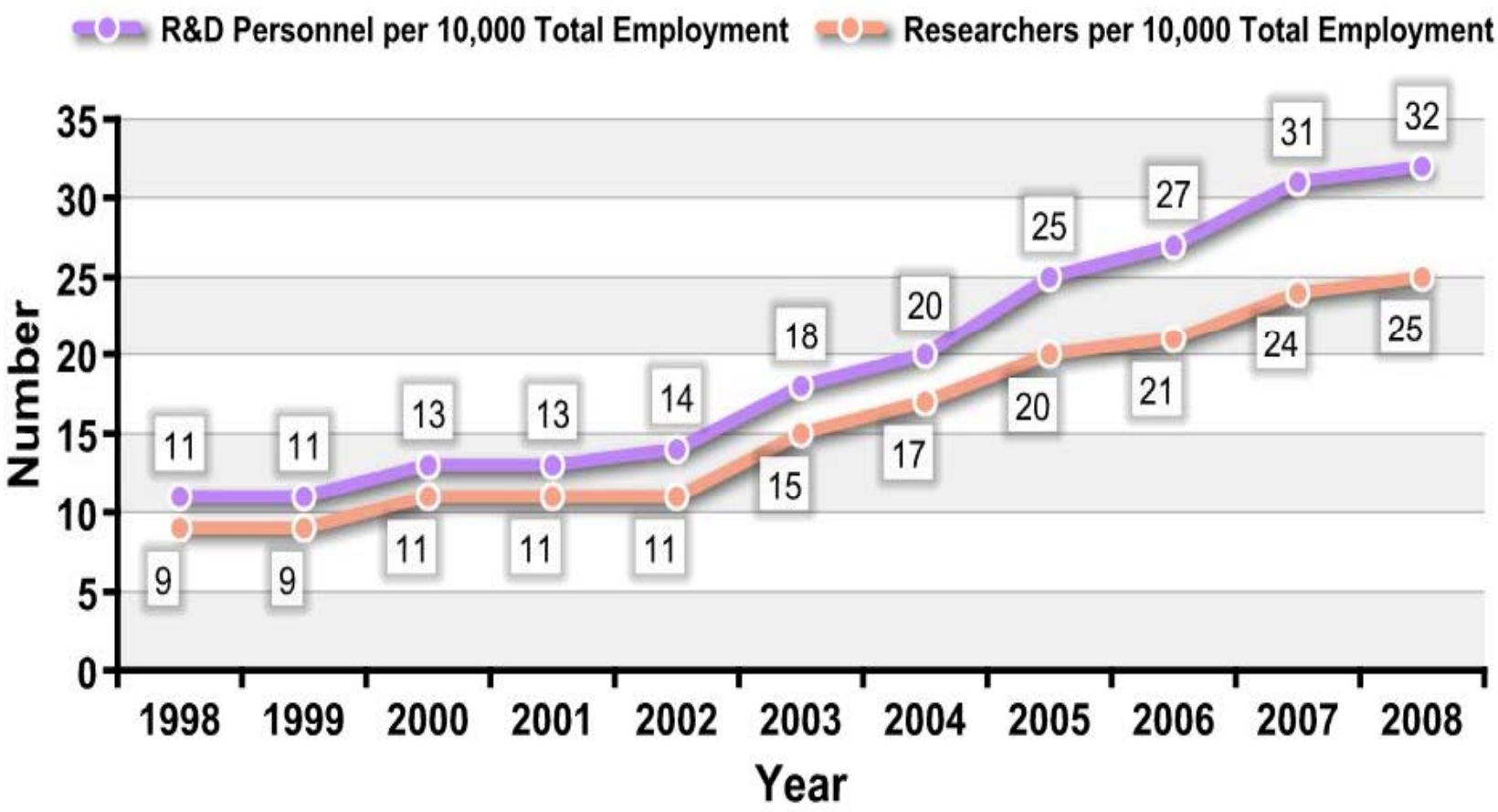


Increased to 2.3 fold during 2002-2008
TR Target 150 000 by 2013

Source: TurkStat

FTE R&D Personnel

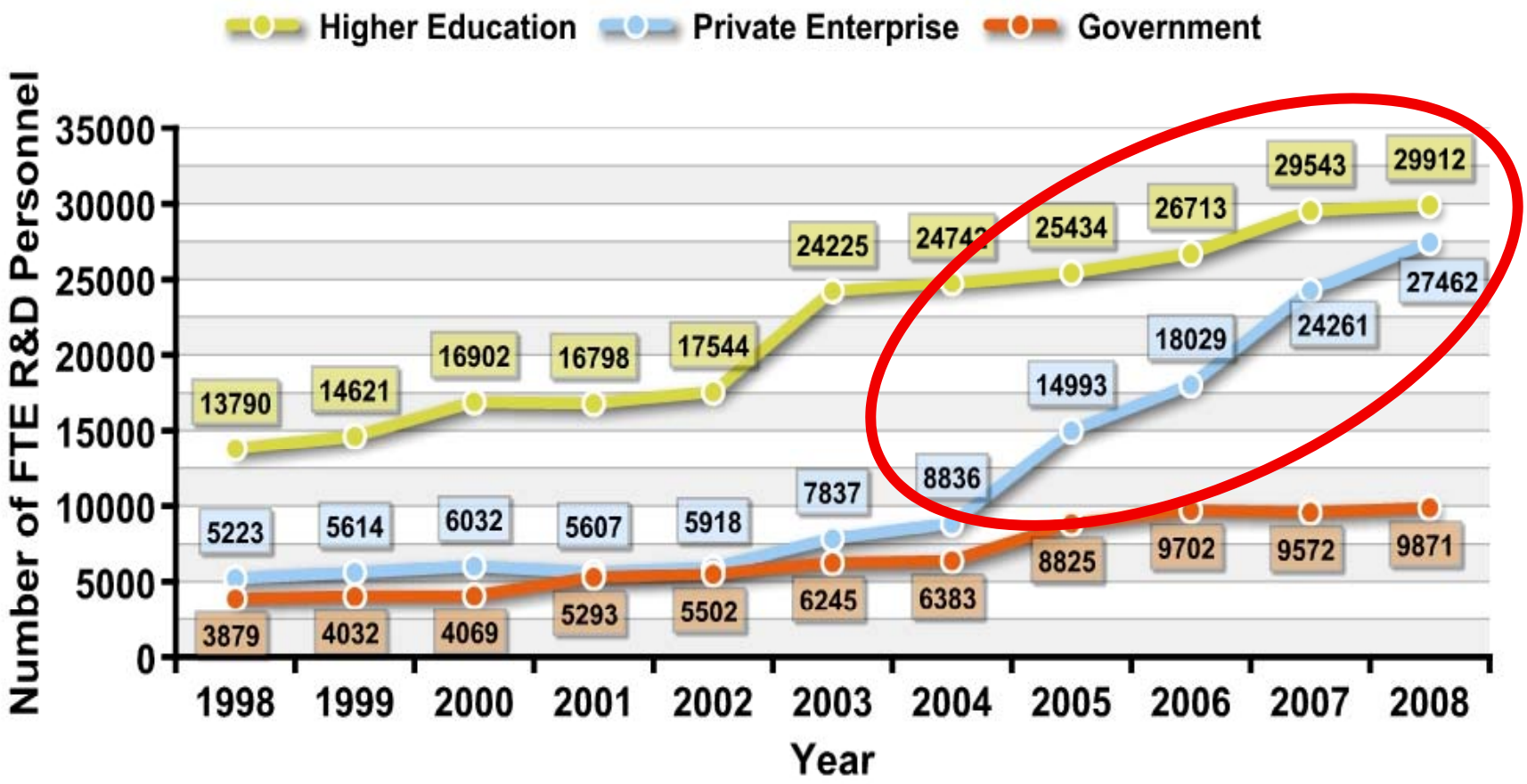
Number of R&D Personnel and Researchers per 10,000 of Total Employment in Turkey (in full-time equivalents FTE)



Source: TurkStat

FTE R&D Personnel

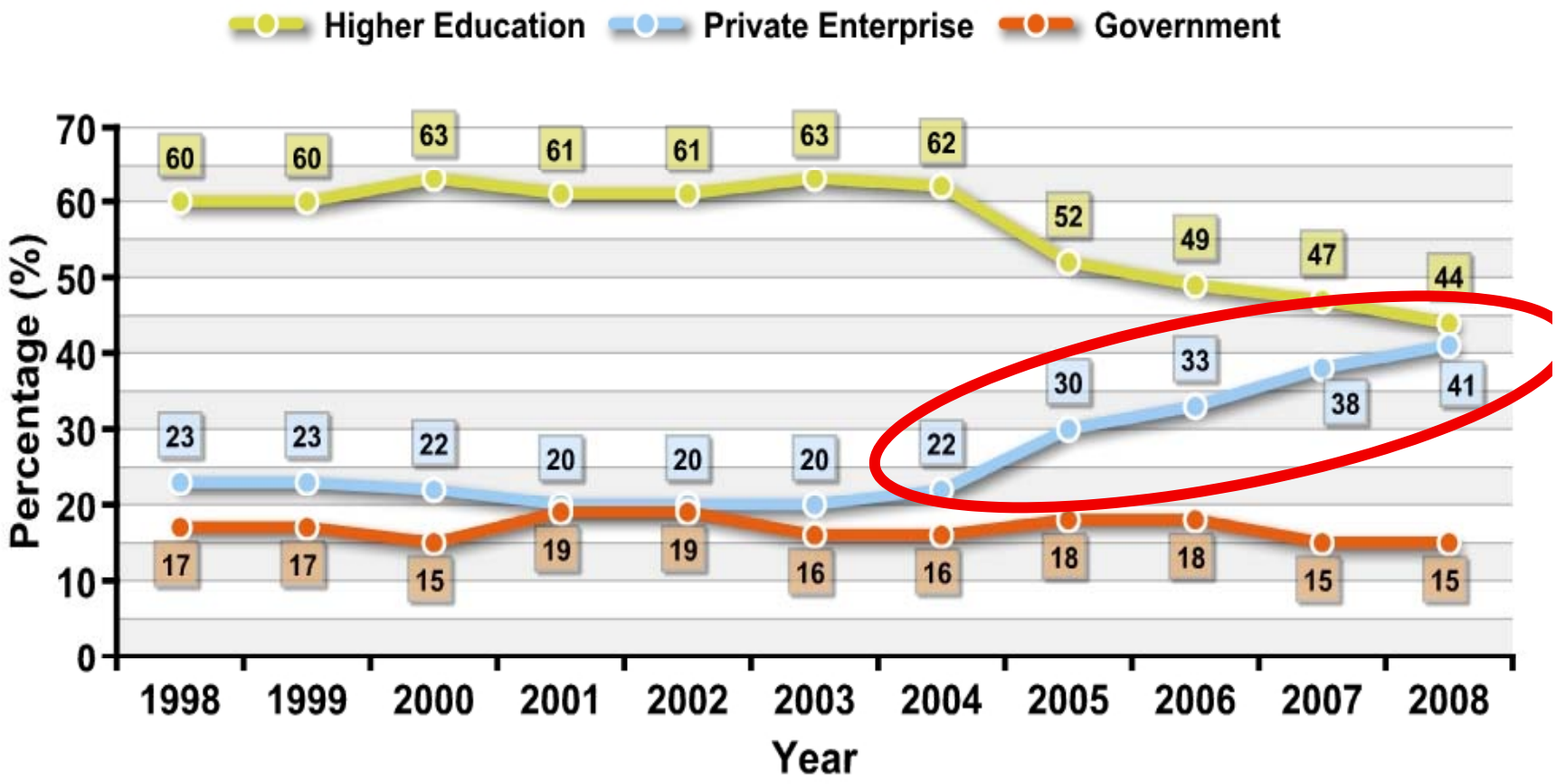
Number of FTE R&D Personnel by Sector of Employment



Source: TurkStat

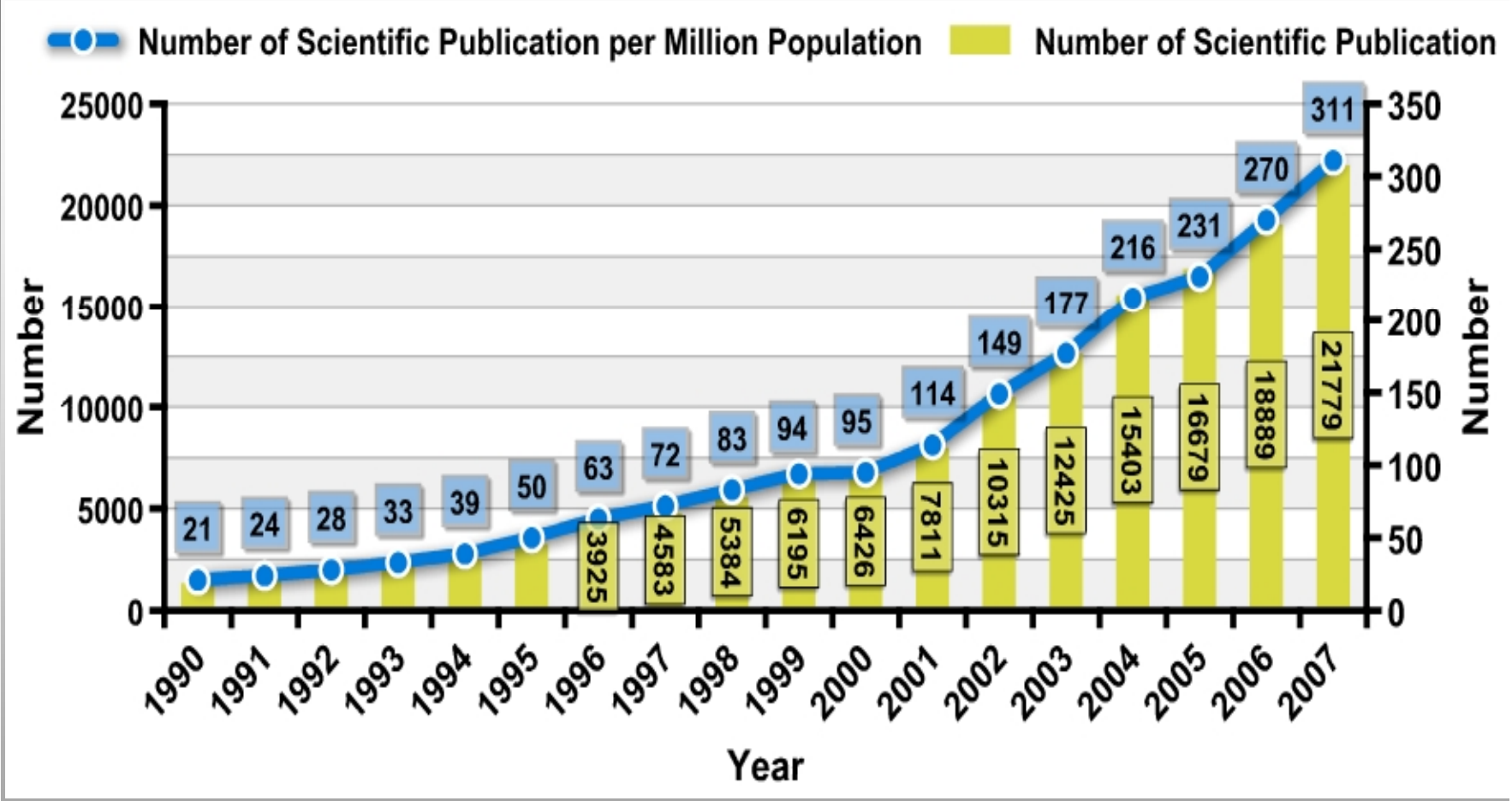
FTE R&D Personnel

Share of FTE R&D Personnel by Sector of Employment



Source: TurkStat

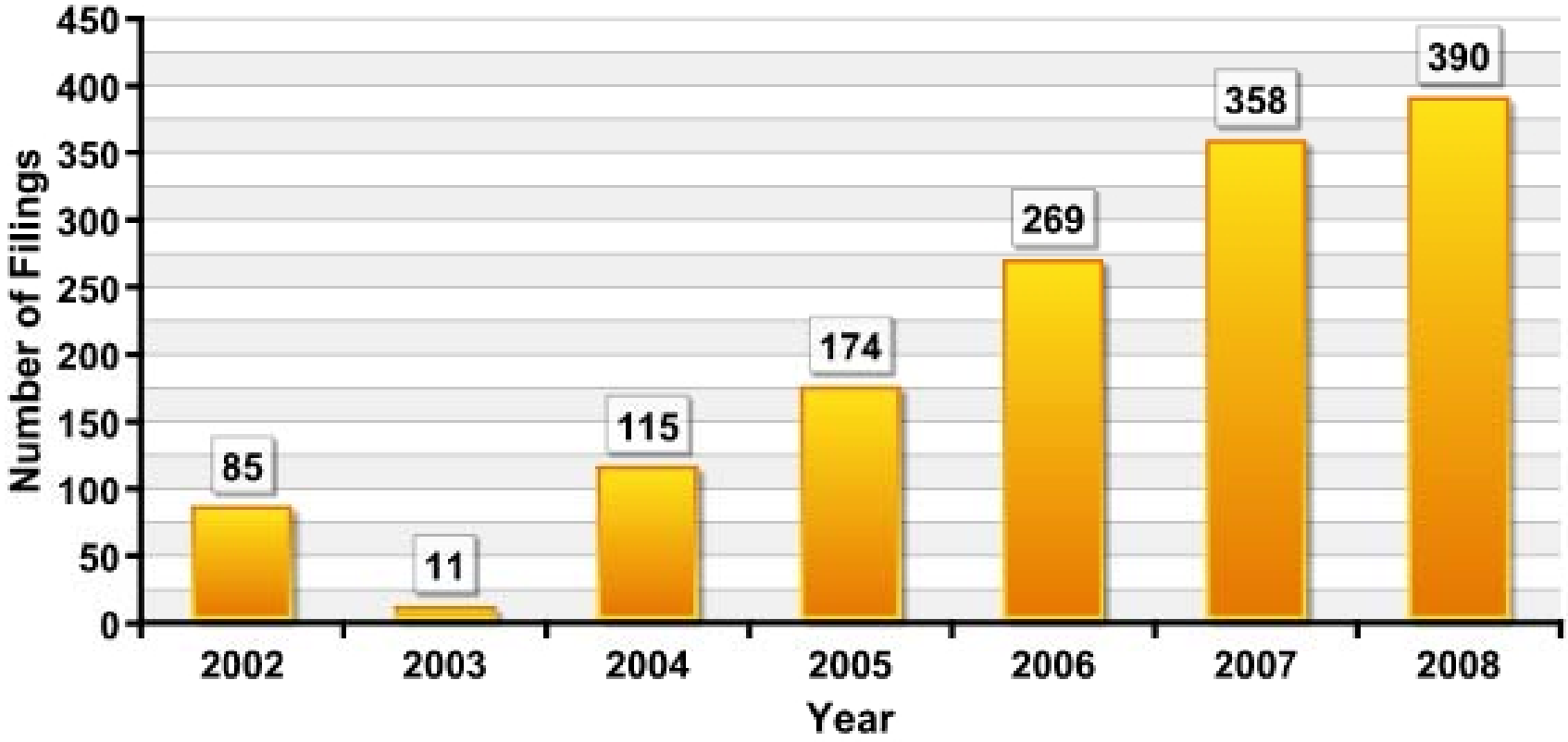
Scientific Publications



305% increase between 1998 and 2007

Source: Thomson's ISI Web of Science Updated on 17.11.2008

Patent Applications From Turkey Within the Framework of Patent Cooperation Treaty (PCT)



Moreover, from 2002 to 2008 the number of domestic patent filings and grants increased respectively to 5,4 and 4,6 folds.

Source: Turkish Patent Institute and WIPO

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From 2002 to 2007; Turkey Outpaced:

- Two countries regarding GERD (Finland, Denmark)
- Six countries regarding FTE R&D Personnel (Finland, Denmark, Belgium, Austria, Greece, Romania)
- Five countries regarding FTE Researchers (Finland, Denmark, Belgium, Austria, The Netherlands)
- Four countries regarding Scientific Publications (Belgium, Poland, Taiwan, Israel)

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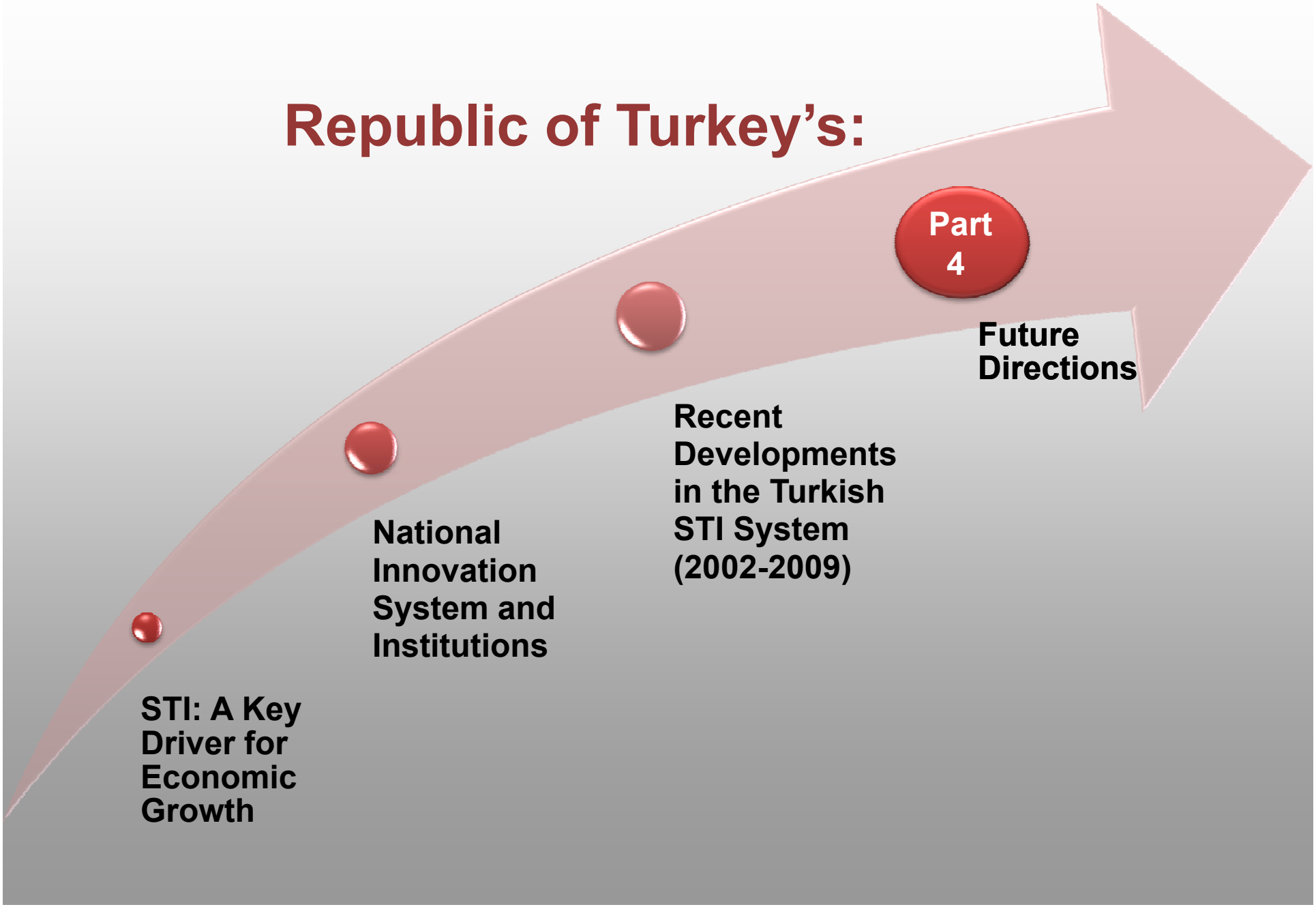
Republic of Turkey's:



Increase in the direct public funds for R&D and innovation boosted the innovative activity in the country and resulted in capacity development

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Some Examples

- Towards Green Growth
  - *Hybrid Electric Vehicle Prototypes made in Turkey*
  - *Solar and Hydrogen Car Races to promote green technologies among young researchers and scientists*
- Public Research Institutes as World-Scale Partners for Collaboration.
  - *Turkey supplies NATO information security technology*
- Moving up the Value-Chain in Sectors with High Export Share
  - *Europe's most energy efficient refrigerator is Turkish and so is the World's Fastest Washing Machine*

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Future Directions

- Continuing Investment in S&T
- Preparing New Strategies for 2011-2016
  - Science, Technology and Innovation Implementation Plan
  - STI Human Resources Development
- Continuing Efforts to Make Turkey a More Attractive Destination for Qualified Researchers
- Continuing Efforts to enhance Research Infrastructures
- Furthering proven demand side policies to address societal needs

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Thank You

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