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# Statistics on Science, Technology and Innovation: How to Get Relevant Indicators

Dr Emira Becic  
MSES, Directorate for Science

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# 1. Challenges for Measurement

- Globalisations
- The Knowledge-based Economy towards a Sustainable Knowledge Society: EU innovation gap with Japan and the US
- Internationalisation of R&D
- Science policy: towards improving current state of art
- Accessing Croatia to EU: Statistics

## 2. USERS and their DEMANDS

### Type of Users

Politicians  
Government  
Parliament  
S&T decision policy makers  
Local authorities  
Scientific community  
Business sector  
Society  
International organizations  
NGOs

### Demands

Up-to-date, **key indicators** by policy-relevant categories  
**Long time series, detailed statistics, comparable indicators by research views**  
General overview, detailed information on their **own sector and connecting sectors**  
Mass media, inquiry ranking nations by competitiveness, searching co-operation partners, knowledge of global tendencies

# Context: towards social and economic impacts of STI activities

- STI activities have been one of driving forces of economic and social change for centuries. The transformation of the developed economy from one based on natural resources to a globally integrated system based on knowledge and information could not have occurred without the adoption of scientific principles or the implementation of innovative technology.
- Similarly, STI activities have accelerated growth and brought about social change through movement of people, goods and services, and an increased capacity to generate, transmit and use STI knowledge.
- Despite their importance, much of the existing information about STI activities relates only to inputs (who is involved in which activity and what is the nature of that activity?)
- However they are not as useful for assessing the outcomes and impacts of STI activities. Although some current indicators do provide information on the immediate outputs of STI activities.

# Start Points

- Measuring the impacts of science, technology and innovation, for example, means looking at **changes** on nature, society, people such as changes on understandings, beliefs and behaviours.
- Today challenges in measurement **changes** should be concerned on measuring intangible outcomes of social type (other than economic outcomes).

## UNFORTUNATELY

- In an era of rapid technological change, economic growth is increasingly dependent on research and development (R&D). Monitoring industry, government, and university R&D programs, where measuring progress of society is concerning on indicators (statistical) framed into an accounting framework.
- Most current indicators are economic in type: expenditure in research; output as patents; high-technology products; marketed innovation, etc.

### 3. Recent initiatives on the Global level

- **The Global Project on Measuring the Progress of Societies**, *exists to foster the development of sets of key economic, social and environmental indicators to provide a comprehensive picture of how the well-being of a society is evolving.*
- **2 nd World Forum on "Statistics, Knowledge and Policy" held in Istanbul 2007**
  - The World Forum is run as part of the Global Project on Measuring the Progress of Societies, which is hosted by the OECD in collaboration with the European Commission, the World Bank, the United Nations Development Program and United Nations' regional commissions, regional development banks, research institutes and non-governmental organisations.

See: [http://www.oecd.org/pages/0,3417,en\\_40033426\\_40033828\\_1\\_1\\_1\\_1\\_1,00.html](http://www.oecd.org/pages/0,3417,en_40033426_40033828_1_1_1_1_1,00.html)

- **OECD Blue Sky II Forum 2006"**  
(Ottawa, Canada, 25-27 September 2006).  
What Indicators for Science, Technology and Innovation Policies in the 21st Century?

See: [http://www.oecd.org/document/24/0,3343,en\\_2649\\_34409\\_37075032\\_1\\_1\\_1\\_1,00.html](http://www.oecd.org/document/24/0,3343,en_2649_34409_37075032_1_1_1_1,00.html)

## 4. Related methodological guidelines

- Frascati Manual, 2002
- Revised Field of Science and Technology (FOS) Classification in the Frascati Manual, 2007
- Oslo Manual: Guidelines for Collecting and Interpreting Innovation Data, 3rd Edition, 2005
- Canberra Manual (Human Resources in S&T)

Source:

[http://www.oecd.org/document/6/0,3343,en\\_2649\\_34451\\_33828550\\_1\\_1\\_1\\_1,00.html](http://www.oecd.org/document/6/0,3343,en_2649_34451_33828550_1_1_1_1,00.html)

## 5. STI statistics and indicators

Sources: e.g.

### **EUROSTAT: STI statistics**

- Research and development
- Community innovation survey
- High-tech industry and knowledge-intensive services
- Patent statistics
- Human Resources in Science & Technology

See:

[http://epp.eurostat.ec.europa.eu/portal/page?\\_pageid=1996,45323734&\\_dad=portal&\\_schema=PORTAL&screen=welcomeref&open=/&product=EU\\_TB\\_science\\_technology\\_innovation&depth=2](http://epp.eurostat.ec.europa.eu/portal/page?_pageid=1996,45323734&_dad=portal&_schema=PORTAL&screen=welcomeref&open=/&product=EU_TB_science_technology_innovation&depth=2)

### **OECD Science, Technology and Patents**

- [Biotechnology Statistics](#)
- [Patents Statistics](#)
- [Research and Development Statistics](#)
- [Science and Technology Indicators](#)

See: [http://www.oecd.org/topicstatsportal/0,2647,en\\_2825\\_497105\\_1\\_1\\_1\\_1\\_1,00.html](http://www.oecd.org/topicstatsportal/0,2647,en_2825_497105_1_1_1_1_1,00.html)

## 6. STI statistics: Documents, Monitoring and Analyses

- OECD STI Scoreboard (Science, Technology and Industry Scoreboard), 2007
  - Innovation and Performance in the Global Economy  
(See: [www.oecd.org/sti/scoreboard](http://www.oecd.org/sti/scoreboard) )
- OECD Science, Technology and Industry Outlook 2006  
(See: [www.oecd.org/sti/outlook](http://www.oecd.org/sti/outlook) )
- European Commission Key figures of science, technology and innovation  
(See: [http://ec.europa.eu/invest-in-research/monitoring/statistical01\\_en.htm](http://ec.europa.eu/invest-in-research/monitoring/statistical01_en.htm))
- Other documents of interest for the monitoring and analysis of the evolution and impact of R&D investment in Europe and the world.  
(See: [http://ec.europa.eu/invest-in-research/monitoring/document\\_en.htm](http://ec.europa.eu/invest-in-research/monitoring/document_en.htm))
- Industrial research and innovation monitoring system (EIRIMS)  
(See: [http://ec.europa.eu/invest-in-research/monitoring/analyses01\\_en.htm](http://ec.europa.eu/invest-in-research/monitoring/analyses01_en.htm))

# EU policy process: Industrial research and innovation monitoring system (EIRIMS)

- **Industrial research investment monitoring (IRIM)**

(See: <http://iri.jrc.es/> )

- **Innovation watch** - As part of the broader initiatives PROINNO Europe (innovation policy analysis, learning and development in Europe) and Europe INNOVA (innovation patterns in different industrial sectors); **(EIS, REIS etc.)**

See: [http://ec.europa.eu/enterprise/innovation/index\\_en.htm](http://ec.europa.eu/enterprise/innovation/index_en.htm)

# STI indicators

- **R&D and investment in knowledge**
- **Human resources in S&T**
- **Innovation policy**
- **Innovation performance**
- **ICT: an enabler for the knowledge society**
- **Particular fields**
- **Internationalisation of S&T**
- **Global economic flows**
- **Trade and productivity**

# New Indicators

- Covering areas such as:
  - **patenting** by universities and public research centres; the interaction between science and technology (in patents); and patenting by regions and industries.
  - Patterns in **S&T activities in biotech, nanotech and environmental technologies**.
  - The **internationalisation** of S&T brings together indicators of international collaboration in science, technology, and research activities by multinational companies.

# Instead of conclusion

- The need for indicators
  - development of indicators
- The challenges of assessing impacts
  - Better understanding through a combination of survey and analytical techniques rather than direct assessment from survey instrument alone
  - How different indicators are connected

Thank you for your attention!

[emira.becic@mzos.hr](mailto:emira.becic@mzos.hr)