Innovation, R&D and Talent

Advanced Approaches of Measuring New Sources of Wealth in National Accounts

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Beijing, February 15, 2012

From Capitalism to Talentism

http://en.wikipedia.org/wiki/Klaus_Schwab

Professor Klaus Schwab

Founder and President of the World Economic Forum

Schwab, press conference on January 18, 2012:
"Capitalism, in its current form, no longer fits the world around us."

"The necessary conceptual models do not exist from which to develop a systemic understanding of the great transformations taking place now and in the future. We must rethink our traditional notions of economic growth and global competitiveness, not only by focusing on growth rates and market penetration, but also, equally — if not more importantly — by assessing the quality of economic growth.The time has come to embrace a much more holistic, inclusive and qualitative approach to economic development.

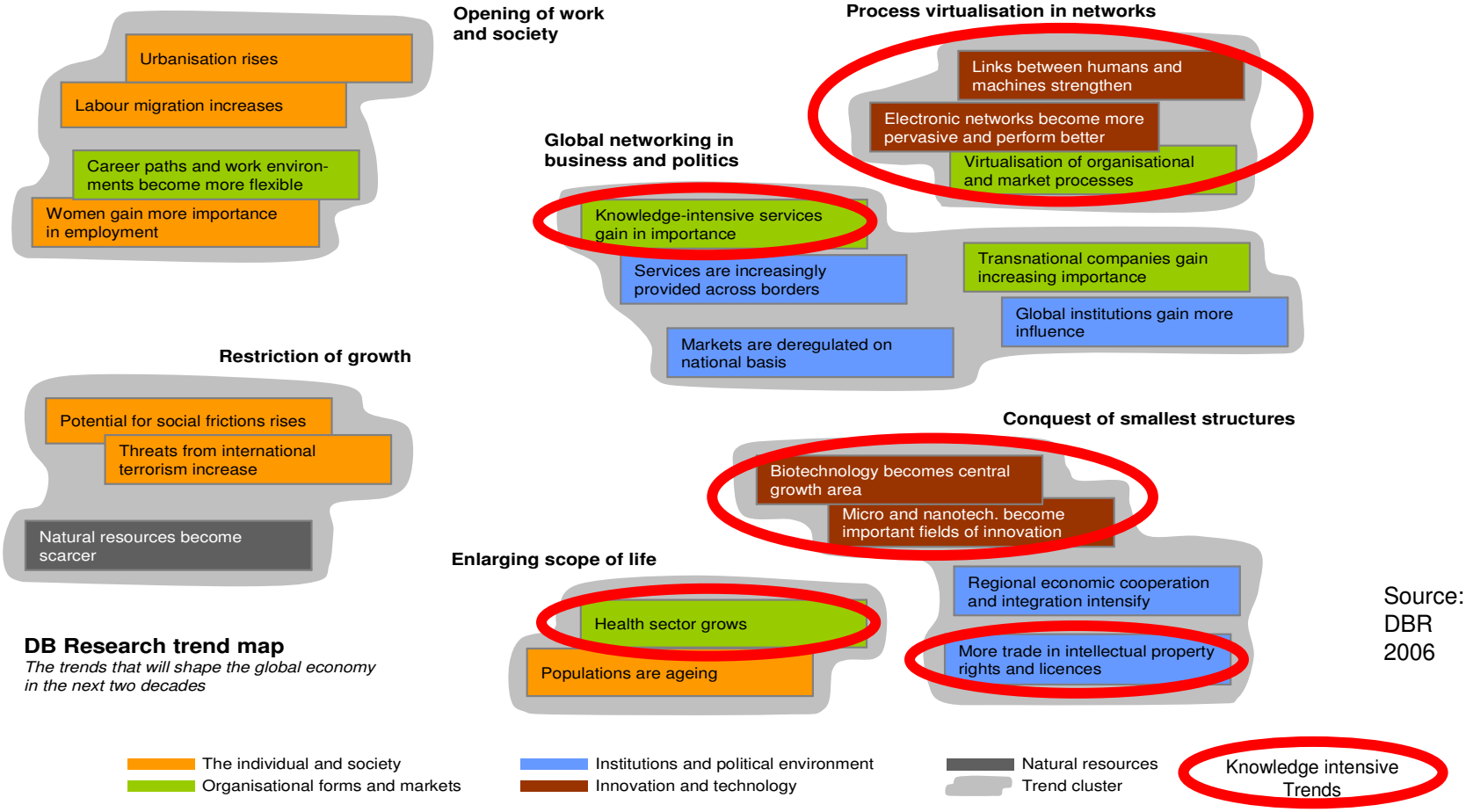
The success of any national and business model for competitiveness in the future will be less based on capital and much more based on talent. I define this transition as moving from capitalism to 'talentism."

Source: http://www.cbc.ca/news/world/story/2012/01/25/pol-vp-milewski-davos-harper.html

Some Initial Thoughts

Macro Economic Development
- Towards Knowledge Economies (Macrotrends)

6 Clusters formed by 21 Trends



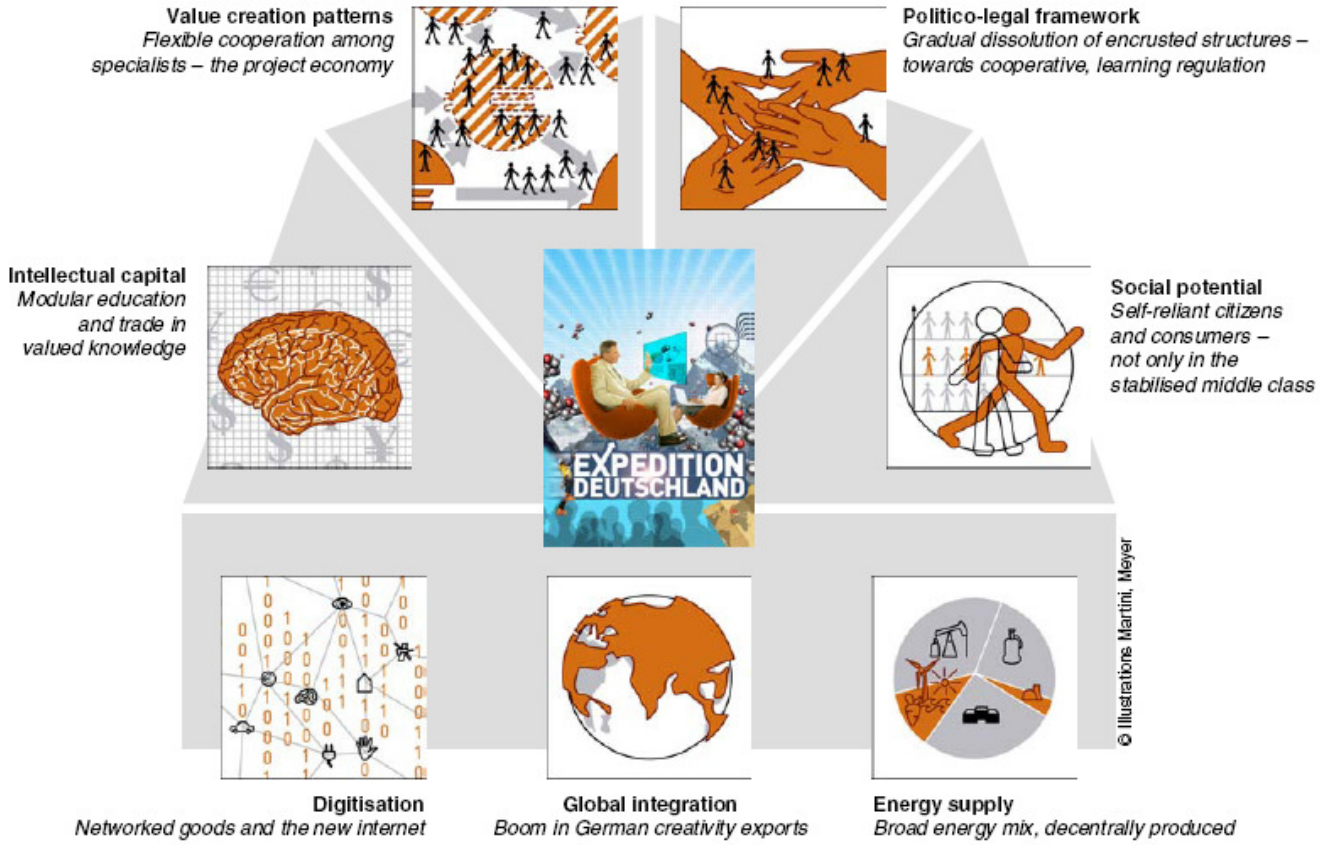
DB Research trend map
The trends that will shape the global economy in the next two decades

Source: DBR 2006

Picture of the Future ‚Germany 2020‘
- New Challenges for a Land on Expedition

“Expedition Deutschland” scenario

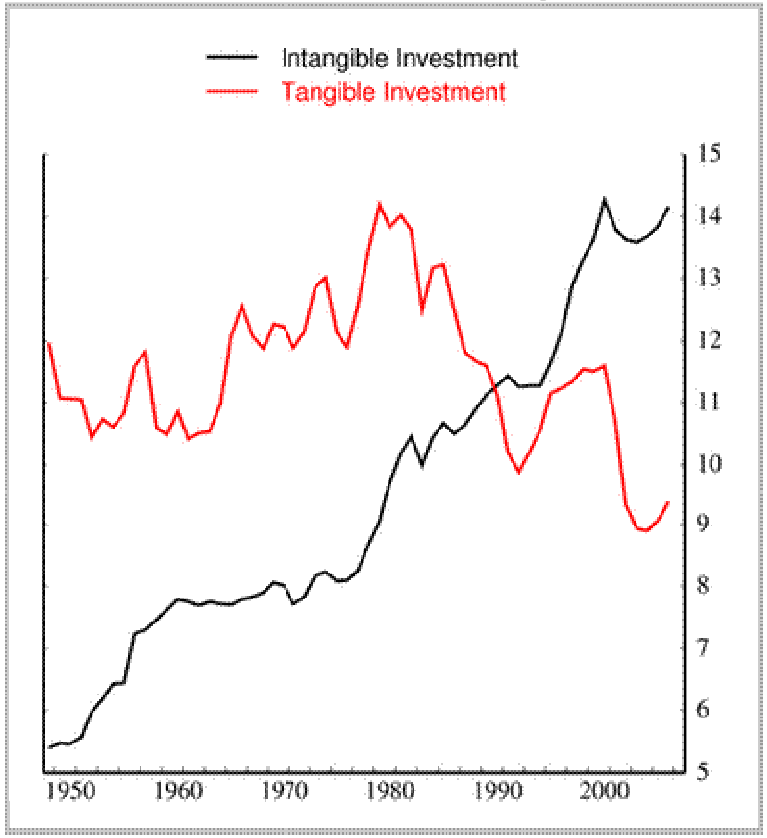
An all-around view of Germany in 2020 according to the seven descriptive dimensions



Source: Hofmann et al, Deutsche Bank Research (2007)

Corresponding Evidence: Business Investment in Intangibles in the US (1950ies – 2006)

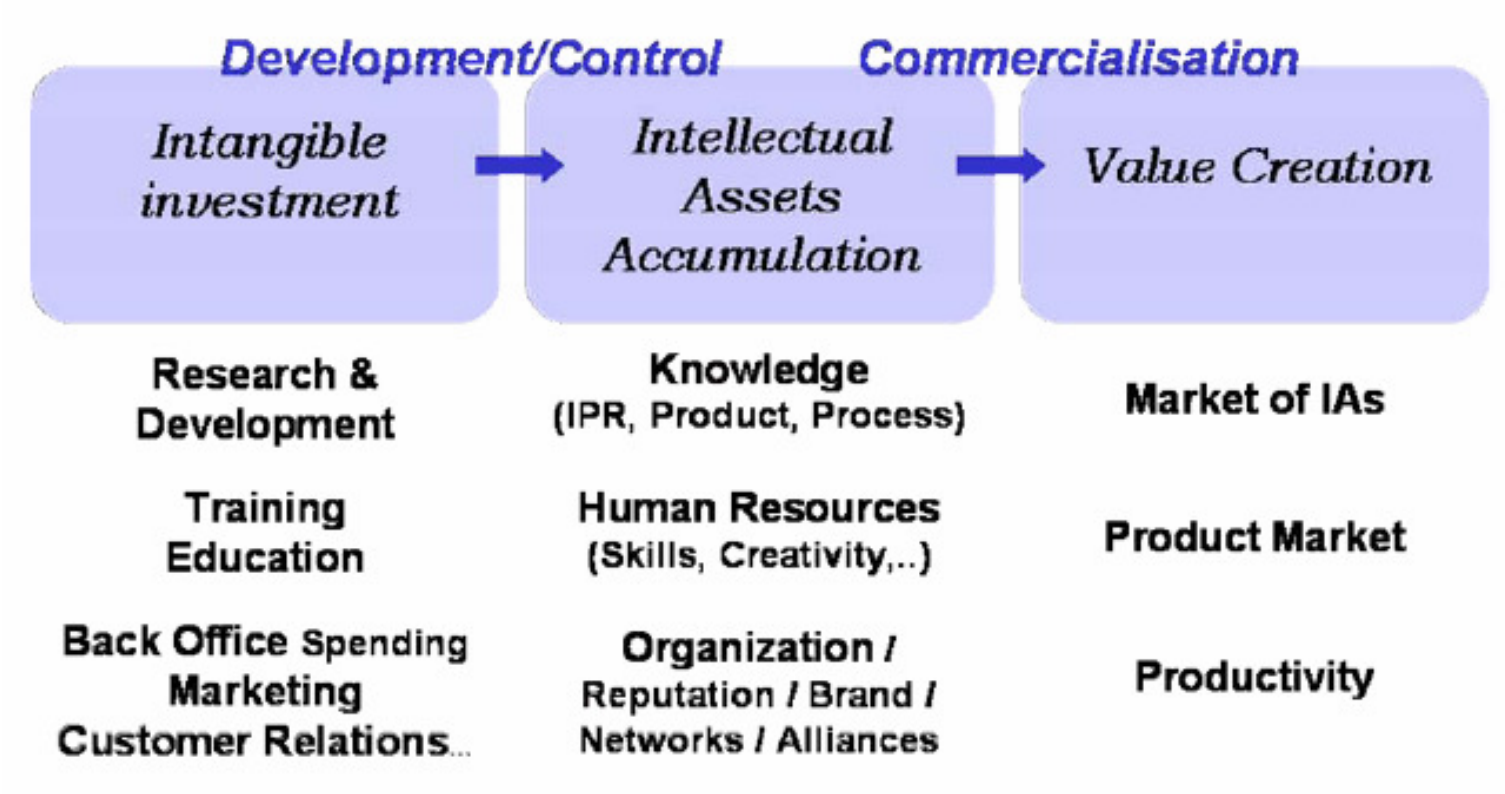
Business investment in US (ratio to business out put)



- Investments in intellectual assets are matching to those in tangible capital
- U.S. intangible business investment was **more than $1 trillion in the late 1990s**: software, innovation (R&D, design, etc.) and firm competitiveness (brand, human capital, organisation)
- In first 6 years of this decade: intangible business investment 40% larger than tangible investment

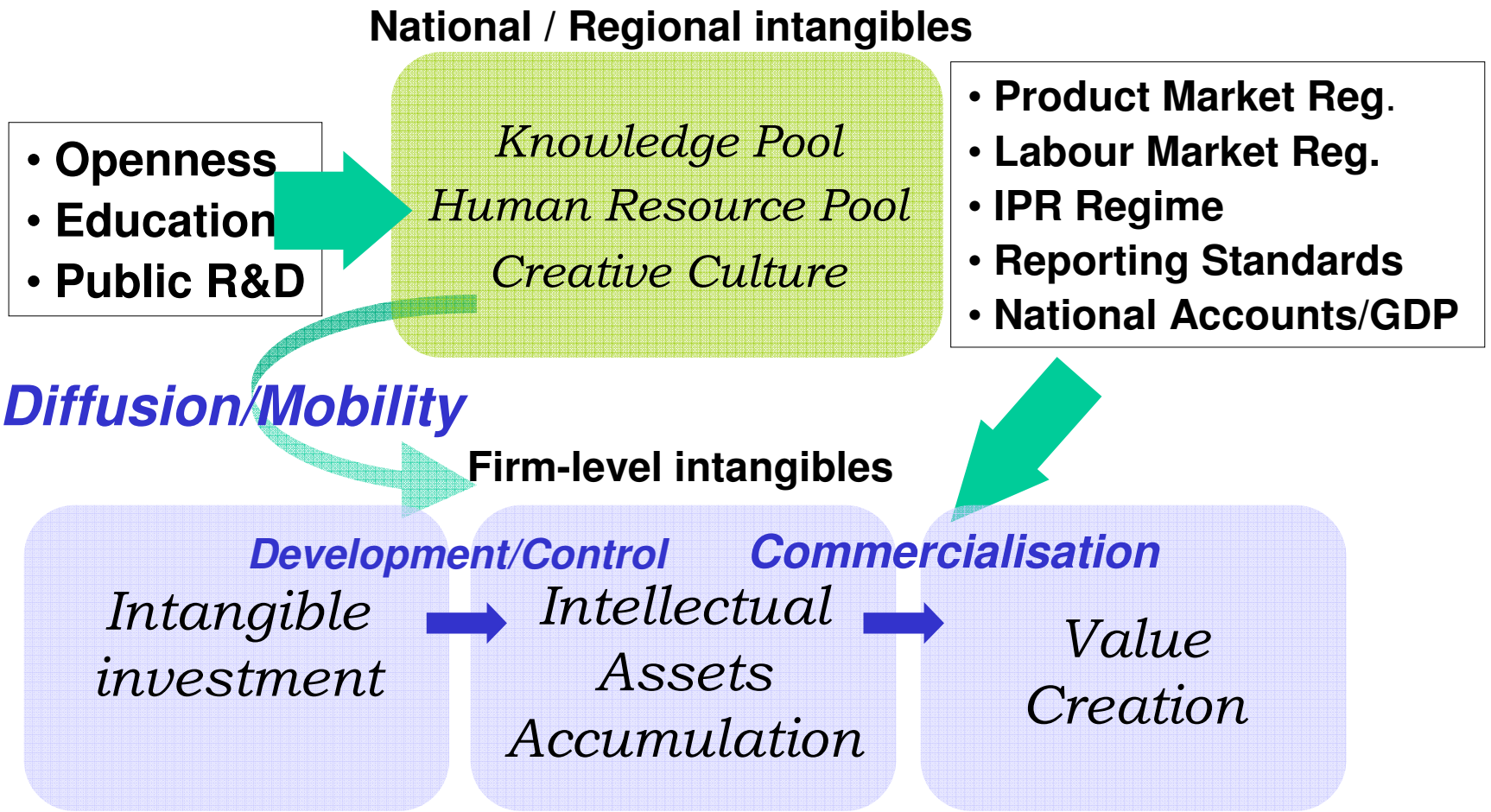
Source: Tojo, OECD (2009), Corrado, US Federal Reserve Board (2007); Corrado, Hulten, and Sichel (2006, 2007); Hofmann, DB Research (2006);

OECD: Intellectual Assets Should Therefore be Developed, Retained, and Commercialised for Value Creation by Firms …



Source: Tojo, OECD Directorate for Science and Technology (2008), adjusted

… This also Corresponds to Macroeconomically Nurturing Environments in Nations / Regions / Cities



Source: Tojo, OECD Directorate for Science and Technology (2008), adjusted

The Need for Better Measurement of R&D, Talent and Innovation Capacity

- While all countries account for investment in tangible assets in their gross domestic product (GDP) statistics, no country currently includes a comprehensive estimate of business investment in intangible assets in their official accounts.
- Most economists agree, however, that intangible assets - which represent an important input into the innovative process - are critical components of the modern economy.
- Understanding the role of intangible assets - and thus the role of innovative activity in general - is critical to understanding the modern economy.

Source: BEA, US (2009)

Modelling Innovation on Microlevel … Has an Impact on Macrolevel

- Modeling innovation at a microlevel is difficult, in part because the process of innovation involves a complex set of economic actors and interactions that in principle require that one take account of networks, linkages, and complementarities.
- A linear model - in which research expenditures lead to product development and then commercialization - is not an accurate model for the innovation process.
- This narrow focus on the formal research process misses the feedback between innovators, their competitors, and their customers.
- For example, it is commonly understood that innovation is influenced not only by the actions of a particular firm but also by the institutional environment, the structure of the production process, the other firms and customers that the firm interacts with, the public research infrastructure, and the characteristics of the labor market.

Source: BEA, US (2009)

Innovation Creates Useful Knowledge - It Has Input and Output Characteristics

- Summing up, the innovation process leads to the creation of economically useful knowledge that exists separately from either people or tangibles, such as equipment or structures.
- This economically useful knowledge is an intangible that is an output of a productive process as well as an input into the creation of new output.
- By identifying measures of this knowledge, measuring them using national accounting, and incorporating them into a growth-accounting framework, one can begin to develop a comprehensive set of statistics to better understand innovation as a driver of economic growth.

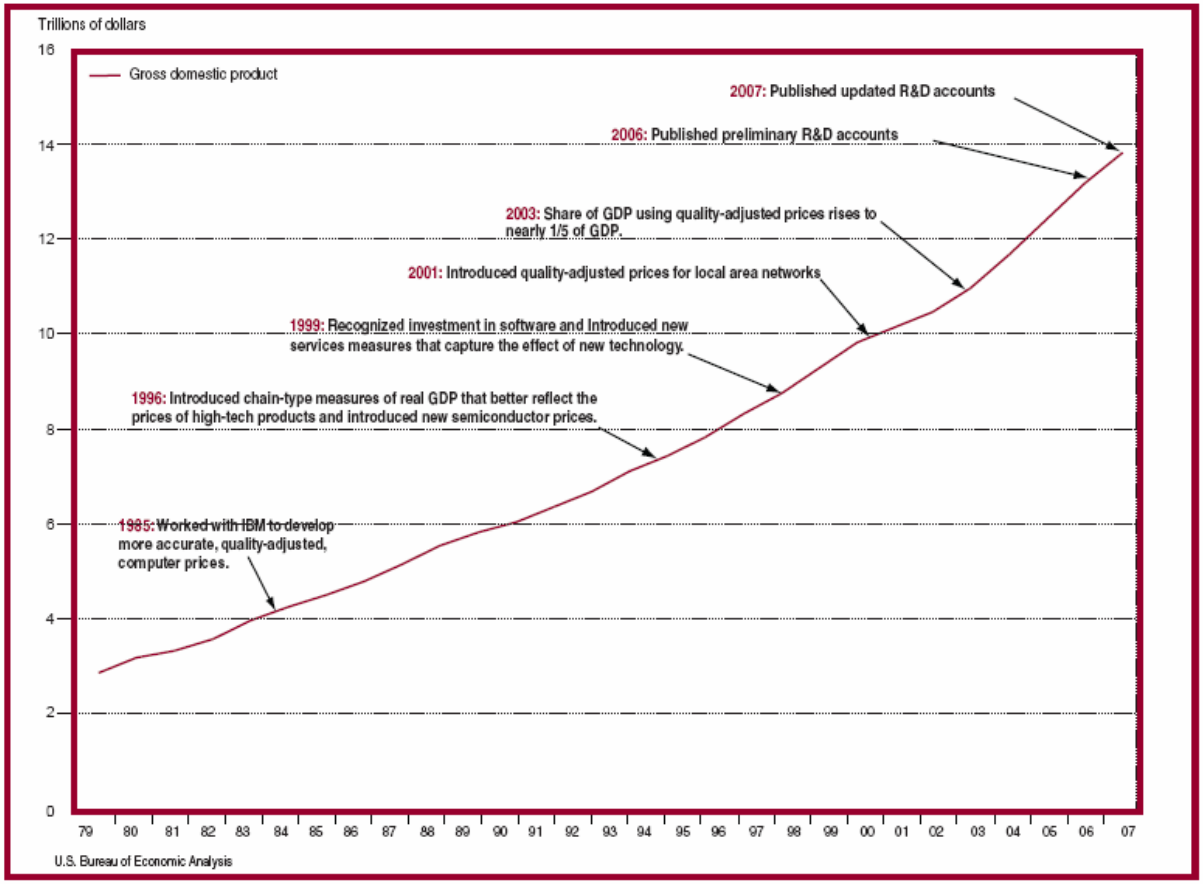
Source: BEA, US (2009)

So far National Accounts Paid Little Attention to Measure Innovation, R&D and Talent as Investments

Type of intangible investment	Includes the following intangibles	Current treatment in National Accounts
Computerised information	(1) Computer software (2) Computer databases	Both treated as investment
Innovative property	(1) Scientific R&D (2) Mineral exploration (3) Copyright and license costs (4) New product development costs in the financial industry (5) New architectural and engineering designs (6) R&D in social science and humanities	Only (2) and (3) treated as investment
Economic competencies	(1) Brand equity (2) Firm-specific human capital (3) Organisational structure	None of these treated as investment

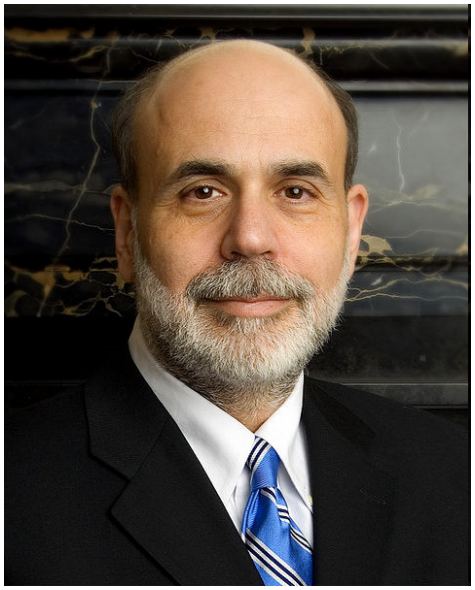
Source: HM Treasury (October 2007)

Progress Since the Mid-1980ies: Path of Inclusion of Intangible Investments in GDP Accounts (Example US)



Source: BEA, US (2009)

FED Chairman Bernanke on Measuring Innovation and Intangibles in Macroeconomics



http://en.wikipedia.org/wiki/Ben_Bernanke

Professor Ben Bernanke

Chairman of the United States Federal Reserve

Bernanke in his Keynote-speech at OECD-conference, Washington DC, May 2011:

„(…) let me put in a plug for more work on finding better ways to measure innovation, R&D activity, and intangible capital.

We will be more likely to promote innovative activity if we are able to measure it more effectively and document its role in economic growth.“

Development in the EU

R&D Capitalisation in EU National Accounts: EUROSTAT Task Force on R&D

- 1st meeting of the Eurostat Task Force on Research and Development (Implementation of the Capitalisation of R&D):

  31 March 2011

- Following the discussion on the main implementation issues, Eurostat informed that two more meetings of the Task Force are planned for March 2012 and November 2012.

- The final report of the Task Force that should contain an assessment of reliability and comparability of the capitalised R&D data will be presented to the Directors of Macroeconomic Statistics in December 2012.

Source: 1st meeting of the Eurostat Task Force on Research and Development - Implementation of the Capitalisation of R&D) (EUROSTAT 2011)

Planned Steps on EU-level Until 2014

- In the ESA revision based on SNA2008 introduced in the EU countries the change in treatment of R&D will not be included in core national accounts. Instead plans foresee mandatory production of R&D satellite accounts. R&D satellites have already been compiled or are currently being compiled in several OECD and EU countries (eg. Finland, Austria, Norway)
- In order to develop and test a capitalisation method of R&D suitable for EU countries, plans had been made to launch experimental calculations in 2011.
- Introducing R&D satellites into regular production is planned for 2014 in connection with the ESA revision.
- The long-term goal is to develop, in connection with the R&D satellite, a sufficiently reliable and comparable R&D capitalisation method suitable for EU countries which could be included in core national accounts.

Source: Statistics Finland, 2009

Impact of R&D Capitalisation on GDP

- The differences in impact are significant, the extreme values being 0.06% for Bulgaria and 2.75% for Switzerland.
- A strong correlation between the share of R&D expenditure in GDP and the impact of the capitalisation of R&D on GDP was noted.
- It was furthermore argued that the impact depends on the share of the public sector in the production of R&D services – R&D expenditure of the non-market producers was already contributing to the GDP before capitalisation of R&D (as an element of non-market output of those units).

Source: EUROSTAT, 2011

Implementation on EU level

- Following from the conclusions of this new Task Force on R&D that will become available in December 2012, Eurostat will organise a 1-day course at the end of 2013.

- According to the information currently available the following structure of the course is suggested:
  - Research and Development in ESA 2010
  - Methodological issues (based on the OECD manual)
  - Practical aspects in the European context (based on the issues outlined above)

Source: EUROSTAT, 2011

Satellite Accounts as Initial Step

- A satellite account refers to a set of accounts that allows for experimental measurement in a framework consistent with GDP but separate from the official accounts.
- Satellite accounts typically allow for a more detailed look at specific parts of the economy, measures based on new methodologies and source data, and new estimation approaches.
- The R&D satellite account, for example, provided a means of exploring the impact of capitalizing R&D spending on GDP growth and a framework through which various methodological and conceptual issues can be worked out.

Source: BEA, US (2009)

Development in the US

Motivation

- Expenditures on intangible products that have the characteristics of fixed assets (ownership rights, long-lasting, used in production process) should be treated as investment.

- Improved measurement of intangibles important for:
  - Improving accuracy of GDP estimates,
  - Developing quantitative measures of innovation,
  - Identifying sources of economic growth.

- Intangible produced assets in the SNA:
  - Computer software; mineral exploration; entertainment, literary, and artistic originals; R&D expenditures; other intellectual property products.

Source: BEA, US (2011)

Intangibles Currently Capitalized

- Computer software:
  - Introduced into the national accounts in 1999.
  - Time series estimates back to 1959.
  - Contributes 0.2 percentage point to GDP growth for 1982–1999.
  - For 2009, US software investment is about $295 billion, or 2.1 percent of GDP.

- Mineral exploration is also capitalized.

Source: BEA, US (2011)

R&D as Investment in GDP Statistics

- R&D satellite accounts
  - 1994: R&D capital stocks,
  - 2006: Impact of R&D capital on GDP statistics,
  - 2007: industry, regional, and international dimensions,
  - 2010: Incorporate NIPA and industry comprehensive revisions, expand industries to include finance, insurance, and real estate.
- 2013
  - R&D to be capitalized in national and industry accounts, followed by other BEA accounts.

Source: BEA, US (2011)

From R&D Expenditures to GDP Impacts

- New R&D Investment
  - Sum R&D input costs, removing double-counting.
  - Include depreciation of fixed assets.
  - Assign investment to owning sector.
  - Deflate nominal investment.

- R&D stocks by owner
  - Create capital stocks with perpetual inventory method.

- GDP impacts
  - Private business sector GDP increases by new investment.
  - Government and private nonprofit sector GDP increases by capital services flow on their stock of R&D capital.

Source: BEA, US (2011)

Summary of Impacts: 2007

GDP Impacts (billions of dollars)	
Total GDP (as published in the NIPAs)	14,077.6
Plus business own-account and purchased R&D investment	269.7
Less overlap with own-account software	-23.7
Plus CFC on government and non-profit R&D assets	103.1
Total final uses, adjusted with R&D as investment	14,426.7
Impact on final uses and GDP	349.1

Note: The impact on GDP is smaller than that shown in the Satellite Account. These estimates follow the NIPA use of CFC as the measure of capital services for government and non-profit institutions serving households.

Source: BEA, US (2011)

Depreciation

- Economic depreciation measures the value of the capital used up in production.
- Satellite account currently use averages for R&D from economic literature.
  - Chemical manufacturing: 11% per year
  - Transportation equipment manufacturing: 18% per year
  - Computer equipment manufacturing: 16.5% per year
  - All other industries, government, and non-profit R&D investment, including colleges and universities: 15% per year
- Going forward, updated measures will be informed by:
  - Survey questions to performers about expected useful life,
  - Financial data to estimate depreciation.

Source: BEA, US (2011)

Price Measures for Real R&D Investment

- Volume measures and market prices for R&D output are unobserved.
- Featured price index: price change for downstream goods as a proxy for R&D price change.
- Alternative approaches:
  - Input price index,
  - Adjusted input price index for unobserved productivity in the conduct of R&D,
    - Selected service sector industries or R&D-performing industries,
  - Growth of adjusted downstream industry profits as a proxy for the price of R&D,
  - Patent counts as an indicator of R&D output,
  - Industry-specific R&D input price indexes, adjusted with labor productivity for knowledge intensive industries.

Source: BEA, US (2011)

Geographic Dimensions of R&D

- R&D can be used simultaneously in multiple locations.
  - Multi-unit firms can move R&D-created knowledge around without a transaction.

- How should the national accounts treat the R&D investments of multinational and multi-unit firms?
  - Count each expenditure in only one location—where performed or purchased, or
  - Split between all locations where the company operates, or
  - Allow R&D stocks to multiply as multinationals enter new markets where the R&D-created knowledge can be used.

Source: BEA, US (2011)

Artistic Originals

- The SNA recommends the capitalization of entertainment, literary, and artistic originals.
- In 2013, to be capitalized in the national and industry accounts.
  - Theatrical movies,
  - Long-lived television programs,
  - Musical compositions and recordings,
  - Books,
  - Miscellaneous artwork.
- Estimates will go back to 1929.
- Similar estimation issues to R&D.

Source: BEA, US (2011)

Comparison with Broader Set of Intangibles

Share of nominal GDP

	US (2002)	US (1998-2000)	Australia (2005-2005)	Canada (2005)	Japan (2000-2002)	Netherlands 2005
Scope of investment covered	private sector	non-farm business sector	market sector	business	industry	commercial sector
Type of Intangible						
Computerized Information	**1.7%**	**1.6%**	**0.8%**	**1.0%**	**2.0%**	**1.4%**
Innovative Property	**2.1%**	**4.5%**	**2.2%**	**5.0%**	**3.7%**	**1.8%**
R&D from business expenditure surveys	1.5%	2.0%	0.8%	1.9%	2.1%	1.0%
Social science R&D, not captured in the line above	0.0%	0.1%	*	1.8%	no estimate	*
Mineral exploration	0.1%	0.2%	0.3%	1.1%	0.0%	
Copyright and license costs	0.4%	0.8%	0.1%	0.1%	0.9%	0.2%
New product development in the financial industry, not captured in business expenditure surveys	no estimate	0.8%	0.1%	0.0%	0.7%	*
New architectural and engineering designs, not captured in business expenditure surveys	no estimate	0.7%	0.1%	0.0%	no estimate	0.6%
Economic Competencies	**no estimate**	**6.9%**	**2.9%**	**3.8%**	**2.5%**	**5.2%**
Intangible investment % of unadjusted GDP	3.8%	13.1%	5.9%	9.8%	8.3%	8.4%
	Robbins, Streitwieser, & Joliff	Corrado, Hulten, & Sichel	Barnes and McClure	Belhoucine	Fukao and Hamagata	van Rooijen-Horsten et al.

Source: BEA, US (2011)

Development in the China

What Currently Happens in China?

- **Macroeconomics:** With regard to developments on the level of national accounts and integration of R&D and other intangible investments in GDP measurement the situation has to be explored

- **Microeconomics:** With regard to use of valuation and use of intangibles as loan collateral in the financial industry China is since a few years among the front-runners worldwide

Intangible Assets (IPRs) as Collateral for Loans: Bank of Communications (BoCom) and Others

- "The new loan offering not only helped the technology-based SMEs get financed, but also created a new business domain for the bank," Zhang Xin, director of retail credit department of BoCom said at the 10th China Hi-Tech Fair held in Shenzhen in October 2008.
- Bank of Beijing has also decided to make a foray into the IPR loan business and provinces such as Hunan and Anhui have also made progress in trying the new loan model.
- In Changsha, capital of Hunan, the local IP Office signed a cooperative agreement with Changsha Commercial Bank in 2008 to provide IPR mortgage loans to SMEs in the province.

Source: IP Department of Hong Kong SAR (February2012)

Thank You!

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