The Novo Nordisk Foundation's "The Importance of Impact Assessment"

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November 25, 2014

WHY IS IMPACT ASSESSMENT USEFUL?

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Different perspectives

1. RESEARCHERS
2. THE INSTITUTIONS/UNIVERSITIES
3. FOUNDATIONS
4. THE SOCIETY
    1. Documentation of return on investments
    2. Show good governance, openness, transparency and accountability
    3. Help to explain and communicate economic and non-economic impacts to citizens (the societal value of research)
    4. Support the decision on the allocation of new money for research

HOW DO WE BEST MEASURE RESEARCH?
What are pro and cons of impact assessment?

- Risks
  - **The WRONG INDICATORS creat perverse incentives**
  - Case: The ***Dead Sea Scrolls*** were discovered in eleven caves along the northwest shore of the Dead Sea between the years 1947 and 1956.
  - A reward was introduced for new discoveries. The result was that new scrolls were torn into small pieces

- Advantage
  - **The RIGHT INDICATORS improve the incentives to perform well**
  - Case: The ***Bibliometric Indicator*** has incresed the production and quality of research publication in Denmark.
  - A reward on the production of publications was introduced in 2010. The result was improved documentation of research activities

I. PERSPECTIVE

THE SOCIETY

WISHES:

- High rankings in an international context, e.g.
  - University ranking
  - OECD-ranking
  - EU-ranking
- To create a modern, wealthy and competitive society
- Need to explain why tax payers money should be spend on research and education

REQUIRES

- Documentation of high return on investments
- Documentation of impact in the society: e.g. international top-2, top-3, top-4 and top-5 in innovation, research, investments and R&D personel
- Documentation of quality of universities: e.g. KU in top-100
- Documentation of an open competitive society: e.g. international collaboration

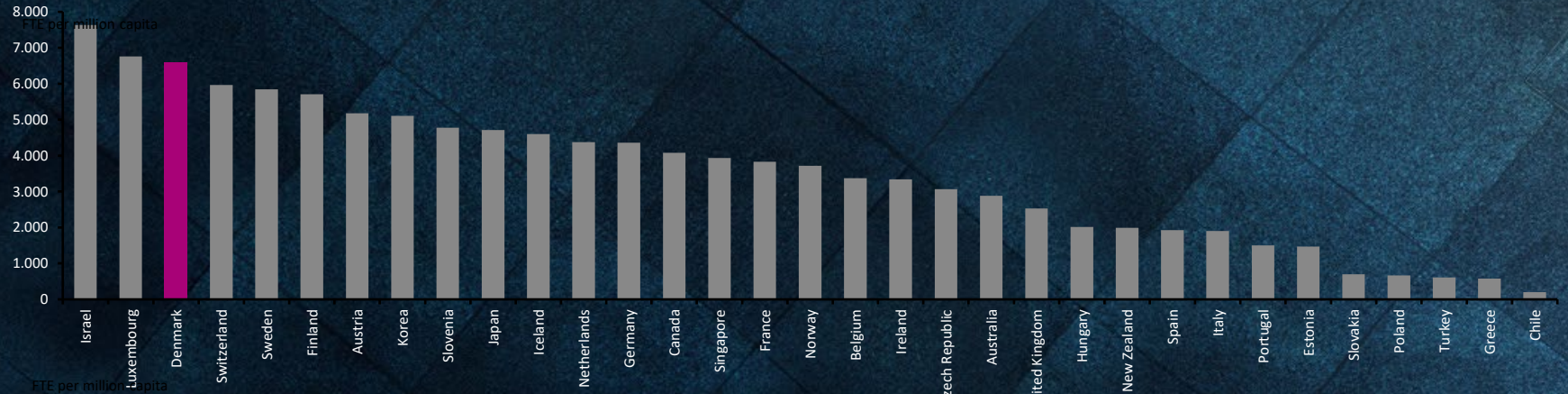
ET GLOBALT SAMFUND

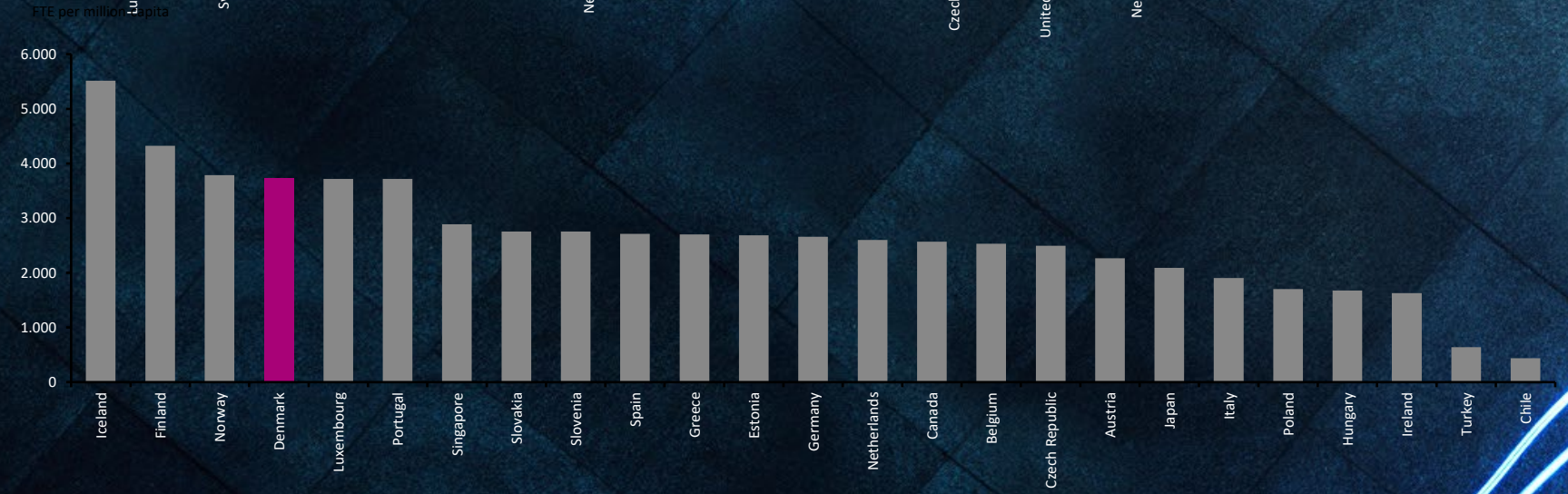
Danmark i top 3 inden for citationer pr. publikation

Danmark i top 3 inden for publikationer pr. indbygger

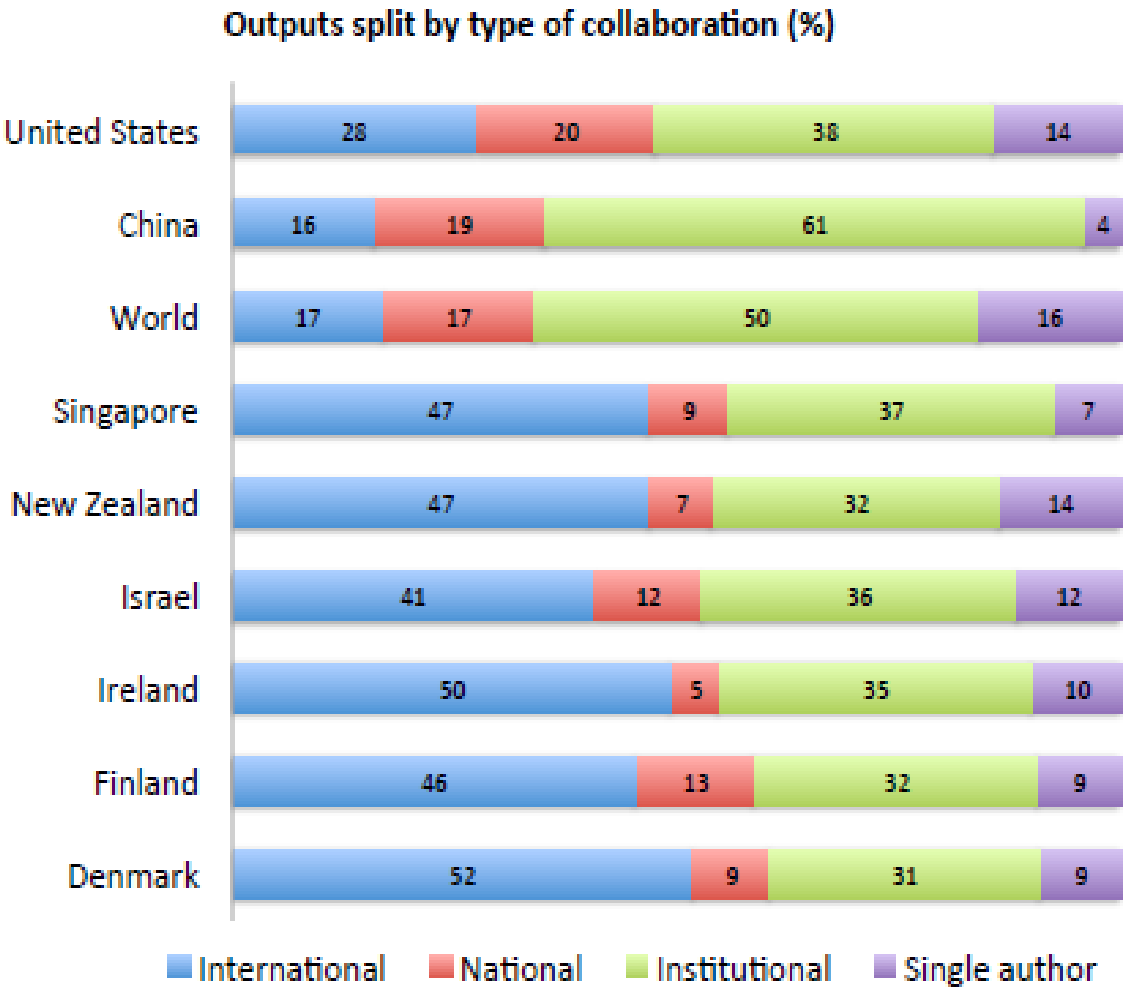
Ledende internationale tidsskrifter (2013)	Danmarks placering i OECD	
	Absolut placering	Impact-placering: publikationer per capita
Science	13	3
Nature	11	3
New England Journal of Medicine	9	2
Lancet	17	5

Privat og offentlig forskningspersonale per million indbyggere, - Danmark ligger henholdsvis i top-3 og top-4





Collaboration (2008-12)

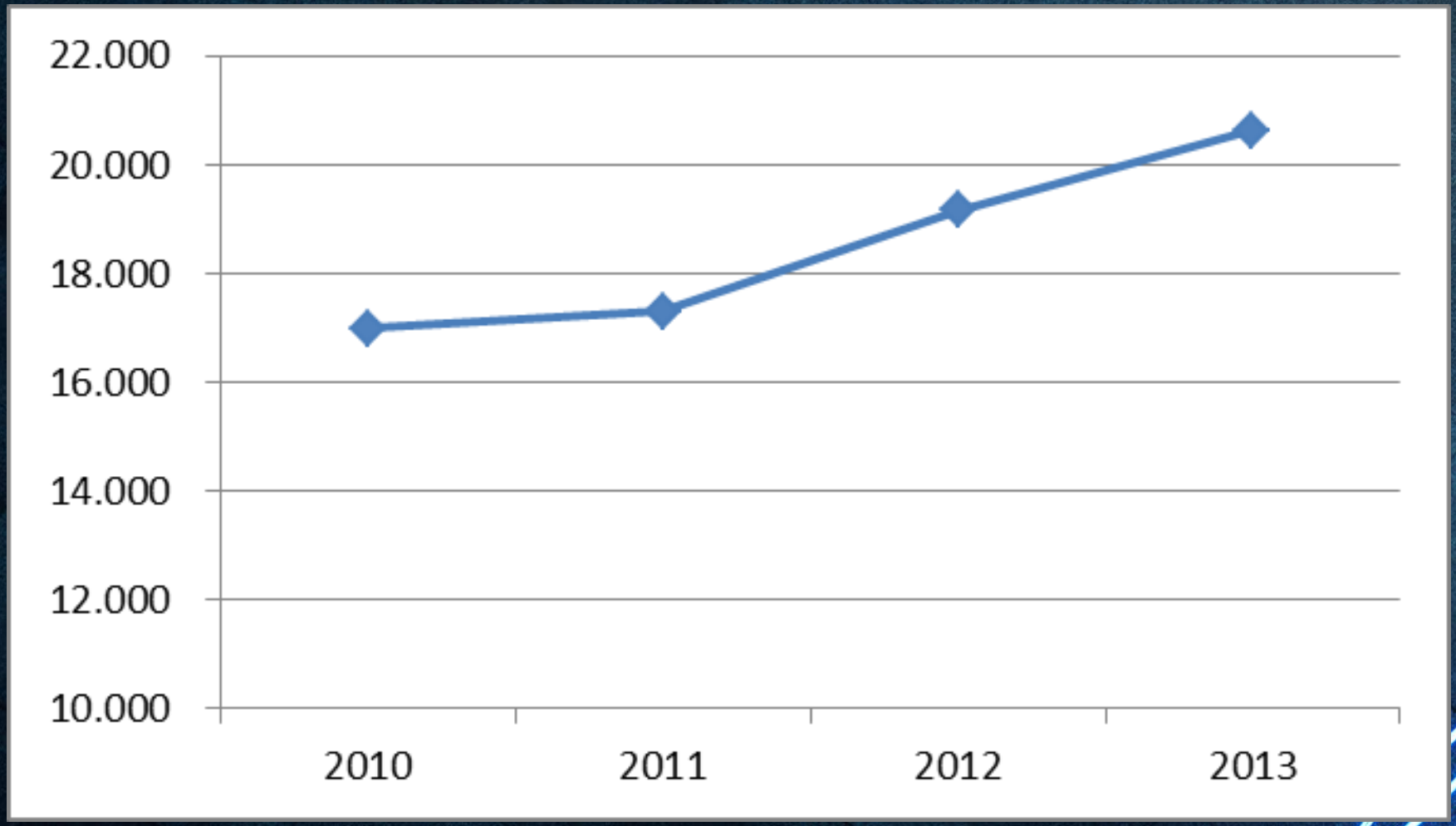


- Science is an international endeavour
- In small countries, the majority of papers produced involve international collaboration (40-50%)
- The degree of collaboration has only been increasing over time.

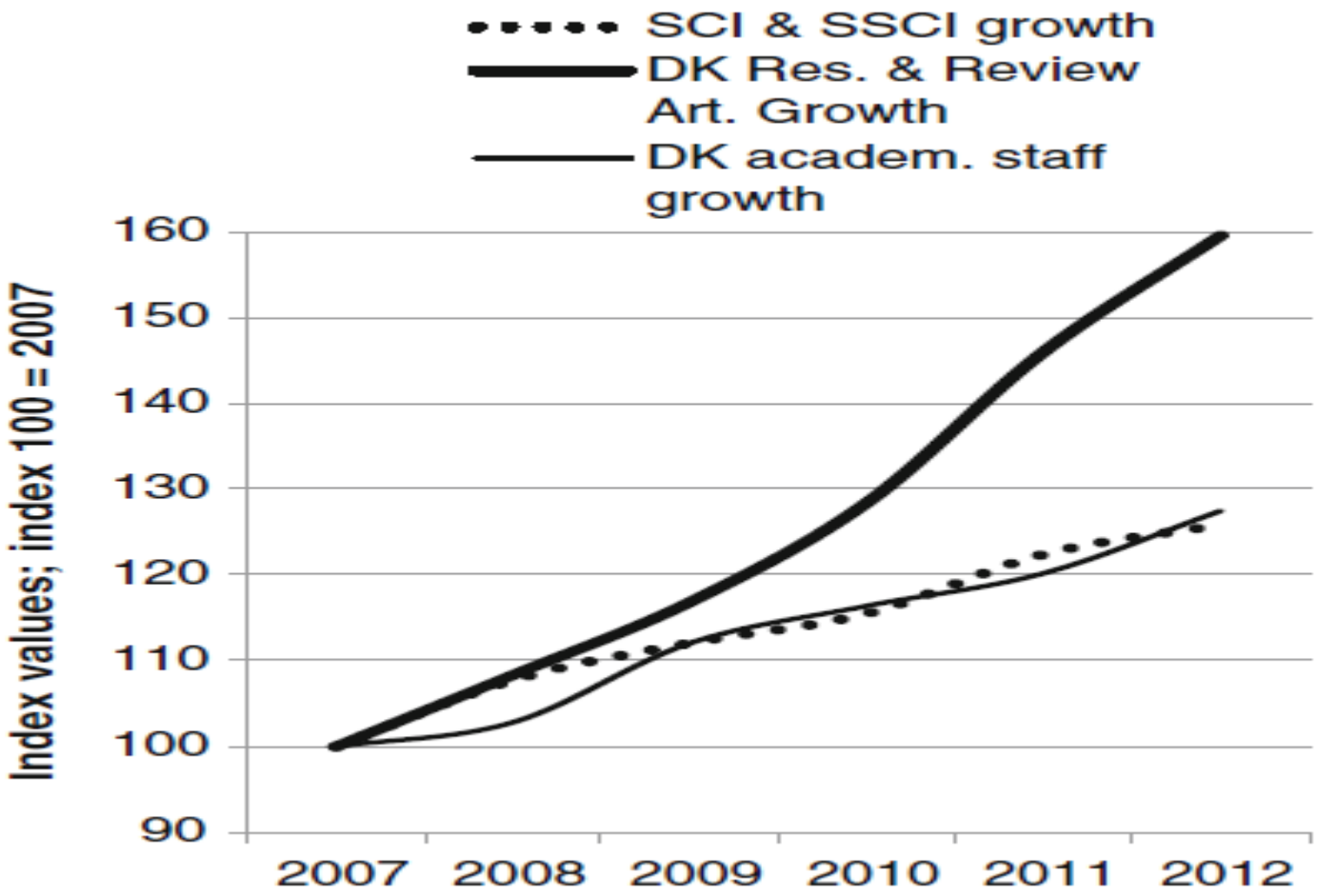
Internationalt samarbejde øger effekt af forskning

Indekseret "verdens-gennemsnit" for alle videnskaber er 1	Citations to publications without international co-authorship			Citations to publications with international co-authorship			Proportion of publications with international co-authorship*		
	2000-2003	2004-2007	2008-2011	2000-2003	2004-2007	2008-2011	2000-2003	2004-2007	2008-2011
Danmark	1.17	1.17	1.22	1.44	1.41	1.49	29%	32%	35%
Gennemsnit i Norden	1.04	1.04	1.06	1.33	1.31	1.36	28%	31%	35%

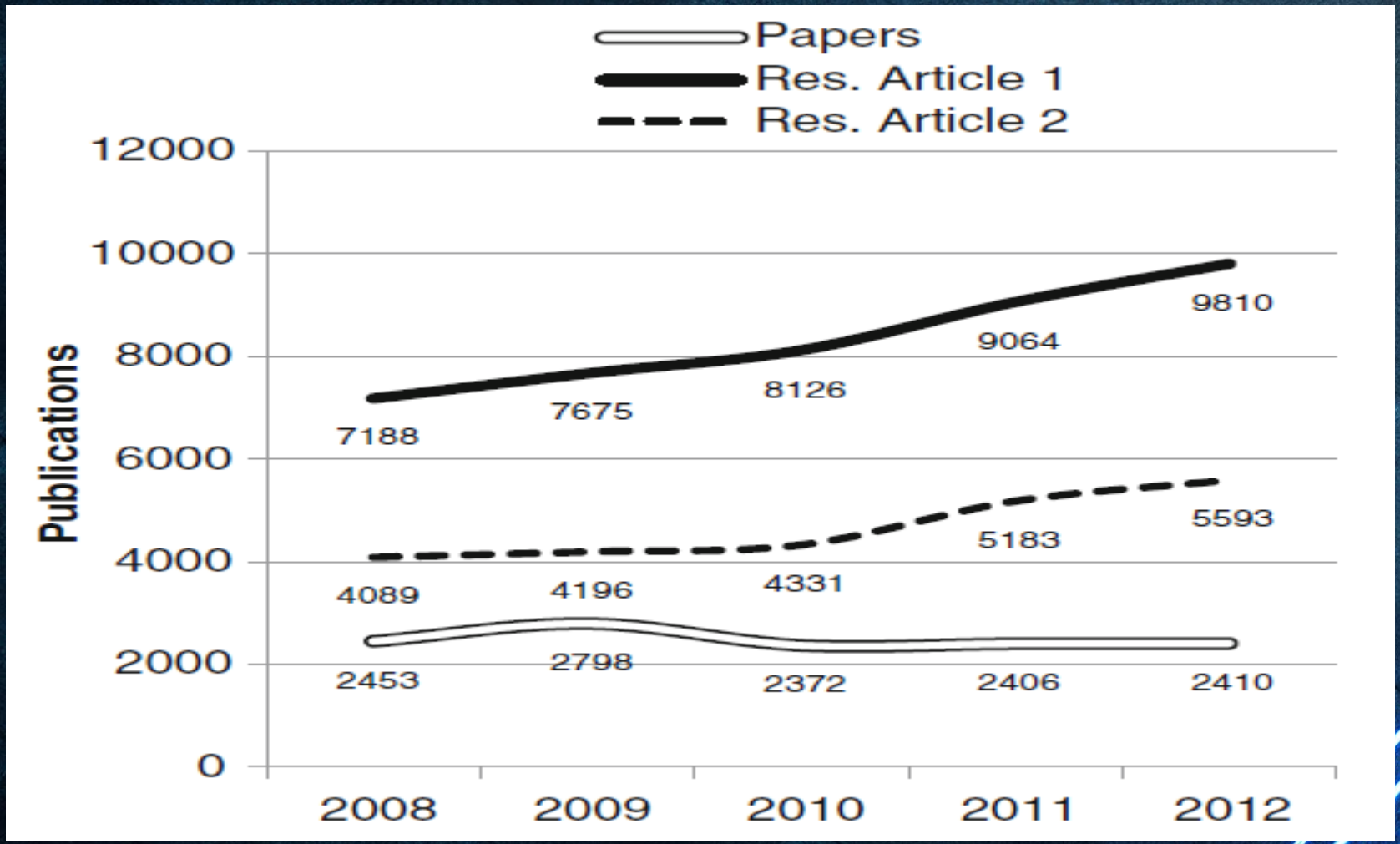
Number of publications since 2010



Publication, citation and academic staff growth since 2007 - Denmark



Publications in the BFI indicator divided into quality levels



Costs per publication, all research fields (million DKK)

Hvd.	Publikationsår			
	2009	2010	2011	2012
Samfundsvid.	0,81	0,95	0,97	0,83
Naturv./Tek	0,92	1,00	0,82	0,82
Humaniora	0,60	0,64	0,52	0,54
Sundhedsvid.	0,89	0,92	1,07	1,09
I alt	0,86	0,93	0,88	0,86

Costs per BFI-point (million DKK)

	Publikationsår			
	2009	2010	2011	2012
Samfundsv.	0,58	0,67	0,69	0,61
Naturv./Tek	0,82	0,85	0,72	0,72
Humaniora	0,40	0,43	0,38	0,40
Sundhedsv.	0,92	0,90	1,09	1,15
I alt	0,74	0,77	0,76	0,76

II. PERSPECTIVE

UNIVERSITIES AND RESEARCH INSTITUTIONS

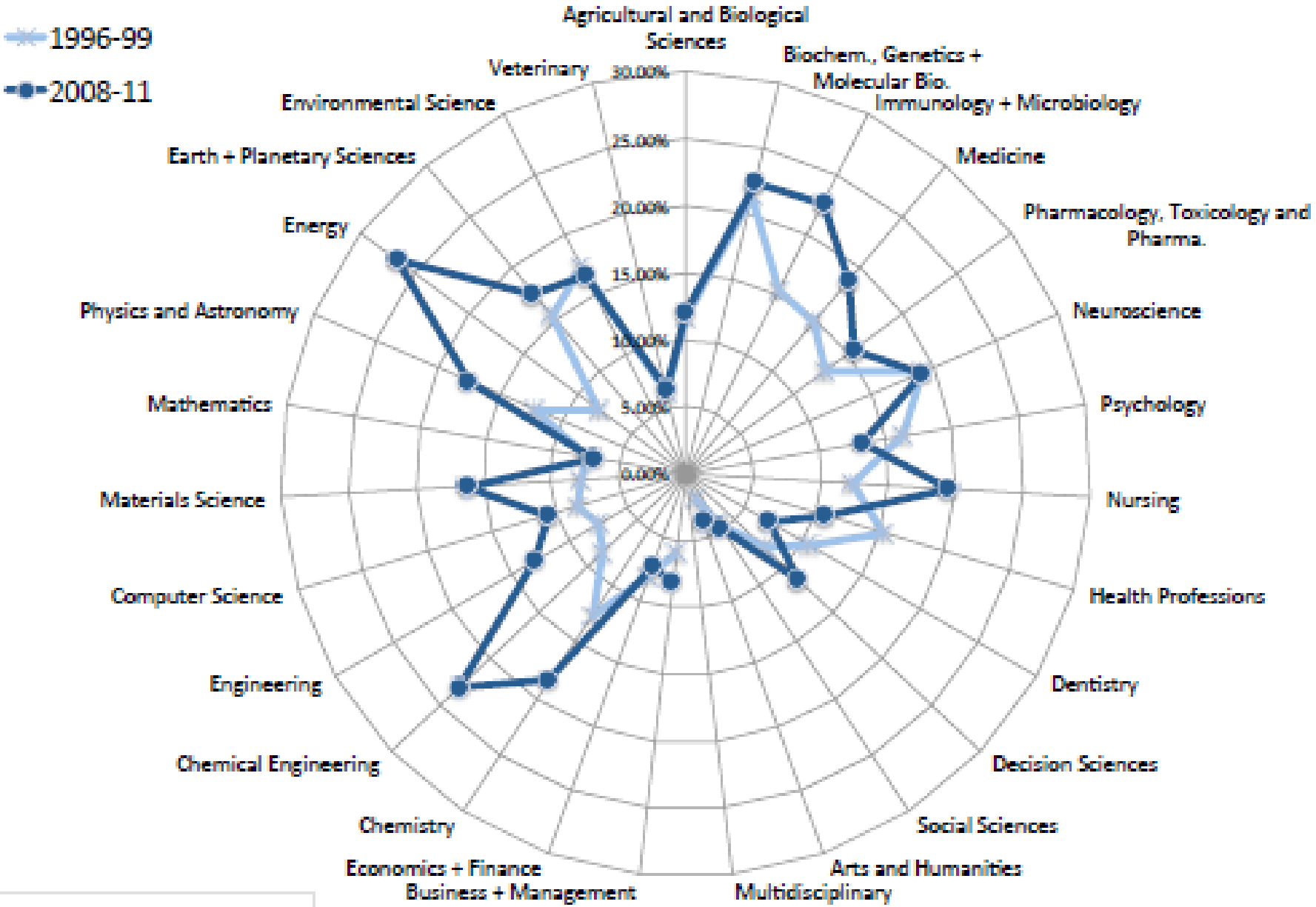
WISH TO

1. Produce excellent research and scientific discoveries
2. Produce good educations, research talents and candidates for society
3. Promote technology and knowledge transfers to the society
4. Obtain access to more basic funding of institutions and more external finance of research

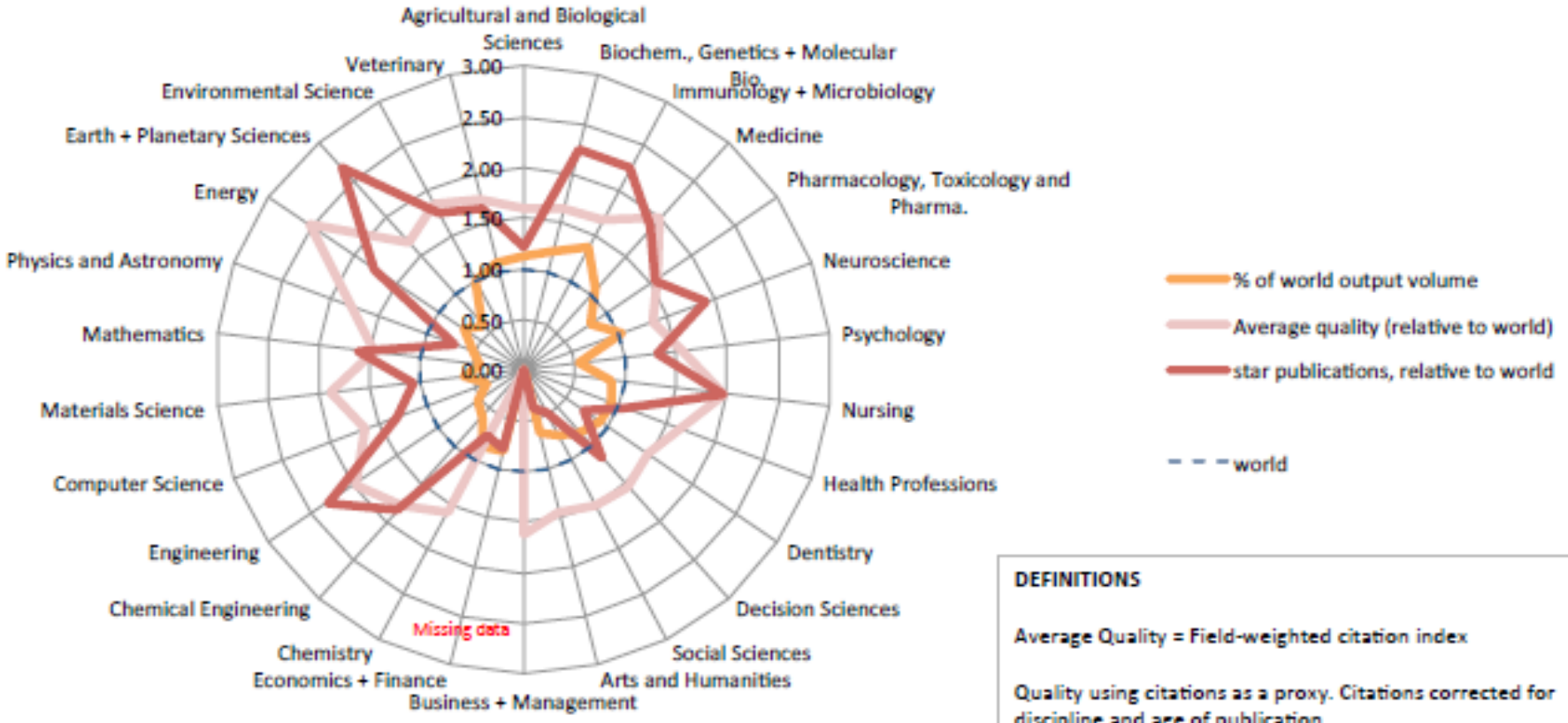
NEED TO

- Documentation of research quality and impact of research
- Documentation of the quality and value of education, candidates and research talents
- Verification of the impacts of knowledge and technology transfer and research collaboration – value for money
- Documentation of the contribution to the renewal of society

DENMARK Star publications over time (% of outputs in top 10% of world by citations)



Quantity and quality for Denmark – 2008 to 2012



Data source: Elsevier, Scopus
Graph produced by: SAEI Secretariat

DEFINITIONS

Average Quality = Field-weighted citation index

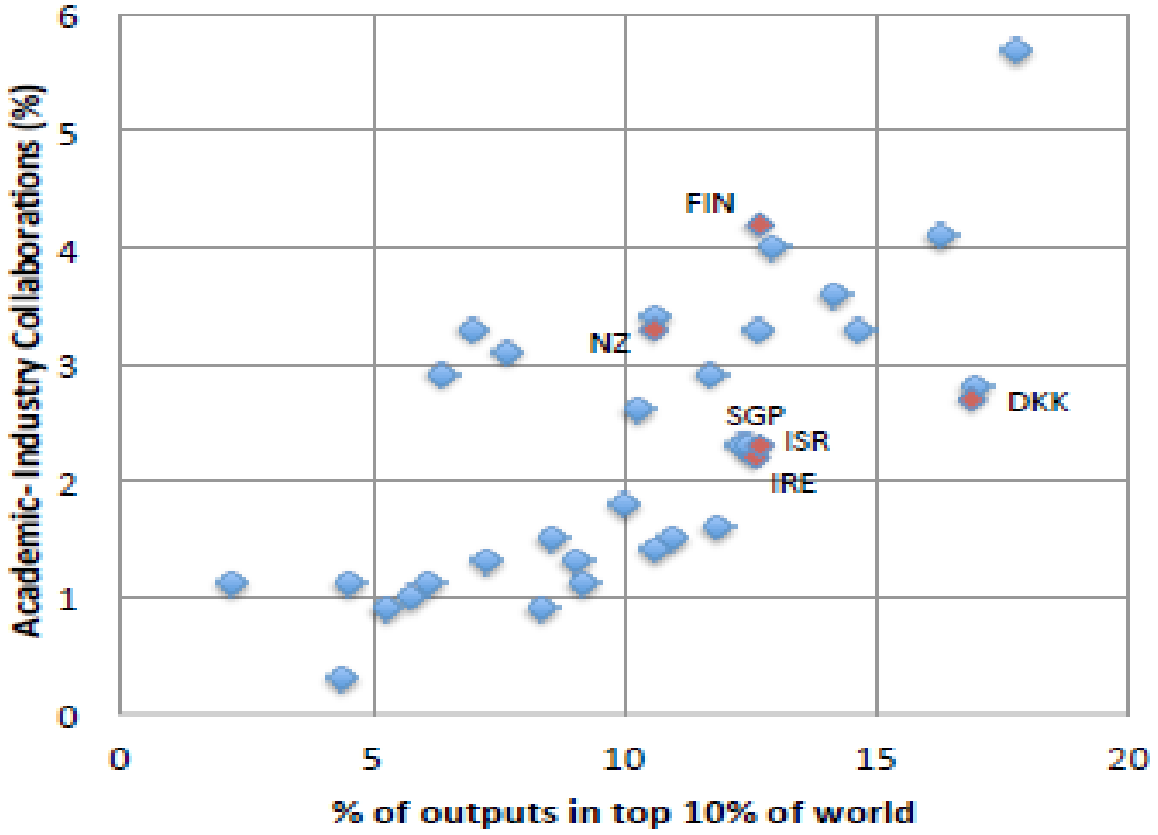
Quality using citations as a proxy. Citations corrected for discipline and age of publication.

Quality – star performers:

Using top-cited publications as a proxy. Based on % in top 10% of world outputs, normalised to 1.

Correlation between top cited outputs and industry collaboration

Outputs in top percentiles vs academic-corporate collaboration (2000-2012)



Data: Articles only, self-citations excluded from "Top10" metric

Institutional Competencies (2012)

The word cloud below shows sub-disciplines associated with institutional-level competencies for Danish universities.

The size of the word is related to how many fractional papers from competencies are approximately associated with the discipline. The colours represent the high-level discipline area.

PERSPECTIVE
THE RESEARCHERS

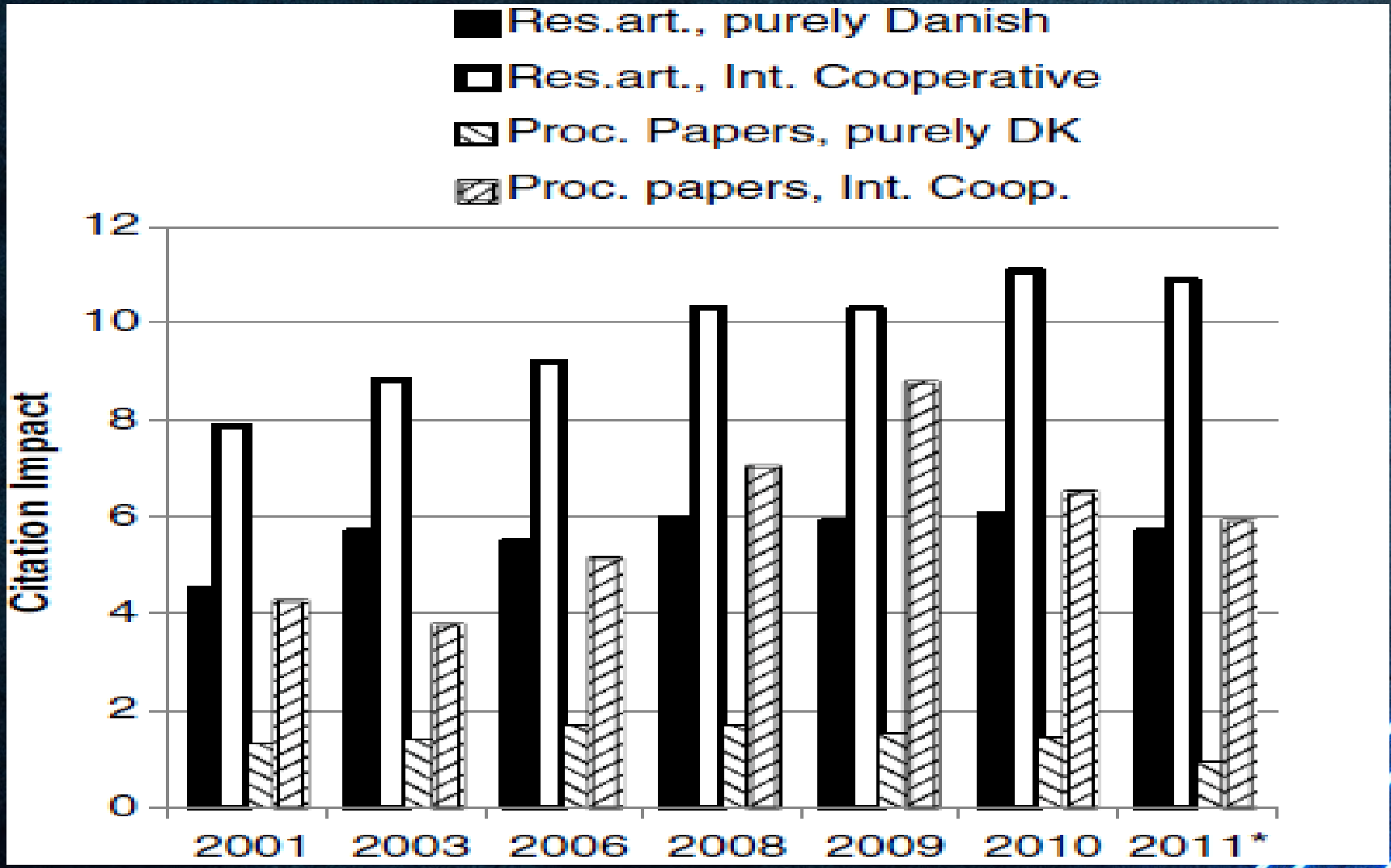
WISH TO

- Want to do excellent research and create a research career
- Prefer stable (long-term) finance of research
- Work in good research environments with modern research infrastructure

NEED TO

- Documentation of research production, talent and excellence
- Documentation of impact of research production
- Documentation of societal impacts
- Documentation of contribution to education
- Documentaiton of impact of grants and technology transfer

Citation impacts – Danish versus international research-collaboration



Economic impact of knowledge transfer and research collaboration with businesses

- Research-business collaboration projects
  - 3,6 per cent higher total factor productivity in companies
  - Impacts differ between research-industry collaboration, knowledge transfer and PhD-collaboration
- Research-business networks
  - 3½ per cent higher productivity in companies

PERSPECTIVE

THE FOUNDATIONS

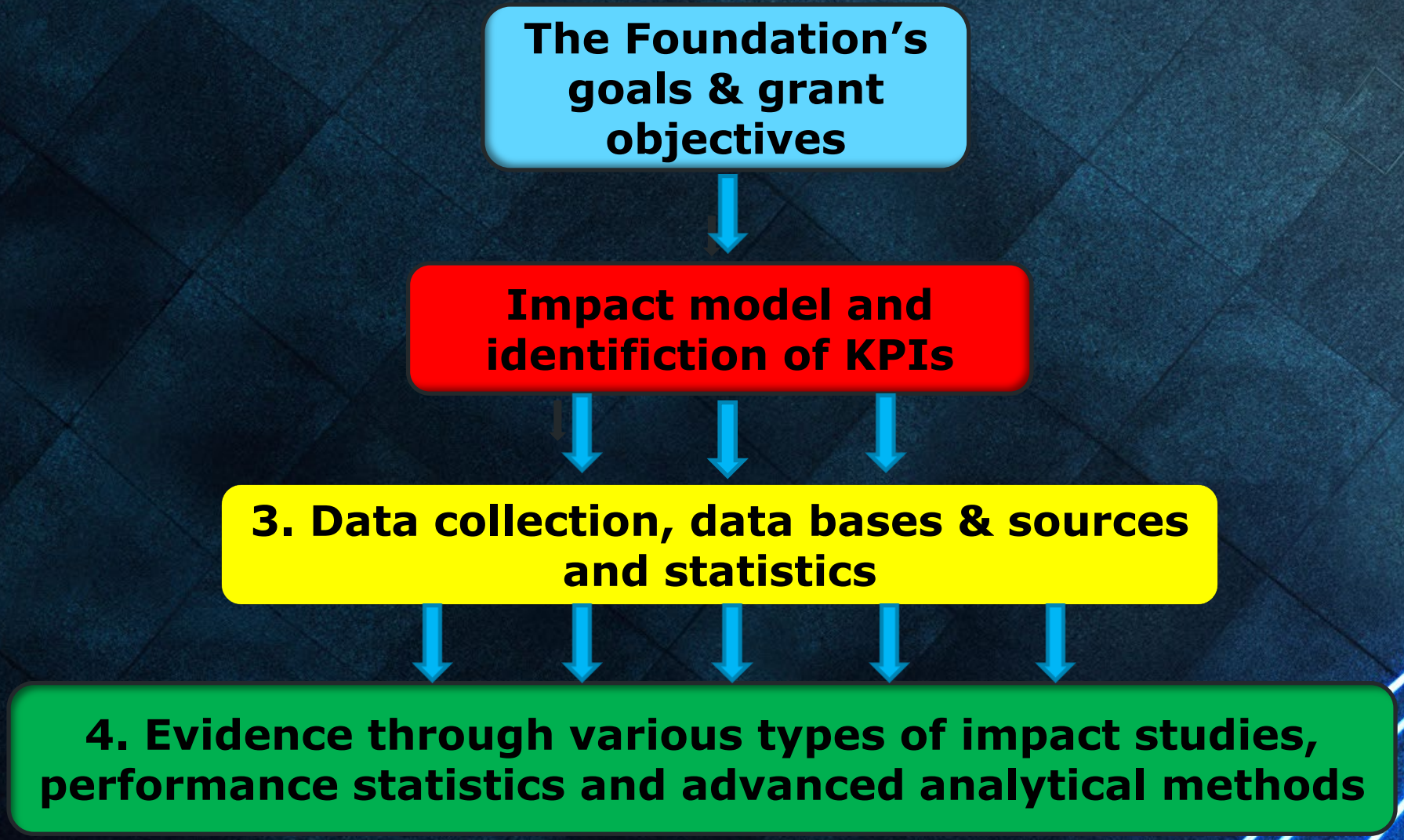
WISH TO

- Live up to their societal commitments and missions
- Comply with their societal and strategic goals of foundations
- Contribute to the development of the society
- Reach their grant objectives

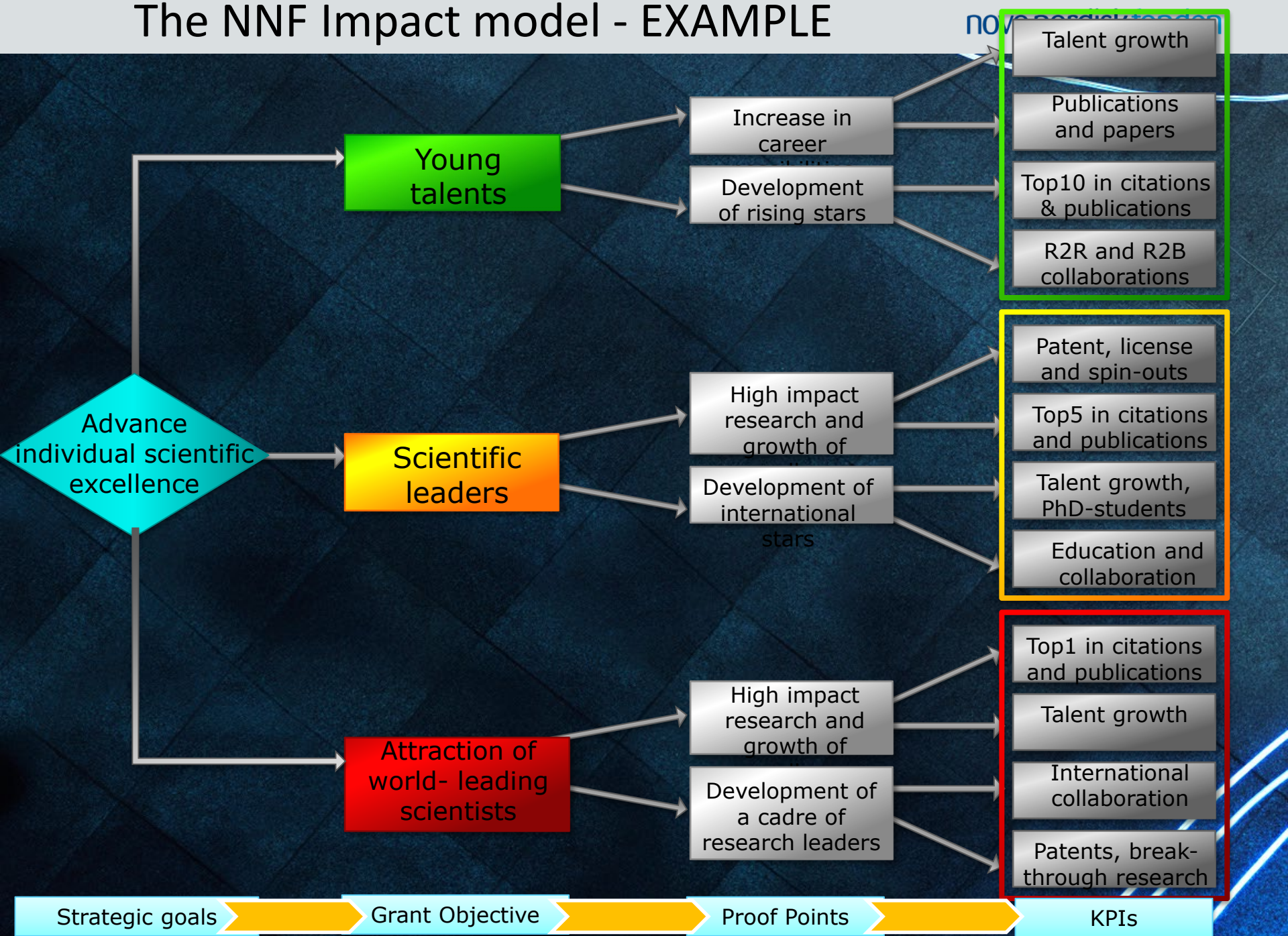
NEED TO

- Document the return on their investments
- Verify the micro and macro impacts of grants
- Document the contribution to living condition and economic development of the society (societal impacts)
- Promote transparency, openness and countability

The four steps in the implementation of the strategy



The NNF Impact model - EXAMPLE



Foundations use up to 50 Key Performance Indicators (KPIs)

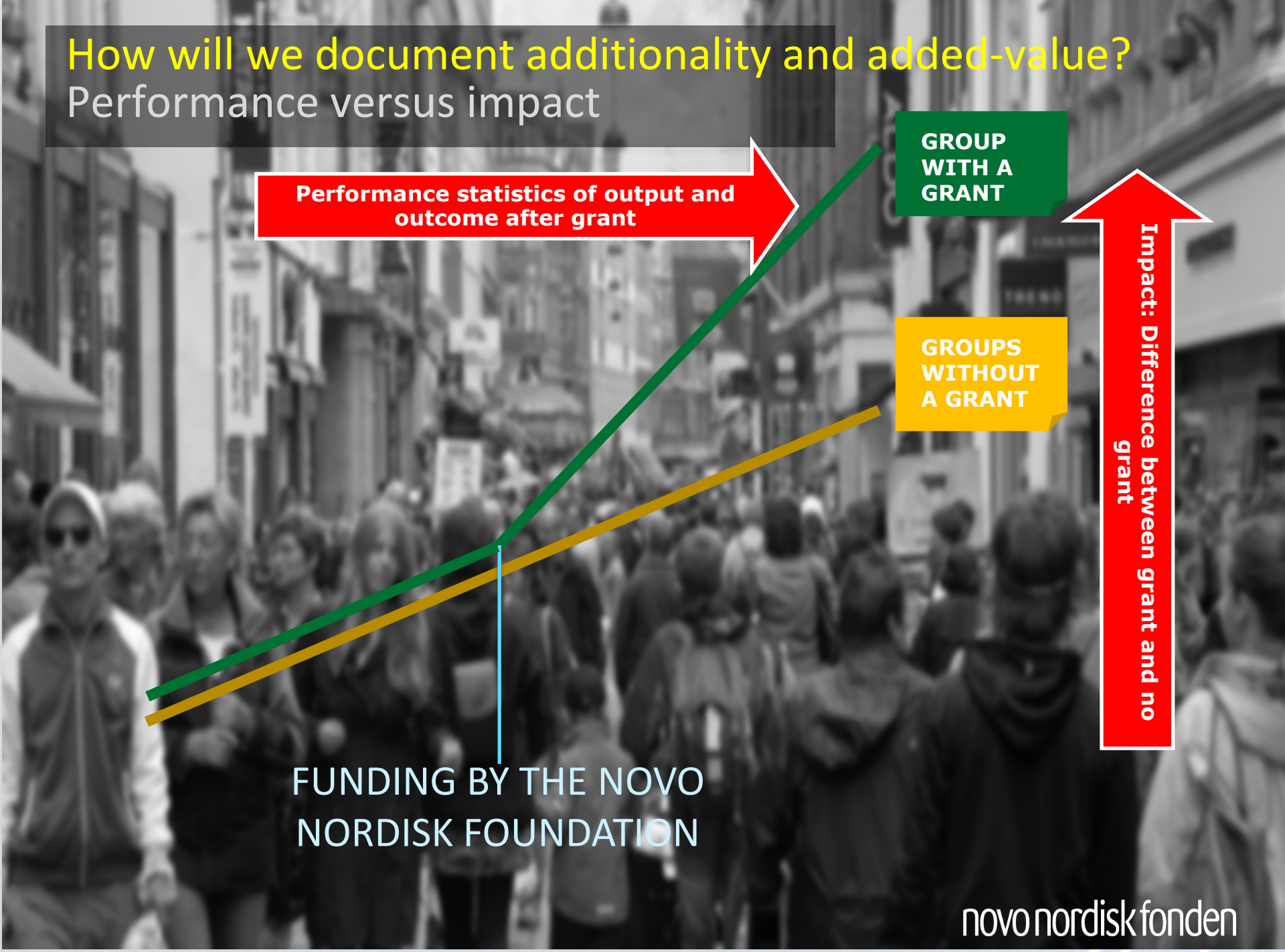
30 INPUT- & OUTPUT-KPIs:

- Funding (money)
- Human capital (people)
- Academic performance (activity)
- Collaboration (behavior)

20 OUTCOME- & IMPACT-KPIs:

- Academic results (newness)
- Dissemination (spread of newness)
- Commercial exploitation (value creation)
- Societal additionality (value capture)

How will we document additionality and added-value?
Performance versus impact



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The research literature on the impact of public research

Aarhus University (Schneider m.fl. – 2013)

- The Danish national research foundation centres match the performance of the best universities in the world

Tool (1999, 2000)

- The duration from basic research to commercialization in pharmaceuticals is about 17-19 years.
- 1% increase in basic research for pharma industry could lead to 2-2,4 % increase in new products.

Wellcome Trust (2013)

- 6% of grants reported filing a patent
- 17 % reported public-private research collaboration

The research literature on the impact of public research

Agrawal, McHale and Oettle (2014)

- Funding research stars results in an increase in the average quality of subsequent recruits

Copenhagen Business School (CBS - 2011)

- An increase in the workforce share of academics with a natural science with 1 percentage point increase GDP by 1,5 percentage

The Ministry of Higher Education and Science (2011/2012)

- An industrial PhD fellow increases employment with eight persons during the project period.

The research literature on the impact of public research

Aarhus University (Bloch og Gravesen -2008)

- An increase in public research funding by 1 per cent increases private research by 0,1 per cent

The Ministry of Higher Education and Science (2011)

- Public-private research collaboration boosts labour productivity by 9-15 per cent