

The Danish Funding System and recent policy trends

IMPACT STARTS WITH A STRATEGY

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Stilized facts – people and economy

- 5.7 million inhabitants
- GDP per capita: World top-11
- Unemployment rate: 6,7
- Budget deficit: 1,2 per cent of GDP

Facts about STI performance

- European Innovation Scoreboard top-2
- STI World top-3: citations per publication
- STI World top-3: publications per capita
- OECD top-4: Public R&D (1,05% of GDP)
- OECD top-8: Private R&D (2,05% of GDP)
- OECD top-11: innovative companies

Stilized facts about the universities and RTOs (2012)

- Eight public universities
- Three public research institutions
- Nine RTOs (so-called GTS-Institutes)
- One university in world top-100 (publications)
- 28 per cent gets a bachelor degree
- 29 per cent gets a master degree



Stilized facts about R&D personnel

(source: Denmark's Statistics Office)

30,000 private researchers

30,000 technical and administrative
personnel in the public and private
sector

Scientific personnel in the public
sector – 30,000 persons

R&D investments are 3,1 per cent of GDP

8 billion euros

90,000 work directly with R&D activities

10,000 PhD students

..... 2,400 new PhD-students
annually

.....out of this 10,000 are
professors, associate professors
and assistant professors at the
universities



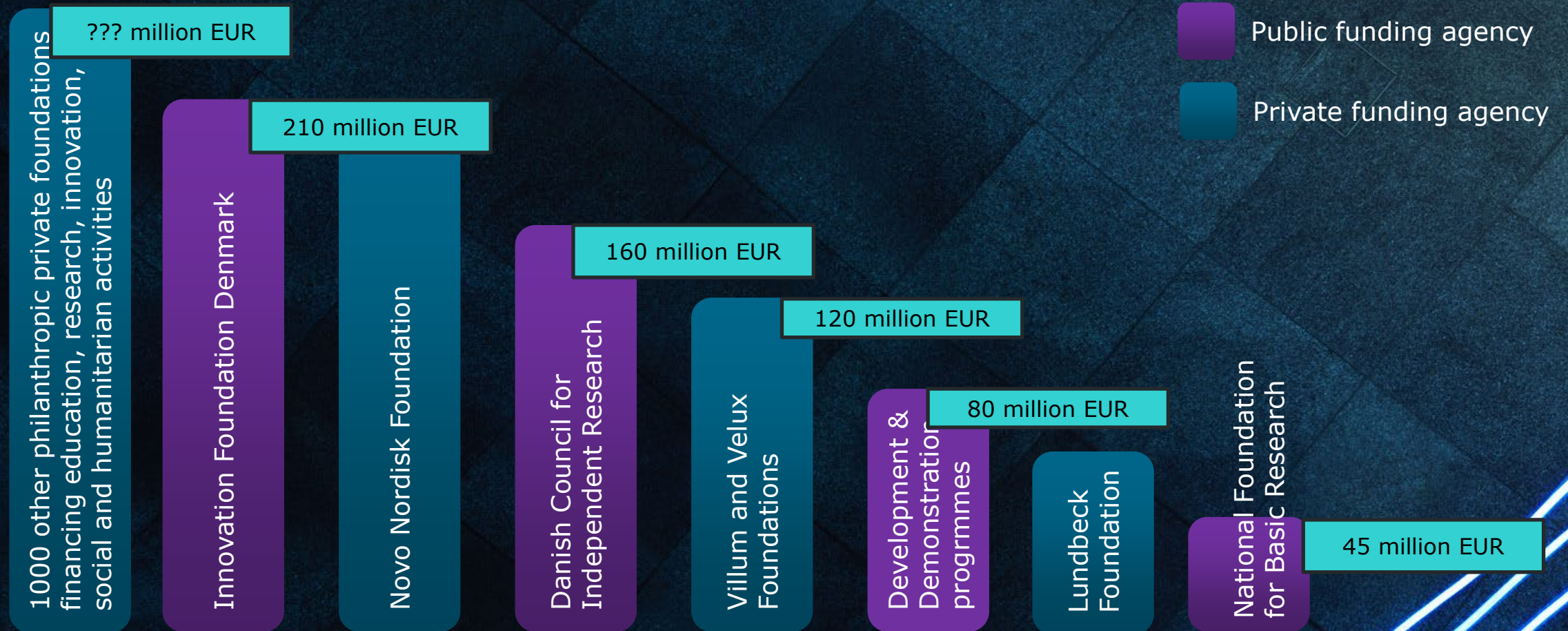
Financing public research in Denmark, 2011 EUR 2,4 billion

- 1,90 billion EUR from the public sector
- 0,25 billion EUR from private foundations
- 0,16 billion EUR from abroad (EU, Nordic Council, UK, USA...)
- 0,09 billion EUR from private companies

Innovation Strategy 2012 & Productivity Commission 2013

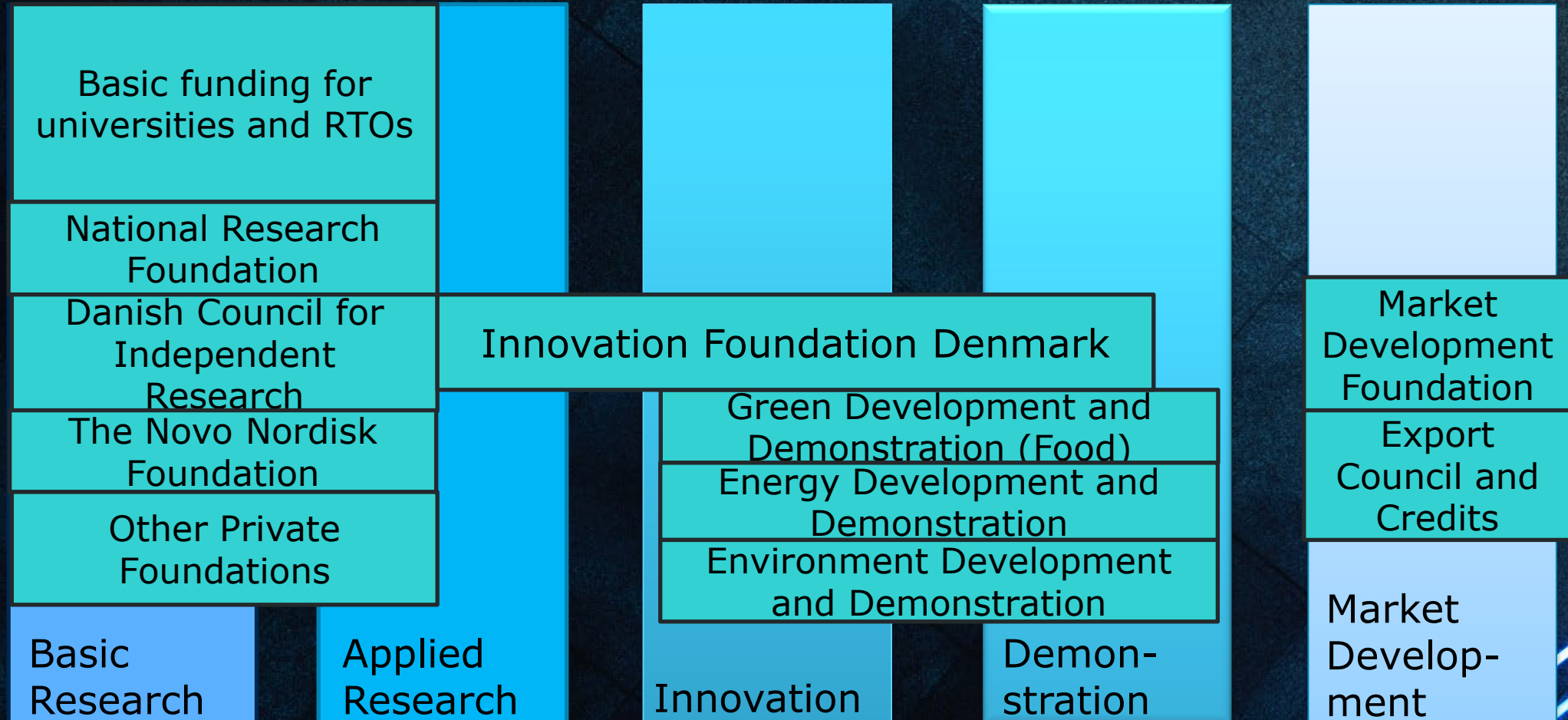
- **Societal objectives:** contribute to new solutions to the grand challenges and to improved competitiveness of businesses
- **Goals:** Denmark in OECD top-5
- **Challenge:** Productivity impacts of STI policy
- **Instruments:**
 - Public and private R&D and innovation funding bodies
 - Executing institutions: Universities, enterprises, RTOs (GTS-net), 22 innovation networks, regional clusters
 - Evidence-based STI policy and impact assessment
 - Simplification and coordination of funding bodies and instruments
 - New instrument for challenge driven innovation

MAIN BODIES FOR FUNDING OF PUBLIC RESEARCH, EDUCATION AND INNOVATION in 2014



Relative size of research funding agencies in Denmark

The division of labour between Funding Bodies



STI policy trends in Denmark – reforms and evaluations...

- 0,4 billion EUR to the National Foundation for Basic Research (December 2013)
- Establishment of Innovation Foundation Denmark (April 2014)
- Establishment of The Council for Research and Innovation Policy (April 2014)
- Evaluation of the technology transfer and knowledge transfer (September 2014)
- Evaluation of the Council for Independent Research (October 2014)
- Interaction between private and public research foundations (June 2015)

FOUR GRANT CATEGORIES in the funding system

Open
competition
grants for
collaboration:
platforms,
partnerships,
consortia etc.
to ***institutions***

Bottom-up

Research
centres,
centres of
excellence and
innovation
networks,
business
clusters

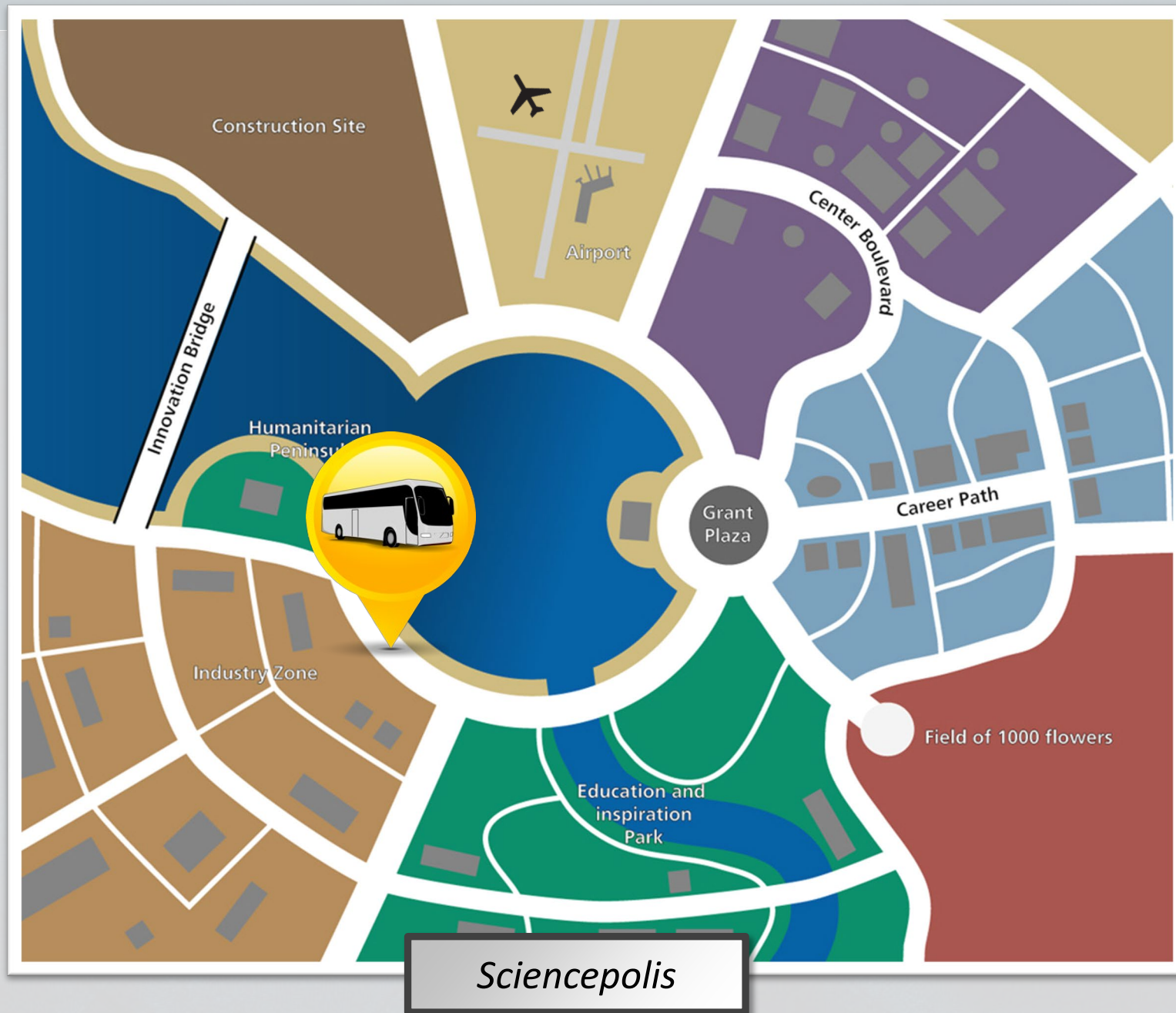
Top-down and bottom-up

Open
competition
grants to
individual
researchers and
enterprises:
scholarships,
post.doc, phd,
projects etc.

Bottom-up

Stand-alone
grants and
strategic
initiatives

Top-down



7 policy areas which create significant impact

- ☐ Inspiration, collaboration about education, spur imagination, knowledge about science, innovation and technology
- ☐ Fuel cross-disciplinarity, STI collaboration, B2B, B2R, knowledge dissemination, productivity and innovation
- ☐ Advance individual scientific excellence, labour mobility, matchmaking, career path
- ☐ Strengthen the research base in Denmark and promote excellence in selected fields.
- ☐ Brain Gain and international collaboration
- ☐ Build bridges between scientific discoveries and commercial applications
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- ☐ Creating economic and social impact

INSPIRATION AND EDUCATION PARK

Talent Campus

ESOF 2014
The National Day
of Research

Growth Houses
Student Houses
Venture Cup

The Danish
Diabetes
Academy

The Foundation for
Entrepreneurship

Museums for Natural
Science

Copenhagen
International School
& European School

public service for Inventors
Nobel Lectures

SPUR IMAGINATION, INSPIRATION AND KNOWLEDGE
ABOUT SCIENCE AND TECHNOLOGY

Young Investigators
YDUN- Female
Investigators



High school Collaboration
and Prizes for teachers



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FIELD OF 1000 FLOWERS - open competition

PROJECT GRANTS



Public funding agencies

- Innovation Foundation Denmark
 - InnoBooster programme for SMEs (average grants are 25,000 EUR)
 - Industrial PhD/Post Doc for R&D companies (grants are 200,000 EUR)
 - Innovation Consortia, High Tech Projects and Platforms – for industry-research collaboration (average grant 1,8 million EUR)
 - Strategic Research Centres (average grant 2,1 million EUR)
 - INNO+ challenge driven programme (average grants 4-7 million EUR)
- Danish Council for Independent Research
 - 500-600 individual research projects annually (aver. 350,000 ERU)

Private funding agencies

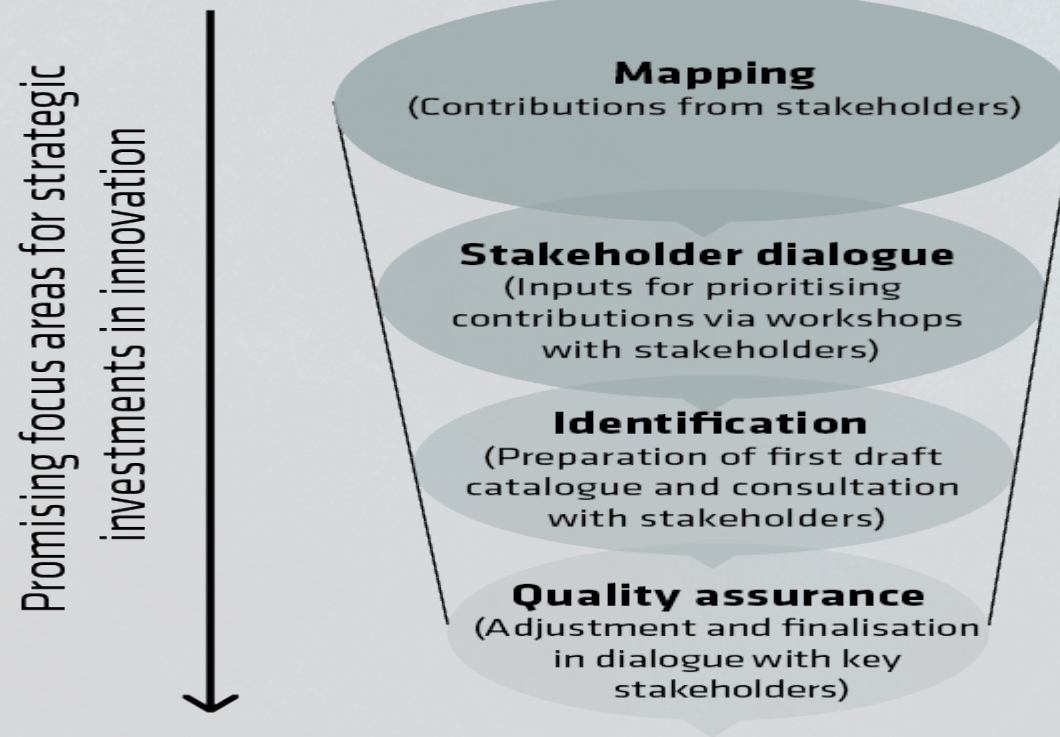
- Novo Nordisk Foundation
 - Investigator (star) grants (grants are 5 million EUR or 1,5 million EUR)
 - 250 projects annually (average grants are 200,000 EUR)
 - Scholar- and Fellowships (grants are up to 1,3 million EUR)
 - Prizes and Symposia (grants up to 0,4 million EUR)
- Lundbeck Foundation
 - 200 individual research projects annually (aver. 350,000 EUR)
- Villum Foundation and Velux Foundation
 - 150-300 individual projects
- Carlsberg Foundation
 - 50-100 individual projects

INNO + contains 21 strategic areas
- for inspiration and prioritisation of investments in innovation



The INNO + process establishing the inspiration catalogue novonordiskfonden

Societal challenges, need for innovation,
research and regulation, etc.,
strengths and capabilities,
and potentials



INNO+

A basis for inspiration and
prioritisation of strategic
investments in innovation

- 
1. To be based on a societal challenge that may prove to be a driving force and have a significant impact for short term to medium term growth in Denmark
 2. To build on
 - a) societal demand and research driven innovation
 - b) a public sector-initiated innovation effort,
 - c) public regulation and public procurement
 3. To build on knowledge-based strongholds and on industrial strongholds
 4. To involve close and binding collaboration between companies, research institutions, public authorities, including international collaboration

Five new partnerships for innovative solutions

- Selected in open competition
- 4-7 million EUR
- Funding period 3-5 years
- Significant co-funding is expected

Blue jobs via green solutions

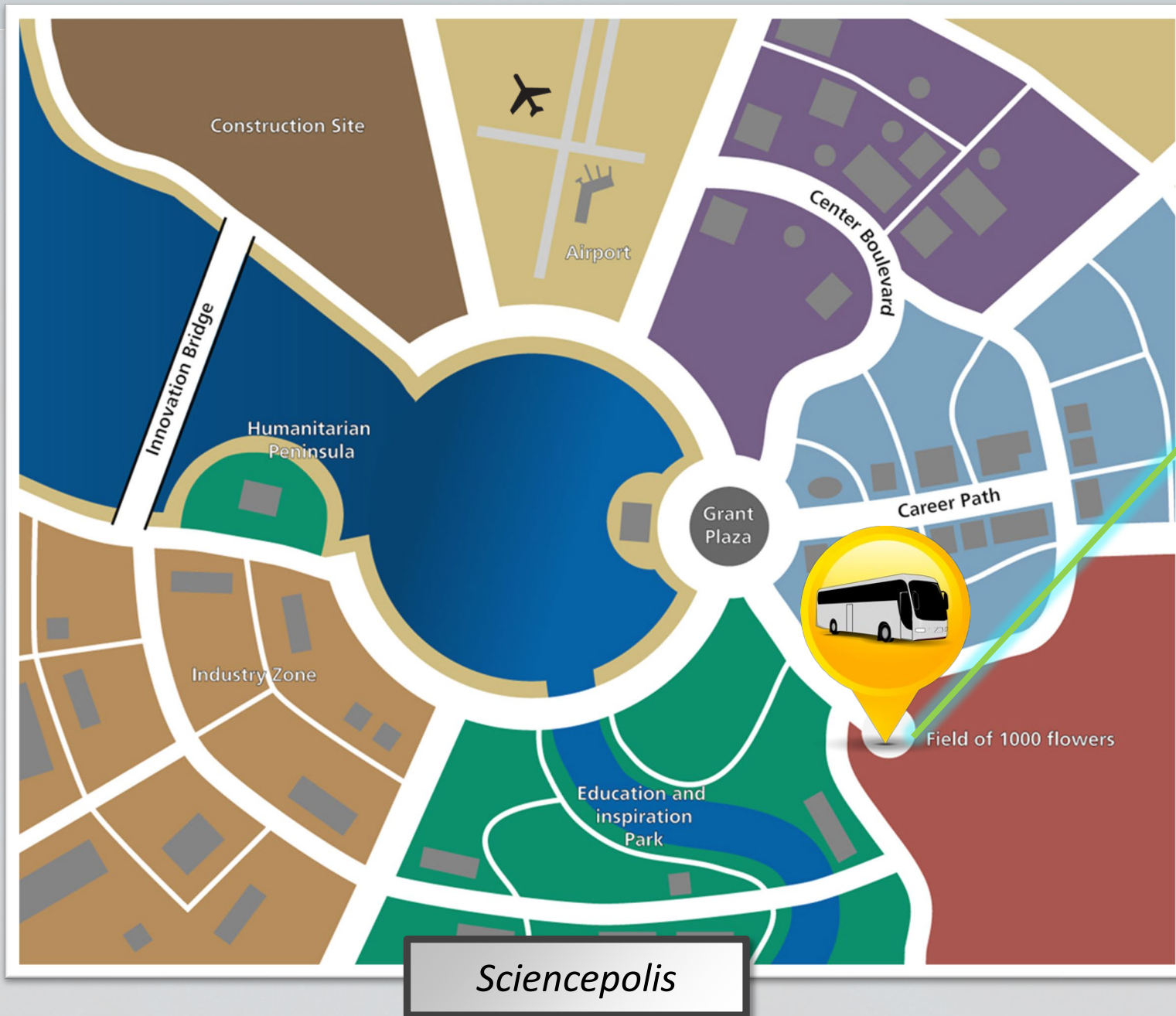
Water-efficient industrial production

Intelligent, sustainable and efficient plant production

Innovatorium for building renovation of world class standard

Denmark as the preferred country for early clinical testing of new medicines





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CAREER PATH

NNF Laureate
Research Grant
Excellence project
Hallas-Møller
Fellowship
Research
Fellowship



Ph.d.- og
post.doc.-
fellowships

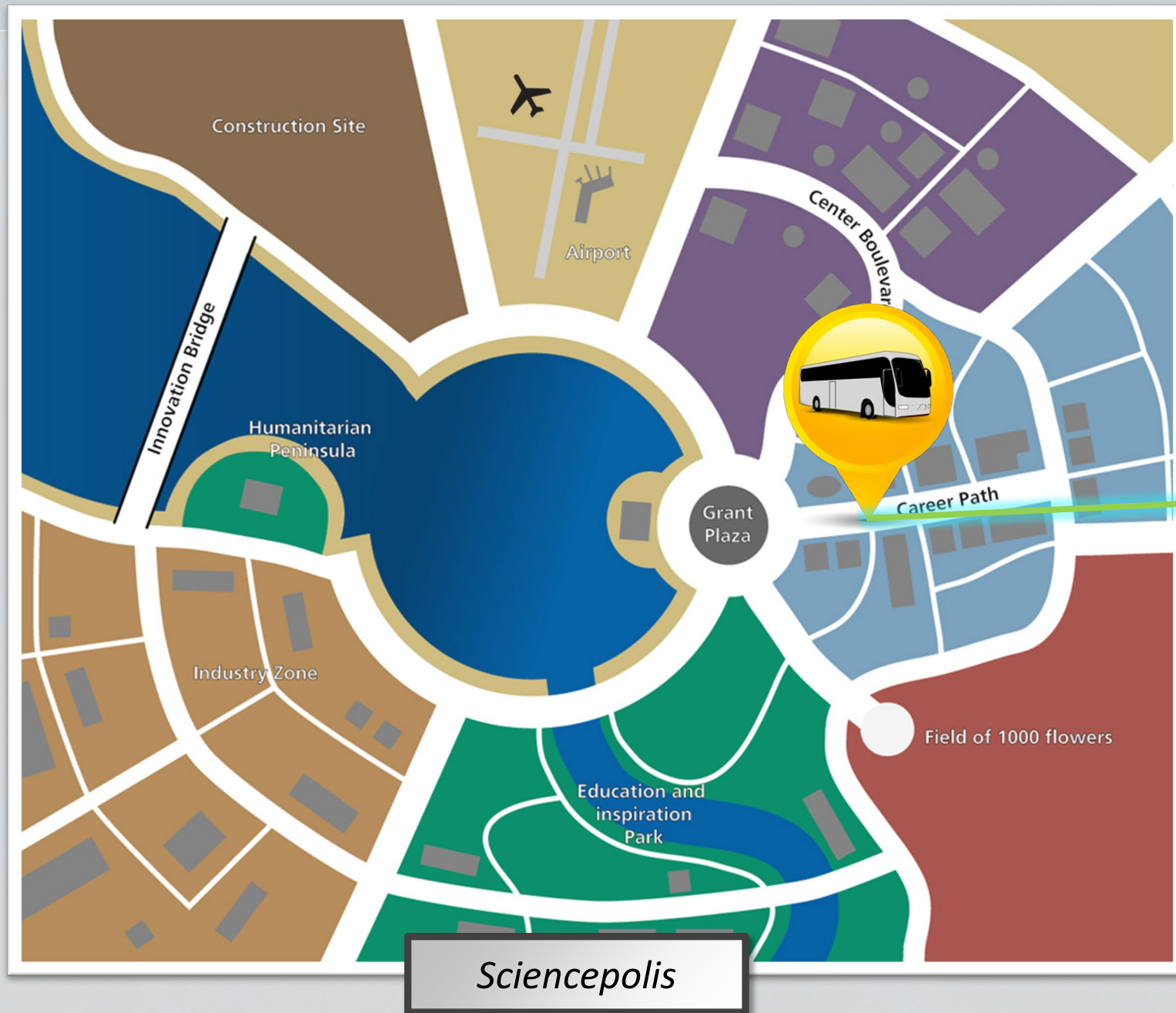
Research
Leader
Programs



Hall of Fame



Prizes



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5 mega research centres funded by the Novo Nordisk Foundation – 500 million euro

Metabolic Research

Stemcell Research

Protein Research

Biosustainability

Biobank

44 centres of excellence funded by the Foundation for Basic Research - 500 million euro

The Innovation Foundation Denmark: Strategic Research and Innovation platforms, Strategic Research Centres, INNO+Partnerships, and Innovation Consortia (average grants are 2 million EUR)

The Danish National Foundation for Basic Research

Establish and develop centres of
excellence in Denmark

All scientific areas

44 centres of excellence

8 million euro for 10 years

NOVO NORDISK FOUNDATION'S FIVE Research Centres

**DANISH
NATIONAL
BIOBANK**

Capital Region

750 employees

54 per cent foreign researchers

Attractive for international top
researchers

Educate people and researchers
who are attractive for public and
private research

Novo Nordisk Foundation
Center for Biosustainability

500 million euro
10 years



The Novo Nordisk Foundation
Center for Basic Metabolic Research

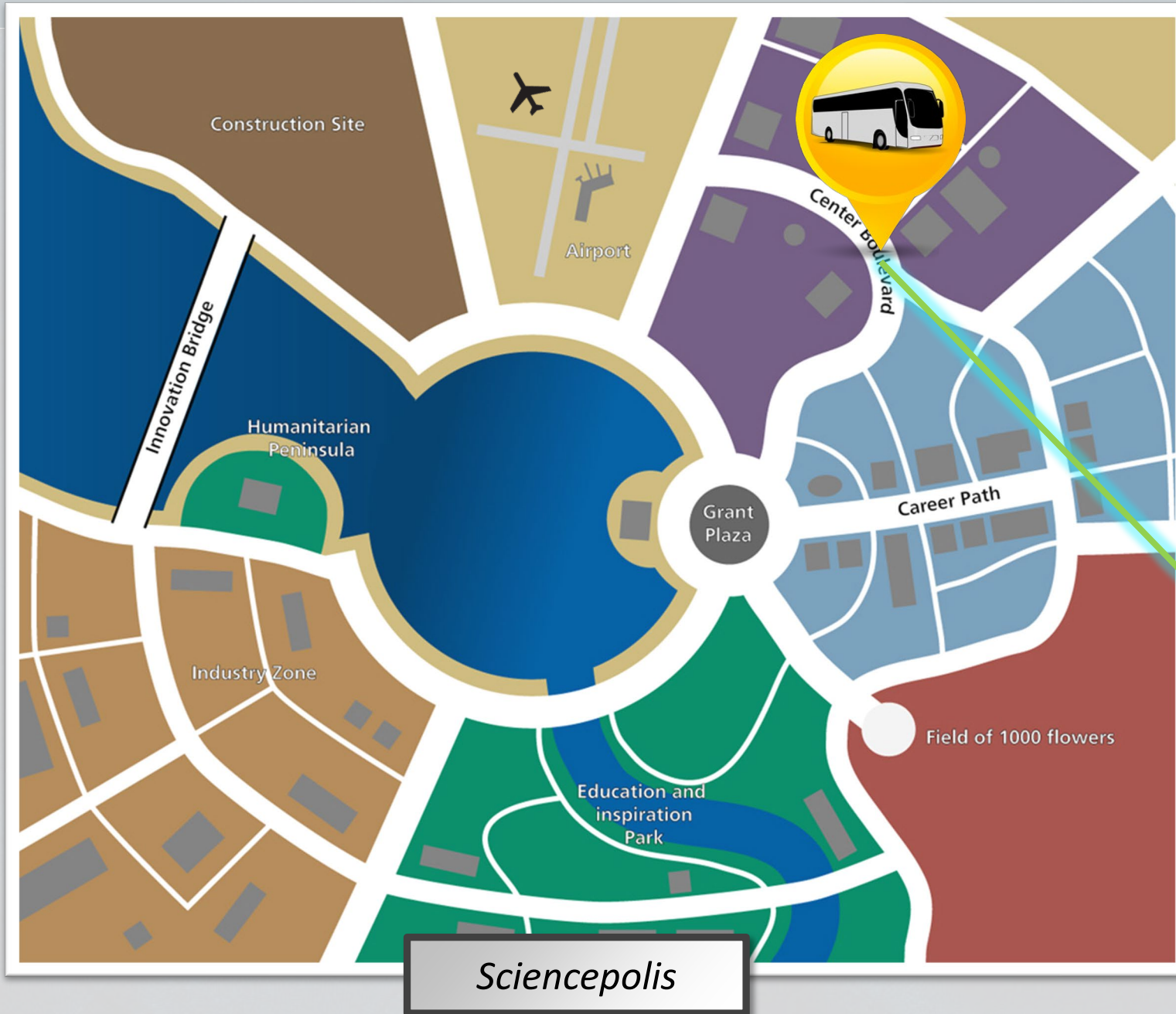


The Novo Nordisk Foundation
Center for Protein Research



DanStem

The Novo Nordisk Foundation Section for
Basic Stem Cell Biology



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Brain drain & Brain gain & International Collaboration



Arrivals



TIME	FROM	FLIGHT	STATUS
09:00	UNIV. ROCHESTER	DG290	Industrial PhD
09:10	UNIV. ROCHESTER	CL332	NNF LAUREATE RESEARCH G
09:30	SYDNEY	RD90	Post Doc
10:00	SINGAPORE	FL667	NNF LAUREATE RESEARCH G
10:45	UNIV. NEWCASTLE	RD88	Research Centres
11:00	UNIV. STRASBOURG	DR105	22 Innovation Networks
11:05	BROWN UNIVERSITY	GD22	HALLAS-MØLLER FELLOWS
11:20	FRANCE	FL525	Partnerships
11:50	USA	DR223	CPH BIOSCIENCE CONFERE.
12:30	JAPAN	NL448	Innovation consortia
13:50	UK	MR510	Large research projects



Example

The Novo Nordisk Foundation
Laureate Research Grant

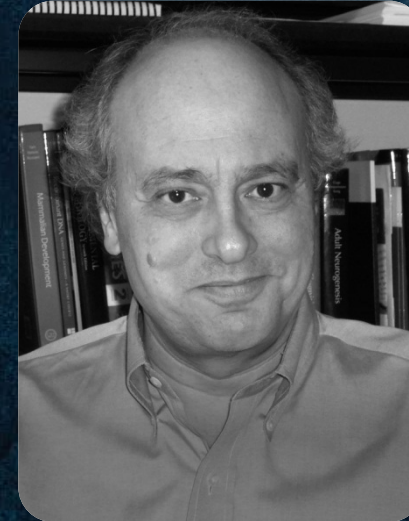
DKK 40 million

novo nordisk fonden



Maiken Nedergaard
MD, DMSc

Research:
Glial cell communication,
removal of waste products
from the brain



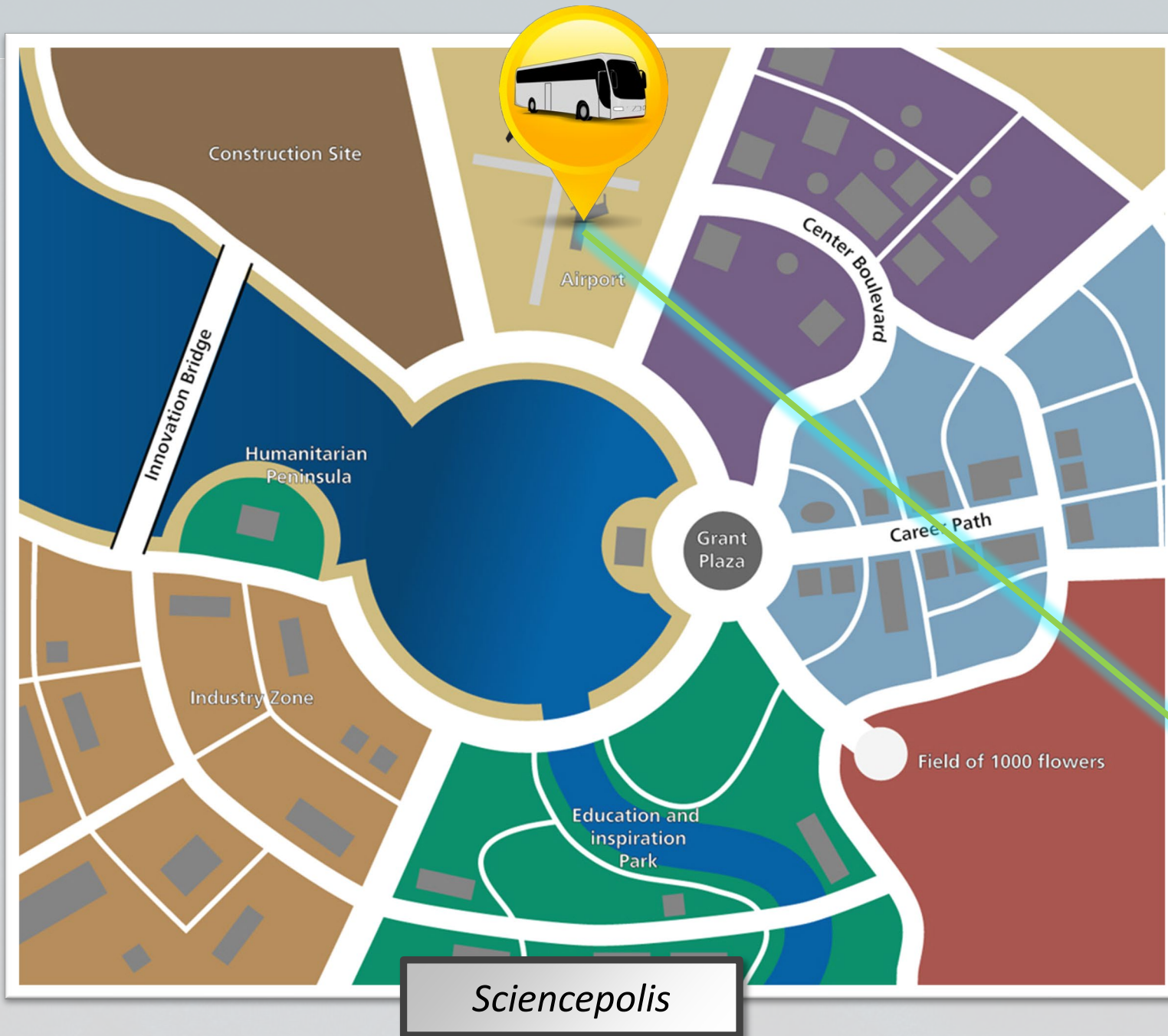
Steven A. Goldman
MD, PhD

Research:
Progenitor cells for
modeling and treating
neurological disease



Michael J. Davies
D.Phil

Research:
Mechanisms and
significance of protein
oxidation



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Start-up, Spin-out,
Incubators, Venture,
Seed

Proof-of-concept and
Proof-of-business

Inventions,
licences and
patents

Innovative
programmes for
research and
innovation

New Research
Centres and INNO+
partnerships

Entrepreneurship,

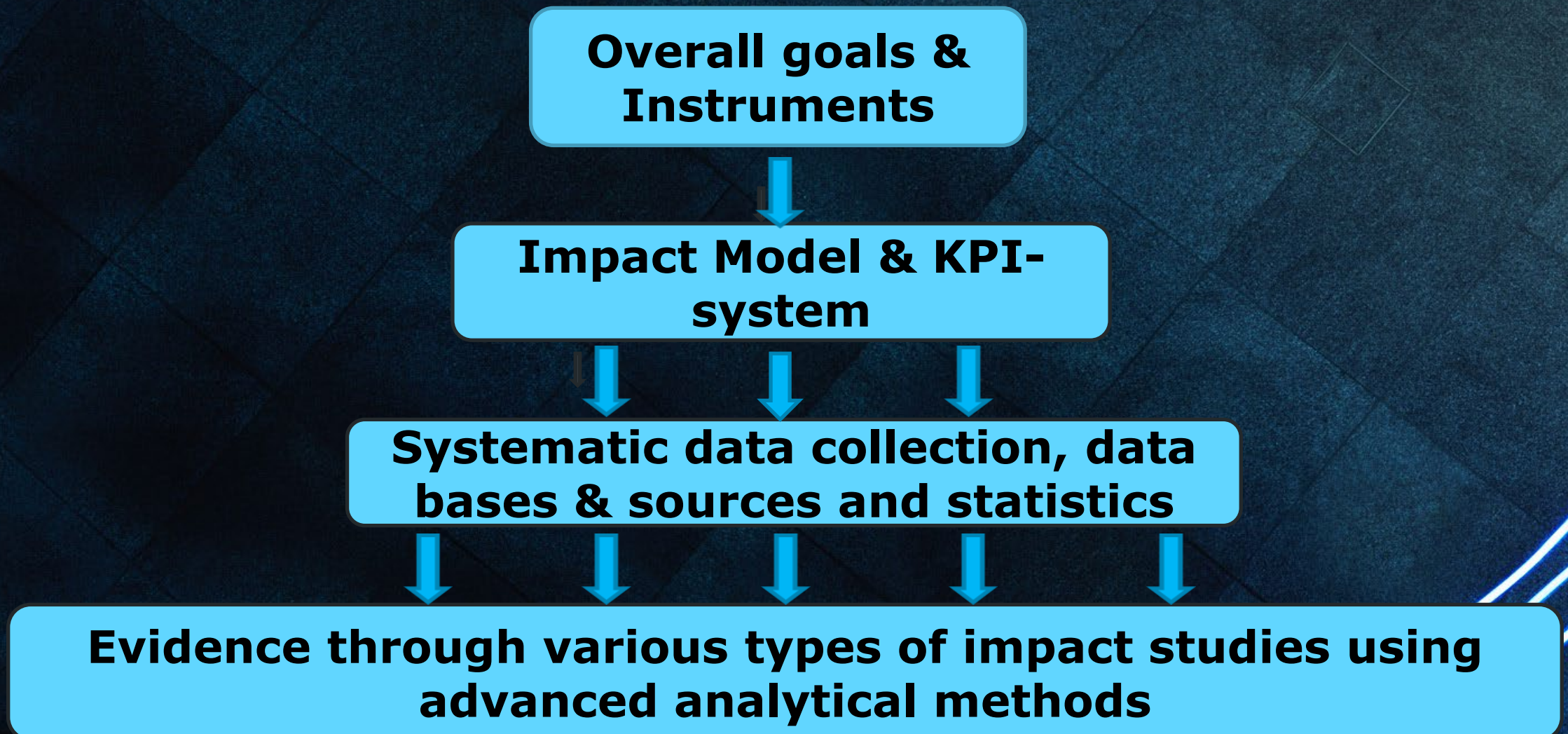
UNDER CONSTRUCTION



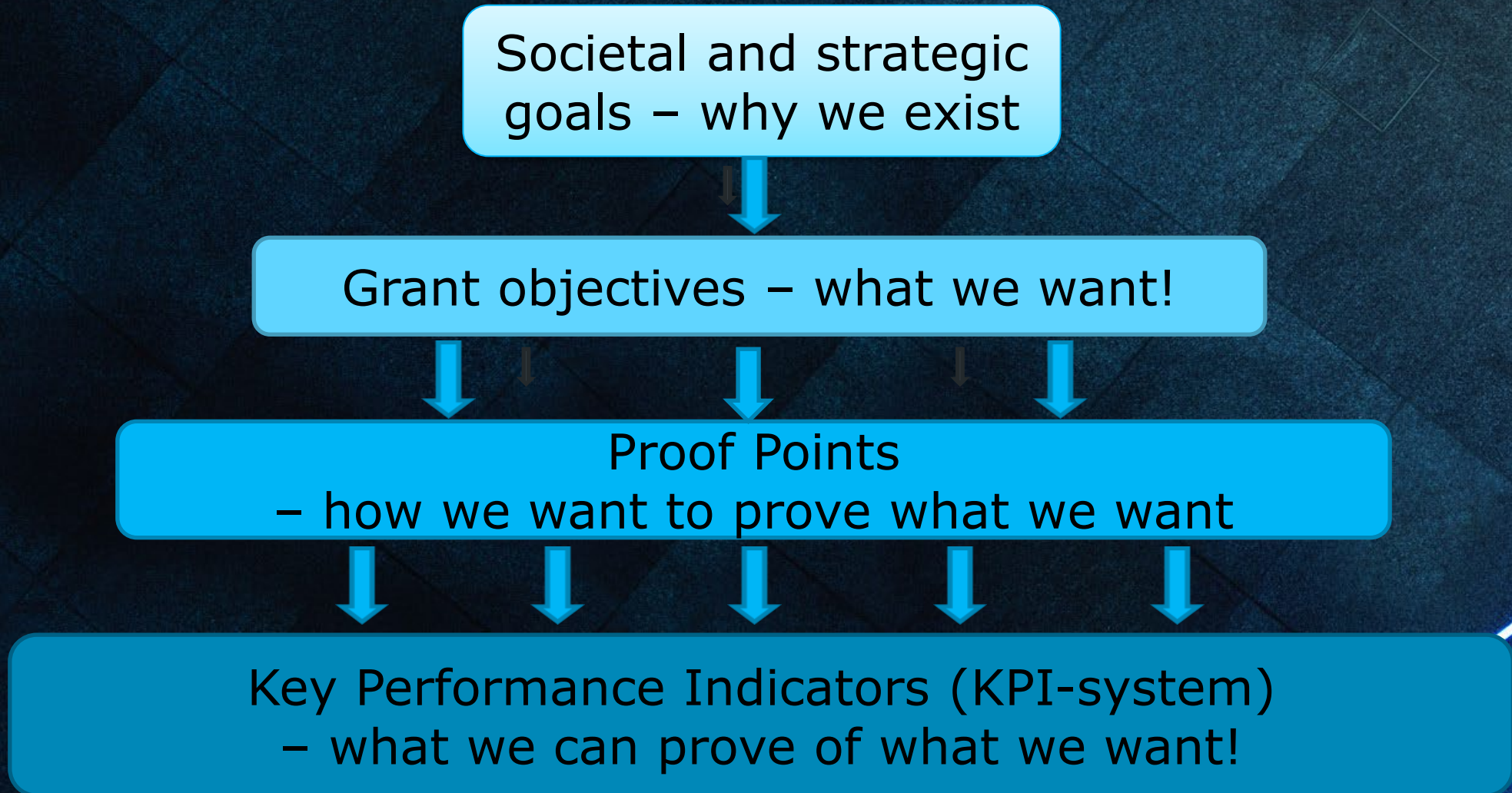
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The new Novo Nordisk Foundation assessment strategy



THE IMPACT MODEL



The KPI-System (50 indicators)

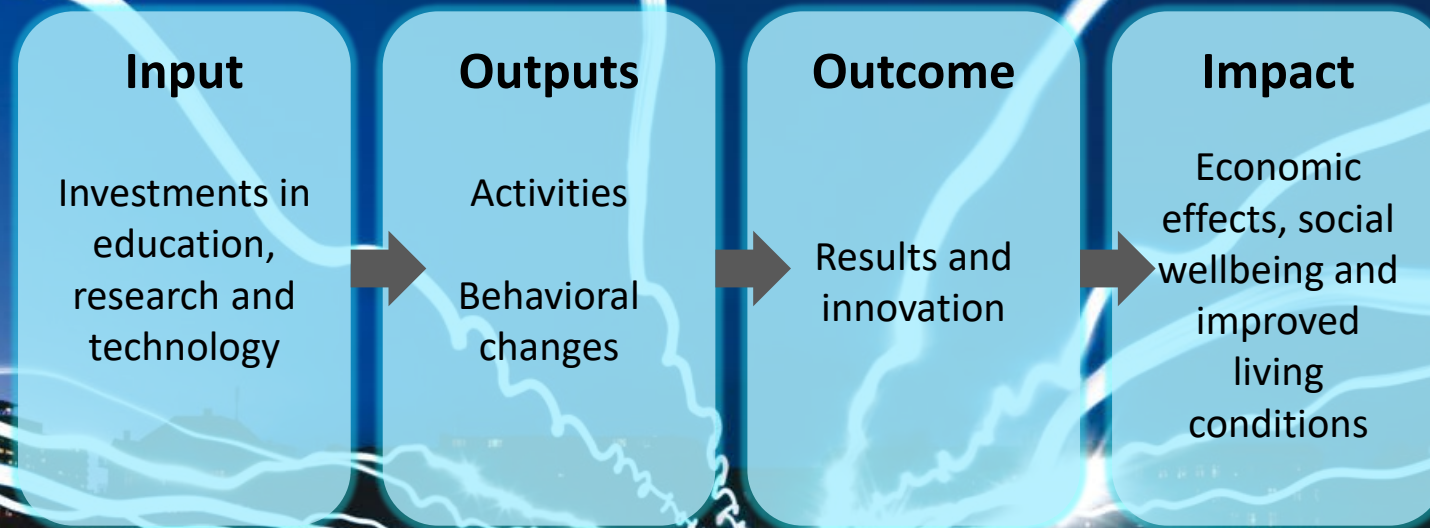
INPUT & OUTPUT DATA:

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

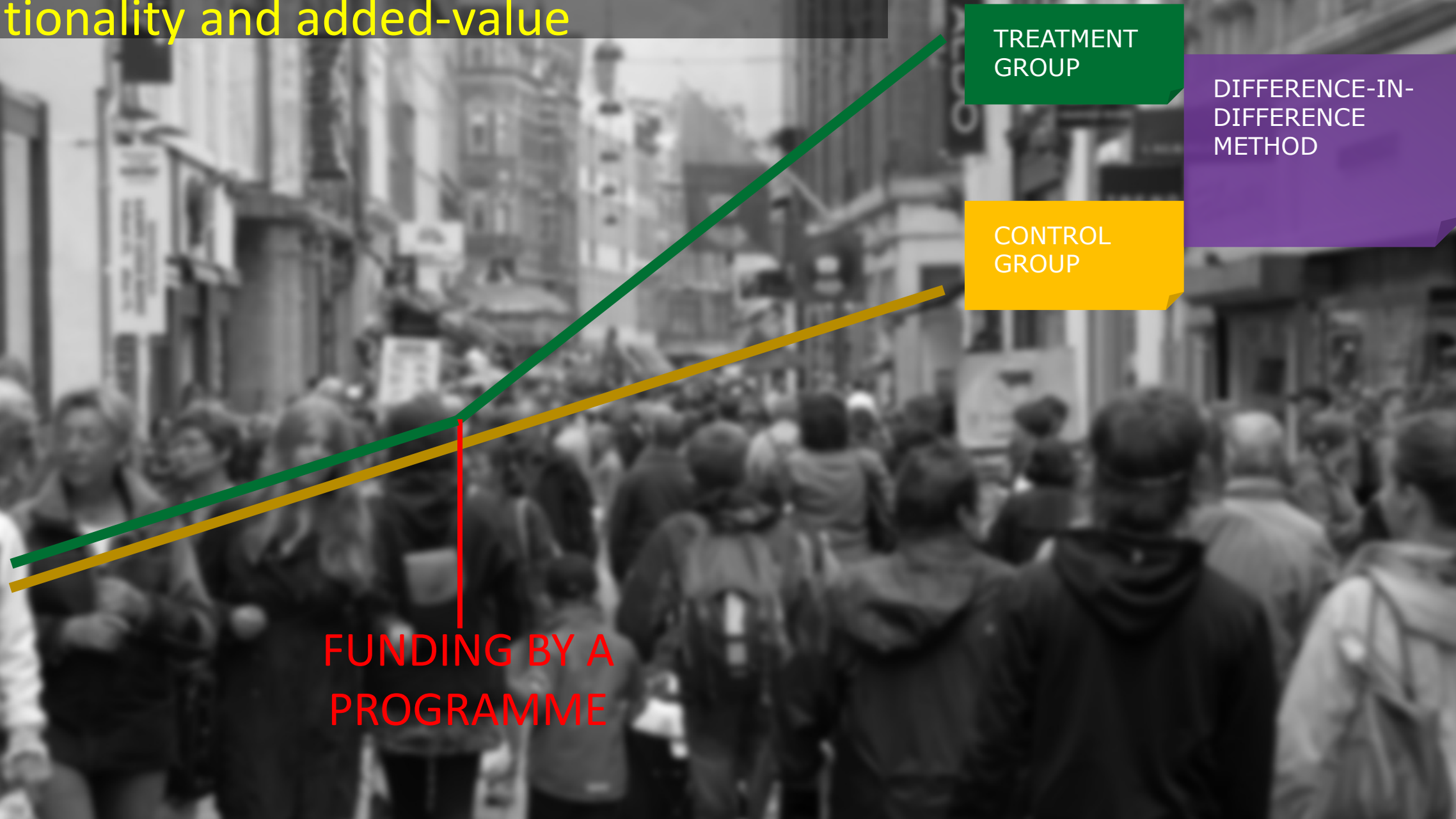
OUTCOME & IMPACT DATA:

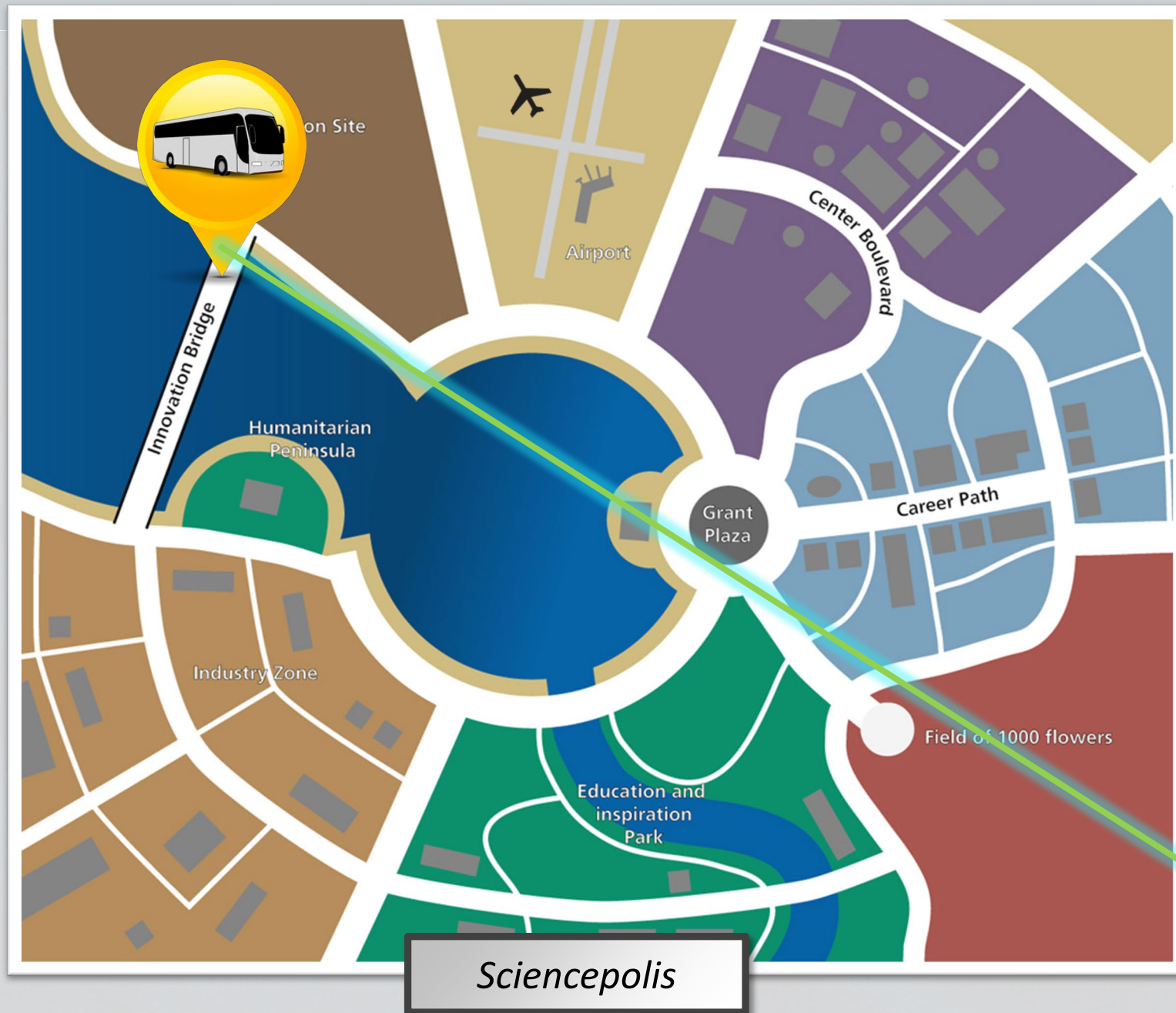
- Academic results (newness)
- Dissemination (spread of newness)
- Commercial exploitation (value creation)
- Societal additionality (value capture)

The Analytical Model – the causal relationships between KPIs



Handbook with analytical methods to identify additionality and added-value





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Examples of Danish impact studies:

- **FI (2010)** shows that an increase in private research by $\frac{3}{4}$ billion EUR increases employment by **30.000** after five years
- **CBS/CEBR (2011)** shows that an increase in the share of academics with a natural science background in the workforce with **1 percentage point** increase GDP by **1½ percentage point**
- **FI (2011)** shows that public-private research collaboration boost labour productivity by **9-15 per cent**
- **CFA/AAU/Bloch og Gravesen (2008)** show that an increase in public research funding by 1 per cent increases private research investments by **0,1 per cent**
- **Christensen, Frosch, Mark & Boysen-Jensen (2014)** show
 - That an increase in private research investments by 1 per cent increases labour productivity in the private sector by **0,1 per cent**
 - That the marginal rate of return of research investments in high tech industries increases with the size of enterprises

IMPACT OF RESEARCH AND DEVELOPMENT IN DENMARK

34 % marginal
return of private
research

9 % higher labour
productivity from
public-private
research
collaboration

Private productivity
increase by 3 per
cent in SMEs with an
collaboration
voucher or an
innovation project

3½ % increase in
private productivity
from innovation
networks and
clusters

3½ % increase in
private productivity
from research
collaboration

1 per cent increase
in public research
increase private
research with 0,1 %

Patent activities
double in enterprises
with industrial PhD
projects

Clusters increase
innovations with 300
%

20-40 % economic
return of public
research



Support



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A long bridge at night, viewed from a low angle looking down its length. The bridge has a metal railing and a dark surface. In the background, a city skyline is visible under a dark sky. The entire scene is overlaid with numerous bright, wavy, glowing light trails in shades of yellow and orange, creating a sense of motion and energy.

Thank you for
allowing me to present the Sciencepolis of Denmark

Future growth
and social-wellbeing