

20 September 2018, Berlin

Embassy Room

Conditions for effective collaboration with industry

Prof. Dr. Torben Schubert (chair)

Günter Korder

Dipl.-Geogr. Carsten Schröder

Dr. Henric Rhedin

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Prof. Dr. Torben Schubert

Fraunhofer-Institute for Systems and Innovation Research, Germany

THE ECONOMIC IMPACT OF PUBLIC RESEARCH

**Professor Dr. Torben Schubert, Fraunhofer ISI & Lund
University**

AESIS Seminar Societal outcome of Academic-Industrial Collaboration
Berlin, September 20th, 2018



Background

- Discussion on the regional impact of public science and HEIs has a long tradition dating back to the 1970s
- Since the late 1980s, an increasing political interest in universities' economic contribution to their environment has added further momentum to the debate

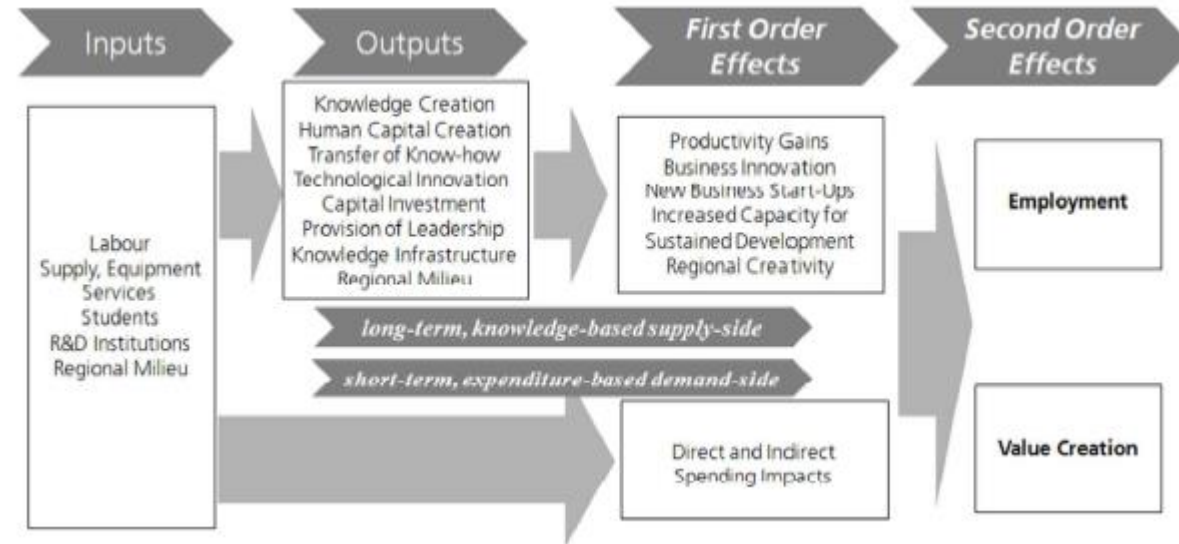
But:

- most studies have focused on the directly observable demand side effects (e.g. demand by students, employees, or HEI investments), underestimating the effects of knowledge-related outputs
- knowledge and human capital creation are the key tasks of HEIs
 - ➔ indirect, knowledge-mediated impacts are extremely important (Florax 1992)

Conceptual Framework

What impacts?

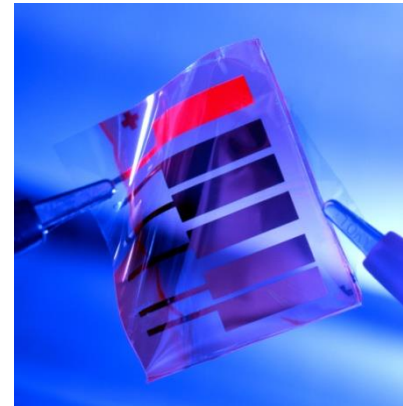
- **variety of different outputs**, from tangible (publications, patents) to less tangible ones (regional leadership, influence on regional milieu) (Florax 1992; Goldstein et al. 1995)
- a **broad range of transfer and interaction channels** related to various types of outputs (Abreu et al. 2009; Benneworth et al. 2009; Koschatzky et al. 2011)
- first order effects vs. **second order macroeconomic impacts** (Florax 1992; Garrido-Yserte, Gallo-Rivera 2010)



Source: own figure, based on: Goldstein et al. (1995); Stokes and Coornes (1998); Segarra i Blasco (2003)

Objective

- Calculating the macroeconomic effect of public science on the economy
- In particular with respect to
 - GDP
 - tax revenue
- Calculating fiscal multipliers
- Analyzing contingency effects (e.g. proximity to business, etc...)
- Method: panel regression-based approaches based on the systematic matching regional data on public science (NUTS3) with regional economic statistics



Some core results for Fraunhofer

	FE	FE	FE
	GDP per capita	GDP per capita	GDP per capita
Net migration	165841.5538***	153657.6729***	91927.5500*
	(3.64)	(3.36)	(1.69)
Labor force	42.4203***	41.9945***	68.5971***
	(6.37)	(6.31)	(3.94)
Share HT employment	8.9139	16.4537	35.8295
	(0.20)	(0.36)	(0.93)
Share agricultural employment	122.3714	113.3253	-282.0650
	(1.35)	(1.25)	(-0.99)
FhG third party funds (p.c.)	18.3193*		
	(1.73)		
FhG investments (p.c.)		14.6410***	
		(2.82)	
FhG researchers (p.c.)			1972732.8155***
			(3.02)
Constant	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes
Observations	4027	4030	1216

Macroeconomic effects

	Third party funds	Scientists
Regression multiplier	18,30	1.972.732,00
Indicator value Germany (million €)	1.100,00	9.125,00
GDP effect (million €)	20.130,00	18.001,18
Total tax revenue (billion €)	588,50	588,50
GDP (billion €)	2.915,00	2.915,00
Taxes as share of GDP (%)	20,19	20,19
Erwarteter Steuereffekt in Mio €	4.063,98	3.634,20
Fraunhofer budget	2.060,00	2.060,00
Fraunhofer#s public funds without revenue from other countries	1.100,00	1.100,00
Tax multiplier (total budget)	1,97	1,76
Tax multiplier (public revenue)	3,69	3,30

Sources: Destatis, Kassenmäßige Steuereinnahmen der Gebietskörperschaften 2014; Bundesfinanzministerium, Geschäftsbericht der Fraunhofer Gesellschaft 2014, internal databases, own calculations

Results for universities

- The local presence of universities leads to
 - an increase of the GDP of 4,500€ per capita
 - a reduction in the unemployment rate of 3.1%
 - an increase in patent applications of 13%

- Overall effect on German GDP of approximately € 190 bn per year.

References & Websites

- Schubert, T., & Kroll, H. (2016). Universities' effects on regional GDP and unemployment: The case of Germany. *Papers in Regional Science*, 95(3), 467-489.
- Schubert, T., & Kroll, H. (2013). Endbericht zum Projekt „Hochschulen als regionaler Wirtschaftsfaktor“. Karlsruhe. Online: http://www.stifterverband.de/wirtschaftsfaktorhochschule/regionale_bedeutung_von_hochschulen.pdf
- Frietsch, R. et al. (2016). Der Beitrag der Fraunhofer-Gesellschaft zum deutschen Innovationssystem, <http://publica.fraunhofer.de/dokumente/N-452680.html>
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- <https://www.fraunhofer.de/en/research/range-of-services/impact-of-fraunhofer-research.html>

Today's speakers

- Günter Korder
 - background in industrial engineering
 - many international management positions at amongst others Siemens and Nixdorf Computer AG
 - today operations and managing director at it's OWL Clustermanagement GmbH
- Dr. Carsten Schröder
 - background in economic geography
 - long career in and outside academia
 - today Vice-President for Research Management and Knowledge Transfer at Münster University of Applied Sciences



Today's speakers

- Dr. Henric Rhedin
 - background in high energy physics
 - work experience both in and outside academia as well as in small and large companies
 - today president ASTP-Proton at Gothenburg University



Thank you for your attention and fruitful discussions!

Prof. Dr. Torben Schubert

Fraunhofer Institute for Systems and Innovation Research (ISI)

torben.schubert@isi.fraunhofer.de

Also: CIRCLE, Lund University, Sweden

20 September 2018, Berlin

Embassy Room

Conditions for effective collaboration with industry

Günter Korder

Managing Director Operations, it's OWL Clustermanagement GmbH, Germany

Das Technologie-Netzwerk:
Intelligente Technische Systeme OstWestfalenLippe

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Industry 4.0 - Conditions for Effective Collaboration with Industry

Günter Korder, Managing Director it's OWL Clustermanagement GmbH
20th of September 2018

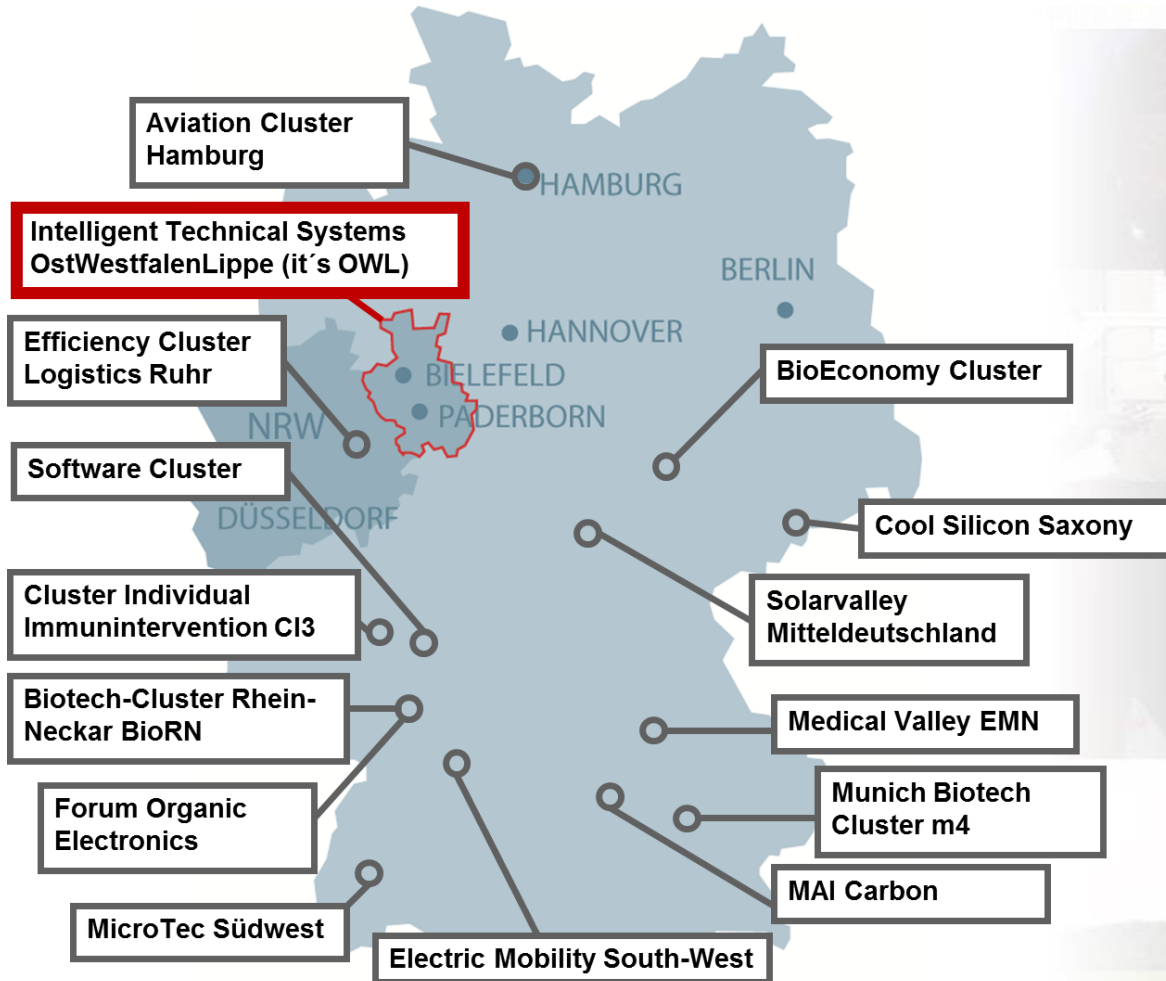
Gefördert durch:

Ministerium für Wirtschaft, Innovation,
Digitalisierung und Energie
des Landes Nordrhein-Westfalen



The Leading-Edge Cluster it's OWL

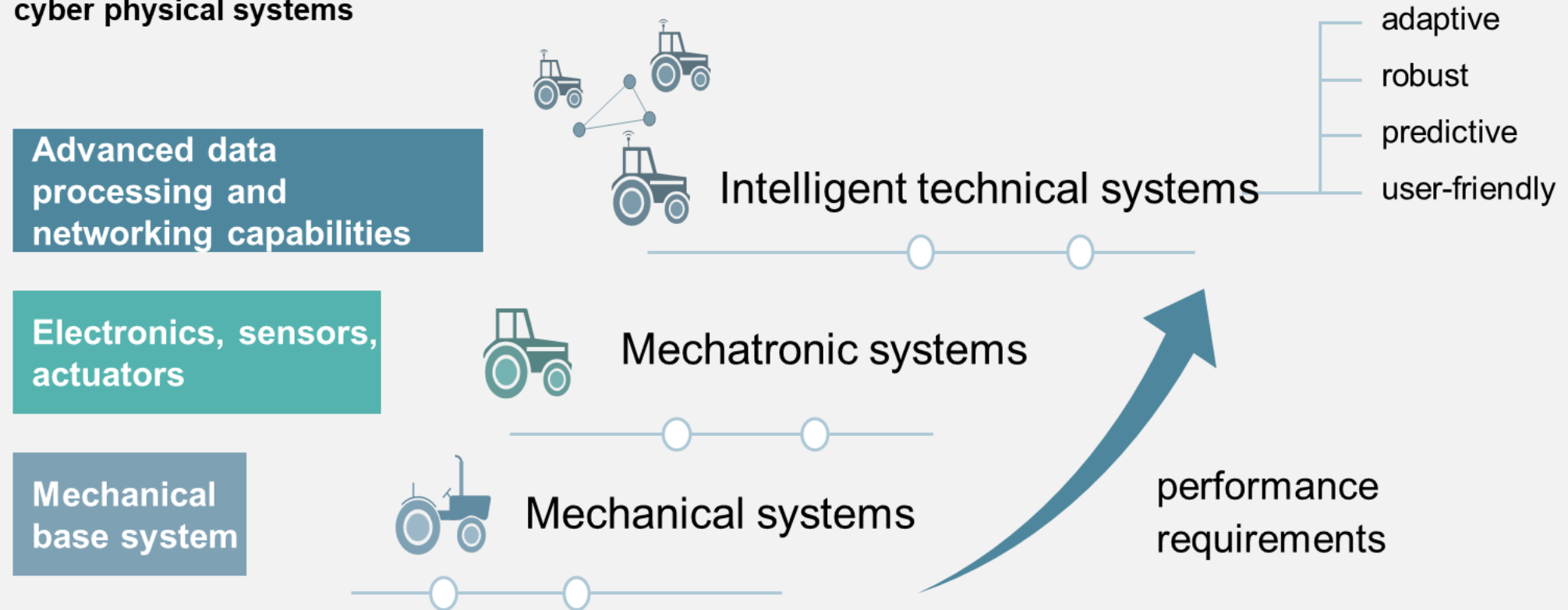
One of 15 Leading-Edge Clusters in Germany



Intelligent Technical Systems

The Diving Force Behind Industry 4.0 and IoT

From mechanical systems to interconnected cyber physical systems



OWL – Outstanding Region for Innovation, Added Value and Employment

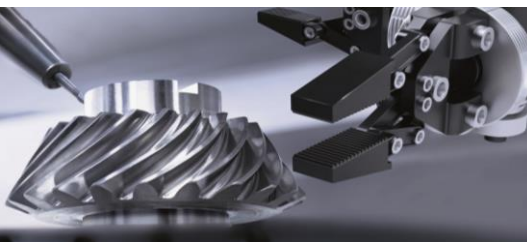
SME's are the Economic Backbone of our Region

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Mechanical engineering, electrical/electronic and
automotive supply industries

Strong brands, hidden champions, independent family-owned companies



OWL – Outstanding Region for Innovation, Added Value and Employment

High Performance Research Institutions & Universities are the Base

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High-Performance Research

Strength: symbiosis of informatics and engineering sciences



Hochschule Ostwestfalen-Lippe
University of Applied Sciences

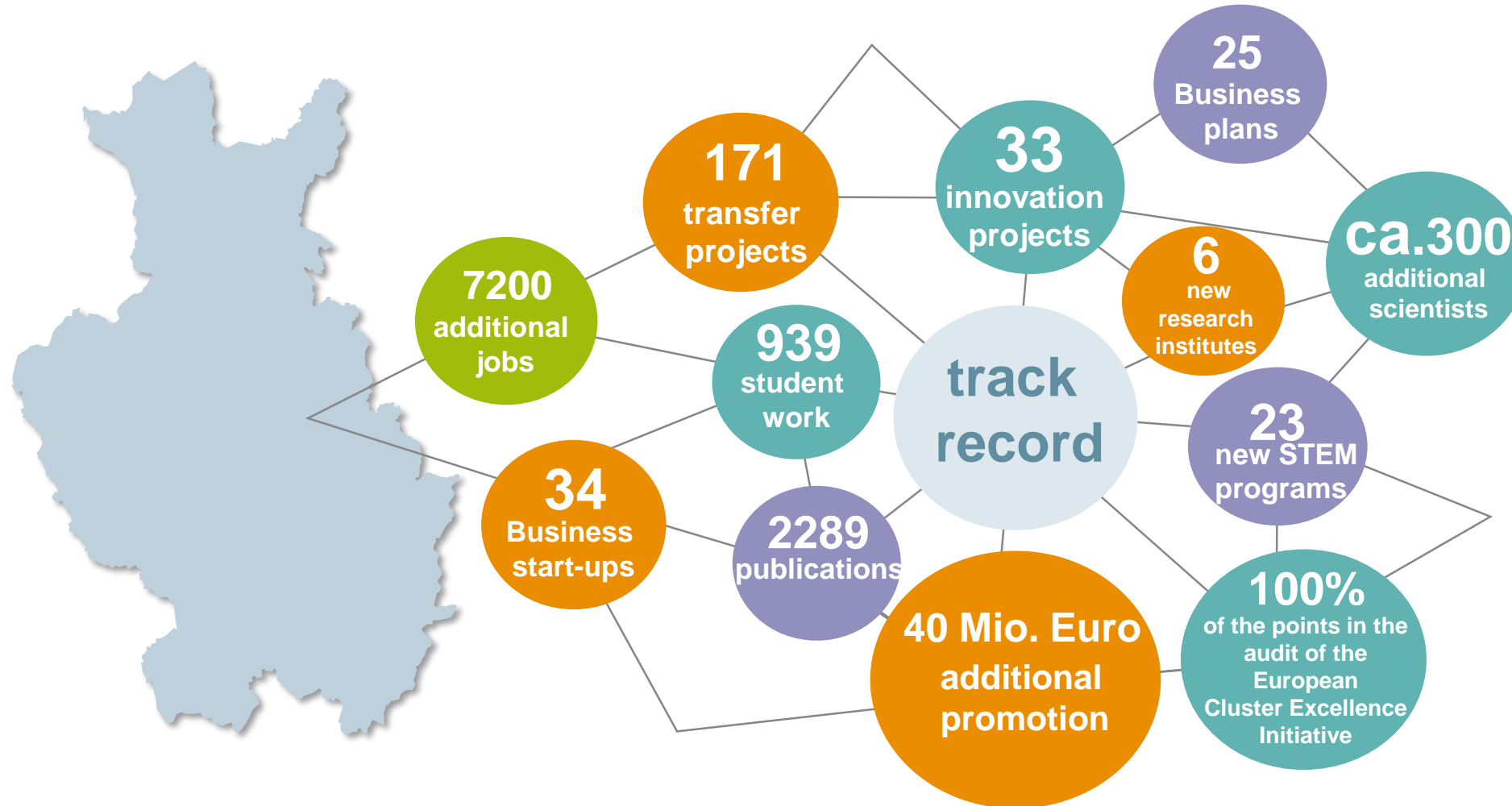


HEINZ NIXDORF INSTITUT
Universität Paderborn



What Have We Achieved?

It's OWL is a Highly Visible, Sought After Partner for Companies, Colleges and Clusters, both Nationally and Internationally



Expansion of Technology Leadership

Service Areas and Content of the Innovation Platform

University research, multiple use, practices strengthen the innovation platform



Intelligent systems (cognition, self-X properties, autonomy)



Design of socio-technical systems (MMI, networked work, migration)



Digital Infrastructure (Stable Networks, Cloud Usage, Dataspace, Platform Technologies)



Security & Safety in CPS / CPPS environments



Value networks (maturity models, business models, practices / patterns)



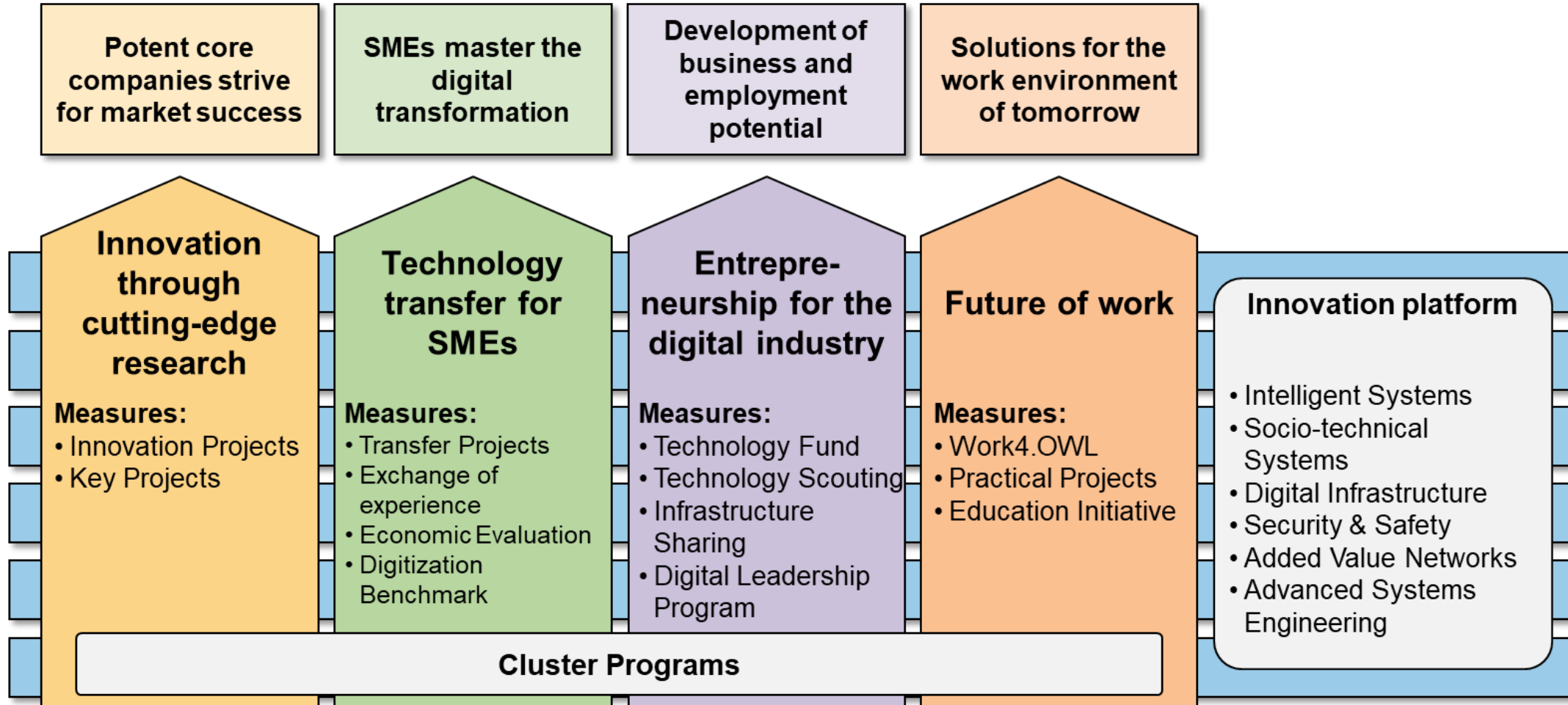
Advanced Systems Engineering (including System of Systems Engineering, Service Engineering)

Development methods and tools, software libraries, practices / patterns, standards maintained and continuously developed by institutions and service providers in the cluster

Cluster Programs for Added Value and Employment

Program Structure 2018 - 22

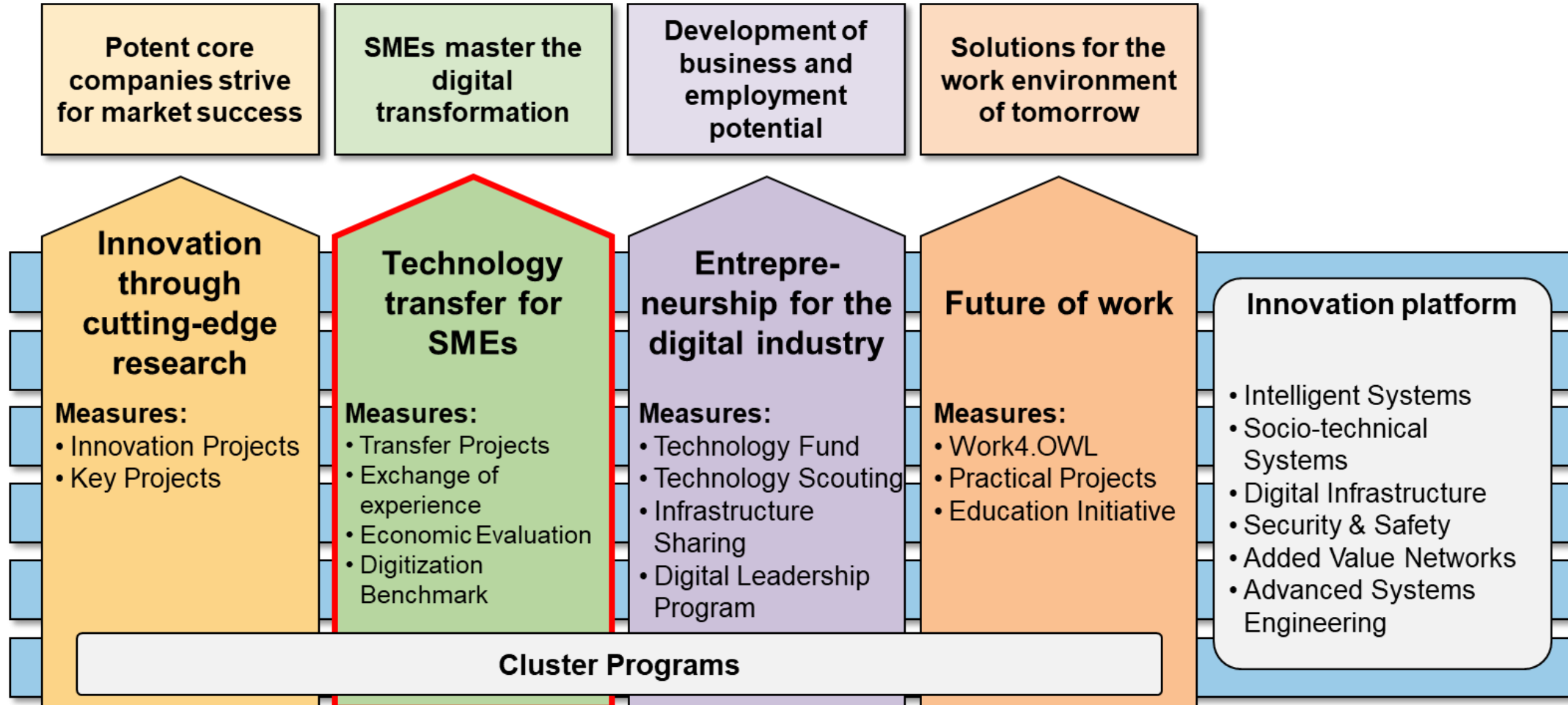
Priority Objectives



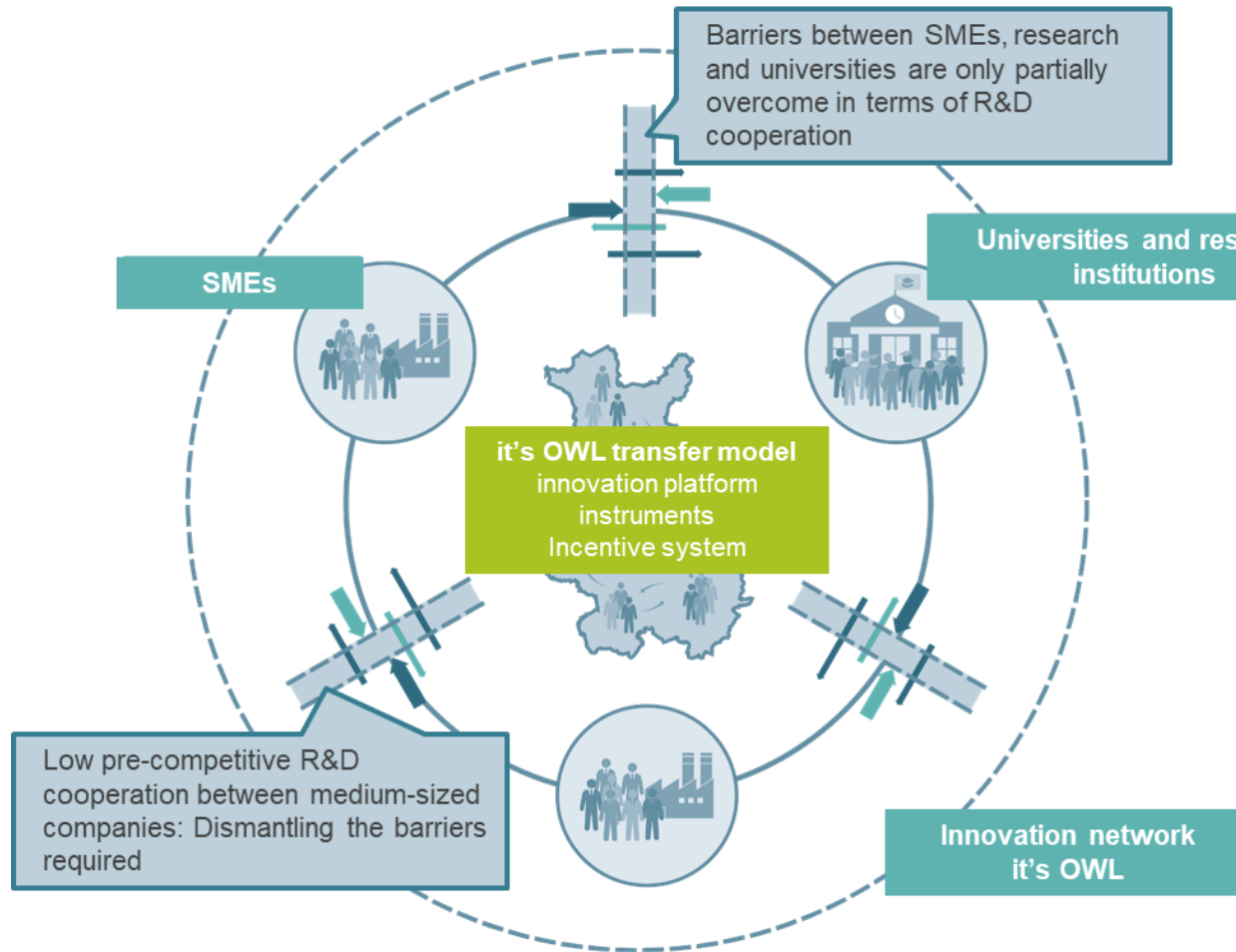
Cluster Programs for Added Value and Employment

Program Structure 2018 - 22

Priority Objectives



Technology Transfer for SMEs



Motivation:

- Companies gain access to advanced technologies; scientists learn through practical application
- Emergence of new partnerships as well as strategic cooperation in the region

Objective:

- Establishment of a sustainable transfer ecosystem in OWL
- Joint design of digital transformation
- Linking the innovation network
- Increase institutionalization

Leading-Edge Cluster it's OWL - Regional Development Effects and Development



it's-OWL pays into the strategy of regional development

It's OWL and Industry 4.0

Pioneering on the Way to Digitization

Extract from our strategy of 2011

The strategic thrust for the cluster's development implies an innovative leap from mechatronics towards Intelligent Technical Systems (ITS). ITS are software-intensive engineering products and production systems which are able to adapt to changing usage and operating conditions. Such systems function autonomously, partially with the help of cognition.

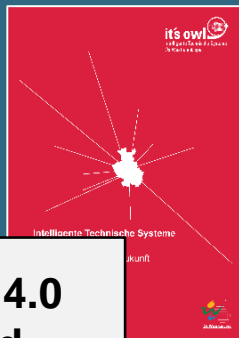
Buzz words in this context are "Things That Think", "Cyber-Physical Systems" and "Industry 4.0"*.

Footnote

*The fourth industrial revolution refers to the integration of intelligent monitoring and control processes into industrial production in addition to their progressing automation. Vision is the integral, real-time control and optimization of whole value-adding networks.



Pioneers
How we
started off...



We spoke of Industry 4.0
before anyone else did.

It's OWL and Industry 4.0

Pioneering on the Way to Digitization



Innovation region for digitization
Our vision for the years to come

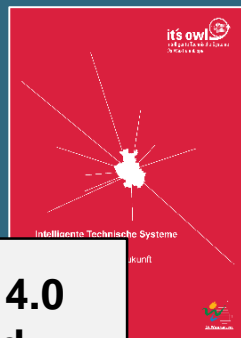


Top converter
Where we stand today



Pioneers
How we started off...

We spoke of Industry 4.0 before anyone else did.



Cluster partners deliver innovative Industry 4.0 solutions



We want to emerge from digitization as a winner; this means:

- **Technology leadership as a means to an end**
- **Transformation of technology leadership into added value and employment**

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Thank you for your Attention!

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Dipl.-Geogr. Carsten Schröder

Vice President for Research Management and Knowledge Transfer

University of Applied Sciences Münster, Germany

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Embassy Room

Conditions for effective collaboration with industry

Dr. Henric Rhedin

*President ASTP-Proton, Business Developer Sahlgrenska School of
Innovation and Entrepreneurship, Gothenburg University, Sweden*

Conditions for Effective Collaboration with Industry

AESIS Fall meeting
20th September 2018, Berlin

ASTP **PROTON**[®]

KNOWLEDGE TRANSFER EUROPE

Henric Rhedin, President of ASTP-Proton
Dep of Medicine, Gothenburg University, Sweden



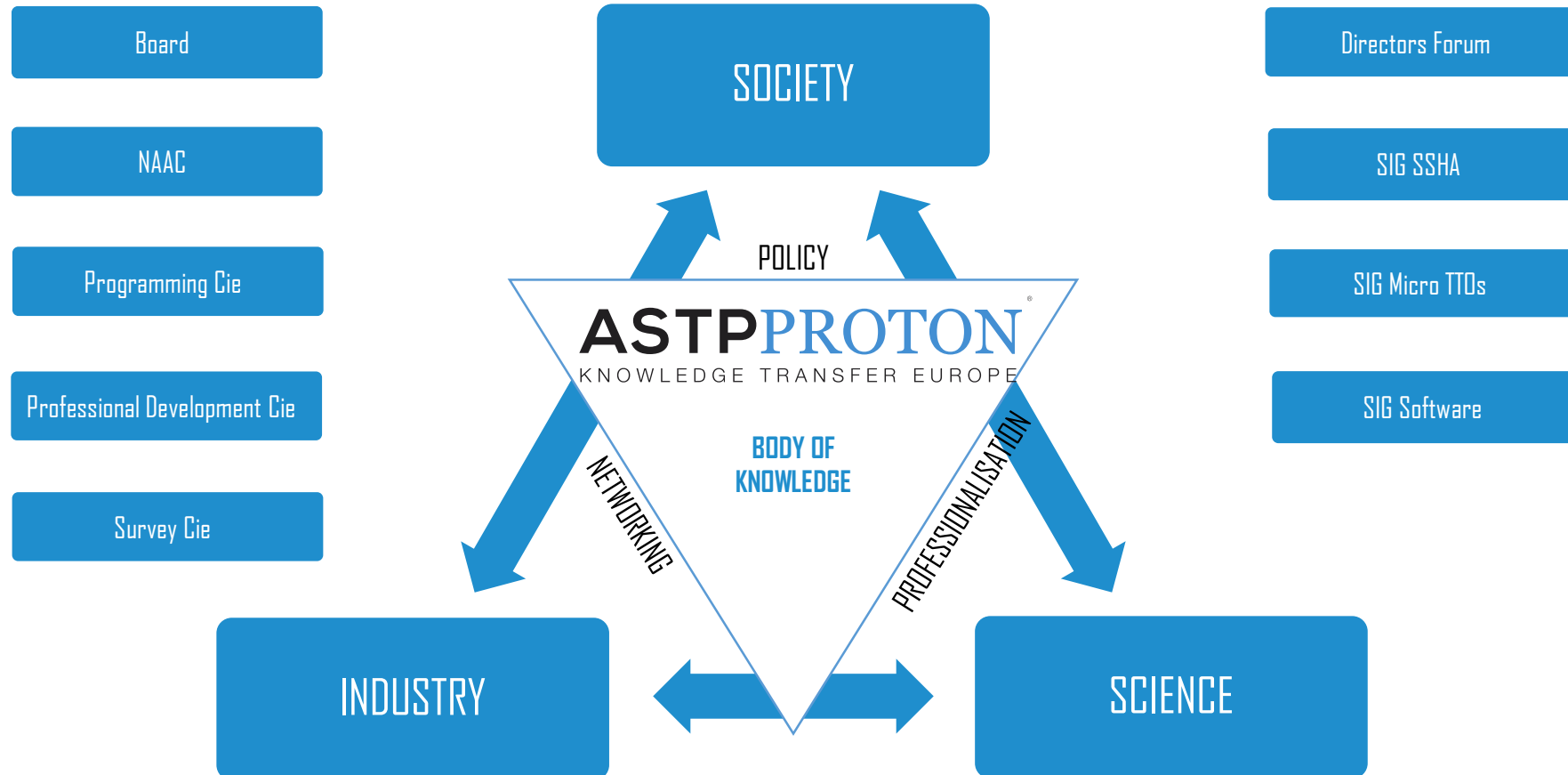
ASTP-Proton

Mission

ASTP-Proton is the premier, pan-European association for professionals involved in knowledge transfer between universities and industry.

By promoting and professionalizing knowledge transfer practice, the association aims to enhance the impact of research on society and the economy.

For members by members



About

- Professionals from both public and private sectors
- Key values are to initiate, inspire, involve and influence individuals and collectives
- Established 1999 with its HQ in Leiden, The Netherlands
- 800 individuals from over 47 countries and 650 institutions
- National Associations Advisory Council provides input from across 27 different countries

Conditions for Effective Collaboration with Industry

Key opportunities

- Universities are a key driver of innovation in the knowledge economy
- Growing market and increased political attention for utilization which includes collaboration with industry
- The scope is widening to include all utilization
- We are in the middle of the biggest change of PROs since research became important

Key challenges; alignment

- Industry; shareholders return of investment (global)
- Government; taxpayers return of investment (national)
- Universities;
 - Research; for the best of mankind
 - Education; for the nation
 - Utilization; nobody knows
- Universities need a better defined role and be measured on utilization
 - This will solve many challenges in industry collaboration

Dowling review key success factors

- Strong and trusting personal relationships
- Shared vision, goals and objectives defined, setting in place clear expectations
- Mutual understanding between partners
- Ability of — and opportunities for — staff to work across institutional boundaries
- Collaboration brings about mutual benefits
- Funding available
- Processes for agreeing contracts and IP are in place
- Clear and effective communication between partners
- Organisational support, including senior management buy-in and championing
- Willingness to devote time and resources from both parties

Dowling review

University barriers

- University metrics, including the REF, prioritise the production of high-quality publications
- IP and other contract negotiations are difficult to complete, processes difficult to navigate, or take too long
- Other pressures on academic time (teaching and research) limit resources for collaboration
- Lack of funding
- Collaborative experience not valued as part of academic career progression
- Lack of time/resource for networking or project development
- Business and academia operate to different timescales
- Tension between academic desire to publish work, and business concerns about competition
- Lack of trust or mutual understanding
- Low overall levels of business investment in R&D, including a lack of absorptive capacity

Dowling review

Business barriers

- IP and other contract negotiations are difficult to complete, processes difficult to navigate, or take too long
- Business find it difficult to identify academic partners or where academic capability lies
- Business and academia operate to different timescales
- Lack of funding
- Lack of alignment of objectives: tension between business and university needs or objectives
- Lack of trust or mutual understanding
- Businesses focus on the short term, rather than long term R&D
- Other funding issues (for example, SME eligibility, subjects within scope)
- Low overall levels of business investment in R&D, including a lack of absorptive capacity
- Lack of understanding within business of potential benefits of working with universities

Other challenges

- Where is the line between government subsidies of R&D costs for industry and publically funded research?
- Attitude from universities
 - How can industry help me in my research?
 - How can the university help industry to grow?
- Companies are not uniform
 - Large companies can do it themselves, and do argue successfully for subsidies
 - Spin offs often not "real companies" (a real company survives on sales to customers) and it remains to be seen if they will ever contribute to growth
 - SMEs cannot do it and can (if helped) create substantial growth
- A company usually starts in low tech but needs to become high tech in order to stay competitive

Key ingredients for success

- No clear University mission
 - Utilization is getting there
- Universities are not structured for efficient collaboration
 - Maybe they shouldn't be but then the lack of efficiency must be accepted
- Industrial collaboration would benefit from clarity in utilization of research results

Utilization in general and in research funding

- Needs to be defined
 - In Sweden at least, there is no formal government definition
- Needs to be defined in the call for proposals
 - Large variations in Europe and in Sweden
- Needs to be evaluated by skilled professionals
 - How do we evaluate with respect to utilization excellence
 - "We will have an innovation board that will meet once per year" is simply not good enough
- Needs to be monitored and effects (impact) needs to be assessed

Organization of universities

- For research and education there are well organized support structures with a well defined role
- If utilization is to be an important mission, what does that require
 - Well defined processes in all levels
 - Well defined policies
 - Structures that are integrated in the organization
- Compare to education
 - Support at all levels
 - Processes, methods, infrastructure in place

Thank you

Contact details:

- E: president [@astp-proton.eu](mailto:president@astp-proton.eu)
- T: +31717113511

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Panel Discussion

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Emporio I Room

Measuring outcome of academic-industrial collaborations

Chaired by: Prof. Dr. Torben Schubert

Recommendation



Societal outcome of academic-industrial collaboration

20 September 2018, Berlin

Next up:

- | | | |
|-------------|--|----------------|
| 15.00-15.30 | Tea & Coffee Break | Wintergarten B |
| 15.30-17.00 | Closing Panel: Conditions for creating a sustainable framework | Emporio I Room |