OECD OUTREACH WORKSHOP

SMART SPECIALISATION FOR INNOVATION-DRIVEN GROWTH
ITS EXTENSION TO EAST ASIA

3-5 April 2013
KDJ Convention Center, Gwangju, Korea

Organized by OECD

Managed by STEPI Science and Technology Policy Institute

GWANGJU TECHNOPARK

Sponsored by Ministry of Science, ICT and Future Planning

GWANGJU CITY

OECD Outreach Workshop on

Smart Specialisation: Its Extension to East Asia

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WORKSHOP DETAILS

Theme	Smart Specialisation for Innovation-Driven Growth: Its extension to East Asia
Dates	3 -5 April 2013
Venue	Convention Hall, Kim Daejung Convention Center, Gwangju, Korea
Organized by	OECD
Managed by	Science and Technology Policy Institute Gwangju Technopark
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Official Language	English Simultaneous interpretation will be provided on Day 1

OECD Outreach Workshop on

Smart Specialisation: Its Extension to East Asia

WELCOME MESSAGES

OPENING REMARKS

PATRTICK VOCK

Vice Chair, OECD-CSTP
State Secretariat for Education, Research and Innovation(SERI)
Federal Department of Economic Affairs, Education and Research(EAER)
Switzerland

Ladies and Gentlemen,

It's a great pleasure for me to be here in Gwangju and to participate in this workshop. I'd like to express my sincere gratitude for this invitation. My thanks go especially to

- the managers of this event: STEPI and the GwangjuTechnopark
- the sponsors: the Ministry and Gwangju City and to
- the organizer: the OECD

For me, this event is a good example of international cooperation which yields mutual benefits. It started within an OECD project which brought together different countries struggling with the same problems and ideas. Dr. JeongHyop Lee played a pivotal role for this event, especially in the relevant OECD Working Party on Innovation and Technology Policy (TIP) which carried out the smart specialisation project.

You have chosen a very interesting but complex issue for your workshop. In my view the key question we have to tackle is:

> *What is the right government approach to best foster the economic development process of a specific location?*

It is not just about one single policy instrument. No, it is about a policy mix, about a strategy and its implementation.

In the long run, an economic structure or an industry has to be self-sufficient. Strong and internationally competitive firmsform the back bone of such a cluster. They need an innovation conducive environment in which the can act. They need easy access to resources of high quality. In such a world the role of the government is to be a facilitator. In a more uneven or unbalanced situation, there is often a request for a more active government.

In this respect, the photonics cluster in Gwangju with its different development stages seems to be a very promising subject of investigation.

I wish us very inspiring and enlightening statements and exchanges. And I encourage all of you to actively engage in an open discussion.

So let's start with the substantive discussion as soon as possible!

CONGRATULATORY REMARKS

UN-TAE KANG

Mayor, Gwangju Metropolitan City

The Honorable senior economist, Mario Cervantes, and Professor Hugo Thienpont from Vrije Universiteit Brussel, officials from the OECD Smart Specialisation Strategy Working Group, industrial policy experts, and distinguished guests from home and abroad,

I would like to extend my heartfelt welcome to all of you for being here in Gwangju, a city of advanced science and industry, to participate in the "OECD Smart Specialisation Strategy Outreach Workshop".

I would like to express my particular gratitude to OECD officials for selecting Gwangju Metropolitan City as a base in spreading the Smart Specialisation Strategy across East Asia.

Gwangju is a city of **"democracy, human rights, and peace"** where citizens sacrificed their lives to safeguard Korean democracy and human rights in the May 18 Democratic Movement in 1980, and the 1980 archives for the movement have been recently listed on the UNESCO Memory of the World Register.

Gwangju is a "**hub city for cultural content,**" driving the Hub City of Asian Culture Project, the largest cultural project ever in the history of Korea. It communicates with the world through Gwangju Biennale, a globally renowned art festival, as well as Gwangju Design Biennale and Gwangju World Kimchi Culture Festival.

On the industrial front, Gwangju is a city of "**advanced science and industry,**" which is intensively nurturing the photonics industry as one of its staple industries along with automobiles and information electronics appliances, befitting the meaning of its name, "province of light."

Gwangju is a city that boasts global science and technology infrastructure with one of the three special R&D zones in Korea. It is home to 204 top-notch research and support institutions that incubate sophisticated technologies including Gwangju Technopark, the Korea Photonics Technology Institute; the Advanced Photonics Research Institute, the Electronics and Telecommunications Research Institute, and the Korea Institute of Industrial Technology. Gwangju Institute of Science and Technology (GIST) campus is the International Science and Business Belt, which combines fundamental science and business. GIST ranked seventh in the world and "first in Asia four years consecutively" in "Citations per Faculty" of the 2012 World University Rankings announced by Quacquarelli Symonds (QS), a British global university evaluation agency. Three Nobel-laureate research centers including Heeger Center, Ertl Center and Steitz Center as well as the Research

Institute for Solar and Sustainable Energies (RISE) within GIST are providing tremendous support for technology research and local industries.

In particular, Gwangju's photonics industry, which was introduced as an example of smart specialisation, is considered as an exemplary success of "Science to Business" whereby the private and public sectors as well as the industry, academia, and research institutes have come together and succeeded in research and development, and industrialization.

The local and central governments have invested approximately KRW 1 trillion in Gwangju's photonics industry over the last decade and achieved continuous growth in LED and optical communication in terms of quality and quantity. Gwangju's photonics industry has reached KRW 2.7 trillion in yearly sales and has become a staple industry of the city, driving its industrial development. The industry is now advancing into the global market.

Nevertheless, in order for Gwangju's photonics industry to keep up with the rapidly changing global market and take one step further, it must find a turning point.

Gwangju strives to make Korea one of the "three global powerhouses in the photonics industry" by 2015 through the establishment of an industrial ecosystem for the globalization of the photonics industry, as well as photonics-based convergence to build a sustainable, local staple industry and scale-up of the industry to reinvigorate the local economy.

We have high expectations for the "Smart Specialisation Strategy" to greatly contribute to making these dreams come true and your constructive advice will be of great help to the development of Gwangju's photonics industry.

I hope that this workshop can serve as a significant opportunity for Korean and European photonics industries to build a stronger relationship based on cooperation.

Once again, I would like extend my deepest respect and gratitude, and say welcome to all of you. I hope that you will have a rewarding and beneficial time in Gwangju.

Thank you.

CONGRATULATORY REMARKS

SANG-MOK LEE

Vice Minister
Ministry of Science, ICT and Future Planning, Korea

I sincerely congratulate the opening of OECD Outreach Workshop on Smart Specialisation under the theme of Smart Specialisation for Innovation-Driven Growth: Its extension to East Asia.

Today, the world is faced with aging population, climate change, global economic depression and intensified competition for resources. Looking more closely on Korea, the country is struggling to secure growth engines due to increasing pressure for competition in foreign markets coupled with lack of decent jobs and stagnant unemployment rate. However, these challenges go far beyond Korea. Every country and government is faced with similar challenges and in this regard, the whole mankind should work together in garnering wisdom to address those pending issues.

Korea is standing at a new era of change with the launch of the Park Geun-hye administration which aims to realize "Creative Economy." In the framework of Creative Economy, Korea wishes to merge creative knowledge into the industry subsequently increasing added value to the economy as well as conversing and expanding science and technology across the industry.

The Korean government will stand at the forefront in creating the environment for Creative Economy with the help from local governments. To this end, we will assist and support individuals and small and medium sized companies to open start-ups and commercialize their S&T in a swift manner so that new businesses could continue to be established. As a result, new industries and quality jobs will be generated enhancing the quality of the people's life thereby opening the "era of happiness for all people" in Korea.

Smart Specialisation Strategies were embarked with rising concern over research efficiency stemming from fragmented and duplicated R&D investments in Europe. Smart Specialisation Strategies propose to develop and expand private led growth based on limited resources and I hope that the Strategy would present useful policy tools in envisioning Korea's Creative Economy. Especially, I have great expectation for the Strategies' unique characteristic of smart specialisation policy that pursues bottom-up way in government support during the implementation of an entrepreneurial discovery process.

In regions, S&T policies have achieved qualitative growth in a short period of time however are faced with limitations in effectiveness. As the Strategy is being implemented at a regional level, I strongly believe that the Workshop will provide a meaningful momentum in restructuring local STI policies.
Drawing my remarks to a close, the Korean government will continue to put a great deal of efforts in sharing and developing S&T polices with OECD leading the project. Lastly, I wish to extend my

gratitude to the OECD Secretariat, Gwangju Metropolitan City, Gwangju Technopark and STEPI for organizing and managing the event.

Thank you.

WELCOMING REMARKS

JONG-GUK SONG

President, Science and Technology Policy Institute (STEPI)

I convey my sincere appreciation to all the distinguished participants and attendants that are present here today to attend the "OECD Outreach Workshop on Smart Specialisation". I would like to especially thank Patrick Vock from Austrian Federal Ministry of Science, the vice-chair of OECD-CSTP, Mario Cervantes, the senior economist from OECD, and Professor Hugo Thienpont from Vrije Universiteit Brussel in Belgium for their participation in today's workshop.

The implementation of regional innovation policy for the past twenty years has successfully established regional science and technology infrastructure and expanded investment at the local level in Korea. However, there still remain challenges such as solving fragmentation and duplication of projects, as well as building a pro-cyclical structure that will promote new industries and create more jobs. The new administration of President Park strongly emphasizes the importance of regional development as key to reviving the economy and addressing current social issues. At the very heart of promoting regional development lies the creation of quality jobs through vitalizing local economies and industries, and strengthening SMEs.

Such challenges are not exclusive to Korea. To overcome similar obstacles, Europe has been devising Smart Specialisation strategies to promote development at the regional level. Various experts in OECD have been working together in rendering concrete results from the concept of smart specialsation, a new coordination mechanism that promotes entrepreneurship and market-driven innovation.

This workshop aims to provide the venue for the collaborative work on smart specialisation to be shared, to further concretize strategies, and for countries in the Asian region to contextualize it into appropriate policies in order to bring forth innovation-driven development. I truly hope that this workshop will encourage you to make suggestions that elaborate and articulate how the new South Korean government can promote regional development through contextualization of Smart Specialisation and its implementation strategies. The policy implications from today's workshop will make an invaluable contribution to the new administration's policy formulation towards a creative economy with science, technology and innovation at heart.

I welcome all of you esteemed participants and attendants and thank you for attending this very meaningful workshop. I greatly look forward to your insightful discussions and contribution. I would also like to thank the task force team from Gwangju Technopark, Gwangju Metropolitan City, Ministry of Science, ICT and Future Planning, and STEPI in organizing this workshop.

Thank you very much.

WELCOMING REMARKS

DONG-GUK YOO

President, Gwangju Technopark

Distinguished Guests, Speakers, the Honorable Senior Economist from OECD, Mario Cervantes, and officials from the Smart Specialisation Strategy Working Group:

I would like to extend my heartfelt welcome to all of you for participating in the "OECD Smart Specialisation Strategy Outreach Workshop" here in Gwangju, a city boasting of an advanced photonics industry.

I would like to express my deepest gratitude to Kang Un-Tae, the Mayor of Gwangju Metropolitan City for sparing no efforts in preparing Gwangju to host this workshop. I would also like to extend my sincere appreciation to Song Jung-Guk, president of the Science and Technology Policy Institute, for recommending Gwangju as the host city of this workshop. My sincere appreciation also goes to Dr. Lee Jeong Hyeop for introducing Gwangju's photonics industry at the Smart Specialisation Strategy Working Group and actively encouraging the participation from abroad. I would also like to thank all the officials from home and abroad for working very hard in organizing this workshop.

Over the last decade, Gwangju Technopark has been striving to sophisticate the strategic local industries of Gwangju, and to seek out and develop new industries, such as the 3D convergence industry and the graphene industry, which will lead the way in the next decade.

In particular, Gwangju Technopark has adopted the Smart Specialisation Strategy as a policy tool that will not only make up for the shortcomings of the cluster-oriented policy but also present a vision for future development. Accordingly, we have formed a task force team to apply the Smart Specialisation Strategy to our photonics industry, which is a prime strategic industry of the region, and the efforts have allowed us to formulate a smart specialisation strategy for the photonics industry that will be presented at today's workshop.
In order to immediately apply the smart specialisation strategy in Gwangju, Gwangju Technopark will sign an MOU for cooperation in the implementation of smart specialisation with Spain's Institute for Prospective Technological Studies, which has been designated as a co-research center for smart specialisation along with the European Commission. With this, we aim to make Gwangju a global leader of smart specialisation .

Also, we will take the "OECD Smart Specialisation Strategy Outreach Workshop" as a significant opportunity to form a "Korea-EU Photonics Business Forum," to establish a network between Gwangju's photonics industry and Europe's photonics-related industries, academia, and research institutes, and to build a global value chain. The forum will allow the stakeholders engaged in the photonics industries in Europe and Gwangju to meet and promote the mutual development of the photonics industries in both regions.

The efforts will allow us to build a virtuous circle whereby Europe's advanced photonics technologies are transferred to Korea for commercialization, and in turn, Korea can make products with the technologies for sales in the global market including Europe. This will be beneficial for both European and Korean Photonics industries.

I hope that this workshop will offer significant insights for the formulation of future industrial policies and the development of local industries.

Once again I would like to express my deepest gratitude to all distinguished guests for taking the time to participate in this workshop.

Thank you.

OECD Outreach Workshop on

Smart Specialisation: Its Extension to East Asia

PROGRAM

WORKSHOP BACKGROUND

Smart Specialisation in an era of structural change: beyond national innovation system approaches

The world economy is restructuring along global value chains. This has undermined the consistency of national innovation system approaches which have tend for long time to develop STI policies in a relatively closed system perspective. The confrontation of national innovation policies with international fragmentation of R&D activities, as well as manufacturing activities, has raised concern over overall efficiency of public support to innovation. The European Union is a predecessor in exploring a multilateral framework of coordination of national research and innovation policies. While its Framework Programme still has only a limited share in total R&D, new efforts are launched to stimulate 'joint-programming' between national research institutes in Europe in order to increase the scale of cooperation. But the latest and maybe most far-reaching strategy for coordination is called 'smart specialisation'. In smart specialisation strategies the regional or local dimension of the innovation system is explored for allocating new innovation investments based on the discovering of comparative and competitive advantages. This – still tentative - 'regional' smart specialisation in the EU is coupled with a 'supranational' transition strategy for structural changes in breakthrough areas for green growth, the EU 2020 strategy.

Faced with slow productivity growth and an inability to overcome the global financial crisis, European policymakers seek ways to stimulate their economies through innovation. In the context of regional innovation policy, duplication and fragmentation of R&D investment, which exacerbate the small scale economies of Europe compared to USA, China and others, have been identified as some of the causes of stifled growth through innovation. In response to this environmental situation, a smart specialisation strategy is one proposed policy that merges industrial and innovation policies to address this identified barrier to innovation-driven growth. Additionally, smart specialisation pools resources in certain poor or marginalized areas which enable them to reach critical mass for industrialization.

In new industry promotion and job creation, Europe may only be the first region to face this dilemma of restructuring its policies towards regional innovation away from national levels. The current globalized knowledge economy requires that stakeholders find new ways to mobilise resources across complex schemes and fragmented locations that are not necessarily within a country's borders. No longer are national catch-up strategies appropriate under present global supply chain structures, where different actors in different countries are all affected by the global economic crisis. Gaps fall along sectors that span across countries rather than within them. Within this restructured policy framework, however, the context of smart specialisation requires greater scrutiny at the regional or system innovation levels, which increasingly have been recognized as the most appropriate levels of governance.

Under this new paradigm, smart specialisation is an implicit coordination mechanism that allocates resources when uncertainty is the norm and structural change expected. The most important characteristic of smart specialisation policy is the implementation of an 'entrepreneurial discovery process' for identifying these specialisations, as opposed to 'picking winners' in a traditional 'top-down' industrial policy. Entrepreneurship and innovation are the market driven prime movers in this self-discovery process but they need common medium- to long term perspectives to enable converging investments at system level. The appropriate governance mechanism will be a challenge-driven growth model that responds to societal challenges and induces shared expectations. It is at that level – setting political objectives and regulatory frameworks - that governments have an important role to play. Implementing smart specialisation is similar to a 'whole-of-government' approach with vertical policies along value chains and clusters. It is focused on cluster conditions at a regional level (place-based innovation) considering the various components of an innovation system. But the innovation system is an open innovation system and the governance is a multi-level governance. This holistic view can provide policy remedies at critical tipping points for innovation systems.

Smart specialisation, as an inherent coordination mechanism, will necessarily include 'co-specialisation' of partnering/competing regions and clusters, a division of labour enhanced by knowledge-intensive decision mechanisms and combined top-down and bottom-up approaches to interdependent strategic governance. Additionally, it is necessary to recognize the role of regional and national governments and to make entrepreneurs stakeholders in the policy process. Giving business a leading role in defining the road maps in STI policies embeds the entrepreneurial selection and discovery choices into the decision-making process of identifying and exploiting the potential of key enabling technologies.

Smart specialisation will leverage regional comparative advantages for growth in quality of human capital, market rigidity, industrial structure and absorptive capacity but these advantages may work in coordination for common growth overall. In this cross-national arrangement, resources can be better and more efficiently allocated throughout the connected system. While individual stakeholders still search for added-value, it is recognized that value is increasingly found outside the borderlines of individual actors, like spillovers, network complementarity and comparative advantage.

Ultimately, smart specialisation responds to the new environment that faces policymakers around the world, namely that economic growth is dependent on key enabling technologies that are produced using knowledge-based capital across global value chains. New strategies are necessary to respond to new frameworks in innovation and growth, which requires structural changes through system innovations involving smart policy design. Smart specialisation is part of the system innovation approach to innovation systems.

East Asian Context: Instilling a Bottom-up Process and Specifying the Implementation Strategy

While smart specialisation as a specific strategy is only now being articulated and codified in a global context, several countries have already implemented smart specialisation strategy components. Across East Asia, there have been several dedicated specialisation policies that have been implemented to improve innovation-driven growth. China has implemented its policies for almost a quarter century. Japan has built its strategies through several iterations of economic development policies. South Korea has also spurred innovation-driven growth through coordinated clustering policies. All of these East Asian approaches have relied heavily on a top-down approach, which have enabled them to effectively and efficiently develop rapidly and even gain ground on advanced economies. Another defining feature of their strategic policies was the adaptability of responses that changed as needs did. As the economies converge with more developed countries, these approaches will need to adapt again and instil a bottom-up perspective to avoid potential limitations.

As part of its national goals, China aims to strengthen its innovative capacity to transform into an innovative country. The State Council of China began implementing a plan to develop hi-tech industries in 1988 and established the Torch High Technology Industry Development Centre the following year. While reporting to the Ministry of Science and Technology, the Centre operated independently to realize industrialisation of hi-tech. This was followed by policies that provided tools like technology parks, funding and business incubators. Later, these independent agencies were integrated to better coordinate their functioning and mobilize their resources, simultaneously increasing centralised control.

While having a similarly long history of government intervention, Japan has approached its innovation-driven growth policies from a slightly different angle. Its National Development Plans began as land reform efforts and have evolved into clustering policies that focus on industrialisation. In the 1980s and 1990s, its policies focused specifically on hi-tech industrial zone promotion. Coordinated by the Council for Science and Technology Policy of the Cabinet Office, both the Ministry of Education, Culture, Sports, Science and Technology and the Ministry of Economy, Trade and Industry are responsible for aspects of the industrialisation policies. The latest policies focus on increasing competitiveness through open science and innovation at a regional level.

Like China and Japan, Korea has been successful in implementing smart specialisation components to its policies to promote innovation-driven, balanced economic growth from the top-down. Since the mid-1990s, various ministries became involved in the policymaking that would drive growth as part of the Plan for National Balanced Development. These ministries provide financial support to R&D stakeholders including universities, research institutes and firms for various efforts to industrialise clusters around the country. Since it focuses on technology development and commercialisation, however, the Ministry of Knowledge Economy was the principle actor to establish research institutes, agencies and technology centres that promoted different sectors in different regions. Today, the central government still supports projects such as the Leading Industry Promotion program that includes a collaborative effort within and between different regions.

While these types of top-down approaches have been effective at mobilizing resources, they ultimately led to bottlenecks in decision making process. One problem was the proliferation of ministries and agencies that were involved, which led to the creation of the Presidential Committee on Regional Development to provide a coordination mechanism across ministries in Korea and increased centralisation in China. Another problem was that, with the central government initiation of projects, local organizations tended work with central agencies rather than other local ones. This centripetal effect caused a neglect of regional networks and local actors that often worked merely as "matchmaking" partners.

The initial rapid success enabled by these approaches can be seen in the Gwangju photonics cluster. In Gwangju, South Korea, the photonics industry reached a production volume of 2,540 billion Korean won in 2010. That same year, the local industry employed 8,270 at 377 companies. Since its inception, the average growth rates of these figures are 19.2%, 9.6% and 5.0%, respectively. Just fifteen years ago, however, the industry did not exist in Gwangju. Rapid innovation-driven growth was enabled through top-down government intervention. By focusing on capacity building and networks, policymakers increased capabilities of local stakeholders and enabled greater industry-focused input from firms and agencies that work directly with consumers and technology. At present, however, the Gwangju cluster needs to instil bottom-up capacity building to have better coordination among local stakeholders and further diversification of its technology areas of fusion and convergence photonics.

The next stage of policy formation must be re-evaluated in the East Asian context in order to reach higher innovation goals. Implementation strategies include system innovation through public-private partnership (PPP) approaches and expanding global partnerships to boost innovation through open science. Through these approaches, policymakers can more strategically and efficiently distribute resources. Additionally, PPPs allow this system to be responsive to various stakeholders while distributing risk. Global partnerships are also more complementary to global supply chains that already exist. Further, by adopting an open science perspective, innovations can be more readily achieved along these internationally dispersed global networks by ensuring that knowledge flows are open and research is kept on the forefront of technology innovation.

The contextualization of smart specialisation in East Asia and their implementation strategies may also help European policy practitioners and stakeholders elaborate and detail their smart specialisation strategies, by which they meet the needs of Europe within their global supply chain networks.

Photonics Global Governance Design between Gwangju and Europe

As the Global Financial Crisis has demonstrated, countries around the world are no longer economically isolated from each other. Although the negative consequences of one country's policies may have differing effects on others, there is likely to be some, even major, effects on interdependent economies. Within this global context, stakeholders can pursue their smart specialisation strategies with their counterparts anywhere else around the world. The interaction between the Gwangju photonics cluster and its external partners can provide a helpful example of these strategies in practice that can complement the R&D capabilities found in Europe.

Policymakers in Gwangju have been adept at reformulating policies as innovation needs changed. For instance, the initial stage focused on infrastructure that enabled pilot production and research equipment and facility acquisition at a public research institute. Once the underlying infrastructure was established, the second stage promoted more specific infrastructure that was required in key enabling technologies, namely optical communication and LED technology. Each stage targeted a certain critical mass in specific areas that were required to boost innovation. As the stakeholders of the innovation clusters plan the next stage of strategic implementation, they have set goals to further advance the photonics R&D cluster, to develop both large firms and SMEs and strengthen supply chains through localization of intermediate goods and internationalizing R&D cooperation and marketing. This latest stage prioritises commercialisation of fusion and convergence photonics technologies, which will include global partnerships and open innovation.

Policymakers planning the next stages of Gwangju's strategy seek to continue their influence on industrialisation of the cluster, focusing on various aspects of system innovation. Local universities, research agencies and industrial firms in production and services make up the actors within the innovation ecosystem in Gwangju. Strategies will focus on networking between actors within the cluster but also with external collaborators. In this case, a national level coordination mechanism can more efficiently allocate resources and provide critical mass, for instance through funding. Meanwhile, firm and industry level policies will support the strengthening of the connectivity between these agents to improve business incubation, research and technology development, pilot production and equipment services, management and marketing services, human resource development and technology transfer.

In addition to university, research institute and industry stakeholders, government from local to national levels also have an important role to play in smart specialisation approaches. Since Gwangju's industrial cluster is still mainly focused on optics communication and LED technology, it still needs to diversify technologies, which requires knowledge capital that is still missing from the cluster. It is therefore necessary for stakeholders within the cluster to collaborate with experts outside of the local ecosystem. While obviously not in every situation, governments are sometimes better positioned to negotiate and coordinate interactions that connect different aspects of the innovation system especially across national boundaries.

While Gwangju is attempting to continually build its R&D and related networks, its European equivalents are seeking to improve its commercialisation capabilities through partnership as well. While its universities are held in high regard globally, this strength in academia has not necessarily translated into commercial R&D success in the market. What each of these separate regions needs is precisely the expertise that the other offers, namely that there are more open innovation networks needed in Korean clusters and more multilevel government innovation-driven policies needed in Europe. In the European innovation system, there are weak coordination mechanisms that exist, yet the wider range of stakeholders involved provides a stronger rationale for them. Having already successfully employed several techniques outlined in the smart specialisation strategy, Gwangju provides a natural collaborator for entities seeking build a global photonics governance mechanism similar to the East Asian context.

Currently, there is still a need to detail characteristics of global partnership and technology platforms for collaborating. The workshop on smart specialisation strategies will provide participating stakeholders the opportunity to detail their perspectives and also establish next steps for forming coordinating mechanisms and policies.

PROGRAM

Day 1: Wednesday 3 April 2013	
13:00 – 13:30	Registration Performance by Gwangju Metropolitan Traditional Music Orchestra
13:30 – 14:00	**Opening Session**
Opening Remarks	Patrick Vock – OECD CSTP Vice Chair
Congratulatory Remarks	Mayor of Gwangju Metropolitan City, Un-tae Kang
Welcoming Remarks	STEPI President, Jong-Guk Song
	Gwangju Technopark President, Dong-Guk Yoo
14:00 – 15:15	**Session I: Smart Specialisation: Concept and Strategy**
This session will present the theoretical and practical approaches to smart specialisation and its relevance to efforts in OECD countries to find new sources of growth. It will also discuss the role of partnerships as a policy instrument to support the design of smart specialisation strategies.	
Presenters	**Theoretical Underpinnings for Smart Specialisation Strategies** Mario Cervantes , OECD
	The European Politics of Smart Specialisation Armin Mahr, Austrian Federal Ministry of Science
15:15 – 15:45	Coffee Break
15:45– 17:00	**Session II: Global Photonics Governance Design**
This session will discuss the positioning of leading regions in the photo+nics cluster	
Presenters	**Gwangju Photonics Smart Specialisation Strategy** Yong-jin Shin, Chosun University, Korea
	The Brussels and European Perspective on Photonics Smart Specialisation Hugo Thienpont, Vrije Universiteit Brussel (VUB), Belgium
17:00 – 18:00	**Session III: Round Table Session**
This session will explore some of the policy implications arising from the application of key enabling technologies (KETs) to regional development through smart specialisation strategies.	
Chair	**Patrick Vock,** Federal Department of Economic Affairs, Education and Research, Switzerland
Panelists	Raine Hermans, Tekes (The Finnish Funding Agency for Technology & Innovation), Finland
	Jeong Hyop Lee, STEPI (Science & Technology Policy Institute), Korea
	Mario Cervantes , OECD
	Armin Mahr, Austrian Federal Ministry of Science
	Yong-Jin Shin, Chosun University, Korea
	Hugo Thienpont, Vrije Universiteit Brussel (VUB), Belgium
	Floor Discussion
18:00 – 20:00	**Gala Buffet Dinner @ Convention Hall, Kim Dae-Jung Convention Center**
	Performance by Fusion Music Group 'Rootmerge' Performance by Percussion group 'Olssu'

Day 2: Thursday 4 April 2013	
08:30 – 10:15	**Session IV: Lessons Learned from the OECD – TIP Project on Smart Specialisation**
This session will present the main lessons learned from the OECD-TIP project on smart specialisation.	
CHAIR	**Armin Mahr, Austrian Federal Ministry of Science**
PRESENTERS	**Findings for the OECD Project and Implications for STI Governance** Inmaculada Perianez-Forte, OECD
	Smart Governance for Smart Specialisation Strategies: Lessons from OECD Case Studies Patries Boekholt, Technopolis,The Netherlands
	Smart Specialisation in Lower Austria Irma Priedl, Regional Government of Lower Austria
	Smart Specialisation Strategy of Finland Raine Hermans, Tekes, Finland
10:15 – 10:45	Coffee Break
10:45 – 12:30	**Session V: Extension of Smart Specialisation to Other Regions: Concept and Considerations**
The aim of this session is to contextualize the EU-based smart specialisation approach in East Asia and South East Asia. This session will discuss the role and need of baseline information, diagnostics tools in the smart specialisation evaluation process, and major policy considerations.	
CHAIR	**Tae-Young Shin, STEPI, Korea**
PRESENTERS	**OECD Smart Specialisation Project: Lessons Learned and Insights Obtained** Koenraad Debackere , ECOOM KU Leuven, Belgium
	The RIS3 Self Assessment Key: Motivation, Concept and Application Christian Hartmann, Joanneum Research, Austria
	Synchronization of National and Regional Innovation Strategies: The Case of Spain Roberto Sánchez Sánchez, Ministry of Economy and Competitiveness, Spain
	Cluster Internationalisation – An Important Element of Smart Specialisation Günter Clar, Steinbeis-Europa-Zentrum, Germany
12:30 – 14:00	Lunch Break

14:00 – 16:00	**Session VI: Extension to East Asia**
The aim of this session is to provide examples of national policies and initiatives to promote smart specialisation strategies in East Asia.	
CHAIR	**Yeong Cheol Seok, KIAT (Korea Institute for Advancement of Technology)**
PRESENTERS	**New Challenges for Japanese Cluster Policy – Beyond Proximity and Trust** Ichiro Sakata, Todai Policy Alternatives Research Institute, University of Tokyo, Japan
	Chinese Torch Programme: Environmental Construction for High-tech Industrialization Ding MingLei, Chinese Academy of Science & Technology for Development, China
	Korean Cluster Policies: Retrospect and Prospect for Smart Specialisation Strategies Dongsoo Kim, KIET(Korea Institute for Industrial Economics & Trade),, Korea
	Key Features of Cluster Policy in Russia Evgeniy Kutsenko, HSE, Russia
16:00 – 16:30	**Coffee Break**
16:30-17:30	**Session VII: Extension beyond East Asia**
The aim of this session is to provide examples of national policies and initiatives to promote smart specialisation strategies in other Asian regions.	
CHAIR	**Enrique Campos, CIATEJ, Mexico**
PRESENTERS	**Innovation in Southeast Asia** Mario Cervantes ,OECD
	An Adjustment Reform towards a More Integrated Innovation System Strengthening: Indonesia Cluster Policy Context Tatang Taufik, BPPT(Agency for the Assessment and Application of Technology), Indonesia
Discussants	**Contextualisation of Smart Specialisation beyond East Asia** Participants from Other Regions
17:30 – 18:30	**Session VIII: Looking beyond Smart Specialisation**
The aim of this session is to explore areas for future policy research and analysis as well linkages between smart specialisation and the new activities being carried out by the OECD Working Party on Innovation and Technology Policy (TIP).	
CHAIR	**Patrick Vock,** Federal Department of Economic Affairs, Education and Research, Switzerland
PRESENTER	**From Implicit Coordination of Regional Innovation Strategies towards International PPPs** Jan Larosse, Dept. of Economy, Science and Innovation of the Flanders Government, Belgium
DISCUSSANTS	**Contextualisation for East Asia: Requirements and Considerations** Mario Cervantes, OECD Jeong Hyop Lee, STEPI, Korea
	Floor Discussion
18:30 – 20:30	**Dinner @ Ramada Hotel Gwangju**

OECD Outreach Workshop on

Smart Specialisation: Its Extension to East Asia

Biography of presenters,
Abstracts & Presentations

Session I Smart Specialisation: Concept and Strategy

April 3 (Wed) 14:00 – 15:15

Session I-I Theoretical Underpinnings for Smart Specialisation Strategies

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BIOGRAPHY

Mario Cervantes is Senior Economist in the Country Studies and Outlook Division at the OECD's Directorate for Science, Technology and Industry (STI) where he is responsible for the OECD's Working Party on Innovation and Technology Policy (TIP). Current areas of work include systems innovation, open science, commercialisation of public research and smart specialisation strategies. With more than 15 years experience in innovation policy at the OECD, he has overseen a number of projects ranging from technology incubators, R&D tax credits, technology foresight, demand-side innovation policies, social innovation, international mobility of the highly skilled. Before heading the TIP, he was held several positions at the OECD including heading the OECD Working Party on Steering and Funding of Research Institutions (SFRI) where he worked on public research and human resources. His experience prior to the OECD includes being a researcher on telecommunications policy at the Centre for Tele-Information at Columbia University's Graduate School of Business in New York. He has consulted for the World Bank, UNESCO, national governments, regional development agencies as well as small and large companies.

PRESENTATION ABSTRACT

Smart specialisation is policy framework that focuses on targeting and steering public investments in education R&D and innovation to influence economic, scientific and technological specialisation within a regional policy framework and through this mechanism, productivity, competitiveness and economic growth. This presentation will present the economic underpinnings of the smart specialisation policies in the context of the current debate on industrial and innovation policies. The theoretical origins of smart specialisation are deep and are grounded in the classical economic theories of economic growth and notably trade specialisation. Recent strands of economic thought from evolutionary economics to the economics of agglomeration are also visible in the smart specialisation concept, notably the issue of increasing returns to knowledge and the role of knowledge spill-overs.

Session I-2 The European Politics of Smart Specialisation

ARMIN MAHR

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BIOGRAPHY

Armin Mahr is a senior policy expert and public manager for science, research and innovation in the Austrian federal government, Vienna. He is vice-chair of the OECD Working Party on Innovation and Technology Policy (TIP) and has been among the initiators of the OECD project on smart specialisation 2011-12. In the Austrian Federal Ministry of Science and Research (BMWF), he is heading a new strategy unit for location-based policies, promoting smart specialisation, the dialogue for co-ordinating national and regional innovation policies, and a priority role of science and research in the European Structural and Investment Funds 2014-20.

Armin Mahr has been involved in country reviews of the innovation system, and in the formulation of the Austrian national research, technology and innovation strategy 2011-20. 2007-08, he directed a nation-wide stakeholder dialogue that identified development priorities for the national research and innovation policy.

PRESENTATION ABSTRACT

Smart specialisation is a predominantly political concept, created by innovation gurus for practical use. Reframing a well-established set of instruments, smart specialisation has become a fresh policy frame that is rightfully sparking the interest of many economies worldwide.

However, smart specialisation has been developed in close proximity of the politics and policies of the European Union. To be fully understood in its timeliness and potential, smart specialisation is to be approached by several important political parameters in the European Union’s quest to re-embark on a new understanding of growth after the economic crisis.

The keynote will therefore discuss the European Union’s Europe 2020 strategy, its growth dimensions, Europe’s goal to establish an innovation union, and to bring growth into every single region. The notion of regions, a revised approach to territorial development, smart specialisation’s link to new industrial policy and a new, holistic, place-based approach to innovation are further important dimensions to be examined.

The presentation will generally focus on the political impact of smart specialisation, and on how the European Union intends to use regional or national Research and Innovation Strategies for Smart Specialisation (RIS3) as a motor for its policies 2014-20, fostering cohesion on the continent.

From the perspective of a national policy shaper, the keynote will finally share some practical ideas on how smart specialisation can be used as an instrument for communication and the mobilisation of important stakeholders, thus transcending an originally European perspective to a worldwide dialogue for place-based development.

OECD Outreach Workshop on

Smart Specialisation: Its Extension to East Asia

OECD Synthesis Report on Innovation Driven-Growth in Regions: The Role of Smart Specialisation

SYNTHESIS REPORT ON INNOVATION DRIVEN-GROWTH IN REGIONS: THE ROLE OF SMART SPECIALISATION

FOREWORD

This synthesis report brings together the key findings from the CSTP Activity 2.4 on Smart specialisation strategies for innovation driven growth carried out under the auspices of the OECD's Working Party on Innovation and Technology Policy (TIP).

The synthesis report is based on a review of the literature on smart specialisation and its underlying concepts; the identification and development of indicators and metrics for smart specialisation strategies; an enquiry of governance and priority setting processes; and 15 case studies of country and regional experience in designing and implementing smart specialisation strategies. This report has been prepared by the OECD Secretariat (Inmaculada Perianez-Forte and Mario Cervantes) and benefited from inputs and comments from members of its Steering Group. The Secretariat would like to thank members of the steering group for this collective effort and for their fruitful contribution to the project. Special thanks are extended to the lead countries, Austria (Armin Mahr), Belgium (Jan Larosse), Finland (Raine Hermans) and Korea (Jeong Hyop Lee). Thanks are also extended also to the European Commission, notably the DG Regio (Mikel Landabaso, Katja Reppe and Luisa Sanches) and the working team of S3 platform of the IPTS. The report draws on the analytical work carried out by ECOOM (Koenraad Debackere, Petra Andries), the Joanneum Research Graz (Christian Hartmann), Technopolis Group (Patries Boekholt) and the comments received by experts, including Dominique Foray, Philip McCann, Raquel Ortega, Claire Nauwelaers, Alessandro Rosiello and Michele Mastroeni and Dimitrios Pontikakis. In addition to the voluntary and in-kind contributions from the participating countries, the activity also benefited from a grant from DG-Regio of the European Commission which is gratefully acknowledged.

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EXECUTIVE SUMMARY

Introduction: From concept to policy framework

1. In November 2009, the European Commission published the report "Knowledge for Growth", the results of an expert advisory group to the EU. Tasked with finding an alternative to public policies that were seen to spread public investments in knowledge and innovation – research, education, public support to business R&D, etc – thinly across technology research fields such as biotechnology, ICTs, and nanotechnology, the expert group proposed that national and, especially, regional governments should encourage investment in domains that would "complement the country's other productive assets to create future domestic capability and interregional comparative advantage". This strategic proposal was coined "smart specialisation" and it spread quickly and was adopted in the EU 2020 Agenda with its objectives of smart, sustainable and inclusive growth. Indeed, Research and Innovation Strategies for Smart Specialisation (RIS3) are proposed as an *ex-ante* conditionality for future EU Structural Fund Programmes[1] with a view to concentrate resources on research and innovation to maximize the impacts of the structural funds. However, the issues raised by smart specialisation go far beyond the discussion in the EU context. A number of countries, within OECD or not, are now taking interest in Smart Specialisation as one way to lead their economies out of the crisis by leveraging regional dynamism in innovation led/knowledge-intensive economic development.

2. Although initially relatively simple as a concept – the concentration of public resources in knowledge investments on particular activities in order to strengthen comparative advantage in existing or new areas – the conceptual and policy implications of smart specialisation are far more complex and transcend three distinct areas: *i)* the underlying role of scientific, technological and economic specialisation in the development of comparative advantage and more broadly in driving economic growth; *ii)* policy intelligence for identifying domains of present or future comparative advantage and; *iii)* governance arrangements that give a pivotal role to regions, private stakeholders and entrepreneurs in the process of translating specialisation strategies into economic and social outcomes.

3. In this sense, smart specialisation is a regional policy framework for innovation driven growth. That said, many of the underlying elements of the smart specialisation approach are not new and have been part of the broader discussion on innovation, industrial policies and regional economic development for some time.

4. What distinguishes smart specialisation from traditional industrial and innovation policies is mainly the process defined as "entrepreneurial discovery" - an interactive process in which market forces and the private sector are discovering and producing information about new activities and the government assesses the outcomes and empowers those actors most capable of realising the potential (Foray, 2012; Hausmann and Rodrick 2003). Hence smart specialisation strategies are much more bottom-up than traditional industrial policies. In addition, the focus of the choices is on the "enabling knowledge-based assets", both public (e.g. education, public research) and private, not on particular industries. This more upstream approach gives more of a margin for the market to determine and lead on downstream choices. Still, the operationalisation of entrepreneurial discovery processes from a policy perspective is a major challenge and requires the collection and analysis of diverse information that often is held by entrepreneurs themselves or embedded in firms and public institutions. Incentives and instruments for disclosing –

[1] However, the choice as to whether the smart specialisation strategies should be prepared at a regional level or a national level rests with the EU Member states.

passively or actively – this information (*e.g.* through stakeholder consultations, public-private partnerships, IPRs) will be key.

5. Like traditional industrial policy, smart specialisation strategies aim to address market/systems and co-ordination failures. But traditional industrial policies required significant levels of information to justify subsidy support and they tended to be implemented in vertically integrated sectors with stable technological paradigms. In contrast, smart specialisation recognises the lack of perfect information, the level of advancement of a given activity, and the relative risks for policy. It thus focuses on helping entrepreneurs identify their knowledge-based strengths at the regional level and in a more exploratory approach in which public decision makers listen to market signals using a range of assessment tools (*e.g.* SWOT analysis, surveys) and mechanisms such as public-private partnerships, technology foresight and roadmapping to name a few.

Risks of policy induced specialisation

6. While the central tenet of the concept of smart specialisation was quickly accepted by the EU policy community, especially with a view to increasing synergies and avoiding duplication in national and EU research and innovation funding, the implicit idea of policy-induced specialisation in innovation have raised concerns amongst economists and others inside and outside the EU policy circles (Pontikakis, D. *et. al.* 2009). First among these are the problems of:

- *Government picking winners:* To what extent does smart specialisation lead governments to favour some R&D/technology and innovation activities at the expense of a market-driven allocation of resources? Indeed, experience with industrial policy in OECD countries has shown that any policy involving "picking winners" - such as supporting firms to produce renewable energy technologies through subsidies or taxes is difficult to implement and could be wasteful from a social welfare point of view (*e.g.* to the extent that some activities would have been undertaken even in the absence of policies), and could lock in inefficient activities and encourage rent-seeking.

- *Competition effects*: Another important concern is the prescription for a policy-induced division of labour between leading and lagging regions due to assumptions about the role of technology in traditional or leading edge sectors. A policy that targets public R&D towards an area of existing strength, such as agriculture, may deepen interregional disparities though the reduction of competition and market/merit based selection. Indeed, some "duplication" is a side-effect of competition and may be beneficial from a societal point of view.

- *Diminishing returns:* Another concern that arises from the concentration of R&D investments is that of the "diminishing returns" to R&D.

7. To allay some of the concerns about "smart specialisation" scholars and policy advocates point out that it is a vertically-oriented policy framework for priority setting at the regional level that combines bottom-up and top down process in priority setting for public investments in knowledge. They also point out that smart specialisation depends on good general framework policies (*e.g.* competition, trade policy, labour market policy and education and skills) and horizontal innovation policies (*e.g.* R&D tax credits). A smart specialisation strategy means that government efforts and resources don't all go to the same extent to all activities: that concerns various types of support to innovation, but also other involvement with industry, education etc. An important issue is then how to select the relevant areas where government will focus its effort. The main principles of the smart specialisation framework can be summarised as follows:

- *Concentration of public investments in R&D and knowledge on particular activities is crucial for regions/countries* that are not leaders in any of the major science or technology domains. Past policies tended to spread "knowledge investment" (*e.g.* high education and vocational training, public and private R&D) too thinly, not making much of an impact in any one area. However, concentration in the smart specialisation context is about focusing knowledge investments on 'activities' – those 'business functions' carried out by firms which range from the conception of a product to its end use and beyond (e.g. design, production, marketing, distribution and support to the final consumer) (Porter, 1986; Gereffi *et al*., 2001). These 'activities' (*e.g.* goods or services) may be undertaken by a single firm or divided among different (supplier) firms and be concentrated within one location or spread out over global value chains (OECD, 2012a). The emerging feature of many of these activities is that they increasingly cut across established sectors and industries.

- *Smart specialisation relies on an entrepreneurial process of discovery* that can reveal domains of economic activity where a country or region excels or has the potential to excel in the future. It empowers entrepreneurs who are able to combine the necessary knowledge about science, technology and engineering with knowledge of market growth and potential in order to identify the most promising activities. In this learning process, entrepreneurial actors have to play the leading role in discovering promising areas of future specialisation, because the needed adaptations to local skills, materials, environmental conditions, and market access conditions are unlikely to be able to draw on codified, publicly shared knowledge, and instead will entail gathering localised *information and the formation of social capital assets.* One implication for policy makers is that this requires ensuring policy tools to collect the 'entrepreneurial knowledge' embedded in the region to transform it into policy priorities. In this context, entrepreneurial actors are not only the people creating new companies but also innovators in established companies, in academia or in the public sector.

- *Specialised diversification:* specialisation on the selected activities (out of a related variety) that provide comparative advantage based on differentiation of their operations and products in global markets.

- *The specific properties of General Purpose Technologies (GPTs) underlie the logic of "smart specialisation"*[2]. Invention of a GPT extends the frontier of invention possibilities for the whole economy, while the "co-invention of applications" changes the production function of a particular sector. GPTs *are important for upgrading upstream and downstream of the value* chain. The leading regions invest in the invention of a GPT or the combination of different GPTs (*e.g.* bioinformatics). Regions do not need to "lead" in these technologies to benefit. In fact, follower regions often are better advised to invest in the "co-invention of applications" around a GPTs. Benefiting from GPTs generally also requires alignment with education and training policies in order to build capacity.

- *Multi-governance and inter-regional policy co-ordination:* setting common goals for drawing up regional strategies and to allocate public funding accordingly. Smart specialisation strategies are interlinked by nature through complementary activities at horizontal level and require horizontal policy coordination. But they are in particular co-defined by the 'vertical' alignment of entrepreneurial activity, partnering in clusters, regional development strategy and interregional and international arrangements that all are part of a multi-level governance structure for smart specialisation. Setting common goals therefore constitutes a powerful governance mechanism for

[2] See also (EC 2011) Final Report on High Level Expert Group on Key Enabling Technologies. Available at http://ec.europa.eu/enterprise/sectors/ict/files/kets/hlg_report_final_en.pdf; See also page 21 of this report.

the vertical alignment of these strategies, without jeopardising a market-oriented process of resource allocation. This multi-level governance co-ordination requires the synchronisation of both national strategies with regional strategies and the synchronisation of different regional strategies (*e.g.* innovation strategies, research strategies, industrial strategies), to support regional priorities.

- *Patterns for structural change:* Structural change, not just the accumulation of capital, is a driver of economic growth. As such smart specialisation aims to accelerate structural change by encouraging the transformation of economic activities from a structural perspective. It may in some cases mean modernising existing industries or enabling lagging sectors to improve their competitiveness through the adoption of ICTs, but for front runner countries it can also mean developing new areas at the edge of the technological frontier (*e.g*. radical formation).

The global economic context for smart specialisation

8. Since 2009, and following the aftermath of the global financial and economic crisis, including the current euro debt crisis, the concept of smart specialisation has found an echo in the OECD discussions on “New Industrial Policy”, “New Sources of Growth” and “New Approaches to Economic Challenges”. Indeed, the OECD has exhorted countries to “go structural” to make economies more competitive; to “go social” to address the increased inequality and lack of jobs; to “go green” to promote a growth path that takes due account of environmental constraints; and to “go institutional” to address the current confidence gap in institutions and markets. Smart specialisation is one several frameworks that accommodates many of these goals by focusing on promoting structural change in the economy through investments in knowledge-based assets and better governance in STI policy making. Although smart specialisation has arisen in the EU context of market integration, regional cohesion and the European Research Area, similar strategies are based on targeting of public investments and top-down and bottom up initiatives are visible in regions and states as varied as in Australia, Michigan or California in the United States as well as Korea and Singapore.

9. Strategies for concentrating investments in knowledge-based assets on particular activities through an entrepreneurial-led process have also found fertile ground at the OECD as the result of a confluence of different developments. On the one hand, many OECD countries have entered a period of slow growth, high unemployment, and low demand and high public deficits. And innovation is thus seen a key to re-start growth and investment. General purpose technologies (GPTs) in particular are seen as way to revitalise existing industries and to stimulate innovation downstream including innovation in services (*e.g.* ICT services for public health).

10. On the other hand, globalisation and advances in ICT allow firms to fragment their production in the global value chain. As a result, the relevant unit in the economic analyses is not the industry or sector but the ‘business function’ or ‘activity’ along the supply chain (*e.g*. design, R&D, procurement, operations, marketing, and customer services). Countries tend to specialize in specific ‘business functions’ or ‘activities’ rather than specific industries (*e.g.* assembly operations for China or business services for India). This rise of GVC illustrates why specialisation no longer takes place solely in industries but in specific functions or activities in the value chain (OECD, 2012a).

11. At the same time, the crisis has also exposed the vulnerability of global value chains to demand and supply shocks and has also forced OECD governments to look more closely at where economic value is created along global value chains, and whether knowledge spill-overs can be captured locally by enhancing linkages between local and foreign actors. Place-based growth is seen as particularly important for innovation given the weight of agglomeration economies (OECD 2011). The smart specialisation approach responds to the need to better position regions/regional clusters in global value chains but also, for those regions where it is more relevant, in local and regional production systems.

Key policy findings

12. The OECD project on smart specialisation, organised around several modules - a theoretical and empirical literature review, detailed economic and technological specialisation profiles of regions and countries, a survey of governance mechanisms for smart specialisation in self-selected countries and country case studies - has generated a rich amount of material. Some of the key policy messages include:

- **Policies for entrepreneurial discovery.** The smart specialisation approach calls for an 'entrepreneurial selection' of market opportunities (*e.g.* to minimise failures and to avoid ill-informed policy decisions). In practice, this means the promotion of entrepreneurship across the board. While successful companies will constitute the new specialisation of the country/region (self-discovery), the role for policy is to develop a flexible strategy focusing on measurable intermediate goals, identifying bottlenecks and market failures and ensuring feed-back into policy learning processes. But the smart specialisation approach goes further, it suggests the need to consider incentives (*e.g.* IPR, prizes) to reward those entrepreneurs who discover new domains and activities and incentives (*e.g.* lead markets, public procurement) to attract other agents and firms and facilitate entries so that agglomeration and scale effects materialise at a later stage (Foray, 2012). One important challenge concerns how governments deal with the "de-selection" or the abandonment of support to certain activities.

- **Promoting General Purpose Technology platforms and networks**. Given the range of applications of general purpose technologies, technology platforms involving public and private actors but also standards settings organisation can leverage productivity in existing sectors or help reveal or identify sectors in which to concentrate resources. Not all regions need to posses leadership in these technologies to benefit. Indeed, they can purchase or access such platforms from the market in neighboring regions or abroad. Follower regions, however, may be better advised to invest in the "co-invention of applications" around a GPTs. Benefiting from GPTs generally also requires alignment with education and training policies in order to build capacity.

- **Diagnostic and indicator based tools and infrastructure.** The TIP project has demonstrated that smart specialisation requires regions and countries to maintain an infrastructure and indicator base. It has also shown that for most technological domains, there is a match between the technological and the economic performance. However, there are cases where some domains are economically strong in country but technological revealed comparative advantage (RCA) is relatively weak. For example, Upper Austria has strengthened its educational and research base in Mechatronics and Plastics to match demonstrated industrial needs (Upper Austria 2011).This information could help policy makers assess the sustainability of traditionally strong sectors, or it may inspire them to focus support on areas where research capacity is strong but economically weak, or even on activities yet nonexistent but which match well with existing capabilities in the region. In addition to quantitative indicators, *qualitative* data such as SWOT analyses, surveys, workshops and interviews with regional stakeholders are also important in the priority setting and discovery process. Some leading OECD regions are using very sophisticated tools to assess priority areas (*e.g.* Lower Austria's Innovation Assessment Methodology) as well as sophisticated policy monitoring tools to assess impacts at both programme and regional level (*e.g.* the annual Brainport Monitor).. Lessons from the OECD case studies for the project show this kind of capacity takes time and cannot be easily improvised.

- **Strategic governance for smart specialisation.** Three types of strategic capacities are needed to grasp future opportunities: the capacity to identify local strengths; the ability to align policy actions and to build critical mass; and the ability of regions to develop a vision and implement the strategy. The role of strategic policy intelligence as a tool for governance of smart specialisation is therefore important. In practice, the link between policy instruments and the priority setting is not explicit in the vast majority of regions and countries. Many policy makers find it difficult to move from the "priority setting process" to the process of developing policy instruments and the corresponding budget. In most cases, the prioritisation process is disconnected from the budgetary process. Additional governance challenges including building channels for two-way communication and having skilled personnel in agencies and ministry (*e.g.* in Estonia, efforts are focused on engaging ministries and industry in the governance of the national innovation system more actively to ensure synchronised implementation and coordination of policies). The latter is especially a challenge for smaller and remote regions, and especially context of constraints on public finances and public sector employment.

- **Openness to other regions:** the specialisation strategy of regions should integrate the fact that other regions are also involved in knowledge creating activities and that duplication (the "not invented here" syndrome) might lead to lower effectiveness and finally failure. Hence, co-operation with other regions with complementary capabilities and strategies is to be sought (*e.g.* the cross-border cooperation of Brainport Eindhoven Region in the Netherlands with Leuven in Belgium on ICT and LifeTec&Health).

CHAPTER 1: THE IDEA OF SMART SPECIALISATION

Smart specialisation is an industrial and innovation framework for regional economies that aims to illustrate how public policies, framework conditions, but especially R&D and innovation investment policies can influence economic, scientific and technological specialisation of a region and consequently its productivity, competitiveness and economic growth path. It is a logical continuation in the process of deepening, diversifying and specialising of more general innovation strategies, taking into account regional specifities and inter-regional aspects, and thus a possible way to help advanced OECD economies – as well as emerging economies- restart economic growth by leveraging innovation led/knowledge-based investments in regions.

Genesis of smart specialisation as an STI policy relevant concept

13. Smart specialisation has emerged as relevant concept and policy agenda for science, technology and innovation against the background of important changes in the structure of OECD economies. These economic changes are the result of both long-term and structural trends (*e.g.* the diffusion of ICTs, the rising supply of R&D and human capital and other knowledge-based assets, globalisation of production systems but also of business R&D, the rise of services and of new global players in STI such as China and India) and shorter-term developments such as fiscal austerity in OECD countries and quests for savings in public spending; the devolution of national innovation policy prerogatives to specialised agencies (public or private) and to regional governments; the (re) emergence of “new” industrial policy with a focus on revitalising manufacturing production activities in OECD countries.

14. The genesis of the concept can be traced back to the work of Dominique Foray and Bart van Ark and other members of the “Knowledge for Growth”, an EU expert group tasked with finding an alternative to public policies that spread public investments in knowledge and innovation – research, education, public support to business R&D, etc - thinly across technology research fields such as biotechnology, ICTs, and nanotechnology. A central tenet of the smart specialisation argument advanced by Foray and others is that governments should focus their knowledge investments in activities– not in sectors in per se – that reflect areas where a region or country has some comparative advantage (specialisation) or emerging areas where entrepreneurs could develop new activities (diversification). This connection between specialisation and technological diversification in the context of regional development and growth has been highly influential as it demonstrated that the smart specialisation as policy framework is very well suited for dealing with the problems of place-based growth (McCann, P. and Ortega-Argiles, R., 2013 forthcoming).

15. The principles behind smart specialisation rapidly became a central element of the Europe 2020 Strategy and smart specialisation strategies have been incorporated as an *ex ante* condition for regions in the *Regional Policy Contributing to Smart Growth in Europe* [COM(2010)553] to access the European Fund for Regional Development (ERDF) which account for €201 billion, for the period 2007-2013 and of which €65 billion are spent for innovation (the total investment for innovation in this period from Cohesion

Policy being € 86 billion considering also the European Social Fund). European regions are therefore required to identify the key areas, activities or technological domains where they are more likely to enjoy competitive advantage and focus their regional policies to promote innovation in these fields.

16. The OECD project on smart specialisation, led by the Working Party on Innovation and Technology Policy (TIP), has sought to contribute to the conceptual framework for smart specialisation by exploring the boundaries of smart specialisation for regions and countries; to define the rationales for policy intervention (*e.g.* knowledge spill-overs, co-ordination, and competition failures but also opportunities to shift the direction of innovation towards global challenges); and to help build the policy tools for smart specialisation and to identify the key elements of STI governance frameworks that might need to change to accommodate smart specialisation strategies. On the operational side, the TIP project also aims to, based on analysis of indicators and policy governance, identify good practices in policy development, methodologies and selection criteria for designing, implementing and evaluating smart specialisation strategies in (self-) selected OECD regions and countries.

Characteristics of smart specialisation

17. The theoretical origins of smart specialisation are deep and are grounded in the classical economic theories of economic growth (*e.g.* the theory of the division of labour by Adam Smith) and notably trade specialisation. Modern recent strands of economic thought from evolutionary economics to the economics of agglomeration are also visible in the smart specialisation concept, notably the issue of increasing returns to knowledge, the role of knowledge spill-overs and rigidities (*e.g.* labour market barriers) that prevent shifts in specialisation patterns. Smart specialisation also draws on the broad economic research on industrial development [*e.g.* Marshallian externalities, industrial districts; flexible specialisation (Piore and Sabel, Storper), and neoclassical spatial economics (Krugman and Venables)].

18. Smart specialisation thus is very much an *economic* framework focussed on regions that aims to illustrate – for the purpose of policy making – how public policies, framework conditions, but especially R&D and innovation investment policies – can influence economic, scientific and technological specialisation within a regional policy framework and through this mechanism, productivity, competitiveness and economic growth. Another important feature of the smart specialisation concept is that through policy interventions focused on releasing entrepreneurial forces, it aims to impact not only on the rate but also the direction of innovation.

19. The core elements of the smart specialisation concept for policy include:

- **Self discovery or entrepreneurial discovery process**. Prioritisation is no longer the exclusive role of the state planner (top down) but involves an interactive process in which the private sector is discovering and producing information about new activities and the government provides conditions for the search to happen, assesses potential and empowers those actors most capable of realizing the potentials. But entrepreneurship in the knowledge economy recognises that value added is also generated outside sole ownership, in spillovers, in networks of complementarity and comparative advantage. These are the two sides of the smart specialisation coin. Implicit in this is the need for better co-ordination mechanisms between regions and national governments for allocating resources in an environment of structural change and uncertainty, risk, and information asymmetries.

- **Activities, not sectors *per se* are the level for setting priority setting for knowledge investments.** While sectors still matter, the issue is not to target sectors but rather activities. Activities can be tied to specific technologies or the technology mix, to specific capabilities, natural assets etc. In general what is discovered as future priorities are those activities where innovative projects complement existing productive assets, hence the need to differentiate the target of smart specialisation according to the overall position of a given activity (e.g. modernisation, transition, diversification, radical foundation and the key notion of related diversity).

- **Smart specialisation entails strategic and specialised diversification.** Rather than encouraging specialisation along pre-determined paths, the smart specialisation approach recognises that new or unexpected discoveries of activities might emerge within a given parts of an innovation system leading to "specialised" diversification.

- **Evaluation and monitoring.** As other versions of new industrial policies, smart specialisation emphasises the need for policy makers to carry out evidence-based monitoring and evaluation and to feed-back into policy design. It also requires flexibility in policy making to be able to terminate or reallocate public support to R&D and innovation. For that purpose, **clear benchmarks and criteria for success and failure are needed.** Smart specialisation policies need to have measurable goals, whether it involves an increase in business R&D, R&D commercialisation or research excellence.

20. The EU has translated these principles of smart specialisation into operational elements of regional innovation strategies Regional innovation strategies for smart specialisation are integrated, place-based transformation strategies that:

- concentrate public resources on innovation and development priorities, challenges and needs;

- outline measures to stimulate private RTD investment;

- build on a region's capabilities, competences, competitive advantages and potential for excellence in a global perspective;

- foster stakeholder engagement and encourage governance innovation and experimentation;

- are evidence-based and include sound monitoring and evaluation systems.

From "picking winners" to facilitating and supporting entrepreneurial self- discovery in regions

21. The central element of the smart specialisation concept that differentiates it from traditional innovation and industry policy frameworks is the focus on the 'entrepreneurial discovery process' or 'self-discovery' which is the process through which an entrepreneur realises that a good or activity, that may or may not already exist in other regions, can be produced locally, with some variations and possibly at lower cost (Rodrik D., 2004). The entrepreneur is able to 'discover' new activities by combining existing scientific and technical knowledge (*e.g.* ICTs or nanotechnology) with the industrial resources and capacities in the region (*e.g.* local knowledge) that can lead to new economic opportunities. This new process of 'self discovery' will also hopefully lead away from imitation and me-too strategies that characterised many regional innovation strategies in the past decade. Furthermore, empirical evidence shows that despite similar endowments, countries and regions may specialise (through the self-discovery process – for example by applying the same technology to the local conditions) in very different activities (Sabel Charles *et al.* 2010).

22. One of the longstanding problems of governments seeking to be strategic in their targeting of industrial policies or innovation polices has been the lack of information on the market, the technology, and capacities of institution. The advances in ICT, the increase in human capital in public administrations and closer public-private interactions between industry and government at various stages and levels of policy making (*e.g.* from foresight exercises to concrete public-private partnerships) have increased the amount of information as well as the incentives for disclosing information that underlies strategic policy intelligence. Smart specialisation strategies are thus enabled by new capabilities in national and regional administrations but also by the release of information previously embedded in the market and institutions.

Box 1. How to use Smart Specialisation diagnostics in the evaluation process

The selection of a smart specialisation field should only take place when local entrepreneurial commitment and development have already achieved a sufficient level of stability and coherence.

At that point in time, policy makers should decide whether and how to support these entrepreneurial processes, engaging in and committing to a process of policy learning and deployment.

Both diagnostic tools and indicators should therefore not be used to select priorities in a top-down manner, but rather to monitor the entrepreneurial discovery and policy learning processes.

Instead, diagnosing apparent strengths, weaknesses, fits and misfits in terms of scientific, technological, innovative and economic capabilities will allow policy makers and funding agencies to ask the right questions when evaluating and deciding whether or not to support specific entrepreneurial processes.

In this evaluation process, all entrepreneurial actors including firms, but also universities and research centres should be engaged. Engaging them will not only allow policy makers to develop a deeper insight into the matches and mismatches of their specialisations, but it will also initiate and nurture the necessary collaboration efforts among these different actors.

If the evaluation exercise shows that some specific capabilities are missing, one should look across the borders of the region or country and see whether interregional and international collaborations with stronger partners can be set up. The global value chain perspective offers a valuable framework to support the attendant discovery and learning processes.

Source : ECOOM - Centre for Research & Development Monitoring at Leuven University

23. Here, the role of government intervention is important but it is subsidiary. Policy intervention is required not to select the areas or activities for investing public resources (Foray D. *et al,* 2009) but to facilitate this ‘discovery’ to occur and to be supported (*e.g.* by providing incentives, removing regulatory constraints). Governments should create the necessary conditions, environment, dynamics and structures through which entrepreneurs and government learn about costs and opportunities and engage in strategic coordination (Rodrik D., 2004). To illustrate, this could mean justifying public support for “exploring” the opportunities from applying GPT technologies to existing industries (*e.g.* via demonstration projects, training).

24. Another characteristic of the smart specialisation approach is that it aims to deal with one of the weaknesses of government intervention in industrial and innovation policy, that is the “diffused agency” problem since it focuses on entrepreneurs and co-ordination of policy over a broad range of stakeholders (regions, national actors) and between *top-down* and *bottom-up* initiatives (See Box 2 and Chapter 4).

Box 2. Examples of bottom-up initiatives to foster entrepreneurial discovery

In Alicante (Spain), a new civil society organisation has emerged proposing projects focused on radical specialisation where a discovery is followed by a firm compromise of a critical mass of citizens who become actors, then protagonists, then authors and then co-authors. As an example, one of these projects is focused on the development of a classic guitar culture, where at least ten sub-projects closely linked have emerged, proposing different business opportunities related to education, tourism, performance, guitar building, museum, recording, research or publishing. This citizen and business driven initiative is the consequence of the severe impact of the crisis in Spain which has brought to a collapse of the traditional business models, highly subsidised in the past: tourism, construction and industrial production.

These citizen and business driven initiatives propose a radical change of paradigm, where public investment is located only where a consolidated project is already in place, following strictly a low cost philosophy. Projects are structured following a "neuronal" approach, where different private and business stakeholders assume direct responsibility on specific sub-projects and a platform provides full information of the development of the different initiatives. Results are measured upon the degree of cross-fertilization amongst the projects and the potential and actual market and job opportunities created, while the role of the public institutions is limited to provide support and co-operate in the creation of the minimum structures needed.

Source: OECD (2012). Interview with Prof. Manuel Desantes from the University of Alicante

Articulation between smart specialisation and cluster policy

25. Clusters are important building blocks of a smart specialisation strategy[3]. Indeed, cluster dynamics are a force for the economic, industrial and technological specialisation of a region or country. The main rationale for public policies to promote clusters through infrastructure and knowledge-based investments, networking activities and training, is an increase in knowledge spillovers among actors in clusters and thus the generation of a collective pool of knowledge that results in higher productivity, more innovation and an increase in the competitiveness of firms. Many OECD and non-member countries have programmes to promote the creation of new clusters or to strengthen existing clusters. Cluster policies in many ways aim to achieve an "implicit" strategy for specialisation. For example, cluster policies in many countries from France to the United States explicitly targeted specific sectors/industries in their national innovation strategies or plans.

26. While offering a specific way of activating the spillover and networking effects of cluster policies (entrepreneurial discovery), policies for smart specialisation aim also to go beyond these policies, by emphasising the interaction between framework conditions and vertical innovation policies needed to accelerate *structural change*, notably by deepening existing capabilities and creating new capacities (Navarro M., *et al*. 2012). Key to this goal is the emphasis of cluster development around key enabling technologies (*e.g.* information and communication technologies [ICTs], biotechnology, nanotechnology). Likewise, clusters should be grounded on technological fields with sufficient regional substance and a broad potential to absorb novel entrepreneurial activities (e.g. Upper Austria's plastics cluster is branching out and actively promoting the upcoming high-tech industry in light weight materials). Seen from this perspective, smart specialisation offers a tool kit of policy interventions to address co-ordination and market failures at regional level while mobilising general purpose technologies to help scale up activities or accelerate the transformation and modernisation of economic activities in clusters. There are also

[3] Some case studies in the OECD appear to interpret smart specialisation as necessarily involving prioritising 'sectoral cluster', 'sectoral strategic plans' or 'cluster strategy', for example, the Photonics Cluster (Gwanju, Korea); Automotive Cluster (East Marmara, Turkey and West Midlands, UK); Aeronautics Cluster (Andalucía, Spain).

important synergies and complementarities between smart specialisation and cluster policy (*e.g.* promotion of cross-sectoral collaboration and entrepreneurial processes and place-based interactions[4] between actors and institutions) which strengthen the argument for governments to align national policy goals and instruments with regional and cluster-based initiatives.

Vertical and horizontal policies for smart specialisation

27. At the operational level, smart specialisation mainly refers to vertical policies at regional level. These are "targeted" policies towards supply or the demand side of the innovation activities from idea generation to market uptake. However, the concept seems to rely on the existence of some pre-conditions and capacities that are not always present in every region (*e.g.* entrepreneurial or absorptive capacity). To assume that these pre-conditions or capacities always exist may lead to government failures and unsatisfactory results in the 'discovery process'. The place-based approach of smart specialisation seem to suggest that when looking 'inside' the region the 'bottlenecks' that impede the well functioning of the system are also identified and removed. Experience illustrated by the country case-studies in the TIP project show that in some regions horizontal and general framework policies are a necessary first step. Other regions reveal difficulties in strategic capacity building. These regional differences cannot be ignored and they need to be addressed in order to work out the smart specialisation concept (McCann P. and Ortega-Arguiles R., 2011).

Summary

28. The idea or concept of "smart specialisation" is based on long standing economic theories and empirical evidence and mobilises well tested policy instruments. As a regional and place-based growth policy framework it aims to improve the allocation of public investment in R&D and innovation related investments, in order to stimulate competitiveness, productivity and economic growth through entrepreneurial activities. Smart specialisation "strategies" can be viewed as a mix of modern industrial policy with innovation policies that emphasise a bottom-up approach (the entrepreneurial discovery), transparency (*e.g.* monitoring and evaluation) and flexibility (*e.g.* abandon failure programmes). But the emergence of this policy approach is by no means independent from the present economic and political context of disruptive change at the global level.

29. Smart specialisation strategies aim to favour experimentation in existing and new areas of activities, and adjust policies according to lessons learnt from these experiments. Smart specialisation requires effective and active co-ordination of policy interventions (*e.g.* policy mix and alignment of policy instruments, such as cluster policies) to enable strategic co-ordination. It also requires longer term visions on the part of policy makers but also various stakeholders, including business. At the same time, they reflect the urgency of making tough choices in times of difficult transitions under severe budgetary constraints. An adequate governance of smart specialisation can potentially ensure important efficiency gains on a systems level.

[4] "Place-based policies" can be defined as those policies that take into account the spatial dimension of economic activities. For example, developing labour markets or innovation in a city or in a rural area may not entail the same type of instruments and may require a differentiated approach. Policies that are "space-blind" may miss this element of differentiation and thus are not the most effective way of promoting growth in all types of regions (OECD, 2011).

CHAPTER 2: SMART SPECIALISATION IN THE CURRENT ECONOMIC CONTEXT AND POLICY ENVIRONMENT

> The current economic crisis and more recently the euro debt crisis, has increased pressure on OECD governments to tackle long-standing structural problems in their economies. Smart specialisation, both as an economic concept and a policy framework provides a novel avenue to pursue the dual objectives of fiscal constraint and investment in longer-term growth potential in a context of rapid technological change and globalisation. General purpose technologies play an essential role in strengthening existing specialisations and revealing new economic opportunities in high-tech sectors, but also in traditional industries.

30. Although in many ways, the European Union is a laboratory for the elaboration of smart specialisation strategies, the interest in smart specialisation in OECD countries from Australia to Korea but also in the United States where variants of smart specialisation are visible in “new industry policies” or new “manufacturing strategies” as in the United Kingdom coincides with two underlying trends. The first concerns the current global economic context. OECD countries face difficult policy choices due to weak economic situation characterised by low economic demand, falling tax revenue, fiscal pressures related to the financing of health and pension systems and shrinking public budgets. This creates a difficult balancing act for policy makers, who have to reduce budget deficits and the national debt without fanning unemployment or causing long term damage to innovation capacity and the long-term growth potential.

31. In most OECD countries, the response to the crisis and to the slowdown in productivity growth has focused on a combination of structural reform policies - labour reform, competition policy, tax policy, etc and efforts to preserve investments in knowledge based assets such as education and innovation especially in areas from where new drivers of growth may arise such as in green technologies and health.

32. Preserving the margin for public investment in knowledge-based capital so that it contributes to productivity growth will be increasingly important not only in the medium term but also in the longer term in light of challenges such as demographic change and competition from emerging economies.

33. The second trend which has created a fertile ground for smart specialisation, is the weakening of the national innovation systems as the unit of analysis for policy making in the face of regional innovation systems and the rise of global innovation networks. The economics of R&D location (indivisibility, strong spatial clustering of innovation activities) makes regional responses to R&D globalisation naturally appropriate. Indeed there has been a trend over the past decades to devolve competences for innovation policies to regions. Meanwhile the rise of open innovation and global value chains reminds us that internationalised firms operate outside the scope of economic conditions determined directly by national policies, even if national policies such as attractiveness policies can influence the investment and innovation strategies of global firms.

Economic and policy rationales for smart specialisation

34. The main justification behind policy attempts to affect specialisation is the presence of externalities or market failures preventing an efficient allocation of resources. Here, public intervention is justified based on: 1) *Information externalities:* both the government and the industry have imperfect information on their own. Governments should ensure mechanisms through which they exchange

information with entrepreneurs in order to learn about costs and opportunities and engage in strategic coordination (Foray, 2012; Hausmann and Rodrick 2003) and; 2) *Co-ordination externalities:* private activity and 'discovery' opportunities may be restricted due to the high fixed costs and large-scale investments required by some projects, and in particular by the spillovers that are specific to knowledge driven investments. Policy intervention is required to facilitate the coordination of investments and decisions of different entrepreneurs.

35. A second set of rationales for smart specialisation concern: 1) incentive problems that lead to underinvestment in the "discovery process"; 2) The discovery of pertinent specialisation domains may have a high social value (development of the region's economy), but the entrepreneur who makes this initial discovery will only be able to capture a very limited part of this social value because other entrepreneurs will swiftly move into the identified domain ("first-mover disadvantage"); 3) Entrepreneurial individuals that are well-placed to explore and identify new activities often will not have sufficient external connections to marketing and financing sources, reducing their incentives to enter in the first place, finally; 4) the quality of specialised infrastructures is initially a given for the search and later an objective of support policy.

36. Table 1 outlines some of the failures and policy instruments that smart specialisation aims to address through both existing and new policy instruments. Incentives and policies to cope with information externalities as well as the support to technologies having scale or agglomeration effects are not unfamiliar to most policymakers. However, the coordination of investment decisions of different entrepreneurs and the coordination among many economic agents throughout the value chain are daunting tasks for policy makers.

Table 1. Rationales for smart specialisation		**Policy intervention**	**Examples of existing and new policies/initiatives**
Information externalities	Low 'self-discovery' activity.	Incentives to reward entrepreneurs who discover new domains.	Prizes for inventions and discoveries, fiscal incentives, IPRs
	Low information exchange flows.	Incentives to involve non-traditional actors.	Incentives for public sector innovation (e.g. procurement)
	Lack of *intra*- and *inter*-regional interactions that restrict the knowledge spillovers.	Creation of platforms and mechanisms to facilitate –*intra* and –*inter* regional interactions. Public policies can assist further this process by providing key infrastructures (e.g. information about emerging technological and commercial opportunities and constraints, product and process safety standards for domestic and export markets, and external sources of finance)	Public web consultations Regional workshops Innovation Vouchers Internationalisation support services
Coordination externalities	Low 'self-discovery' activity due to the high fixed costs and large-scale investments required by some projects. Prevention of emerging trends for	Coordination of investments and decisions of different entrepreneurs. Coordination among many economic agents throughout the value chain suppliers, producers, users, specialised services, banks, basic research and training institutions. Support to technologies which have	Cluster policies Technology banks Public-private partnerships Innovation-oriented procurement Sectoral platforms SME support organisations

	regional economic growth.	scale or agglomeration economies.	Demonstration projects, technology extension services

Source: OECD based on Rodrik

Smart specialisation: Beyond framework conditions

37. Framework conditions are essential for establishing a successful link between innovation and growth (Hansen and Birkinshaw, 2007; Asheim, 2009; Navarro M. *et al*, 2012). Thus, horizontal and targeted policies to improve those drivers which are particularly crucial for the success of smart specialisation are also important (*e.g.* increasing entrepreneurial capacity, technology absorption, international connectivity, domestic and local spillovers and creative capacity) (Veugelers R. and Morak M. 2009).

38. But another rationale for government action concerns not only market failure but also opportunities and goals of a society (*e.g.* meeting social and global challenges like ageing and climate change). Indeed, governments do not only intervene to correct market or systemic failure but they also intervene with specific goals especially in markets for goods that are public or semi-public such as national security, health and the environment. Furthermore, the government is not only there to moderate framework conditions, it has an important role in own right by creating markets (low carbon) and as a procurer of government goods and services (*e.g.* infrastructure, health services). (See box 3).

Box 3. Tackling societal challenges through smart specialisation

The main catalyst of the smart specialisation strategy in the UK automotive sector as way to transition towards a lower carbon economy was the environmental challenge of reducing CO_2 emissions amidst an economic downturn. The main objective of the smart specialisation strategy is to secure the environmental benefits while regenerating competitive advantage, mainly by: 1) Continuing to reduce C02 emissions (which have already fallen 20.3% over the last 10 years) to comply with environmental protection and safety legislation. The UK has adopted a legally binding target to reduce emissions in the Climate Change 2006, by at least 26% by 2020 and 80% by 2050. 2) Aligning the technology, product and business performance to deliver customer value in a global industry which is subject to relentless cost-cutting pressures, in particular for the auto manufacturing industry.

The case study of Estonia shows that, due to its size, Estonia cannot effectively address all societal challenges alone, mostly due to the lack of critical mass and economies of scale. However, many of the large societal challenges are universal and are therefore well-suited to be addressed jointly, for example, between the partners of European Research Area and with the support of European policies and measures (e.g. through the Joint Programming Initiatives). This is acknowledged as a clear argument for a continued strong Estonian cooperation and contribution within the European Research Area. This also means utilising the synergies and opportunities opening up within the Baltic Sea Region and Nordic countries.

Source: OECD-TIP Case studies on Smart Specialisation

Smart specialisation: a pro-active framework for meeting the challenges arising from globalisation

39. Insofar as smart specialisation is about *ex ante* industrial and innovation strategies, it may offer a pro-active framework for governments to anticipate the possible redistributional effects of policy or inactions in an increasingly globalised economy. Over the past two decades, globalisation has increased specialisation by creating opportunities for outsourcing and the development of global value chains. It is a fact that this has led to a shift away from low-skilled employment in OECD countries to high skill labour and from manufacturing activities towards service oriented activities. Some OECD countries have reduced

specialisation in sectors such as steel and shipbuilding and increased specialisation in fast growing and high value added areas such information technology services.

40. While most government response to the *ex-post* distributional effects of globalisation-driven specialisation focus on social policies such as unemployment and increased worker (re-) training, smart specialisation arguably offers an opportunity to foster a dynamic economic process that accelerates structural change and as such attenuates the negative effects of technological change and globalisation on regions, employment and older industries by creating new avenues for economic renewal and growth.

Box 4. Specialisation and comparative advantage

Classical economic theory tells us that regions and countries will specialise in certain economic activities according to their factor endowments (land, capital, human resources). Trade theory as elaborated by 19th century economist David Ricardo and expanded in the 20th century by Hekscher and Ohlin also tells us that countries tend to specialise in the production of goods where they have a comparative advantage. Recent economic theories touching on specialisation and trade (e.g new trade theory) tell us that other factors play a role in specialisation, often connected with economies of scale and locational externalities. Indeed, the factors that lead to comparative advantage are dynamic and change over time (e.g. human capital) (e.g. OECD, 2011; Redding, 2002). World prices of natural resources (e.g. energy) and input factors as well as technology or the discovery of new factor endowments can change comparative advantages.

Trade and technological developments are increasingly allowing firms to fragment their production in the global value chain. Recent empirical analyses of trade patterns show that countries tend to specialise in specific ‘business functions’ or ‘activities’ along the supply chain (e.g. design, R&D, procurement, operations, marketing and customer services) rather than specific industries (OECD, 2012). This supports why specialisation is no longer relevant in industries but in specific functions or activities in the value chain (e.g. assembly operations for China or business services for India).

While specialisation is often viewed in terms of macroeconomic outcomes, it is important to recall that there is a microeconomic level as well. Depending on their own “micro” factor endowments firms, especially MNEs, will exploit differently the same set of national or regional comparative advantages.

Among the conditions that affect factor endowments, specialisation and comparative advantage are the following:

- *Institutions.* The quality of institutions such as government institutions (e.g. rule of law, competition, security), social institutions (labour-employer relations) also affect factor endowments.
- *Framework policies.* Broad policies such as investment in education and infrastructure, social policies and regulations in labour and product markets can play a role in shaping specialisation patterns by affecting comparative advantages, even when this is not their primary goal (Lin, 2011). This has implications for framework policies that can attract or retain firms, especially MNEs, that old the complementary assets necessary for specialise in activities characterised by increasing returns on knowledge investment (e.g. automobile suppliers).
- *Technological attributes.* Differences in technologies across regions/countries also shape specialisation patterns.
- *Demand factors.* It has been suggested that an expansion of an economy’ scientific and technological capacity will not endow it the needed productive dynamism unless there is an adequate demand for innovation by the business sector (Rodrik D., 2004). Furthermore, demand factors such as the level of human capital and income per capita of a country’s trading partner create specific patterns of taste and, therefore, affect demand of goods (Linder, 1961).
- *Economies of scale and product life cycles.* Specialisation can also create or help to take advantage of economies of scale. Product life cycles also affect specialisation (i.e. from novel to mature).
- *Market dynamics.* The extent to which regions and countries are less specialised also reflects the degree of market integration. Higher levels of internal market integration, as opposed to incomplete/fragmented markets, lead to greater scale advantages. Imperfect competition, product market and labour market conditions can influence the degree of market integration.
- *Industrial policies* (e.g. taxes and subsidies) can also play a role in shaping the production structure, for good or bad. Ill-designed industrial policies can distort relative prices and lead countries to specialise in activities in which they have no comparative advantage and, thus, are less likely to raise growth.

It is important to recall that in a global economy, changes in the factor endowments and in the specialisation patterns for trading partners will also have an impact on own-country specialisation. Policy changes in countries’ trading partners can have implications for domestic specialisation to the extent that they influence the structure of foreign endowments (e.g. the quality of institutions) and, in turn, affect countries' relative comparative advantages. Moreover, changes in policy settings in countries with more rapidly changing institutions (e.g. emerging economies) may have disproportionally larger effects on relative factor demands and relative prices across countries than changes elsewhere.

Source : OECD (2012)

The contribution of key enabling technologies (KET) to smart specialisation

41. Modern core technologies, referred to as "key technologies" (KET) such as nanotechnology, micro and nanoelectronics, advanced materials, photonics, industrial biotechnology and advanced manufacturing systems as well as "general purpose technologies" such as ICT and biotechnology can address particular problems of quality and productivity[5]. Smart specialisation suggests that not all regions need to possess leadership in these technologies to benefit (*e.g.* regions can purchase or access such platforms from the market in neighbouring regions or abroad). Thus, the key question for regions is how to focus their knowledge investments to take advantage of these technologies. While some regions are better in carrying out basic research or technological development of these technologies, others should focus on the use and application of these technologies. Catching up regions may want to focus on policy instruments that increase the absorptive capacity for these technologies such as providing consultancy services to SME to facilitate the adoption of specific technologies; knowledge transfer institutions and educational programmes. In the region of Malopolska, Poland the emergence of fast-growing companies and clusters in industries like information and communication technologies and telecommunications has been supported by the changes of the profiles of regional universities. In the case of advanced regions with a very strong knowledge base, they too need to develop the capacity to absorb outside knowledge in order to create new niches.

42. Given the range of applications of these technologies, technology platforms involving public and private actors but also standards settings organisation can leverage productivity in existing sectors or help reveal or identify sectors in which to concentrate resources. In Finland's Lathi region, for example, a publicly-supported "Technology bank" provides access to SMEs to a group of related technologies through a single license. Assemblies by product area or technology area generates a potential to understand latest technologies and provides potential to license patents and gets access to technologies of large multinational enterprises. In many cases, the large enterprises are interested in buying or licensing the technologies that are developed further by the SMEs.

Non-tech and low tech innovations

43. The smart specialisation framework recognises the role of both technological and non-technological innovation to the process of specialisation/diversification. The smart specialisation approach is relevant for R&D intensive activities as well as for traditional sectors where innovation is often more incremental and non-technological.

[5] See also EC-IPTS S3 (2012) Guide on national/regional Research and Innovation Strategies for Smart Specialisation (RIS3) http://s3platform.jrc.ec.europa.eu/s3pguide at page 87 and annex II at page 65.

Smart specialisation, regional economic development and place-based[6] growth

44. That smart specialisation has an important regional dimension is obvious. Regions are increasingly recognised as a relevant level of innovation policies given the weight of agglomeration economies (*e.g.* the benefits that firms obtain when locating near each other; the more related the firms that are clustered together, the lower the cost of production, the greater the learning and network effects).

45. The OECD carried out a survey among regions[7] in order to investigate the governance of their innovation policy. The survey results show that the prioritisation of public investments in R&D and innovation is more intense at regional than at national level. This is especially the case in the EU regions and has to do with the globalisation and the ensuing pressures for greater integration of research and innovation policies. In many EU countries, policies related to knowledge investments – from education, research and innovation and industrial/sectoral policies are spread across many fields of intervention with a lack of critical mass; the weak international orientation of most strategies; and the limited knowledge about impacts of the strategies. The fragmentation of the European research system does not only create wasteful overlaps, and limit the possibilities in some activities to exploit economies of scale, but it also does not match the regional distribution of innovation capabilities.

46. The OECD categorisation of regions on the basis of innovation-related indicators shows that different regions have different levels of performance. Some OECD regions perform better than their national average (*e.g.* Catalonia region and Spain), nearly all of the knowledge hubs (California, Baden-Württemberg, Stockholm) belong to countries that are "Innovation Leaders". This means that the innovation challenge will vary according not just to the regions but also the economic structure and the specialisation of key agents; firms, public research institutions and universities (OECD, 2011).

47. In the main, the smart specialisation approach suggests regions, especially those regions which are not leaders in any of the major science and technology domains, to investing in R&D and innovation on few key priorities[8]. The logic is: 1) regions cannot do everything in science, technology and innovation and; 2) they need to promote what should make their knowledge base unique and superior to others. The key challenge for regions is how to identify those activities or domains where new R&D and innovation projects will create future domestic capability and interregional comparative advantage (Foray D. *et al* 2011). Here, recent empirical evidence suggests that "related variety" - which refers to economic diversification offered by combining localised know-how and assets into new innovations that are related to existing areas of strength - leads to the best economic returns (Frenken *et al*. 2007; Boshma *et al* 2012).

[6] Also referred as 'Standortpolitik' in German.

[7] OECD-TIP enquiry in governance for smart specialisation (10 respondents from regional governments and 10 from national governments).

[8] COM(2010) 553 final of the European Commission.

Table 2. Patterns of structural change

Towards a Smart specialisation strategy				
Mix of elements from different strategies	**Objectives** *(For what)*	**Strategic choice** *(What)*	**Elaboration process** *(How and by whom)*	**Results of the 'self-discovery' process** New activities emerging from:
Enterprise	Maximise value and economic returns.	Differentiation of the product, resources and capacities within the enterprise.	Different processes, but strong commitment of all stakeholders.	The existing industrial commons (transition)
				The application of a GPT in an existing sector (modernisation)
Territorial	Improve the social being (linking economic, social and environmental objectives)	Differentiation of the activities/assets/services offered by the region (*e.g.* to attract firms or foreign investments)	Multiply participation since none of the participants have authority to commit others.	New synergies between existing economic activities with new or emerging activities (*e.g.* new line of productive activity) (diversification)
				An entirely new domain (radical formation)

Source: OECD (2012) based on Foray (2009); Navarro M. et al, 2012 and OECD TIP case-studies on smart specialisation.

48. From this perspective, smart specialisation strategies offer an opportunity for economic transformation of regions based on strategies that link actions to objectives in order to:

- Ensure differentiation and unique position in the market of the activities carried out in the region, based on the resources and capacities available (*e.g.* what is the value added of the new products, what markets).

- Ensure differentiation and unique position of the activities and conditions offered by the region (*e.g.* to attract firms and/or foreign investments).

- Link economic goals with societal and environmental challenges (*e.g.* the transition of the automotive industry to low carbon in the United Kingdom).

- Allow experimentation, creativity and rapid adjustment of the strategies to the changing conditions.

- Ensure the commitment and involvement of all stakeholders – regional, national or supranational – in the designing of the strategy and consecution of its objectives. In the Netherlands, the case of the Brainport Eindhoven Region illustrates this through a model based on a set of Triple helix (government, universities and firms) collaborative initiatives and public-private partnerships to strengthen the region's economic and innovation base.

Summary

49. The current economic crisis and more recently the euro debt crisis, has increased pressure on OECD governments to tackle long-standing structural problems in their economies. But restarting growth has also increased attention in countries about the need to preserve the margin for public investment in knowledge-based capital, but doing so in a "smart way" so that it contributes to productivity growth and competitiveness. Smart specialisation, both as an economic concept and a policy framework provides a novel avenue to pursue the dual objectives of fiscal constraint and investment in longer-term growth potential in a context of rapid technological change and globalisation. The rationale for smart specialisation goes beyond traditional market failure arguments for framework conditions and highlights the role of: *i)* regional governments; *ii)* knowledge-based institutions and; *iii)* and entrepreneurs, in shaping specialisation and competitiveness in a holistic place-based approach. General purpose technologies play a particularly essential role in strengthening existing specialisations and revealing new economic opportunities in high tech sectors but also in traditional industries.

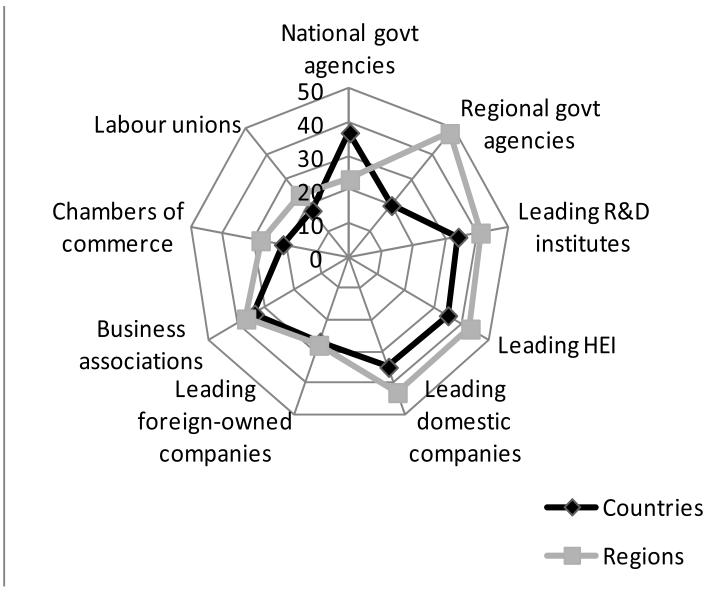
CHAPTER 3. DEVELOPMENT OF SPECIALISATION STRATEGIES: THE ROLE OF REGIONAL PROFILNG AND INDICATORS

Designing a specialisation strategy at the regional level requires an intelligent use of data in order to diagnose apparent strengths, weaknesses, complementarities and mismatches in terms of scientific, technological, innovative and economic capabilities. However, most of the existing indicators focus mainly on the past and the present, being not able to grasp emerging opportunities for the future. The use of foresights exercises and diagnostic tools can be particularly useful to identify these emerging 'activities' and new synergies and complementarities. Developing a set of quantitative and qualitative indicators would contribute not only in situating the regions and their respectful strategies in a broader context but also enhance communication between relevant actors.

Designing smart specialisation strategies

50. The process of designing a specialisation strategy is normally initiated by lead actors or institutions that are strongly committed and well positioned to mobilise other stakeholders and resources and to set the strategic framework for further actions. These lead actors may arise, for example, from companies, research institutions, national or regional authorities. The role and diversity of these lead actors and institutions in setting the priorities and designing of the strategy permits a more diverse, interactive process, comparing to the purely vertical decision by government agents, oftentimes at the expense of a market-driven allocation of resources (See Figure 1). As stated previously the smart specialisation approach calls for an 'entrepreneurial-driven' allocation of resources.

Figure 1.Degree of involvement of types of actors in the selection of policy priorities



Note: Countries: 10 respondents. Regions: 10 respondents

Source: OECD-TIP enquiry in governance for smart specialisation

51. Once the process of 'discovery' has been initiated, the immediate challenge is to ensure mechanisms or structures for these new 'entrepreneurial bottom-up initiatives' to emerge and prove they can mobilise the relevant stakeholders that have the potential to provide value added. These structures are necessary to ensure the 'open invitation' flows between all stakeholders and empowering as well as accelerating the learning process Thus, the entrepreneurs discover emerging activities of future specialisation and other stakeholders contribute to identify existing capabilities (*e.g.* research capabilities) but also barriers (*e.g.* regulatory constrains or institutional problems) to allow these activities to flourish further (See box 5).

Box 5. The importance of strong lead actors and management structures

In Estonia, ICT companies have a very strong association of enterprises – Estonian Association of Information Technology and Telecommunications, which plays a leading role in cluster and education development. Estonian ICT Cluster, supported by the national cluster programme, aim to offer highly functional, reliable services and integrated solutions to various industrial sectors and countries based on the complementary experiences existing in the Estonian ICT sector as a whole. This includes the creation of several world class e- and m-services for both public and private sector (the ID-card applications, m-parking solutions, etc).

In Flanders (Belgium) in the case of FISCH (Sustainable Chemistry) the employers federation Essenscia Flanders developed a business plan for the FISCH initiative, involved the stakeholders from the wide business community and built the 'light structure' that was needed to raise funding from the Flemish government. With this 'light structure' now in place, there is a cluster-type management to organise further strategic activities. Strategic intelligence and methodologies for road mapping play an important role in streamlining the entrepreneurial process.

In Andalusia (Spain), the metal-mechanic companies turned to aeronautics, after the decline of the shipbuilding industry during the 80s, as a potential market opportunity. Utilising their existing know-how and competences these metal-mechanic companies engaged in intensive dialogue with the regional government, who helped to empower these companies (*e.g.* with soft loans for new machinery). The aerospace sector experienced a sustainable growth over two decades stemming from a regional strategy based on risk sharing funding of original equipment manufacturer (OEM) programs and the commitment to a policy of "fine tuning to the sector's needs".

In Australia and Finland, on the contrary, the national governments have taken the lead and by organising regional panels, the national government gets engaged in intensive consultation with regional stakeholders, in order to detect emerging opportunities but also bottlenecks and threats to push these opportunities further.

Source : OECD -TIP case-studies on smart specialisation

52. The universities dealing with economics, public policy and administration, and specific policy areas (e.g. industry, health, agriculture, environment and culture) can play a crucial role during the process of designing the innovation strategies[9](EC-IPTS (2011).

53. As companies are continuously redefining their strategies, regional governments and key stakeholders should be ready to adjust their responses rapidly to the changing conditions (*e.g* strengthening the collaboration between Universities and Business in curricula design and curricula deliver may ensure

[9] For example, Universities can provide private and public authorities both with strategic advice and experts to work directly on regional development priorities. The role of Universities as a critical 'asset' of the region may be even higher in the less developed regions, where private sector may be weak or relatively small, with low levels of research and development activity. Among the mechanisms by which universities can contribute to regional innovation systems are: *i)* stimulating the entrepreneurial spirit of its staff and students; *ii)* providing advice and services to SMEs; *iii)* participating in schemes promoting the training and placement of high level graduates in innovative businesses; *iv)* hosting incubators for spin-offs in science and technology parks and; *v)* providing input to innovative clusters and networks. See also EC-IPTS (2011) 'Connecting Universities to Regional Growth: A Practical *Guide'*.
http://ipts.jrc.ec.europa.eu/activities/research-and-innovation/documents/connecting_universities2011_en.pdf

that graduates have the right skills and transversal competences required by the market (EC-IPTS (2011)). For example, in Estonia, the rapid growth of RDI requires a higher number of skilled human resources than currently available. Industry representatives in Estonia have highlighted that the lack of educated and skilled workers as an important challenge for future growth.

54. The necessary mechanisms or structures for these new 'entrepreneurial bottom-up initiatives' should also serve to phase out the support/activities with no potential to restructure the economic fabric. Some of the institutional adjustments required to deal with the emerging place-based activities are illustrated by the experience of the regions and countries taking part in the OECD project (see box 6).

Box 6. Detecting changing conditions and adjusting policy actions

Changing the role of regional universities: In the region of Malopolska, the emergence of fast-growing companies and clusters in industries like information and communication technologies, telecommunications and pharmaceuticals has been supported by the changes of the profiles of regional universities. Regional universities are also engaged in many initiatives aimed at addressing the main challenges in traditional areas of regional specialisation (*e.g.* mining and clean coal technologies).

Abandonment of failure programmes: In Lower Austria, two cluster initiatives which initially enjoyed public support were discontinued due to the weak support received by companies active in their respective sectors. Namely, the *Automotive Cluster Vienna Region* (ACVR) and the *Wellbeing Cluster of Lower Austria*.

Intensive stakeholders' consultation: In Australia, future bottlenecks/threats of the Australian grains industry are detected by direct consultations among grain growers, the Australian Government, research partners and other stakeholders. Based on this, the Grains Research and Development Corporation (GRDC) identifies the most likely drivers of change in the GRDC's immediate and broader business environments over the next five years. They include grain market characteristics, environmental issues, government policy and regulatory requirements, R&D and delivery, customer expectations and social issues.

Source: OECD -TIP case-studies on smart specialisation and

55. Innovation systems are increasingly borderless and regional economies are increasingly interconnected. Governments may want to take the inter-regional and international dimension of the emerging activities into account in their strategies (*e.g.* to increase regional competitiveness, to detect business opportunities and to capitalise on synergies and complementarities with other regions). Here, international organisations could serve as platforms to facilitate inter-regional and international interactions across sectors (*e.g.* the International Association of Science Parks and Innovation Areas)[10].

56. Likewise, governments may also want to consider and assess how their policies can have an impact on firms and the location of activities and adjust them accordingly (*e.g*. simplification of policies and integration of markets). Nonetheless, the results of the governance survey show that regions and countries define their strategies mostly from an internal perspective and that the cross-border dimension of strategies in still in its infancy (See Box 7).

[10] On July 14th, 2010, the European Economic and Social Committee approved an opinion report about the role of science and technology parks which recommends that the European Union (EU) needs a strategy to maintain and develop the XXI century parks. The paper encourages the development of new generations of parks and innovation structures and explains that the parks are increasingly seen as instruments to accelerate economic development and international competitiveness.

Box. 7. Openness to other regions and internationalisation of strategies

In South Moravia, existing bottom up activities imply cross-border interactions. Thus, a potential for geographical extension of the South Moravian innovation strategy is acknowledged. However, existing administrative borders and political mandate pose a barrier. In the Moravian innovation eco-system, in terms of manufacturing specialisation, there are several common strategic fields (*e.g.* machine tools, precise machining, mechatronic modules and components for various high-tech industries and precise measurement technologies) where increasing intensity of R&D collaboration across regional borders could bring new opportunities.

In Andalusia, its peripheral position raises both opportunities and challenges for cross-border collaboration. Its close position to the Mediterranean area, as the European gate to Africa, is acknowledged as a unique position to explore cross-border activities. Nonetheless, the region acknowledges the need to link Andalusian capacities to other cutting-edge scientific and productive regions, in order to facilitate Andalusian firms and knowledge centres to be part of competitive international value chains.

In Australia, the exposure of the grains industry to international competition ensures that innovation driven productivity growth is a constant priority. Recognising that the Australian grains ecosystem is connected to global economies lead the Grains Research and Development Corporation to design its priorities to be compatible with other regional, national and international drivers. For example, in July 2012 the Australian Government released its Green Paper for a National Food Plan to foster a sustainable, globally competitive, resilient food supply that supports access to nutritious and affordable food.

In Lower Austria, the development of the innovation system included a specific linkage to available competences in the Vienna and Centrope region such has the Vienna's research infrastructure. The case refers to spill-over effects, as the Viennese research and innovation infrastructure has positive effects on the structure of Lower Austria. Although cross-border activities and networks exists in the region, the geographical position of Lower Austria, very close to Czech, Slovakian and Hungarian regions, is acknowledged as a potential source for new cross-borders activities.

Source : OECD TIP case-studies and enquiry in governance for smart specialisation

57. The mobilisation and empowerment of key stakeholders and institutions to realise their potential as leading contributors are essential elements to transform a traditional regional innovation strategies into regional ones for smart specialisation. Successful mobilisation of the resources of the universities may also have a strong positive effect on the achievement of comprehensive regional strategies (EC-IPTS (2011)). The factors needed to ensure an efficient contribution from all relevant socio-economic actors involved in the designing of the smart specialisation strategy include: *i)* the participation of the leading institutions of knowledge: universities and institutions of research, innovation and creativity complement the market know-how of business entrepreneurs with sound expertise for the skills, scientific and technology frontiers that exist in a country or region; *ii)* the participation of highly skilled workers in the process, given the increasingly cross-sectoral, cross-technology and cross-border dimension of activities, in order to easily process the knowledge required to identify complementarities and synergies (*e.g.* related diversification); *iii)* the need to build trust and reciprocity among all socio-economic actors involved; *iv)* the need to use a common language between all actors to achieve common objectives, goals and commitment; *v)* the need to increase transparency on how stakeholders are selected,involved and, especially, what role (empowerment) they are provided during the process (See box 8).

Box 8. Empowerment of stakeholders in the designing of the smart specialisation strategies

In the context of the Brainport Eindhoven Region in the Netherlands, the innovation system is to an important extent 'business-driven', powered by entrepreneurial leadership and strong collaboration between industry, knowledge institutes and government in the triple helix[11] and ample participative involvement of civic society. The tradition of entrepreneurial leadership and co-operation goes back a long time in history. Entrepreneurs such as the brothers Philips (Royal Philips, established 1891), Van Doorne (DAF, established 1928), Van Thiel (metal-/steel industry), and Father Van den Elsen (co-operative banking, nowadays Rabobank) laid the foundations for a strong industrial base. Relatively new OEMs such as AMSL, Océ, NXP and FEI are a continuation of this tradition. Many of today's initiatives and projects stem from and are led by private business. The R&D and innovation governance model explored by the Brainport Eindhoven Region has unique features, characterized by public-private partnerships (*e.g.* Holst Centre), strong involvement of knowledge institutes in close proximity, open innovation (*e.g.* the former Philips, nowadays High Tech Campus Eindhoven), multidisciplinary and cross-overs between technology domains, low barriers and high trust. The role of government in the triple helix is relatively modest, yet important, as a funder of public R&D expenditure, public infrastructure and as a stimulator and co-ordinator.

In Turkey, on the contrary, relevant stakeholders of the automotive sector (Companies of the cluster of the automotive sector are acknowledged to enjoy a strong "critical mass") are invited only with advisory capacity to the STI policy-making meetings with the Supreme Council for Science and Technology (SCST). Ad hoc committees are organised, 'as necessary', to allow stakeholders to identify specific problems and generate policy recommendations that feed-back into the policy-making process. After the meetings, the SCST 'assigns' tasks to stakeholders for the implementation of the adopted decrees.

In Austria, smart specialisation and the RIS3 KEY are used by the federal government, together with public performance-contracts, to mobilise universities and research institutions to deal with their regional habitat in a strategic way ("Standortpolitik"). The RIS3 KEY also pursues that lead institutions realise their potential role in shaping their regional profile. For example, the Upper Austria's innovation and specialisation strategy is based on a continuing process of multi-level governance with extensive participative elements. Thematically focused working groups were established, counting more than 250 stakeholders. Agents from the business side, academics, and special interest groups and from the social partners, participated in the design and implementation of the "Innovative Upper Austria 2010" program. The top-down component assures a strategic fit with complementary regional, national and European policy goals and measures. The chosen approach enables a systematic and quick response to experiences during the process and the implementation phase. A challenge in such participative processes, however, is the division of competencies during the development of the strategy and the final control and monitoring of the implementation.

Source : OECD TIP case-studies on smart specialisation and the project results

Profiling the region

58. Together with strong leadership and stakeholder's involvement, another important element is the use of quantitative and qualitative data to situate the region, country or emerging 'activities' in a larger picture. The key question is what data and tools are needed – and available – to support policy makers to assess the potential of emerging activities and to detect bottlenecks for future specialisation and development. The analyses of the case-studies show that most countries and regions use different methodologies such as science and technology indicators analyses, regional sectoral employment distribution, export indicators, road mapping, SWOT analyses and foresight approaches.

59. Thus, data and indicators are necessary to track progress, assess structural transformations and compare strategies. Indicators to measure specialisation in science, technology and employment may help policy-makers in diagnosing of strengths, weaknesses, fits and misfits in terms of scientific, technological, innovative and economic capabilities. However, these indicators are mostly geared towards past and

[11] With open innovation in the core of Brainport's development strategy - along with new forms of participation-, the Eindhoven triple helix model has actually transgressed towards a quadruple helix structure in which innovation users, most importantly B2B, are already part and parcel of the Brainport model.

present specialisations and may not capture the increasingly cross-sector and cross-technology emerging ‘activities’ since these are not easily captured in traditional lists of research disciplines (Box 9).

Box 9. Indicators of science, technology and economic specialisation for place-based growth

Longitudinal analyses of patterns in scientific, technological and economic specialisation – and potential lags or interdependencies between the different components – can provide policy makers with background information to assess the sustainability of traditionally strong sectors or, to consider providing public support to those areas where research capacity is strong but economically weak. Likewise, comparison of technological and economic specialisations may show economically strong domains where technological activity is relatively weak or vice-versa. In such cases, policy makers may want to consider whether stimulation for technological advancements or international technological collaborations would contribute to the sustainability of these industries.

Relative indicators, such as the Activity Index (AI) for scientific activities, the Revealed Technological Advantage (RTA), and the Revealed Comparative Advantage (RCA) for economic activities, are used to avoid biases and to compare countries and countries on an "equal basis". Relative specialization indices integrate a comparison of profiles of a focal country/region to profiles of reference countries/regions. They can hence be used to answer questions like "Where does a country (or region) stand in various science/technology/economic domains, compared to other countries (or regions)?"

Relative indices can be computed for scientific and economic specialisations. The former are often based on publication numbers per science domain, while the latter can use a variety of data types, including number of employees, number of newly established enterprises, Gross Domestic Product, and export data per economic sector. For countries, sufficiently detailed, internationally comparable economic data is available from OECD (www.oecd-ilibrary.org/industry). Unfortunately, on a regional level, it is difficult to find sufficiently detailed, internationally comparable economic data. The most appropriate data appear to be OECD’s regional labour market statistics.

By comparing specialisation indicators over time, changes in scientific, technological or economic specialisations can be analysed. Interesting insights can also result from studying relations between scientific, technological and economic specialisations, which can be mapped using conversion tables (see for example Callaert et al., 2011). Examples are two-dimensional mappings of technological and economic specialisation indicators, or of scientific and economic specialisations that generate insights into the past, present and future endeavours. For example, it is questionable whether a historically important economic specialisation can be expected to last if scientific and technological strengths in underlying areas are absent. Similarly, strong scientific or technological positions that do not translate into economic performance raise policy questions regarding knowledge transfer.

Alongside those relative indicators, which are important from a benchmarking and from an evolutionary perspective, it is also relevant to study the absolute positions of countries and regions on the indicators developed and deployed (see chapter 3 of this report). Those absolute positions are important since they signal a presence or lack of critical mass in the fields subject to prospective specializations studies. A nation or a region can indeed at first sight have a strong relative position in a certain area, though upon further inspection (and given the mathematical nature of the relative indicators) it may still lack a distinctive critical mass in that area.

Nonetheless, indicators for science, technology and economic specialisation also have some inherent limitations: *i)* they are mostly geared towards past and present specializations and may not capture ‘emerging’ activities that are not easily captured in traditional lists of research disciplines (*e.g.* ‘healthy ageing’); *ii)* they require high technical skills in terms of calculation and careful interpretation; *iii)* they are only informative, meant to feed in discussions among stakeholders and cannot be used directly for taking decisions, notably because they can hardly identify emerging activities.

Source : ECOOM - Centre for Research & Development Monitoring at Leuven University

60. In order to help policy makers to have a broader picture on national or regional specialisations, additional – and sophisticated – indicators could be developed to map the interactions between science and

technology, detect emerging scientific and technological domains and mapping inter-regional collaboration (See box 10).

Box 10. Advanced specialisation indicators

References contained in each patent application to previous relevant patents can provide information on the interrelatedness of various technological domains.

References contained in each patent application to research papers reporting results on which the invention is based, can be used to map the science-technology nexus, which can point to interesting opportunities for technology development and to gaps in the regional or national scientific profile.

Sophisticated techniques combining citation-linked and text-based approaches allow for monitoring the evolution of scientific and technological domains and for the detection of new, emerging topics within existing fields.

International and interregional collaborations in science and technology development can be mapped by studying co-authorship or co-inventorship patterns between countries, regions and their respective institutions as articulated in the Triple Helix concept.

In addition to publications, patents and economic performance indicators, other data are relevant for assessing a country's or a region's STIE potential. Some examples include expenditures on innovation and research and development in specific sectors, the availability of human capital for certain scientific, technological and economic areas, the presence of IT-infrastructure in specific sectors, etc. On a national level, some sector specific datasets are available. Unfortunately, it is very difficult to find regional data that are sufficiently detailed in terms of relevant underlying fields, and that are comparable across different regions.

STIE= Science, Technology, Innovation, Economy

Source : ECOOM - Centre for Research & Development Monitoring at Leuven University

61. Additional limitations to data analyses arise when considering that regional internationally comparable data – especially on economic specialisation – are underdeveloped. A number of indicators for innovation, research and development commitments, complementary investments in related industries, early stage market transactions as well as for inter-regional and international collaboration deserve more attention in the future. For example, the ongoing OECD work on global value chains is building national indicators based on the new data available to measure trade in value-added terms: the OECD ICIO model and ORBIS firm-level data. It could be interesting to explore if regional indicators can be developed to help regions to position themselves in the 'global value chains'.

62. In addition to quantitative data, diagnostic tools can be particularly useful to identify these promising 'activities' – not captured by existing empirical material – but that have already reached a certain degree of local commitment in the development cycle. Here, foresight exercises have been highlighted as a powerful tool to develop a shared vision of the future among all stakeholders. Such an exercise may be a strong complement to quantitative and qualitative analyses looking at the past and present of a region, by combining: *i) Information:* to better understand the complex interactions in which emerging activities evolve; *ii) Intelligence:* through scanning to explore novel ideas, unexpected issues and shocks, as well as persistent problems or trends; *iii) Imagination* by integrating foresight, creativity and design for scientifically possible, technologically feasible and socially desirable futures; *iv) Interaction* with the systematic involvement of stakeholders in an inclusive process with long-term perspective for the analysis of different perspectives and their social relations in the system; and finally, *v)* an effective *Implementation* for a successful transformation programme (Saritas, O. 2011).

63. Some case-studies show how lead actors or institutions are developing their own methodological tools to analyse existing strengths, collecting the knowledge embedded in the regions (and across regions) and to conduct forward looking analyses to define further actions (See Box 11).

Box 11. New methodological tools for mobilising and profiling regions

The RIS3 KEY[12] for self-assessment: The RIS3 KEY is a brief and easily comprehensible tool for regions to introduce the idea of smart specialisation and start their RIS3 process. It can help to stimulate communication among key players and permits a quick first assessment of their status and potential that is needed to prepare a SWOT analysis as described in the European Commission's RIS3 GUIDE. It provides four sets of complementary questions that address relevant dimensions of a region ready and willing to start or improve their RIS3 development process. The RIS3 KEY can be used to assess the following: the enterprise sector, the science / knowledge & creative sector, the government sector and the regional innovation system as a whole – covering interactions between all three sectors. The RIS3 self-assessment KEY may help regions to prepare further steps on the way to smart specialisation by:

- Identifying existing strengths and potentials for future development efforts,
- Spotting remaining gaps and bottlenecks in the regional innovation system,
- Mobilizing the relevant institutions and actors to be involved in the RIS3 development process, and by
- Defining possible starting points for your RIS3 development process.

Mapping exercise: In the case of NanoforHealth, the strategic research centre IMEC in Flanders took a lead role in defining the potentially new domain by combining its own expertise with complementary expertise in the region, develop a method to map the multidisciplinary expertise in this field, and motivate the (public and private sector) actors from this domain to take part in a mapping exercise. This preparatory activity is subsequently taken up by the existing cluster organisations in adjacent domains, which will explore the possibilities to build a similar 'light structure' and transform this loosely emerging domain into a more self-organising network.

Web consultations: The development of the information and technology communications (ICTs) has strongly facilitated the connectivity and communication within regions (and inter-regions). In Poland and the Netherlands, the prioritisation process involves citizens through web consultations.

Cross-regional governance structure: The innovation strategy between Brandenburg and Berlin (innoBB) has developed a specific cross-regional governance structure to develop joint strategies activities and to compare common fields of excellence in both regions. Over the years of this process the number of prioritised fields was reduced.

Innovation database: In Finland, the Technical Research Centre (VTT) has made a path-breaking research on the sources, nature and development of Finnish innovations. During the last 15 years the so-called SFINNO project has identified nearly 5 000 innovations and collected data on them. This database makes it possible to make versatile studies of the renewal of the Finnish economy and innovation environment. The study represents pioneering work in the area of impact analysis in Finland. VTT updates the survey every other year by identifying innovations in economic and technical publications. This object-oriented approach is complemented by sending a questionnaire to the innovator. Based on the questionnaire, they defined typologies of different kind of innovations and linked individual innovations to actors in the Finnish innovation system. An innovation is defined here as a new product, service or method that produces economic or social benefit. The number and types of innovations in the marketplace will be followed in Lahti region and other regions utilizing the SFINNO database.

Source: OECD -TIP case-studies on smart specialisation. The RIS3 KEY for self-assessment at www.era.gv.at (Available in Czech, English, German and Spanish).

[12] The RIS3 KEY was an idea and contribution of the Austrian Federal Ministry of Science and Research (BMWF). The RIS3 KEY for self-assessment was developed by Joanneum Research Graz, in co-operation with and funded by BMWF.

Summary

64. The smart specialisation process can be initiated by different lead actors or institutions such as companies, research institutions, national or regional authorities. The role and diversity of these lead actors and institutions in setting the priorities and the designing of the strategy may help to clarify that the smart specialisation approach calls for an 'entrepreneurial-driven' allocation of resources. Once the process of 'discovery' has been initiated, the immediate challenge is to ensure mechanisms or structures for these new 'entrepreneurial bottom-up initiatives' to emerge and prove that they can mobilise – through an open invitation – and empower the relevant stakeholders that have the potential to provide value added.

65. Data and indicators to measure specialisation in science, technology and employment may help policy-makers in diagnosing apparent strengths, weaknesses, fits and misfits in terms of scientific, technological, innovative and economic capabilities. However, they are mostly geared towards past and present specialisations and may not capture the increasingly cross-sector and cross-technology dimension of emerging 'activities', since they are not easily captured in traditional lists of research disciplines. To fill in these gaps, the use of foresights exercises and diagnostic tools can be particularly useful to identify these emerging 'activities' and new synergies and complementarities. The role of the government could be to communicate the existing tools and set the necessary mechanisms to reduce imperfect information among all stakeholders.

CHAPTER 4. GOVERNANCE MECHANISMS AND POLICY TOOLS FOR SMART SPECIALISATION

Governance for smart specialisation requires strategic capacities to grasp future opportunities, mainly in order to: identify local strengths; to align policy actions and to build critical mass; and to develop a vision and implement the strategy for the regions; thus the importance of strategic policy intelligence as a tool for governance of smart specialisation. This chapter presents various relevant policy instruments for smart specialisation. The major challenges for policy makers is to synchronise regional and national strategies for a better articulation of priorities and to clearly link the policy instruments to the priority setting and budgetary process.

STI governance and smart specialisation

66. Strategies for smart specialisation present new governance challenges for policy makers. STI governance may be defined as a set of publicly institutional arrangements that shape the ways in which public and private actors involved in socioeconomic development interact when allocating and managing resources for innovation. Institutional arrangements contributing to the co-ordination of innovation policies range from national strategies and visions, innovation agencies and ministries, policy evaluation and reviews, information channels of communication, staff exchanges and inter-agency joint programming (OECD, 2012f). Some of these new challenges can be grouped as follows:

Multi-level co-ordination

67. The difficulties for an efficient co-ordination of innovation-related policies across different ministries and agencies required for STI strategies in the smart specialisation process are following:

- *Multi-disciplinary dimension of emerging activities in terms of knowledge, activities and actors:* the emerging of cross-sectoral and cross-technological activities require multi-level communication and policy coordination across a higher number of different ministries and agencies (local, regional, national and supranational) and across a higher number of policy areas (*e.g.* industrial, innovation, education, energy, transport and entrepreneurship).
- *Growing STI governance at regional level*: co-ordination of STI policies is affected by a growing regionalism, in which more control over policy and resources is devolved to sub-national authorities.[13] This requires development of governance models allowing national, inter-regional and regional co-ordination.
- *New cross-border governance mechanisms*: to support and coordinate the emerging 'activities', which increasingly involve actors that go beyond administrative borders. This demands inter-

[13] In South Moravia, Innovation Centre (JIC) was established in 2003. The region of Malopolska has reshaped their multilevel governance system over the last decade, especially regarding innovation and science, leading to decentralization of the public administration, building of a regional strategic management system and preparation of regional documents. These tools contributed the region and provided possibility to enhance their competitive advantages nationally and globally. In Flanders, innovation policy has a relative recent history. From the 1990s, the progressing federalization of Belgium has provided the Flemish community and region with an extensive mandate in science and innovation policy.

regional co-operation between different authorities. It also brings new challenges to national governments where regions enjoy different degree of autonomies (See box 12).

- *Growing international governmental organizations and regulations shaping governance regimes:* multi-level alignment of policies could help to push emerging activities further and create the critical mass needed to play a role globally.
- *Efficient eco-system management:* the increasing multi-disciplinary, cross-sectoral and cross-border profiles of key actors involved in socioeconomic development challenge traditional innovation systems and require development of adequate conditions to build trust, effective communication and commitments.

Box 12. Good practice examples for multi-level co-ordination

Multi-level co-ordination: In Finland, in order to design a national strategy, a vertical link was formed between the National Innovation Strategy, the Ministry of Employment and Economy Corporate Strategy and Sectoral Strategies, the Finnish Funding Agency for Technology and Innovation Investment Strategy (Tekes) and the Regional Innovation Strategies. The Tekes 2008 strategic focus area paper "People-Economy-Environment – Choices for building the future" represented the main linkage between regional and national strategies. The paper was formulated through a broad-based process with over 5000 contributors from different sectors and regions. The paper outlines global drivers of change and current challenges of the Finnish economy and industries. In accordance, it presents eight national (lead market) themes and practices, as well as six cross-cutting competences and technologies for Finland. These choices were made to drive research, development and innovation activity to areas where Finland would have the best opportunities for growth and competitiveness globally.

Cross-border collaboration: Brandenburg and Berlin (Germany) have developed a specific cross-regional governance structure and an inter-regional innovation strategy (innoBB) to join forces between both regional administrations to leverage the policy instruments required at all levels. In Lower and Upper Austria, an attempt is being made to define specialisation areas, taking into account the cross-border dimensions, but this still calls for further development. The Dutch-Belgian corridor Eindhoven-Leuven is another case of cross-border collaboration, especially in R&D and innovation, with IMEC and Holst Centre as good practice examples. Also, the joint participation in InnoEnergy KIC (Knowledge and Innovation Community), established end 2009 by the European Institute of Innovation and Technology (EIT). The challenge ahead is to improve cross-border collaboration at the level of high-tech starters and SMEs.

Source : OECD -TIP case-studies on smart specialisation

Loosely defined 'activities' and technology domains

68. Another challenge arises from the 'loosely defined' emerging 'activities' that may span across research fields, technology domains, economic sectors, which are not easily captured by traditional classifications[14]. Among these are:

- *Lack of clearly defined set of actors:* of the emerging 'activities' which are less organised and have a lower critical mass than traditional activities. This is a particular challenge for policy makers when identifying and ensuring the participation of key actors (even within governments) during the 'self-discovery' process.

- *Lack of institutional or formal arrangements and a clear agenda:* some of these activities are still 'homeless' or sit in between different ministries. The horizontal fragmentations in policy-making hinder co-ordination and more efficient public intervention.

Synchronisation of strategies

69. One of the most crucial issues of the smart specialisation process is the need to synchronise, on one hand, the national innovation strategies with the regional strategies, and on the other hand, the different regional strategies among themselves to make them consistent with each other. The analyses of the case studies show that some regional strategies may focus on technology areas, some on industrial clusters and some on picking industries. In the synchronisation process towards formation of the smart specialisation strategy, it is important to involve participants across industries, academia, regional and national

[14] For example, nanotechnology for health in Flanders.

governments in order to avoid duplicities. The same kind of logic holds with the EU, national and regional strategy synchronisation procedures (See box 13).

Box 13. Synchronisation of national and regional strategies

In Finland, the synchronisation process of Finnish national and regional innovation strategies in year 2008 had the aim to increase the competitiveness of the Finnish economy by: *i*) building a strong knowledge base network; *ii*) renewing the economy and creating new businesses; *iii*) increasing productivity in industries and the service sector; and *iv*) enhancing wellbeing in society and improving environmental sustainability. Globalisation was outlined as the key driver of change, transforming performance and value creation logics of national and regional value networks. After this synchronisation process, the national and regional authorities concluded that critical mass should be situated in only a few multidisciplinary centers, encourageing at the same time development of several specialised centers. The importance of utilizing complementary competences in a flexible manner in order to enhance a cross-regional interaction in national collaboration was emphasized. In the Päijät-Häme (Lahti) region case, the concern was to find the cross-cutting competences and industries being able to create the most competitive value for a low level R&D activity area.. Further in the process, national and regional innovation policy goals were harmonized, and nationally selected lead market areas were translated into the regional context..

In Australia, regional priorities are the key determinant in a yearly setting of the R&D priorities for the national Grains Research and Development Corporation (GRDC). Growers participate in regional Annual General Meetings and elect panel representatives. The prioritisation process is made up by three regional panels collecting grower priorities and synthesising these at the National Panel.. The regional panels are composed of grain growers, agribusiness practitioners, scientists and the GRDC's Executive Managers, with a possibility for other industry experts to participate as appropriate. The National Panel is composed of the chairs of the three regional panels, the Managing Director and the GRDC's Executive Managers.

Source : OECD -TIP case-studies on smart specialisation

70. These new challenges may help to explain why smart specialisation strategies are still in an early phase in most countries both from a policy development and deployment perspective.

Market conditions

71. Beside the governance challenges resulting from policy processes and capacities, changing market conditions require new, flexible and innovative governance mechanisms to allow governments to react, adjust or re-direct rapidly their public support to the new needs (*e.g.* new market requirements demanding new skills). Some of the exogenous factors restricting government's reactivity arise from:

- *Path-dependences*: the stickiness of public allocations to existing organizations, programmes or initiatives may prevent a 'quick' shift of the public support towards new activities.
- *Regulatory constrains*: long-term programs are sometimes difficult to reshape because of regulatory conditions. The smart specialisation approach requires flexible tools, for example, to allow the abandonment of failure programmes.[15]
- *Proliferation of policy frameworks:* the growing interconnectedness of economies re-enforce the need for increased regional and international collaboration and for a coherent alignment of policy frameworks to adjust policies to business reality (*e.g.* simplification of policies and removal of regulatory barriers).

[15] In Lower Austria, two cluster initiatives which initially enjoyed public support were discontinued due to the weak support received by companies active in their respective sectors. Namely, the Automotive Cluster Vienna Region (ACVR) and the Wellbeing Cluster of Lower Austria.

- *Vested interests:* Each programme benefits a particular set of actors, who may resist its suppression.

How to institutionalise smart specialisation?

72. The results of the governance enquiry show that most countries and regions expect an increase in prioritisation activities in the future (See box 14). The challenge posed by smart specialisation is how to bring the results obtained from the 'self-discovery' process (knowledge exchange between the public and private sector) into prioritisation, in order to both engage in strategic co-ordination and fine tuned priorities. The analyses indicate areas where additional efforts are needed. These can be grouped as follows:

Challenges for fine-tuned 'activities'

- Current priority setting processes mainly target broad domains (life science, biotech, health; ICT; Environmental technologies; mobility and logistics; and new materials), whereas smart specialisation requires narrowing down these broad domains into 'activities' of competitive advantages (See box 14 for examples of specific niches within broad domains).
- Not all regions choose to prioritise between thematic domains or support quite a broad set of domains or functional priorities (*e.g.* Lower Austria and South Moravia).
- There is little information on how decisions/priorities are adopted (*e.g.* empirical evidence basis used is not clear or possibly masks a factual lack of decision making mechanism)).
- There is a need to increase the inter-linkages between quantitative and qualitative inputs into strategy formation process, prospective data and analysis.
- Selecting and engaging key actors, necessary for their expertise and knowledge, is– is an increasingly difficult task due to the cross-border, multi-disciplinary and cross-sectoral dimensions of emerging activities.

Box 14. Increased attention to priority setting in selected OECD countries and regions

Countries and regions covered by the OECD-TIP enquiry recognisethe growing importance of the prioritisation of innovation policies in the future. Those who have recently engaged in such a process, opted for a deepening of the existing broader priorities rather than starting a completely new process. In the enquiry, there were no cases of countries or regions planning to withdraw from a policy prioritization process.

Countries		Regions	
Australia	⇨	Lower Austria	⇨
Austria	⇧	Upper Austria	⇨
Czech Republic	⇨	Flanders	⇧
Estonia	⇧	South Moravia	⇧
Finland	⇧	Lahti	⇨
Netherlands	⇨	Berlin/Brandenburg	⇨
Poland	⇨	Brainport Eindhoven	⇨
South Korea	⇧	Malopolska	⇧
Spain	⇨	Gwangju	⇨
United Kingdom	⇧	Andalucia	⇧
		Basque country	⇧

⇧ Intensity of prioritisation is expected to increase ⇨ Intensity of prioritisation is not expected to change

Examples of specific niches within broad priorities

Lower Austria

- *Broad priorities:* Life science, biotech, biomedicine, pharma, health, ICT, Environmental technologies, energy, Nanotechnology, materials and agrifood.
- *Niches:* Analysis of biological materials, and medical technology: agrobiotechnology and environmental biotechnology: Bioanalytics, environmental biotechnology, crop breeding, utilization of natural resources, pharmaceuticals; Blood purification systems, tissue engineering, cell therapy, cell biology and physiology, ICT visual computing, building physics and energy systems, Materials, tribology (friction, wear, lubrication), medical technology, sensory technology and actuators, surfaces, Green building, Food safety and Bioplastics

Korea

- *Broad priorities:* Life science, biotech, biomedicine, pharma, health and ICT.
- *Niches:* Green technology industry (New renewable energy, Low-carbon energy, Water technology, LED application, Green transportation system and High-tech green city); State-of-the-art fusion industry (Media Communication fusion, IT fusion system, Robot application, New materials and nano-fusion, Biomedicine and medical devices, High value-added food industry); High Value-added service industry (Global healthcare, Global education services, Green financing, Contents and software and Meetings, Incentives, Conventions and Events and tourism industry)

Brainport Eindhoven Region, Netherlands

- *Broad priorities:* High Tech Systems, Life science, Energy, Design.
- *Niches:* Smart Mobility, Solar and energy in built environment, Smart Materials, LifeTec&Health (including Homecare), Design.

Source : OECD-TIP enquiry in governance for smart specialisation

Public action to support entrepreneurial bottom-up initiatives

73. In line with the 'entrepreneurial bottom-up initiatives' (referred to in chapter 3), governments also take actions in order to engage and improve the communication with stakeholders for further strategic co-ordination and fine tune priorities setting. Some national governments, such as Finland and Australia, organise regional panels to detect direct needs and to identify emerging opportunities at regional level. The results have a direct impact on national strategies. Other regions, such as South Moravia, have seen the benefits of increasing the absorptive capacity of their staff inside the regional governments for an efficient 'self-discovery' process.

Policy instruments for smart specialisation

74. The following chapters inquire on the policy instruments and their potentional impact on sprouting bottom-up initiatives of entrepreneurial networks: and achieving their primary goal of transforming economies into more competitive, job-rich and sustainable ones.

Linking policy instruments to priorities

75. Smart specialisation encourages an outcome-driven approach to policies. That is, linking actions to objectives, connecting opportunities to assets, and policy instruments to priorities. The most common

policy instruments used to support specialisation range from dedicated budgets, institutions, clusters initiatives, strategic investment, venture capital, education and training. Nevertheless, in many countries and regions, there is no clear articulation of priorities (*e.g.* stated in policy documents) and policy instruments in place. The main barriers to translate policy documents into policy actions have been grouped as follows:

Table 3. Evidence from the governance enquiry and case-studies

Bottleneck	Challenge
▪ Stickiness of public allocations to existing priorities/areas.	▪ Developing flexible policy tools to 'shift' public support towards new priorities.
▪ Loosely defined priorities (*e.g.* listed as possible intervention areas rather than genuine priorities).	▪ Ensuring political commitment.
▪ Horizontal fragmentation in policy-making (*e.g.* priorities are between or beyond traditional policy areas).	▪ Adopting a synergic approach from different fields of policies (*e.g.* research, technology, innovation, industrial, education and training).
▪ Lack of means and tools to assess the relevance of certain actions to contribute to the priorities.	▪ Developing policy tools with measurable goals.
▪ Proliferation of policy frameworks (*e.g.* activities that go beyond administrative borders).	▪ Simplifying or de-fragmentising policies. ▪ Removing regulatory barriers.

Source: OECD TIP governance enquiry and case studies

Policies for 'entrepreneurial discovery'

76. Compared to the traditional policy instruments for STI, the efficient 'self-discovery' process that is required for smart specialisation puts emphasis on the need of policies focused on:

- *Incentives for entrepreneurs: i)* to reward those entrepreneurs who discover new domains and activities (information externality problem) and; *ii)* to attract other agents and firms and facilitate entries so that agglomeration and scale effects materialise at the next stage.

- *Building inter-regional linkages:* to detect knowledge/capabilities/technologies located in other regions. Together with general policy for STI co-operation (*e.g.* staff exchange, participation in conferences, joint research programmes), smart specialisation requires special attention to policy measures in order to: *i)* improve the absorptive capacity of the socio-economic stakeholders (including public staff and SMEs) and; *ii)* facilitate the mobility of highly skilled.

- *New mechanisms to detect novel ideas:* The policy challenge here is how to incentivise firms to reveal and share information on their experiments and explorations, in order to support discoveries, identify complementarities and connect capacities. Most case studies do not provide information regarding how novel ideas are to be assessed for policy support, and how long such support might be provided for.

- *Supporting experimentation:* emerging 'activities' may lack evidence-based potential economic value, opportunities for new start-ups or technology exploitation for existing companies. New tools are required to help policy makers to assess the potential of emerging activities for future economic growth, in order to support them.

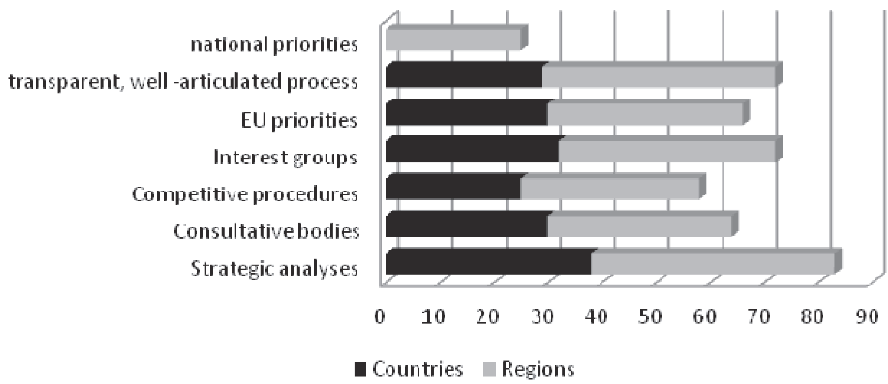
- *Educational programmes:* updating the skills required by the increasingly cross-sectoral and cross-technology activities (*e.g*. university level training in mechatroncis in Upper Austria as a reaction of a new specialisation evolving from machine building).

Policy intelligence

77. The role of strategic policy intelligence as a tool for governance of smart specialisation is important. Smart specialisation emphasises the need to align policy actions to priorities in order to build a critical mass in emerging activities, develop a vision and implement the strategy. The policy community requires tools to allow governments to assess the viability, not only of existing strengths, but of the ambitions and future plans (roadmaps) of the entrepreneurial organisations asking for government support. This may require a different type of assessment tools, but perhaps more importantly a reference framework of criteria in order to adequately select and de-select.

78. Overall, strategic analyses are declared as one of the most important influence on the selection of priorities, both for regions and countries (Figure 3). The influence of stakeholders, either individually through the action of interest groups, or collectively through the action of consultative bodies, is also a key vehicle through which the priorities are determined. Priorities set at higher level (EU priorities, national priorities for regions), also influence the choices. The only vector which seems a bit less common is the use of competitive procedures to elicit the priorities. Amongst all these sources of influence, there is no clear difference between the process at play in regions or in countries.

Figure 3. Influences on the selection of policy priorities



Source: *Note: Countries: 9 respondents. Regions: 11 respondents*
Source: OECD-TIP enquiry in governance for smart specialisation

79. Other intelligence policy instruments identified in the case-studies include:

- Using demand-side instruments, such as, public procurement policies oriented towards the promotion of innovation and the development of new markets: or supply-demand policies to link the needs of the industry to research activities. For example, world class technologies can only be used by firms which benefit from using the new knowledge and have internal capabilities to do so.

- Developing mutual learning practices to provide policy makers opportunities to learn from good practice examples but also failures carried out by other governments.

- Relying on expert support to improve the stakeholder's involvement during the priority-setting and policy-making process.

- Using participatory Foresight exercises in the priority-setting and policy making process in order to explore potential futures and to develop shared normative visions of the future (*e.g.* Normative Foresights with backcasting, Strategic Roadmapping exercises to identify existing bottlenecks and to align policy instruments to a shared vision and priorities, Online Delphis with regional and international experts and stakeholders to identify emerging issues and trends, Systemic Foresight Methodology).Fostering a structural transition from policymaking to cycles of policy development & policy learning once smart specialisation becomes more and more adopted as an economic policy concept.

- Developing monitoring and evaluation systems geared to smart specialisation. This is discussed in the following session.

Monitoring and evaluation mechanisms for smart specialisation

80. Smart specialisation places a strong emphasis on the need for policy makers to carry out *ex ante*, mid-term and *ex-post* monitoring and evaluation, and to feed the results back into policy design. As a source of strategic intelligence, the role of evaluation is to generate information about the appropriateness and effectiveness of public policy intervention (OECD 2012). The results may help policy makers to account for public spending choices (*ex ante*), re-positioning policies and public support towards new priorities (*mid-term*), and to learn from past failures (*ex post*). Nonetheless, the development of monitoring and evaluation systems specifically geared to smart specialisation is either under preparation or inexistent (See box 15).[16] According to the results of the governance enquiry, some of the challenges for efficient monitoring and evaluation mechanisms for smart specialisation are:

- Responders of the enquiry were not able to provide a strategic view of the policy instruments, policy mix and public budgets dedicated to the priorities.[17]

- There is an unclear view on public allocations to the prioritised areas preventing policy-makers to assess the relevance and effectiveness of their policies.[18] Clear benchmarks and criteria for success and failure are needed.

[16] An exception is the UK that mentioned the existence of monitoring systems looking at the priority areas. Evaluation systems are being developed in Poland and the Netherlands to monitor Top Sector policies.

[17] The way through which policy instruments serve the priorities and the split of budgetary allocations to the prioritised areas could not be elucidated through the enquiry. Accordingly, monitoring and evaluation systems, when in place, are not (yet) geared towards the follow-up and assessment of the prioritization of policy.

[18] The governance enquiry reveals that in many cases there is a dissociation between: priorities stated in policy documents but not translated into policy instruments; de facto prioritization is not declared in policy documents; or there is an inconsistency between expressed priorities and actual use of targeted instruments.

Box 15. Examples of monitoring systems incorporating a view on prioritized areas

Lower Austria: "There is a balanced scorecard tool to monitor the regional strategy, one covers the clusters and the other one the Technopoles. It includes performance data such as publications, critical size, collaborative projects etc. The Monitoring helps to "fine-tune" the Strategy... Decreasing performance figures of the Wellbeing Cluster shown in the Balance Scorecard monitoring resulted in the decision to stop this cluster initiative.";

Brainport Eindhoven: "the main instrument is the Brainport monitor, an annual report that analyses the region on about 40 statistical indicators on people, technology, business and basics. It contains trend analysis, benchmark with national average and, where possible other European Innovation Regions (Regional Innovation Scoreboard top 20). The monitor also includes an analysis of about 30 reports with qualitative and quantitative analyses on Brainport relevant topics like global location trends, raw materials, talent etc.";

Netherlands: *i)* Formulating indicators for general policy, specific instruments and specific economic sectors. *ii)* Transparency: a 'follow the money' website. *iii)* Dashboards that describe the ambition, goals, and activities for every sector, with corresponding indicators and target values."

Source: OECD TIP enquiry in governance for smart specialisation

81. When designing monitoring and evaluation activities for smart specialisation, both for the priority-setting and evaluation of programmes, governments may want to consider:

- Involving external expertise as needed (external expertise assessment method). This would counteract the influence of vested interests and provide a neutral and evidence base to decision-makers in order to help them strike a balance between various pressures from interest groups.

  Developing policies with clear measurable goals, whether it involves an increase in business R&D, R&D commercialisation or research excellence.

- Making use of problem definition and structuring methods such as logic framework analysis and logic chart analysis to provide for a coherent intervention logic and clearly defined indicators for inputs, activities, outputs, outcomes and desired impacts.

- Developing pilot exercises on implementing 'Smart specialisation-oriented' public budget pictures of budgets allocated to each prioritised areas by aggregating: *i)* Budgets allocated to dedicated bodies and programmes (*e.g.* institutes, centres, R&D programmes, clusters); *ii)* Budgets allocated through preferential treatment in generic programmes; *iii) Ex post* money received by prioritized areas in generic programmes.

- At regional level, governments may want to include in their budgets regional, national and EU (for EU regions) money flowing to the priority areas.

Summary

82. Governance for smart specialisation requires strategic capacities to grasp future opportunities. This includes: the capacity to identify local strengths; the ability to align policy actions and to build critical mass; and the ability of regions to develop a vision and implement the strategy. The role of strategic policy intelligence as a tool for governance of smart specialisation is therefore important. In practice, the link between policy instruments and the priority setting is not explicit in the vast majority of regions and countries. Many policy makers find it difficult to move from the "priority setting process" to the process of developing policy instruments and the corresponding budget. In most cases, the prioritisation process is

disconnected from the budgetary process. Additional governance challenges include increasing the absorptive capacity of key actors and staff inside the regional governments which is crucial for an efficient 'self-discovery' process: the latter is especially a challenge for smaller and remote regions. . The variety of policy mechanisms (entrepreneurial discovery, intelligence and monitoring/evaluation) highlights the complexity of the challenges policymakers face. Taking those different policy components as one whole inevitably leads to the insight that policymakers have to move beyond policymaking into the realm of policy development & policy learning. The emphasis on policy learning is one of the key elements (alongside the concept of entrepreneurial discovery) of smart specialisation.

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OECD Outreach Workshop on

Smart Specialisation: Its Extension to East Asia

Biography of presenters,
Abstracts & Presentations

Session II Global Photonics Governance Design

April 3 (Wed) 15:45 – 17:00

Session II-I Gwangju Photonics Smart Specialisation Strategy

YONG-JIN SHIN

Professor, Dept. of Physics, Chosun University, Korea
Chair of Gwangju Photonics Industry Smart Specialisation Strategy TF Team

BIOGRAPHY

Prof. Yong-Jin Shin has been with Chosun University since 1994, where he teaches medical imaging, laser physics, radiation physics, E&M. He received M.S. degree in atomic physics from New York University, New York in 1986 and his Ph.D. degree in medical physics from Polytechnic University, New York, in 1990. The area of his research interest has been nuclear magnetic resonance imaging and spectroscopy, biomedical diagnostic and imaging technology, laser engraving and display, and optical coherence tomography.

During 2000-2002, he was the director of Photonics Research Center in Chosun University, and has been the Dean of natural science College in the same school between 2010-2012. He was a visiting researcher at Beckman Laser Institute and Medical Clinic, University of California at Irvine, in 2003-2004. He worked as an evaluation commissioner of the Presidential committee on balanced national development, in 2005-2007. He was the president of Gwangju Regional Innovation Agency, in 2007-2009.

He is currently the vice-president and editor-in-chief of the Journal of Physics and High Technology of the Korean Physical Society. Since 2005, he has been the technical director of the Korean Society of Laser Processing, and the vice-president and the director of the Optical Society of Korea. He is the chair of Gwangju Photonics Industry Smart Specialisation Task Force Team.

PRESENTATION ABSTRACT

From 2000 to 2012, Gwangju had invested a total budget of 800 million US dollars on photonics industry to nurture as a strategic industry of the city, to improve the vulnerable local industrial structure and to elevate the national competitiveness. Gwangju photonic industry achieved a positive result in terms of "photonics cluster formation", but structural problems exist in most of the small companies due to the lack of core technology. Therefore, in order to overcome these limitations and to leap forward, Gwangju has been considering the option of introducing a new concept called "Smart Specialization Program." We analyzed photonics industry from regional context/potential to the monitoring and evaluation by dividing 6 steps and established a new raising strategy. And lastly, we suggested a policy for the mutual development of Gwangju and Europe so that Gwangju could be the success model of the Smart Specialization Program, proposed by OECD.

Gwangju Photonics S3

April 3, 2013

Gwangju Photonics S3 Chair

Prof. Yong Jin Shin

GWANGJU CITY

GWANGJU TECHNOPARK

Contents

기업이 행복한 창조도시 광주

GWANGJU CITY

I. Review of Gwangju's Efforts to Nurture the Photonics Industry

1. Background of the Emergence of the Photonics Industry

■ The term "photonics" first emerged in Gwangju in 1998.

- Growing consensus that the framework for the local economy needed to be re-established
- "Strategic Planning Research Council for Science and Technology" was formed and the photonics industry was selected as a new strategic industry

Requirements for new industries	▪ No overlap with other regions
	▪ Sufficient infrastructure within the region
	▪ New industries of the 21st century that can be developed in connection with national strategic industries

■ The central government's policy aimed at nurturing local industry

- Gwangju requested government support from the Ministry of Commerce, Industry and Energy to revitalize the local economy.
- The Ministry of Planning and Budget selected Gwangju's photonics industry
- Projects aimed at nurturing strategic, local industry were launched in 2000 on a trial basis

2. Vision and Goals in Nurturing the Photonics Industry

Vision	**One of the three global powerhouses in the photonics industry, Mecca for photonics production**
Strategy	**Foundation establishment** (1st *phase*) ⇒ **Business settlement** (2nd *phase*) ⇒ **Business maturingb** (3rd *phase*)
Specialization areas	**Next-generation optical communication, semiconductor lighting, optical material and precision system**
Key projects	**Sophistication and clustering of photonics-based convergence industries**
Goals	● **Development of original and key technologies for next-generation convergence industries.** ● **Development of the region into a major production base for the country.** ● **Nurturing of highly-skilled human resources and technologically -advanced companies** ● **Establishment of international photonics-based convergence standards.**

3. Programs Nurturing the Photonics Industry

	First Phase	Second Phase	Third Phase
Period	**2000 - 2003** (four years)	**2004 - 2008** (five years)	**2009 - 2012** (four years)
Strategy	• Clustering of the photonics industry and establishment • The foundation for self – sufficient development	• Selection and concentration • Globalization • Expansion of the foundation for industrial knowledge	• Establishment of a hub for the Korean photonics Industry • Full-fledged advancement into the global market
Budget (USD)	400 million	350 million	50 million
Details of the project	• Establishment of the KAPID • Establishment of the KOPTI • Human resources development, business incubation , establishment of clustered industrial complexes	• Support for enhancement of global competitiveness in production • Expansion of the knowledge base for the photonics industry • Six projects including photonics company support service	• Establishment of a hub for the convergence of the photonics industry • Expansion of the knowledge base for photonics-based convergence • Six projects including photonics-based convergence industry company support service

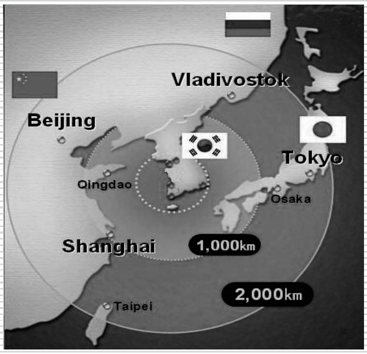
4. Achievements in Nurturing the Photonics Industry

■ Establishment of a photonics industry cluster _ (1/4)

● **Establishment of a self-sufficient, clustered industrial complex equipped with research, production, education and support functions**

- A 257,268㎡ - rental industrial complex is included.

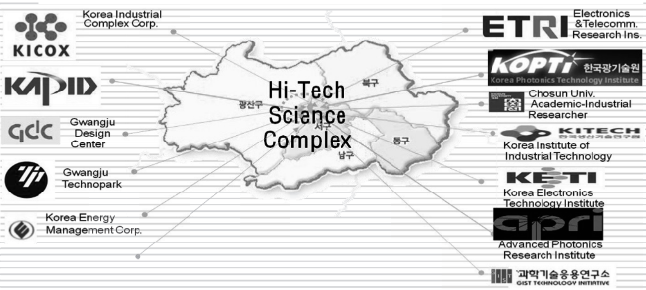
- The only high-tech science industrial complex in Korea equipped with research, production, education and support functions

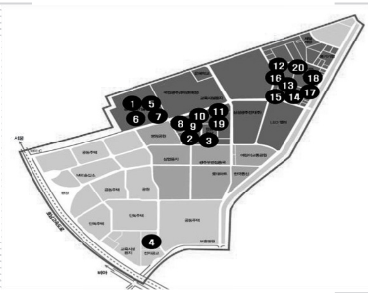


4. Achievements in Nurturing the Photonics Industry

■ Establishment of a photonics industry cluster _ (2/4)

● **Establishment of research infrastructure**





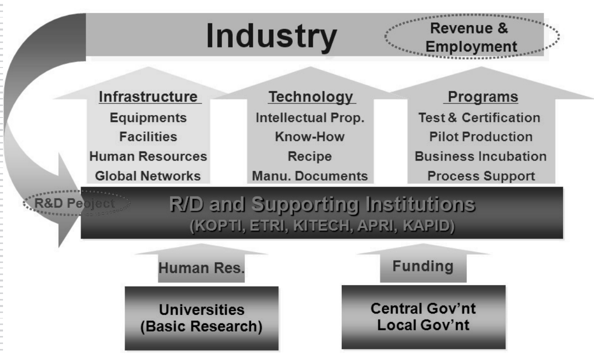
- **Universities (4) :** ① Gwangju Institute of Science and Technology (HQ), ② Chosun University (industry-academy campus), ③ Chonnam National University (industry-academy campus), ④ Nambu University (HQ)
- **Research Institutes (9) :** ⑤ Advanced Photonics Research Institute, ⑥ GIST Technology Institute, ⑦ Energy and Climate Change Research Center, ⑧ ETRI (Optical Communication Research Center), ⑨ KITECH (Gwangju Research Center), ⑩ KETI (Gwangju Regional Branch), ⑪ National Institute of Environmental Research (Honam Branch), ⑫ Korea Photonics Technology Institute, ⑬ KATECH Gwangju Center
- **Service agencies (7) :** ⑭ Gwangju Technopark, ⑮ Korean Industrial Complex Corp., ⑯ Korea Association for Photonics Industry Development, ⑰ Honam Leading Industry Office, ⑱ Gwangju Science and Technology Cooperation Center, ⑲ Gwangju Design Center, ⑳ Green Car Parts Industry Promotion Foundation

4. Achievements in Nurturing the Photonics Industry

■ Establishment of a photonics industry cluster _ (3/4)

- **Establishment of a connection and collaboration system among innovative industrial cluster leaders in order to create and disseminate knowledge**

Industry Support Model in Gwangju City

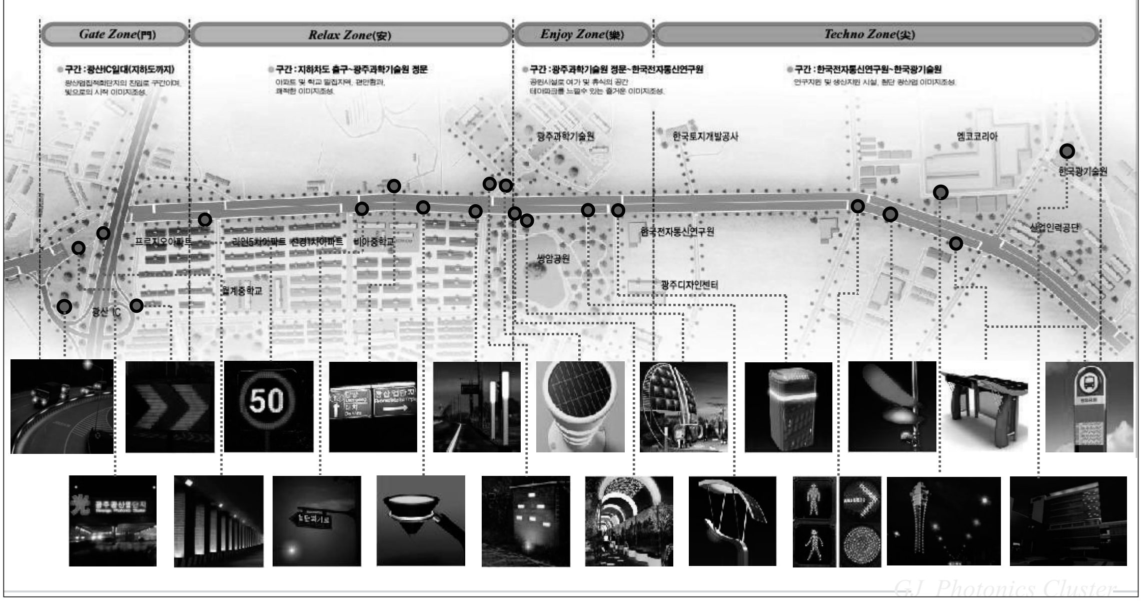


- **Korea Association for Photonics Industry Development:** cooperation and information exchange among relevant companies, and establishment of networks among the industry, academia and research institutes (248 members companies)
- **Korea Industrial Complex Corporation:** mini-clusters for optical communication, mini-clusters for LED and mini-clusters for photonics applications
- **Gwangju Technopark:** a local industry promotion council and a council of organizations supporting companies in high-tech complexes, the Photonics Industrial Representatives Council, and the LED-lighting Representatives Council

4. Achievements in Nurturing the Photonics Industry

■ Establishment of a photonics industry cluster _ (4/4)

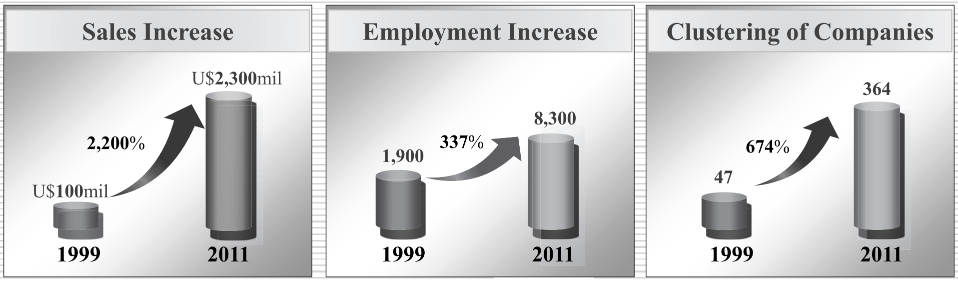
- **LED Signal System for Road Test**



4. Achievements in Nurturing the Photonics Industry

Nurturing of companies _ (1/3)

- **Dramatic expansion of production and employment through the establishment of a virtuous circle of the nurturing of companies**



Classification	1999	2003	2008	2009	2010	2011	2012
Sales (U$) (growth rate)	100 mil.	285 mil.	1,151 mil	1,422 mil	2,236 mil	2,300 mil (2.8%)	2,412 mil (5.0%)
Number of employees	1,896	2,834	6,018	6,870	8,004	8,320	8,470
Number of companies	47	190	327	346	360	364	370

4. Achievements in Nurturing the Photonics Industry

Nurturing of companies _ (2/3)

- **Emergence of successful cases including global leaders**
  - **OE Solution** (CEO Park Yong-gwan and Choo An-goo)
    - **The first development and commercialization of GE-PON ONU SFF transceivers in Korea**
    - **Named world-class 300 in 2012**
    - **Market share: No 1. in Korea and 10th in the world**


Transceiver

Smart SFP

Classification	2005	2007	2009	2011
Sales (U$)	0.700 mil	8.540 mil	26.500 mil	41.800 mil
Export (U$)	0.300 mil	4.160 mil	15.200 mil	22.000 mil
Employment	54	92	120	175

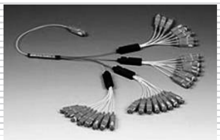
4. Achievements in Nurturing the Photonics Industry

■ Nurturing of companies _ (3/3)

- **Emergence of successful cases including global leaders**
  - ➢ **Wooriro Optical Telecom** (CEO Kim Gook-woong)
    - **Production of optical splitters and photodiodes**
    - **first photonics company listed on the KOSDAQ (November 27, 2012)**

PLC splitter chip

Rack-Mount type splitter



PLC splitter Module

2.5Gbps APD
(Avalanche Photo-Diode)

Classification	2005	2007	2009	2011
Sales (U$)	2.200 mil	5.720 mil	11.440 mil	22.000 mil

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5. Central Government's Assessment of Gwangju's Efforts to Nurture the Photonics Industry

■ **Assessment of strategic, national projects by the Board of Audit and Inspection of Korea (2005) : Gwangju's nurturing of the photonics industry was rated "Good."**

> Some projects including "Gwangju's nurturing of the photonics industry" have exceeded their goals in terms of export and employment growth by intensively making strategic investment in promising businesses

■ **The National Assembly Budget Office's assessment of projects aimed at promoting local industries (2005) : Gwangju's nurturing of the photonics industry was rated "Very Good."**

■ **The 3rd Local Industry Policy Awards of the Ministry of Commerce, Industry and Energy (2006) : Gwangju's photonics industry won the Grand Prize.**

■ **In-depth assessment of fiscal projects [group of projects aimed at supporting the development of local industries] by the Ministry of Strategy and Finance (2012) : Gwangju's photonics industry was rated "Good."**

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6. Success Factors

■ Intensive nurturing of a carefully-selected and differentiated high-tech industry

- Selection of an industry differentiated from the industries fostered by other regions; no need to compete with other regions to establish a solid foothold
- Selection of a subdivision of high-tech industries, the photonics industry, rather than larger industries such as the electronics or the IT industry

■ Consistent policy support from the central government and strong will of the municipality to push ahead with the project

- Provision of projects in need of government support such as technology development and relocation of laboratories in the process of the development of the cluster
- Continuous investment from the central and local governments through strategic projects aimed at nurturing the local industry

■ Clustering of innovative capabilities of the industry, academia and research institutes as well as establishment of a virtuous-circle system aimed at nurturing companies

- Clustering of research, education, production and company-supporting organizations
- Knowledge dissemination and creation of innovation through mutual connection
- Marketing activities suitable for the circumstances around Gwangju's photonics industry and continuous support for the industrial ecosystem

7. Limitations in Nurturing the Industry

■ The poor foundation of Gwangju's photonics industry

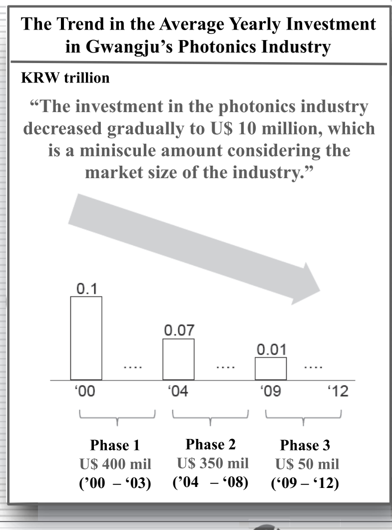
There is no development-oriented connection system among relevant companies :
Materials (venture companies) → Components (SMEs) → Systems (industry leaders)

■ Lack of globally-competitive original technology and limitations in the development of new photonics technology-based products

Insufficient technological capabilities for securing original technology in the area of convergence and meeting new demand for technology

■ Budget cuts and diversified investment caused by changes in central government's policy for nurturing of local industries

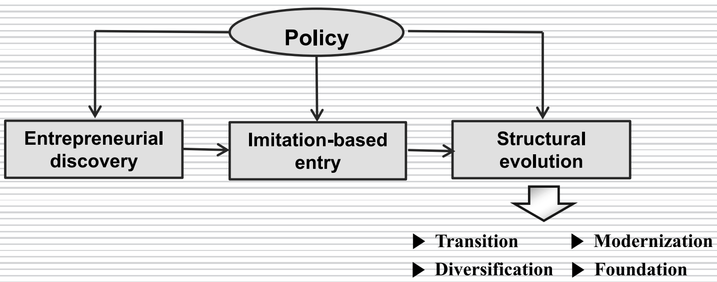
Limitations in continuous growth due to diversified investment in multiple industries with limited financial resources



II. Need for the Introduction of Smart Specialization Strategy

1. Background of the Emergence of the Smart Specialization Strategy

- **Need for new strategies to get rid of the main causes of the productivity gap between Europe and the US : Structural effect and intrinsic effect**
- **Introduction of the concept of the European Research Area (ERA) in order to achieve economies of scale and expand ripple effects**
- **Strategic tools of the EU aimed at overcoming decreasing competitiveness of countries and regions while accommodating policy demand and socioeconomic environmental changes**
  - ⇨ **The concept of smart specialization has been established as a key strategy aimed at the achievement of the ERA.**

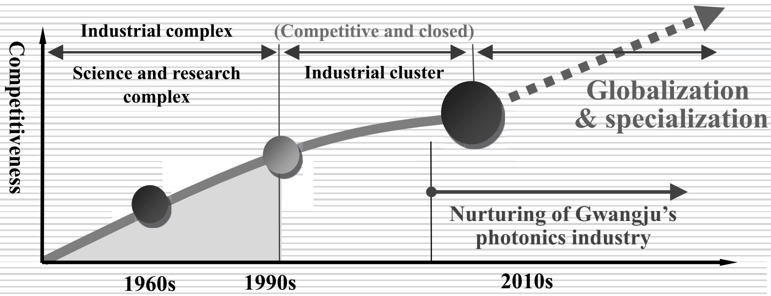


2. Need for New Strategies for Nurturing the Photonics Industry

■ **Formulation of new strategies for Gwangju's photonics industry**

- Future-oriented R&D for products with high marketability and in line with the trend of industrial convergence
- Business size expansion by strengthening capabilities in order to secure global competitiveness in the photonics convergence industry
- Globalization of Gwangju's photonics industry through the establishment of a global knowledge network for the photonics convergence industry

■ **Setting a new vision and goals for the photonics industry: Introduction of the "Smart Specialization Strategy" of the OECD**



III. Smart Specialization Strategy of Gwangju's Photonics Industry

1. Strategy Formulation Process

■ **What does "Smart Specialization Strategy" mean when it comes to the photonics industry?**

Step1	**Analysis of regional context / potential**	Analysis of the current status of resources, etc. within the region
Step2	**Governance**	Establishment of a system to implement the smart specialization strategy for the photonics industry
Step3	**Vision of future**	Setting a new vision and goals for nurturing the photonics industry
Step4	**Selection of priorities**	Presentation of criteria for the selection of areas to be intensively fostered and seeking out such areas
Step5	**Policy mix**	Seeking out policy alternatives for urturing the photonics industry as well as projects to provide support for
Step6	**Monitoring & evaluation**	Review of project implementation results & drawing up ways to manage performance

2. Analysis of Resources within the Region

■ **Technological competitiveness**

- Since the photonics industry encompasses a wide variety of areas, there are global No.1 industries within the region in terms of technological competitiveness, as well as industries whose technological capabilities are at 20% to 30% of those of advanced countries.
- Analysis of the status of patent acquisition in photonics technology after 2007 indicates that while the patent acquisition trends in advanced countries including the US and Japan have been on the decline, that of Korea (particularly Gwangju) has been on the rise.

<Quality Competitiveness of Gwangju's Photonics Industry Compared with Other Countries>

	Japan	Korea	Gwangju	Taiwan
Overall photonics industry	100.0	98.7	101.9	90.6
Optical communication	100.0	99.4	103.5	93.1
Optical sources and optoelectronics devices	100.0	100.0	102.3	89.8
Optical precision devices	100.0	102.1	110.0	90.0
Optical material	100.0	92.1	97.5	90.0
Optical communication device	100.0	100.0	93.3	95.0
Optical instrument	100.0	93.8	95.0	90.0

Data: Photonics2020, KIET, 2010, survey on domestic photonics companies

2. Analysis of Resources within the Region

■ Resource

- **Infrastructure-related capabilities**

  One national research institute, three state-sponsored research institutes, 182 private research institutes, four science and engineering colleges, and six organizations providing support for networking among the industry, academia and research institutes

- **Professionals-related capabilities**

  Except for those in the Seoul Metropolitan area and Daejeon, the best research institutions and colleges of the country are in the region. 47 photonics-related departments (disciplines) have been established at general graduate schools of major universities in the region, and there are 38 affiliated research institutes and research support centers.

- **Corporate capabilities**

  While there were only 47 photonics companies in Gwangju in 1999 before the project aimed at nurturing the industry went into operation, the number dramatically rose to 364 in 2011 and is estimated to have reached 370 at the end of 2012.

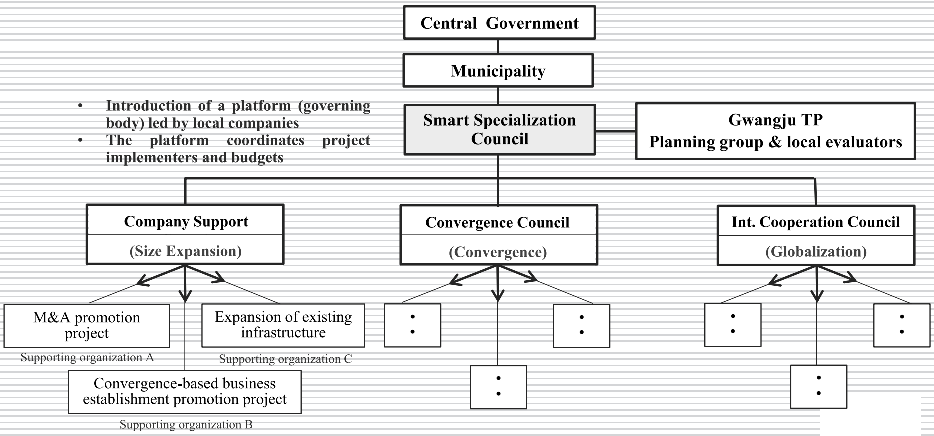
3. Implementation System for the Smart Specialization Strategy

■ Governance between the central and local governments

Application of a bottom-up approach to increase the autonomy of municipalities and assign more responsibility to them

■ Project implementation governance within the region

Introduction of a private council, led by companies who are beneficiaries, as the governing platform



4. Industry-nurturing Vision and Strategies

■ Basic directions for setting a vision

- Presentation of a future-oriented vision as a global industry
- Overcoming limitations in the growth of the photonics industry (spatial limitations)
- Contributions to the creation of new industries and revitalization of the local economy
- Modernization in line with technological sophistication

■ New vision and goals

Vision

Establishment of a global hub city for the photonics-based convergence industry

Goal

Size Expansion	Convergence	Globalization
Nurturing of major, leading photonics companies equipped with world-class competitiveness in terms of technology and size	Creation of photonics convergence-based new technologies and markets in connection with staple industries of the region	Establishment of global governance aimed at utilizing and connecting global photonics innovation capabilities

4. Industry-nurturing Vision and Strategies

■ Criteria for selecting targets for intensive nurturing

- Establishment of basic infrastructure for each area and governance structure
- World-class photonics-based technology innovation capabilities
- Highly-skilled workforces for research and production support at research institutions and companies
- Status of local companies in promising areas and potential for advancement into the global market

■ Results of selecting areas for intensive nurturing

Scope of the Photonics Industry	Selected Areas
Optical Communication	LED and OLED (lighting products based on semiconductor light source)
Optical Information Appliances	Optical Communication and Sensor (communication network and smart convergence sensor)
Optical Precision Devices	Optical Materials and Applications (high-performance optical lenses and laser light source)
Optical Source Application	
Optical Material	
Optical Devices	

- It has been considered whether these items are in line with government policies on current new growth engines and promising next-generation growth engines.
- Whether each item is in line with key considerations of each area has been analyzed.

5. Smart Specialization Nurturing Policy for the Photonics Industry

Strategy	Policy	Directions for program development
"Size Expansion" for the revitalization of the local economy	**Modernization Sophistication Advancement**	➢ Expansion of industry-supporting infrastructure in line with the full-fledged growth phase of companies ➢ Nurturing of essential companies that will lead the value chain of materials, components, modules and systems ➢ Expansion of the size of the industry through the establishment of convergence and global collaboration systems
Sustainable photonics-based **"Convergence"**	**Diversification Standardization Pioneering**	➢ Establishment of infrastructure that will lead the development of global photonics -based convergence technologies ➢ Creation of new convergence-based technologies and industries in connection with local staple industries ➢ Preoccupancy of international standards and key technologies aimed at dominating new photonics convergence-based markets
"Globalization" through the Establishment of a global ecosystem	**Connection Mutual existence Market-leading**	➢ Establishment of a connection and collaboration system to utilize global technological and industrial capabilities ➢ Invitation of world-class research institutes to locate in the region and strengthening of the research capabilities of local institutions and companies ➢ Establishment of a collaborative system between multinational global companies and local companies for mutual existence

IV. Proposal

Korea (Gwangju)- EU Photonics Technology & Business Forum

Reason for Suggestion

- **The photonics industry in Gwangju needs to share its rapid growth and cooperate with the European photonics industry so that it can create a synergy effect and sustain the development of the photonics industry as a whole.**

Main Activity

- **Conference for commercialization and latest technology for photonics industry**
- **Match-making event for technology transfer and photonics product trading**
- **Match-making event to help companies find and join R&D grant programs such as Eureka, EU FP**

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Thank you for your attention!

Have a Good Time in Gwangju !

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Session II-2 The Brussels and European Perspective on Photonics Smart Specialisation

HUGO THIENPONT

Professor, Faculty of Engineering, Vrije Universteit Brussel(VUB)
Chair of Applied Physics and Photonics Department
Director of Brussels Photonics Team (B-PHOT)

BIOGRAPHY

Hugo Thienpont received the Ph.D. degree in applied sciences in 1990 at the Vrije Universiteit Brussel (VUB), Brussels, Belgium. He coordinates the Brussels Photonics Teams, a group of 60 researchers that focuses on photonics industrial innovation. Prof. Thienpont coordinates large research and networking projects and manages micro-photonics related industrial projects on a European level. Prof. Thienpont received the International Commission for Optics Prize ICO'99 and the Ernst Abbe medal from Carl Zeiss. In 2003, he was awarded the title of "IEEE Photonics Distinguished Lecturer." In 2005 he received the SPIE President's Award for dedicated services to the European Photonics Community, and in 2007 the international MOC Award for his contributions in the field of micro-optics. Hugo Thienpont is a member of the Board of Stakeholders of the Tech nology Platform Photonics21. Since 2012 Prof. Thienpont is Vice-Rector for innovation and ind ustrial policy of the Vrije Universiteit Brussel.

PRESENTATION ABSTRACT

In this presentation we will highlight the present-day economic impact of Photonics in Europe, and Europe's smart specialisation strategy towards 2020. We will illustrate this approach with best practices in photonics industrial innovation from the Brussels Photonics Team.

Vrije Universiteit Brussel

B-PHOT BRUSSELS PHOTONICS TEAM

The Brussels and European perspective on Photonics Smart Specialisation

Prof. Dr. ir. Hugo Thienpont
hthienpo@vub.ac.be

PHOTONICS21

Photonics – The Science and Technology of Harnessing Light

Photonics is the science and technology of the harnessing of light.

Photonics encompasses the generation of light, the detection of light, the management of light through guidance, manipulation and amplification, and most importantly its utilisation for the benefit of mankind .

Photonics bears the same relationship to light and photons as electronics does to electricity and electrons.

The future generation will rely on energy efficient lighting solutions © Philips

PHOTONICS[21]

Photonics will Impact Most Areas of our Lives

► **Healthcare**
- Early diagnosis through new detection methods
- Minimal invasive surgery

► **Energy Efficiency**
- LEDs, OLEDs and intelligent networks can save 2/3 of electricity for lighting

► **Safety & Security**
- Smart sensors for automotive safety; IR detection systems

► **Manufacturing**
- Lasers enable new lightweight structures
- Laser drilling: 25,000 holes per second for efficient solar cells

► **Inclusion**
- High speed fibre networks with multi-terabit capacity are backbone for web 2.0 & 3.0 products & internet of things

PHOTONICS[21]

Sustainable Products - Triple Win with Green Photonics

Ecology

Less CO_2 emissions:
- LED/OLED can save an additional 30% energy in lighting by 2030
- Limit growth of energy consumption of ICT
- Sensors will enable reduction of power consumption during production and increase environmental safety

Economy

Additional growth:
- Disruptive photonic technologies as key driver for profitable growth
- Save hundreds of billion Euros on global energy bill
- New market segments
- Driving force for more jobs
- Laser enable profitable production

Society

Lower cost & higher quality of life:
- Energy saving saves money
- Sensor networks for safety
- Green technology & emotion
- More comfort
- Faster communication
- Higher safety (automobiles)
- No hazardous materials

EUROPE'S NEXT GREAT PROMISE

Photonics is a key driver of European innovation, and a new technology platform calls for its acceleration.

By **Hugo Thienpont** and **Ronan Burgess**

Hugo Thienpont is chair of the Applied Physics and Photonics Department at Vrije Universiteit Brussel in Belgium. Thienpont is an SPIE Fellow, member of the SPIE Board of Directors, and chair of the Photonics Europe symposium. He is also a member of the Photonics21 board of stakeholders.

Ronan Burgess is with the European Commission's Information Society Technology in Belgium.

Photonics21 brings together the key stakeholders in Europe in the area of photonics. Its purpose is to stimulate greater and more effective investment in research and development, to accelerate innovation, and to eliminate barriers to the deployment and growth of new photonic technologies.

Photonics21 is one of several European Technology Platforms (ETPs) that have been set up and led by European industry to address technology areas considered to be key to future economic growth in Europe. Photonic technologies are driving innovation in a broad range of areas from telecommunications to manufacturing and lighting to medical and environmental.

In order to remain competitive, European industry needs to better exploit the capabilities of high technologies. Investment in research needs to be increased, and there needs to be better coordination between privately and publicly funded research, and between European and national research. In particular, the fragmentation of Europe's photonics research and development effort needs to be addressed.

The Photonics21 platform therefore brings together the key players from the entire photonics sector and includes industrialists, researchers, academics, and policy makers. The European Commission has actively encouraged the formation of such technology platforms, in that they can help to better align European research priorities with the needs of industry.

Photonics21 has its origins in early 2005 with the publication of "Photonics for the 21st Century," which set out a vision for photonics. The first task for Photonics21 was to draw together the main stakeholders in the sector and to define a strategic research agenda, presenting the medium- to long-term objectives for photonics. This was completed in March 2006 and the strategic research agenda was officially presented to Viviane Reding, European Commissioner for Information Society and Media, by Alexander von Witzleben, president of Photonics21, during the Photonics Europe 2006 symposium.

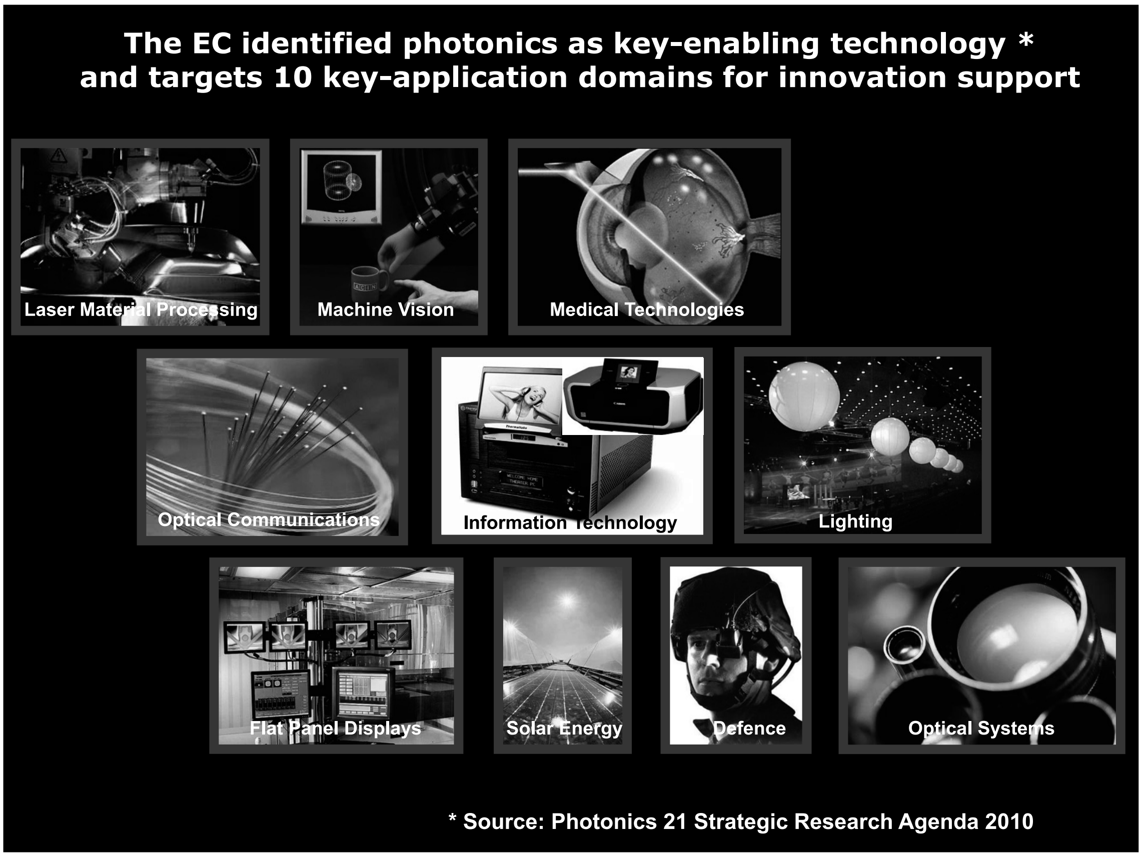
In the next few months, the platform will produce a deployment strategy that defines how its members will mobilize the human and financial resources needed.

The ambitious goals of the Photonics21 platform will not be achieved overnight, and its members will need to remain committed to these goals for the long haul. However, it is clear that the importance of photonics is already being recognized more widely, and that technological advance is entering the "century of the photon."

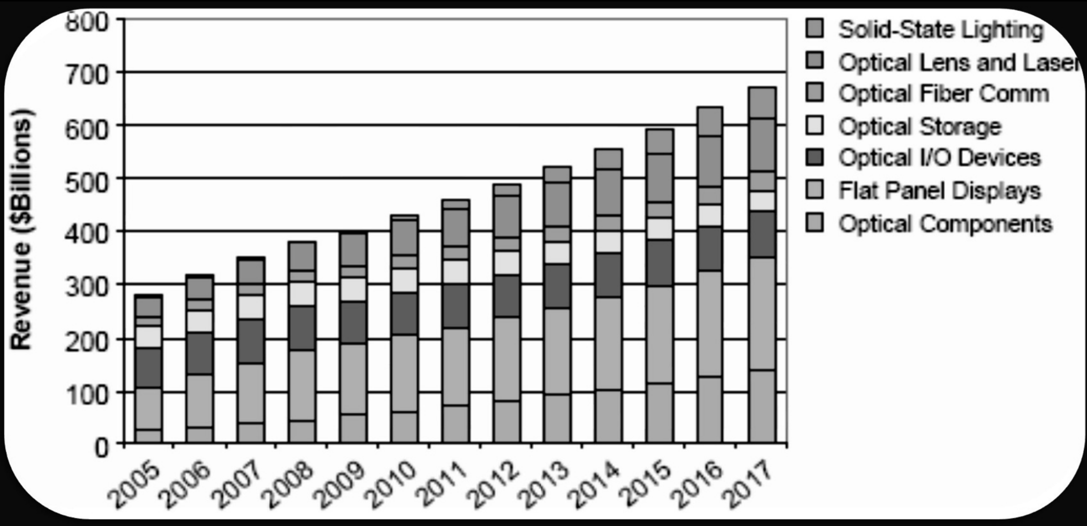
Alexander von Witzleben, Photonics21 president, presented the first draft of the strategic research agenda to Viviane Reding at Photonics Europe in April.

Learn more about Photonics21 at www.photonics21.org. There you can read about recent developments or download the strategic research agenda titled *Towards a Bright Future for Europe.*

PHOTONICS21



The global photonics market has grown at 10% per year*
This growth is mainly "innovation" driven.



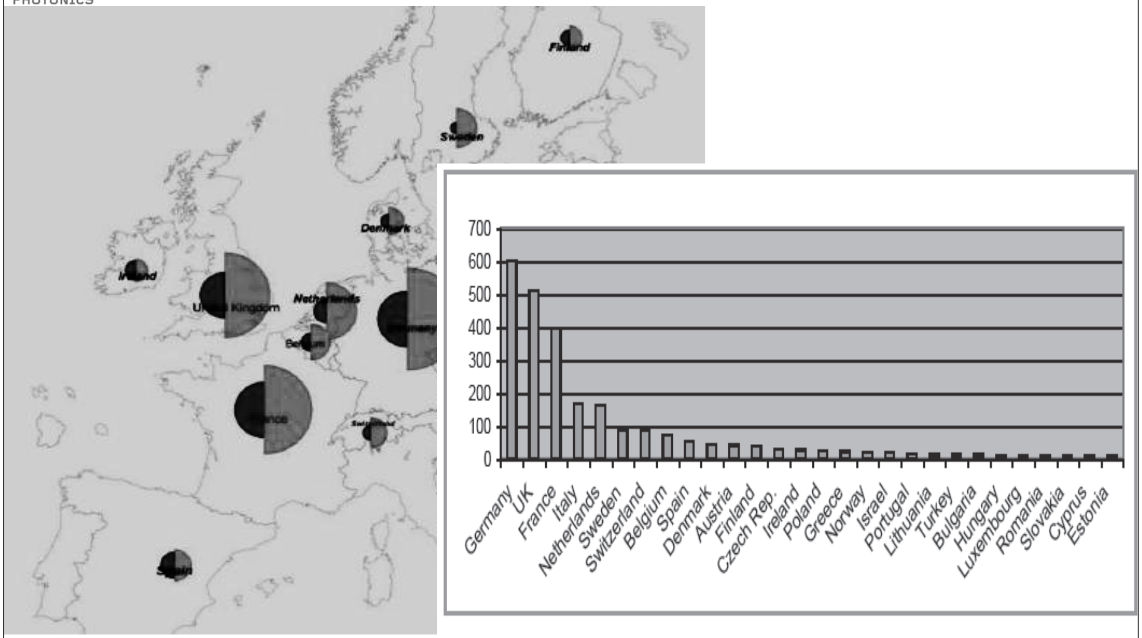
***Source: Optoelectronics Industry Development Association OIDA 2009**
The leverage effect of photonic technologies 2011

PHOTONICS21

Photonics – A Key Enabling Technology with Enormous Economic Potential

- ► Total Direct Photonics market ~ € 300 bn
  - even larger leverage effect along the value chain
- ► European Photonics market ~ € 60 bn
- ► Estimated annual growth rate ~ 8-10%
- ► **Estimated market size in 2015 ~ € 480 bn**
- ► Many market-leading industrial players
- ► **> 5000 SMEs / > 1000 research institutes**
- ► **Leading market shares of European companies**
  - Lighting 40%
  - Production technology 45%
  - Optical communication 24%
- ► **~ 300,000 employees directly**

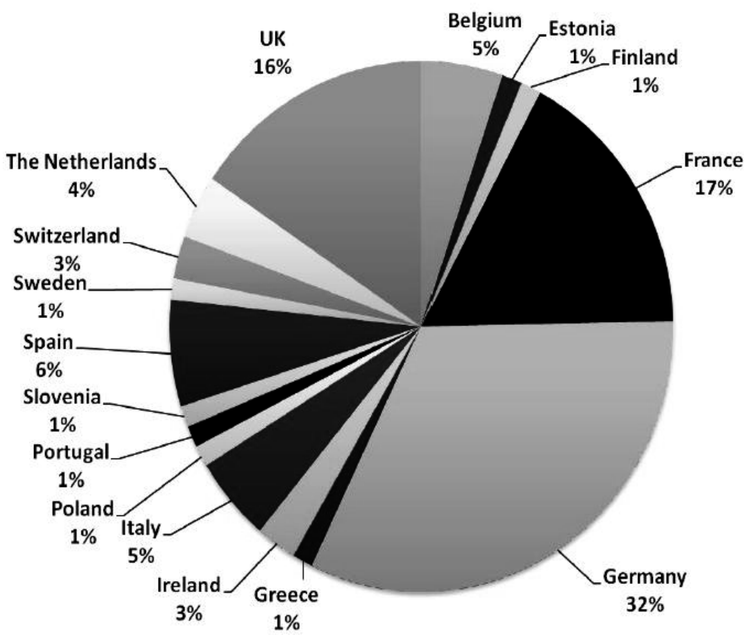
Most of the EU27 countries have a strong representation in photonics and photonics-enabled industry



EU report: Photonics: key-enabling technology for Europe 2010
The leverage effect of photonic technologies 2011

PHOTONICS[21]

Photonics21 Board of Stakeholders – Members by Country



Regional and national photonics clusters in Europe

Vrije Universiteit Brussel

B-PHOT BRUSSELS PHOTONICS TEAM

Photonics at the Brussels Photonics Team

B-PHOT
BRUSSELS PHOTONICS TEAM

Our core-business at B-PHOT is applied and industrial research and its technology transfer of micro-system solutions based on photonics

tyco Electronics
BARCO Visibly yours
BEST CETS EVERYTHING SORTED
ICOS
FOS&S
umicore
Melexis Microelectronic Integrated Systems
PHILIPS sense and simplicity
PUNCH graphix
anteryon LEADERS IN OPTICAL INTERFACE TECHNOLOGY

B-PHOT
BRUSSELS PHOTONICS TEAM

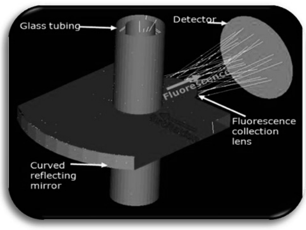
B-PHOT focuses on disruptive micro-systems that need a complete technological supply chain to be demonstrated

Mastering and Prototyping Technologies

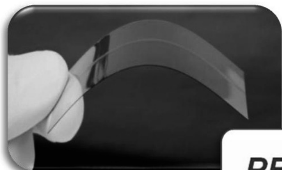
Optical Measurement and Characterization

Low-Cost Low-Volume Replication

B-PHOT

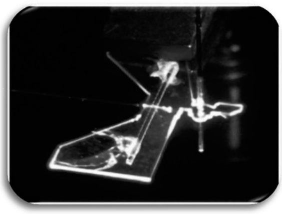


Optical Modelling



Advanced Materials

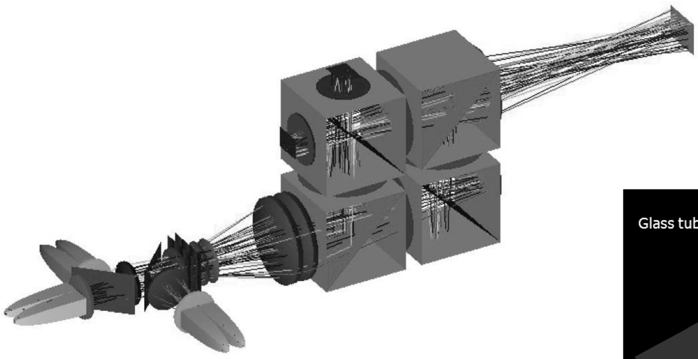
PBM UGent Polymer Chemistry & Biomaterials Group

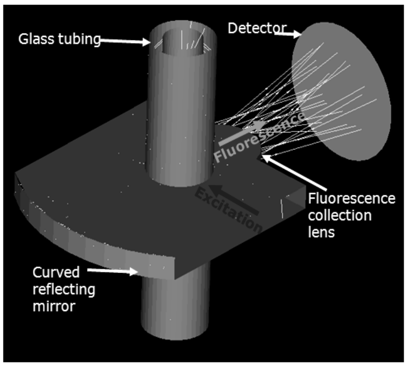


Demonstrators and Prototypes

With our infrastructure we model and develop practical optical and photonic systems

Ray-tracing of a stereoscopic LED projector





Ray-tracing of a polymer lab-on-a-chip

We prototype macro- micro- and nano- photonic components with diamond tooling fully compatible with industrial manufacturing

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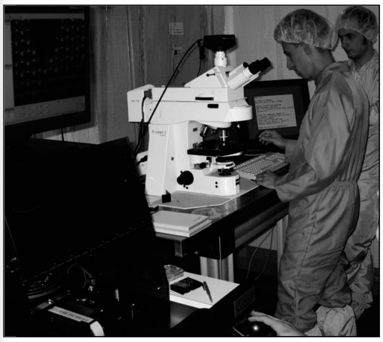
We characterize these components with professional optical instrumentation and metrology tools



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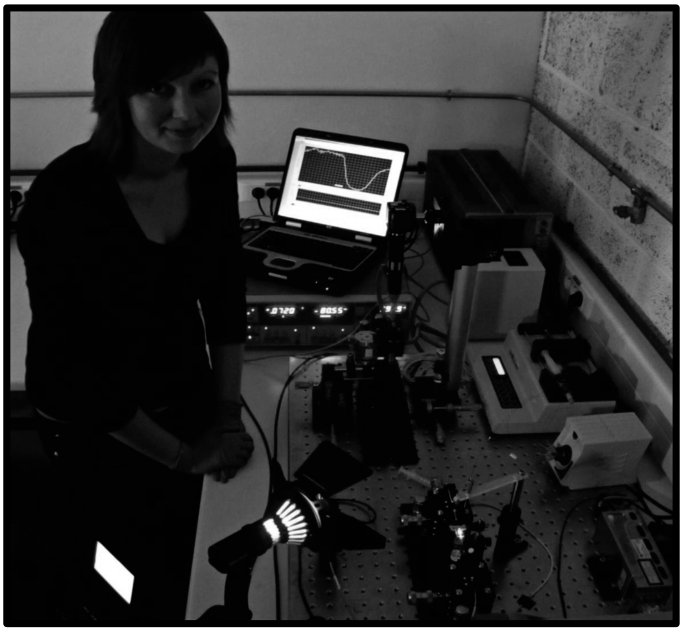
…and build proof-of-concept demonstrators and validate prototypes for companies



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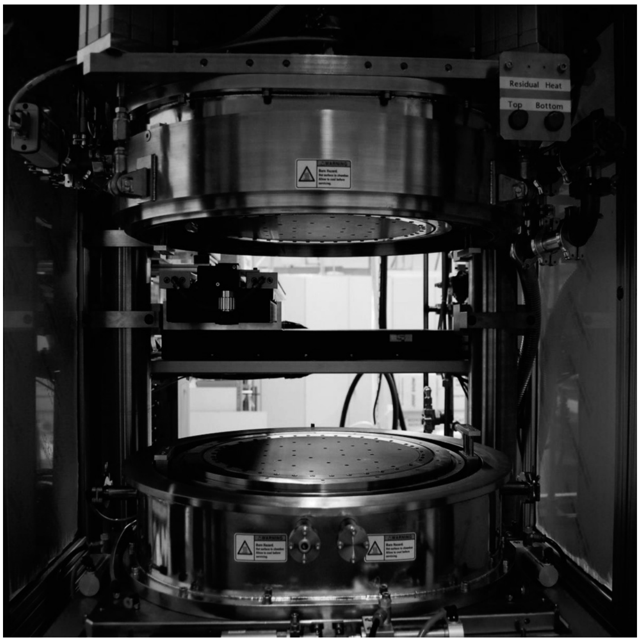
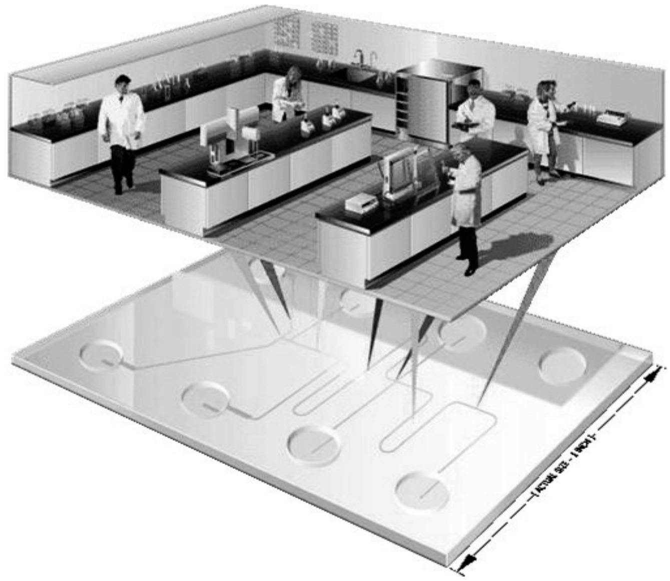
We test mass-manufacturability and fabricate low-volume series using hot embossing for replication

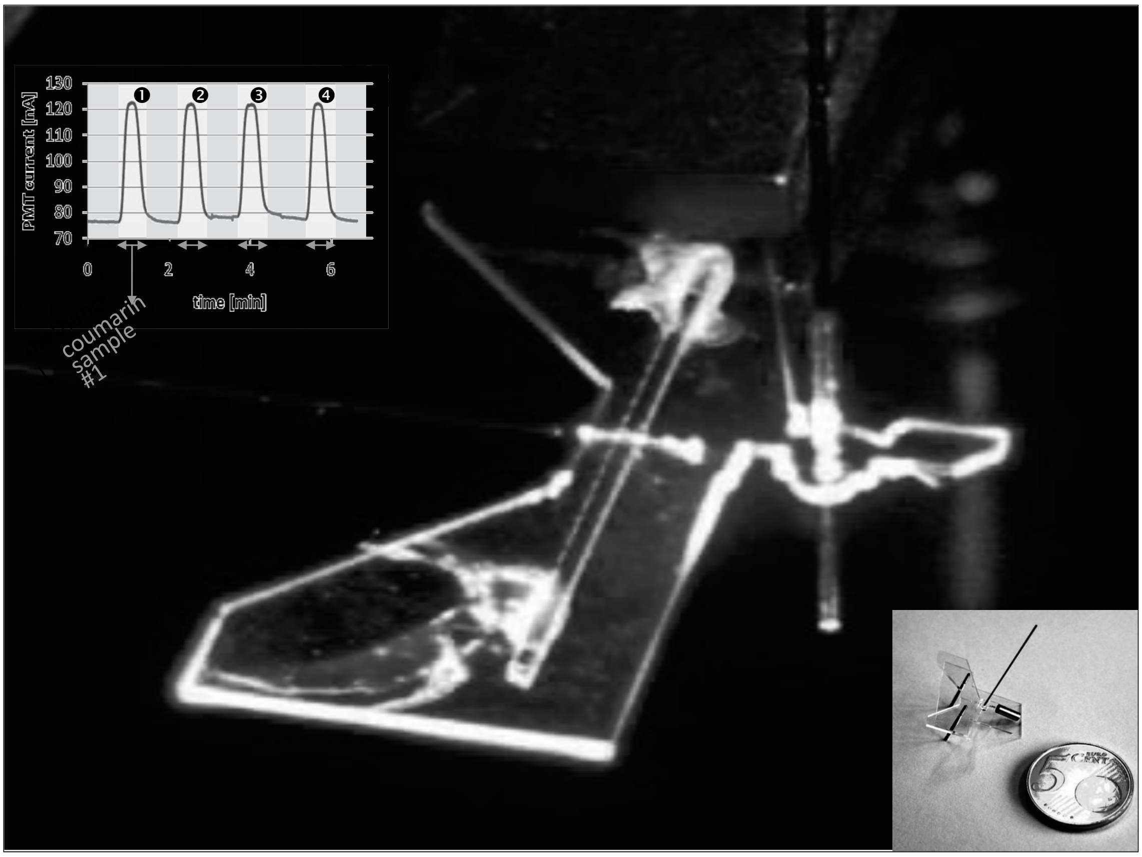


Our first 300 mm polymer wafer with optofluidic structures

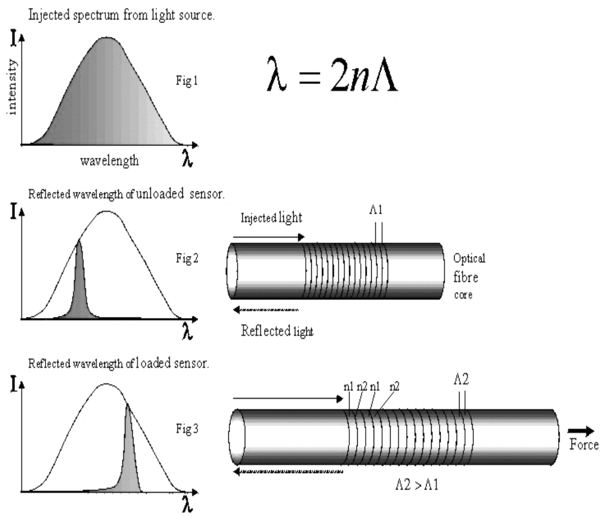
B-PHOT
BRUSSELS PHOTONICS TEAM

B-PHOT contributes with its strategic research to low-cost biomedical optofluidic chip demonstrators



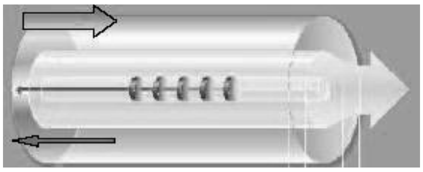


Optical Fibre Sensors



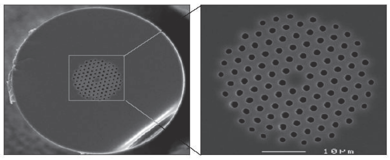
$$\lambda = 2n\Lambda$$

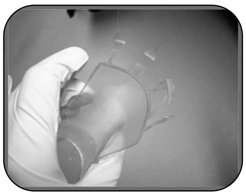
Microstructured Optical Fiber Sensors for structural health monitoring, smart structures, prosthetics, and artificial (robot) skins



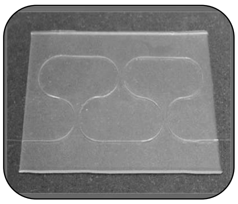
"Holey fiber"

Photonic Crystal Fibers in combination with Bragg gratings offer opportunities to avoid cross-sensitivity and expensive compensation schemes in fibre sensing

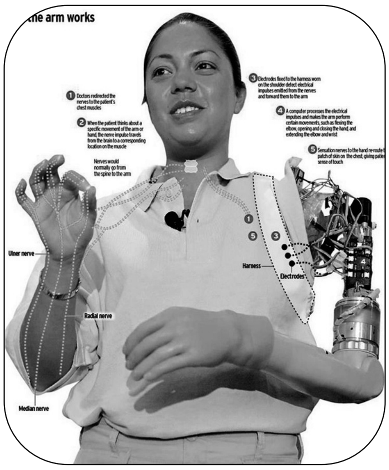




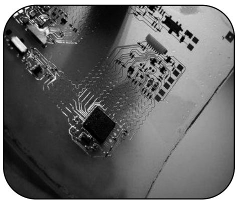
Optical fiber sensors embedded in stretch/flex foil



Optical fiber based artificial sensing skin



Optical fiber sensors embedded in composite prosthetics



Signal processing electronics embedded in flex foil

Smart prosthetics and artificial skin

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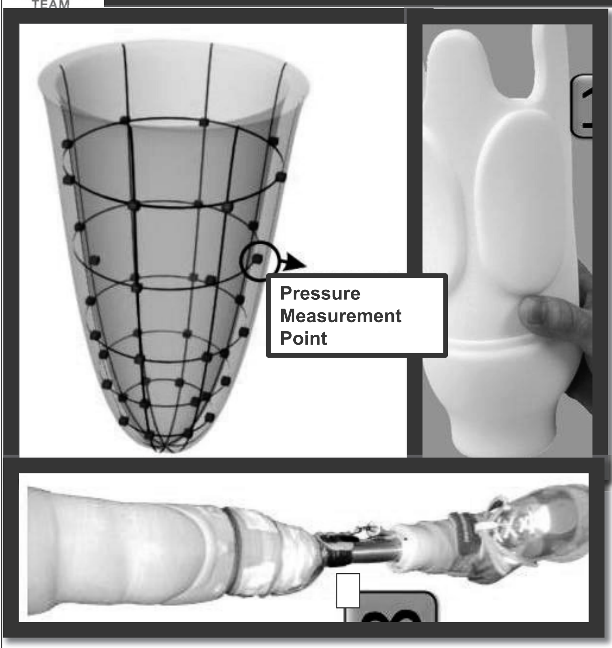
Plastic Optical Fibre sensors for plastic prosthetics and gastro-intestinal diagnosis



G. Kanellos et al., Optics Express (18) 2010

EU FP7 SMARTSOCKET

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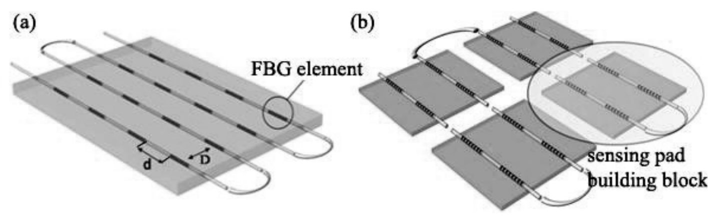
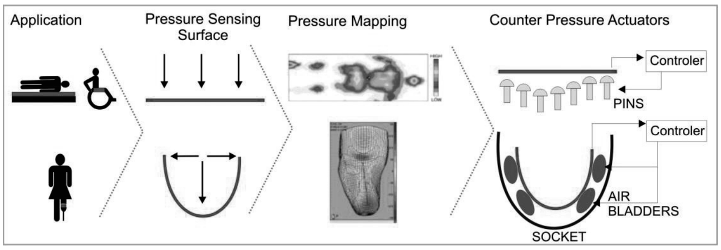
Smart matrasses and healthcare





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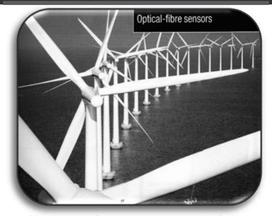
With its unique expertise and technology platforms B-PHOT supports a variety of local and European companies

Infrared nightvision for safety and security

umicore Autoliv



Optical fiber sensors for smart structures

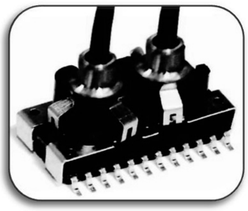
FOS&S

3-Dimensional displays and projectors

BARCO

Freeform micro-optics for solar energy

umicore

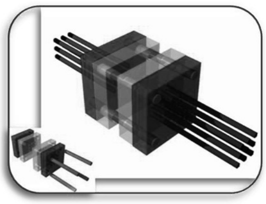


Opto-electronic chips for automotive

Melexis Microelectronic Integrated Systems

Optical engines for food-sorting

BEST GETS EVERYTHING SORTED



Optical interconnects for Local Area Networks

TE connectivity

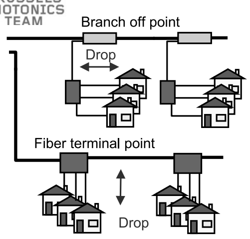
High-efficiency lighting applications

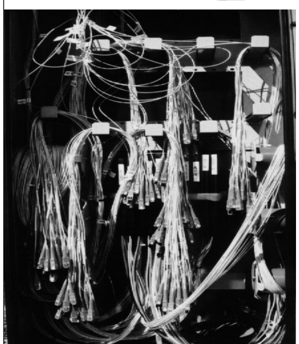
PHILIPS

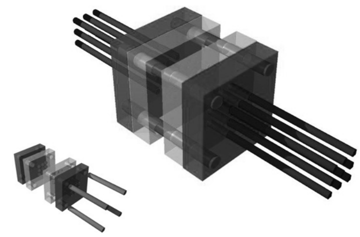
All topics contribute to solving societal challenges and are priorities of the EC

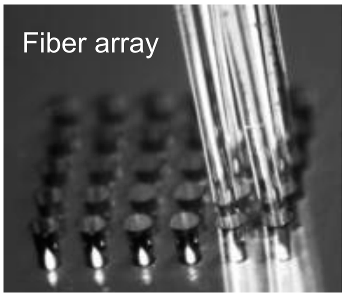
Laser assisted industrial food-sorting, quality and safety control, and plastic recycling

Low-cost plastic fiber connectors for Fiber-To-The-Home



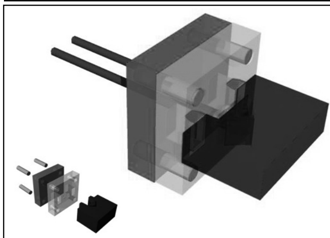


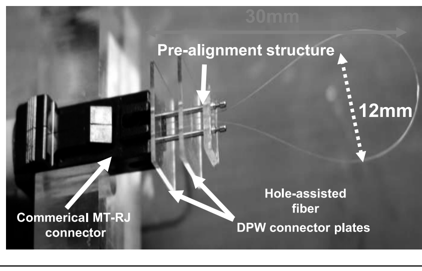




2-D SM fiber array connector

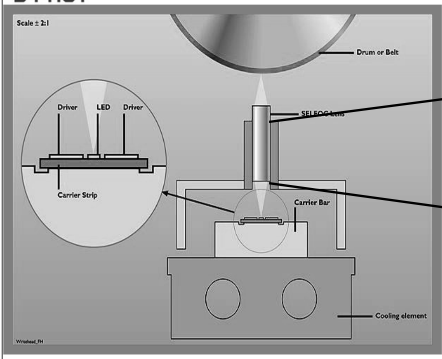
Diameter accuracy = 1.2μm
Positioning accuracy = 0.6μm
Average losses = 0.15dB @ 1550nm

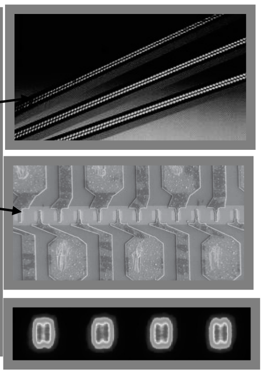


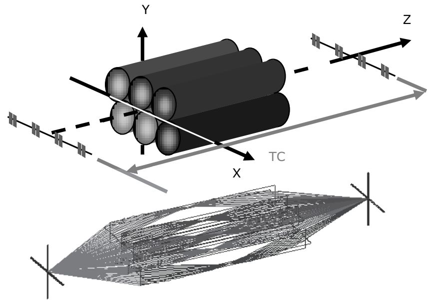


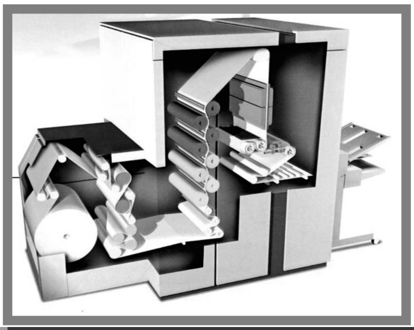
180° butt-coupling connector

Development of a high-resolution 1200 dpi print engine



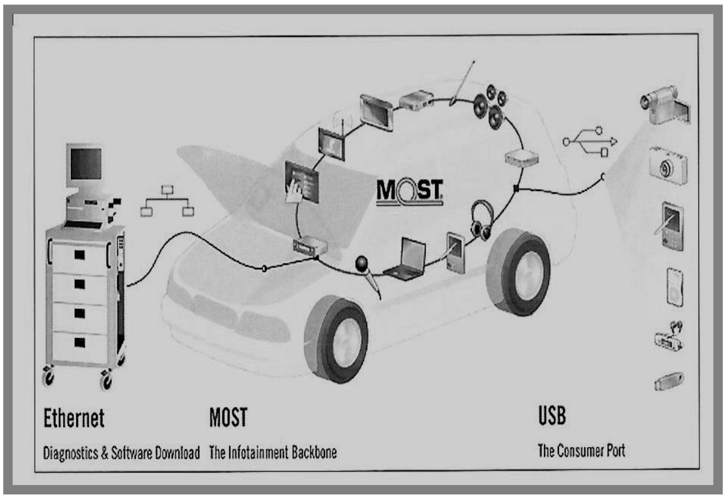


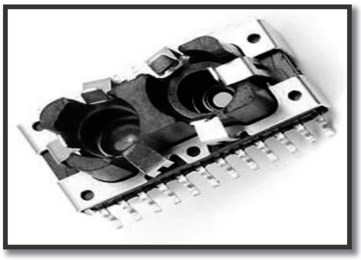


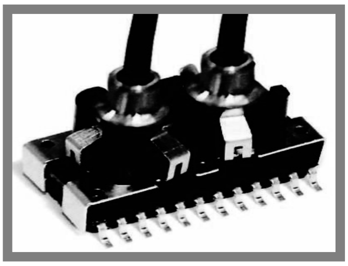


150 MBit/s POF datacom transceiver for the automotive

Power budget, tolerancing analysis, automotive specs.







(Product release MLX75605)

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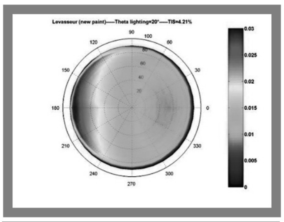
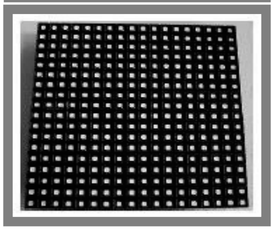
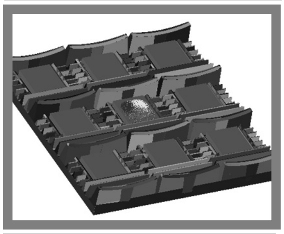
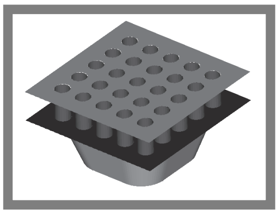
High-end LED-walls for visual performance

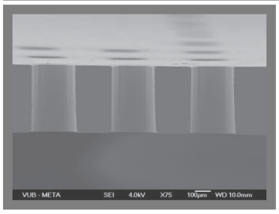
BARCO
Visibly yours











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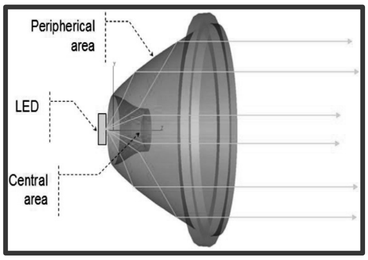
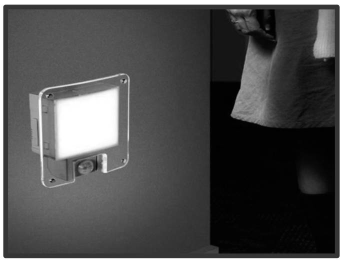
Freeform optics for LED-based luminaires

PHILIPS
sense and simplicity





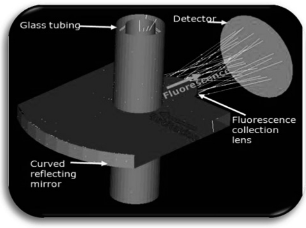
An industry-compatible technology supply chain is a great research tool and facilitates innovation with companies

Optical Measurement and Characterization

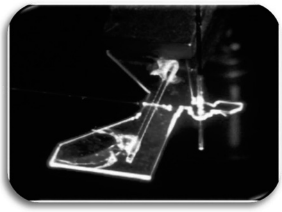
Mastering and Prototyping Technologies

Low-Cost Low-Volume Replication

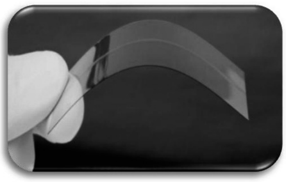
B-PHOT



Optical Modelling



Demonstrators and Prototypes



Advanced Materials

B-PHOT's photonics master curricula attract students from all over the globe

- Interuniversity Master in Photonics
- Master in Photonics Engineering
- MSc in Photonics

Education and Culture

Erasmus Mundus

- Vrije Univ. Brussel (BE)
- Univ. Gent (BE)
- Univ. St. Andrews (GB)
- Heriot-Watt Univ. (GB)
- KTH Stockholm (SE)

B-PHOT and the Solvay business school: pioneering efforts in photonics entrepreneurship


Inhuldiging 2010


Entrepreneurship in Photonics 2010

B-PHOT organizes “Photonics Europe” the largest European high-quality symposium on photonics

SPIE Europe

New Location

Photonics Europe

12-16 April 2010
The Square Conference Centre
Brussels, Belgium

The premier photonics event in Europe has moved to Brussels!

Photonics Europe is the essential European photonics event that bridges the gap between academia and industry. Participation in Photonics Europe ensures you access to network with the leaders who are developing technologies rife with economic opportunity for the future.

Featuring Top Quality conferences, Plenary “Hot Topics in Photonics” presentations, an extensive industry programme, student and early career professionals information and networking and the well-known Photonics Innovation Village, the 2010 programme will give you access to developers from universities and institutes and you will meet others interested in developing prototypes and commercializing technology.

Conference Chairs:
Francis Berghmans, Vrije Universiteit, Brussels, Belgium
Ronan Burgess, European Commission, Brussels, Belgium
Jürgen Popp, IPHT, FR Germany

Emphasis is given to topics in

- **Micro/Nano Technologies**
  Metamaterials, Nanophotonics, Photonic Crystal Materials and Devices, Photonic Crystal Fibres, MEMS-MOEMS, Micro-Optics, Optical Micro- and Nanometrology
- **Disruptive Organic and Bio-Photonics**
  Photonic Solutions for Better Health Care, Organic Optoelectronics
- **Highly Integrated and Functional Photonic Components**
  Silicon Photonics, Photonic Integrated Circuits, Photonic Sensors
- **Advances in Laser and Amplifier Technologies**
  Semiconductor Lasers, Laser Dynamics, Solid State Lasers and Amplifiers
- **Photonics in Industrial Applications**
  Photonics for Energy Production Systems, Photonics in Multimedia, Optical and Digital Image Processing, Industrial Perspectives in Photonics

Conferences • Hot Topics in Photonics • Industry Programme • Courses • Student and Early Career Workshops • Exhibition

www.spie.org/photonicseurope SPIE Europe

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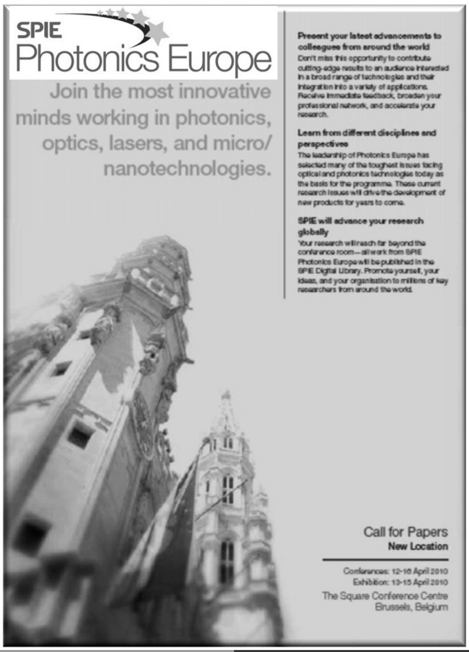
Photonics Europe features 20 conferences, 2500 attendees, a technical exhibit, an innovation village, a job event, ...



If European companies want to keep their market share ...
continued product innovation with photonics will be crucial ...

But often SMEs and large-scale companies encounter road-blocks in their innovation efforts...

Some examples of photonics innovation show-stoppers for European companies

in-house experts
and photonics expertise
are missing

supporting an
in-house R&D team
is too expensive

identifying external experts
is often
a shot in the dark

dedicated task forces
for photonic solutions
are almost nonexistent

in-house cutting-edge
photonics technology
is missing

investment risk
is too high or
financially irresponsible

multiple-stop technology
shopping fails
partial solutions
are often incompatible

single-stop shop
technology supply chains
are almost nonexistent

A variety of industry-compatible technology supply-chains are needed to support companies in a multitude of application domains. This calls for well-managed intensive European partnerships.

ACT
MOST

Access to
Micro-Optics
Expertise,
Services &
Technologies

WWW.ACTMOST.EU

ACTMOST teams up top European experts in micro-optics technology

ACT
MOST

ACTMOST teams up technology supply chains that have proven their worth in joint collaborative (industry-related) projects

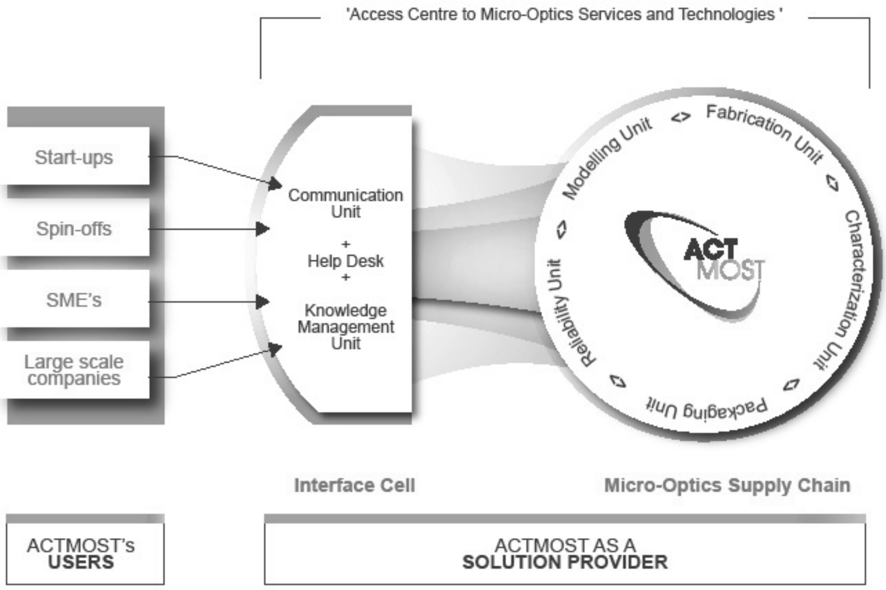
1	Vrije Universiteit Brussel	VUB	Belgium
2	Karlsruhe Institute of Technology	KIT	Germany
3	Politechnika Warszawska	WUT	Poland
4	Centre National de la Recherche Scientifique	CNRS	France
5	Technical Research Centre of Finland	VTT	Finland
6	Max Planck gesellschaft zur foerderung der wissenschaften	MPL	Germany
7	University of Eastern Finland	UEF	Finland
8	Interuniversitair Micro-Electronica Centrum	IMEC	Belgium
9	Stiftelsen SINTEF	SINTEF	Norway
10	Institut für Photonische Technologien	IPHT	Germany
11	Université de Franche Comte	UFC	France
12	Wroclaw University of Technology	WRUT	Poland
13	Maria Curie-Sklodowska University	UMCS	Poland
14	Institute of Electronic Materials Technology	ITME	Poland

ACT MOST

Equipment is benchmarked and second sources are identified

ACT MOST

We created a micro-optics supply chain and an interface cell to facilitate access and support



With these experts and technology facilities ACTMOST offers European companies innovation support in the form of “user projects” and “trainings”

INNOVATION SUPPORT for INDUSTRY

SOLUTION-DRIVEN USER PROJECTS

- exploratory studies
- feasibility studies
- proof-of-concept demonstrators

PERSONALIZED TECHNOLOGY COACHING

- hands-on training
- top-level tutors
- dedicated coaching

The last 18 months we served 15 companies with user projects (12 of which are SMEs)

	Core expertise and business is OUTSIDE the photonic domain	Core expertise and business is INSIDE the photonic domain
LSC	AGFA	Eurofarad, TE connectivity
SME	UVT, PEIRA Scientific Instruments, SGS luxéole, EximiusLab	Anteryon, VIGO SYSTEM S.A., SÜSS MicroOptics, LovaLite, Amplitude Systemes, LASOS For worldwide photonics, lyncée tec, mLED Smart Light-Engines for Tomorrow's Innovators

48

Company details

Company name	Peira
Location	Belgium
Company type	SME
Description	Technology integrator focused on design, production and maintenance of customized research platforms for life sciences.
Application field	Life sciences

Project information

Scope	Development of medical imaging system for preclinical cancer research
Access unit	Modeling & Desig
Project leader	Youri Meuret (VU
Start date	June 2011
Duration	4,5 months
Partners	VUB (Belgium)

ACTMOST created a support model that can remove innovation roadblocks and support companies with short-term micro-photonics-based product innovation.

centralized contact point and quick guidance

low administration (for companies)

European experts in dedicated task forces

one-stop-shop for technology

subsidy opportunity no investment risk

solution-driven support

timely support

supporting a variety of sectors

support instead of funding

innovation instrument dedicated to SMEs

ACTMOST is an access centre conceived as a single-stop-shop solutions provider and an innovation facilitator backed with a novel subsidy model

prioritize product innovation with photonics

open or maintain the windows of opportunity of the new markets

decrease the time-to-market

grow business in Europe

create jobs

Technology coaching at EU level to inspire industrial innovation

SMETHODS stands for SMEs Training and Hands-on Practice in Optical Design and Simulation. We organize 5-day hands-on training sessions in four different domains

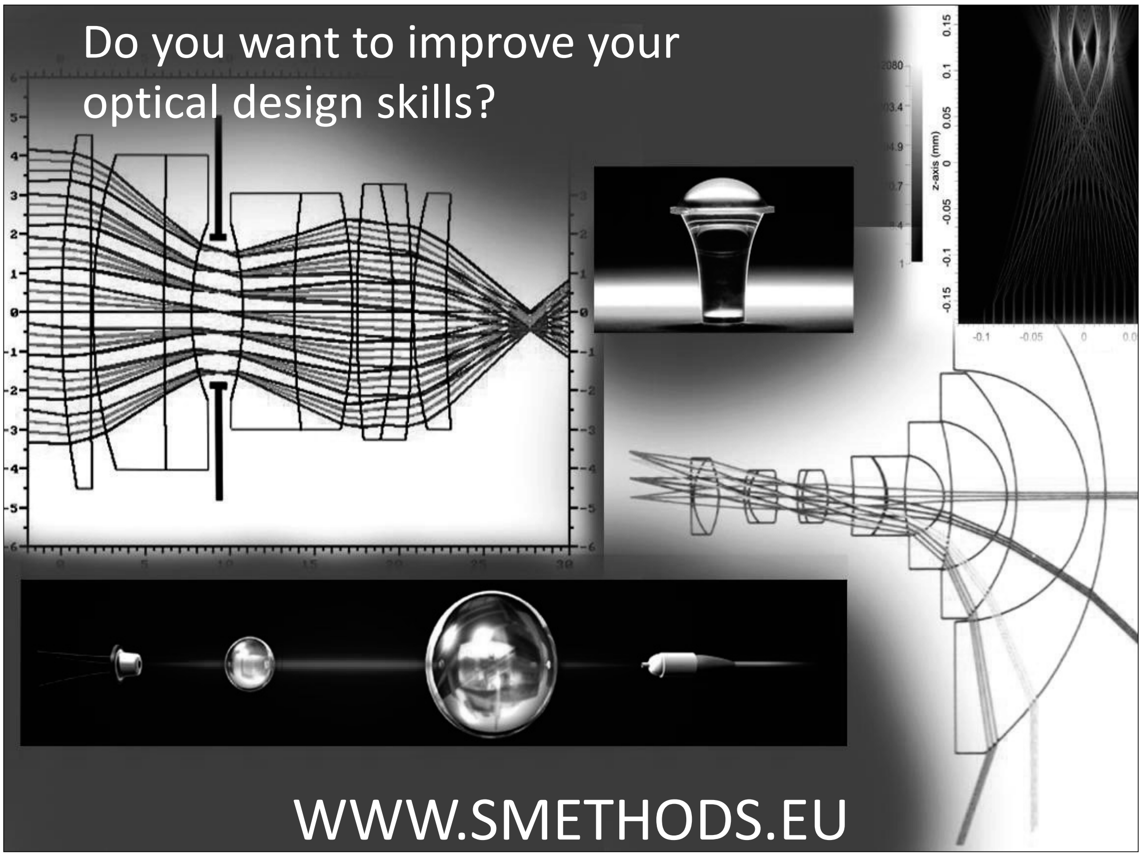
- Imaging Optics
- Non-imaging Optics
- Wave Optical design
- Diffractive Optics

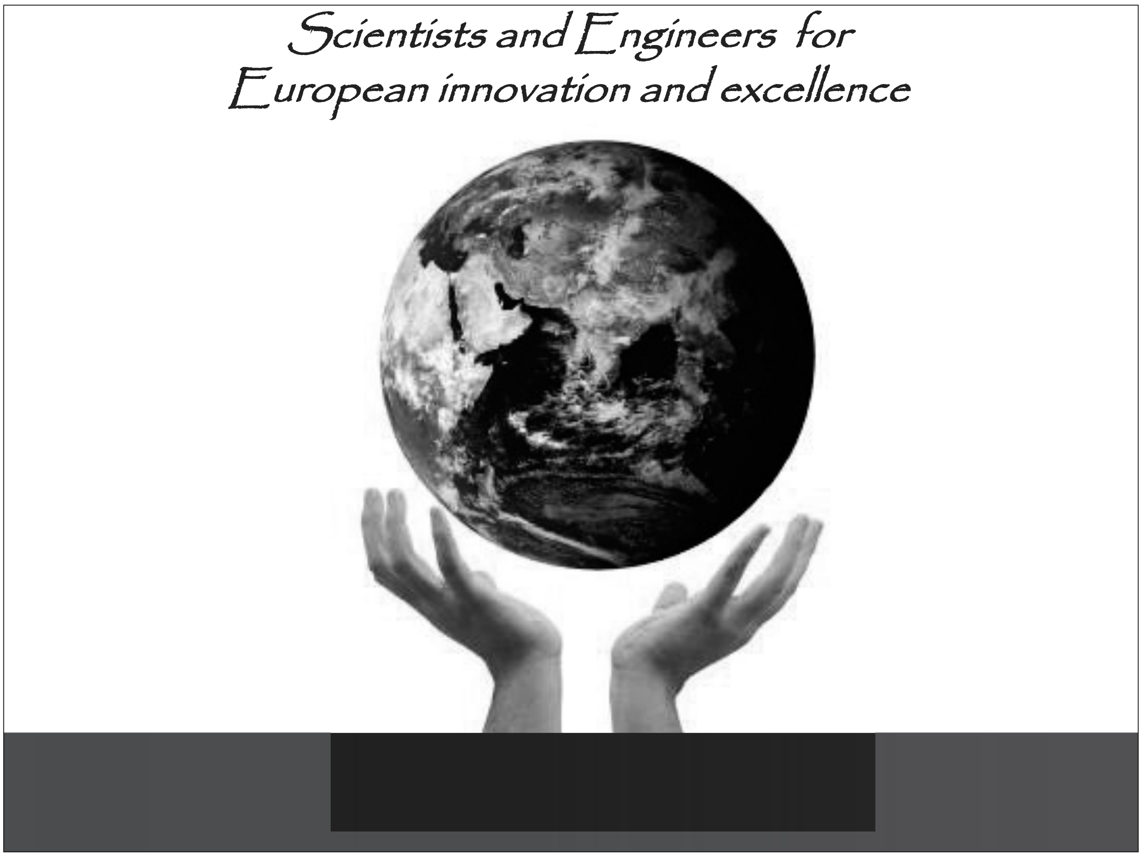
SMETHODS

SMETHODS teams up 7 European academic institutions that are leaders in optical design to provide top-experts as instructors for the different course modules.

Thanks to the support of the EU we can provide these training sessions for free!

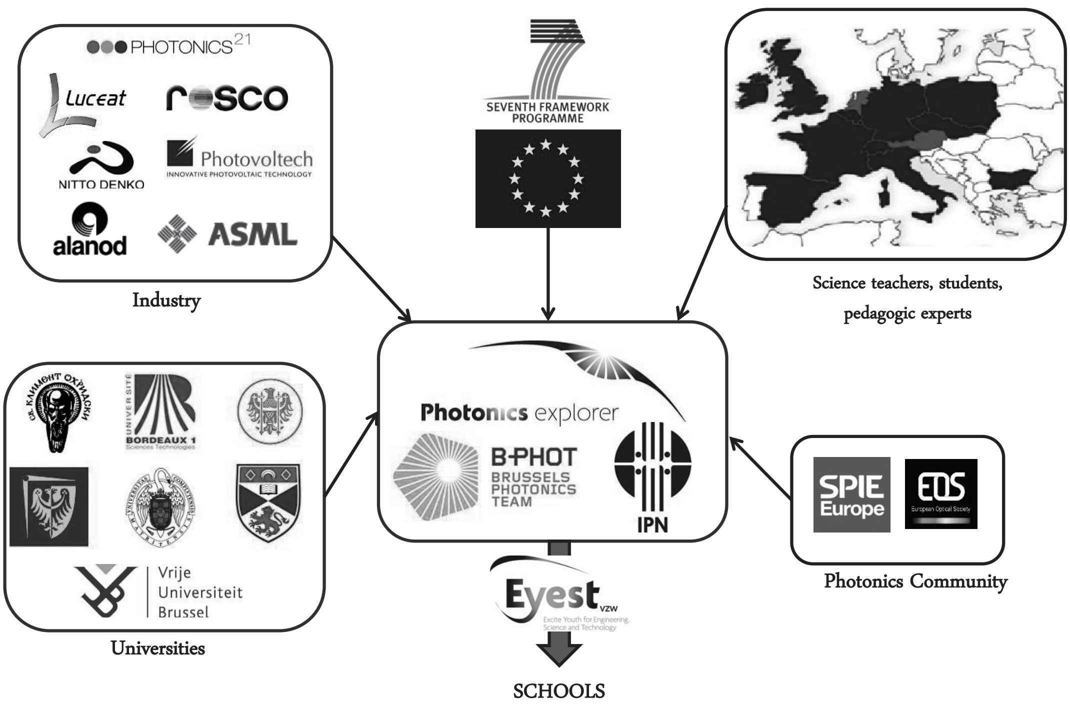
TUDelft · Vrije Universiteit Brussel · ИТМО · INSTITUT d'OPTIQUE GRADUATE SCHOOL · POLITÉCNICA · UNIVERSITY OF EASTERN FINLAND


Do you want to improve your optical design skills?
WWW.SMETHODS.EU


Scientists and Engineers for
European innovation and excellence

The Photonics Explorer: engage, excite, educate
A comprehensive , intra-curricular class kit

Pan -European Public Private Partnership



Our Ambition: Pan European impact

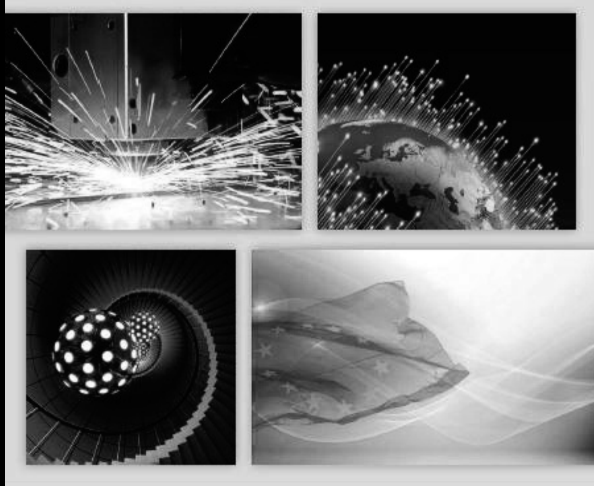
10,000 Photonics Explorer
= half a million students per year
over 2.5 million students across Europe
over next three years

Eyest VZW
Excite Youth for Engineering, Science and Technology

- Effective Members
- Regional/Local Sponsors
- Global Sponsors

TOWARDS 2020 – PHOTONICS DRIVING ECONOMIC GROWTH IN EUROPE

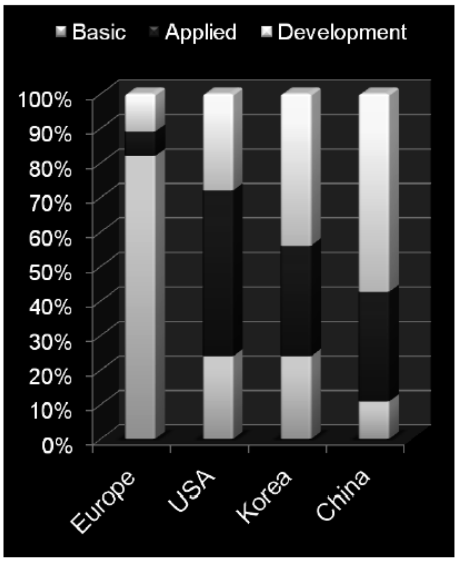
Multiannual Strategic Roadmap 2014 – 2020



PHOTONICS21

PHOTONICS[21]

Our Analysis: Europe is lagging funding along the Value Chain



Source: KET Report: Strategic focus on applied research and development

Benchmarking

- ► Many of Europe's competitor nations have a focus on translating basic science via technology building blocks into advanced processes, products and systems

Our Recommendations

- ► Excellent R&D results – we have a world leading position

➔ Continue – stay at the forefront

- ► Our weakness – "Valley of Death"
  - slow transition from photonic inventions to industrial deployment
  - not sufficiently materializing on our scientific success & excellence

➔ The Challenge – include Value Chain

PHOTONICS[21]

Message was heard: Horizon 2020 extends Scope of Funding

Horizon 2020 foresees funding towards market readiness and commercialization

TRL1: Basic principles observed	TRL2: Technology concept formulated	TRL3: Experi-mental proof of concept	TRL4: Techno-logy vali-dation in lab	TRL5: Tech. vali-dation in relevant en-vironment	TRL6: Demonstra tion in rele-vant en-vironment	TRL7: Demonstra tion in ope-rational en-vironment	TRL8: System complete and qualified	TRL9: Success-ful mis-sions operations

KET Report: The Technological Readiness Level (TRL)

FP 7 ended funding prior product development

I Disruptiv Research

II Applied Research

III Pilot Production or Demonstration Project

Manufacturing

Product idea

Prototype

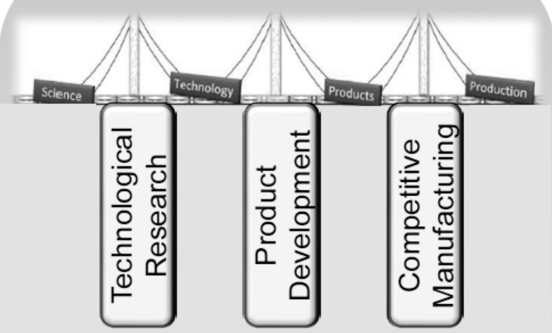
First test product

Commercial end products

Fostering Innovation by an Integrated Value Chain Approach

PHOTONICS21

Recommendations: A 3-Pillar Bridge across „Valley of Death"



According to: High Level Expert Group on Key Enabling Technologies – Final Report, July 2011

- **Technological Research**
- making technologies competitive on world level
- arising from basic research & scientific excellence
- protected by a single and efficient EU patent

- **Product Demonstration**
- making products competitive on global level
- putting pilot lines & prototype facilities
- enabling fabrication of a significant quantity

- **Competitive Manufacturing**
- making advanced manufacturing competitive on global level
- master solutions tackling societal challenges
- scale up for progress on learning curve enabling competitive price

PHOTONICS21

Our Integrated Approach in a PPP to bridge the Innovation Gap

- **Disruptive and Road-Map based Core Photonic Technologies**
  - Roadmap-based research – value chain approach, involvement of end users
  - Disruptive technology - breakthrough advances for disruptive research
- **Demonstration Programmes**
  - Deployment programmes to leverage EU infrastructure to create jobs..
  - Coordinated market pull/push measures seed and accelerate market penetration
- **Photonics Manufacturing Platforms – Manufacturing in Europe**
  - Generic photonic foundries – improve infrastructure for photonics manufacturing
  - Establish public-private pilot production facilities for industry/research
- **Innovative Photonics SMEs**
  - "Light touch' open schemes
  - Fast-track funding allowing prototyping & short-term commercialization
- **Support Actions**
  - Education, training and skills development
  - Standardization & International Cooperation & Outreach.

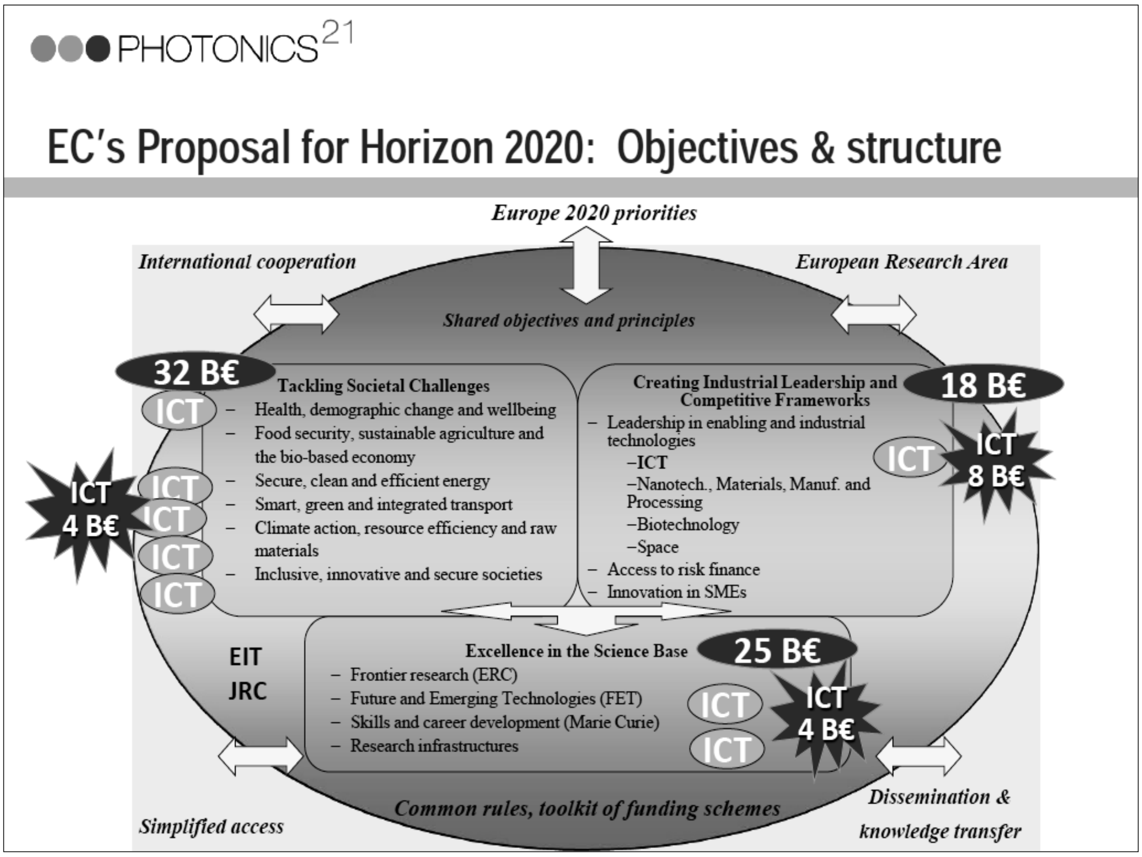
Founding a Photonics PPP in Horizon 2020 – Our Targets

What we expect and advocate

- ► Long-term commitment in funding
- ► Partnership at eye level
- ► Significant budget that reflects the means of Photonics as a KET
- ► Lean, simple and efficient structures

What we offer

- ► Investing in Europe's long-term competitiveness and growth
  - 4:1 leverage EU funding by private investment ➔ ~ 7 bn Euros
  - 70,000 – 100,000 additional jobs in Europe
- ► Measure success by Key Performance Indicators (KPIs)


PHOTONICS21
EC's Proposal for Horizon 2020: Objectives & structure
Europe 2020 priorities
International cooperation
European Research Area
Shared objectives and principles
32 B€
Tackling Societal Challenges
– Health, demographic change and wellbeing
– Food security, sustainable agriculture and the bio-based economy
– Secure, clean and efficient energy
– Smart, green and integrated transport
– Climate action, resource efficiency and raw materials
– Inclusive, innovative and secure societies
ICT
ICT
ICT
ICT
ICT
ICT 4 B€
Creating Industrial Leadership and Competitive Frameworks
18 B€
– Leadership in enabling and industrial technologies
–ICT
–Nanotech., Materials, Manuf. and Processing
–Biotechnology
–Space
– Access to risk finance
– Innovation in SMEs
ICT
ICT 8 B€
EIT
JRC
Excellence in the Science Base
25 B€
– Frontier research (ERC)
– Future and Emerging Technologies (FET)
– Skills and career development (Marie Curie)
– Research infrastructures
ICT
ICT
ICT 4 B€
Simplified access
Common rules, toolkit of funding schemes
Dissemination & knowledge transfer

OECD Outreach Workshop on

Smart Specialisation: Its Extension to East Asia

Biography of the Chair & Panelists

Session III Round Table Session

April 3 (Wed) 17:00- 18:00

Session Chair

PATRICK VOCK

Vice chair, OECD-CSTP
State Secretariat for Education, Research and Innovation SERI
Strategy and Planning
Federal Department of Economic Affairs, Education and Research, Switzerland

Switzerland is among the leading countries in science, technology and innovation (STI) performance and recognizes the vital importance STI plays in economic growth and societal development.

Mr. Patrick Vock has long served in this thematic context and is currently heading the strategy and planning unit of the State Secretariat for Education, Research and Innovation (SERI) in Switzerland. He is responsible for the four year plan, which comprises the goals, the measures and the financial means of the Swiss federal policy in education, research and innovation.

Mr. Vock is currently Vice Chair of the Committee for Scientific and Technological Policy (CSTP) of the OECD. Between 2007 and 2012 he served as Chairman of the CSTP Working Party on Innovation and Technology Policy (TIP).

Earlier, he has been the Director of the Center for Science and Technology Studies, which was affiliated with the official advisory body of the Swiss government in matters dealing with higher education, science and innovation policies.

He holds a Master's degree in economics from the University of Zurich (1990). Following his postgraduate studies in European affairs at the College of Europe (Bruges), he has been involved in several studies and publications in the STI field.

Panelist

RAINE HERMANS

Director of the Unit for Strategic Intelligence, Tekes
The Finnish Funding Agency for Technology & Innovation, Finland

Raine Hermans is the Director of the Unit for Strategic Intelligence at Tekes since the beginning of 2010. The unit is in charge of knowledge management, including impact analysis, funding of innovation policy research, and foresight services. Dr. Hermans started as the Director of regional networks at Tekes in September 2007. The regional networks consist of 14 technology development departments all over in Finland. One of his most important challenges was to coordinate synchronizing the distinctive regional strategies together and with the national one of Tekes'.

Prior to joining Tekes, he acted as a visiting professor (managerial economics of biotechnology) at the Kellogg School of Management, Northwestern University, Illinois USA, since the beginning of 2006. Dr. Hermans has also led a group of multidisciplinary corporate and industry analysts for several years with Etlatieto Ltd and ETLA, the Research Institute of the Finnish Economy. He has hold positions of chairman and member of the board in fields of education and health industry, and the CEO of Regiofacta Ltd providing consultant services on geographic information systems. He has been the adjunct professor with the Aalto University School of Economics since 2009, specialized in innovation management and valuation of intangible assets.

Panelist

JEONG HYOP LEE

Research Fellow, Director of the Center for STI Development
Science and Technology Policy Institute (STEPI), Korea

Jeong Hyop Lee received his PhD on economic geography from the Seoul National University and is a Director of the Center for STI Development at the Science & Technology Policy Institute (STEPI) in Korea. Before he joined the STEPI, he worked for the Korea Information Society Development Institute (KISDI). He has published many articles, books and policy reports on the issue of science, technology and innovation and he has actively engaged in the various planning and evaluation committees of the major programs in Korea. Some programs are the Enterprise City Program of the Ministry of Construction & Transportation, the Techno-park Program of the Ministry of Knowledge Economy, and the Research Hospital and Medi-Cluster Program of the Ministry of Health and Welfare. He has also served as a full time advisor for the Korean Presidential Committee on Northeast Asian Business Hub (later Presidential Committee on Northeast Asian Cooperation Initiative) where he led the sub-committee on cluster and national innovation systems. He also has various consulting experiences for developing countries. He helped the Vietnamese Ministry of Science and Technology to prepare the five year S&T plan and provided a master plan of industrial technology centers for the Egyptian Ministry of Industry and Technology. He was also invited to contribute to the feasibility study on Uzbekistan Special Economic Zones. And he has experience working with various international organizations such as OECD, the World Bank, APEC, UN agencies, etc. He recently initiated a three year consulting project on innovation system diagnosis and STI strategy development for least developed countries with the financial support of UNDP and in partnership with the Asian and Pacific Centre for Transfer of Technology under UN ESCAP.

OECD Outreach Workshop on

Smart Specialisation: Its Extension to East Asia

Biography of presenters,
Abstracts & Presentations

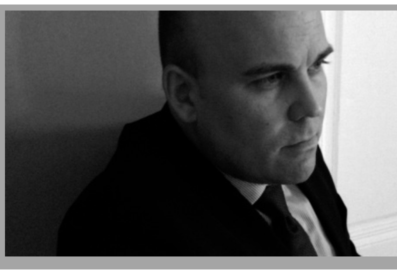
Session IV Lessons Learned from the OECD – TIP Project on Smart Specialisation

April 4 (Thur) 08:30 – 10:15

Session Chair

ARMIN MAHR

Senior policy expert & Public manager for STI,
Austrian Federal Government
Vice-chair of OECD Working Party on Innovation and Technology TIP



Armin Mahr is a senior policy expert and public manager for science, research and innovation in the Austrian federal government, Vienna. He is the vice-chair of the OECD Working Party on Innovation and Technology Policy (TIP) and has been among the initiators of the OECD project on smart specialisation 2011-12. In the Austrian Federal Ministry of Science and Research (BMWF), he is heading a new strategy unit for location-based policies, promoting smart specialisation, the dialogue for co-ordinating national and regional innovation policies, and a priority role of science and research in the European Structural and Investment Funds 2014-20.

Armin Mahr has been involved in country reviews of the innovation system, and in the formulation of the Austrian national research, technology and innovation strategy 2011-20. 2007-08, he directed a nation-wide stakeholder dialogue that identified development priorities for the national research and innovation policy.

Session IV-I Findings for the OECD Project and Implications for STI Governance

INMACULADA PERIANEZ-FORTE

Consultant, Country Studies Division
Directorate of Science, Technology and Industry, OECD

BIOGRAPHY

Inmaculada Perianez-Forte is a consultant in the Country Studies Division, Directorate of Science, Technology and Industry at the OECD. Inma has coordinated the OECD Smart Specialisation project, in which 12 OECD countries and 15 regions participated and co-author the Synthesis Report on Smart Specialisation. Previously, she worked for the Institutional Management of Higher Education Institutions Division in the Directorate of Education at the OECD. Inma Perianez has been seconded to the OECD from the Knowledge Agency in Andalusia where she co-author the Andalusia self-evaluation report on Higher Education in Regional and City Development. Inma has a law degree from the University of Seville, Spain, an LL.M in European Legal Studies from the University of Bristol, an MSc in Regulation from the London School of Economics and a Masters in Management, Evaluation and Planning of Innovation at the International University of Andalusia.

PRESENTATION ABSTRACT

This session will present the final OECD report on Smart Specialisation which brings together the key findings from the OECD project on “Smart Specialisation Strategies for Innovation-driven Growth”. The presentation will focus on the new governance challenges for policy makers in designing strategies for smart specialisation. It will present some new institutional arrangements as good practices examples of STI governance for Smart Specialisation.

FINDINGS FOR THE OECD PROJECT AND IMPLICATIONS FOR STI GOVERNANCE

Inmaculada Periañez Forte

Country Studies and Outlook Division
Directorate of Science, Technology and Industry
4 April 2013, Gwangju

OECD
BETTER POLICIES FOR BETTER LIVES

Outline

- **Contents and context of the OECD report.**
- **Practical definition of smart specialisation (SmSp) for strategy development.**
- **Characteristics of SmSp.**
- **Strategy Development.**
  - Leadership for SmSp.
  - Metrics and tools for SmSp.
  - Governance for SmSp.
- **Insights from concrete examples.**
- **Conclusions.**

Content and context for the OECD report

- Smart specialisation potential for growth and social cohesion.
- But how to do this in practice?
- OECD report provides answers and examples for how such smart specialisation strategies can be developed.
- Not only for regions in the EU, but from other OECD countries (e.g. US, Korea, Australia).

Definition in Practice

- *What?* Smart specialisation is a regional strategy for knowledge based growth by promoting structural change in the economy.
- *How?* through priority investments in knowledge-based assets and better governance in innovation policy making.
- *Where?* At regional level but links to national policies, international positioning.
- *Time?* Strategies are long-term but have short and medium term goals.

Characteristics of Smart Specialisation

- **Prioritization of certain activities (not sector or industries):** in public policies, R&D and knowledge investment in regions.
- **Entrepreneurial discovery process:** based on an interactive process between the public and private sector to identify the most promising activities.
- **Aim to building sustainable clusters** with dynamic comparative advantages.
- **Promotion of key enabling technologies.**

Characteristics of Smart Specialisation

- **Strategic and specialised diversification:** creation of new activities and differentiation of services/products in global markets (comparative advantage).
- **Openness to other regions** to identify synergies and/or complementarities.
- **Evidence-based monitoring and evaluation** and to feed-back into policy design.

Strategy Development

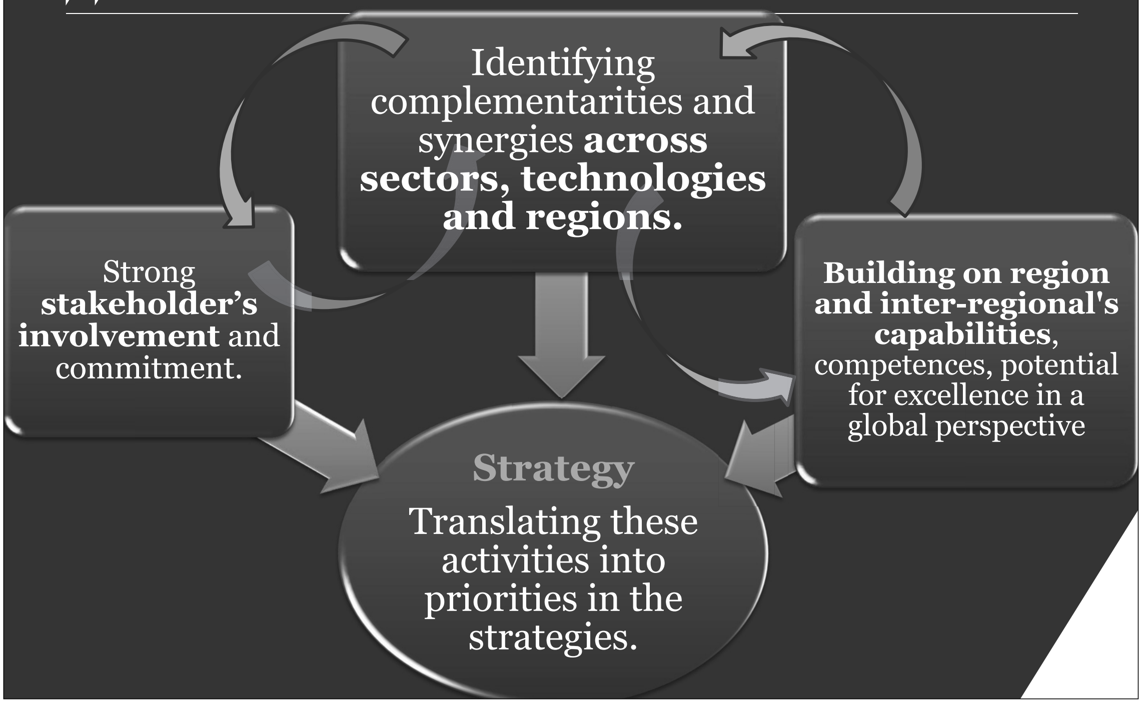
Who starts?

- Lead actors from companies, agencies, research institutions, national or regional authorities.
- Highly skilled across regions, sectors, technologies and disciplines.

How?

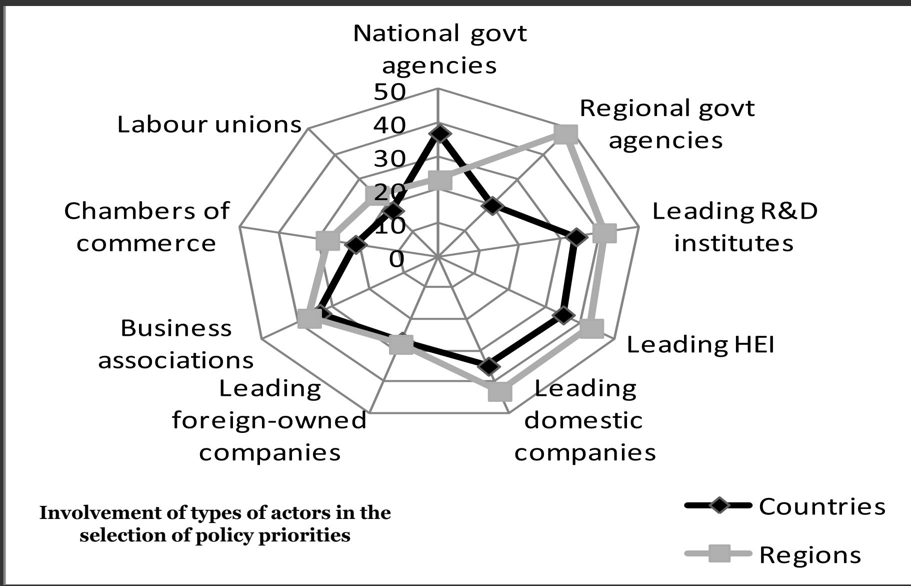
- Ensuring mechanisms to detect 'entrepreneurial bottom-up initiatives'.
- Encouraging governance innovation and experimentation.
- Empowering stakeholders in the designing of the smart specialisation strategies.

Strategy Development



What does Smart Specialisation require?

Strong leadership and stakeholders‘ involvement.

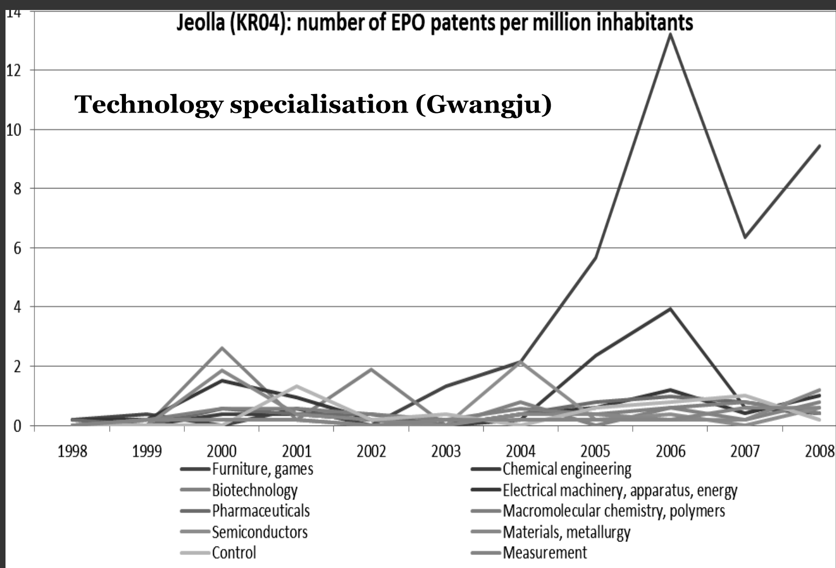


Involvement of types of actors in the selection of policy priorities

Source: OECD-TIP

What data is needed to support policy makers to assess the potential of emerging activities?

Advanced Specialisation Indicators.



Source: ECOOM

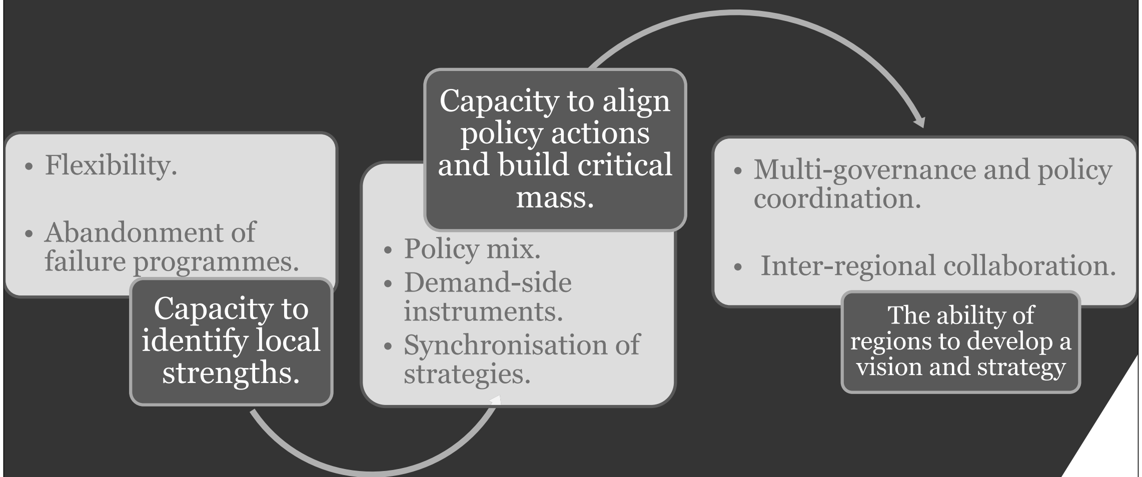
What tools can be used to capture the 'entrepreneurial knowledge' embedded in the region?

New diagnostic tools for mobilising and profiling regions.

- **Efficient eco-system management,** increasing multidisciplinary and cross-sectoral key actors.
- **Mapping exercises** of multidisciplinary expertise, technologies, etc.
- **Web consultations** to reach the society and users of services and products.

What STI Governance is needed for Smart Specialisation?

Strategic Capacities to seize emerging activities



How can policy makers support Smart Specialisation?

Linking policy instruments to priorities

- Simplifying or de-fragmentising policies.
- Developing flexible policy tools to ‘shift’ public support towards new priorities .

Promoting policies for entrepreneurial discovery.

- Providing incentives for entrepreneurs.
- Building inter-regional linkages.

Using policy intelligence

- Promoting participatory Foresight exercises.
- Developing monitoring and evaluation systems

Regional examples of:

Stakeholder’s involvement:

- **Intensive industry-public government dialogue** to use existing regional competencies in a new industry (Andalusia).

- **Regional panels** to harmonise national and regional policy goals (Australia and Finland).

New STI governance models:

- **Cross-border collaboration:** Brandenburg and Berlin (Germany) have developed an inter-regional innovation strategy.

New diagnostic tools:

- **Online platforms** to involve citizens in the prioritisation process (Poland).

Conclusions

Smart Specialisation is about:

- A concentration of public investments in R&D and knowledge on particular activities in regions.
- Economic transformation of regions based on strategies that link actions to objectives.

New challenges to policy makers:

- Loosely defined 'activities' & technology domains.
- New governance models (across departments, regions).
- Existing quantitative data is limited to past and present specialisation.
- Rapid adjustment of strategies to the changing conditio

Conclusions

Strategy development requires:

- Moving away from the "avoid picking winner" dichotomy: make priority setting smarter through stakeholder involvement and better policy intelligence.
- 'Entrepreneurial discovery' policies.
- Strategic governance.
- New diagnostic tools and sound monitoring and evaluation systems.

Thank you!

Inmaculada.perianez-forte@oecd.org

Session IV-2 Smart Governance for Smart Speicalisation Strategies: Lessons from OECD Case Studies

PATRIES BOEKHOLT

Managing Director
Technopolis Group, The Netherlands

BIOGRAPHY

Patries Boekholt is Managing Director of the Technopolis Group. She has worked on the topic of research and innovation policy for over 20 years. Her assignments are at the interface of public research, the private sector and government, and include studies, evaluations and strategic advice. She has led large studies on topics such as cross-border co-operation, the socio-economic impact of research infrastructures and the impact of the European framework programmes. She currently works on smart specialisation, joint programming and public procurement for innovation. She has worked in many European countries and for international organisations such as the European Commission, the OECD and UNIDO.

PRESENTATION ABSTRACT

It will build on the key findings from the CSTP Activity on Smart specialisation strategies (S3) for innovation driven growth, carried out under the auspices of the OECD's Working Party on Innovation and Technology Policy (TIP). Within this project special attention was paid to new governance challenges for policy makers. S3 asks for new coordination mechanisms between multi-levels of governance at various geographical levels, (in particular between regional and national policies) and between government departments and agencies working in different policy domains. It also asks for new policy tools to facilitate and support the entrepreneurial initiatives from stakeholders. As part of the OECD project, 15 countries and regions developed case studies on the basis of concrete smart specialisation examples. This provided interesting lessons for practical approaches and tools to support entrepreneurs, companies, research organisations, clusters and policy makers to develop and implement strategies for renewal and future economic growth. The presentation will discuss the key lessons on governance and policy from the OECD-TIP project.

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Smart governance for smart specialisation
Lessons from OECD case studies

Dr Patries Boekholt
Managing Director Technopolis Group

Gwangju,
April 3-5 2013

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This presentation

- Focus on the 17 case studies in the OECD project
- Specific focus on governance and entrepreneurial discovery
- Policy lessons from case studies

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17 cases studies in OECD initiative

Thematic (vertical)	Generic (horizontal)
• Photonics (Gwangju)	• Lower Austria (AT)
• Nano-for-Health (Flanders)	• Upper Austria (AT)
• Sustainable Chemistry (Flanders)	• Brandenburg (DE)
• Aerospace Andalusia (ES)	• Basque Country (ES)
• Automotive Marmara (TR)	• Estonia
• Automotive (UK)	• Eindhoven Brainport (NL)
• Grain Industry (AUS)	• Lahti (FI)
	• Malopolska (PO)
	• South Moravia (CZ)
	• Melbourne South East (AUS)

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What did we learn from the case studies?

- Impressive set of examples on innovation strategy processes in the OECD-TIP case studies
  - *De facto many regions/nations already have some form of S3*
  - *Every case shows strong path dependency in terms of competences, sectors, institutions, assets etc...*
  - *Changing direction in favour of structural economic changes not easy nor fast*
- The **prioritisation process** is still controversial in many regions & nations
  - *Prioritisation = making choices*
  - *Limited resources => not support every initiative*
  - *Who makes those choices and on which criteria?*
  - *Only limited examples of 'exit strategies' from old specialisations*

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Governance in the case studies

- The time of developing top-down innovation strategies 'from a policy makers desk' seems over
  - *Many examples of stakeholder dialogues (triple-helix networks, web-based consultations, stakeholder events, advisory boards, facilitation of road mapping by stakeholders, etc...)*
- Balancing **top-down and bottom-up** prioritisation a delicate exercise
  - *Often parallel prioritisation processes from competing actors*
  - *Difficulty to go beyond status quo and well organised groups*
  - *Needs sufficient room for experimentation and fledgling clusters*
  - *Inclusiveness and societal challenges need a voice as well*
- The challenge for policy makers is to develop sound **criteria for selection of priorities** based on evidence

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Entrepreneurial discovery process (1)

- Today innovations are rarely the outcome of one 'entrepreneurial genius' coming up with an invention
  - *Today our understanding of innovation relates to social processes*
  - *Relies on making combinations between technologies (e.g. mechatronics and biomedicine) and cross-fertilisation*
  - *Relies on combining technologies, with new customer services, design and new business models*
  - *Relies on the power to organise, network and taking leadership in this process*
- Thus: the entrepreneurial discovery process that has **the scale and impact** to affect the region is likely to come from a combination of entrepreneurial individuals and organisations rather than from individual entrepreneurs

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Entrepreneurial discovery process (2)

- Various actors can be the **originator and driver** of the discovery process
  - *Entrepreneurial individuals*
  - *Innovative companies*
  - *A network of companies -> Green building cluster Lower Austria*
  - *An institution that has a mobilizing role in knowledge creation and dissemination -> IMEC in the NfH case*
  - *Visionary policy makers -> UK gov. Ultra Low Carbon Vehicles*
- Needs a considerable level of **'self-organisation'** of these actors
  - *But also support to maintain the momentum*

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Policy instruments for S3

- The **key policy instruments** for smart specialisation are already in place in the today's portfolio of innovation policies.
  - *The challenge is to find the appropriate policy mix suitable for the dynamic clusters*
  - *Policy instruments need to be adjusted to specific specialisations (eg regulation, public procurement, financial support, research centres)*
- **New tools** to encourage the entrepreneurial discovery process
  - *Tools and mechanisms to support agenda setting, market and technology searches, networking by the stakeholders -> government as facilitator of processes*
  - *New diagnostic tools for policy makers to use evidence*

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Multi-level governance

- The alignment of **regional and national** strategies needs further improvement in most case studies
  - *Examples of 'splendid isolation'*
  - *Examples of going in similar directions*
  - *Few examples of reinforcing national and regional strategies*
- **Cross-border** collaboration, an essential element of the smart specialisation philosophy, is high on the policy agenda but still faces various practical bottlenecks
  - *In Europe mostly cross-border funding an issue*
- **Horizontal alignment** between policy domains (eg innovation policy and regulation in environment)
- **Evaluation and monitoring** of smart specialisation still 'work in progress'

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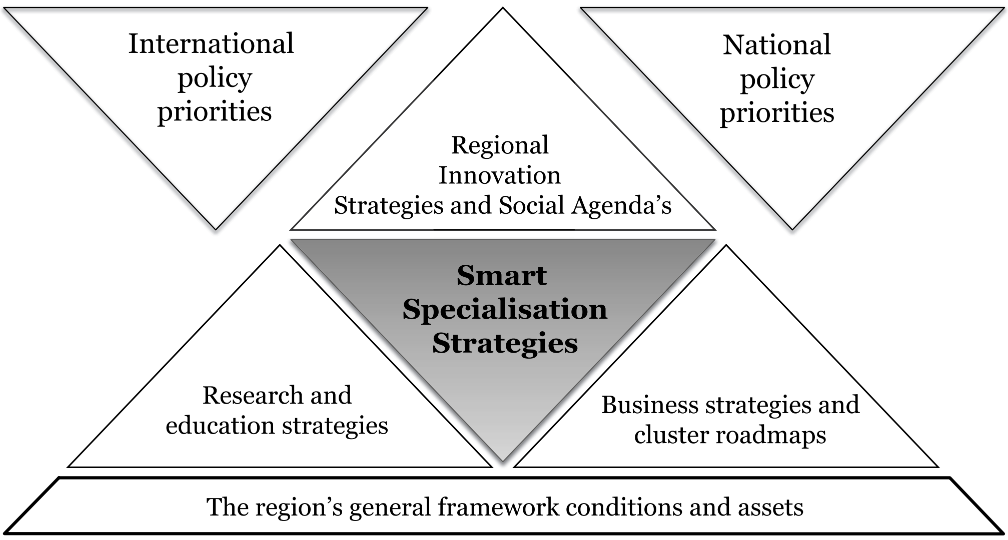
Challenge is to bring governance levels together



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Conclusions

- The S3 debate has reached a strong political momentum mostly due to the incorporation in Cohesion Policy in Europe
- Work still needs to be done to translate the discourses into practical strategies and tools for policy makers
- Needs a reality check in terms of the expectations of a purely rational and evidence based approach -> too much path dependency and social interests involved
- In view of the economic and financial crisis and a set of grand societal challenges: there is an urgent need to align and coordinate governance level more closely to make step changes

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Thank you

Further information;
patries.boekholt@technopolis-group.com

technopolis |group| has offices in Amsterdam, Ankara, Brighton, Brussels, Frankfurt/Main, Paris, Stockholm, Tallinn and Vienna

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Session IV-3 Smart Specialisation in Lower Austria

IRMA PRIEDL

Head of Innovation and Technology,
Regional government of Lower Austria

BIOGRAPHY

Irma Priedl works for the regional government. She was responsible for two very interesting topics at the same time. From 1980 to 1985, she was responsible as the Managing director at a health resort, where the Government was the shareholder of. At the same time, she began to develop her career in the area of innovation for Lower Austria, to ensure that it becomes the leading province in the country in the field of innovation and technology, where she continues to work.

In 2002, Lower Austria received the award of excellence for the start-up initiatives. In 2007, the regional government of Lower Asia were marked from the EC as the most innovation region in Europe. They were awarded for support schemes as the Technopol program in 2012 and 2013) and the Innovation assistant in 2008.

PRESENTATION ABSTRACT

Innovation as driver for growth has a long tradition in Lower Austria and there is experience in Smart Specialisation. The main lessons learnt from the OECD TIP Project can be concluded as:

- Based on strength, challenges and future potential it´s necessary to find specific fields for investment as we focus in Lower Austria on technology niches with the potential to grow. Regarding other regions, especially neighbouring regions we take into account already available know-how and competences in order to avoid duplication
- The main topic is not only to invest in basic research but to bring these knowledge into companies to create added value in the region in order to foster transformation and structural change
- Regions know the best what to do; so regions have to be involved in the process of defining the strategy and the implementation in order to meet regional specifications & needs. Close cooperation and coordination within the region as well as on local – regional – national – international (EU) level is a success factor of multi-level governance.
- Monitoring and evaluation are the guarantee for finding the right instruments and the best policy mix. The results should influence the continuous improvement process of implementing the strategy and its further development.
- Smart specialisation is a tool for sharpening the regional profile

Smart Specialisation in Lower Austria
Niederösterreich

Outreach Workshop on
Smart Specialisation Program
Session IV, 4th. April 2013

Irma Priedl

Regional Government of Lower Austria
Department for Economy, Tourism and Technology

Niederösterreich - facts and figures

area:		19.178 km²
population: 2011 (+5%)		1,615 Mio.
Person employed 2012: (+1,1%)		577.306
unemployment rate 2012:		4,6 %
economic growth:	2012:	1,1%
	2013P:	0,8 %
start-ups 2012:		7.424
Gross Domestic Product 2011:		€ 47,5 bil.
Contribution NÖ->AT:		15,8%
total exports: 2011:		€ 18,6 bil.
2010/2011:		+18,6%
R&D expenditures 2011		742 Mio
R&D share on GDP 2011		1,56 %

Niederösterreich: part of Vienna Region

Key challenges:

- Lacking critical mass in public R&D:
  Vienna as Austria's R&D hub in the middle of NÖ, but own province
- Lacking critical urban agglomeration:
  low population density - 83 people per km², capital St. Pölten only 50.000 inhabitants, > 410 km rural border region
- Highly diversified economy,
  no strong sectorial specialization
- Dominated by very small companies

Lower Austria needs to:

- Create its unique selling proposition, no duplication of other regions
- Collaborate with neighbor regions
- Create critical mass in R&D and Innovation in niche technologies
- Facilitate innovation also in rural areas, foster innovation capacity
- Encourage co-operations between instruments

3

One Answer: The Technopol Program

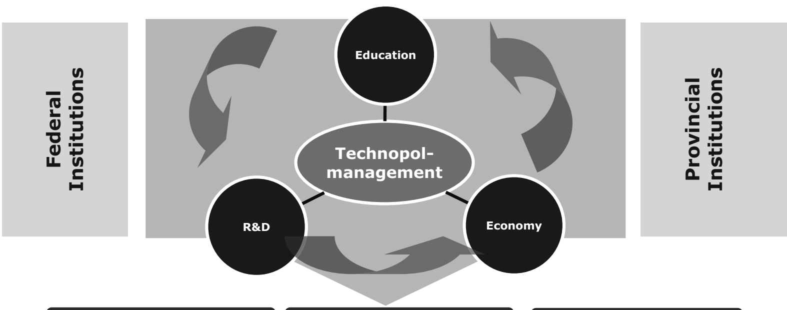
Start: 2004 to:

- Strengthen the regional strength and develop regional potentials
- Create critical mass in a selective way
- Involvement of all relevant actors and stakeholders due to Triple Helix Approach:

at one place -
in a specific field:

- ✓ R&D
- ✓ higher education
- ✓ economy

with synergetic emphases



R&D - Projects | Start up / Spin off | Know how Transfer

Technological site development

- Monitored by Balanced Scorecard Approach

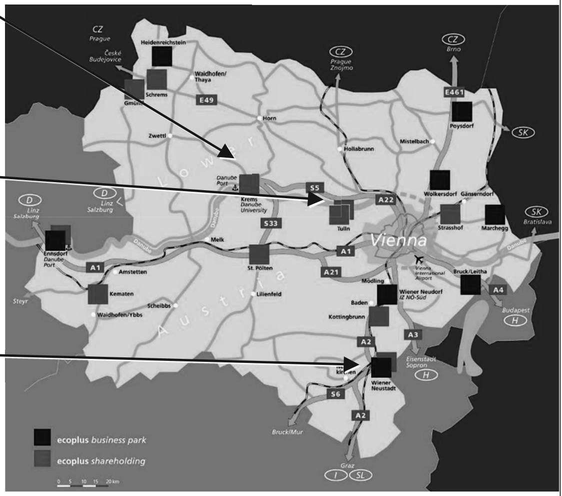
4

The Technopol Program - Locations

Technopol Krems:
Medical biotechnology
- focus: „regenerative medicine“
- e.g, extra corporal blood-purification, tissue engineering, cell therapy
- ICT -visual computing

Technopol Tulln:
Agro- and environmental biotechnology
- focus: plant- and animal-production, (bio)-analytics, natural materials technology, environmental biotech

Technopol Wr. Neustadt:
Medical and Material technologies
- focus: materials, sensors, tribology, medical-technology, surfaces



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Technopol Program - Objectives

- Strengthen applied research in Lower Austria.
- Strengthen the economic realisation in Lower Austria.
- Increase of added value at the technopols and in the province.
- Creation of employment with Start up´s and Spin off´s.
- Increase of name of recognition of Lower Austria as a land of technology

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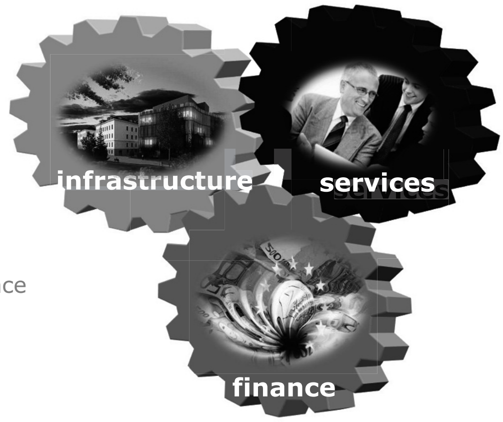
Technopol Program - Instruments

Technology Centers:
Krems: 5.900m²
Tulln: 3.500m²
Wr. Neustadt: 16.100m²

Campus in Tulln and Krems
University and Research Center in Tulln: 15.000m²
Universities of applied science



Technopol-manager:
Krems
Tulln
Wr.Neustadt

Accompanying Services for:
Start ups
Patents
Clusters

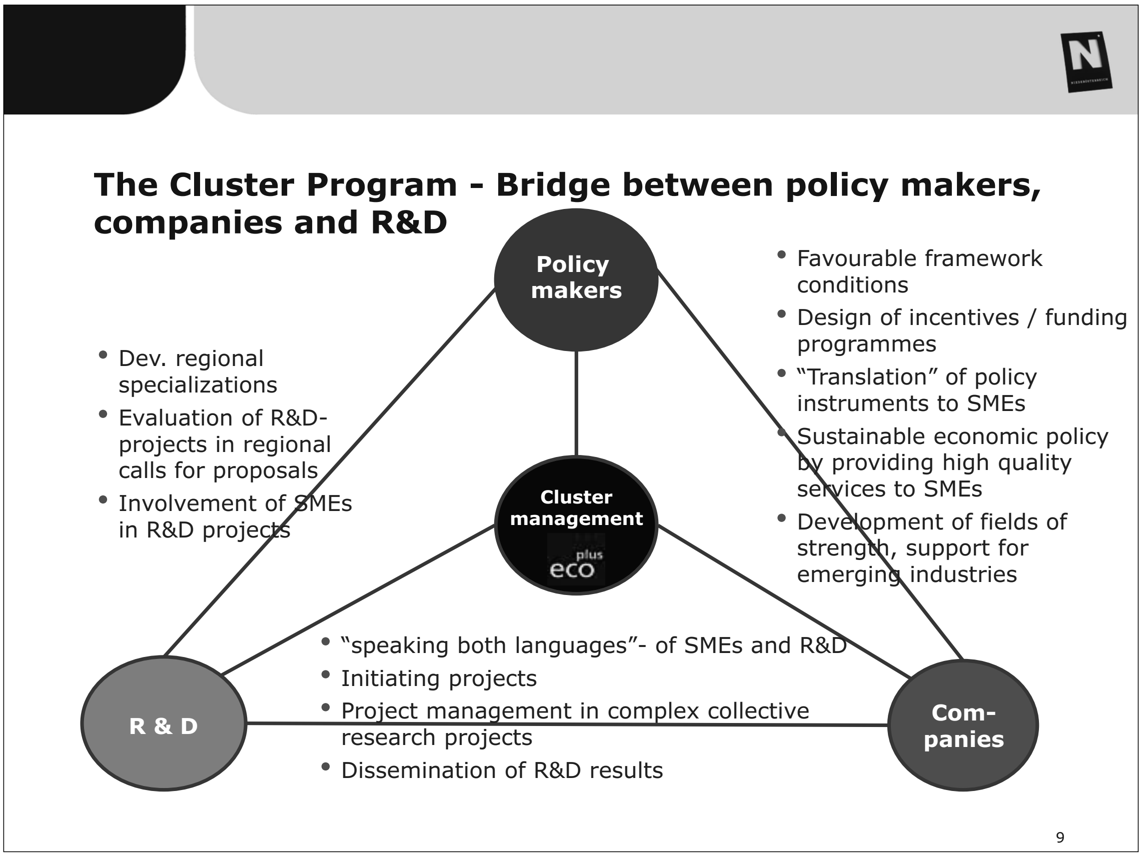
Financial support for Technopolprojects:
Regional (incl. ERDF), national and european funding schemes

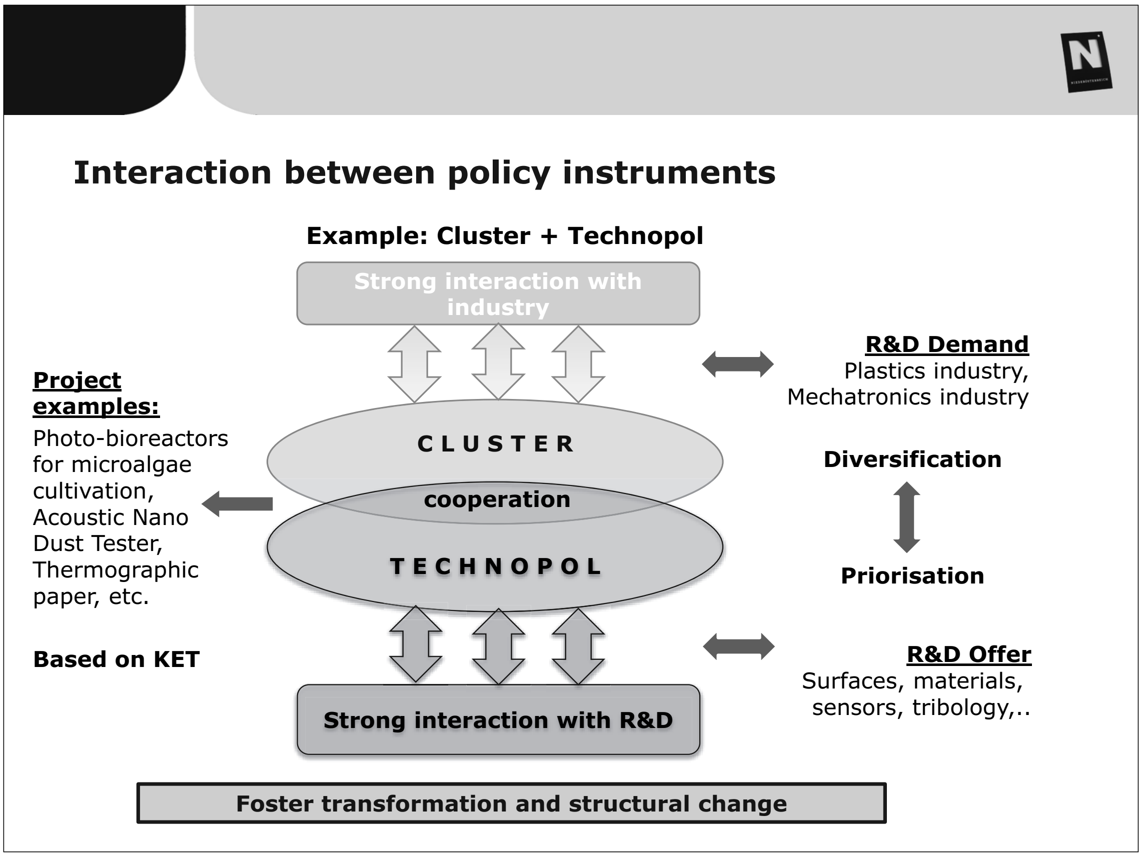
Another Answer: The Cluster Program

Advance through Collaboration
Lower Austrian Clusters & Network

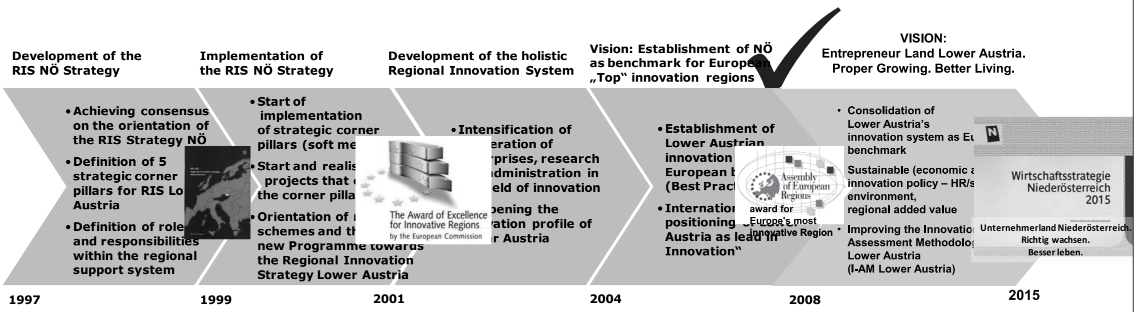
- **Green Building Cluster (2003)**
  - www.bauenergieumwelt.at
  - Focus: energy efficient construction and
  - refurbishment, healthy interior environments
- **Plastics Cluster (Lower Austria in 2005)**
  - www.kunststoff-cluster.at
  - Focus: bio-plastics
- **Mechatronics Cluster (2010)**
  - www.mechatronik-cluster.at
  - Focus: energy efficiency in production processes
- **Food Cluster (2006)**
  - http://www.lebensmittelcluster-noe.at/
  - Focus: food safety, regional und bio-products
- **Logistics Cluster (2008)**
  - www.logistikcluster.at
  - Focus: modal split, bundling (empty runs)
- **E-mobility initiative (2010)**
  - www.e-mobil-noe.at
  - platform for e-mobility activities and projects

8


The Cluster Program - Bridge between policy makers, companies and R&D
Policy makers
Favourable framework conditions
Design of incentives / funding programmes
"Translation" of policy instruments to SMEs
Sustainable economic policy by providing high quality services to SMEs
Development of fields of strength, support for emerging industries
Dev. regional specializations
Evaluation of R&D-projects in regional calls for proposals
Involvement of SMEs in R&D projects
Cluster management
eco plus
"speaking both languages"- of SMEs and R&D
Initiating projects
Project management in complex collective research projects
Dissemination of R&D results
R & D
Com-panies
9


Interaction between policy instruments
Example: Cluster + Technopol
Strong interaction with industry
R&D Demand
Plastics industry, Mechatronics industry
Project examples:
Photo-bioreactors for microalgae cultivation, Acoustic Nano Dust Tester, Thermographic paper, etc.
CLUSTER
cooperation
TECHNOPOL
Diversification
Priorisation
Based on KET
R&D Offer
Surfaces, materials, sensors, tribology,..
Strong interaction with R&D
Foster transformation and structural change

RIS³ - Regional Innovation Strategy

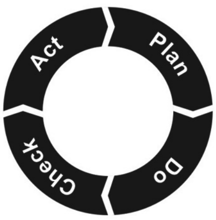


Based on

- SWOT
- Needs of clients / companies
- Trends and challenges
- Potential for excellence

Implemented

- Full commitment, Steering Committee



Steered by

- BSC, Balanced Score Card

Monitored and evaluated

- CIP, continuous improvement process

Integrated

- National/European

RIS³ - Governance

Level	Strategy	Responsibilities / co-ordinating bodies
EU	Europe 2020	EC DGs
National	National Strategic Reference Framework STRAT.AT	ÖROK (Austrian Conference on Spatial Planningthe co-ordinating body between the internal and the European level, drafting and strategic monitoring of STRAT.AT, www.oerok.gv.at)
	Strategy 2020 – Research, Technology and Innovation for Austria	Austrian Council for Research and Technology Development (www.rat-fte.at)
Regional	Regional Innovation Strategy (RIS3)	Regional Innovation System (RIS)

Regional Government Departments

Department of Spatial Planning and EU Regional Policy (ROP Managing Authority)	Department of Science and Research Policy (Science and higher education)	Department of Economics, Tourism & Technology (Coordination RIS)
Contact: Henriette Leuthner, Tel.: + 43 2742 9005 14245, henriette.leuthner@noel.gv.at	Contact: Martina Maria Höllbacher, Tel.: + 43 2742 9005 13047, martina.hoellbacher@noel.gv.at	S3 Contact: Irma Priedl, Tel.: + 43 2742 9005 16123, irma.priedl@noel.gv.at

Regional Agencies

Tourism / Location Marketing: Development and support of Tourism in Lower Austria	N-Vest, Investment: Equity, Venture Capital and Guarantees	ecoplus. The Business Agency of Lower Austria: Technology & Research, Clusters, Internationalization, Regional Support, Investor Services & Business Parks
Contact: Christoph Madl, Tel.: 02742 9000-19800, office@noe.co.at	Contact: Dr Doris Agneter, Tel.: 02742 9000-19300, office@tecnet.co.at	S3 Contact: Simone Hagenauer, Tel.: +43 2742 9000-19657, s.hagenauer@ecoplus.at

RIS Steering Committee:

- Regional Government Departments
- Regional Intermediaries/Representatives of Companies (Clusters, Technopols, Start-up supporters, Investment agencies, Chamber of Commerce, Federation of Industries, etc.)
- Representatives of regional universities and higher education

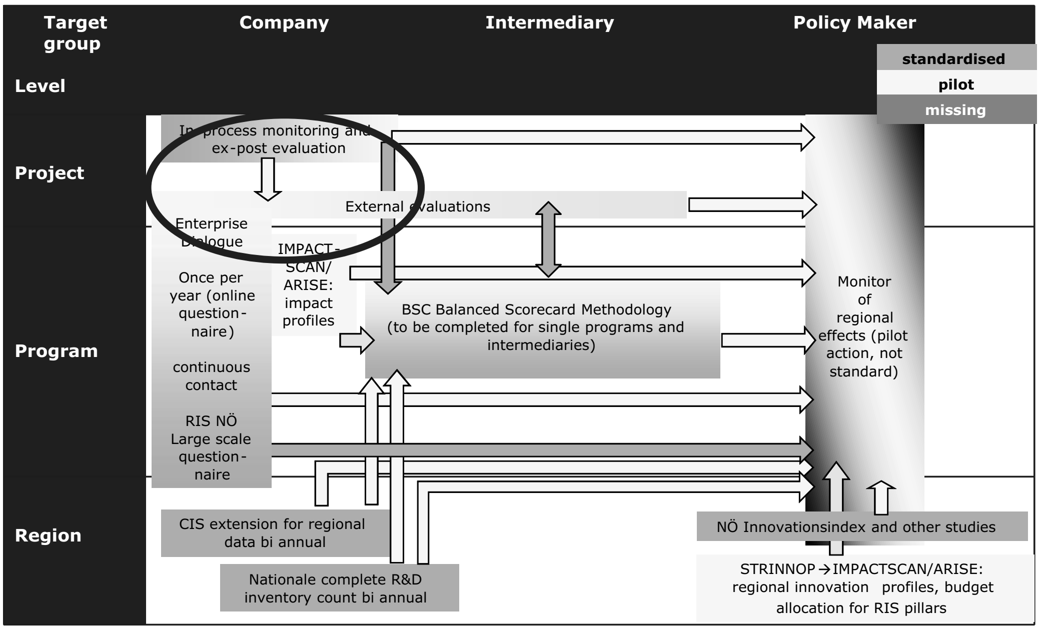
Companies:

Involved through

- Enterprise Dialogue,
- RIS large scale survey,
- regular contacts,
- indirect through Technopols and Clusters

S3 Strategy has to be under regional responsibility!

RIS³ - Monitoring and Evaluation

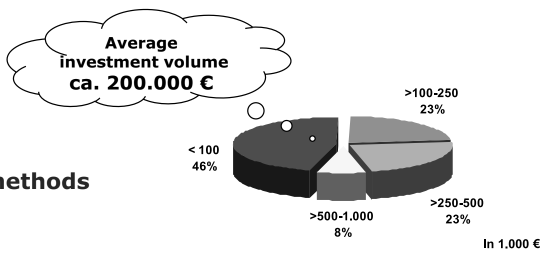


Results: Innovation Assistant, a funding scheme

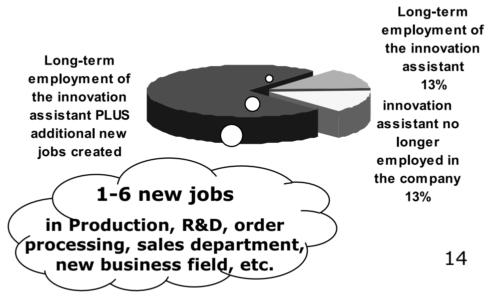
Monitoring and evaluation – some results:

- **Strengthening of competitiveness**
  - ca. 80 % innovative products / ca. 20 % innovative processes created during funding project
  - ca. 80 % significant technological improvements
- **Introduction of modern management methods**
  - More than 90 % improved their project management
  - Ca. 80 % organisational change activities
- **Stimulation of cooperation culture and know how transfer**
  - More than 50% established new long term cooperations, 50% improved collaboration with RTD and/or universities
- **Growth of the companies funded**
  - More than 85 % created new jobs
  - More than 70 % with rising sales
  - More than 50 % with rising earnings

Companies´ investments stimulated by the funding programme



Employment effect



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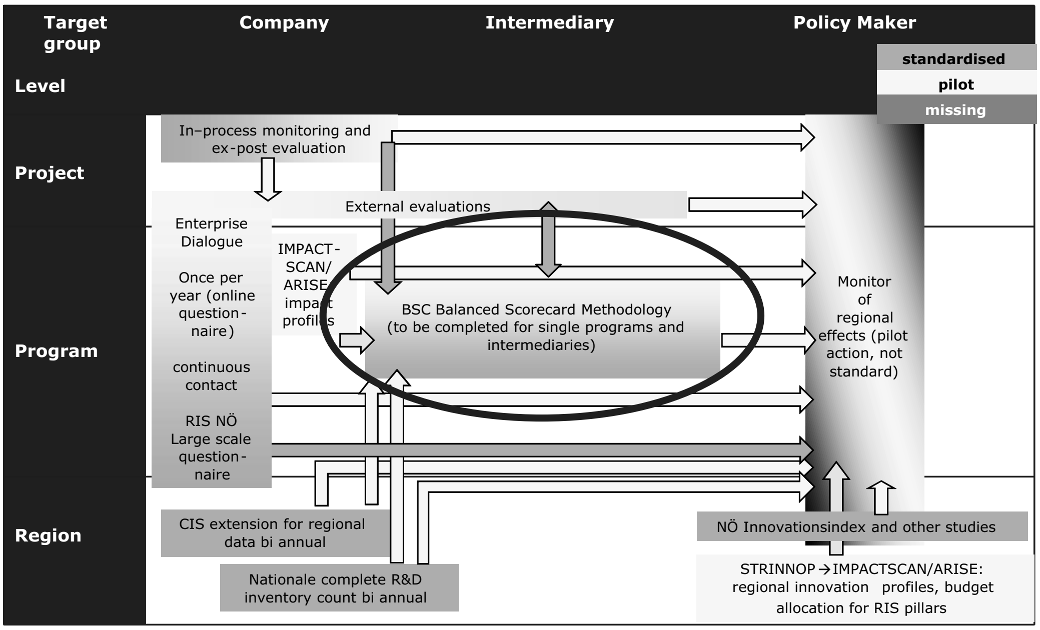
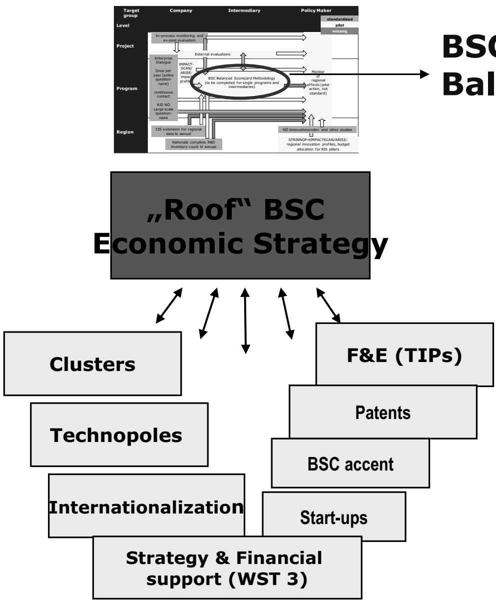
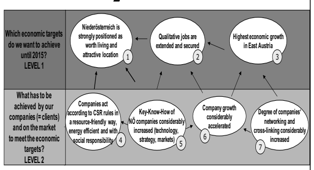
RIS³ - Monitoring and Evaluation



Monitoring Impacts of Regional Innovation Policy:



BSC -
Balanced Score Card



- Which economic objectives do we want to achieve by 2013?
- What do we need to do for our customers and in the market in order to reach these economic objectives?
- Which processes do we require to achieve excellence and to reach our customer, market and economic objectives?
- What must we learn and where must we innovate in order to achieve our process, market and economic objectives?

Measurable Indicators

Technopol Program - Measurable indicators

3 Technopol Locations since 2004	12/2012
Jobs in technology fields (on site)	1.976
Researcher on site	1.123
Patents	198
Scientific publications	1.975
Technology Center (rentable m²)	25.500m²
Investment in TCs since 2004	€ 72,7 Mio

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The Economic Impact of all Technopols in Lower Austria ?

- "Structural change translates into growth dynamics
  – but in a lagged manner"
- Quantitative analysis of the economic contribution of Technopols
- Direct and multiplier (indirect and induced) effects on value added, employment, tax revenues and social security contributions
- Effects on structural change

ECONOMICA

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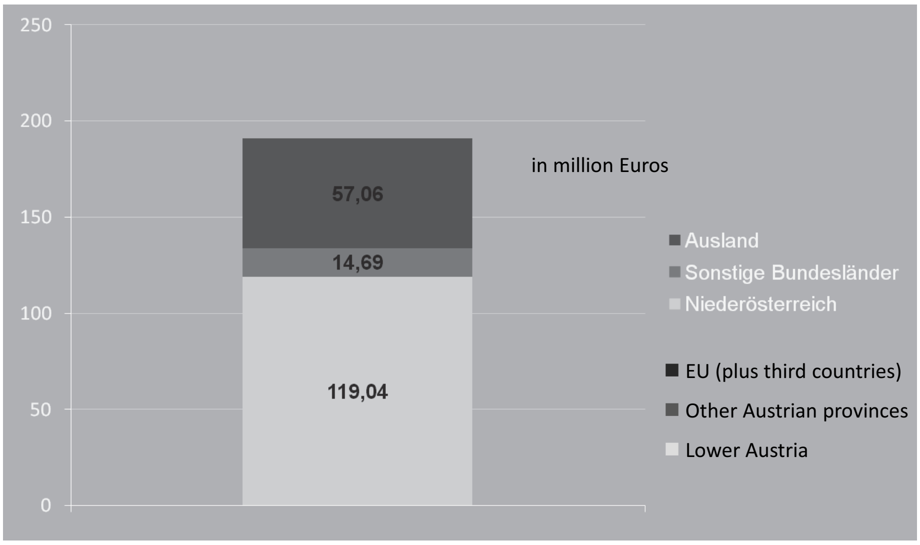
Overall Economic Effect - Gross Value Added



ECONOMICA

Economic Effect - Structural Change
Employees (excl. self-employed) by economic sector

	Change 2004-2009	All NÖ districts	Technopol districts
	Total	**9.24%**	**11.49%**
A	Agriculture, forestry, and fishing	-2.43%	-3.81%
B	Mining and quarrying	13.86%	27.74%
C	Manufacturing	0.68%	1.36%
D	Energy supply	15.44%	7.99%
E	Water supply	23.41%	24.14%
F	Construction	2.28%	3.50%
G	Wholesale and retail trade	8.26%	8.89%
H	Transportation and storage	-2.11%	-1.44%
I	Hotels and restaurants	9.39%	14.83%
J	Information and communication	19.96%	20.59%
K	Financial and insurance activities	13.10%	15.89%
L	Real estate activities	11.09%	17.96%
M	Professional services (scientific, technical)	23.84%	26.39%
N	Other services (administrative, support services)	22.30%	28.42%
O	Public administration	14.35%	15.72%
P	Education & childcare	31.71%	39.62%
Q	Healthcare and social work activities	15.20%	12.13%

ECONOMICA

Conclusions: Example Technopol:

- Technopols enhance **regional value** creation chains and networks
- Technopols support the **structural transformation** of the Lower Austrian economy
- Technopols promote the creation of a **knowledge-intensive economy**

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Any Questions ?

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INNOVATION UND TECHNOLOGIE

Session IV-4 Smart Specialisation Strategy of Finland

RAINE HERMANS

Director of the Unit for Strategic Intelligence, Tekes
The Finnish Funding Agency for Technology & Innovation, Finland

BIOGRAPHY

Raine Hermans is the Director of the Unit for Strategic Intelligence at Tekes since the beginning of 2010. The unit is in charge of knowledge management, including impact analysis, funding of innovation policy research, and foresight services. Dr. Hermans started as the Director of regional networks at Tekes in September 2007. The regional networks consist of 14 technology development departments all over in Finland. One of his most important challenges was to coordinate synchronizing the distinctive regional strategies together and with the national one of Tekes'.

Prior to joining Tekes, he acted as a visiting professor (managerial economics of biotechnology) at the Kellogg School of Management, Northwestern University, Illinois USA, since the beginning of 2006. Dr. Hermans has also led a group of multidisciplinary corporate and industry analysts for several years with Etlatieto Ltd and ETLA, the Research Institute of the Finnish Economy. He has hold positions of chairman and member of the board in fields of education and health industry, and the CEO of Regiofacta Ltd providing consultant services on geographic information systems. He has been the adjunct professor with the Aalto University School of Economics since 2009, specialized in innovation management and valuation of intangible assets.

PRESENTATION ABSTRACT

The emphasis of innovation is changing radically. The earlier science and technology-based model is challenged by broad concept of innovation and, especially by the fact that innovation gets most often origin in very practical contexts. The Finnish innovation policy has traditionally focused on promoting science-technology-innovation model. However, recent development has shifted the focus radically towards doing-using-interacting model. This presentation sheds light on the current phase of Finnish innovation system facing the new paradigm. The Finnish innovation system is seen as a mosaic of regional innovation systems. There has been a challenge to synchronize or harmonize regional strategies with their national counterpart. The harmonization process emphasized a role of smart specialization in two perspectives. Firstly, instead of focusing on established industry, the strategic choices were made utilizing a concept of future lead markets which aim to enable renewal of the established industries. Secondly, instead of focusing on existing disciplines, the harmonization process showed the importance of cross-cutting competencies. By presenting lead market and competence choices, the regional innovation strategies were then comparable, and complementary competence and lead market networks were able to be identified.

OECD Outreach Workshop on

Smart Specialisation: Its Extension to East Asia

Biography of presenters,
Abstracts & Presentations

Session V Extension of Smart Specialisation to Other Regions: Concept and Considerations

April 4 (Thur) 10:45 – 12:30

Session Chair

TAE-YOUNG SHIN

Senior Fellow, Science and Technology Policy Institute (STEPI), Korea
Vice chair of OECD-CSTP

Dr. Tae-Young Shin received his Ph.D in Economics from State University of New York at Binghamtom. He is a senior fellow at Science and Technology Policy Institute(STEPI). As a Korean delegate, he has been the vice chair of Committee for Science and Technology Policy (CSTP), OECD since 2005. His area of specialization includes applied economics, quantitative analysis, and science and technology policy studies. He is on the advisory board of Forward Visions on European Research Area (VERA), EU. He is also a member of the editoral advisory board of an international journal, Technology Transfer and Entrepreneurship. He is actively engaged in the Executive Committee of Nuclear Fusion and Committee of Global Frontier Project Steering, Ministry of Science, ICT and Future Planning, Korea.

Session V-I OECD Smart Specialisation Project: Lessons Learned and Insights Obtained

KOENRAAD DEBACKERE

Managing Director, KU Leuven Research & Development
Chairman of the Gemma Frisius Fonds of KU Leuven, Belgium

BIOGRAPHY

Koenraad Debackere has been with KU Leuven since 1995. In 1995, he became profes sor at KU Leuven, where he teaches Technology and Innovation Management. In 1993, 1995 a nd 1997, he has won Best Research Paper Awards from the American Academy of Manageme nt and the Decision Sciences Institute. His research has focused on the area of technology and innovation management and policy. He is also actively engaged in technology transfer activitie s as managing director of KU Leuven Research & Development and Chairman of the Gemma Frisius Fonds (the venture fund) of the KU Leuven. He is the co-founder and chairman of Le uven.Inc, the innovation network of Leuven high-tech entrepreneurs. He is a board member of IWT-Vlaanderen, the Flemish government agency that supports science and technology develop ment in Flemish industry. Since 2005, he is the general manager of KU Leuven.

PRESENTATION ABSTRACT

Smart specialisation strategies require the development and the deployment of appropriate indicators. Those indicators map the relative positions and strengths of countries, regions and institutions in the various fields of science, technology and innovation relevant to the modern economy. The data used to construct those indicators vary from the bibliometric databases as developed by Thomson Reuters (Web-of-Science) and Elsevier (Scopus), the various patent databases (as originating from USPTO, EPO and PCT procedures) and the innovation and economic indicators as designed and promulgated by OECD. Based on those data and using the instrument of Relative Indicators, the relative (past and current) positions of various economic entities under study can be examined and linked to emerging and future smart specialisation trajectories. During the presentation, the vast array of data and indicators will be demonstrated and explained. Applications to Asian countries will be made and presented.

OECD Smart Specialization Project

Lessons learned, insights obtained
Gwangju – April 3-5, 2013

ECOOM KU Leuven & EWI
W. Glänzel, B. Thijs (ECOOM)
J. Callaert, M. du Plessis (ECOOM)
P. Andries (ECOOM)
K. Debackere (ECOOM)
J. Larosse (EWI)
N. Geerts (EWI)

ECOOM
Centre for R&D Monitoring

EWI

OECD Smart Specialization Project
Constructing the Baseline

Quantitative Baseline Profiles

ECOOM
Centre for R&D Monitoring

EWI

3

Introduction to baseline data: the road taken …

- Using robust, existing data sources with benchmark potential:
  - WoS
  - Patent databases (EPO, USPTO, PCT)
  - CIS & R&D surveys
  - (Regional) economic data (employment, added value, export, …)
- Using robust indicators such as:
  - Activity index
  - Relative specialisation index
  - Salton cosine measures
  - Robust classification systems --- that may differ though between science (journal classification), technology (patent classification) and economic data (sector classification)
- Using those indicators:
  - Longitudinally and across consistent time periods
  - Focusing on relative advantages and disadvantages of countries and regions

4

Specialisation indicators deployed for data on scientific research

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5

Measures of national and regional specialisation

- Specialisation in science is traditionally studied using publication profiles.
- The favoured measures are the *Activity index* (*AI*) and its derivatives (Frame, 1977; Schubert and Braun, 1986).
- *AI* is a version of the economists' *Revealed Comparative Advantage* (*RCA*) typically calculated with export data (Balassa, 1965).

Definition:

$$AI = \frac{\text{the world share of the given country (region) in publications in the given field}}{\text{the overall world share of the given country (region) in publications}}$$

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Properties of the Activity Index:

- *AI* may take values in the range [0, ∞].
- Its neutral value is 1.
- *AI* = 0 indicates a completely idle research field.
- *AI* < 1 indicates a lower-than-average activity.
- *AI* > 1 a higher-than-average activity.

AI reflects a certain *internal balance* among the fields:

- *AI* > 1 values in some fields is always balanced by *AI* < 1 in others.

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Data sources:

- Data of Thomson Reuters' Web of Science (WoS) are used.
- Only original research work and review articles were extracted from the database.
- A full counting scheme was applied to country, region and institutional assignment.
- The observation period comprises 13 years and is subdivided into the following sub-periods:
  - 1998–2002
  - 2003–2006
  - 2007–2010

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Specialisation indicators deployed for data on technology

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EWI

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Measures of national and regional specialisation:

- Technological specialisation is studied using patent-based indicators, broken down by:
  - Country / Region (based on applicant addresses)
  - Technology domain (Fraunhofer classification into 35 domains)
  - Application years (1998-2001; 2002-2005; 2006-2009)
  - Patent system: EPO – USPTO - PCT
- Full counting schemes are used for allocation to countries, regions and technology domains.
- Data source: PATSTAT database (EPO Worldwide Patent Statistical Database, version October 2011).
- In the current presentation, we focus on EPO application data; USPTO grant data (only on country level) and WO application data will be reported in the full report (the USPTO results run parallel to the EPO results, though).

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Measures of national and regional specialisation:

- Relative specialization indicators are typically used:
  - $RTA_{ij} = (P_{ij}/\Sigma_i P_{ij})/(\Sigma_j P_{ji}/\Sigma_{ij} P_{ij})$
    - with P the number of patents
    - with i = country or region grouping variable and j = patent IPC-class grouping (technological domain or industrial sector)
    - value of 1 = benchmark group average
    - various mapping possibilities (RCA - RTA or RTA over different periods, …) exist

Measures of national and regional specialisation:

- RTA is monotonically transformed to deal with the measure's asymmetry (range [0, ∞[with 1 as neutral value)

$$\mathrm{RTAN} = \frac{\mathrm{RTA}\ -1}{\mathrm{RTA+1}}$$

  - *RTAN* takes values in the range [-1, +1].
  - Its neutral value is 0.
  - *RTAN* = 0 indicates a completely idle research field.
  - *RTAN* < 1 indicates a lower-than-average.
  - *RTAN* > 0 a higher-than-average activity.
  - Within-country correlations (RTA; RTAN) ranging between 0,89 and 0,98
- To complement relative measure of technological advantage: within-country top 10 technology domains are mapped over the considered time period (patent volume per capita) as well.

Economic specialisation indicators

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Measures of national and regional specialisation:

- National economic specialisation is usually studied using export data or production output, broken down by NACE sector.
- However, data not available at the regional level.
- Most appropriate available data are OECD's regional labour market statistics:
  - Available for selection of countries and regions
  - Aggregated in 32 industries (not all industries represented)

Measures of national and regional specialisation:

- **RCA** (Revealed Comparative Advantage) calculated using employment
- Formula RCA:
  - $$\frac{\text{employment in country (region) c in economic sector j / employment over all countries in economic sector j}}{\text{employment in country (region) c in all sectors / employment over all countries in all sectors}}$$
  - Where 'employment over all countries' (both for a specific sector as for all sectors) is calculated as the sum of employment over all countries in the OECD regional labour market dataset.
    - Note that it would be more appropriate to use (total and sectoral) worldwide employment as a benchmark
- RCA is monotonically transformed to deal with the measures asymmetry => RCAN

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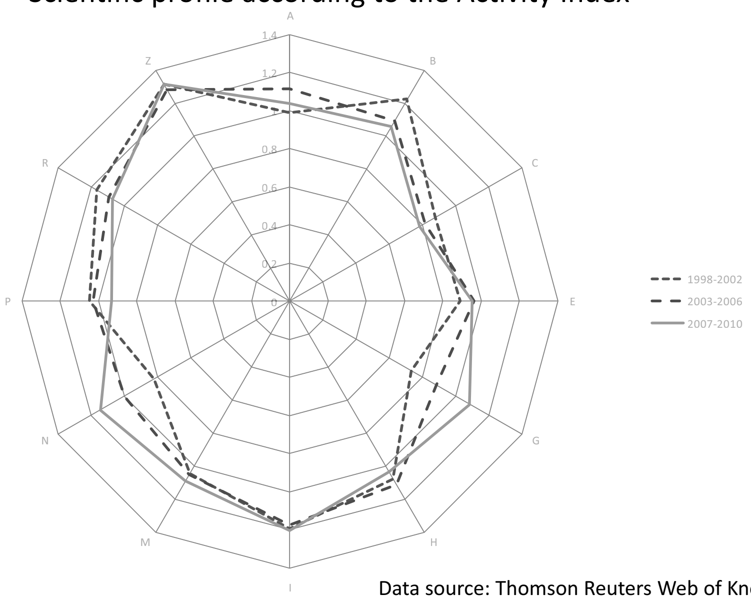
Results per country / region

Belgium

Scientific profile according to the Activity Index



Data source: Thomson Reuters Web of Knowledge

Belgium

Specialisation within the science fields with the highest relative activity
(*AI values are given in chronological order*)

biology (organismic & supraorganismic level) (Z)
- veterinary sciences (AI=1.27; 1.25; 1.33)
- mycology (AI=0.97; 0.90; 1.18)
- microbiology (AI=1.24; 1.40; 1.28)
- parasitology (AI=1.21; 0.95; 1.19)

clinical and experimental medicine II (non-internal medicine specialties) (M)
- tropical medicine (AI=1.82; 1.93; 2.05)
- infectious diseases (AI=1.49; 1.27; 1.53)
- radiology, nuclear medicine & medical imaging (AI=1.63; 1.53; 1.53)
- critical care medicine (AI=1.45; 1.47; 1.45)

neuroscience & behavior (N)
- psychology, mathematical (AI=1.89; 2.42; 2.53)

Data source: Thomson Reuters Web of Knowledge

Belgium

Striking observations, scientific profile:

- *General trends*
  - Increase of relative activity in geosciences & space sciences
  - High specialisation in biology (organismic & supraorganismic level)
  - Decrease of relative activity in agricultural science & technology and biosciences
  - Outside the ‘focus fields’: high specialisation in physics, nuclear and reproductive biology
- *Highlights*
  - Enormous increase of specialisation in neuroscience (as field) and neuroscience & behaviour (as subfield)

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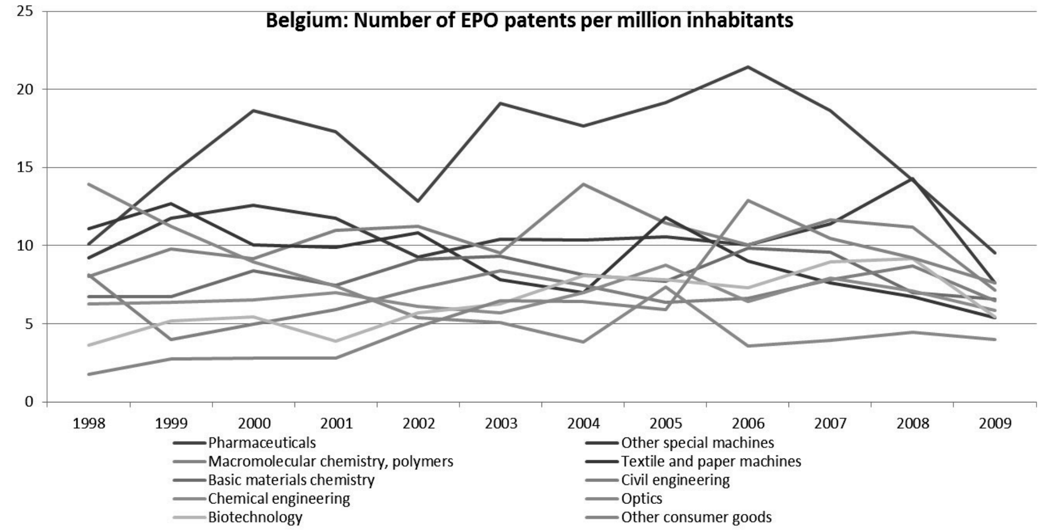
Belgium
Technology profile:



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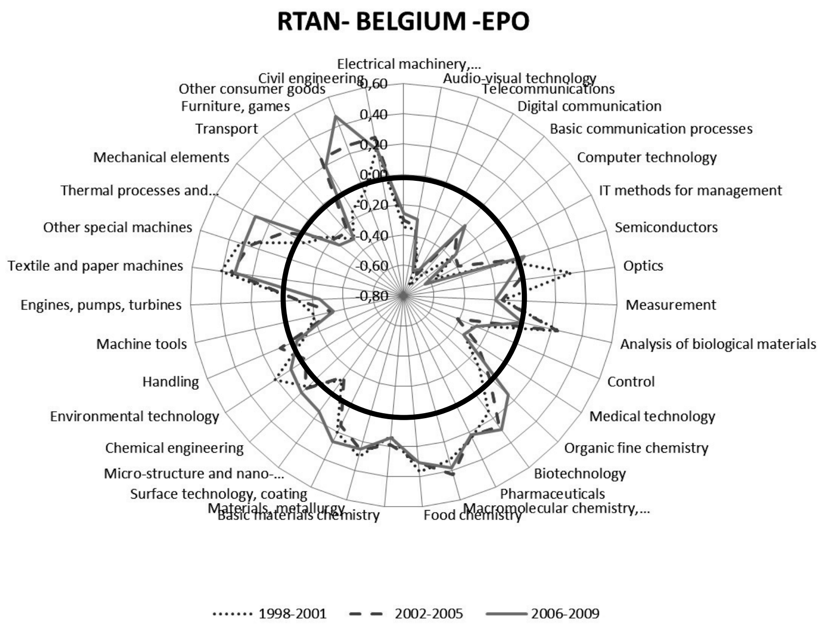
Belgium



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Belgium

Observations, technology profile:

- *Top 3 highest and lowest specialisations*

Highest specialisation	Lowest specialisation
Macromolecular chemistry, polymers	Digital communication
Textile and paper machines	Telecommunications
Food chemistry	IT methods for management

- *Highlights*
  - Pharmaceuticals top in terms of patent volume throughout the considered period (with a decrease around 2002).
  - Considerable decrease in Optics patent volume over the considered time period – also notable in drop in specialisation.
  - Emerging specialisations (high increase) in the latest period (2006-2009) for the domains: Nanotechnology; Other consumer goods; Furniture, games and Thermal processes, apparatus.

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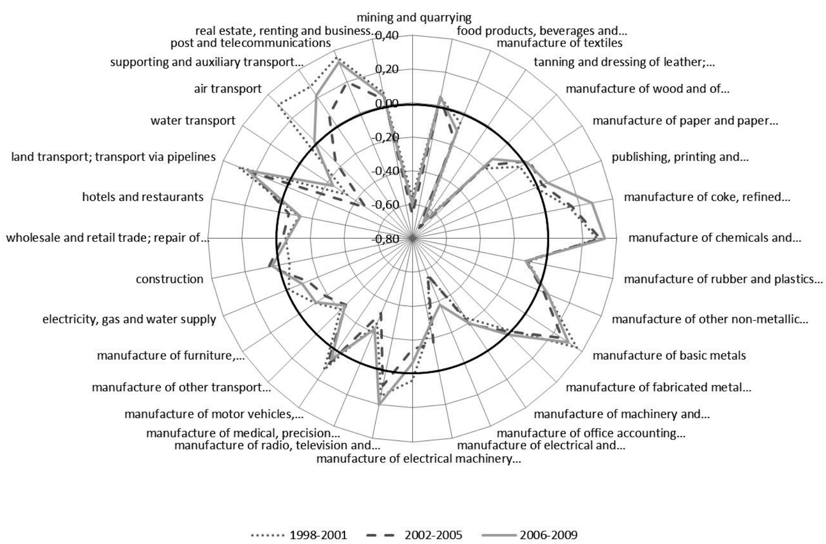
Belgium

RCAN - BELGIUM



Data source: OECD

Belgium

Observations, economic profile:

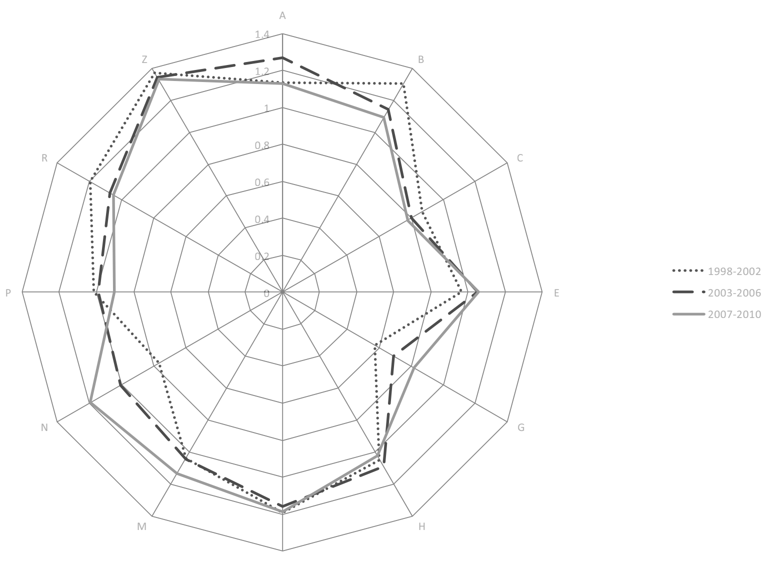
- *Top 3 highest and lowest specialisations*

Highest specialisations	Lowest specialisations
Manufacture of chemicals and chemical products	Tanning and dressing of leather
Post and telecommunications	Mining and quarrying
Manufacture of basic metals	Manufacture of office accounting and computing machinery

- *Highlights*
  - Relative employment in air transport plummeted initially, but then recovered slightly.
  - Other sectors remained more or less stable over time.

Flanders (Belgium)

Scientific profile according to the Activity Index



Data source: Thomson Reuters Web of Knowledge

25

Flanders (Belgium)

Specialisation within the science fields with the highest relative activity
(*AI values are given in chronological order*)

- biology (organismic & supraorganismic level) (Z)
  - veterinary sciences (AI=1.02; 1.12; 1.26)
  - microbiology (AI=1.28; 1.50; 1.37)
  - parasitology (AI=1.49; 1.13; 1.40)
- clinical and experimental medicine II (non-internal medicine specialties) (M)
  - tropical medicine (AI=2.56; 2.31; 2.37)
  - infectious diseases (AI=1.56; 1.31; 1.45)
  - radiology, nuclear medicine & medical imaging (AI=1.70; 1.55; 1.57)
  - critical care medicine (AI=1.10; 1.09; 1.22)
- neuroscience & behavior (N)
  - psychology, mathematical (AI=2.53; 3.19; 3.27)
  - psychology, experimental (AI=1.94, 2.01; 1.98)
  - psychology, applied (AI=0.87; 1.33; 1.66)
  - psychology, social (AI=0.97; 1.54; 1.50)
- engineering (E)
  - transportation (AI=0.60; 0.92; 1.88)
  - nuclear science & technology (AI=1.46; 1.32; 1.54)
  - medical informatics (AI=1.22; 1.16; 1.32)
  - engineering, electrical & electronic (AI=1.34; 1.26; 1.23)
  - computer science, interdisciplinary applications (AI= 1.18; 1.38; 1.38)

Data source: Thomson Reuters Web of Knowledge

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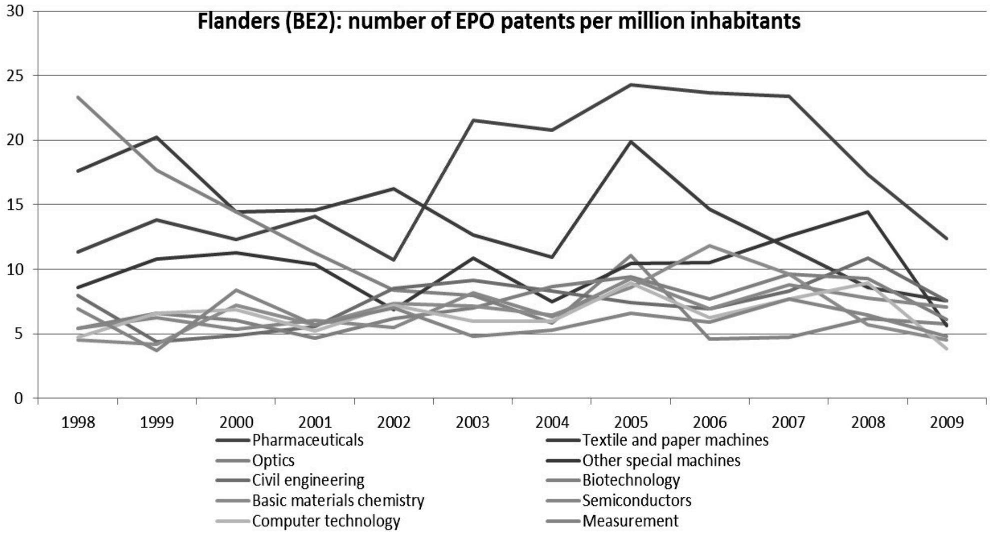
Flanders (Belgium)

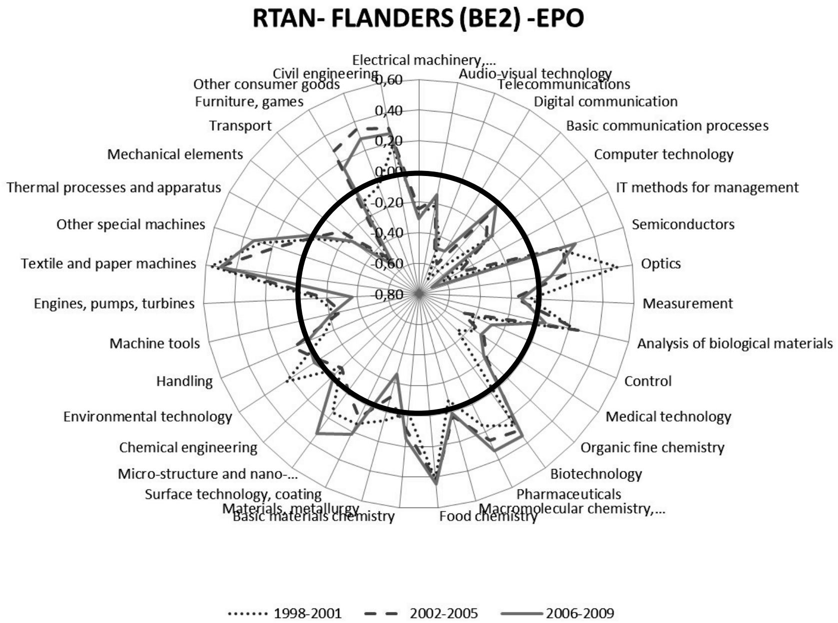
Striking observations, scientific profile:

- *General trends*
  - Follows the general trends in Belgium
  - High specialisation in engineering
  - Specialisation in tropical medicine has historical roots
- *Highlights*
  - Enormous increase of specialisation in neuroscience
  - Enormous growth of relative activity in transport (within engineering)
  - High specialisation in electronics and informatics related disciplines (within engineering)
  - High specialisation in psychology (within neuroscience & behaviour)

Flanders (Belgium)
Technology profile:



Flanders (Belgium)



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Flanders (Belgium)

Observations, technology profile:

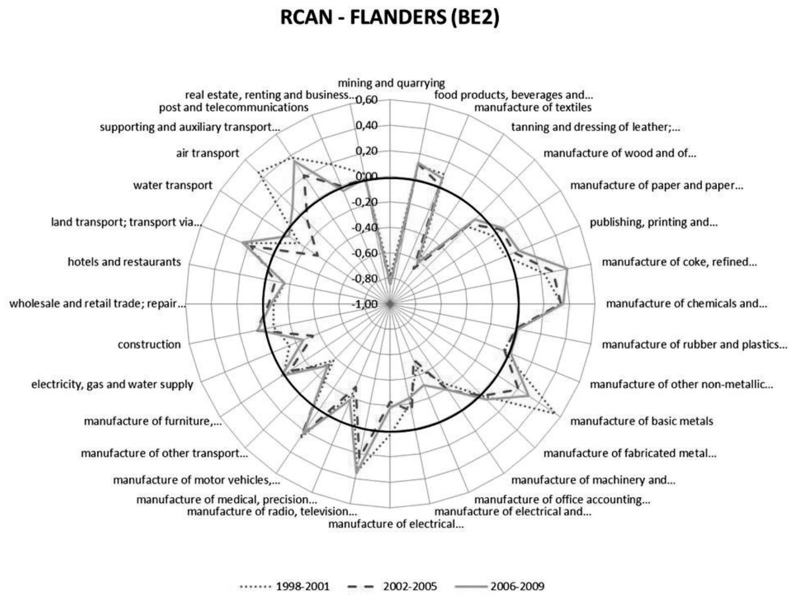
- *Top 3 highest and lowest specialisations*

Highest specialisation	Lowest specialisation
Textile and paper machines	IT methods for management
Food chemistry	Digital communication
Biotechnology	Transport

- *Highlights*
  - Pharmaceuticals become top in patent volumes from 2002 onwards.
  - Considerable decrease in Optics patent volume over the considered time period - also notable in decreased specialisation (cf. Belgian national profile).
  - Increase in patent volume 'Other consumer goods' – also notable in increased specialisation.
  - Emerging specialisations (high increase) in the latest period (2006-2009) for the domains: Thermal processes and apparatus and – to a lesser extent – for Nanotechnology.
  - Decreased specialisation in latest period: Environmental technology; Analysis of biotech materials.

30

Flanders (Belgium)



Data source: OECD

Flanders (Belgium)

Observations, economic profile:

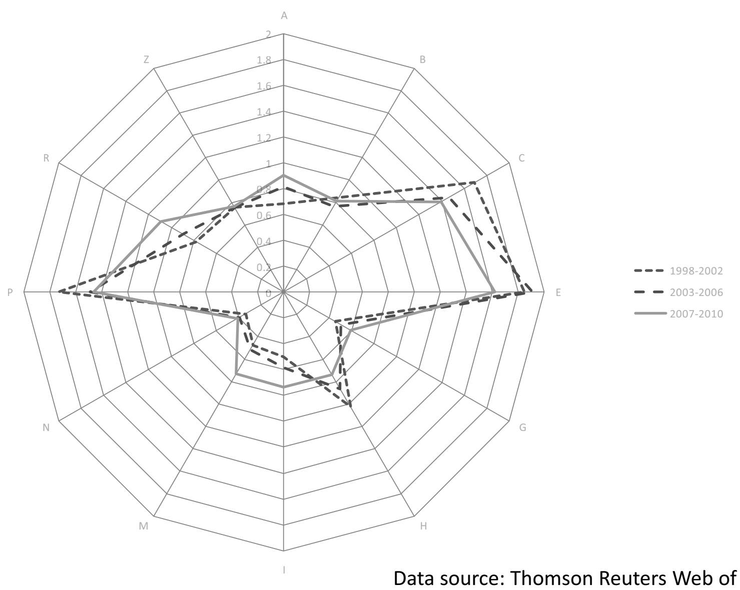
- *Top 3 highest and lowest specialisations*

Highest specialisations	Lowest specialisations
Manufacture of coke, refined petroleum products	Mining and quarrying
Manufacture of chemicals and chemical products	Tanning and dressing of leather
Manufacture of equipment for radio, tv and communication	Manufacture of other transport equipment

- *Highlights*
  - Relative employment in air transport plummeted initially, but then recovered somewhat.
  - Considerable fall in relative employment in the manufacture of basic metals, followed by a small recovery.
  - Economic profile relatively similar to that on country-level

South Korea

Scientific profile according to the Activity Index



Data source: Thomson Reuters Web of Knowledge

33

South Korea

Specialisation within the science fields with the highest relative activity
(*AI values are given in chronological order*)

engineering (E)
- telecommunications (AI=1.56; 1.58; 2.07)
- transportation science & technology (AI=1.33; 1.46; 1.39)
- engineering, electrical & electronic (AI=1.40; 1.23; 1.39)
- engineering, mechanical (AI=1.60; 1.25; 1.28)

physics (P)
- physics, applied (AI=1.50; 1.64; 1.59)
- physics, condensed matter (AI=1.01; 1.14; 1.13)

Data source: Thomson Reuters Web of Knowledge

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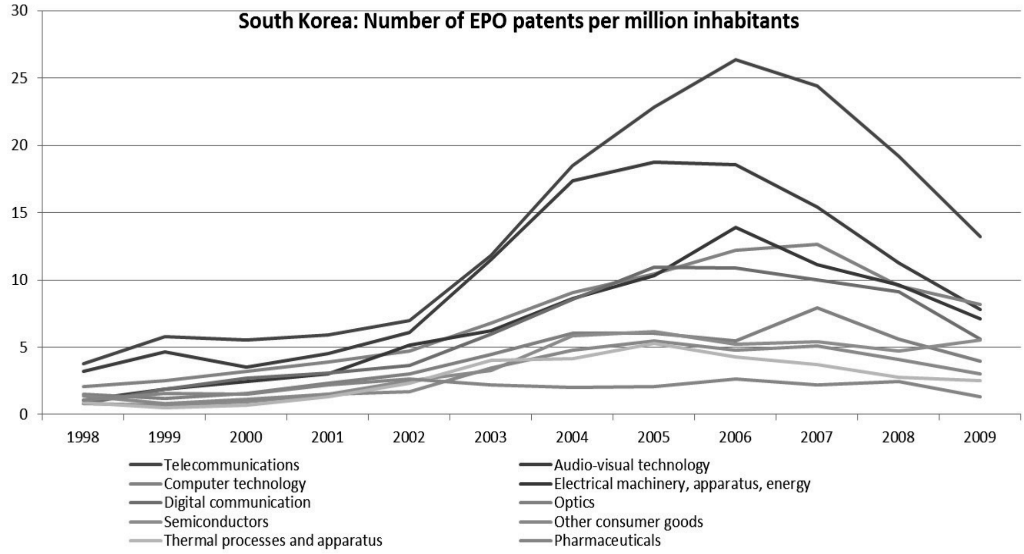
South Korea

Striking observations, scientific profile:

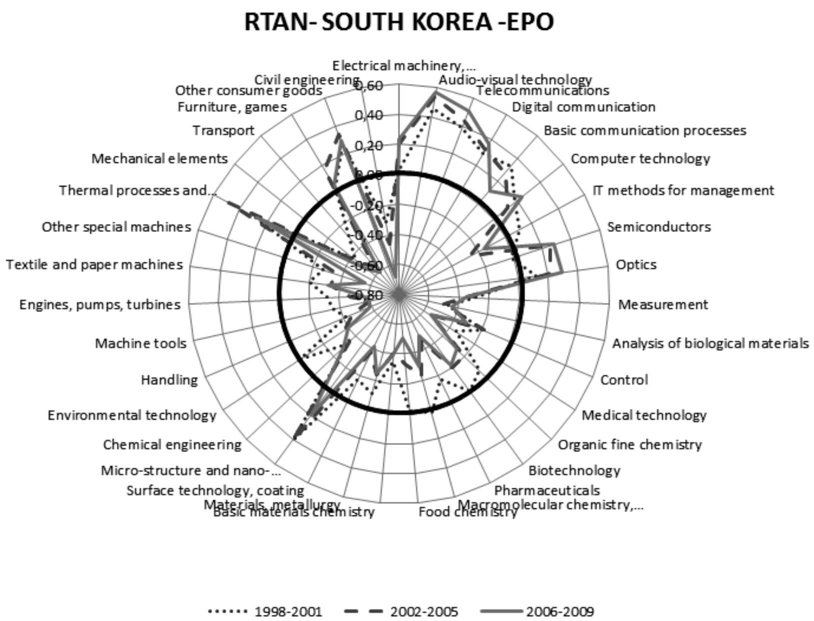
- *General trends*
  - Increase of relative activity in clinical & experimental medicine II (non-internal medicine specialties) and biomedical research
  - High specialisation in physics, chemistry and engineering
  - Decrease of relative activity in chemistry

- *Highlights*
  - In the 'focus fields': Enormous increase of specialisation in telecommunications
  - Outside the 'focus fields': Very high level of specialisation in engineering, ocean and integrative & complementary medicine; enormous increase of specialisation in horticulture

South Korea
Technology profile:



South Korea



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South Korea

Observations, technology profile:

- *Top 3 highest and lowest specialisations*

Highest specialisation	**Lowest specialisation**
Audio-visual technology	Machine tools
Telecommunications	Transport
Thermal processes and apparatus	Civil engineering

- *Highlights*
  - Increasing volume trends for most domains; especially for two top domains: Telecommunications and Audio-visual technology.
  - Both domains also display high specialisation levels.
  - Other specialised domains: Digital communications; Computer tech; Semiconductors (recent increase); Optics; Thermal processes; Other consumer goods.
  - Recent decrease in specialisation for: IT methods for management.

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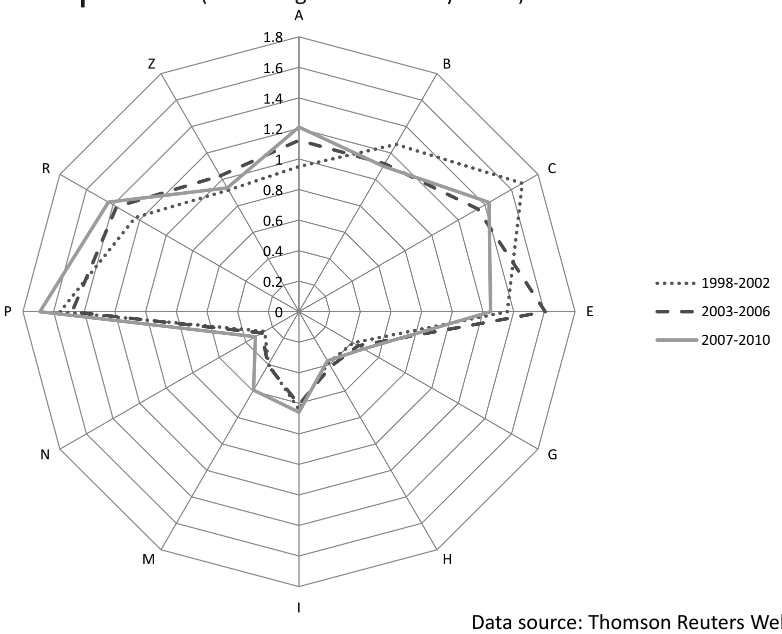
Jeolla (Gwangju Region)

Scientific profile (according to the Activity Index)



Data source: Thomson Reuters Web of Knowledge

Jeolla (Gwangju Region)
Scientific profile (according to the Activity Index)

Specialisation within the science fields with the highest relative activity
(*AI values are given in chronological order*)

- Agriculture & Environment
  - Food Science & Technology (AI=1.28; 1.31; 1.64)
  - Water Resources (AI=1.62; 1.72; 1.56)
- Chemistry
  - Chemistry, Medicinal (AI=1.88; 2.39; 1.98)
  - Chemistry, Multidisciplinary (AI=1.46; 1.40; 1.51)
  - Electrochemistry (AI= 1.64; 2.09; 1.80)
  - Materials Science, Coatings & Films (AI=1.98; 1.51; 1.90)
- Physics
  - Optics (AI=0.93; 1.90; 1.84)
  - Physics, Applied (AI=1.89; 1.66; 1.61)
- Biomedical Research
  - Pharmacology & Pharmacy (AI=1.58; 1.55; 1.37)

Data source: Thomson Reuters Web of Knowledge

Jeolla (Gwangju Region)
Scientific profile

Striking observations:

- *General trends*
  - Increase of relative activity in agriculture & environment and biomedical research.
  - High specialization in physics.
- *Highlights*
  - In the ‘focus fields’: Increase of specialisation in food science & technology and optics.
  - Outside the ‘focus fields’: Enormous increase of specialisation in orthopedics, clinical Neurology; High specialisation but with a decline of relative activity in biotechnology & applied microbiology and microbiology

Data source: Thomson Reuters Web of Knowledge

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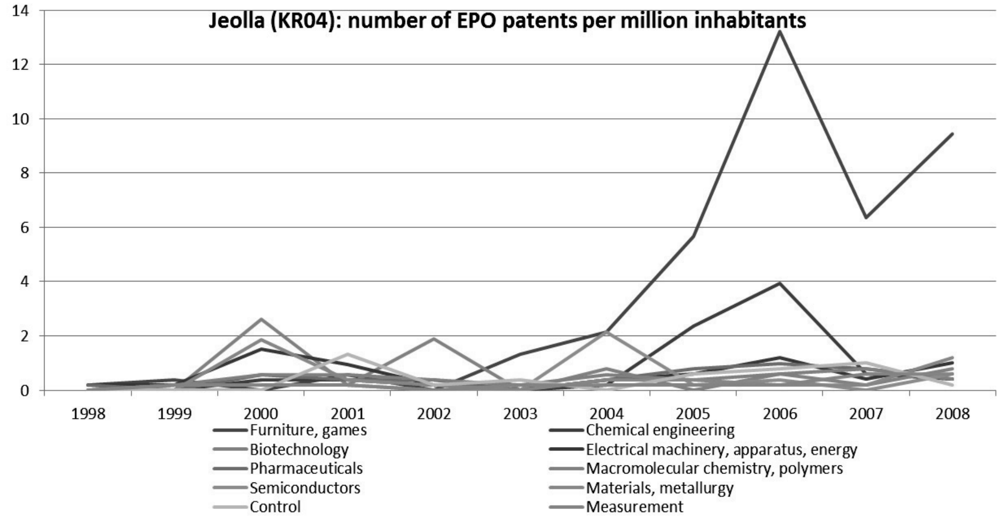
Jeolla (Gwangju Region) Technology profile:



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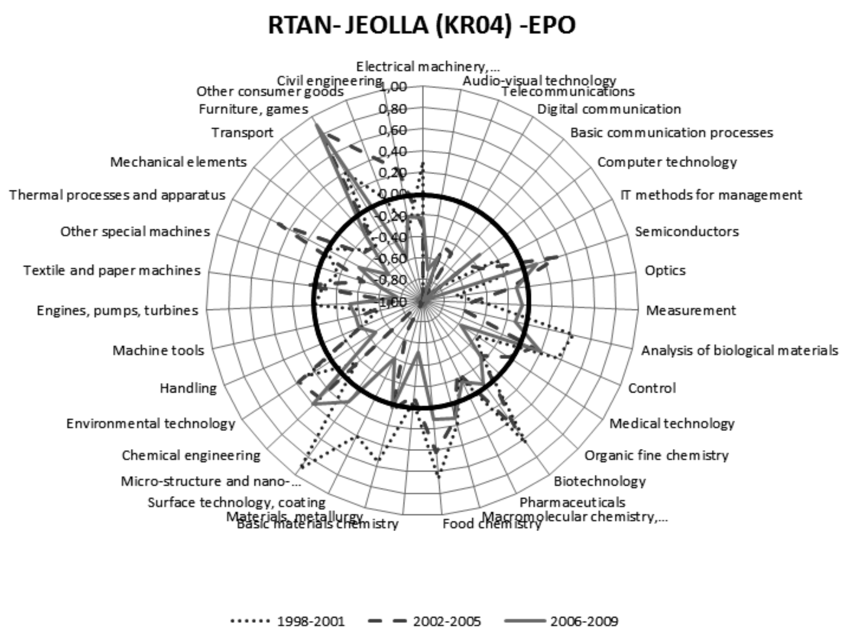
Jeolla (Gwangju Region)



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Jeolla (Gwangju Region)

Observations, technology profile:

- *Top 3 highest and lowest specialisations*

Highest specialisation	Lowest specialisation
Furniture, games	Basic communication processes
Micro-structure and nano-technology	Audio-visual technology
Food chemistry	Digital communication

- *Highlights*
  - Low patent volumes overall (! Volatility of relative indicators !)
  - Sharp increase in technological activity within the Furniture and games field, especially since 2003
  - This is also the field with the highest specialisation level

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General observations (Europe/Belgium/Flanders – Korea/Jeolla)

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Centre for R&D Monitoring

EWI

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What do we see?

- Specialization profiles differ on the various STIE dimensions for the various countries and regions under study
- Those differences can be exploited to identify complementarity and additionality, with regard to:
  - Scientific strengths
  - Technological strengths
  - Innovation activity
  - Economic texture

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What do we see?

- E.g. Belgium/Flanders (as symptomatic for other European countries & regions) vs. Korea/Jeolla:
  - Complementary scientific strengths (physics & chemistry (K), engineering strong on both sides, biomedical & clinical sciences (Flanders-Europe));
  - Complementary technological strengths (nano-electronics overlap, optics-photonics (K), technological strengths in application relevant downstream areas – textiles, materials, machinery (Flanders-Europe));

What do we see?

- E.g. Belgium/Flanders (as symptomatic for other European countries & regions) vs. Korea/Jeolla:
  - Complementarities in and across global value chains, between supplier industries versus downstream (lead-user) industries as sources of innovation;
  - Complementary markets for technology and its applications between Europe and Korea;
  - Data and indicators allow for refined analyses of those complementarities based on a more detailed articulation of questions and focus required.

Thank you!
Further discussion …

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Centre for R&D Monitoring

EWI

Session V-2 The RIS3 Self Assessment Key: Motivation, Concept and Application

CHRISTIAN HARTMANN

Head of Technology, Foresight and Planning,
The Center for Economic and Innovation Research,
Joanneum Research, Austria

BIOGRAPHY

Christian Hartmann is currently heading the research group 'Technology, Foresight and Planning' at the Centre for Economic and Innovation Research of Joanneum Research. He is holding a Ph.D. in economics from the Karl-Franzens-University Graz and is also a trained facilitator and change manager.

Christian Hartmann has conducted qualitative and quantitative research on R&D and innovation issues in Europe at regional, national and transnational level. He has been working for clients such as regional or national ministries and for the European Commission. His research interests comprise the evolution of regional and sectoral innovation systems research, governance of research and innovation policy and the development smart specialisation strategies.

PRESENTATION ABSTRACT

The RIS3 KEY is a tool which has been conceived to unlock the idea of smart specialisation for regions and countries, and to mobilise the stakeholders for the strategy process. It helps regions and countries to approach RIS3 by stimulating communication and permitting a quick first assessment of their status and potential. It provides four sets of complementary questions that are addressing all relevant dimensions of a region/country ready and willing to start its RIS3 development process. Accordingly, the following dimensions can be assessed: the enterprise sector, the science / knowledge & creative sector, the government sector and the regional innovation system as a whole – covering interactions between all those sectors. It will help regions and countries prepare the consultation of relevant stakeholders, establish dialogue with them and collect their views. It can also be used to 'test' and discuss results of studies conducted but does not replace them.

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The RIS3 Self Assessment Key

Motivation, Concept and Application

Dr. Christian Hartmann, JOANNEUM RESEARCH, Centre for Economic and Innovation Research

THE INNOVATION COMPANY www.joanneum.at

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Overview

2

- Why and how has the S3 Self Assessment Key developed?
- What is the S3 Self Assessment Key?
- Elements of the S3 Self Assessment Key
- How can you use the S3 Self Assessment Key?

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Overview

3

- Why and how has the S3 Self Assessment Key developed?

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Why do we need a RIS3 Key?

4

- Smart Specialisation stands for a new concept of regional innovation policy;
- Policy makers and stakeholders in European regions are in need of practical guidance for the development of Smart Specialisation Strategies;
- Existing documents (i.e. the RIS3 Guide of IPTS) are valuable but too large and too complex for practical use at regional level.

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How the RIS3 Key was developed

- The RIS3 KEY is an output of the project of the OECD TIP working party on Smart Specialisation (2011-2012).
- It has been directly built upon the practical needs of regional policy makers.
- Its draft versions were tested and commented by stakeholders from several European regions and the experts from European Commission DG REGIO in three iterative rounds.
- Its final version was presented at the OECD working group meeting in Paris in May 2012.

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Overview

- What is the S3 Self Assessment Key?

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The RIS3 Self Assessment Key is….

- an easy to use tool to unlock the idea of Smart Specialisation for regions;
- a quick first assessment of their status and potential that is needed to prepare a SWOT analysis;
- a checklist of easily understandable questions for the assessment of the science / knowledge & creative sector, the enterprise sector, the government sector, and the regional innovation system as a whole;
- a complement to the first steps of the RIS3 Guide.

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The RIS3 Self Assessment Key helps you….

- To mobilise relevant stakeholders in all three triple helix spheres of your regional innovation system;
- To start communication between enterprises, the science sector and the regional government;
- To develop a shared language and understanding of the potentials and challenges for sustainable growth in your region;
- To make first steps towards a shared and mutually supported vision of the future in your region;

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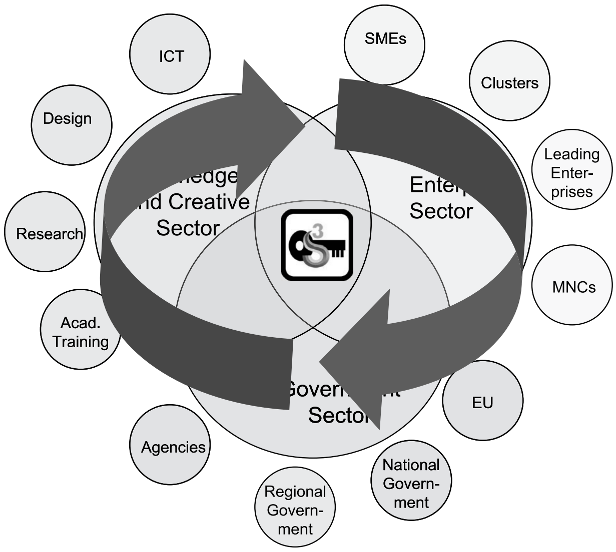
The RIS3 self assessment key helps you to start dialogue within the regional triple helix



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Source: JR-POLICIES

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Overview

- Elements of the S3 Self Assessment Key

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The RIS3 Self Assessment Key consists of four parts….

1. Brief introduction
2. Guiding questions for the self assessment
   - Assessment of the status and potential of the Enterprise Sector
   - Assessment of the status and potential of the Science / Knowledge & Creative Sector
   - Assessment of the Government Sector
   - Assessment of the Innovation System as a whole
3. Brief Guidance for the self assessment process
4. Glossary explaining technical terms

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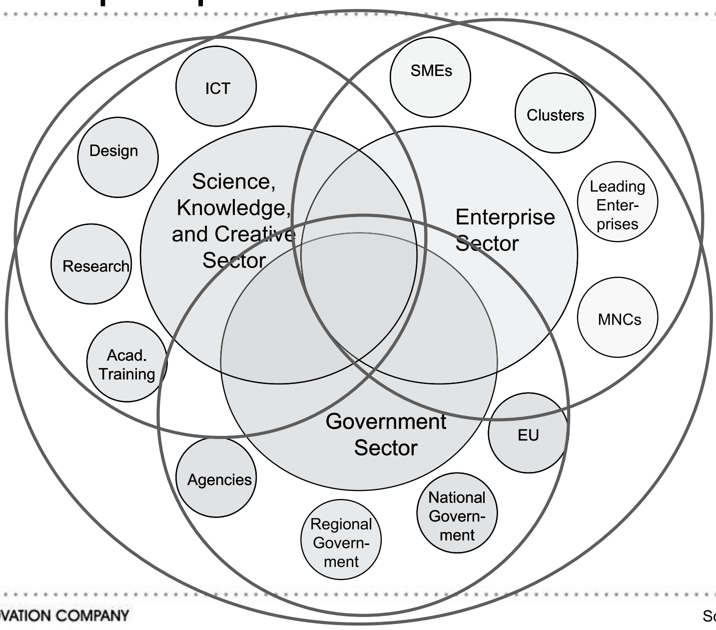
The elements allow for an assessment from four perspectives of the innovation system



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Source: JR-POLICIES

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Sample questions for the assessment of the status and potential of the ENTERPRISE SECTOR

- What are your regional economic key sectors and in which sectors are innovation networks / clusters present in your region?
  - How did these strengths evolve over the last 10 to 15 years?

- Which leading enterprises (i.e. large multinational firms and/or hidden champions and/or key entrepreneurial innovators) are situated in your region?
  - Do they belong to the economic key sectors or are they situated in other sectors?
  - How would you describe their structural involvement in regional planning / innovation policy development?

- How competitive are your regional economic key sectors compared to European or international rivals?
  - What are their competitive advantages and how did they evolve over the last 10 to 15 years?

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Sample questions for the Assessment of the status and potential of the SCIENCE / KNOWLEDGE & CREATIVE SECTOR

- Considering both academic and non-academic skills, expertise and knowledge name up to three fields/challenges in which your region already excels or has the potential to put itself on the map as a recognised world-class place of competence?

- What are the specific scientific strengths and research specialisations in your region (i.e. in which science fields are R&D investments, R&D personnel, publications, and patent applications concentrated)?
  - Please name up to five. How did these strengths evolve in the last decade?

- Are these scientific activities competitive on a European or global level?
  - Where are potential partners, where are the main competitors located?

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Overview

- How can you use the S3 Self Assessment Key?

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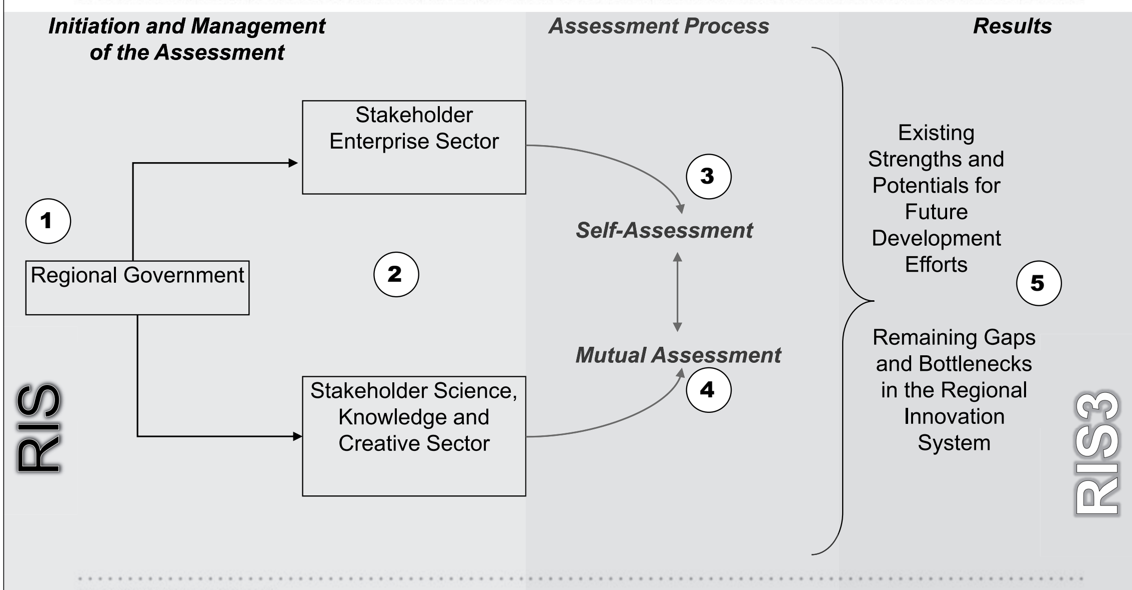
From Regional Innovation Strategies (RIS) to Smart Specialisation (RIS3)



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Five steps to make use of the S3 Self Assessment key

1 Initiate the self assessment process and identify the relevant stakeholders for the in the enterprise and the science, knowledge & creative sector

2 Prepare for the self assessmenrt: contact relevant stakeholders, distribute the guiding questions and organise necessary milestones

3 Perform the self assessment for each sector by stakeholders stemming from the respective sector

4 Perform an assessment of each sector with an mutual outside view (i.e. enterprises assessment the science and the governance sector and vice versa)

5 Prepare a first SWOT analysis as starting point for the S3 process. Use identified strenghts, weaknesses, opportunities and threats for the development of a shared vision

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How can you get your personal copy of the RIS3 Key

- The RIS3 KEY is currently available in German, English, Spanish and Czech language.
  - http://www.era.gv.at/space/11442/directory/27668/doc/27669.html?template=print
- The RIS3 KEY is committed to practical use.
- BMWF therefore encourages requests for translation standort@bmwf.gv.at.

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Thank you for your attention

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Session V-3 Synchronization of National and Regional Innovation Strategies: The Case of Spain

ROBERTO SÁNCHEZ SÁNCHEZ

Deputy Director of Competitiveness and Business Development
Ministry of Economy and Competitiveness, Spain

BIOGRAPHY

Roberto Sánchez Sánchez has a background in Telecommunication Engineering by the Polytechnic University of Madrid, and he counts for more than 30 years experience working in either public or private sectors.

Currently, he is the Deputy Director of Competitiveness and Business Development in the R&D&I Secretary of the Ministry of Economy and Competitiveness, where he takes responsibilities in the design and development of Strategy and Planning for the innovation in Spain. In this position he is directly involved in the design and development of the Spanish Strategy an Plan for Science, Technology and innovation and the coordination of the development of the Regional Strategies of Smart Specialization. He also has responsibility over the programs dedicated to foster innovation in the Spanish companies supporting them in the recruitment and training of new talent.

He worked previously in the General Secretary of Innovation as Director of the Technical Cabinet and it was appointed as General Director in the General Directorate for Telecommunications and Information Technologies.

He also had a sound background based upon previous activities in several industrial companies in technical research, applications and engineering in different sectors: electronics, health, aeronautical (flight simulators), telecom and environment (water and wastewater master planning and engineering).

PRESENTATION ABSTRACT

The Kingdom of Spain is politically organised in a nationwide structure represented by the Central Government and a Parliament with two cameras: Congress and Senate, and a Regional structure with 17 Regions plus two autonomous cities, each region with its own government and Parliament.

The legal distribution of competences between Central Government and Regions is very complex and in terms of RDI and industrial policy has led in the past to inefficiencies.

The recently approved Spanish Strategy for Science, Technology and Innovation, together with the process for the development of regional RIS3 strategies is a good opportunity to synchronise the pace among central an regional governments and with due consideration to all the stakeholders.

This presentation shows the new organisational structures to provide a framework for allowing the articulation and coordination of the RDI activities in both regional and central government.

As a good case of the potential and strength of the coordination mechanisms, it is included a summary of the actions carried out to implement a Platform for floating off-shore wind turbines.

General Direction for Innovation & Competitiveness

MINISTERIO DE ECONOMÍA Y COMPETITIVIDAD

OECD-Gwangju Workshop on Smart Specialization

Session V: **Extension of Smart Specialisation to Other regions: Concepts and Considerations**

Synchronization of National and Regional Innovation Strategies: the case of Spain

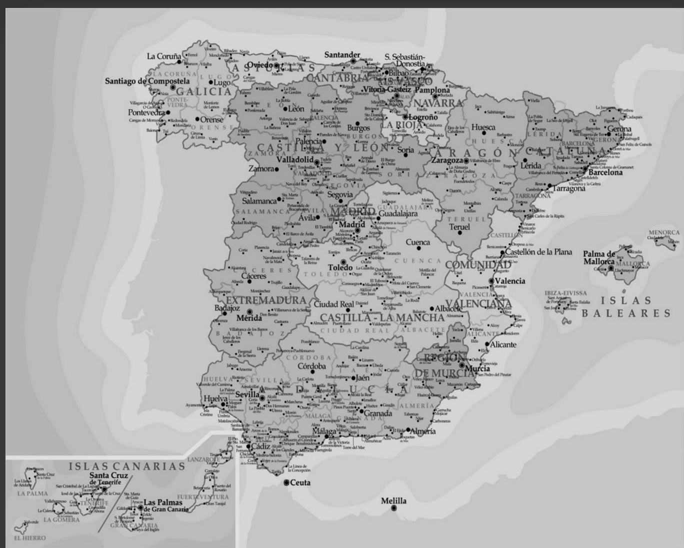
Roberto Sánchez Sánchez
SG Competitividad y Desarrollo Empresarial

April 4, 2013

General Background information

MINISTERIO DE ECONOMÍA Y COMPETITIVIDAD

Area: 504,750 km^2
Population: 46.125.154
GDP: 1.063.355 Million €
GDP /capita: 23.271 €

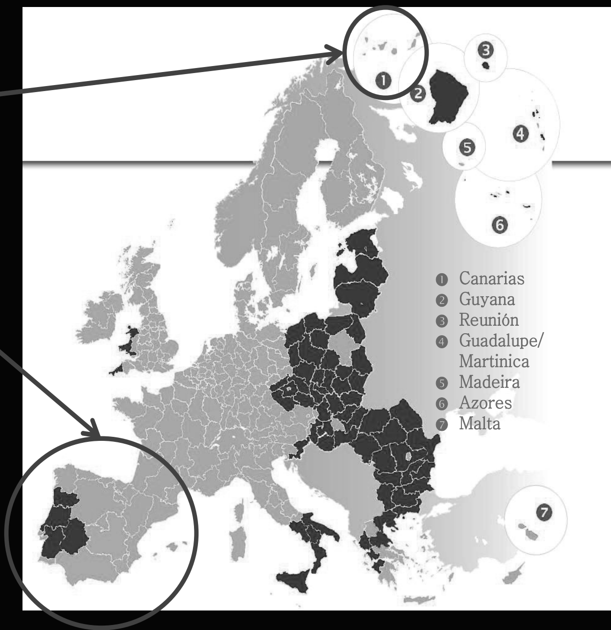


Central Government
Parliament (Two Cameras)
17 Regions (Government & Parliament)
2 Autonomous Cities

Background information

MINISTERIO DE ECONOMÍA Y COMPETITIVIDAD

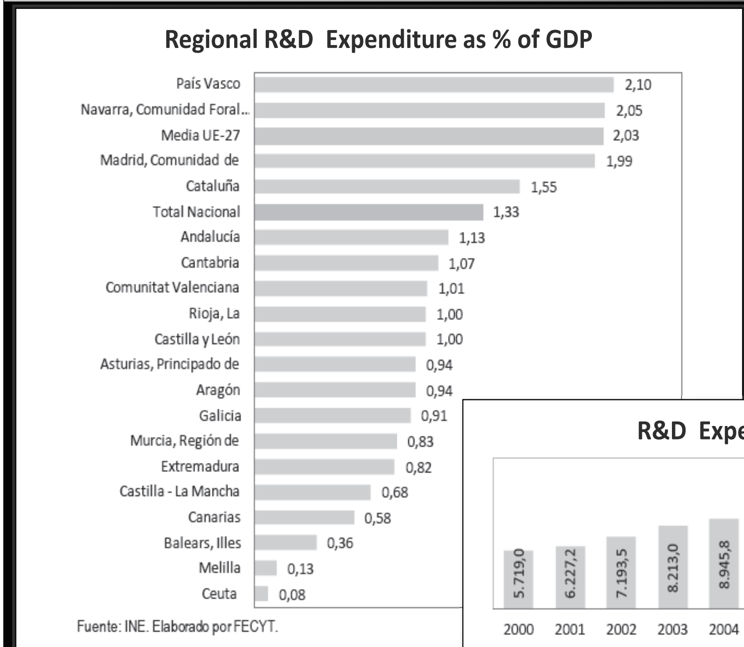
Spanish Regions in the European context

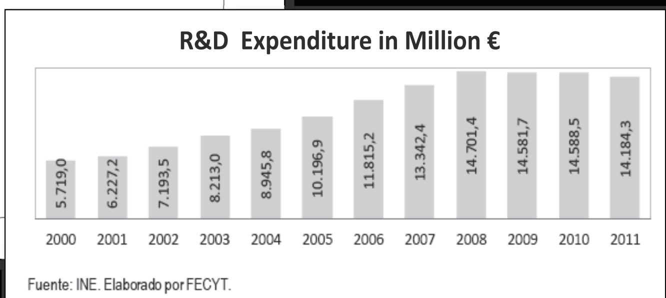


- Less Developed Regions
  GDP per capita < 75% UE average
- Transition Regions
  GDP per capita >75% & < 90% UE
- Developed Regions
  GDP per capita > 90% UE

R&D information

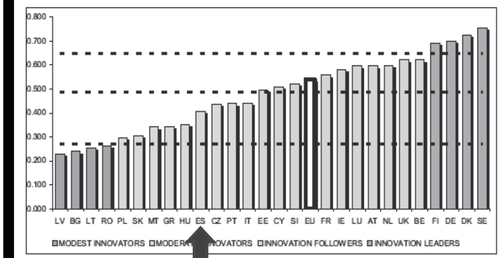
MINISTERIO DE ECONOMÍA Y COMPETITIVIDAD



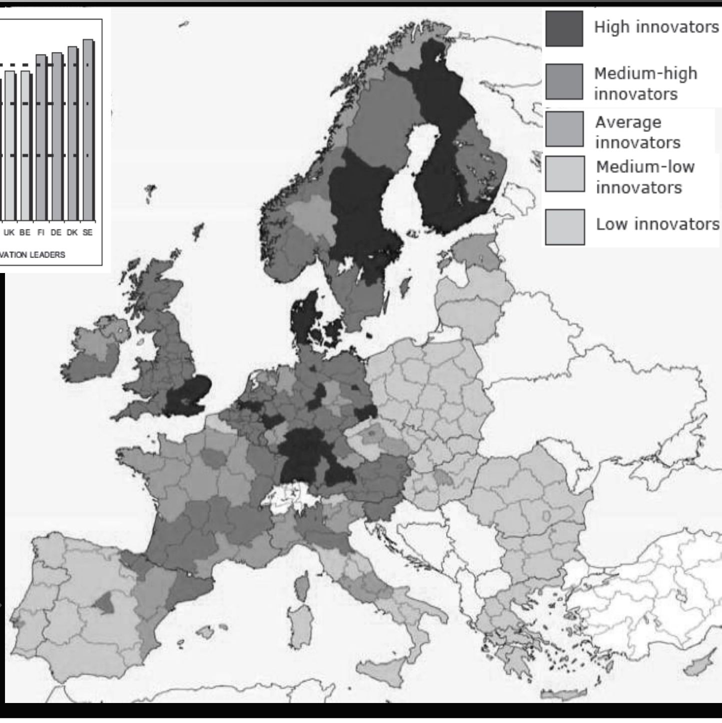


Innovation Ranking

MINISTERIO
DE ECONOMÍA
Y COMPETITIVIDAD



IUS 2011
Spain: 18th (Moderate Innovators)
Few Regions Ranking Medium –High Innovators



Strategic framework

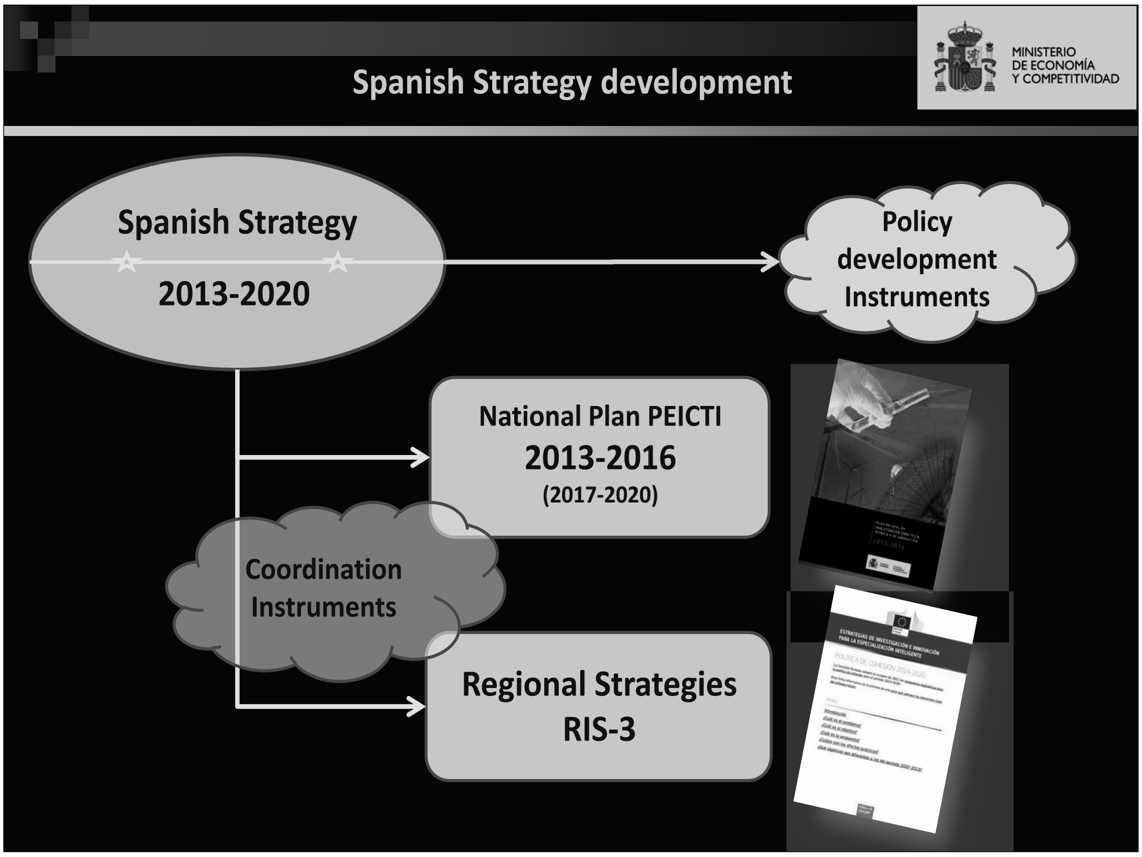
MINISTERIO
DE ECONOMÍA
Y COMPETITIVIDAD

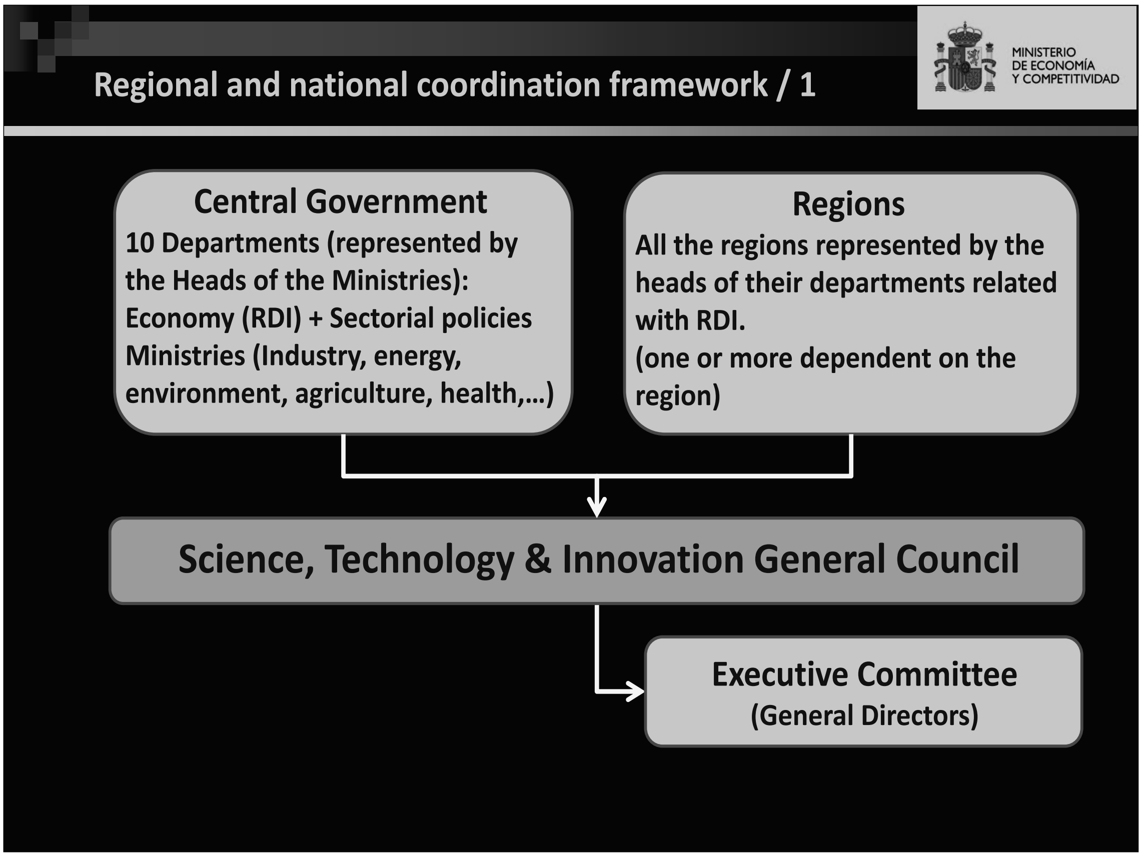
One single nationwide Strategy (EECTI)
Common for all the Regions (directly involved in its design and approval process).
Sharing objectives, challenges, instruments and indicators.
Wide stakeholders involvement in its definition and implementation.
Based on realistic diagnostic and SWOT analysis.

To be developed through:

National RDI Plan (PEICTI) &
Regional strategies RIS3

http://www.mineco.gob.es


Spanish Strategy development
MINISTERIO
DE ECONOMÍA
Y COMPETITIVIDAD
Spanish Strategy
2013-2020
Policy
development
Instruments
National Plan PEICTI
2013-2016
(2017-2020)
Coordination
Instruments
Regional Strategies
RIS-3


Regional and national coordination framework / 1
MINISTERIO
DE ECONOMÍA
Y COMPETITIVIDAD
Central Government
10 Departments (represented by the Heads of the Ministries): Economy (RDI) + Sectorial policies Ministries (Industry, energy, environment, agriculture, health,…)
Regions
All the regions represented by the heads of their departments related with RDI.
(one or more dependent on the region)
Science, Technology & Innovation General Council
Executive Committee
(General Directors)

Regional and national coordination framework / 2

MINISTERIO DE ECONOMÍA Y COMPETITIVIDAD

RED I+D+i

UNIÓN EUROPEA
FONDO EUROPEO DE DESARROLLO REGIONAL
FEDER
"Una manera de hacer Europa"

RDI NETWORK

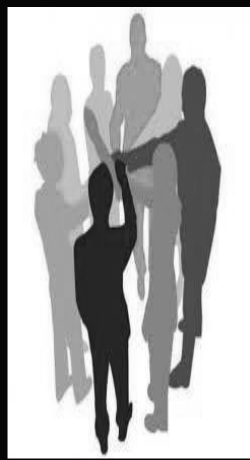
The RDI Network is configured as the meeting point for all the stakeholders whose mission is to contribute in the development of the innovation in Spain, either at national and regional level.

The main objectives are:

To optimize the design, the implementation and the development of the current and future public measures and instruments to support the innovation, contributing to the better expending of the public funds.

To promote the innovation in the Spanish companies

To contribute to reach the goals established in the National and Regional Strategies.



Regional and national coordination framework / 3

MINISTERIO DE ECONOMÍA Y COMPETITIVIDAD

Key issues of the objectives are:

- **To avoid duplication in the definition of programs and use of resources**
- **To foster the cooperation and dialogue among the different administrative levels**
- **To generate synergies between actors and increase the support of innovation activities**
- **To improve the information systems**
- **To propose ways to increase the use of the programmes funded with ERDF**
- **To identify priorities in knowledge areas and / or sectors**

Regional and national coordination framework / 4

MINISTERIO DE ECONOMÍA Y COMPETITIVIDAD

RED I+D+i

Lines of action

1. **Generation of knowledge and management of information to allow a better coordination of policies and programs.**

2. **Actions for better spending of the public funds, in particular ERDF "Technological Fund"**

3. **Best practices exchange**

Regional and national coordination framework / 5

MINISTERIO DE ECONOMÍA Y COMPETITIVIDAD

RDI Network Structure

The Nodes Cooperation for Innovation (NCIS) are advisory and consulting firms whose primary mission is to help in identifying projects for better spending the public funds:

Identify cooperative R&D projects to be cofunded and submitted to National Calls.

Identify best practices in R&D.

Produce useful information on the implementation of ERDF Fund in Spain and making recommendations for improving the performance and coordination of policies and programs for innovation support.

Technical Secretariat is in charge of coordination tasks, promotion and implementation of the activities of the Network as a whole, being the link between the permanent members (Chairs and Plenary) , the ATIs and NCIs.

Regional and national coordination framework / 5

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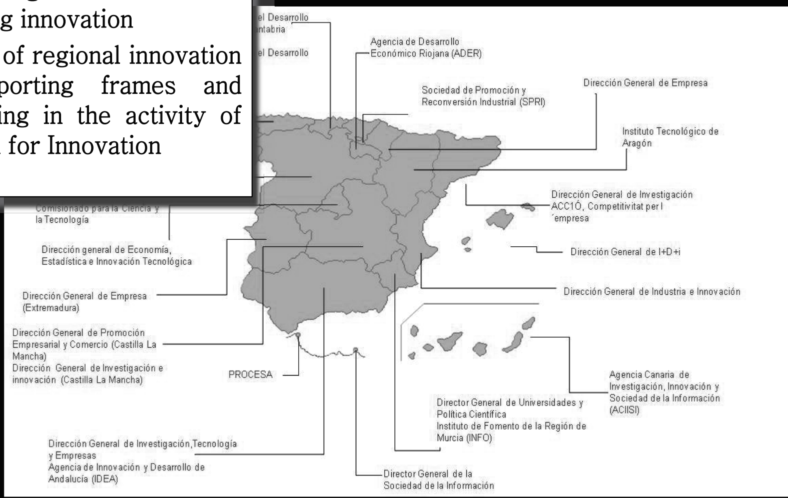
Structure: ATIs – Members

The Territorial Agents of Innovation (ATIs) are regional actors whose mission is:

to contribute to a better articulation between the objectives of the regional and national strategies for improving innovation

to help in the articulation of regional innovation strategies with supporting frames and European Funds, relying in the activity of the Nodes Cooperation for Innovation



Regional and national coordination framework / 6

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- **The RDI Network plays an important role in the definition and development of the Regional RIS3 Strategies**
- **Through their working groups allows open discussions between stakeholders and policy makers national and regional to solve technical issues.**
- **The open discussions and the conclusions facilitates the formal decision making process, alleviating regional- national discrepancies and disputes.**
- **A good example of the success of this working groups are the so called Interregional Thematic Tables (MTIs) where by groups several regions together with the NCIs discuss about specific topics related with RIS3 methodological definition or implementation:**

Entrepreneurial discovery, Specialization, Governance,...

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One best case of coordination

The RDI Platform for Offshore Wind Power

From traditional fixed-bottom wind turbines to floating wind turbines

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Y COMPETITIVIDAD

Background

Green Energies

Spain has a sound background on renewable energies:

It counts with specialised R&D institutions, manufacturing, developing and power supply companies worldwide recognised, leaders in production and distribution of renewable energies.

Spain is the leader in wind power generation in Europe and the 4th worldwide. Is the country with more Thermo solar energy capacity installed and the second worldwide producer of photovoltaic energy.

Background

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R&D Platforms for Green Energies

One example of the R&D platforms installed in Spain is the Solucar Centre, located near Seville in the South of Spain

The Solucar Centre combines operational plants and probably the biggest RDI Platform for Solar Energy.

In this centre are located the two first solar tower plants in operation (PS10 and PS20)

The opportunity

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To develop an RDI Platform for Offshore Wind Power, with the focus on floating wind turbines

Based on the discovery process lead by ALINNE (Strategic Alliance for Energy) and the Technological Platforms in the framework of the European SET Plan (Strategic Energy Technology).

To developed and evolve to another segment of the green energies.

Taking advantage of the continental platform of Spain:

- Three different seas with different characteristics (Atlantic Ocean, Cantabric Sea, Mediterranean Sea)
- Very deep at short distance from the coast.

The project

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The Offshore Platform for RDI wind power (floating)

Objective: Technological leadership in 2016

Installation with capacities for R&D, pilot projects, trials and demonstration projects

At the same time: 1st worldwide operational installation to supply power from offshore floating wind turbines to a city (Las Palmas, Canary Islands)

The difficulties

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Many Regions involved and interested

Several RDI centres and Universities interested and located in different parts of the territory, national and regional.

Many actors involved. Multiple demand for projects and support from public and private sector.

In this sector territorial aspects are fundamental. Legal authorities and competence is divided between administrations. (environment is regional, sea protection and coasts are national,...)

The installation of wind turbines have a social impact that should be politically address, requiring the collaboration of regional and national governments.

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Y COMPETITIVIDAD

The coordination & cooperation role

The project has come to a reality after a coordination process based on smart specialisation allowing:

The coordination of several administrations in different territories Several RDI centres and Universities interested and located in different parts of the territory, national and regional.

Many actors involved. Multiple demand for projects and support from public and private sector.

Key issues:

- Regional Involvement through the network and complementarities of actions in different territories.
- Heavy firms involvement form the beginning.
- Sharing funding

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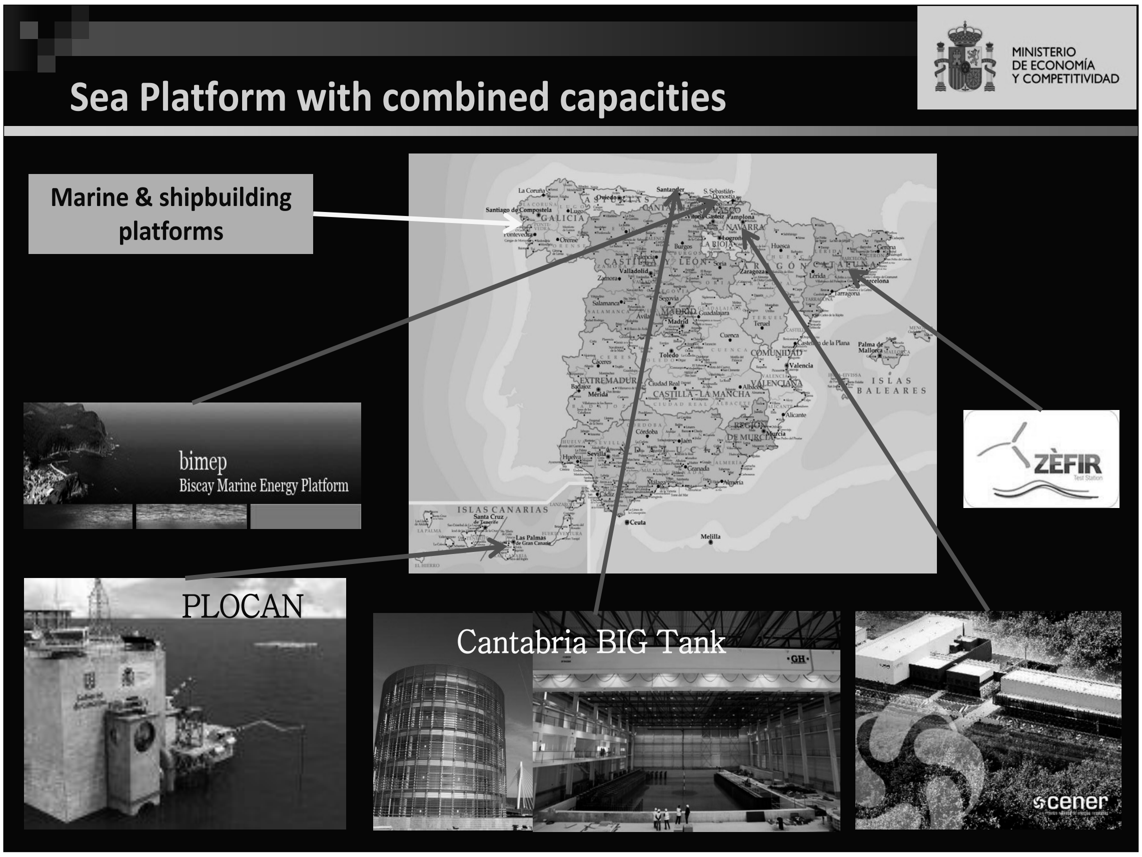

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Y COMPETITIVIDAD

…, thank you for your attention

Session V-4 Cluster Internationalisation – An Important Element of Smart Specialisation

GÜNTER CLAR

Director, Regional Strategies & Innovation
Steinbeis-Europa-Zentrum (SEZ), Stuttgart, Germany

BIOGRAPHY

Günter Clar has a 30 year professional record in Research and Innovation, R&I-Policy and Regional Development, and in Technology Assessment / Foresight and Evaluation. Mobilising and empowering the broad spectrum of societal actors, the underpinning objective in each case was to increase the competitiveness of companies, organisations and whole regions or countries, and the citizens' quality of life.

His experience derives from working in academia, industry and administration. It is based on designing, implementing, and evaluating strategies, programmes & projects, and conducting research not only in a number of European regions, but also in fast growing economies in South-East Asia and South America. He also put a special emphasis on trans-sector and trans-institutional approaches, bringing academia, industry, government and societal actors together.

After academic assignments and industry cooperation in Europe, North and South America and Asia, he advised and worked in (semi-) public bodies in Baden-Wuerttemberg (BW) Germany, as well as in various bi- and multi-lateral settings worldwide. Inter alia, he worked in the European Commission's DG Research & Innovation in Brussels, and collaborated with other DGs (e.g. REGIO, ENTERPRISE), services of the European Council and Parliament, and the OECD. The overall policy focus is on exploring R&I activities and investments for competitiveness and social coherence.

Since 2004, he is seconded from his Ministry (of Science and the Arts) to Steinbeis-Europa-Zentrum (SEZ), a specialised organisation in the 700+ centres network of the Steinbeis Foundation. He built up and manages the Division Regional Strategies & Innovation, complementing Steinbeis' traditional technology-transfer focus by more long-term, multi-actor-based, strategic policy support functions. Under his leadership, SEZ' capacity was strengthened to manage projects focusing on Strategic Policy & Business Intelligence tools for policies and strategies. The aim is to mutually optimise long-term spatial/regional and sector/technological development.

Firmly rooted in his professional and policy networks, Günter Clar is involved in (trans-regional) strategic capacity building, evaluation, and the development of the institutional landscape, and is frequently invited as member of expert and advisory groups established, e.g., by different EU bodies and other international organisations and networks in Asia and the Americas.

The Brazilian Government awarded him the order "Comenda do Mérito Universitário" for "outstanding services concerning the advancement of research".

PRESENTATION ABSTRACT

Based on a broad spectrum of analyses and expert group recommendations from many countries the concept logic goes as follows:

1. Internationalization of clusters is key to cluster policies, as many benefits can be expected - to the businesses and the other organizations in the cluster, to the cluster organization, to the region, to policy makers in various policy fields.
2. Clusters are important building blocks of a smart specialization strategy (S3), as cluster policies focus in part on specialization, i.e. the generation of such a collective pool of knowledge which results in higher productivity, more innovation and an increase in competitiveness.
3. Therefore, cluster internationalization should become an important element of S3s, and help overcome the many challenges with which the implementation of S3s is faced.

At the same time, we see that, within the current state of policy discussions, traditional clusters are often, inter alia, too small, and too limited in their scope of activities to support, and much less shape the development of S3s, and to contribute to overcoming their considerable implementation challenges.

In our presentation we highlight, why the German Spitzen-Cluster MicroTEC Südwest (MT SW) can be seen as a successful case for a 'natural' smart specialization strategy, given its geographical reach, its number and diversity of actors, its breadth of horizontally and vertically outreaching activities, with its focus on the General Purpose Technology "microsystem technologies" and, as a result how it has been formed and selected – the SpitzenCluster competition is the flagship of Germany's "High-Tech Strategy 2020" and a pillar of her "Internationalisation Strategy for Science and Research". The contribution of the MT SW internationalization strategy to its S3 will be outlined, and conclusions drawn for linking cluster policies and policies for S3.

Cluster Internationalisation – important element of smart specialisation

Dr Günter Clar
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- In different countries, policy makers use different expressions to highlight what they are aiming for, ……

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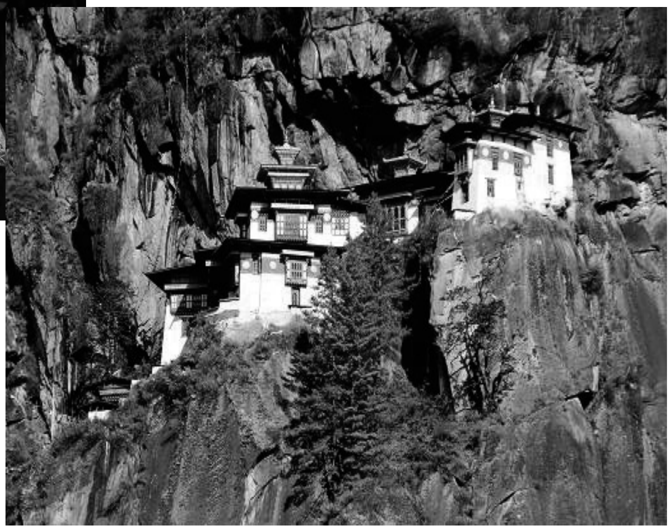
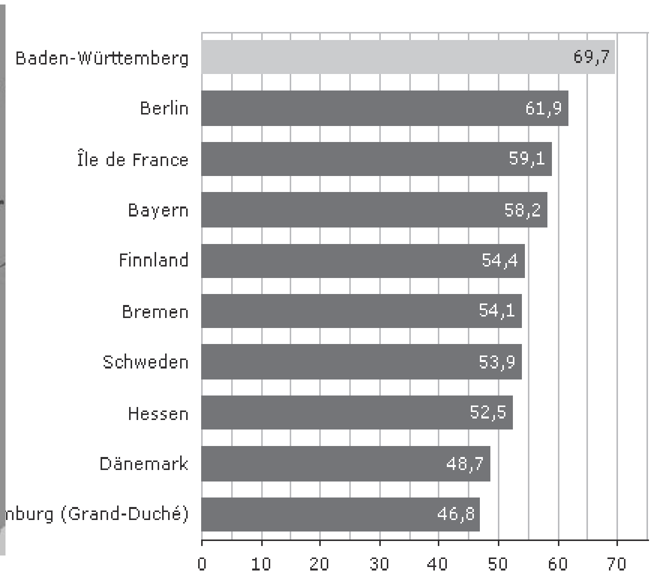
«Gross National Happiness»



„Rich People, Warm Society, Strong Nation“

„Where Ideas Work“

Baden-Württemberg - today’s most innovative EC Region (Eurostat) - with a special History



➢… but in all countries policy makers similarly strive to enable and support **local / regional** quality of life and well-being.

➢In globalised, fast-changing, highly competitive markets, this requires more

- ✓ informed outward-looking (incl. internat. dimensions),
- ✓strategic forward-looking,
- ✓priority-setting and focusing resources.

➢ … in short: Smarter Regional Specialisation

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Boosting innovation for <u>local</u> growth and sustainable development in <u>globalised</u> economies

➢Whole of system & whole of government approaches (incl. external links)

➢Prioritising <u>strategies</u> & improving <u>actions</u>

➢Mutually enriching strategy & <u>creativity</u>

➢Optimising & <u>strengthening inter-national, inter-Regional (e.g. EU-LAC-Asia) and inter-governance-level cooperation</u>

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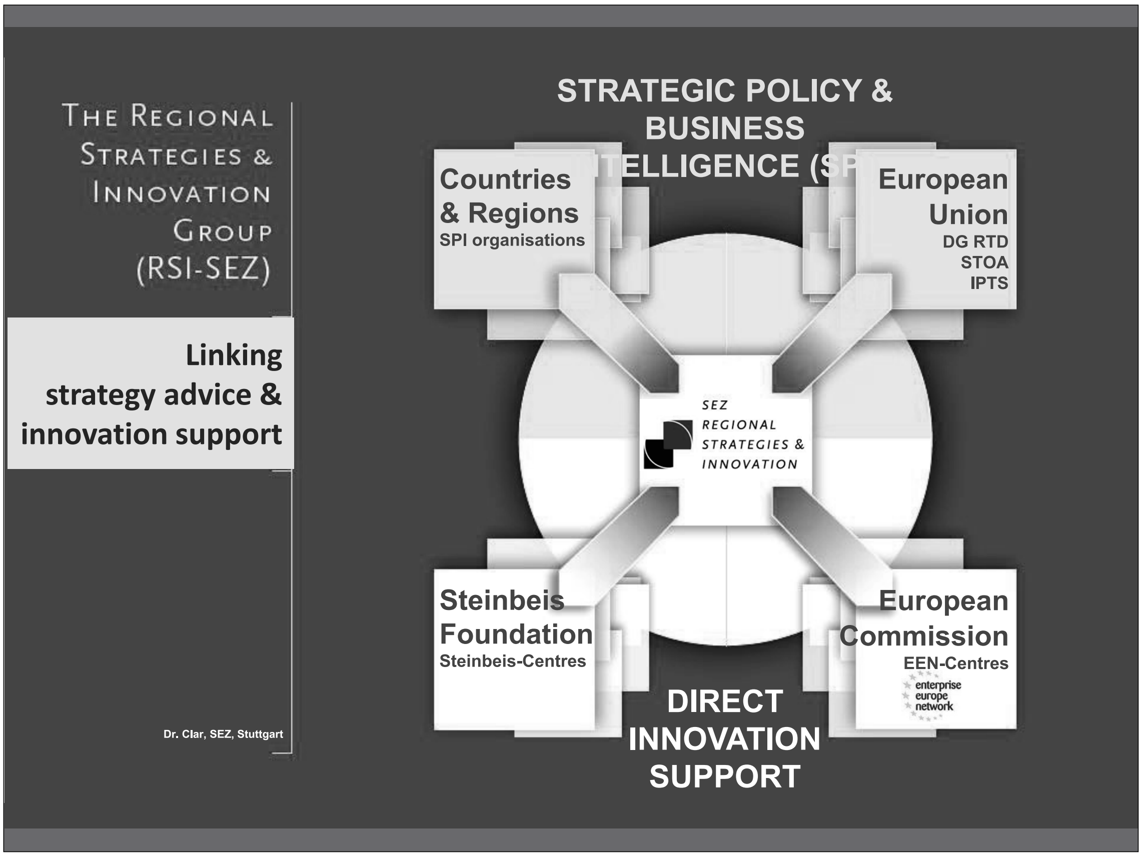

Cluster Policies and Internationalisation

- Public cluster support – fad or necessity?
- Internationalisation dimensions of cluster development and cluster policies
- Clusters, cluster internationalisation and S3
  - expectations
  - challenges
- A case addressing these challenges: the "Spitzen"-Cluster MicroTEC Südwest

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The “Spitzen”-Cluster Competition - German National Context

(in addition to direct cluster support)

- **Excellence Initiative for Cutting-Edge Research at Institutions of Higher Education**: 3 competitive calls (2006, 09, 12) for
- **Internationalisation Strategy for Science & Research**
- **High-Tech Strategy 2020**
  - Assess R&I-support strategies and develop new ones
  - Rally key R&I-stakeholders around nationally prioritised, application-oriented fields
  - Top-level research on **key technologies** focused on future **lead markets** to develop convincing answers to the “Grand Societal Challenges”

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The “Spitzen“-Cluster Competition

ca. 100 mio EUR each (50 % pub/priv)

Flagship of the German High-Tech Strategy 2020, and pillar of the Internationalisation Strategy for Science & Research

- Strengthening the <u>research and innovation potential</u> of the best German ‘Clusters‘ (Consortia) (bottom-up)
  Objective: maintaining/generating <u>jobs</u> by massive R&I investments aiming at achieving a key position internationally, and faster transfer of ideas in ‘products‘ and services
- Supporting innovative approaches to long-term R&I boosting <u>strategies</u>, optimised for both, <u>regional</u> AND ‘<u>sector</u>‘ dimensions

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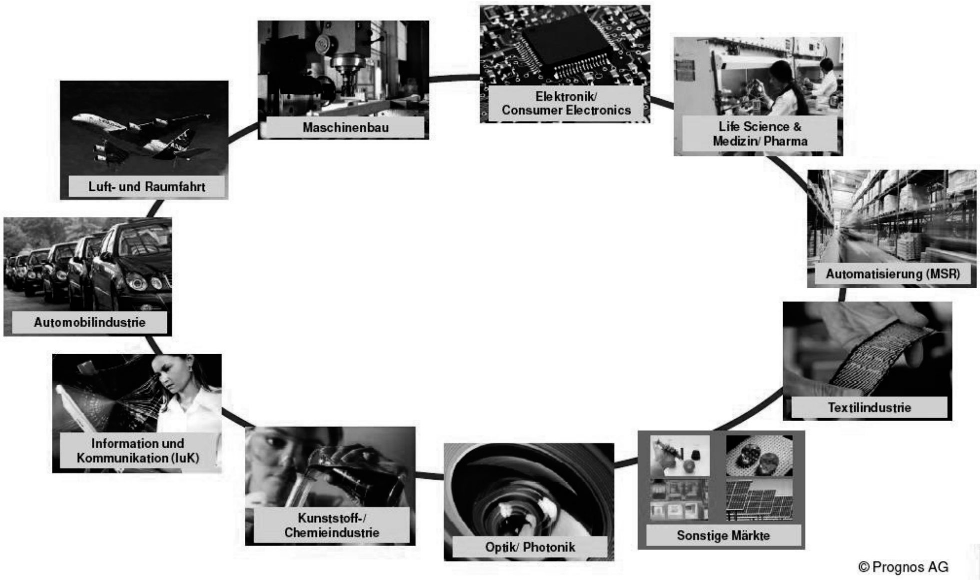
Microsystems technologies (MST), a General Purpose Technology (GPT) and innovation driver for intelligent/autonomous & energy-efficient solutions in traditional and new markets



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The winning 'Cluster' MicroTEC Südwest

- >40 mill EUR own funds, >40 mill nat. funds, >5 mill B-W funds, x mill EU funds
- Consortium of > 300 actors (too big?), with a 6 million inhabitants 'home base', 20 R&I projects & 10 'structural' projects
- Highly innovative and internationally networked economic structure along key micro-system technology (MST) value chains
  - Excellence universities & HE institutions
  - Large research organisations
  - 'Home-grown' multi-national enterprises
  - Technologically strong SMEs
- Strong technology platform

microTEC Südwest

Overall aim: structuring the large consortium and making it work successfully and sustainably

- Joining research forces in 2 “Light-Houses“ (mobility, health) to generate breakthrough innovations for global lead markets
- Establishing technology platforms as a base for customised smart systems and promising cross-industry innovations
- Building strategic partnerships worldwide along all parts of prioritised value chains

Baden-Württemberg

SPONSORED BY THE Federal Ministry of Education and Research

INVENTED IN GERMANY

Elements of the internationalisation strategy for smart specialisation

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Aim: enlarge existing & develop new markets worldwide

- International benchmarking
- Increase international visibility and attractiveness
- Develop strategic alliances between different actors, consortia, parts of clusters
- Deepen and develop new research cooperations
- Exchange staff, train and recruit technical and scientific personnel from abroad

Approach: integral part of all activities & specific actions

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'Lighthouse' roles – internat. aspects

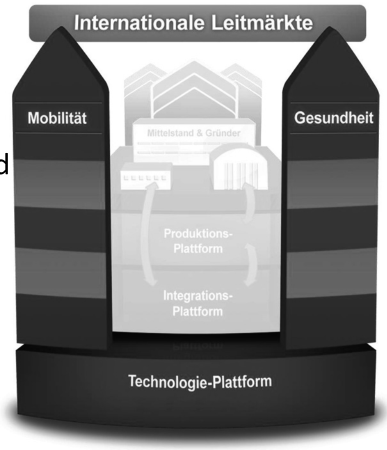
Focus : sustainable mobility, "healthy health"

Goals

- ✓ Build 'open-innovation' technology platforms
- ✓ Achieve leading international market position
- ✓ Fast and successful penetration through world market leaders

Challenges

- ➢ System integration & value-chain integration
- ➢ SME involvement in overall process including world market penetration
- ➢ Close coordination of strategies concerning internationalisation



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Lighthouse "mobility" examples : High-Performance Sensors

➢ Thin, unchilled **distance infrared-image-sensors** with nanotech absorb layers.

BOSCH Binder

➢ Silicon carbide technology for **robust sensors** in a harsh environment (motor)

BOSCH IMTEK centrotherm KIT

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Lighthouse “health“ examples: In-Vitro-Diagnostics

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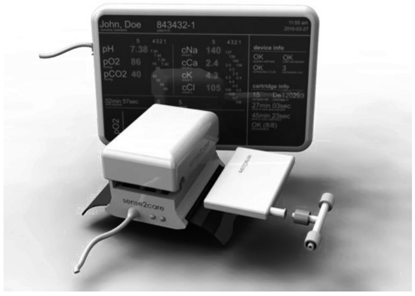
- Cartridge-based analyzing system for **continuous patient monitoring** of blood parameters.

NMI sense2care bürkert G.RAU as electronics OECHSLER



- **Smart Reagent Dosing:** "Intelligent" reagent cartridge for cost optimizing and miniaturization of complex IVD systems

BioFluidiX Roche IMTEK HSG-IMIT

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The enabling & support platforms - their contributions to internationalisation

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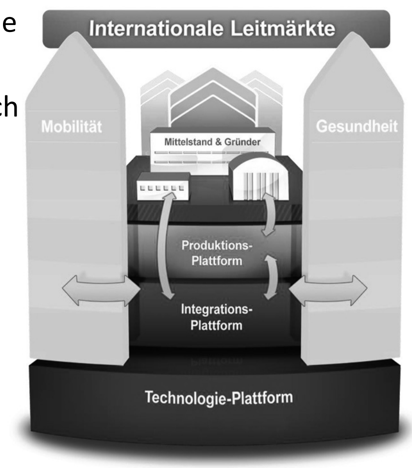
Goal

- ✓ Expand and strengthen the innovation and value chain – with a focus on start-ups and SMEs
- ✓ Improve the links between basic research & tech development



Dynamic support platforms for

- strategy development
- R&I speeding-up & support
- methodological & process competence
- joint system development
- small volume series production
- education & training
- internationalisation / market penetration

Smart Systems Integration (SSI) platform: pilot project examples

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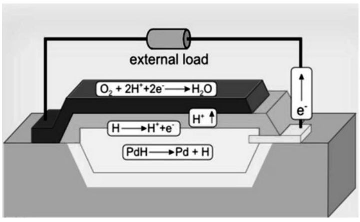
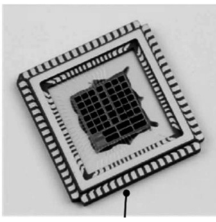
- **Energy autarkic, textile integrated sensor systems** for Electrocardiogram (ECG), Respiration, Motion, Oxygen saturation, Blood pressure (e.g. fire brigade)

ITV DENKENDORF · ZIMMERMANN elastische und technische Garne · KANZ · iAQ · CoSi

- **Chip integrated fuel cell-powered** energy, electronic and sensor-platform





MICRONAS · THIEME · IMTEK

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Production platform (PRONTO) pilot project examples

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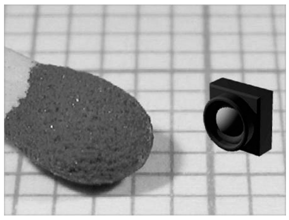
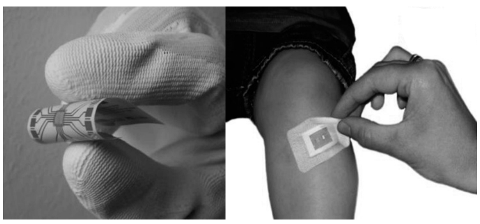
- Configurable **camera** for microsystems

SCHUNK · FESTO · mechatronic · SENSOPART · ims chips · hema electronic · pilz the spirit of safety · HSG-IMAT · HSG-IMIT



- **Ultra-thin flexible chips** and circuit boards for use in microsystems

AdMOS · BOSCH · ims chips · WÜRTH ELEKTRONIK



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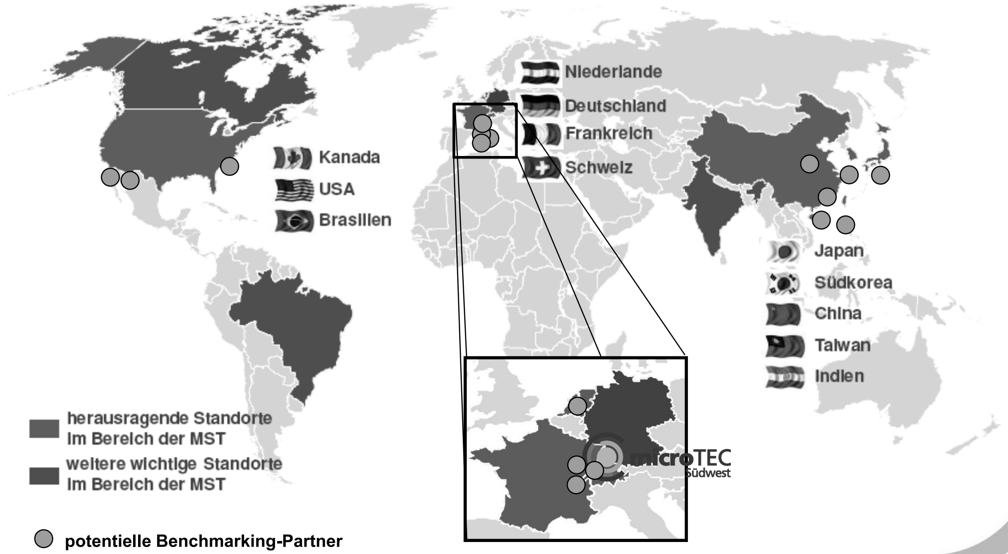
A selection of Partner Regions for R&I cooperation

Leading micro-system technology (MST) regions (clusters)
identified by MicroTEC Südwest actors



STRATCLU
Strategische Clusterentwicklung

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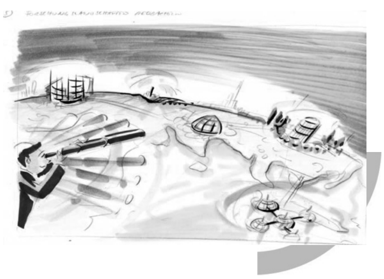
A strategy process involving actively a broad spectrum of public and private stakeholders,

- both integrating their specific knowledge and communicating strategic knowledge from global sources,
- elaborating on this basis optimised and preferred development paths in/for global value chains,
- thus creating synergies AND committment for implement.

- **reduces the risks of S&T&I investments**
  - for the participating actors
  - and for ‚external' investors.



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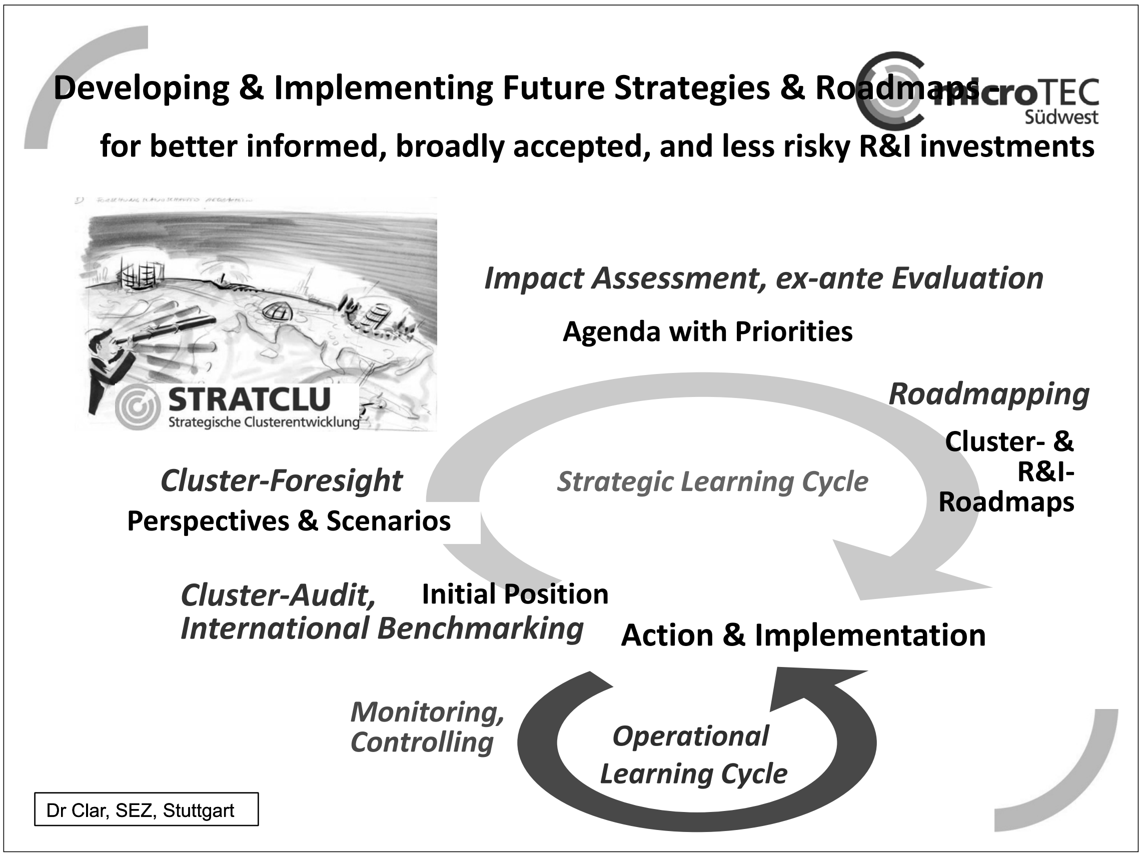
Developing & Implementing Future Strategies & Roadmaps
for better informed, broadly accepted, and less risky R&I investments
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STRATCLU
Strategische Clusterentwicklung
Impact Assessment, ex-ante Evaluation
Agenda with Priorities
Roadmapping
Cluster- & R&I-Roadmaps
Strategic Learning Cycle
Cluster-Foresight
Perspectives & Scenarios
Cluster-Audit, International Benchmarking
Initial Position
Action & Implementation
Monitoring, Controlling
Operational Learning Cycle
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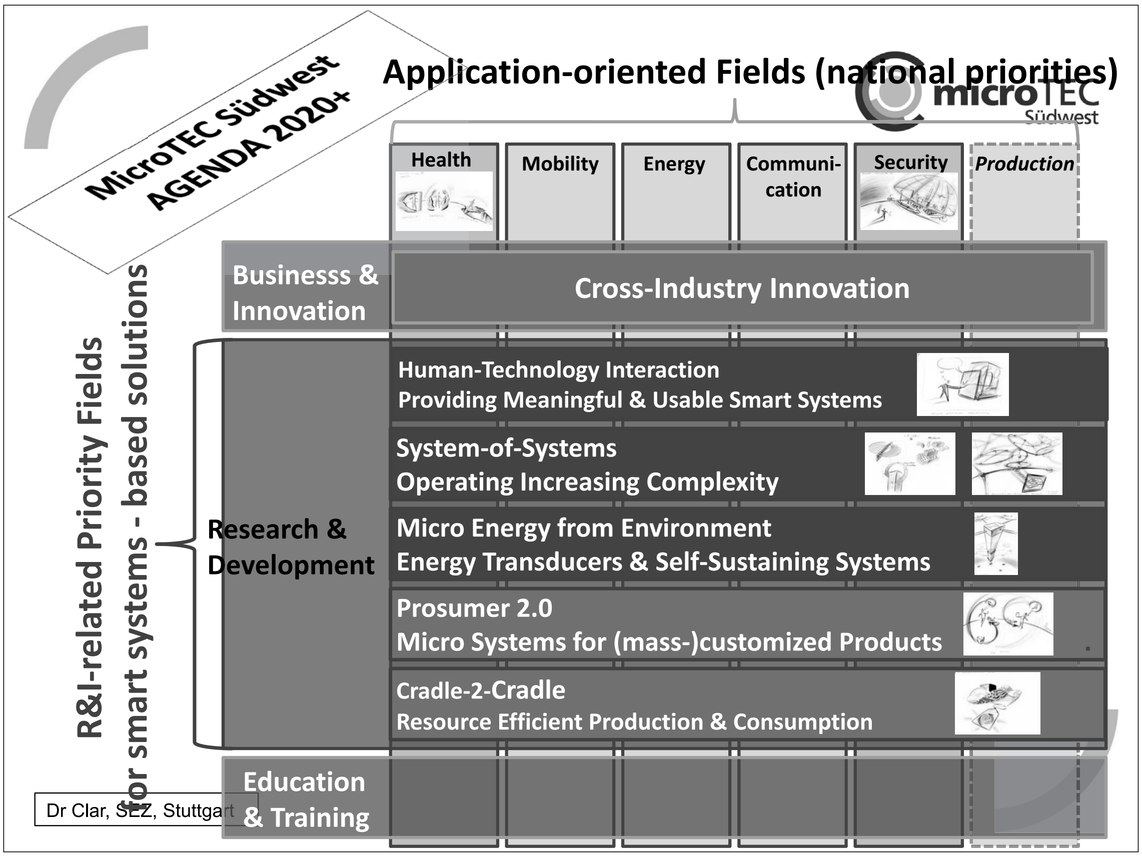
MicroTEC Südwest AGENDA 2020+
Application-oriented Fields (national priorities)
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Health
Mobility
Energy
Communi-cation
Security
Production
Businesss & Innovation
Cross-Industry Innovation
R&I-related Priority Fields for smart systems - based solutions
Research & Development
Human-Technology Interaction
Providing Meaningful & Usable Smart Systems
System-of-Systems
Operating Increasing Complexity
Micro Energy from Environment
Energy Transducers & Self-Sustaining Systems
Prosumer 2.0
Micro Systems for (mass-)customized Products
Cradle-2-Cradle
Resource Efficient Production & Consumption
Education & Training
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Agreed R&I Priority Fields (I)

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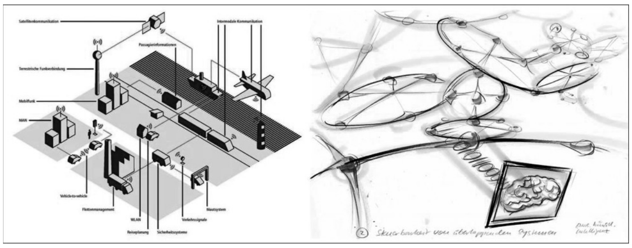
Systems of Systems
Operating Increasing Complexity



Micro Energy from Environment
Energy-Autonomous & Self-Sustaining Systems

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Agreed R&I Priority Fields (II)

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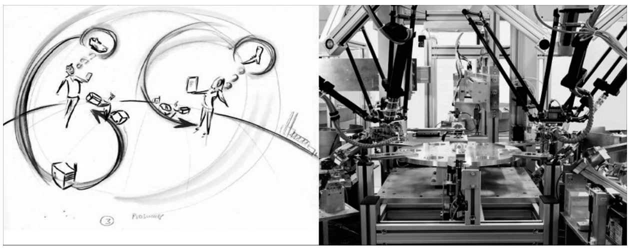
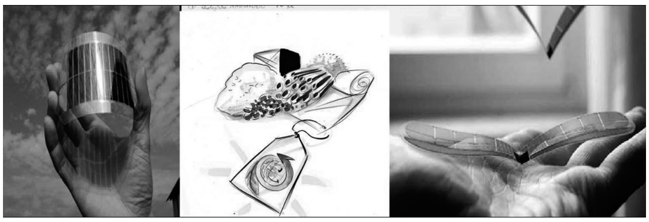
Prosumer 2.0
Micro Systems for (mass-)customized Products



Cradle 2 Cradle
Resource Efficient Production & Consumption



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Agreed R&I Priority Fields (III)

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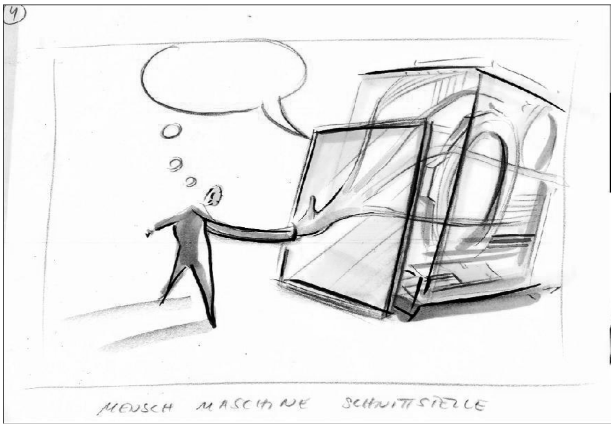
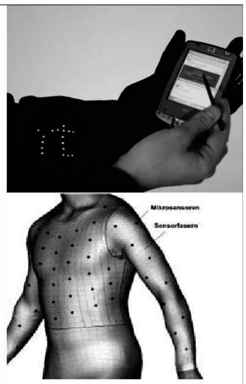
Human-Technology Interaction

Providing Meaningful and Accepted Smart Systems





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Focusing & adapting the cluster strategy process ...to key application fields

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Scoping & Benchmarking

↓

FS & Impact Assessment ⇒

↓

Roadmapping & Evaluation ⇔

Smart Production

Smart Health

e.g. Smart Mobility

- trends & drivers
- RTD priorities
- Innovation Roadmap
- transfer & capacity building

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Application Fields, e.g. Smart Health

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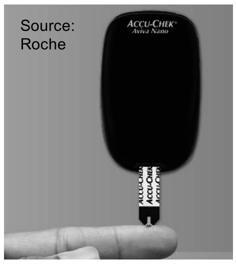

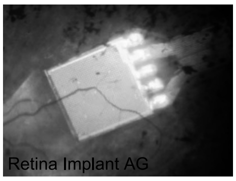

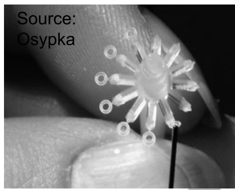

Personalised Medicine/Therapy

- *Targeted/selective (more effective & efficient) therapy based on reliable point-of-care (companion) diagnostics (e.g. easy-to-use devices for HIV, tumor, … patients)*

Intelligent implants

- *Compensation of physiological dysfunctions (e.g. cochlea or retina implants)*

Intelligent medical devices & instruments

- *Risk- & time-reduction for interventions through „intelligent upgrading" of devices & instruments, providing more & better information per procedure (e.g. multifunctional intracardiac catheters)*

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Conclusions

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- …..
- ….
- …
- ….
- ….
- …..

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OECD Outreach Workshop on

Smart Specialisation: Its Extension to East Asia

Biography of presenters,
Abstracts & Presentations

Session VI Extension to East Asia

April 4 (Thur) 14:00 – 16:00

Session Chair

YEONG CHEOL SEOK

Vice President
Korea Institute for Advancement of Technology (KIAT), Korea

Yeong Cheol Seok is uniquely qualified for the position based on his expertise in the area of High Technology Business and his exceptional education background.

After having finished the Graduate School of Economics at the Seoul National University, Dr. SEOK worked as a Research Economist at the Korea Economic Research Institute for one year. He then furthered his education in United States, where he obtained Master's & a Doctorate degree in Economics from the Ohio State University. Upon receiving his doctorate, he was invited by the University of Cincinnati to teach as a Visiting Assistant Professor of Economics and he held this position for four years(1990-1994). Thereafter, he returned to Korea and consecutively filled various senior Research Fellow posts including the Director of the Technology Planning Division at the Korea Institute of Industrial Technology Evaluation and Planning(1994-2001). By virtue of his extensive research experience in the Industrial Technology field and his extraordinary education accomplishments in Economics, Dr. SEOK was recruited by KOTEF and hired in September 2001 for the position of Director of KOTEF's Policy Research Center. He has served as a Vice President of KIAT(Korea Institute for Advancement of Technology) since May 2009.

Dr. SEOK has also published widely on the relationship between High Technology and Business. Specifically, his publications include '*Strategy for the promotion of Industrial Technology Infrastructure in Korea*' and '*An Analysis of Tax Incentive System for R & D Activities in Korea and Inducing Innovations through Public Procurement*'. Accordingly, Dr. SEOK is renowned among the Korean technology industry for his expertise and he has built a wide range of contacts with leading high technology executives in Korea and abroad.

Session VI-I New Challenges for Japanese Cluster Policy: Beyond Proximity and Trust

ICHIRO SAKATA

Professor, Todai Policy Alternatives Research Institute
University of Tokyo, Japan

BIOGRAPHY

Ichiro Sakata is a professor at Todai Policy Alternatives Research Institute, the University of Tokyo. He also has a joint appointment as a professor at the Graduate School of Engineering and co-head of Presidential Endowed Chair for Electricity Network Innovation by Digital Grid. He was a member of OECD's Expert Advisory Group (EAG) to the Innovation Strategy. His research interests include technology management, technology roadmap and innovation network. He has published more than 100 papers in peer reviewed journals and international conference proceedings. He received his Bachelor's degree from the University of Tokyo in 1989, MA from Brandeis University in 1997 and Ph.D from the University of Tokyo in 2003. He has a 20 years' working experience as a senior policy analyst and director at the Japanese Ministry of Economy, Trade and Industry (METI).

PRESENTATION ABSTRACT

Networks within an organization and also among organization are expected to work as conduits of resources and knowledge for innovation. Previous studies have shown that dense networks are closely related with innovation performance. Tight relationships in a close unit group foment trust among actors and therefore promote collaborations, and diverse connections with the others can open an opportunity for breakthrough. Thus, Japanese policy program on regional cluster is characterized by its emphasis on networks and networking as compared to traditional strategies of industrial policy. 'Small-world' structure of regional network is the target of public intervention. However, no single region or even country will possess all knowledge and skills required for dynamic innovation in the 21st century. Technology collaboration between leading regions or countries is important to promptly and efficiently address the global challenges such as climate change, aging and food security. Globalization has become a crucial issue of Japanese cluster policy.

OECD Outreach Workshop on Smart Specialization Program
(April 3-5 2013, Gwangju, Korea)

IPRC

New Challenges for Japanese Cluster Policy - Beyond proximity and trust -

Prof. Dr. Ichiro Sakata
Todai Policy Alternatives Research Institute
Faculty of Engineering
The University of Tokyo

 1

Abstract

Networks within an organization and also among organization are expected to work as conduits of resources and knowledge for innovation. Previous studies have shown that dense networks are closely related with innovation performance. Tight relationships in a close unit group foment trust among actors and therefore promote collaborations, and diverse connections with the others can open an opportunity for breakthrough.

Thus, Japanese policy program on regional cluster is characterized by its emphasis on networks and networking as compared to traditional strategies of industrial policy. 'Small-world' structure of regional network is the target of public intervention.

However, no single region or even country will possess all knowledge and skills required for dynamic innovation in the 21st century. Technology collaboration between leading regions or countries is important to promptly and efficiently address the global challenges such as climate change, aging and food security. Globalization has become a crucial issue of Japanese cluster policy.

We will discuss this matter based on several cases such as Hamamatsu auto and photonics cluster and identify the role of governments and universities.

Brief History of Japanese Innovation Policy

I: 1950's~60's	II: 70's~80's	III: 00's~
Organization	Technology	Fundamentals

I: 1950's~60's — Organization

1950's

Foundation of Organization

- Agency of Industrial Science and Technology
- Science and Technology Agency

1960's:

Establishment of Institution

- Act of Research Association
- National Project System

II: 70's~80's — Technology

1970's

Mega National Project

- Super LSI
- Sunshine
- Moonlight

1980's

Basic research shift

- JAPAN as NO.1
  →criticism against free rider on basic science
- Shift of national research institutes to basic science
- Boom of central research institute

III: 00's~ — Fundamentals

90's~ The Lost Decade

Late 1990's

Reconstruction of Innovation System

- Science and Technology Basic Plans
- Bayh-Dole Act
- TLO

Early 2000's

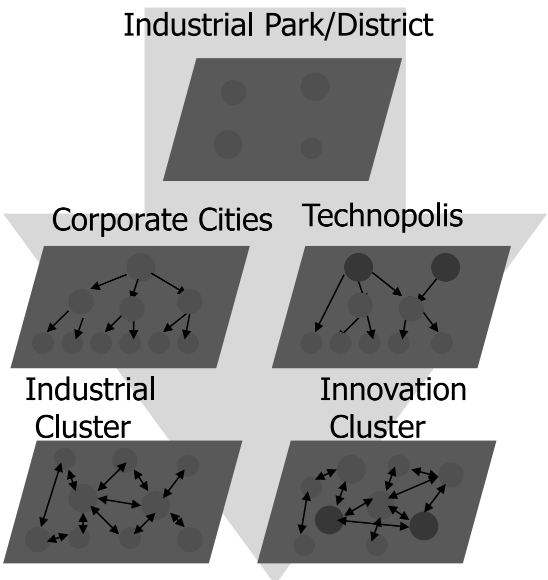
- government reorganization
- Regional cluster policy

2006～

Innovation Strategy

- New Economic Growth Strategy
- Innovation 25

Transition of regional policy



Infrastructure to knowledge and network

1960 Pacific Industrial Belt Plan
1962 National Comprehensive Development Plan
1962 Law for Development of New Industrial Cities
1972 Relocation Promotion Law

1983 Technopolis Law

1997Law on Activation of Specific Regional agglomeration

1998 Regional Platform

2001 Industrial regional Cluster Plan
2002 Innovation Cluster Plan

Changes in the focus of regional policy

Production Resources
- Infrastructure(Land, water ,Port, Road etc)
- Labor force
- Absorptive Capability

Knowledge
- Academic and Industrial Knowledge
- Learning Capability
- Science Park

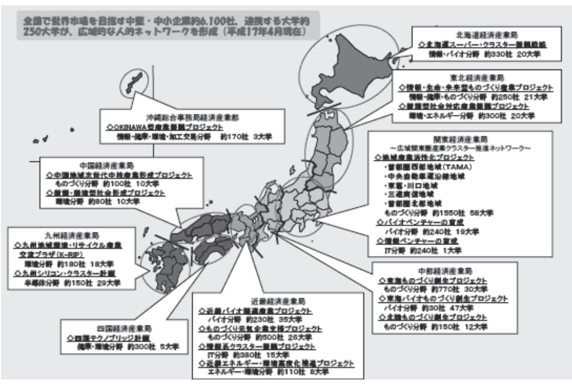
Fundamentals System
- Global / Creative Cities
- **Open Innovation System and Network (Network as a conduit of information)**

 5

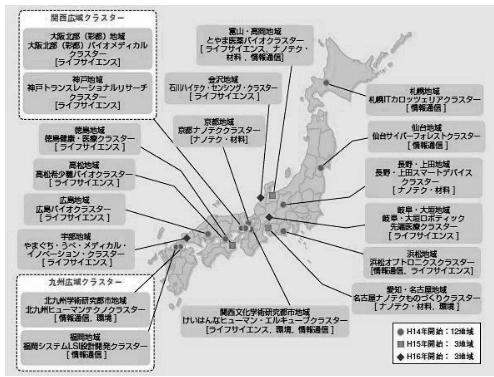
Cluster Projects in Japan

In Japan, national projects for forming regional clusters have been developed since 2001. Now local governments lead cluster policy.

Industrial Cluster Project



Innovation Cluster Project

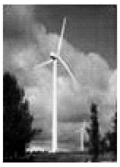


R&D projects, academic-industry collaboration, incubation,
networking efforts, setting buffer institutions and modern IT/Web infrastructure are included in the cluster policy.

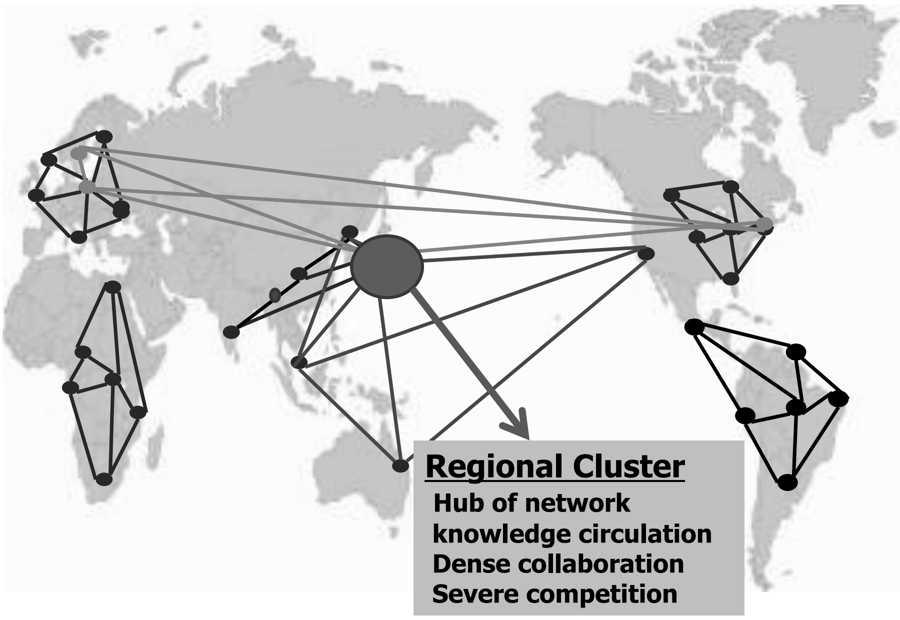
Proximity does matter for Innovation

While firms can access factors of production across the globe, local knowledge and capabilities, including proximity to research and education institutions continue to matter for innovation.

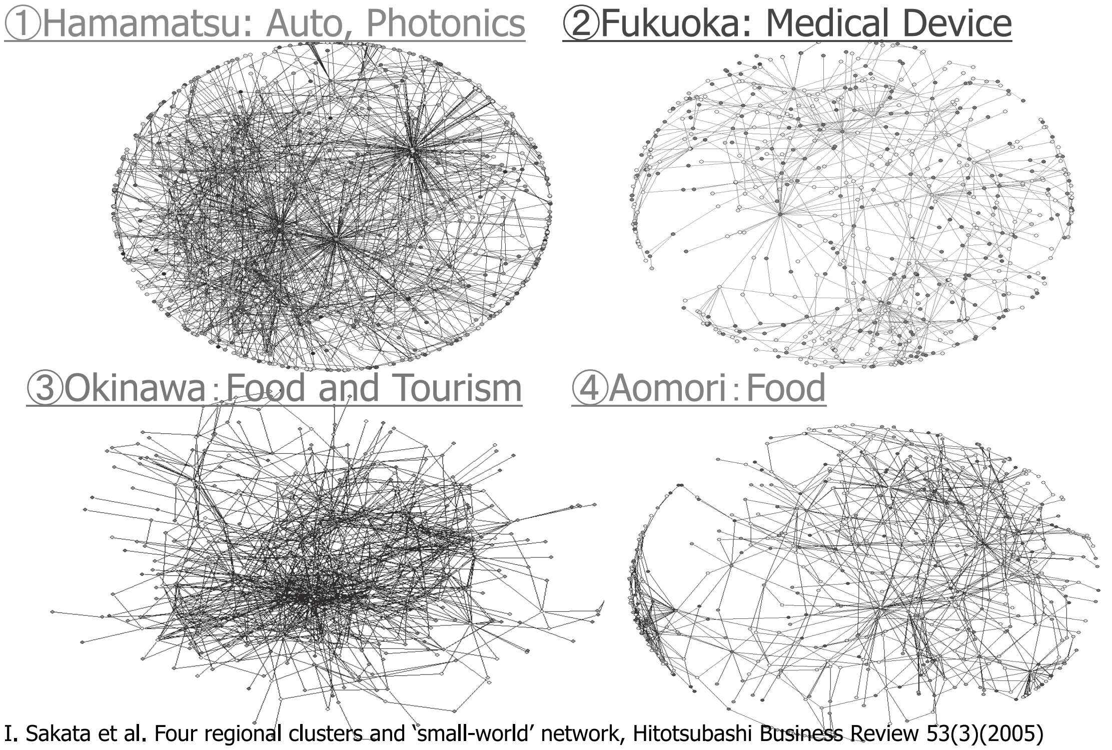
(Source)
Ministerial report on the OECD innovation strategy, May 2010.



Global innovation network and region

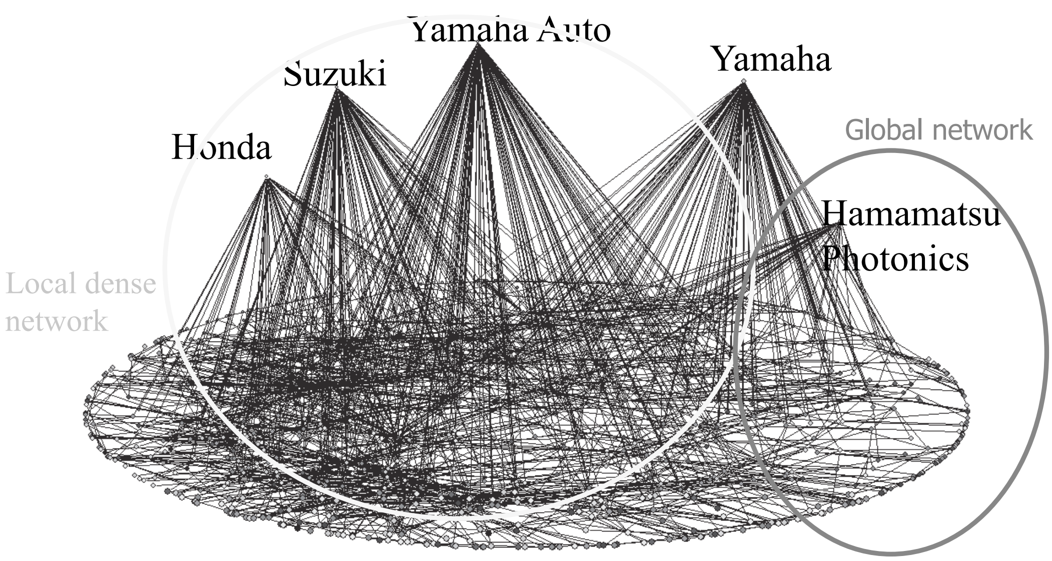


Comparison of Four Networks



I. Sakata et al. Four regional clusters and 'small-world' network, Hitotsubashi Business Review 53(3)(2005)

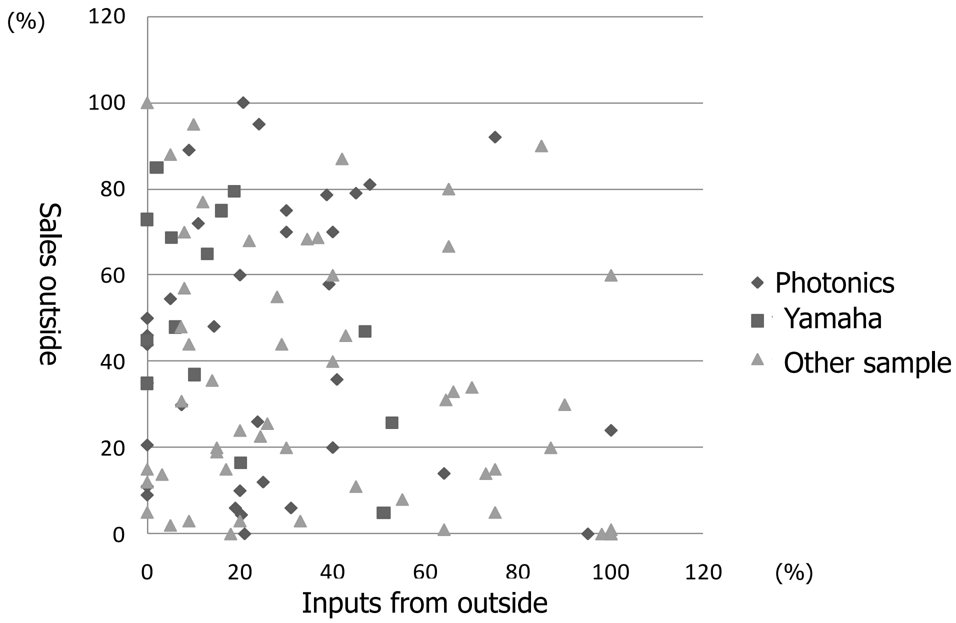
Case : Network structure in Hamamatsu



Effective division of labor, dense collaboration, severe competition in the region

(source) Y. Kajikawa, J. Mori and I. Sakata "Identifying and bridging the network in a regional cluster" Technological Forecasting and Social Change 79(2012) 252-262

Outside links in Hamamatsu



(Source)K. Matsushima, I. Sakata et al. "Design for revitalizing regions" 2013

Major Factors to Develop Network

(1)Trust, (2)Proximity, (3)Industrial Categories

Table 5: Weight of positive features for predicting customer-supplier relationships (Ex.1)

Feature	Average weight
Customer's number of employee	2.80
Supplier's number of employee	1.74
Customer's ranking (nation-wide)	1.13
Common address	0.95
Common industrial categories	0.77
Supplier's ranking (nation-wide)	0.93
Supplier's date of foundation	0.80
Customer's date of foundation	0.74
Customer's ranting (prefecture-wide)	0.70
Common industrial categories of suppliers	0.69

(Source) J. Mori, Y. Kajikawa, H. Kashima and I. Sakata
"Machine learning approach for finding business partners and building reciprocal relationships"
Expert Systems with Applications 39(2012) 10402-10407

Policy suggestions from our experience

◆Network structure is different across regions or industries in Japan. Specialization and globalization depends not only on the nature of industry such as economy of scale and scope but also on policy and corporate strategy. It is possible to improve the regional capability and openness by policy intervention.

◆Even though transactions tend to be more global, trust and proximity are the significant factors to decide network structure.
Policy intervention may be necessary to change the structure.

◆Communities tend to be segmented by industrial categories and keiretsu (existing relationships).
Bridging efforts are essential to develop innovative regions. It is also necessary to provide special support for SMEs or start ups which are suffering from lack of trust and networking resources.

Next stage of our regional policy

Production Resources
- Infrastructure(Land, water ,Port, Road etc)
- Labor force
- Absorptive Capability

Knowledge
- Academic and Industrial Knowledge
- Learning Capability
- Science Park

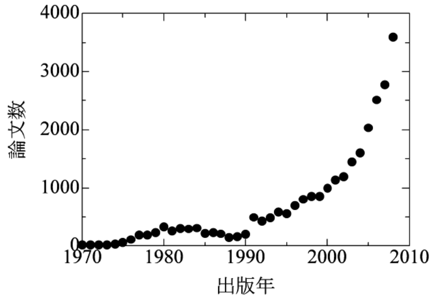
Fundamentals System
- Global / Creative Cities
- **Open Innovation System and Network(Network as a conduit of information)**

Next Stage ?

New innovation model

- Climate Change
- Health / Aging Society
- Food Security
- Poverty

Global challenges

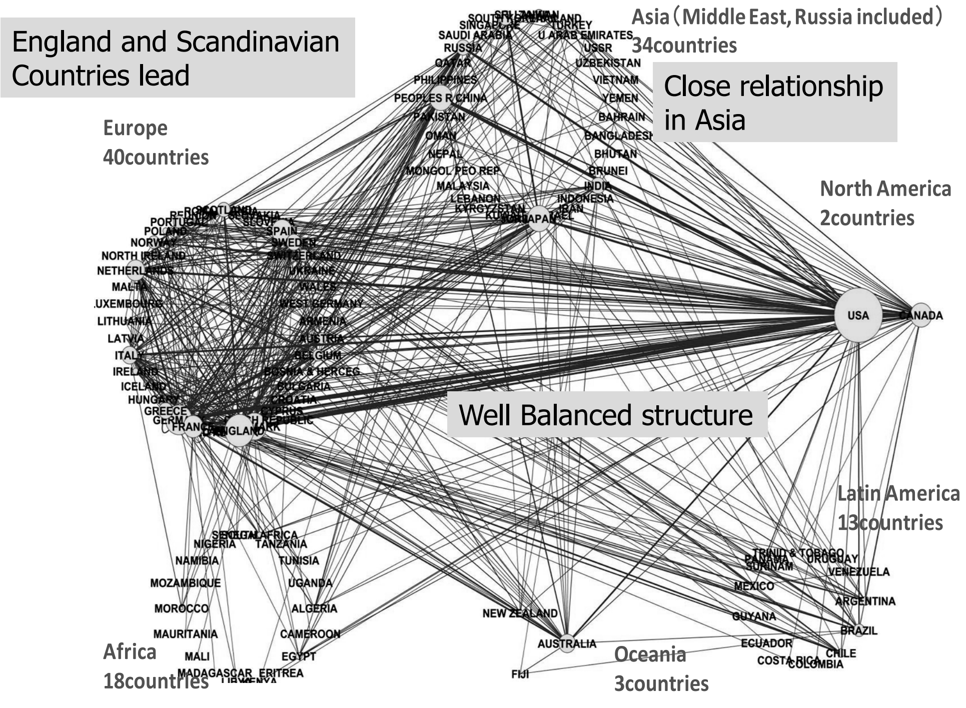


Accelerating tech Progress
(ex. Academic paper of PV)

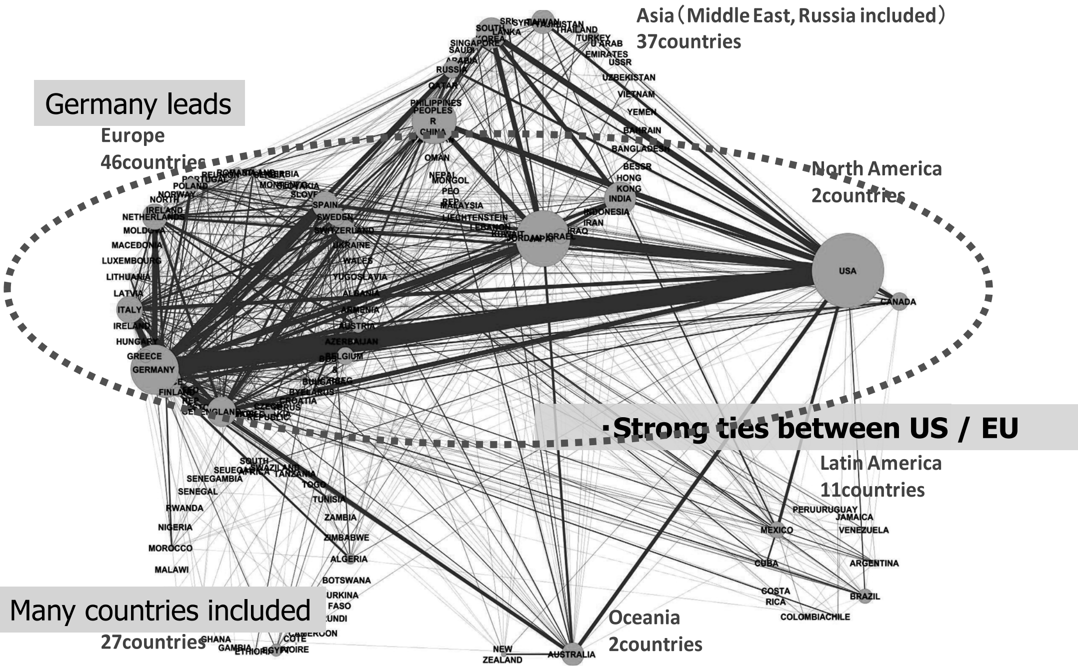
Identify policies, frameworks and governance mechanisms that can accelerate scientific and technological progress and diffuse innovation as widely as possible.

(Source)2009 Interim Report on the OECD Innovation Strategy

Research Network Diagram (Wind Power)



Research Network Diagram (Solar Cell)



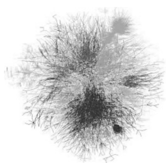
(Source) I. Sakata, H. Sasaki, H. Nakamura and Y. Kajikawa "Maps of international research collaboration in clean energy" Journal of Energy and Power Engineering vol.7

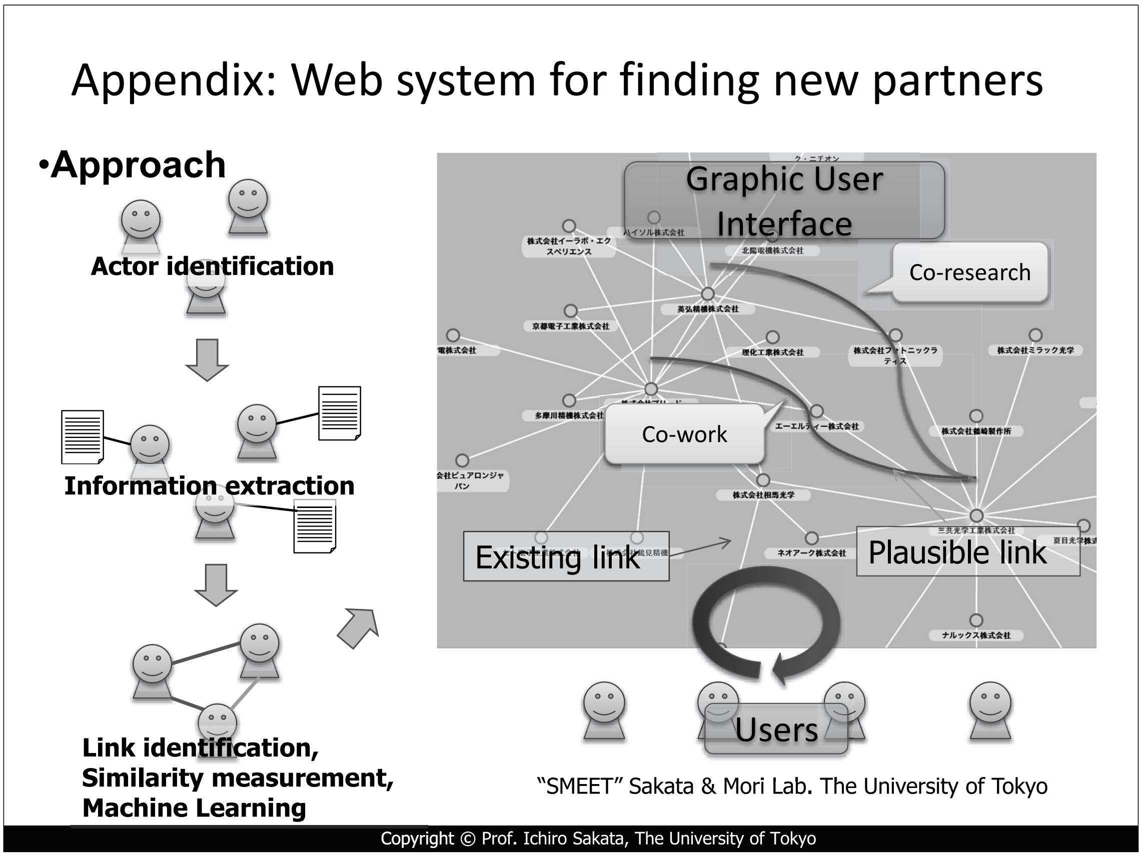
New challenges

◆ No single region or even country will possess all knowledge and skills required for dynamic innovation in the 21st century.

◆ Technology collaboration between leading regions or countries is important to promptly and efficiently address the global challenges such as climate change, aging and food security. Globalization as well as specialization has become a crucial issue of Japanese cluster policy.

◆ Universities and research institutions can lead globalization and wider collaboration based on their expanded networks.




Appendix: Web system for finding new partners
•Approach
Actor identification
Information extraction
Link identification,
Similarity measurement,
Machine Learning
Graphic User Interface
Co-research
Co-work
Existing link
Plausible link
Users
"SMEET" Sakata & Mori Lab. The University of Tokyo
Copyright © Prof. Ichiro Sakata, The University of Tokyo

Session VI-2 Chinese Torch Program: Environmental Construction for High-tech Industrialization

DING MINGLEI

Associate Professor, Department of Comprehensive Development
Chinese Academy of Science & Technology for Development (CASTED), China

BIOGRAPHY

Ding MingLei received his Ph.D. degree from Hebei University of Technology in Management Science and Engineering in 2008. In the same year, he began his post-doctorate research in Applied Economics in Nankai University, Tianjin. Previous to 2008, he worked as a foreign business trade manager for a large pharmaceutical company.

In 2010, Dr. Ding went to Chinese Academy of Science and Technology for Development (CASTED) as a visiting scholar, and enrolled in CASTED by the end of 2011. Now, he works in the Dept. of Comprehensive Development, engaged in the work of S&T strategy and planning. His research interests include S&T Strategy and Planning; Regional and Industrial Economies; Innovation and Entrepreneurial Management.

PRESENTATION ABSTRACT

With the general purpose of reinforcing the overall environment for technology innovation and promoting high-tech industrialization, and the general requirement of "deepening reform, strengthen coordination, demanding oriented, critical breakthrough", Torch Program focused on the construction of high-tech zone, focusing on the cultivation and development of strategic emerging industries, promoting the formation and development of innovative industrial clusters with the outstanding characteristics, substantial economics scales, higher market share and brand awareness, fostering the growth of tech-based SMEs and boost technological innovation in enterprises, constructing the technical support system which integrating the innovative resources including capital, technology and talent to reinforce support for innovation and industrialization. Torch Program has strengthened the combination of science and technology with economy, and achieved remarkable results. It makes significant contributions for the implementation of innovation-driven development strategy and promoting china to be an innovative country.

CASTED

Chinese Torch Program

Environmental Construction for Hi-tech Industrialization

Dr. Ding MingLei
Associate Professor,Chinese Academy of Science and Technology for Development (CASTED)

Gwangju, Korea April. 2013

Contents

CASTED

2013

CASTED

The Trends of Chinese Innovation Policies

The National Conference on Science and Technology Innovation was held on July 7, 2012 in Beijing.

Suggestions for accelerating the development of Innovative Country

- **Promoting innovation-driven development**
- **Improving innovation capacity and system for the cultivation of talented people,**
- **Deepening reform of scientific and technological system**
- **Optimizing environment for innovation**
- **Expanding international cooperation.**

3

Overview of Torch Program (1988-): Main Characters

Torch High Technology Industry Development Centre (1989.10-)
a public institution belonging to the S&T Ministry

1 **National guidance policy in the field of industrialization**

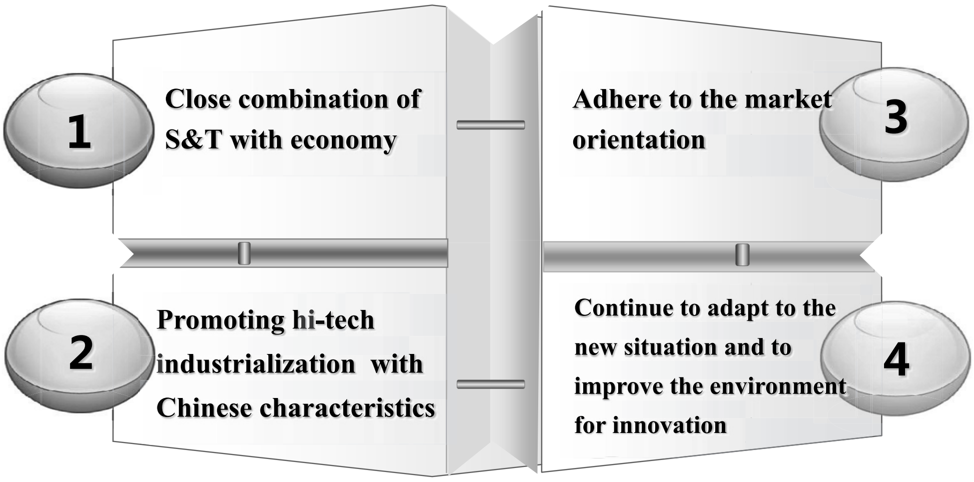
2 **Show the pattern of market economy**

3 **Reflecting the direction of economic reform in the fields of S&T**

4 **Giving full play to local government initiatives**

4

Overview of Torch Program (1988-): Main Experiences



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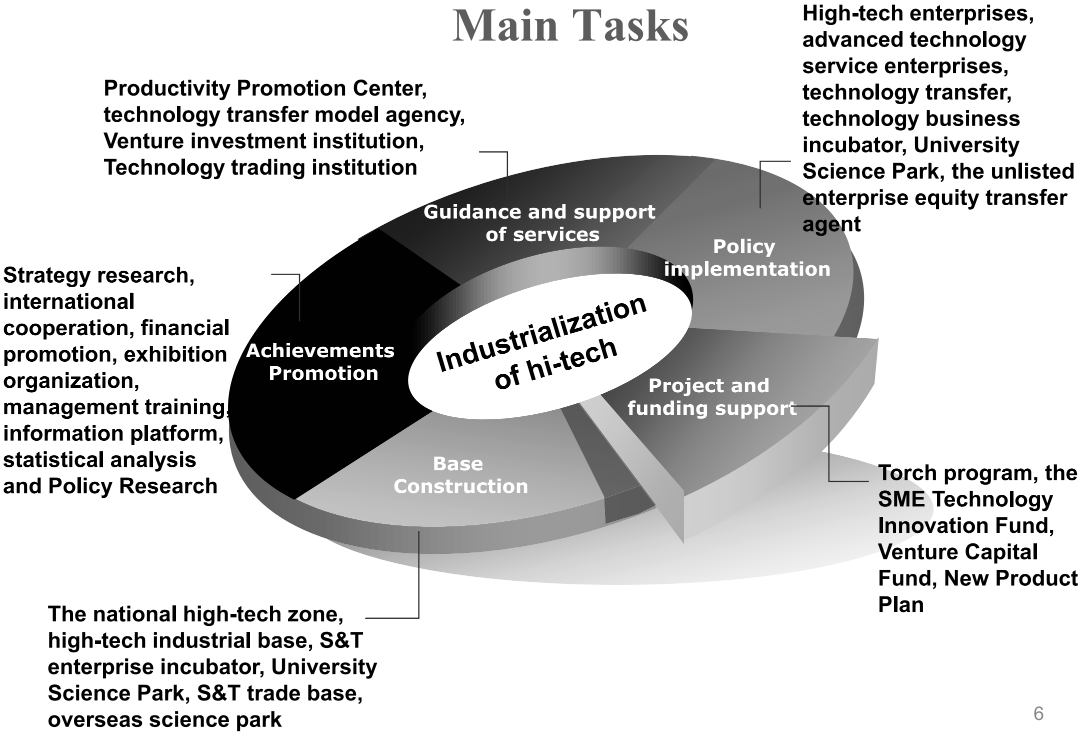
Overview of Torch Centre (1989-): Main Tasks



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Contents

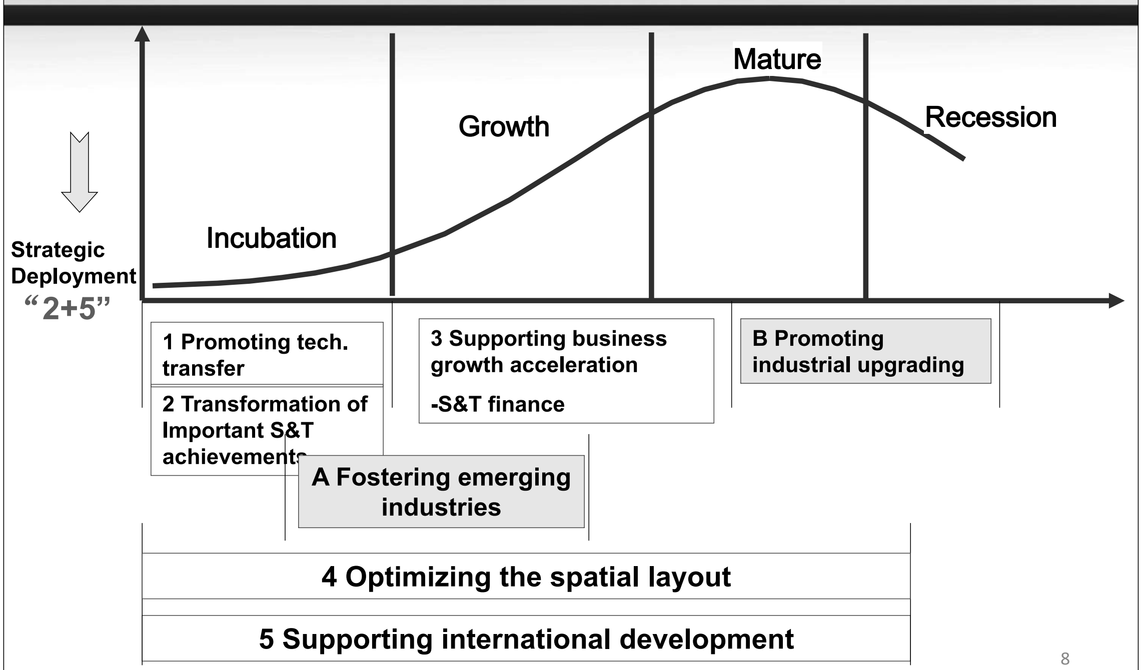
- Background
- Strategic Planning
- Work Progress(2012)
- Policy Measures

2013

CASTED

Research Roadmap:

Environmental Construction of Industrialization



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Objectives of Torch Centre

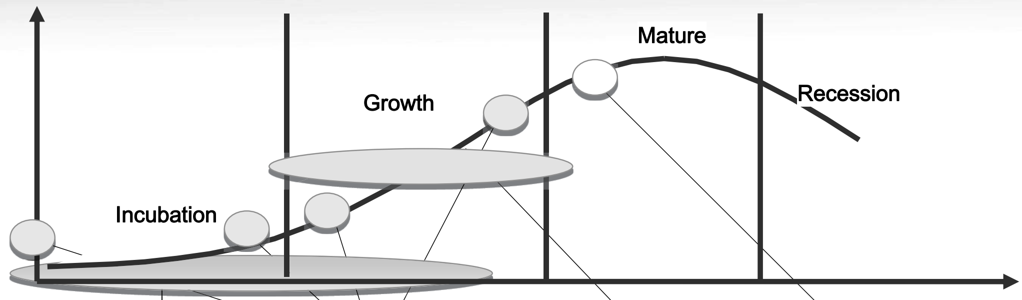
CASTED

1. To perfect the support system for high-tech industrialization, focusing on promoting indigenous innovation
2. To foster the growth of tech-based SMEs and boost technological innovation in enterprises
3. To promote the development of innovation clusters and advance upgrades in high technologies
4. To mobilize innovative resources including capital, technology and talent to reinforce support for innovation and industrialization

9

I. Fostering Emerging Industries

CASTED



1. The enthusiasm and initiative of the local governments play in emerging industries	2. Strengthen the key technology R&D, technology transfer, SMEs founding and market cultivation, important S&T achievements industrialization and others	3. Actively improve the industrial organization, and actively promote the industrial organization innovation	4. Evaluation of high-tech industrial clusters and fostering pilot, regulating the development of emerging industry

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II. Promoting Industrial Upgrading

CASTED

- Developing high technology services, cultural and creative industries and headquarters economy, promoting manufacturing to service transformation
- On the weak link of Chinese manufacturing industry, improving the competitive advantage of manufacturing industries
  - development of core components and key materials
  - development of professional equipment
  - using high technology to transform traditional industries
  - formulating the catalog to encourage the development of high value-added product

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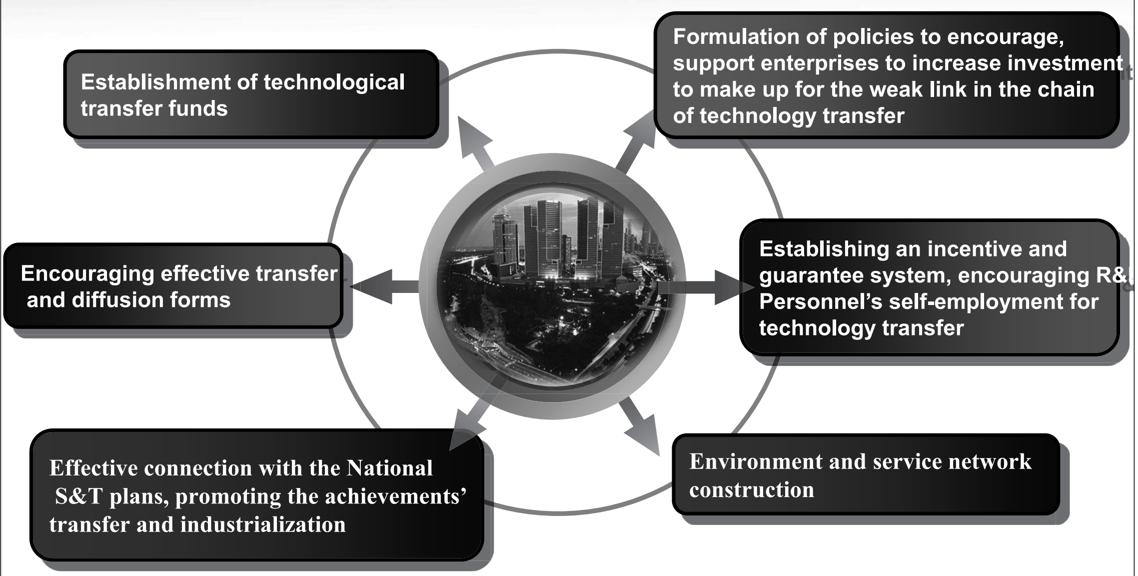
III. Promoting Technology Transfer

CASTED



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Thank You!
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Session VI-3 Korean Cluster Policies: Retrospect and Prospect for Smart Specialisation Strategies

DONGSOO KIM

Research Fellow, Head of Regional Policy Team,
Korea Institute for Industrial Economics & Trade (KIET), Korea

BIOGRAPHY

Dongsoo Kim has worked at KIET since 2007 and researched in many areas such as regional policy comparison, paradigm study in regional policies, regional industry promotion planning, etc. As the head of the Regional Policy team in KIET since 2011, he is working on the White Paper project for regional industry policies, which brings policy implications for government officials and people who are concerned. In addition, he also makes an effort for the dissemination of Korean experiences on how to develop regional industries to many developing countries.

He received a Bachelor Science degree in Mathematics from Yonsei University and a Ph.D. degree in Economics from George Washington University with a concentration of regional and urban economics.

PRESENTATION ABSTRACT

There are two time periods in terms of cluster policies in Korea.

The first period is up to late 1990s since 1960. Special economic zoning policies have been carried out in this period for industrialization and national competitiveness enhancement. Establishing industrial complexes and free export zones brought industrial accumulation and thus made foundations of Korean manufacturing industries, which raised regional disparity between the capital region and non-capital regions.

The second period is from late 1990s up until now, in which cluster policies have been expanded to regional industry development policies. As a result, local governments have been involved in regional industry development policies as important players. At this moment, the institutional base for specialized regional industries has been established. Since 2008, regional industry development policies have been carried out based on Economic Regions for the economies of scale and open innovation with industrial convergence. Collaborative network among enterprises, universities, research institutes, and governments is encouraged for creative industrial ecology.

There is a challenge that Korea faces regarding regional industrial development now. It is necessary for each entity(enterprises, universities, research institutes, and governments) to play its own specialized part and to have productive communications for the future.

Korean Cluster Policies :
Retrospect & Prospect for Smart Specialisation Strategies

Outreach Workshop on Smart Specialisation Strategy
Dongsoo Kim
Korea Institute for Industrial Economics & Trade (KIET)

2013. 4. 4

Contents

- Cluster Theory
- Cluster Policies in Korea
- Retrospect of Regional Industrial Policies in Korea
- Current Korean Regional Industrial Policies
- Regional Industrial Policies and Smart Specialization Strategies

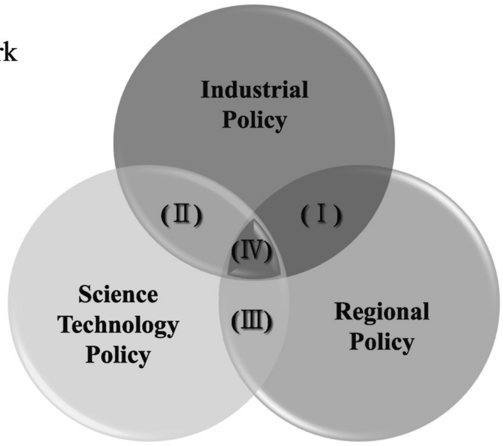
Source

- Industrial Policy and Territorial Development : lessons from Korea, OECD 2011
- White Paper on Regional Industry Development Policies, MKE 2013
- Innovative Cluster Policies for Turkey, KDI KSP 2012

2

Cluster Theory

- Scope of Physical Clusters
  - Type I : Industrial Complexes
  - Type II : R&D Zones, Science Park
  - Type III : R&D Zones
  - Type IV : Free Economic Zones



- Components of Innovative Clusters
  - Enterprises
  - Universities
  - Research institutes
  - Efficient administration

Cluster Theory

	1980s	1990s	2000s
	Marshall	**Porter**	**Miller & Morris**
Theoretical Evolution & Needs	**Industrial Parks:** Production Concentration	**Clusters:** Network	R&BD Clusters
	Regional Industries Accumulation of Human Cap Specialization	Collaboration Innovative Investment	New Industries Integrated Value Added Practical R&D
Policy Tools	Industrial Infra Industrial Complex Skilled Labor	Innovative Infra Networking Governance	Tech Transfer Venture Business Ecology Global Networking

Cluster Theory

- Scope of Research for Innovative Clusters
  - Building an innovative environment from physical industrial complexes
  - Establishing components of clusters
  - Region-oriented from nation-oriented

- Korean regional industrial development policies as the policies for innovative clusters

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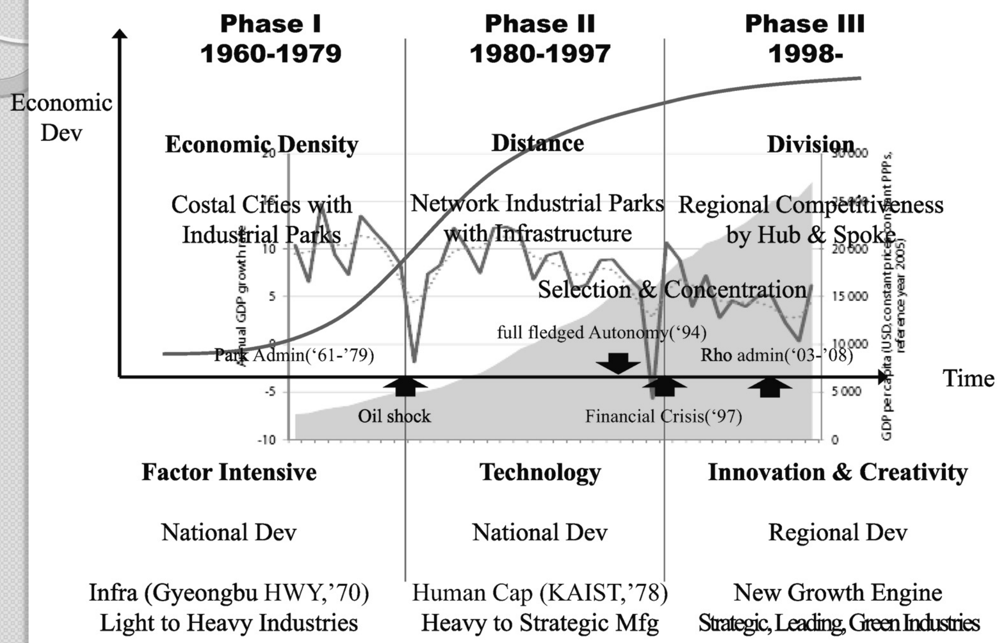
Retrospect of Economic Development in Korea



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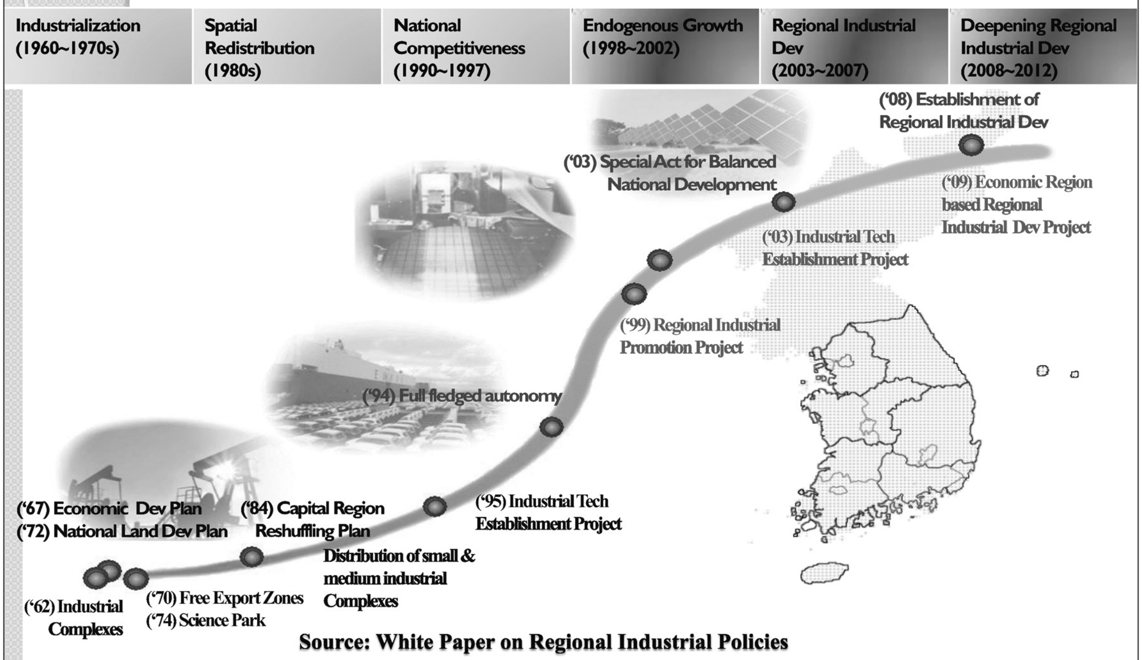
Retrospect of Regional Industrial Policies



Source: White Paper on Regional Industrial Policies

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Retrospect of Regional Industrial Policies

▶ Economic Development Plan : 1960s – 1970s

- Strong Leadership with Grand National Plan Rebuilding Industries
- Labor intensive industries

Light Industries (Textile, etc)

Heavy Industries (Shipbuilding, Steel, Chemicals etc)

Special Economic Zone Policies

Industrial Parks, Free Export Zones, Science Park

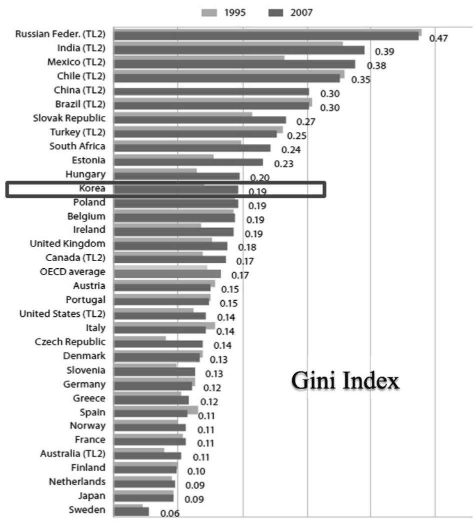
Infrastructure (Highways and Railroads)

Export oriented development

8

Retrospect of Regional Industrial Policies

- Restructuring Industries for Advanced Country : 1980s – 1990s
  - Light Industries to Heavy Industries
  - Selection & Concentration
    - Automobile
    - IT industries
    - Semiconductor
    - Telecommunications, etc)
  - Regional disparity between capital region and non-capital regions has been widening



Note: regional data refer to TL3 level when no specification is included.

Source: OECD (2011a).

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Retrospect of Regional Industrial Policies

- Four reasons behind the upsurge of the regional issue in the late 1990s
  - Regional disparities and social conflicts
  - Consolidation of democracy (Civilian government('92), Autonomy('94))
  - Asian financial crisis ('97)
  - The knowledge economy required the broadening of the technology-centered focus of industrial policy to incorporate innovation

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Retrospect of Regional Industrial Policies

- Full Fledged Local Autonomy since 1994
  - National support for Regional Industries Promotion Projects from four local governments in 1997
  - Building capacities with regional infrastructure such as Technoparks, etc
- Establishment of Regional Development System in Rho Admin ('03-'08)
  - System for Regional Industrial Development based on Regional Innovation System
  - Focus more on R&D in tech development
- Introduction of Economic Region in Lee Admin ('09-)
  - Scale Economy and Collaborative Network
  - Focus more on collaborative networking with

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Current Regional Industrial Policies

	Economic Region	Provinces	Counties
Spatial Scope	7 Economic Regions	16 Provinces	163 Local Areas
Project	Leading Industry Promotion Projects (3yr, since 2009)	Strategic Industry Promotion Projects (5yr, since 1999)	Specialized Local Industry Promotion Projects (since 1995)
Objective	Industrial Competitiveness		Social Cohesion
	Competitive Scaled Industry	Strategic Industry	Local Job Creation
Innovative Governance	Leading Industrial Offices (7)	Technoparks (18) Specialized Centers (80)	Regional Research Institutes (58) Regional Innovative Centers (19)
Program	Leading Industry Program Collaboration Program	R&D & Innovative Tech Program Business Service Program Planning Boards Program Infra Program for Strategic Industry Technopark Program	Local Based Industry Program Program for RRI Program for RIC
Budget (million USD)	400.0 ('12) 385.0 ('11)	173.4 ('12) 268.8 ('11)	60.8 ('12) 101.1 ('11)

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Current Regional Industrial Policies

- Spatial scope of the regional industrial policy

Korea's 16 provinces (nine provinces and seven metropolitan areas)

Korea's 16 Provinces (7 Metropolitan Cities and 9 Provinces)	7 Economic Regions (non-administrative units)	OECD Territorial Classification, TL2
Seoul	Capital Region	Capital Region
Incheon		
Gyeonggi		
Daejeon	Chungcheong Region	Chungcheong Region
Chungbuk		
Chungnam		
Gwangju	Honam Region	Jeolla Region
Jeonbuk		
Jeonnam		
Daegu	Daegyeong Region	Gyeongbuk Region
Gyeongbuk		
Busan	Dongnam Region	Gyeongnam Region
Ulsan		
Gyeongnam		
Gangwon	Gangwon Region	Gangwon Region
Jeju	Jeju Region	Jeju

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Current Regional Industrial Policies

- regional industrial development projects

▶ Leading Industry Promotion Projects in 7 Economic Regions

- The purpose of the Leading Industry Program in 5+2 Economic Regions is
  - to foster into world-class industries
  - to improve the industrial competitiveness of promising products
  - to expand the foundation for value creation
- The purpose of the Collaborative Program in 5+2 Economic Regions is
  - to encourage collaborative cooperation across Provinces

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Current Regional Industrial Policies
- regional industrial development projects

▶ Strategic Industry Promotion Projects in 16 Provinces

- Establishment Program for Local Industrial Foundations

  Comprehensively support tech development and commercialization through joint-establishment and use of equipment and facilities by building local strategic industry complexes or innovation bases

- R&D for Local Industry, Innovative Tech Program

  Develop core tech for strategic industries to promote balanced development

- Business Service, HR Dev Program for Local Industry

  Provide technical instruction, advice, marketing and knowledge support services using local infrastructure

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Current Regional Industrial Policies
- regional industrial development projects

- Regional Strategic Industry Planning Board Grogram

  Establish industrial integration planning bodies to efficiently promote local strategic industry promotion projects

- Promotion Program for Local Innovation Base (Technopark)

  Enhance the function of regional innovation bases centering on established Technoparks and provide comprehensive services for company support

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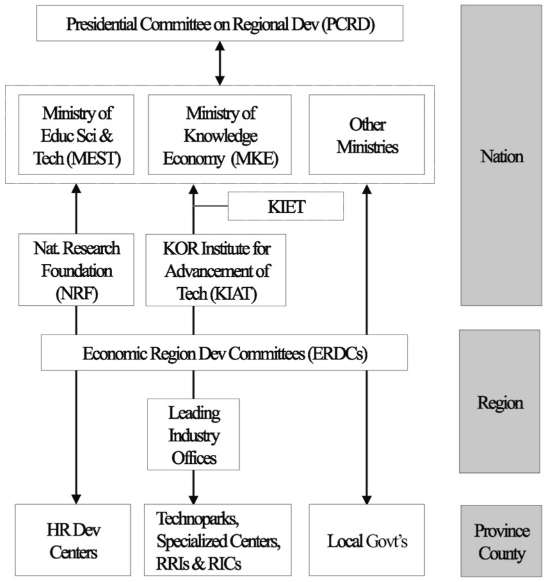
Current Regional Industrial Policies
- governance

- Ministry of Knowledge Economy(MKE)
- KIAT : window agency of MKE
- KIET : research institutes

- Leading Industry Office (7) anchor agency
- Technoparks (18) & Specialized Centers : anchor agency
- RRIs and RICs in Local Universities



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Current Regional Industrial Policies
- central governance

- KIAT (Korea Institute for Advancement of Technology) : a window agency
  - The Regional Industry Division
    - studies regional industrial development policies
    - manages and evaluates regional industrial promotion projects
    - disseminates successful projects

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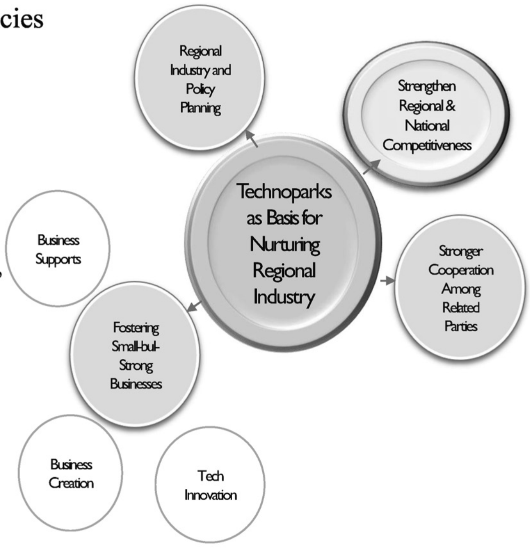
Current Regional Industrial Policies
- local governance

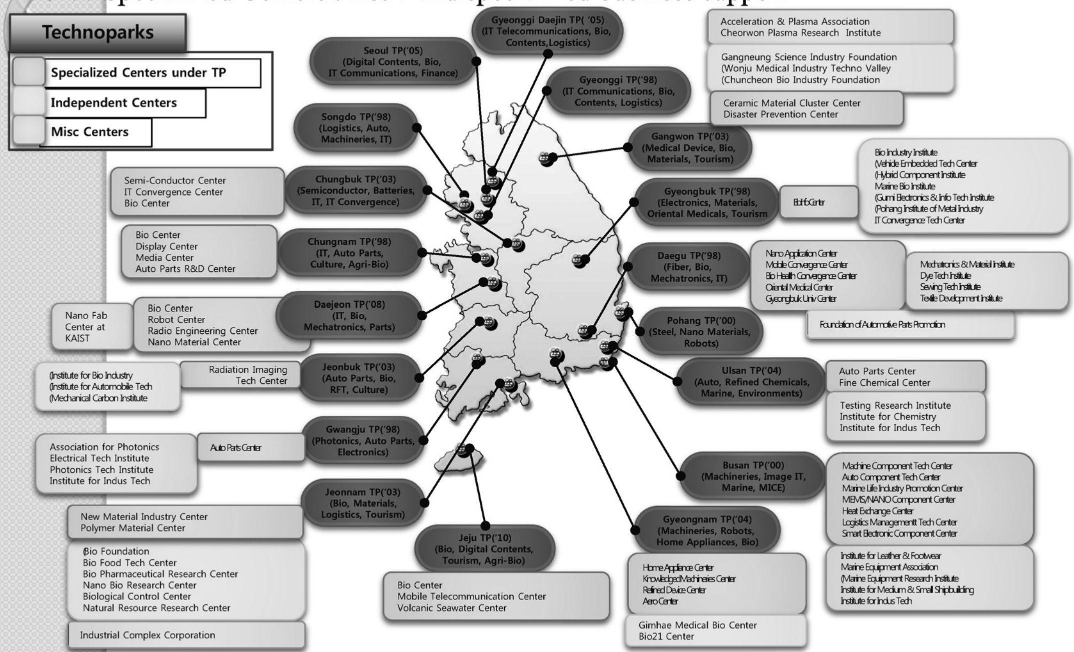
▶ Technoparks in 16 Provinces : anchor agencies for Strategic Industry Promotion Projects

- nurture local industries by forming organic cooperative networks with the regions' innovative institutions including industry, academy, researches and governments
- create strategies and plans that fit the regions' circumstances and characteristics through discovering knowledge-based and small but technologically capable businesses.



Current Regional Industrial Policies
- local governance

▶ 80 Specialized Centers : R&D and specialized business support



Current Regional Industrial Policies
- local governance

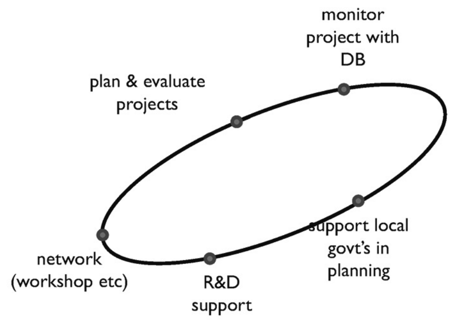
▶ Regional Research Institutes in County govt's for independent industrialization based on small R&D

▶ Regional Innovation Centers in Specialized Local Industry Promotion Projects at universities

- established as a collaborative project between enterprises and universities since 1995

Research Facilities	R&D Project	Human Resource	Business Incubating
Tech Commercialization	Marketing	Network	Tech Transfer

(사)한국RIC협회 RIC



21

Current Regional Industrial Policies
- summary

▶ Zoning to ecology building
- industrial location policy to support programming

▶ Selection & Concentration
- sectoral targeting (e.g. phonics in Gwangju, medical device in Gangwon, etc)

▶ Paradigm Shifts : Decentralization since 2003
- national clusters to local clusters

▶ Infrastructure ▷ ▷ R&D support ▷ ▷ Networking & Ecology

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Prospect of Regional Industrial Policies

- Industrial Ecology based on specialized regional industries
  - entities own role : enterprises, universities, research institutes & governments
  - active & productive networking based on open innovation
- Sustainable Consistent Policies
  - long-term planning under stable policies
  - trial & error over time due to frequent changes in policy
- Wariness of Complexity & Inefficiencies
  - governance (& Quango) problem from multi layers of policies

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Session VI-4 Key Features of Cluster Policy in Russia

EVGENIY KUTSENKO

Senior Researcher, Institute for Statistical Studies and Economics of Knowledge
Higher School of Economics (HSE), Russia

BIOGRAPHY

Evgeniy Kutsenko graduated from the Plekhanov Russian Academy of Economics, one of the leading Russian universities in the sphere of economics. He has a diploma with honours in Corporate Management. He was a post-graduate student at the Plekhanov Russian Academy of Economics (09.2006 – 10.2009) and at the Council for the Study of Productive Forces under Russian Academy of Sciences and Ministry of Economic Development. Finally, He defended his PhD thesis in December 2012.

The main sphere of his professional specialization and scientific interests include clusters and cluster policy. He has been engaged in a large amount of research and consultant projects. He was the Head of the Cluster Development Department at the Interregional center for industrial subcontracting and partnership, an infrastructure organization in Moscow that supports SMEs. He was a senior researcher at the Council for the Study of Productive Forces under Russian Academy of Sciences and Ministry of Economic Development.

Since the beginning of the 2012 he has been working at the Institute for Statistical Studies and Economics of Knowledge in the national research university, Higher School of Economics (HSE). The majority of the projects that he has implemented concern the topic of regional innovation policy. He made some studies for the Ministry of Economic Development of the Russian Federation and took part in the drafting cluster development projects for several pilot innovative clusters in Russia.

PRESENTATION ABSTRACT

In recent years, Russian federal authorities have started moving from drafting of strategies, concepts and guidelines related to cluster development, to formation and implementation of cluster programs. The major initiative on this way was the selection of the pilot innovative clusters announced on March 19, 2012 by the Ministry of Economic Development of the Russian Federation.

In total, there were submitted 94 cluster projects. In the first stage the projects were evaluated by the wide group of experts. Further, the selected clusters (in number of 37) presented their programs at the meeting of "the Working Group for the Development of Public-Private Partnership in the Innovation Sphere". Among the 37 clusters 5 submitted in the field of nuclear technology, 4–in aerospace and aviation, 9–in biotechnology, pharmaceutics, medical devices, 4–in information and telecommunication technology, 3–in novel materials, 3–in machinery, 5–in lightening and electrical equipment and instruments 4–in chemical products.

Finally it was selected 25 pilot clusters, which is planned to be provided with comprehensive government support.

In my presentation I'm going to lighten the most essential elements of the forming cluster program in Russia:

- characteristics of the supported objects,
- criteria for selection of the pilot clusters,
- selection procedure,
- description of the selected pilot clusters,
- budget, directions and supporting mechanisms for pilot clusters,
- monitoring of the implementation of cluster supporting programs.

In addition, I will be addressing the key features of the Russian cluster program in comparison with the most famous European programs: BioRegio, InnoRegio (German), Competitiveness clusters (France).

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Key features of cluster policy in Russia

Evgeniy Kutsenko

Senior researcher
Institute for statistical studies and economics of knowledge
National Research University "Higher School of Economics"

OECD. Outreach Workshop on Smart Specialization Program. 3 -5 April 2013, Gwangju, Korea

Content

1. **Background of cluster policy in Russia**
2. **Selection of the pilot innovative clusters: procedures and results**
3. **Comparisons with some cluster programs in EU countries. Areas for future improvement**

2

1.Background of cluster policy in Russia

3

1. Problems

Insufficient demand for innovation

Low efficiency of R&D sector

- Low level of innovation activities of companies: around 10%
- Low rate of innovation expenditures as a percent of sales: 1.5% (in Sweden - 5.4%, Germany - 3.4%)
- Stable share of innovative products in total sales (5%) in spite of growing expenditures on innovation

- Science (fundamental and applied) is traditionally isolated from the universities and enterprises
- Universities accumulate only about 7% of overall spending on science in Russia
- Almost ¾ of organizations performing R&D are state-owned ones

Source: Strategy - 2020: A new model of growth - a new social policy (2012). The final report on the results of the expert work on the issues of social and economic policy in Russia until 2020. In Russian. http://2020strategy.ru/data/2012/03/14/1214585998/1itog.pdf

4

2. Policy measures (last decade)

- Increasing funding for science (1.6 times for the period 2006-2008)
- Additional support for universities: development of innovation infrastructure, stimulation innovative start-ups appearance, attraction of world-renowned scientists, cooperation of universities with enterprises (overall budget more that 3 bn euro).
- Federal development institutions were formed (Russian Venture Company, JSC "RUSNANO", the Russian Foundation for Technological Development (RFTD), State Corporation “Bank for Development and Foreign Economic Affairs (Vnesheconombank)”, Skolkovo innovation center , etc.)
- Special legislation for "coercion to innovation" of large state-owned enterprises (about 60 companies that are forced to spend a fixed percent of their earnings oninnovation)

5

Policy measures (last decade) - 2

- Development of innovation infrastructure for SMEs in the regions (technology parks, business incubators, technology transfer centers, prototyping and design centers, etc.)
- Technology platform formation (32 platforms in one of the 12 spheres)

Source: Strategy - 2020: A new model of growth - a new social policy (2012). The final report on the results of the expert work on the issues of social and economic policy in Russia until 2020. In Russian. http://2020strategy.ru/data/2012/03/14/1214585998/1itog.pdf; The Ministry of Economic Development of Russia (2010). Innovative Russia - 2020. The strategy of innovative development of the Russian Federation for the period up to 2020 (draft). Moscow 2010. Russian. http://www.economy.gov.ru/minec/activity/sections/innovations/doc20101231_016

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3. Demand for high-efficiency policy

- Coordination of innovation policy measures that are aimed to support different actors (universities, research organizations, large businesses and SMEs)
- Trust building and improving the efficiency of interaction between actors in RIS
- Demand for territorial projection of innovation policy which means both taking account of specific profiles of the regions and involvement of the regions in the drafting and implementation of federal innovation policy

Cluster policy

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4. Cluster approach in Russia before the first national cluster program

- Several regions had entered cluster approach on their policy agenda before any federal initiatives (first of all, Samara, Tatarstan, Kaluga)
- Clusters were mentioned in some top-level federal strategies as one of the high-priority theme (Strategy of long-term social and economic development of Russia till 2020 (approved at 17 November 2008); Strategy of innovation development of Russia till 2020 (approved at 8 December 2011))
- Since 2010 the Ministry of Economic Development of Russia has started to finance the formation and maintenance of the Cluster Development Centers in the regions (Samara, Tomsk, Penza, Kaluga, Astrakhan, Voronezh, etc)
- The goal of Cluster Development Centers is to support of self-organisation of SMEs, enhance internal and external interactions, help with collaborative projects formation. Other goal is to stimulate SMEs’ entering as suppliers in clusters formed by FDI of MNC

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2. Selection of the pilot innovative clusters: procedures and results

9

1. Basic information

- The first stage of national cluster program - the selection of the pilot innovative clusters by the Ministry of Economic Development of the Russian Federation - started March 19, 2012
- The cluster program is based on a competitive procedure for selection of applications submitted by clusters from different regions. It was suggested to emerging and existing clusters to form a detailed cluster development projects
- Most of the clusters consists from large companies (the year turnover more than 25 ml euro), SMEs, universities and scientific organizations. Each cluster development project had been confirmed by the region's authorities
- In total, 94 cluster development projects were received

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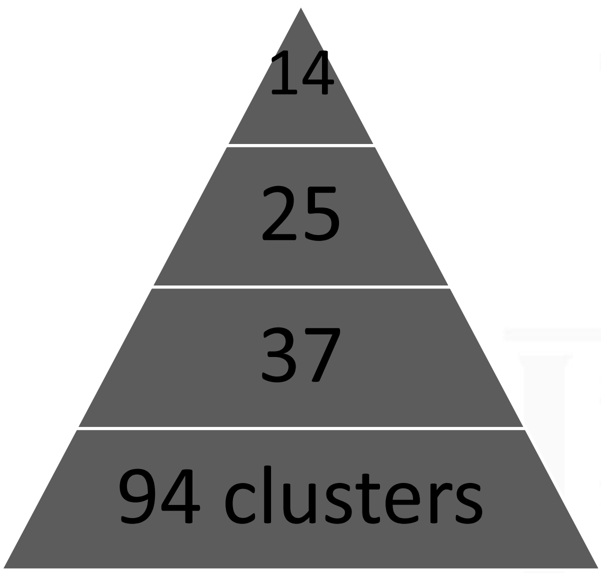
2. Established criteria for the selection of received cluster development projects

	Current situation	Perspective (2017)	Quality of action plan
Scientific and educational potential	7 indicators (4 quantitative ; 3 – qualitative)	2 (1;1)	2 (0;2)
Production (sales) potential	12 (4;8)	6(3;3)	4(1;3)
Life quality, level of transport and logistic, power, engineering, housing and social infrastructure on the territory of cluster location	5 (4;1)	2 (1;1)	2 (1;1)
The level of organizational development	3 (0;3)	0	1 (0;1)

In total, there are 46 quantitative and qualitative indications for complex assessment of cluster development projects through established criteria

3. Stages of the selection



The 14 clusters (from 25 pilot ones) are first planned to get a special subsidy.

The applications that was selected through the process of presentation of each clusters, questions and discussions.

The applications that got the highest grades from the experts during on-line evaluation

Total amount of received applications till 20 of April (one-month period)

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4. Specialization of the pilot clusters in Russia

Specialization of a cluster	Number of pilot clusters*
nuclear technology	5
aerospace and aviation	5
biotechnology, pharmaceutics, medical devices	6
information and telecommunication technology, electronics and lightning	6
new materials	3
chemical production including petrochemistry	4

*Some pilot clusters have broad specialization and are included in two specialization categories simultaneously

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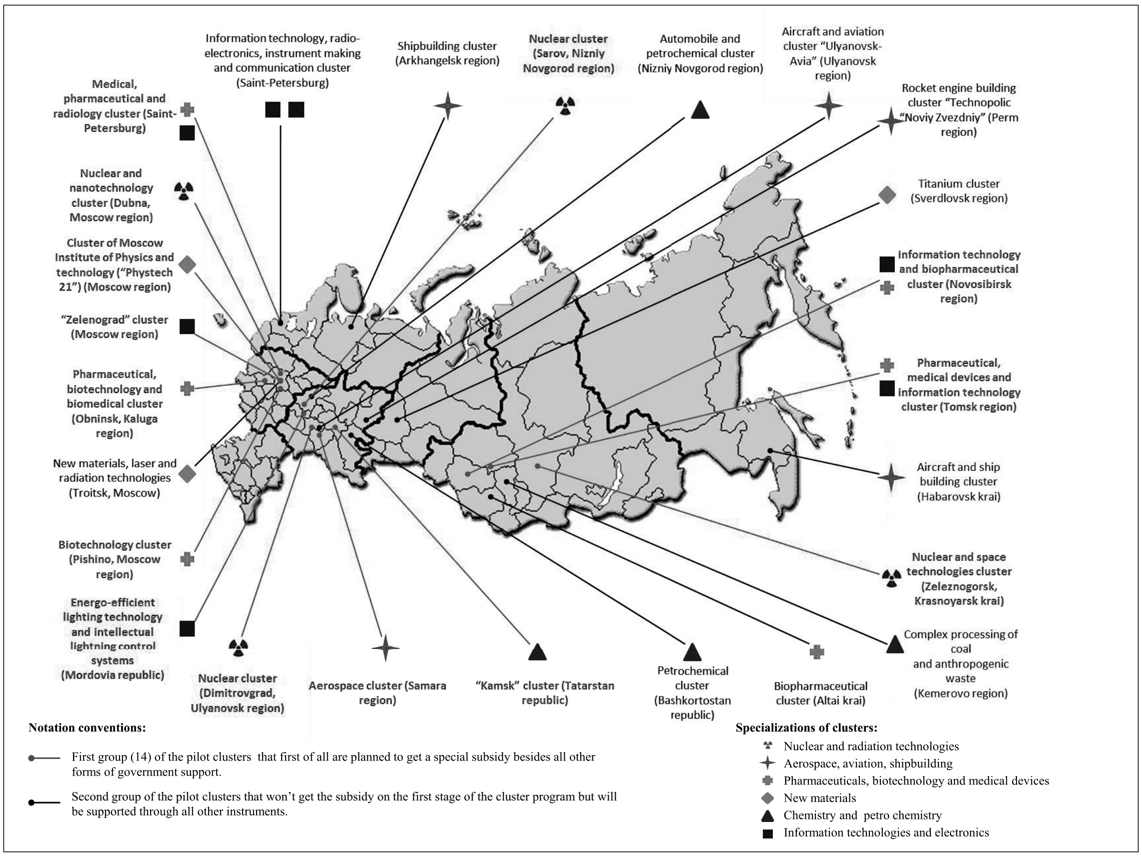

5. Key indicators of the pilot clusters' development

Index	Present value (BN Euros)	Predicted value (BN Euros)	Rate (%)
Total sales (except natural resources)	47 (2011)	95 (2016)	105 (growth rate)
Private investment	16 (2009-2011)	39 (2012-2016)	146 (the ratio of the average annual private investment in 2012-2016 to average in 2009-2011)
R&D expenditures	28 (2007-2011)	24 (2012-2014)	145 (the ratio of average annual R&D expenditures in 2012-2014 to average in 2007-2011)

Source: Ministry of Economic Development of Russia.

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6. Planned instruments of development for the pilot clusters

Special subsidy from federal budget to regionals budgets to finance the first group (14) pilot clusters
(532M Euros for all 14 clusters for the period of 5 year)

Interaction with Skolkovo Foundation:
- Expansion of some of the instruments, developed for the Skolkovo, to pilot clusters' participants
- FDI attraction through Skolkovo Foundation

First-priority support all 25 pilot clusters through current programs and federal organizations specialized in infrastructure development and fostering innovations

Development of transport and logistic, power, housing and social infrastructure :

- Federal special-purpose programs
- The bank for development and foreign economic affairs, Agency for housing mortgage lending, Russian Housing development foundation
- Investments plans of natural monopolies
- Innovation plans of the largest state-owned corporations

R&D and innovation support:

- Program «Science and technology development», sectoral special-purpose programs, Russian foundation for basic research
- Rusnano, The foundation for technological development, Russian venture capital, The foundation for innovative SME support
- SME support program

7. Directions of federal government support for the pilot clusters in 2013

- purchase of new equipment
- additional education and training
- cluster management activities and external consultancy
- consultancy for the preparation of investment projects in the sphere of innovation
- participation in international fairs, forums, round tables, etc.

Source: The Government of the Russian Federation (2013) Allocation rules and subsidies from the federal budget of the Russian Federation on the implementation of activities under the pilot program of innovative regional clusters. Approved by the Government of the Russian Federation on March 6, 2013 № 188. In Russian.

17

3. Comparisons with some cluster programs in EU countries.

Areas for future improvement

18

1. Comparisons with some cluster programs in EU countries. Similar features

1) The volume of support is consistent with famous cluster programs in Germany and France

The name of the cluster program	Budget (million euros)	Term of promotion	Budget support per cluster
Russian cluster program	**532 (plan)**	**2013-2017**	**38.0**
BioRegio (Germany)	90	1995-2002	22.5
BioProfile (Germany)	50	1999-2006	16.7
InnoRegio (Germany)	253	1999-2006	11.0
Les pôles de compétitivité (France)	3000	2005-2011	42.3
Spitzencluserwettbewerb (Germany)	200	2012-2016	40.0

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Similar features (2)

2) "Top-down-top" approach for the selection the pilot clusters

Authorities do not identify the most promising clusters (although they can identify the priority areas in which the clusters are planned to be supported), but organize the competition in which different groups of actors could participate

3) As many European cluster programs, the Russian one is a cooperation-contest program

Competition stimulates cooperation among localized actors even if they loose.

The data from Innoregio show that 40 percent of clusters, whose applications were rejected, nevertheless realized their project afterwards. And 61 percent of them received financial support from other government programs. Eickelpasch A., Fritsch M. (2005) Contests for cooperation – A new approach in German innovation policy // Research Policy. № 34. P. 1269–1282

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Similar features (3)

4) Significant share of rejected applications

Program	Share of rejected applications, %
BioRegio	76
InnoRegio	95
Competitiveness poles	32
Russian cluster program	85 (73 with the second group)

5) First-priority support from current state programs and institutions

Experience of Bioregio: The winning regions got priority in the appropriation of funds from the ‘‘Biotechnology 2000’’ (700 M euro).

Dohse D. (2000) Technology policy and the regions — the case of the BioRegio contest // Research Policy. № 29. P. 1111–1133.

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Similar features (4)

6. Complex inter-governmental co-ordination

- High-level federal facilitation (inter-ministerial commission)
- Strong participation of regional authorities (co-finance, cluster management)

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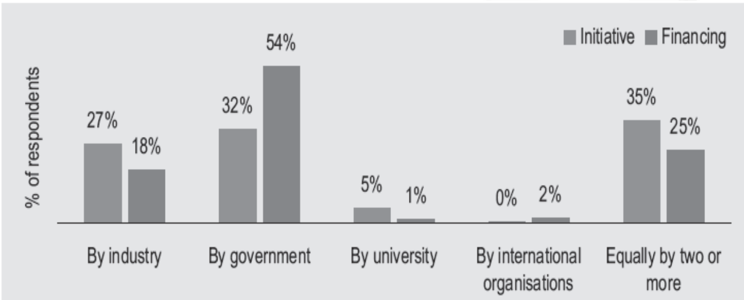
Important differences

1) In many cases there is a significant lack of private initiative.

Very often the initiators of cluster initiative are government-financed organizations (state-owned companies, scientific or educational organizations, local authorities). But It doesn't meet world practice:

Initiating and financing cluster initiatives



Source: Sölvell Ö., Lindqvist G., Ketels C. (2003) The Cluster Initiative Greenbook, P.39.

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Important differences (2)

2) There is no emphasis on SME, start-ups, growth of new companies

Our program:
The main goal is to develop existing large companies. Concerning SME, they are supported by regional cluster development centers (different services – depends on the region).

SMEs very often participate in cluster formally, in paper, but are not really engage in cluster projects.

In many cases SME are excluded from higher level of cluster administration.

European experience:
More than 60% of BioRegio budget were directed to private companies, the majority of which were start-ups

80% of Competitiveness poles program participants were SME. They received 54% of the program budget.

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2. General areas for development of clusters in Russia: towards the self-sustainable growth

Ingredients: critical mass and diversity

- High quality of urban environment
- Critical mass of companies in core industries
- Dominance of the private initiative
- Internal competition and openness

The density of communication and self-organization

- Horizontal professional communities
- Equality in decision-making
- Independence of cluster management
- Cluster managment as a proffesion

The culture of change

- Seek for constant improvement of companies and links in a cluster, not just for lobbing outside
- Framework for appearance of new (unplanned) ideas, solutions, projects and companies
- Protection of clusters from non-economic pressures of emerging groups of special interest and raiders

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Thank you for your attention!

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OECD Outreach Workshop on

Smart Specialisation: Its Extension to East Asia

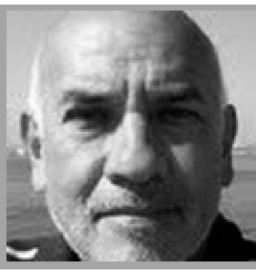
Biography of presenters,
Abstracts & Presentations

Session VII Extension beyond East Asia

April 4 (Thur) 16:30 – 17:30

Session Chair

ENRIQUE CAMPOS-LOPEZ



Advisor, Center for Research and Technological Assistance of Jalisco (CIATEJ)
Mexico

Enrique Campos-Lopez is a scientist at the Center for Research and Technological Assistance of Jalisco (CIATEJ), part of the National Council of Science and Technology (CONACYT). His interest focuses on cooperative innovation networks: its role in the emergence of Regional Innovation systems, how networks can be promoted and incubated and contribute to the regional learning process, and their relation with governance and the regional policy-making. Campos-Lopez is responsible of the regional projects funded by the CONACYT and state governments of Coahuila, Michoacan and La Laguna. He has found several Mexican scientific research institutions such as the Federal Center for Research in Applied Chemistry(CIQA) and private organizations offering consulting and training services to Mexican Corporations on innovation, systems thinking and organizational learning. He has worked for organizations such as Petroleos Mexicanos, CONACYT and he was the CEO of the Production Nacional de Papel Destintado, S.A. de C.V. He worked as an expert for organizations including the United Nations Industrial Development Organization (UNIDO) and the Organizations of the American States (OAS) in industrial management, science and technology, information systems and training. He holds a Ph.D in chemistry from the National University of Mexico and was a professor at the same university. He was a visiting scholar at academic institutions including International Institute of Applied Systems Analysis (IIASA) and the CISTP of the George Washington University. He was awarded with the Mexican National Award in Chemistry and other recognitions for his studies in the area of technology.

Session VII-1 Innovation in Southeast Asia

MARIO CERVANTES

Senior Economist, Country Studies and Outlook Division
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BIOGRAPHY

Mario Cervantes is Senior Economist in the Country Studies and Outlook Division at the OECD's Directorate for Science, Technology and Industry (STI) where he is responsible for the OECD's Working Party on Innovation and Technology Policy (TIP). Current areas of work include systems innovation, open science, commercialisation of public research and smart specialisation strategies. With more than 15 years experience in innovation policy at the OECD, he has overseen a number of projects ranging from technology incubators, R&D tax credits, technology foresight, demand-side innovation policies, social innovation, international mobility of the highly skilled. Before heading the TIP, he was held several positions at the OECD including heading the OECD Working Party on Steering and Funding of Research Institutions (SFRI) where he worked on public research and human resources. His experience prior to the OECD includes being a researcher on telecommunications policy at the Centre for Tele-Information at Columbia University's Graduate School of Business in New York. He has consulted for the World Bank, UNESCO, national governments, regional development agencies as well as small and large companies.

Innovation in Southeast Asia

Gernot Hutschenreiter
Michael Keenan

Country Studies and Outlook Division
Directorate for Science, Technology and Industry

OUTLINE

- Update on country reviews
- The review of Innovation in Southeast Asia
- Next steps – dissemination

OECD Reviews of Innovation Policy

- In 2005, the OECD Committee for Scientific and Technological Policy (CSTP) decided to launch a demand-driven programme of Country Reviews. Since then:
  - ✓ Completed: Luxembourg, Switzerland, New Zealand, South Africa, Chile, Norway, China, Hungary, Korea, Greece, Mexico, Russian Federation, Peru, **Slovenia**, **Sweden**
  - ✓ Ongoing and under launch: **Vietnam, Croatia, Colombia**
  - ✓ Others requested or under discussion
  - ✓ Regional reviews: **Southeast Asia**, Latin America Innovation Initiative , under discussion: MENA
- Scope: Comprehensive analysis of the respective national innovation system (with a focus on the role of government policy)

See: www.oecd.org/sti/innovation/reviews

OECD review of Innovation in Southeast Asia

- This review is the first OECD innovation mapping in a trans-national region - In line with the decision by the OECD Ministerial Council Meeting 2007 to give high priority to outreach work with the SEA region
- It has been welcomed and supported by the ASEAN Committee of Science and Technology (COST), numerous policy makers and experts have shared their knowledge and insights
- Support by Germany and Japan, the SEA-EU-NET project (bi-regional S&T dialogue between Southeast Asia and EU) as well as Korea (in kind) is gratefully acknowledged
- The review would not have been possible without the interest and support of Southeast Asian countries

OECD review of Innovation in Southeast Asia

- The review of Innovation in Southeast Asia provides:
  - ✓ **A cross-country regional synthesis highlighting economic trends with special reference to innovation**; quantitative and qualitative mapping of current capacity and dynamics in S&T and innovation
  - ✓ **A set of country profiles** drawing on the OECD innovation policy review approach; they cover the performance and institutional profile of NIS and take account of the economic environment and framework conditions for innovation
- The review of Innovation in Southeast Asia aims at:
  - ✓ Obtaining a **more comprehensive understanding of key elements**, relationships and dynamics of innovation in the SEA region, and the opportunities to enhance them
  - ✓ **Provide a platform for future in-depth innovation policy reviews** in the SEA region; a first example is the ongoing (joint OECD-World Bank) Review of Vietnam's Innovation Policy

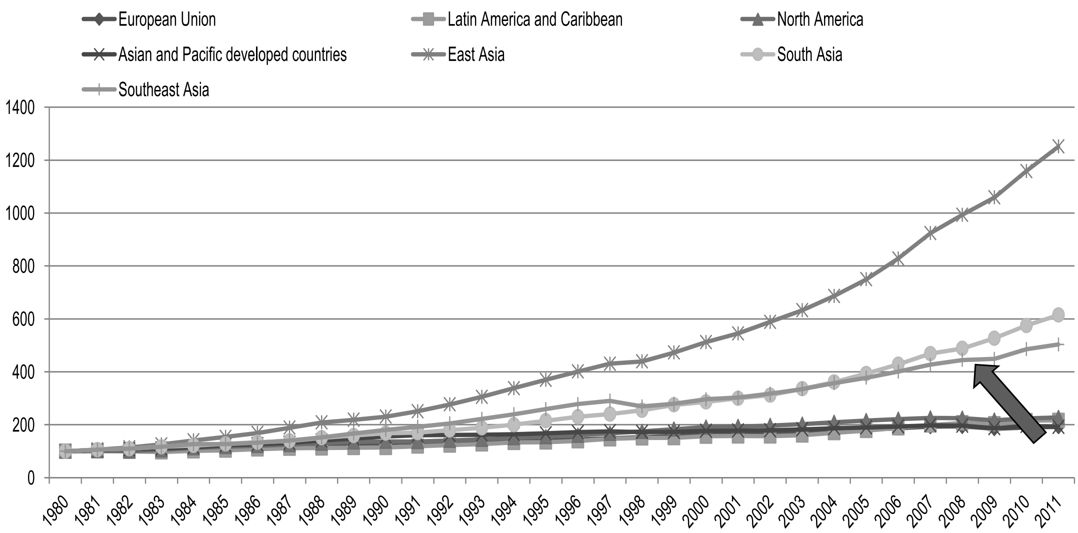
OECD 50

OECD review of Innovation in Southeast Asia

- **Part I: Regional Synthesis**
  - ✓ **Economic Development and Performance**
  - ✓ **Science and Technology Performance and Linkages**
  - ✓ **Business Sector Innovation**
  - ✓ **Innovation and the Role of Government**
- **Part II: Country profiles**
  - ✓ **Cambodia**
  - ✓ **Indonesia**
  - ✓ **Malaysia**
  - ✓ **Singapore**
  - ✓ **Thailand**
  - ✓ **Vietnam**
- **Annex:**
  - ✓ **Economic Relations between China and SEA Countries: Science, Technology and Innovation Issues: a Chinese Perspective**

OECD 50

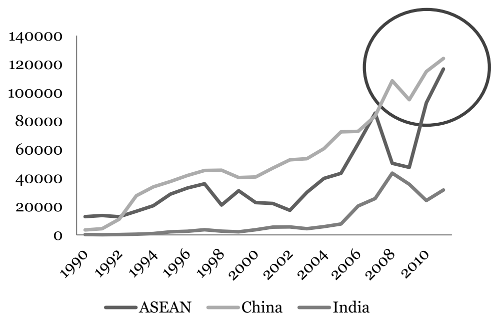
Growth of GDP in seven world regions, 1980-2010



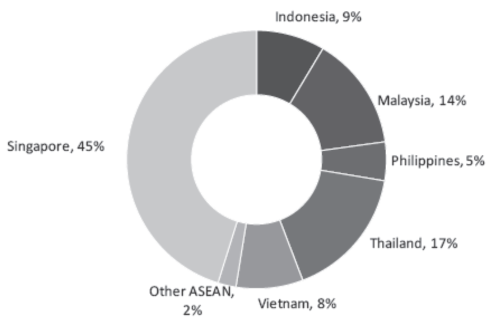
Note: In constant 2000 US dollars. No estimation is made for missing data..
Source: World Bank.

FDI into ASEAN
(Thomsen et al., 2011; updates)

FDI inflows to ASEAN, China and India (USD billion)



Cumulative FDI inflows
in ASEAN, 1990-2009



Catch-up with the United States 1970-2010

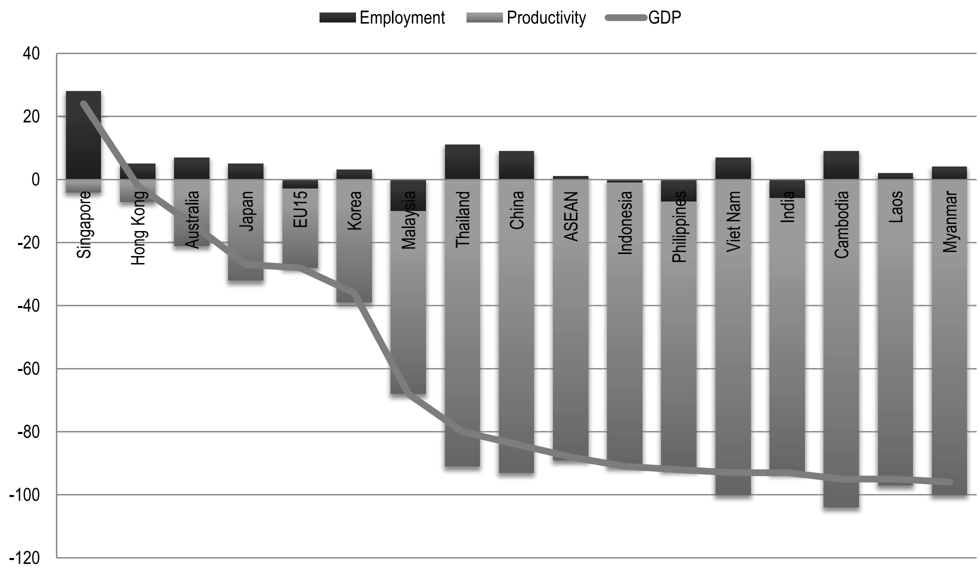
Level and average annual growth rate of GDP at constant market prices, using 2005 PPPs

Initial GDP level to the United States	Annual rate of catch-up to the US (C1) > 3%	(C2) 1% < - < 3%	(C3) 0% < - < 1%	(C4) < 0%
(L1) 60% <			Japan, EU15	**Brunei-Darussalam**, Bahrain, Kuwait, Qatar, Saudi Arabia, UAE, Australia
(L2) 20% < - < 60%	**Singapore**	Hong Kong, China; Oman		Iran
(L3) 5% < - < 20%	Chinese Taipei, Korea	**Malaysia**, Sri Lanka, **Thailand**	Mongolia	Fiji, **Philippines**
(L4) < 5%	**Cambodia**, China	India, **Indonesia**, **Laos**, **Myanmar**, **Viet Nam**	Bangladesh, Nepal, Pakistan	

Source: Asian Productivity Organization (APO) Databook 2012 [APO (2012)]

Labour productivity gap relative to the US, 2010

In percentage points

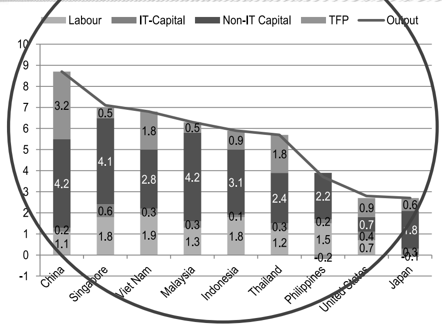


Note: at constant market prices, using 2005 PPPs
Sources: APO (2012) based on official national accounts, including adjustments.

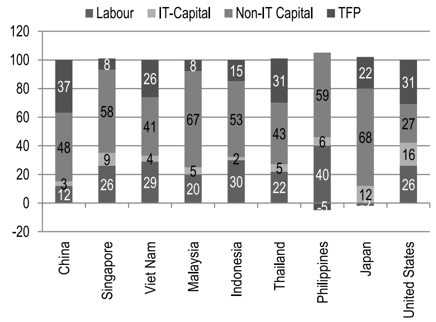
Driving forces of economic growth are shifting

- Non-IT capital accumulation most important, especially during early stages of industrialisation and catching up
- Its contribution is still important but became smaller over time
- **Role of IT capital accumulation and TFP growth increasing over time**
- China's sustained TFP growth

Share of economic growth, 1970-2010 (Source: APO (2012)



Contribution to economic growth, 1970-2010 (Source: APO, 2012)



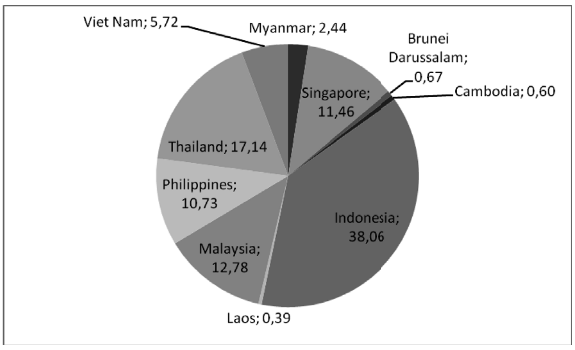
Total Factor Productivity growth

	1970-2010	1970-1990	1990-2010
China	3.2	1.7	4.7
Vietnam*	1.8	1.4	1.8
Korea	1.7	1.7	1.8
Chinese Taipei	1.5	1.5	1.5
Singapore	0.5	-0.1	1.2
Hong Kong, China	1.7	2.6	0.7
Thailand	1.8	2.6	0.9
US	0.9	0.8	0.9
Indonesia	0.9	1.2	0.5
Malaysia	0.5	0.5	0.5
Philippines	-0.2	-0.8	0.5
Japan	0.6	0.9	0.3

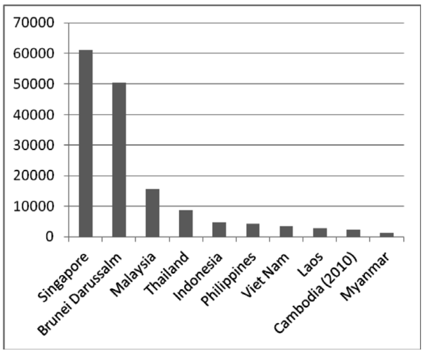
*.The starting period for Vietnam is 1986
Source: APO (2012)

Economic scale and GDP per capita

Percentage share of ASEAN GDP, 2010
(Source: World Bank and IMF)



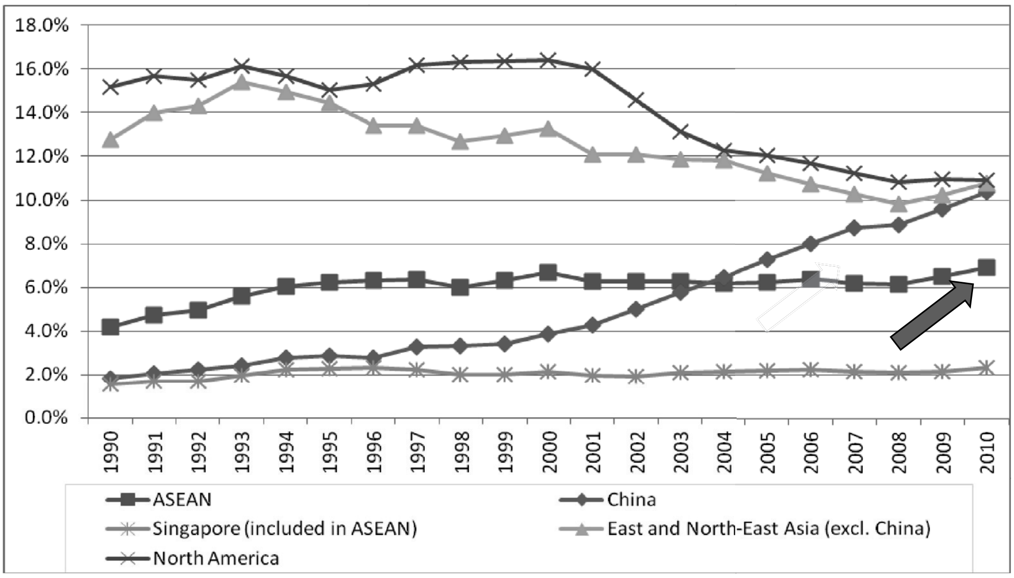
GDP per capita, PPP, current international $, 2011 or nearest year
(Source: World Bank)



Trade, structural change and global value chains (GVCs)

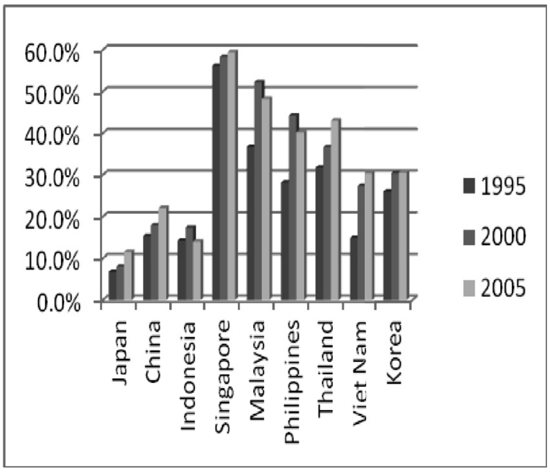
- International trade:
  - ✓ Highly open economies
  - ✓ Maintained share in global export markets in the long term
  - ✓ Integration: Potential ASEAN single market of 600 million; ASEAN+
- Structural change:
  - ✓ Move away from labour-intensive, low-wage production (but newly emerging such as Viet Nam, partly replacing China and SEA middle-income economies) towards more technologically advanced
  - ✓ Specialisation and innovation .... learning vs. lock-in
  - ✓ High demand for raw materials
- GVCs:
  - ✓ “Unbundling”, SEA increasingly embedded in GVCs
  - ✓ Position in GVCs shapes trade structures, e.g. in electronic / electrical goods, automotive, textiles – and opportunities
  - ✓ Transformation of the structure of GVCs, geographical etc.
  - ✓ Related to (export-promoting) FDI

ASEAN share in world exports, 1990-2010



Source: UNESCAP database, 2011.

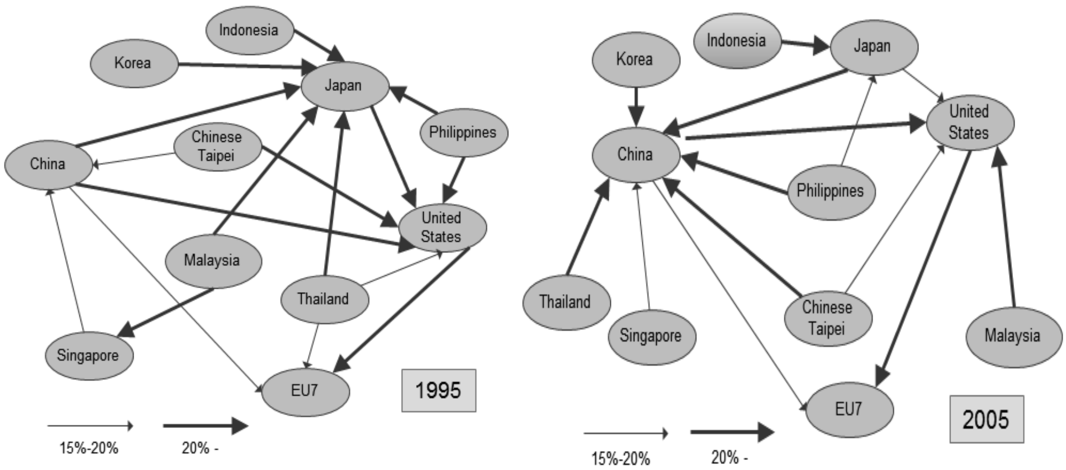
Vertical Specialisation in East Asia – increasing imports content of exports



	1995	2000	2005
Japan	6.8%	8.0%	11.5%
China	15.3%	17.9%	22.0%
Indonesia	14.2%	17.3%	14.0%
Singapore	56.1%	58.3%	59.4%
Malaysia	36.7%	52.2%	48.3%
Philippines	28.2%	44.2%	40.2%
Thailand	31.8%	36.6%	43.0%
Viet Nam	14.9%	27.3%	30.4%
Korea	26.0%	30.4%	30.5%

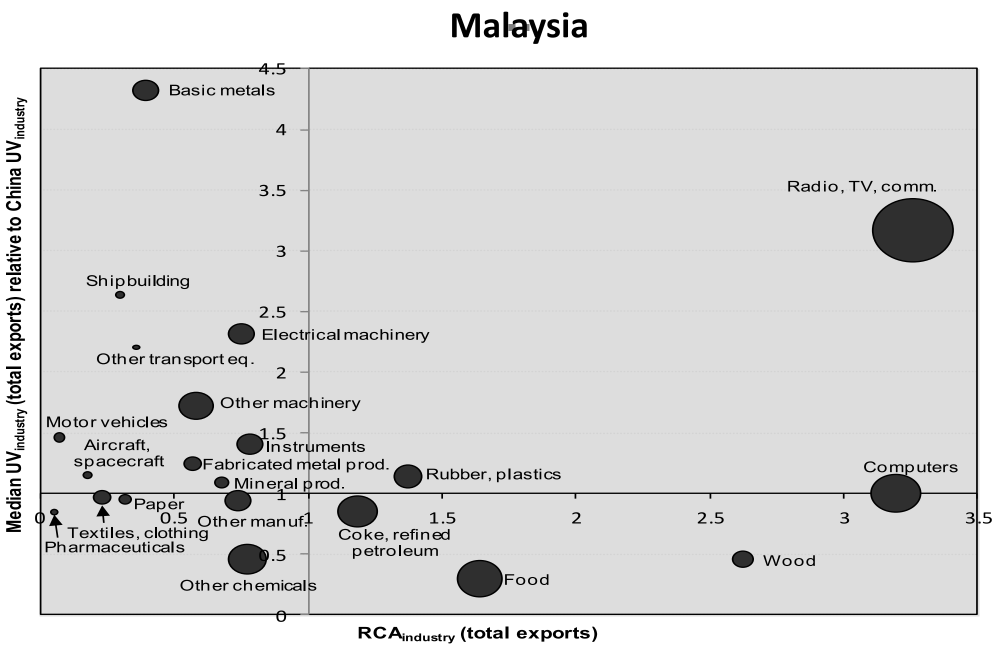
Source: OECD Input-Output Tables, 2010 and IDE-JESTRO, 2005.

Major Trade partners for Asia's intermediate exports in goods and services



Source: Yamano, Mang and Fukasaku (2010); OECD (2011).

International specialisation (RCA – total exports) and price/quality competition, 2010



Source: OECD calculations based on CEPII, BACI database.

Impact of China

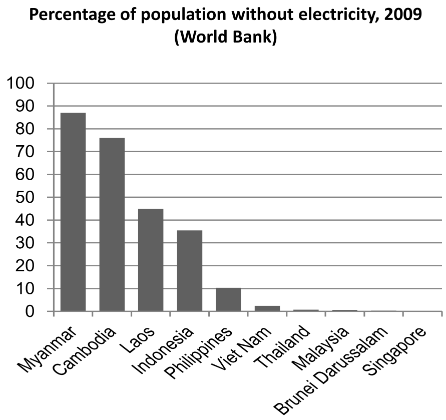
- Aggregate growth of China's economy (and global economic environment):
  - ✓ Overall positive impact, high demand for a broad range of imports from SEA
  - ✓ Differential impact on SEA countries depending on comparative advantage; "reshaping industrial landscapes"
- Growth and composition of China's exports, improved manufacturing capabilities:
  - ✓ Increased competition in areas characterised by more advanced manufacturing (primarily in middle-income economies)
  - ✓ Import replacement through improved "backward integration"
  - ✓ Establishment of own global brands (e.g., ICT industries)
- Attractiveness to FDI :
  - ✓ Export-related FDI
  - ✓ R&D-related FDI

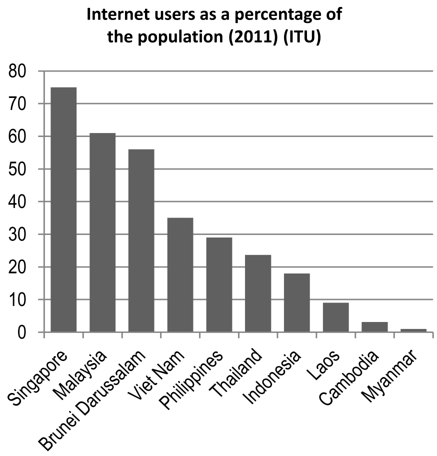
Southeast Asia's innovation imperative

- Dynamic interaction with China and others:
  - ✓ **Results for SEA economies depend on own innovation capabilities, even under different scenarios**
- Innovation weaknesses of SEA economies:
  - ✓ Infrastructure, framework conditions
  - ✓ Mostly very low investment in S&T and innovation
  - ✓ Indigenous innovation capabilities remain relatively weak overall (compared to 1st generation East Asian Tiger economies: Korea *et al*.)
  - ✓ Lack of regional or global brands

Framework conditions for innovation: Infrastructure

- Various infrastructures enable innovation
- Even the most basic infrastructure is missing in some of the LDCs
- But the high and middle-income countries have made impressive strides in developing their infrastructure over the last 30 years





Framework conditions for innovation: Regulation

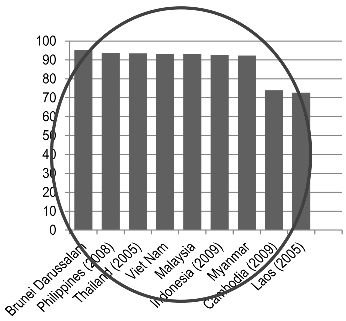
World Bank "Doing Business" indicators for start-ups

	2013 Rank	Procedures (number)		Time (days)		Cost (% of income per capita)		Paid-in Min. Capital (% of income per capita)	
		2004	2013	2004	2013	2004	2013	2004	2013
Singapore	**4**	**7**	**3**	**8**	**3**	**1**	**0.6**	**0**	**0**
Hong Kong, China	6	5	3	11	3	2.4	1.9	0	0
Chinese Taipei	16	8	3	48	10	5.9	2.4	210.8	0
Korea	24	10	5	17	7	18.4	14.6	347.7	0
Malaysia	**54**	**10**	**3**	**37**	**6**	**33.1**	**15.1**	**0**	**0**
Laos	**81**	**7**	**6**	**153**	**92**	**23.9**	**7.1**	**32.1**	**0**
Thailand	**85**	**8**	**4**	**33**	**29**	**8**	**6.7**	**0.4**	**0**
Viet Nam	**108**	**12**	**10**	**59**	**34**	**31.9**	**8.7**	**0**	**0**
Japan	114	11	8	31	23	10.7	7.5	74.9	0
China	151	13	13	48	33	17.8	2.1	1,236.50	85.7
Philippines	**161**	**17**	**16**	**49**	**36**	**28.6**	**18.1**	**2.3**	**4.8**
Indonesia	**166**	**12**	**9**	**168**	**47**	**136.7**	**22.7**	**69.1**	**42**
India	173	11	12	89	27	53.4	49.8	428	140.1
Cambodia	**175**	**11**	**9**	**94**	**85**	**534.8**	**100.5**	**438.9**	**28.5**

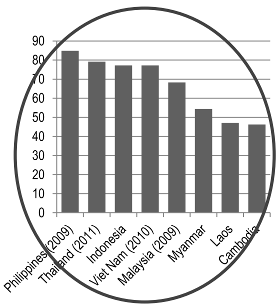
Human capital for innovation

- Many skills sets important for innovation
- At the basic level, adult literacy rates are high
- Secondary enrolment rates are more mixed
- Engineering skills are particularly important in catching-up, but remain under-developed

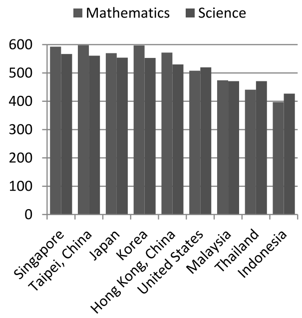
Adult (15+) literacy rate (%), 2010 (Source: UNESCO)



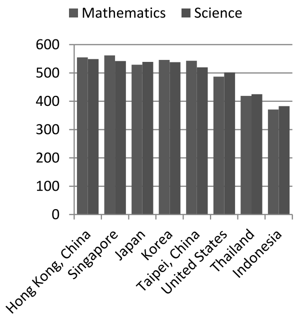
Secondary Gross Enrolment Rates (2010 or nearest year) (Source: World Bank)



TIMSS Science and Mathematics Scores of Eighth-Grade Students, 2007



PISA Educational Attainment of 15-year olds, 2009 (OECD, 2011)



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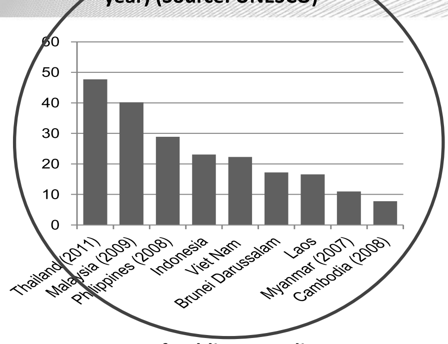
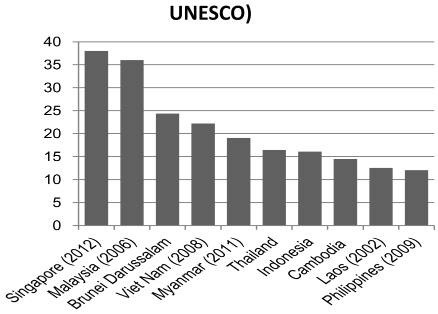
Tertiary education

- Tertiary education – in academic and vocational skills – is essential for technological upgrading
- **Enrolment rates in tertiary education vary significantly within the region with the level of development**
- Reflecting the state of development in many countries, the proportion of public expenditure on tertiary education from education budgets tends to be rather low

Tertiary Gross Enrolment Rates (2010 or nearest year) (Source: UNESCO)



Percentage of public expenditure on education devoted to the tertiary level (2010 or nearest year) (Source: UNESCO)



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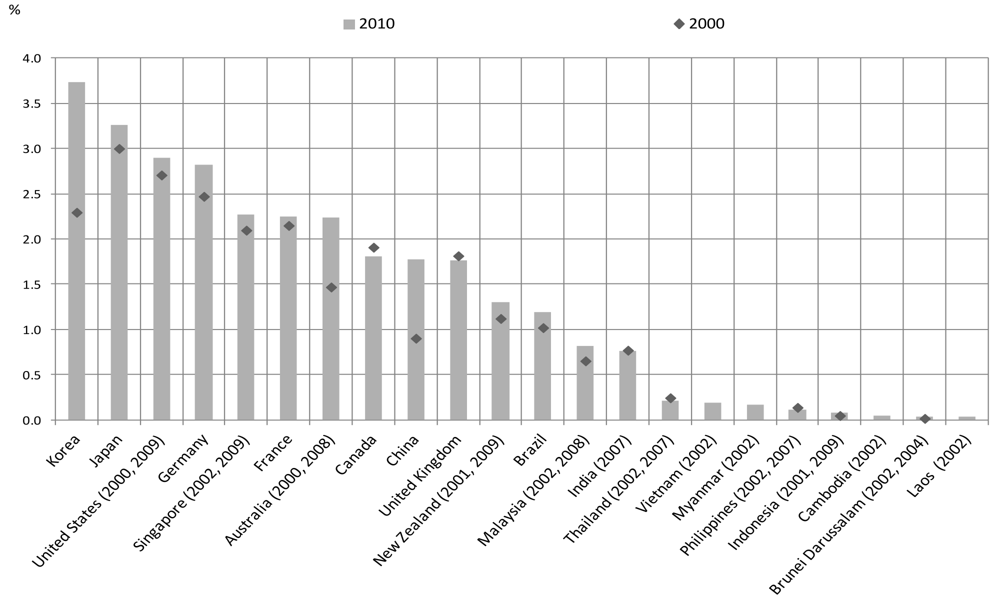
R&D and innovation

GERD as a percentage of GDP in selected countries

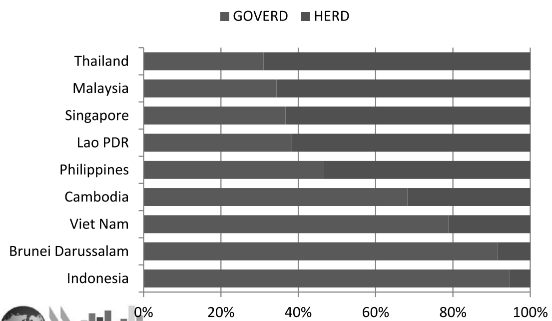


Sources: UNESCO, OECD, MASTIC.

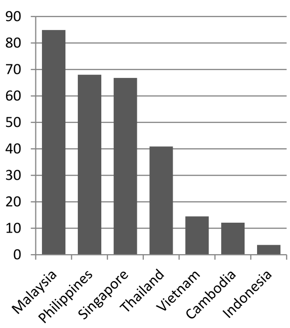
R&D performers

- **There is a strong intra-regional variation in the weight of the business sector in R&D performance**; where BERD is comparable to OECD levels, MNEs tend to be dominant performers
- **There is wide variety in the relative weight of HEIs and PRIs in performing R&D** – in those countries that are more technologically advanced and have significant R&D activities in firms, HEIs dominate. In those with weaker firm performance, PRIs are more dominant

Balance in R&D expenditures between government labs and universities (2007 or nearest year) (Source: UNESCO)

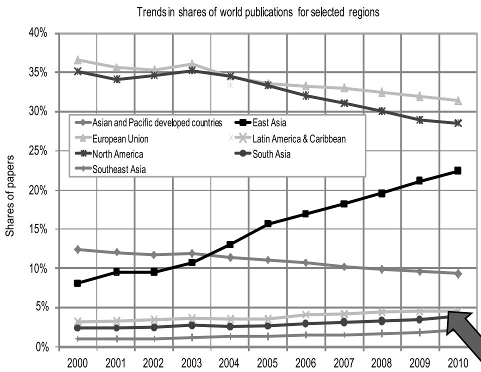


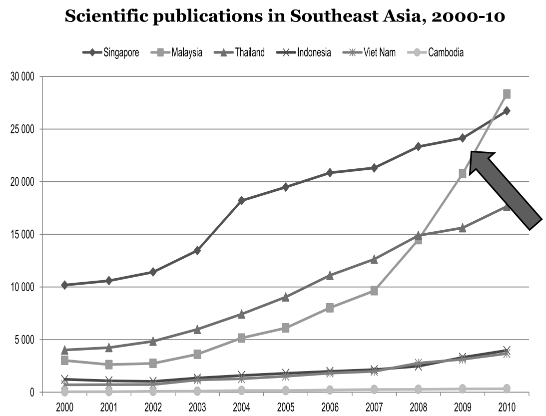
BERD/GERD (Source: UNESCO)



Scientific publications have grown in volume . . .

- The region has shown strong growth in scientific publications and now accounts for around 4% of the world share (up from 2.5% 10 years ago)
- Despite its small size, **Singapore** accounts for a disproportionate volume of papers, followed by **Thailand** and **Malaysia**
- **Indonesia** produces very few publications for the size of its scientific community – the largest in ASEAN
- Many countries have, however, outpaced Singapore in their publication growth, though often from low initial levels

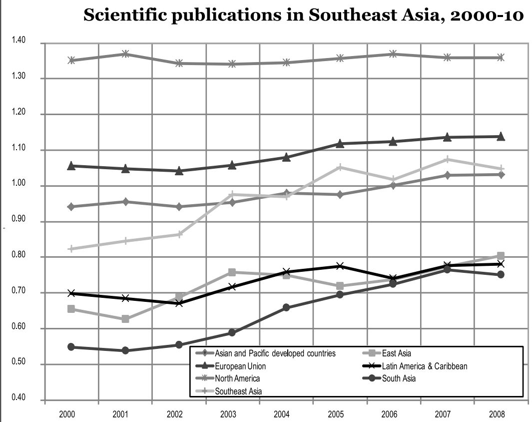


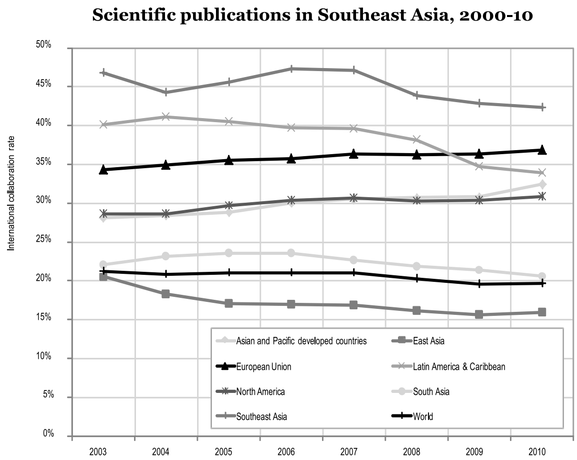


Source: Science-Metrix using Scopus (Elsevier) database

. . . and are relatively highly cited and show strong international linkages

- Since 2005, average relative citation rates are above the world average, though this is more a reflection of Singapore's growing strong performance
- The region has the highest levels of international scientific collaboration in the world, as measured by joint authorship





Source: Science-Metrix using Scopus (Elsevier) database

Innovation at different stages of development

- Less developed:
  - ✓ Significance of non-technological innovation
  - ✓ Technology adoption, incl. “embodied technology” imports (machinery and equipment); some adaptation
  - ✓ Anticipating of steps in development to avoid lock-in in low value-adding activity; little learning
- Middle income:
  - ✓ Innovation (incl. in “high-tech” sectors) often largely residing in MNEs
  - ✓ Sometimes less efficient government enterprises; lack of competition
  - ✓ Spillovers to other parts of the economy, esp. local suppliers, “backward integration” are critical
  - ✓ Challenge of developing advanced innovation capabilities, including around integration, branding, etc.; to diversify and move into new value-adding production
- Advanced:
  - ✓ Increased significance of formal R&D activity; fostering excellence in S&T and education
  - ✓ Access to leading-edge knowledge, e.g. local research centres, but also international R&D linkages

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Thank you for your attention

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www.oecd.org/sti/innovation/reviews

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Session VII-2 An Adjustment Reform towards a More Integrated Innovation System Strengthening: Indonesia Cluster Policy Context

TATANG TAUFIK

Deputy Chairman, Agency for the Assessment and Application of Technology (BPPT)
Indonesia

BIOGRAPHY

Tatang Taufik is deputy chairman for Technology Policy Assessment at Agency for the Assessment and Application of Technology (BPPT) in Indonesia. He holds an engineer degree in Industrial Engineering from Bandung Institute of Technology – Indonesia. He obtained a Master Degree in Industrial and Systems Engineering and Ph.D. in Resource Economics from the University of Florida - USA. He has worked at BPPT since 1986. Prior to his current position, he was a director at some other centers at BPPT.

He has been very active in introducing national and regional innovation system development, industrial cluster, innovation networks, technopreneurship, regional e-development and competitiveness, including developing regional competitiveness councils, and in various science & technology policy, R&D policy, and innovation policy reform initiatives in Indonesia. He is an author and co-author, and editor/co-editor of several books, proceedings, and papers in the area.He is also an Expert Advisor at the "Indonesian Technology Auditor Association".

PRESENTATION ABSTRACT

Various institutions, including international organizations, had started some industrial cluster studies and pilot projects in Indonesia since early 2000. In 2008, the Government of Indonesia, through the Presidential Regulation of 28/2008 formally determined a longterm vision and an industrial cluster development approach in Indonesia industrial policy. As the top-down national policy, 35 industrial clusters were selected, combined with gradually set up bottom-up regional priorities. Nevertheless, some challenging policy issues need to be resolved. A more integrated policy framework of strengthenning innovation system is proposed. Agency for the Assssment and Application of Technology (BPPT) in collaboration with some national and local partners conducted some pilot projects in some autonomous regions (regencies/cities). Industrial cluster development is considered as an important pillar (a "flagship program") in this innovation system approach. More decentralized government system, heterogeneous regions and industrial potentials of Indonesia seem to support this approach.

BPPT

Requirements and Considerations in Indonesian Context

Dr. Tatang A. Taufik
Deputy Chairman
Agency for the Assessment and Application of Technology (BPPT) - Indonesia

Session VII : Extention Beyond East Asia
OECD Outreach Workshop on Smart Specialization
Gwangju, Korea, 3 - 5 April 2013

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OUTLINE

GERBANG INDAH NUSANTARA

1. INTRODUCTION
2. INDUSTRIAL CLUSTER DEVELOPMENT
3. TOWARDS INTEGRATED INNOVATION SYSTEM
4. CONCLUDING REMARKS

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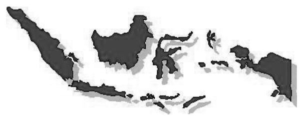
COUNTRY BACKGROUND



- South East Asia, Equator,
  average 27ºC, 90% humidity
- Archipelago (stretched 5,200 km East to West, 67% sea)
- 1,904,569 square km landmass (13,466 islands ~ 400 inhabited, main islands : Java, Sumatera, Kalimantan, Sulawesi, Papua, Maluku, Nusa Tenggara)
- ± 108,000 km coastline
- ± 257,516,167 people (est. 2012, 4th most populated country, ~ 60% in Java)
- ± 300 ethnic groups (major ethnics : Javanese, Sundanese, Melayu, Bugis, Balinese)
- 16th largest economy.

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CURRENT GOVERNMENT DEVELOPMENT POLICY (2010-2014)

11 National priorities

1. Bureaucracy Reform and Governance
2. Education
3. Health
4. Poverty reduction
5. Food security
6. Infrastructure
7. Investment and business climate
8. Energy
9. Environment and disaster management
10. Marginal areas, outer islands/regions, post-conflict ridden areas
11. **Culture, creativity and technology innovation**

15 President's specific priorities

1. Eradication of court law's "mafia"
2. Revitalization of defense industry
3. Terrorism prevention
4. Nation-wide electricity availability
5. Increased food production and strengthened food security
6. Revitalization of fertilizer and sugar factories
7. Regulatory improvement in land-use and regional planning
8. Infrastructure development
9. Financial/credit support for SMEs amounted to ~US$ 200 Mio/year
10. Financing and investment scheme
11. Reformulation of Indonesia's contribution to climate change and environmental challenges
12. Public health reform
13. Harmonization between education and employment
14. Disaster mitigation and management
15. Central and provincial/district governments synergy.

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NATIONAL POLICY ON STI : INNOVATION SYSTEM & INDUSTRIAL DEVELOPMENT

- MOI, MOSME & others in industrial cluster related projects; BPPT's involvement since early 2000 in "industrial cluster & innovation system approaches."
- PERISKOP study - 2001, BMBF – MRT
- **Act (17/2007) : National Long Term Development Plan 2005 – 2025 (includes strengthening the National Innovation System/NIS to support knowledge-based economy development)**
- National Coordination Meeting on Research and Technology, 2008
- **Related Presidential Regulations :**
  1. **28/2008 : National Industrial Policy**
  2. **5/2010 : National Medium Term Development Plan, 2010-2014**
  3. **32/2011 : Master Plan for the Acceleration and Extention of the Indonesian Economic Development (MP3EI), 2011.**

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GERBANG INDAH NUSANTARA

Agency for the Assessment and Application of Technology (BPPT)

NATIONAL INDUSTRIAL POLICY

a. Vision 2025

"Indonesia to be a Strong Industrial Country in the World"

b. Missions

1. **Vehicles to fulfill people's needs**
2. **Dynamic factors for the economic growth**
3. **Multipliers to productive business activities**
4. **Vehicles to advance the national technologies**
5. **Vehicles to modernize people's life**
6. **Supporting pillars for the country'security and defence**
7. **'Main/focal points' for sustainable industrial development**

c. Goals

1. **Manufacturing industries achieve the world class industries**
2. **Balanced contributions of SMIs and LIs to GDP**
3. **Strong networking amongst SMIs and LIs, and international industries.**

Source : Presidential Regulation 28/2008 on the National Industrial Policy

Agency for the Assessment and Application of Technology (BPPT)

NATIONAL INDUSTRIAL DEVELOPMENT : OBJECTIVES

Midterm Objectives

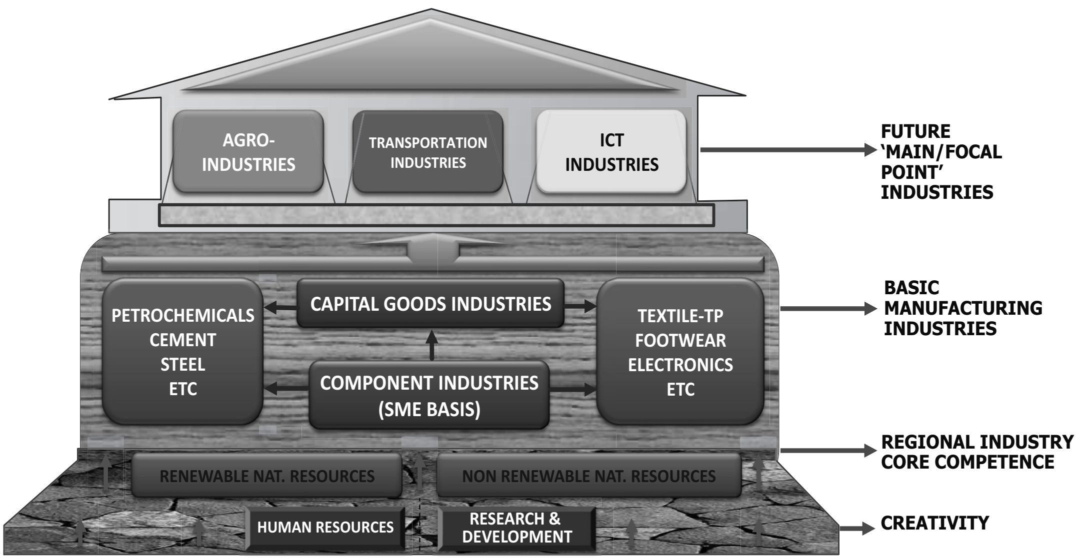
1. Able to provide added value to the economy and to absorb labors.
2. Able to lead in domestic markets and to increase exports.
3. Able to support infrastructure sectors.
4. Able to contribute to the national technology mastery.
5. Able to enhance the industrial structure deepening and to diversify the production varieties.
6. Grow towards outside Java.

Longterm Objectives

Industrial development consistent with the sustainable development concept, on the basis of :

1) Economic development,
2) Social development, and
3) Environmental development.

NATIONAL INDUSTRIAL STRUCTURE



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NATIONAL INDUSTRIAL DEVELOPMENT STRATEGY

Industrial cluster approach is adopted in industrial development in order to realized the national industrial vision 2025

TOP DOWN

Development of 35 ***Priority Industrial Clusters*** selected based on the natioal capabilities to compete in the national and international markets.

Development of processing industries for regional products towards ***regional core competency (distinctive competence***)

BOTTOM UP

APPROACH I

TOP-DOWN POLICY: PRIORITY INDUSTRIES

- To have a more **focused** industrial development, **priority industries** were selected in expectation to be successfully supported to achive industrial development goals
- Those industries may bring along **other industries** to grow
- Priority industries **were selected based on** :
  - **their international competitiveness potentials,** and
  - **future potentials** to grow (the coverage of area, people involved, natural resources to be used)
- International competitiveness potentials measured based on :
  - *Supply* (15 parameters) and
  - *Demand* (8 parameters)
  - from **365 industries** (ISIC 5 digits), had been selected **35 priority industries** with total **output of 78%** and **total export of 83%.**

In 2009, 35 Minister of Industry's Regulations on the Roadmap for the Development of Priority Industrial Clusters had been issued

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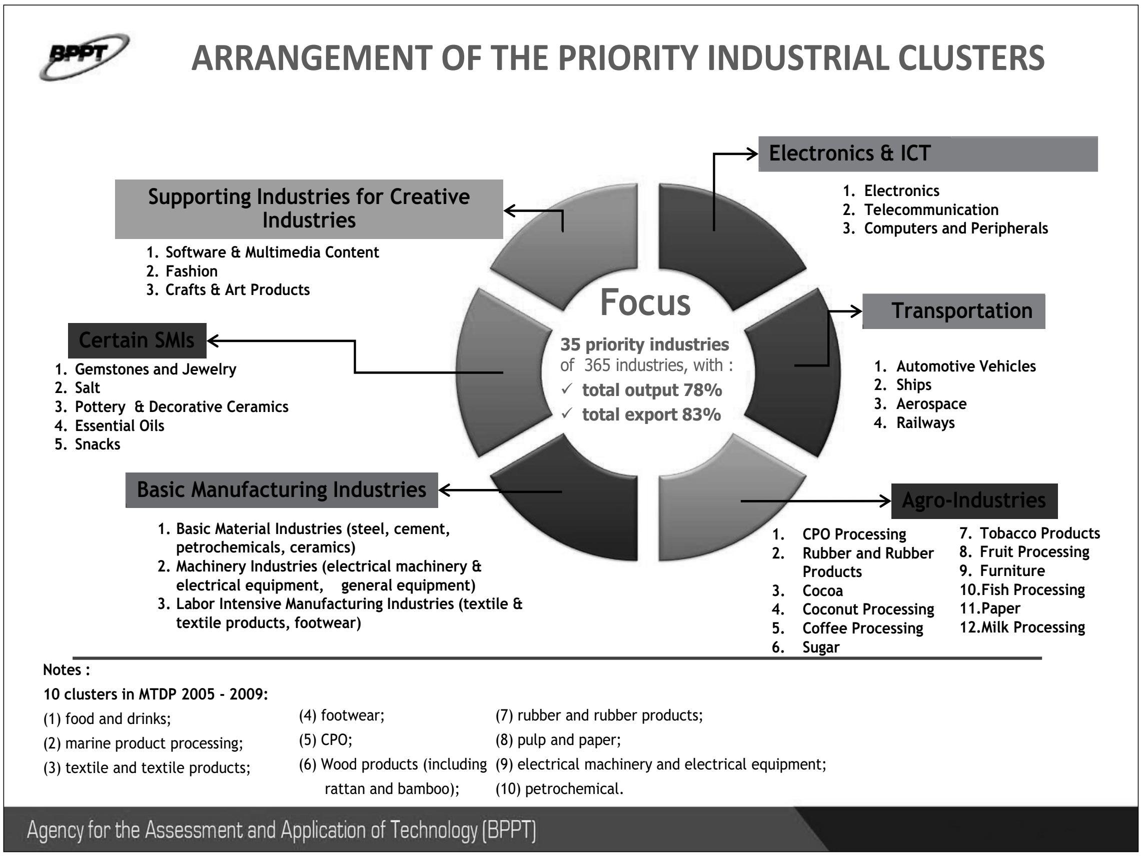
ARRANGEMENT OF THE PRIORITY INDUSTRIAL CLUSTERS
Electronics & ICT
1. Electronics
2. Telecommunication
3. Computers and Peripherals
Supporting Industries for Creative Industries
1. Software & Multimedia Content
2. Fashion
3. Crafts & Art Products
Focus
35 priority industries
of 365 industries, with :
✓ total output 78%
✓ total export 83%
Transportation
1. Automotive Vehicles
2. Ships
3. Aerospace
4. Railways
Certain SMIs
1. Gemstones and Jewelry
2. Salt
3. Pottery & Decorative Ceramics
4. Essential Oils
5. Snacks
Basic Manufacturing Industries
1. Basic Material Industries (steel, cement, petrochemicals, ceramics)
2. Machinery Industries (electrical machinery & electrical equipment, general equipment)
3. Labor Intensive Manufacturing Industries (textile & textile products, footwear)
Agro-Industries
1. CPO Processing
2. Rubber and Rubber Products
3. Cocoa
4. Coconut Processing
5. Coffee Processing
6. Sugar
7. Tobacco Products
8. Fruit Processing
9. Furniture
10. Fish Processing
11. Paper
12. Milk Processing
Notes :
10 clusters in MTDP 2005 - 2009:
(1) food and drinks;
(2) marine product processing;
(3) textile and textile products;
(4) footwear;
(5) CPO;
(6) Wood products (including rattan and bamboo);
(7) rubber and rubber products;
(8) pulp and paper;
(9) electrical machinery and electrical equipment;
(10) petrochemical.
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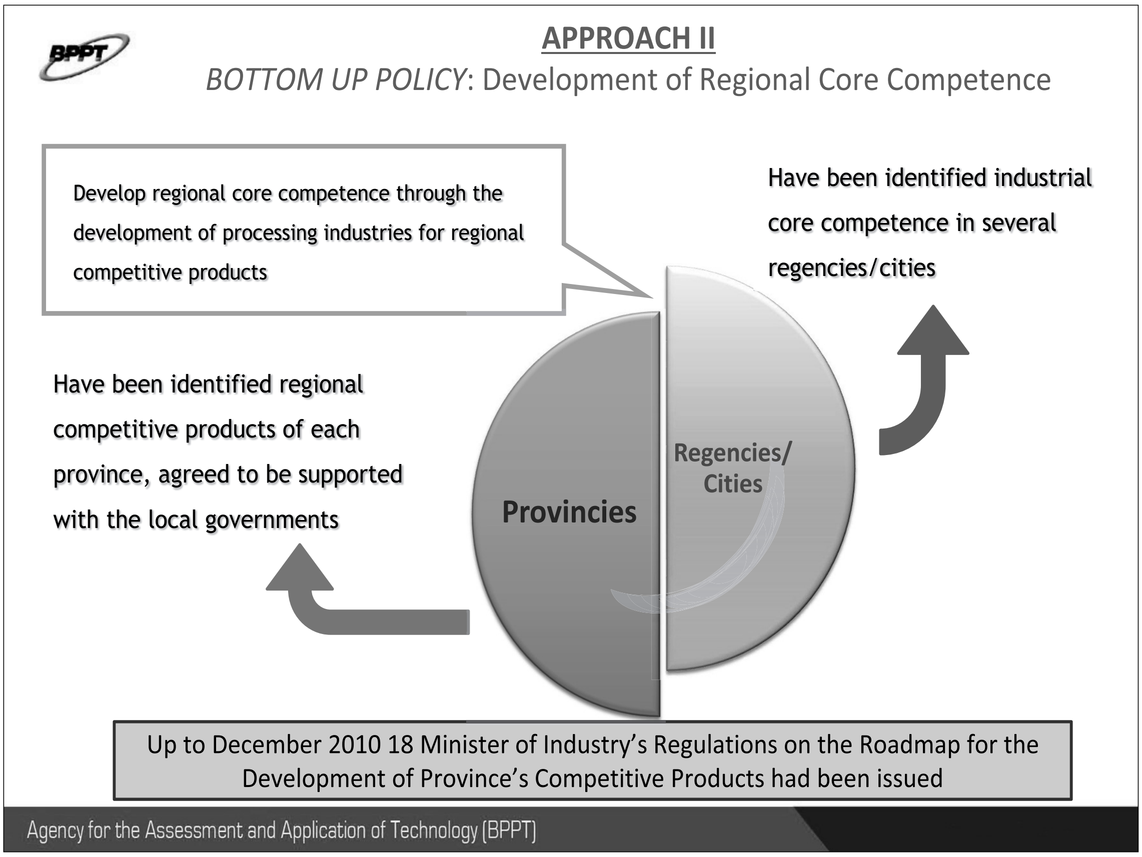
APPROACH II
BOTTOM UP POLICY: Development of Regional Core Competence
Develop regional core competence through the development of processing industries for regional competitive products
Have been identified industrial core competence in several regencies/cities
Have been identified regional competitive products of each province, agreed to be supported with the local governments
Provincies
Regencies/ Cities
Up to December 2010 18 Minister of Industry's Regulations on the Roadmap for the Development of Province's Competitive Products had been issued
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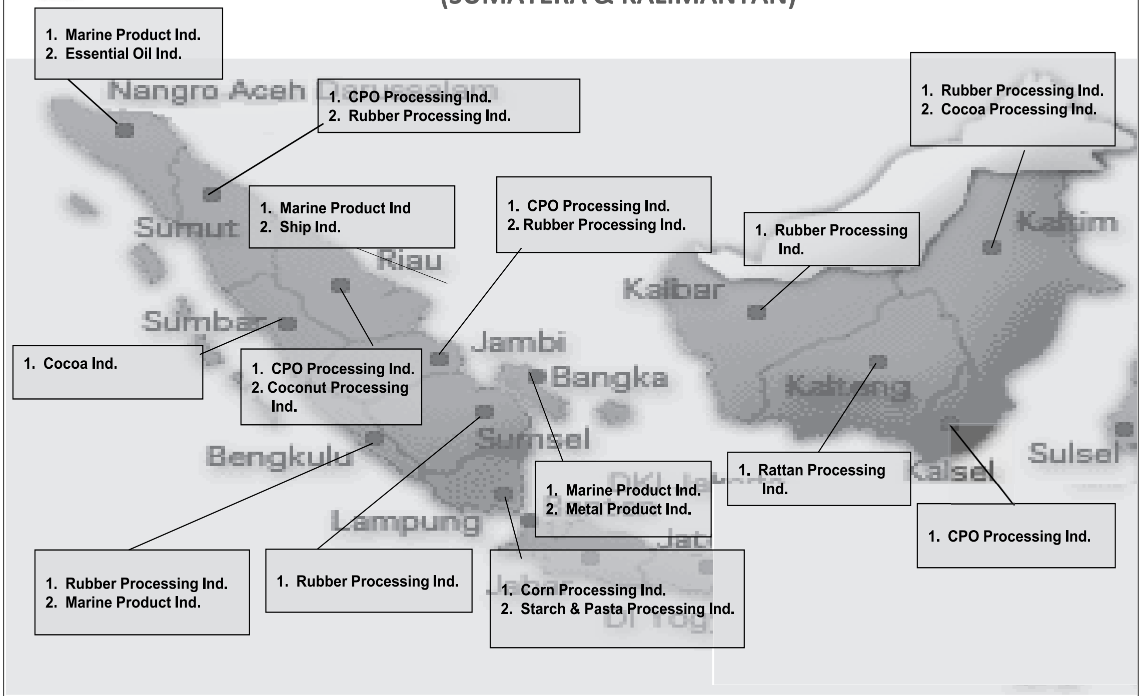
MAP OF DEVELOPMENT OF PROVINCE'S CORE PRODUCT PROCESSING (SUMATERA & KALIMANTAN)



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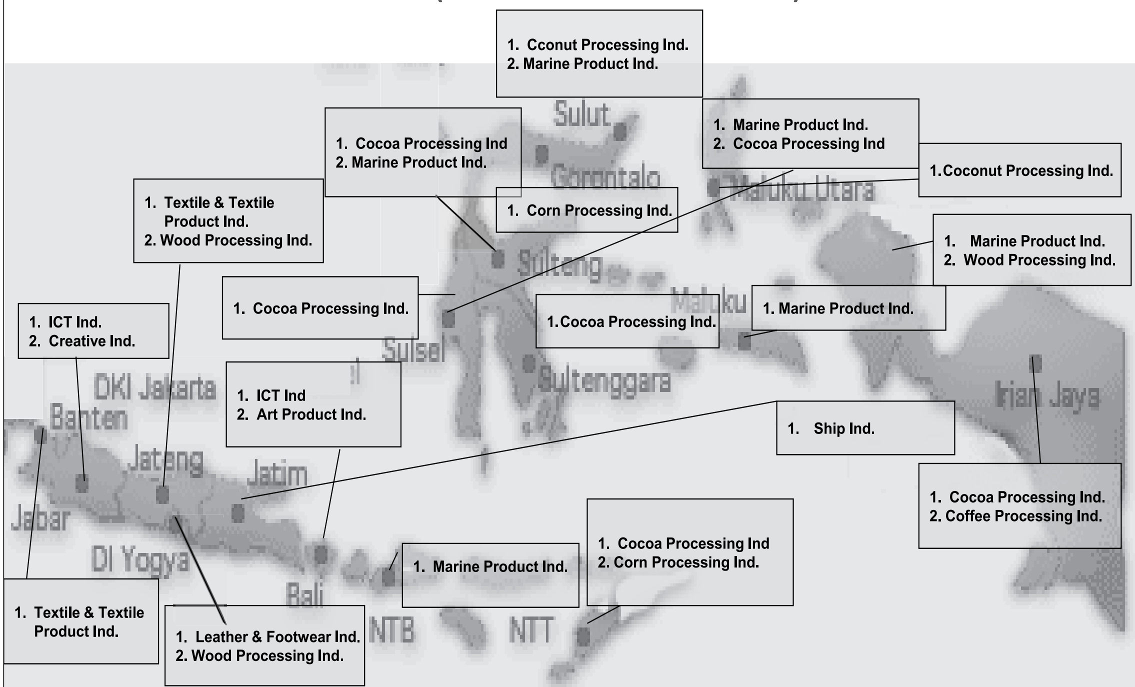
MAP OF DEVELOPMENT OF PROVINCE'S CORE PRODUCT PROCESSING (JAVA & EASTERN INDONESIA)



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SOME SPOTTED ISSUES

PROBLEMS IN INDUSTRIAL SECTORS

- Very high dependencies on imported materials, intermediate goods, and components;
- Limited varieties and types of industries;
- Low depth industrial structures;
- Limited diversifications of export products;
- Imbalance roles of SMIs in industrial structures;
- Industries mostly spread out in Java (> 60 %).

NATIONAL PROBLEMS

- High unemployment and poverty;
- Slowing down exports;
- *Relatively low economic growth (recently good economic growth, but considered 'not in a good & strong quality' yet);*
- Limited infrastructure;
- **Lagged technological capability and low human resource quality;**
- Smuggling, labor issues, high economy costs;
- Less competitive bank interests.

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OUTLINE

GERBANG INDAH NUSANTARA

1. INTRODUCTION
2. INDUSTRIAL CLUSTER DEVELOPMENT
3. **TOWARDS INTEGRATED INNOVATION SYSTEM**
4. CONCLUDING REMARKS

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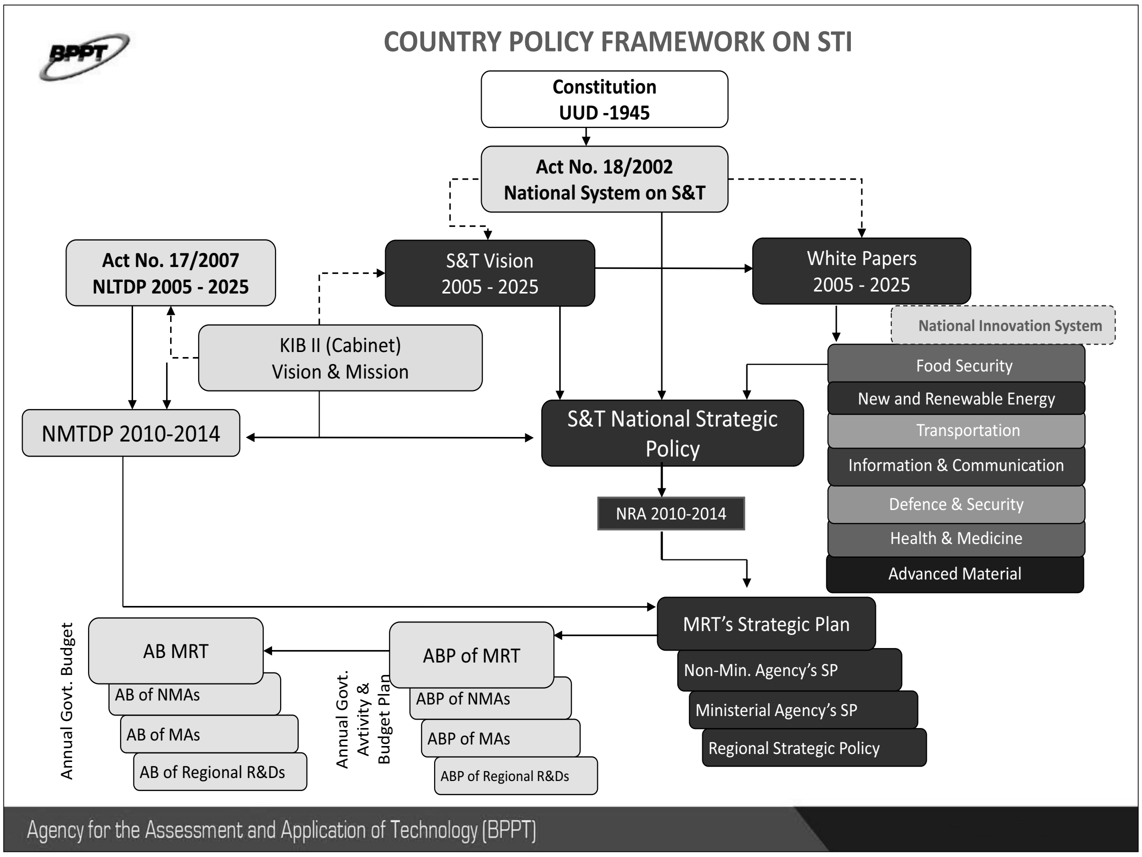
COUNTRY POLICY FRAMEWORK ON STI
Constitution UUD -1945
Act No. 18/2002 National System on S&T
Act No. 17/2007 NLTDP 2005 - 2025
S&T Vision 2005 - 2025
White Papers 2005 - 2025
National Innovation System
KIB II (Cabinet) Vision & Mission
Food Security
New and Renewable Energy
Transportation
Information & Communication
Defence & Security
Health & Medicine
Advanced Material
NMTDP 2010-2014
S&T National Strategic Policy
NRA 2010-2014
MRT's Strategic Plan
Non-Min. Agency's SP
Ministerial Agency's SP
Regional Strategic Policy
Annual Govt. Budget
AB MRT
AB of NMAs
AB of MAs
AB of Regional R&Ds
Annual Govt. Avtivity & Budget Plan
ABP of MRT
ABP of NMAs
ABP of MAs
ABP of Regional R&Ds
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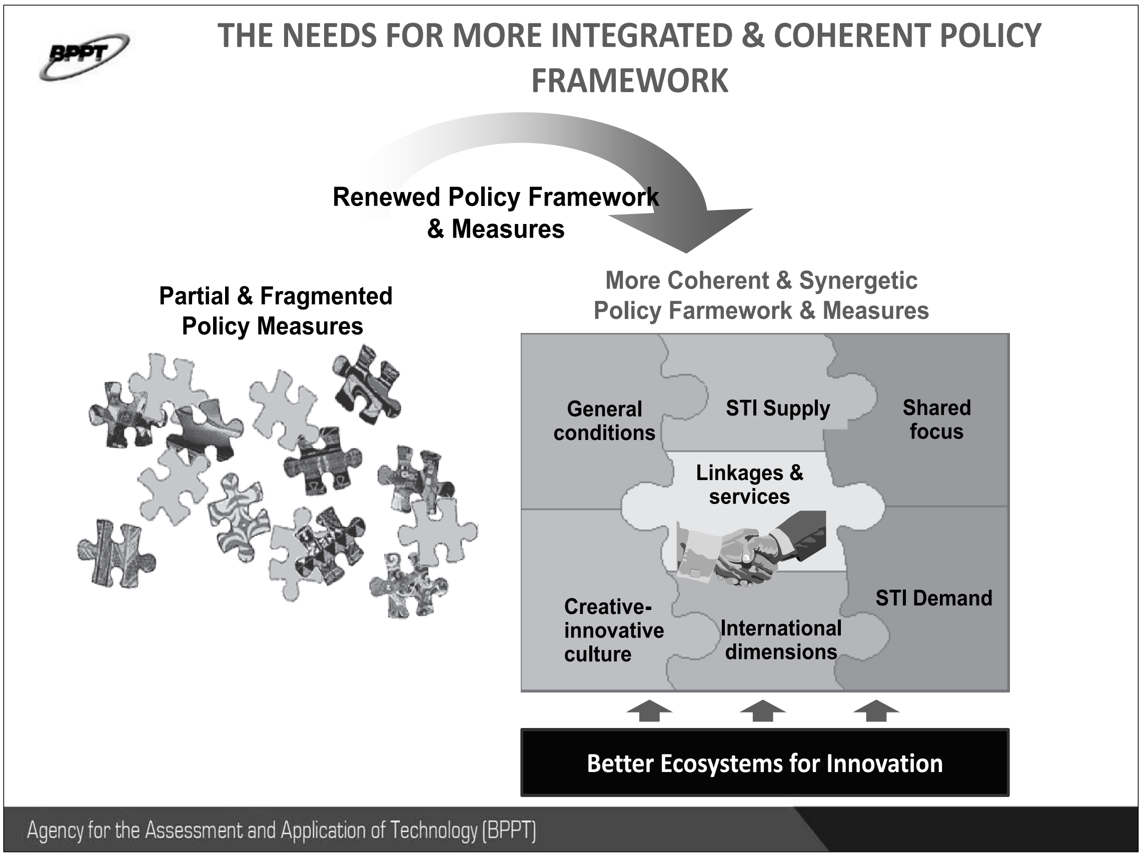
THE NEEDS FOR MORE INTEGRATED & COHERENT POLICY FRAMEWORK
Renewed Policy Framework & Measures
Partial & Fragmented Policy Measures
More Coherent & Synergetic Policy Farmework & Measures
General conditions
STI Supply
Shared focus
Linkages & services
Creative-innovative culture
International dimensions
STI Demand
Better Ecosystems for Innovation
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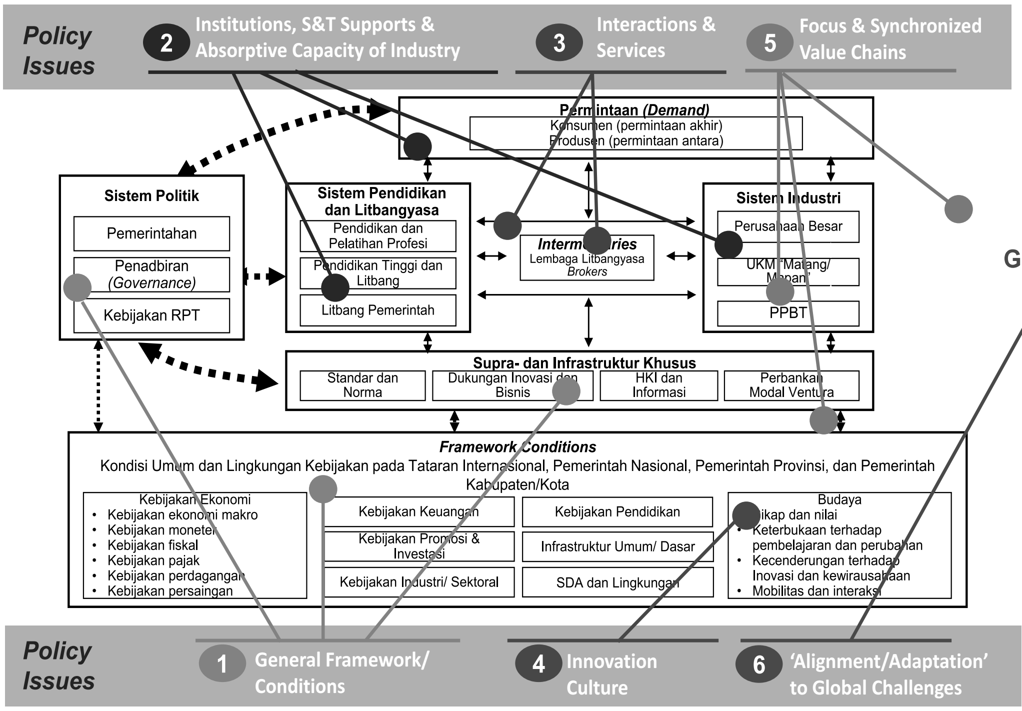
STRATEGIC POLICY AGENDA TO STRENGTHEN THE INNOVATION SYSTEM



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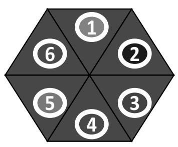
FRAMEWORK OF POLICY ON STI (BPPT)

Innovation Policy Framework : The Hexagon



- National R&T Coord. Meeting 2008
- Strategic Plan of MRT 2010-2014

1. **Develop conducive general framework/conditions for inovation and business.**
2. **Strengthen knowledge institutions and S&T supports, and enhance absorptive capacity of industry (esp. SMEs).**
3. **Develop synergetic collaboration for innovation and its diffusion, and increase knowledge-/ technology-based services.**
4. **Foster innovation culture.**
5. **Develop and strengthen integrated efforts of innovation system and industrial cluster development (at the national and regional levels).**
6. **Develop and adapt strategic responses to global changes and challenges.**

Strategic Initiatives:

1. **Strengthening Regional Innovation System (RIS)** : as a vehicle to strengthen pillars for fostering creativity-innovation at regional levels (as an integral part of the National Innovation System).
2. **Industrial Cluster Development** : as a vehicle to develop the best collective potentials and to enhance industrial competitiveness.
3. **Innovation Network Development** : as a vehicle to develop linkages and partnerships among actors, and dynamizing the flow of knowledge, innovation, diffusion, and learning.
4. **Technopreneurship Development** : as a vehicle to modernize business/economy & society, and to develop innovation culture.
5. **Strengthening Thematic Pilars** : as a vehicle to improve the thematic and contextual elements of the innovation system.

Academic Draft of the White Paper on the National Innovation System

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STRATEGI : *'FLAGSHIP' PROGRAM (SUB PROGRAM)*

Pro Poor ... Pro Job ...
Pro Growth ... Pro Environment ...

Pro Innovation ...

INNOVATION POLICY FRAMEWORK AND STRATEGIC INITIATIVES

Vision & Missions of the National & Regional Sustainable Development

Innovation Policy Framework \ Strategic Initiatives	RIS	Industrial Cluster	Innovation Network	Techno-preneurship	Thematic Pilars
General conditions	●	●	●	●	●
Institution, S&T support, Absorptive cap	●	●	●	●	●
Interaction, knowlegde-based services	●	●	●	●	●
Innovation Culture	●	●	●	●	●
Focus & Coherences	●	●	●	●	●
Adaptability to global changes	●	●	●	●	●

Flagship Programs

Academic Draft of the White Paper on the National Innovation System

OUTLINE

1. INTRODUCTION
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GERBANG INDAH NUSANTARA

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CONCLUSION

- Indonesia as a large country is moving forward, but needs to move faster & in a much better pattern;
- ‘Fragmented/incoherent’ policy framework & effective measures are among challenging issues;
- Significant improvements in STI policy & industrial renewal are required;
- Strong commitment & consistency to invest in innovation may be among the most leveraging factors;
- Better collaboration/partnership within the country and internationally is a must.

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RECOMMENDATION FOR ENHANCEMENT OF COUNTRY STI POLICY

1. A clear & formal comprehensive innovation policy framework to address the most essential systemic failures and to lead STI advancement and utilization to contribute to high economic growth, inclusiveness, and green/sustainable development.
2. Industrial cluster development as a 'development pillar' in strengthening the innovation system (of "5 pillar programs or umbrella programs" need to be mainstreamed in the national & regional development agenda).
3. Better coordination & collaboration among key stakeholders.
4. Strong commitment to support innovation in
   - industries important to enhancing competitive advantages,
   - regional & the youth creativity-innovation development.
5. STI human resource development.
6. Significant improvements in budgeting system :
   a. Improvements in government budget mechanisms & supports
   b. Better funding supports for STI advancement & utilization (including effective incentive schemes).

GERBANG INDAH NUSANTARA

Gerakan Membangun Sistem Inovasi, Daya Saing dan Kohesi Sosial di seluruh Wilayah Nusantara
(National movement to develop innovation system, competitiveness, and social cohesion through out the Country)

... in harmony we progress ...

Thank You

Dr. Tatang A. Taufik
Deputy Chairman
Agency for the Assessment and Application of Technology
Badan Pengkajian dan Penerapan Teknologi (BPPT)
Gedung II BPPT, Lt 13
Jl. MH. Thamrin 8, Jakarta 10340 - INDONESIA
Telp. (021)-316 9441 / 9442
Fax. (021)-319 24127
E-mail: tatang.taufik@bppt.go.id

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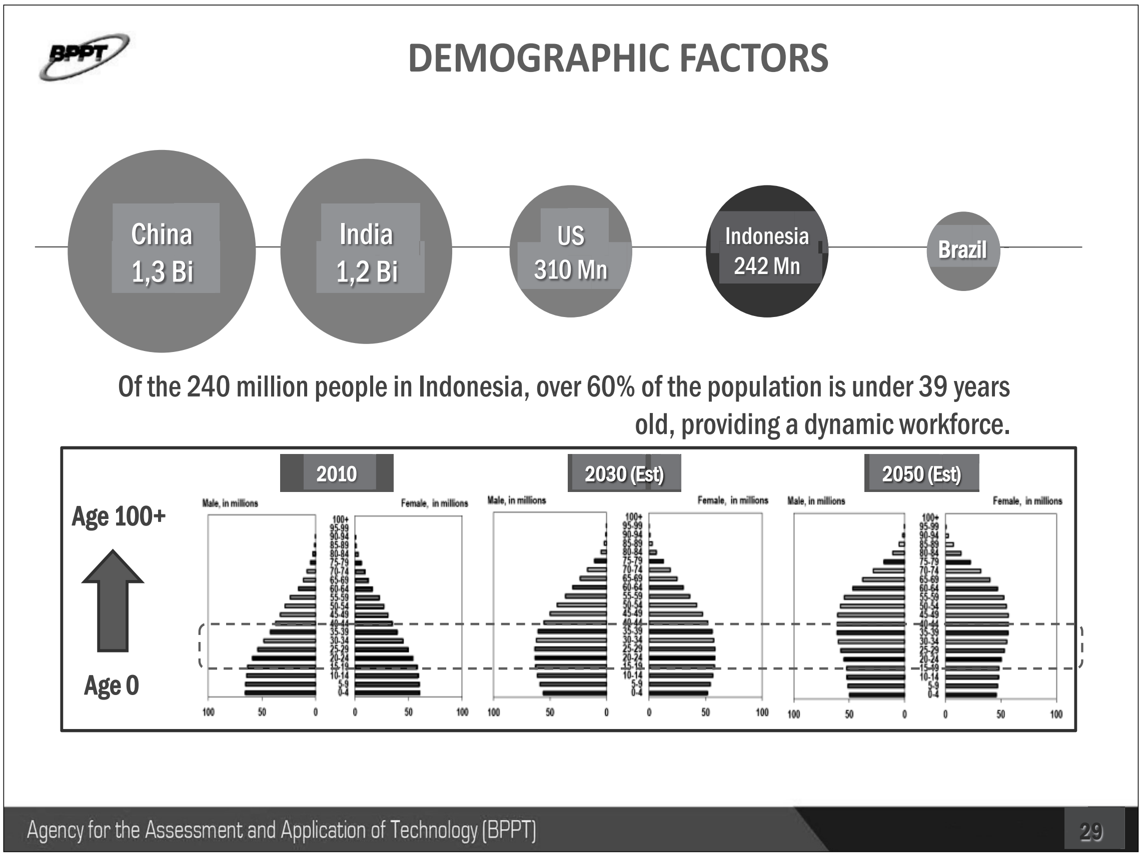
BPPT
DEMOGRAPHIC FACTORS
China 1,3 Bi
India 1,2 Bi
US 310 Mn
Indonesia 242 Mn
Brazil
Of the 240 million people in Indonesia, over 60% of the population is under 39 years old, providing a dynamic workforce.
2010
2030 (Est)
2050 (Est)
Age 100+
Age 0
Male, in millions
Female, in millions
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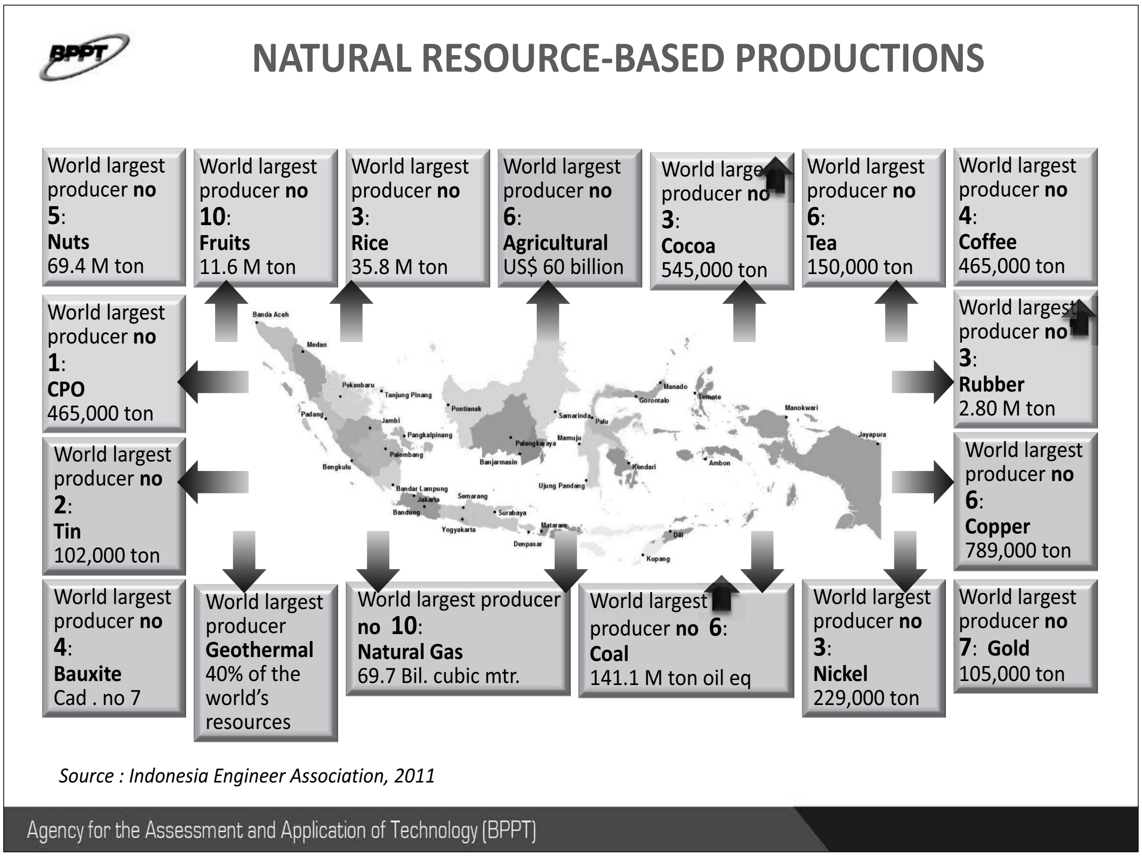
29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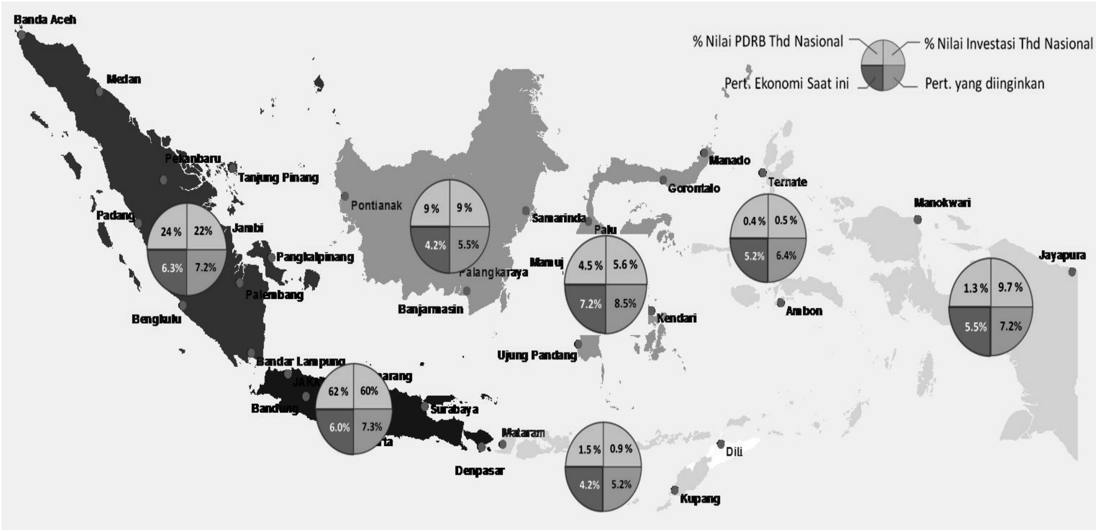
NATURAL RESOURCE-BASED PRODUCTIONS
World largest producer no 5: Nuts 69.4 M ton
World largest producer no 10: Fruits 11.6 M ton
World largest producer no 3: Rice 35.8 M ton
World largest producer no 6: Agricultural US$ 60 billion
World largest producer no 3: Cocoa 545,000 ton
World largest producer no 6: Tea 150,000 ton
World largest producer no 4: Coffee 465,000 ton
World largest producer no 1: CPO 465,000 ton
World largest producer no 3: Rubber 2.80 M ton
World largest producer no 2: Tin 102,000 ton
World largest producer no 6: Copper 789,000 ton
World largest producer no 4: Bauxite Cad . no 7
World largest producer Geothermal 40% of the world's resources
World largest producer no 10: Natural Gas 69.7 Bil. cubic mtr.
World largest producer no 6: Coal 141.1 M ton oil eq
World largest producer no 3: Nickel 229,000 ton
World largest producer no 7: Gold 105,000 ton
Source : Indonesia Engineer Association, 2011
Agency for the Assessment and Application of Technology (BPPT)

NATIONAL DEVELOPMENT CHALLENGES

Regional Shares on the National Economy



Regional disparity needs strategic initiatives in strengthening the national innovation system (as an integral part of the national development)

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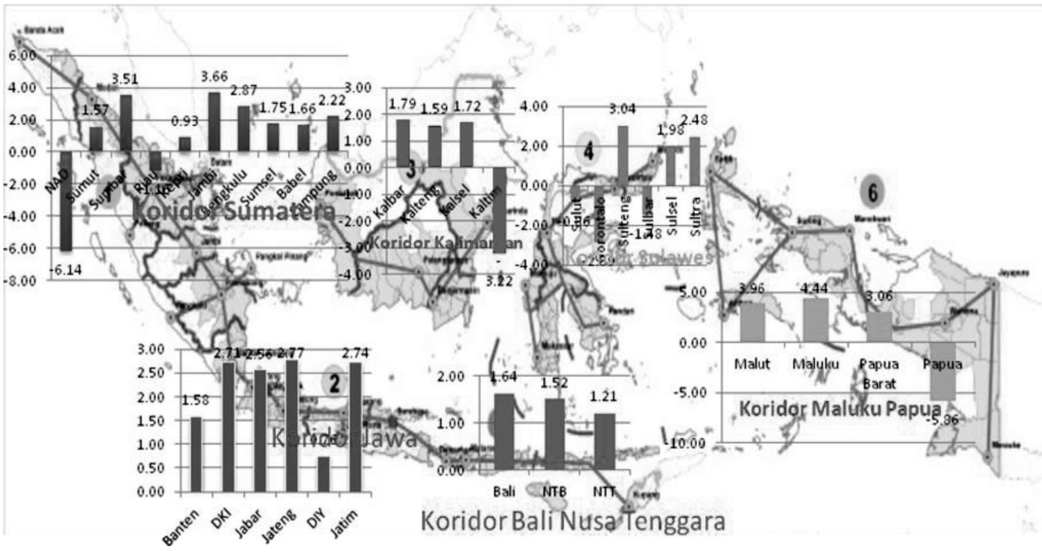
PROVINCIAL TFP GROWTHS (AVERAGE 2001-2008) IN THE 6 ECONOMIC CORRIDORS



TFP : Total Factor Productivity
Source : BPPT, 2011

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BRAIN DRAIN PHENOMENA

1. Emigration of highly qualified STI human resources (highly educated, experts, scientists, etc.) of a country
2. Migration /urbanization of talented people, usually from rural (unattractive regions) to urban areas (more attractive regions/places)
3. Profession/occupation switching (from previous developed competency to different career paths)
4. Massive exodus from an R&D organization to other or different organizations.

CHALLENGES IN POLICY IMPLEMENTATION

- **Political** related issues
- **Leadership** – short-sighted vision/interests
- **Capability** - Human resource related issues (incl. regional brain drain phenomenon)
- **Bureaucratic** system
- Very limited **budget** supports
- Limited **basic infrastructures**
- Limited **involvement** of local universities/HEs & business communities

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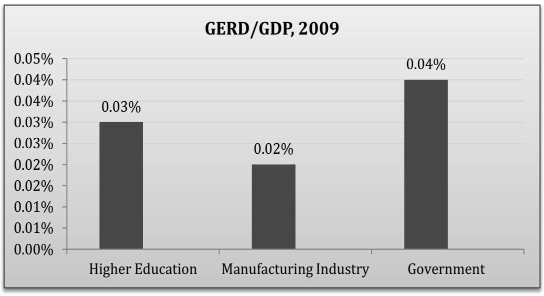
FUNDING FOR RD&I :
GROSS EXPENDITURE ON R&D (GERD)

National GERD and GERD/GDP Ratio, 2009

GERD	Rp. 4,720,341,818,344
GDP	Rp. 5,613,441,700,000,000
GERD/GDP	**0.08%**

Note:
1) Based on R&D Survey in University Sector, 2010
2) Based on R&D Survey in Industry Sector, 2010
3) Based on R&D Survey in Government Sector, 2008*

* the estimates with an average growth rate Goverment R&D budget since 2005-2008.



Shows the breakdowon of R&D expenditure by sector in 2009. Government and Higher Education shares to the R&D expenditure were higher (with ratio of GERD 0,04% for Government and 0,03% for Higher Education) compared to that of Manufacturing industry (0.02%).

Source: LIPI (Dec, 2011) based on R&D survey in University sector (2009), Industry sector (2010), and Government sector (2006)

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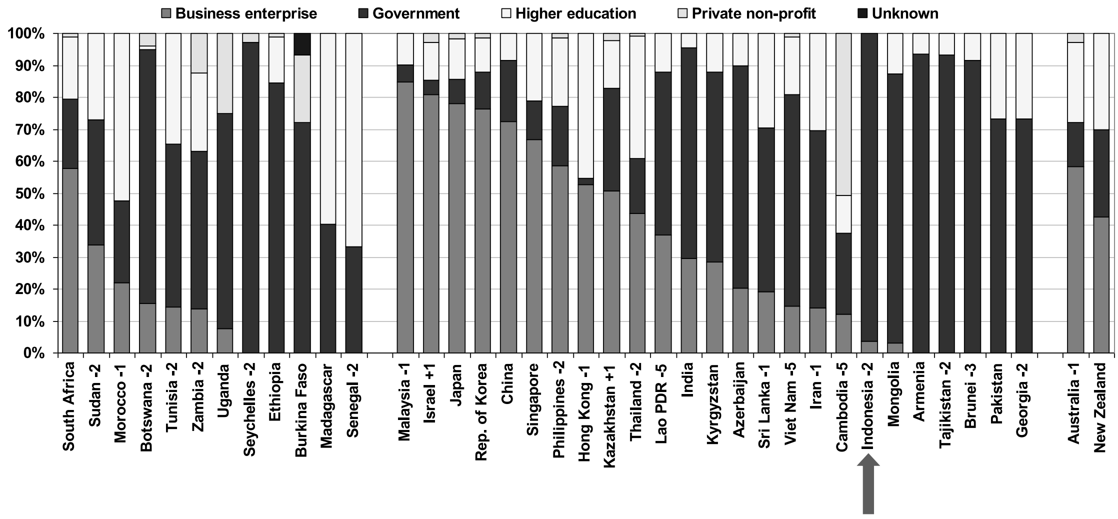
GERD INDONESIA

A breakdown of R&D investment in Africa, Asia and the Pacific. GERD by sector of performance, 2007 or latest available year



Source: UIS, August 2010
www.uis.unesco.org

Note: +1 = 2008, -1 = 2006, -2 = 2005, -3 = 2004, -5 = 2002.

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OECD Outreach Workshop on

Smart Specialisation: Its Extension to East Asia

Biography of presenters,
Abstracts & Presentations

Session VIII Looking beyond Smart Specialisation

April 4 (Thur) 17:30 – 18:30

Session Chair

Patrick Vock

State Secretariat for Education, Research and Innovation SERI
Strategy and Planning
Federal Department of Economic Affairs, Education and Research

Switzerland is among the leading countries in science, technology and innovation (STI) performance and recognizes the vital importance STI plays in economic growth and societal development.
Mr. Patrick Vock has long served in this thematic context and is currently heading the strategy and planning unit of the State Secretariat for Education, Research and Innovation (SERI) in Switzerland. He is responsible for the four year plan, which comprises the goals, the measures and the financial means of the Swiss federal policy in education, research and innovation.
Mr. Vock is currently Vice Chair of the Committee for Scientific and Technological Policy (CSTP) of the OECD. Between 2007 and 2012 he served as Chairman of the CSTP Working Party on Innovation and Technology Policy (TIP).
Earlier, he has been the Director of the Center for Science and Technology Studies, which was affiliated with the official advisory body of the Swiss government in matters dealing with higher education, science and innovation policies.
He holds a Master's degree in economics from the University of Zurich (1990). Following his postgraduate studies in European affairs at the College of Europe (Bruges), he has been involved in several studies and publications in the STI field.

Session VIII-I From Implicit Coordination of Regional Innovation Strategies Towards International PPPs

JAN LAROSSE

Senior Policy Advisor for Innovation and Industrial Policy,
Department of Economy, Science and Innovation
Flanders Government, Belgium

BIOGRAPHY

Jan Larosse holds a Master of Arts in Economics and a Bachelor of Philosophy of the University of Leuven in Belgium (1986). He worked at the University of Leuven as teaching assistant in Economic History and afterwards as administrative coordinator of the Leuven Institute for East European Studies.

He joined IWT, the Flanders Innovation Agency, in 1992 as a scientific advisor for implementing business analysis of innovation projects. In 1996 he became coordinator of the IWT Observatory that started indicator development and analysis of the Flanders Innovation System. He worked also on policy concepts for cluster policy, behavioural additionality, transition management and system innovation. Since then he published several articles on policy subjects.

Between 2005 and 2009 he was seconded as a national expert to the European Commission, in the strategy directory of Directorate General Research, for monitoring the national reform programmes for the Lisbon strategy in several member states, managing the file of ERAWATCH, the European research policy monitoring system, and of the development of the 'smart specialisation' approach. He still works closely with Commission services on this topic.

He is also a Belgian delegate in the OECD Working Party on Technology and Innovation Policy (TIP) for several years and member of the Bureau of TIP in 2013. Lately he was the initiator of the TIP project on 'Smart specialisation in global value chains: designing and assessing smart specialisation strategies'.

In 2009 he became senior policy advisor for innovation and enterprise policy at the Department of Economy, Science and Innovation of the Flanders Government in Belgium. In 2011 he was appointed overall coordinator of the New Industrial Policy of Flanders, including sectoral and cluster policies.

PRESENTATION ABSTRACT

'Smart specialisation' is closely linked with other themes of OECD-TIP's new policy research agenda: 'system innovation' and 'public private partnerships', in which the governance issue is of central concern. What are appropriate coordination mechanisms for investment choices in times of systemic changes that are propelled by huge societal challenges, such as climate change, ageing populations and by implementing disruptive technologies?

Smart specialisation is policy approach to foster an 'implicit' coordination mechanism for pro-active strategies dealing with the uncertainties of investing in research and innovation to seek solutions for these challenges. Regional actors seeking strategic differentiation according their comparative adavantages will tend to find complementary (competitive-cooperative) positions. Provided they are guided by common visions about new systemic opportunities and by reference roadmaps that embody common objectives, this mutual alignment can establish a dynamic systemic coherence. The international division of labour in knowledge production can to a large extent be operationalized with 'light' network coordination structures, based on cluster (triple helix) platforms and other public private partnerships at regional, national and international level.

Compared to markets and hierarchies these networked coordination mechanisms are better suited to exploit knowledge commons. The emergent governance of these knowledge commons along global value chains is reflected in new types of international PPPs. The challenge is to stabilize expectations about the future so that new growth does not end in speculative bubbles, nor is depressed by lack of perspectives. The case of ITRS, the roadmap of the semi-conductor community, setting ambitious technology targets (Moore's Law), can be the archetypical reference for new international PPPs, just like Silicon Valley has been for new cluster dynamics.

From Implicit Coordination of Regional Innovation Strategies Towards International PPPs

Smart Specialisation for Innovation-Driven Growth: Its extension to East Asia

OECD Workshop, Gwangju, 5 April 2013

Jan Larosse

Overview

- '**Smart Specialisation**' is a new approach for strategic allocation of resources in a globalised world where we share the same big societal challenges. The message is: focus on complementarities in finding knowledge-based solutions (open innovation - exploiting spillovers)

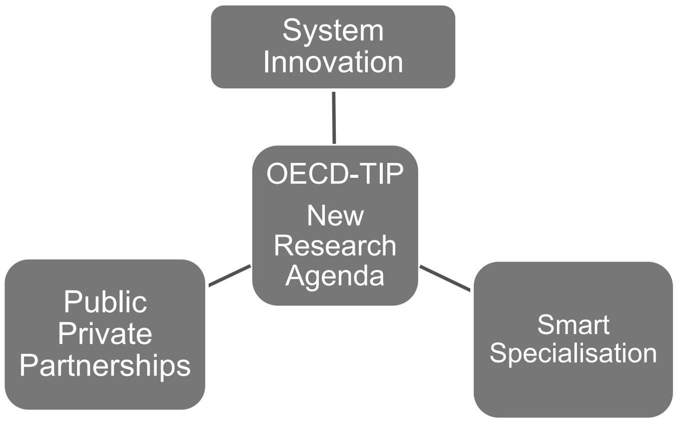
- Societal challenges require '**system innovation**': a transition towards entire new business models for dealing with societal functions such as mobility, health provisioning, energy, city planning …(making them 'sustainable')

- Therefore we have to focus on adequate governance, mobilising the co-creation power of '**public-private partnerships**'. Clusters of companies, knowledge institutes and supporting public institutes are regional nodes in global value chains. Therefore we have to consider the governance at system level .

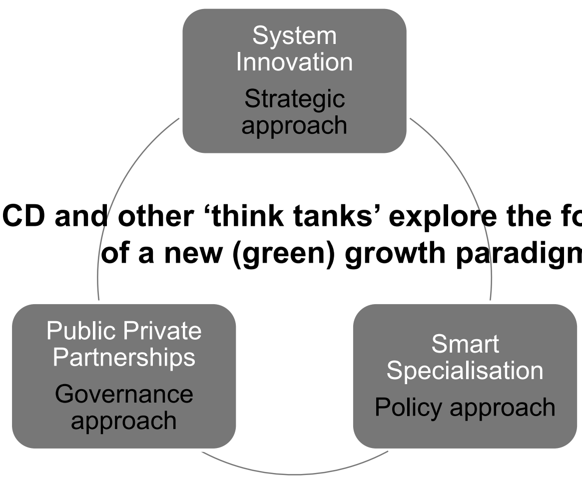
- Smart specialisation is an **implicit coordination mechanism** for decisions in innovation investments. With **international public private partnerships** relations between clusters can be established, internalising the risks and opportunities of future markets.

Session VIII: Looking beyond Smart Specialisation

“The aim of this session is to explore areas for future policy research and analysis as well linkages between smart specialisation and the new activities being carried out by the OECD Working Party on Innovation and Technology Policy (TIP).”



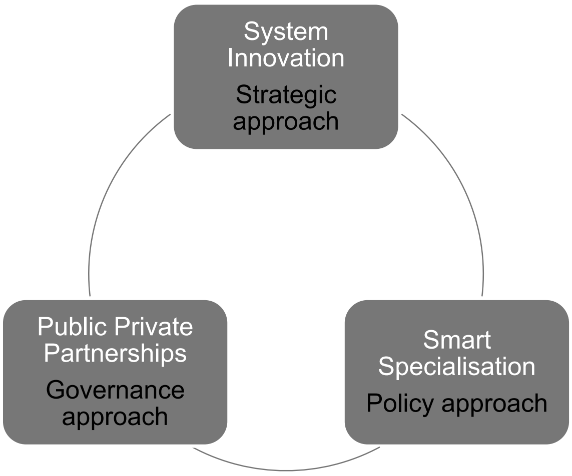
In search for new policy paradigms in times of structural change



OECD and other ‘think tanks’ explore the foundations of a new (green) growth paradigm

In search for new policy paradigms in times of structural change

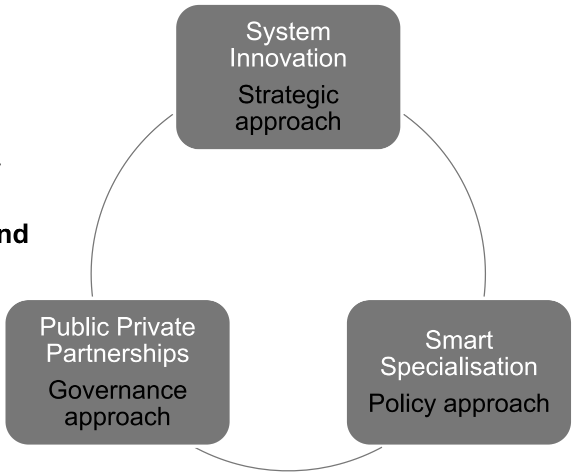
1 A 'transition driven' growth strategy: new lead markets require pro-active and vertical strategic approaches



In search for new policy paradigms in times of structural change

1 A 'transition driven' growth strategy: new lead markets require pro-active and vertical strategic approaches

2 Governance mechanism for co-creation of expectations and commitments: organised as a discovery process

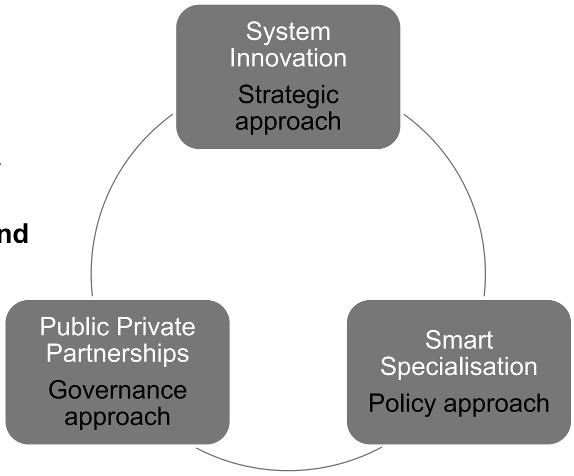


In search for new policy paradigms in times of structural change

1. **A 'transition driven' growth strategy: new lead markets require pro-active and vertical strategic approaches**

2. **Governance mechanism for co-creation of expectations and commitments: organised as a discovery process**

3. **Prioritisation mechanism for investment decisions: combination of bottom-up initiative and top-down orientation**



Beyond smart specialisation strategies

Can we design common futures that can harvest the promises of the disruptive technological advances of our age to bring solutions for our common challenges?

•Smart specialisation is a - low profile and therefore maybe more effective - new approach to that question, because it proclaims a role for all regions in a knowledge driven growth regime.

•Smart specialisation is an implicit coordination mechanism for aligning actor strategies for investments in innovation to tackle huge societal challenges in a decentralized context. Because of the uncertainty and complexity of these innovation trajectories it is a (self)discovery approach: both bottom-up and top-down

•Smart specialisation is therefore closely linked to a systemic approach needed for a challenge driven growth strategy (system innovation) and to new governance mechanisms to align actor strategies (public private partnerships)

SYSTEM PERSPECTIVE ON SMART SPECIALISATION

- S3: Actor perspective
  - develop regional strategies (triple helix clusters) in open regional innovation systems;
  - internalise mutual adaptation by focussing on dynamic *comparative advantages*
- S3: System perspective:
  - develop coherence at higher (international/global) level to use dynamic *economies of scale*
  - compensate for system failures that cause fragmentation (lock-in, segmentation, short termism, …)
- Therefore multi-level governance is needed (strategic convergence between actors at different policy levels)
- How to operationalise coordination in developping S3?
  - Common goals are crucial!
  - Differentiation = implicit complementarity!
  - But having a 'strategy' is not enough: it is the process that counts! **strategy roadmapping is a process**

SYSTEM FAILURES?

- Our basis theoretical models for coordinating investment decisions imply 'system failure'
  - Market coordination (price mechanism): all information & expectations are contained in prices
  - Administrative coordination (command mechanism): all information is contained in a plan
- Both models would lead to a single optimal allocation solution in a perfect market or plan which could internalise all information, but the real world is an open process. In reality there are:
  - Top-down failures: picking winners! (political process driven by lobbies)
  - Bottom-up failures: short termism! (entrepreneurial expectations driven by herd behaviour in unconstrained markets)
- 'System failure' is quite natural!
  - Cooping with intrinsic uncertainty and co-construction of the future: socio-economic system is 'open' in time and space
  - Dynamic system approaches are needed to maximise convergence of expectations of strategic partners towards likely futures

DYNAMIC SYSTEM APPROACH

- Because of the changing nature of innovation
  - Broad concept: non-technological innovation, service innovation, …
  - Open innovation: spillovers become the mains source of knowledge productivity
  - System innovation: beyond product and process innovation
- Because of the special character of knowledge as economic good!
  - Productivity of R&D exhibits increasing returns to scale
  - Spillovers are ‘free’ source of productivity: external knowledge resources are most important resource for any actor
  - Paradigm shift: obsolete business models / changing role of IPR
- Fertility of ‘knowledge commons’
  - Shared know-how, open sources, open data as a resource
  - Clusters as mechanism to internalise creative knowledge flows
  - Communities are the true ‘owners’

GOVERNANCE OF COMPLEMENTARITIES

- Smart specialisation capitalises on the network paradigm
  - Beyond markets and hierarchy: reciprocity relations (mutual dependency of smart specialisation) as a ‘third’ model for coordination
  - Multi-level governance is the bottle-neck: need for co-evolution at different levels. How to ‘organise’ this?
  - Governance arrangements for semi-public good (commons) focus on ‘trust building’, ‘common vision’, ‘strategic convergence’
- Smart specialisation draws on the self-organisation paradigm
  - Global order in complex systems arises from local turbulence around an attractor (opportunity)
  - Self-discovery processes of opportunities occur in different contexts
    - Proximity (clusters: open innovation) &
    - Globalization (information society: open source/open data)
  - Roadmapping of solutions to global challenges will follow common patterns of strategic knowledge development as well in local clusters and in international PPPs according

ROADMAPPING: INSTRUMENT OF GOVERNANCE

- Role of roadmapping
  - Strategies are ‘knowledge-based’: informed by common reference base and by each other
    - Internalisation of uncertainty: common strategic intelligence (common objectives, common roadmaps; common market creation)
    - Self-fulfilling interactive strategies
  - Based on trust in local communities (tacit); explicit shared believes in larger communities (codified):
- ITRS: International Roadmap for Semiconductors = <u>archetype!</u>
  - Semiconductor Industry Association (Silicon Valley)
  - Technical target: linear downscaling by factor 0,7 every 2 years (doubling IC density: Moore’s Law): successful for 40 years
  - Virtuous circle in creating techn. progress: investment in scaling → cost reductions and market growth → new investment …
  - Based on shared belief in technological ability, convergence of opinion
  - Research guidance increases resource efficiency, synchronisation
  - Willingness to share is basic condition!

COMMUNITY BUILDING: INSTRUMENT FOR GOVERNANCE

- IS ITRS Unique?:

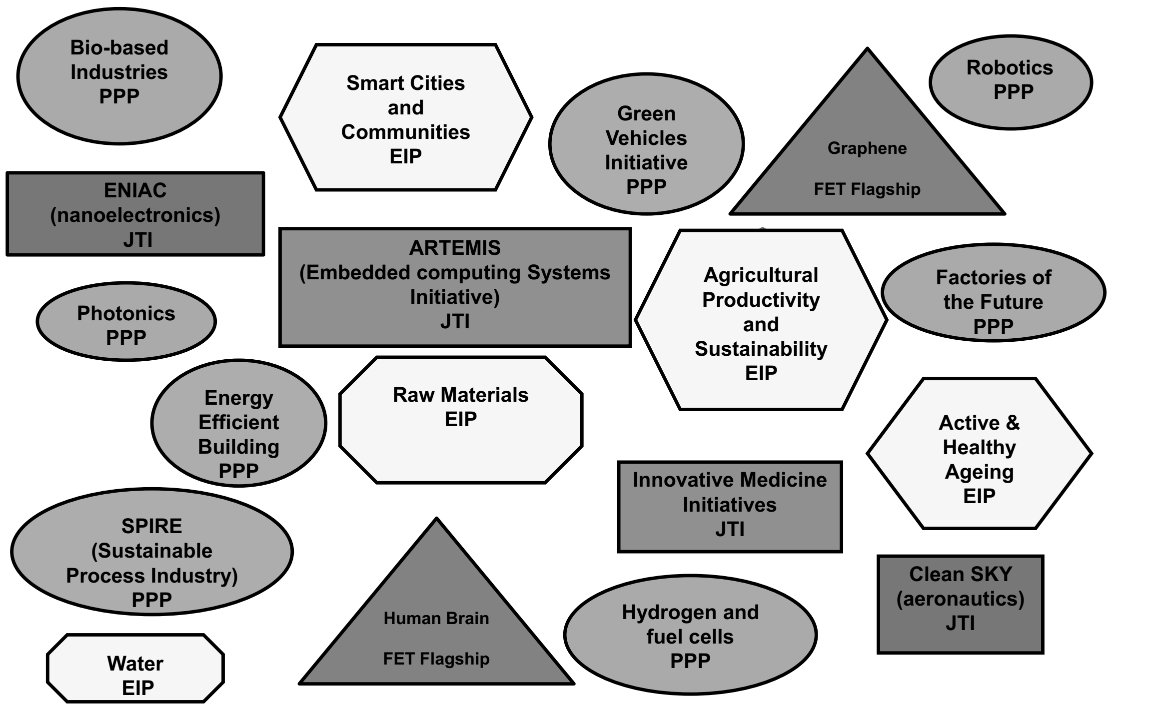
100 G long-haul multi-source agreement group
Optical Internetworking Forum with 100+ member companies: OIF was the first industry group to unite representatives from data and optical networking disciplines, including many of the world's leading carriers, component manufacturers, and system vendors.
OIF creates benchmarks, performs worldwide interoperability testing, builds market awareness and promotes education for technologies, services and solutions. It provides feedback to worldwide standards organizations to help achieve a set of implementable, interoperable solutions.

- Preconditions for virtuous circles of knowledge driven growth
  - Open innovation alliances
    - Because of increasing costs and increasing dependency
    - Partnerships for generic features: wide applicability needed for pre-commercial <u>horizontal</u> collaboration!
  - Societal targets in longer term perspective are ‘meta-competitive’ attractors for new growth regime!
  - User involvement requires <u>vertical</u> collaboration in value chains
    - Opportunity for customisation / adaptation to varying regional requirements
    - Opportunity for new collaborations in global value chains!

PPPs IN THE EUROPEAN UNION

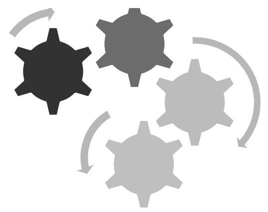
- ‘EU 2020’ and ‘Horizon 2020’: Strategy driven by societal challenges
- Evolution European partnerships
  - From national towards European Technology and Innovation Platforms
  - From technology driven to innovation driven: outcome driven, Addressing the societal challenges
  - Community building across different levels: European Platforms; National Platforms; Regional clusters
- European PPP characteristics
  - Common vision:
    - Challenge driven value chain approach: involving all sectors
    - Concurrent technology development and application (entrepreneurial discovery)
    - Focus on demonstration and proof of concept (of new breakthroughs)
  - Roadmap-based research in strategic application areas
  - Long term commitment
  - Leverage of private money by public money

MAIN EUROPEAN STRATEGIC PLATFORMS

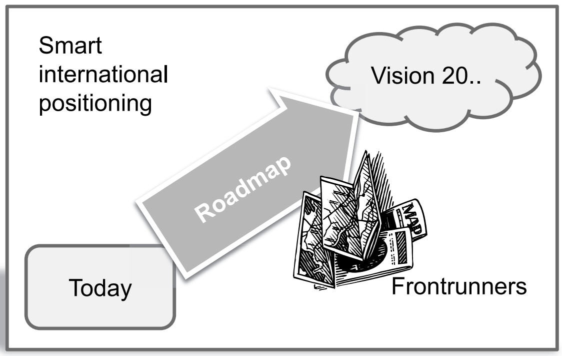


ROADMAPPING TO DESIGN COMMON FUTURES

Roadmapping can become a tool for <u>multi-level coordination</u> of strategic allocation decisions in a decentralised context: by convergence of strategies based on shared knowlege of future opportunities



Cluster / community/ eco-system
self-organisation
for new value creation



Road<u>mapping</u> : interactive strategy development between interconnected companies, knowledge and education instutes and supporting public bodies that aim for new value creating activities by exploiting new opportunities

Road<u>map</u>: strategy document that clairly expresses goals, milestones and commits of all strategic partners that have formed a formal partnership to engage in an important transition path with the aim of delivering societal and economic value-added

EU PHOTONICS ROAPMAP

SOME CONCLUSIONS

- Beyond smart specialisation: is there scope for international PPPs? What is needed for more integration in the global value chains of photonics? Is there scope for 'self-creating industries'?
- Societal challenges are main drivers! Provide photonic solutions to the major socio-economic challenges of our world, such as to the ageing society, health, energy-efficiency, food safety and security
  - System innovation: new opportunities beyond existing business models
  - Smart specialisation: entrepreneurial discovery of these opportunities in local clusters and global communities
  - PPP: communities can internalise risks of transitions IF technological capability is ensured and IF willingness to engage in common market-creation (along the Value Chain) is ensured
- Smart specialisation and international business cooperation in the photonics value chains: a way forward by 'matching the roadmaps' in international PPPs and between linked cluster nodes?

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Any questions? Please contact me!

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