

# BORDWIS+

Boosting Regional Development  
with ICT-Innovation-Strategies

Comparative Analysis concerning the Innovation Potential of  
Information- and Communication Technologies (ICT) in eight  
European Regions



**European Union**  
European Regional Development Fund

The current study has been conducted within the framework of BORDWIIS+



**Comissioned by:**



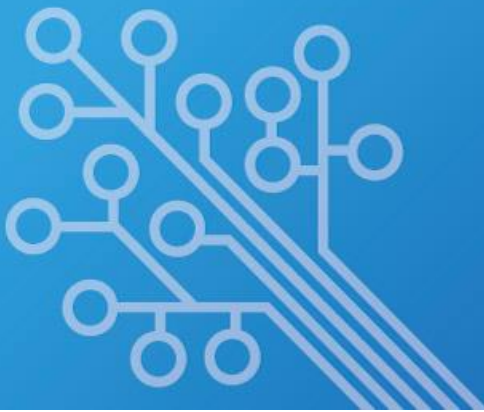
Monika Gatzke  
Cluster ICT.NRW  
c/o SIKoM+ - Institute for System Research on Information,  
Communication and Media Technology  
University of Wuppertal  
Campus Freudenberg  
Rainer-Gruenter-Straße 21  
42119 Wuppertal

Wuppertal, September 2013

**Authors:**

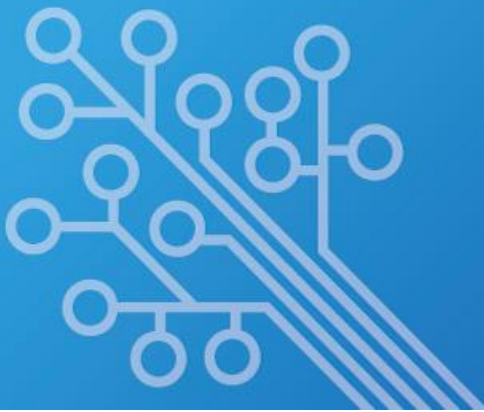
Dr. Silke Stahl-Rolf (VDI TZ)  
Dr. Christian Ripperda (VDI TZ)





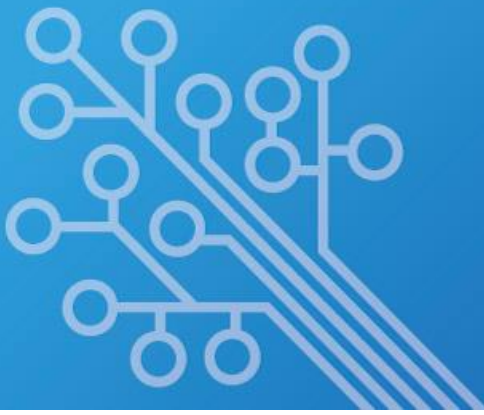
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### 1 Introduction

The Europe 2020 strategy is about delivering growth that is: smart, through more effective investments in education, research and innovation; sustainable, thanks to a decisive move towards a low-carbon economy; and inclusive, with a strong emphasis on job creation and poverty reduction.

Smart growth means that each region shall rely on its assets and potentials, i.e. those competencies where it has a comparative advantage and a unique selling point with respect to other regions.

One task within the context of the preparatory activities for the next Structural Funds period is the development of so-called "Smart Specialisation Strategies". In their Guide to Research and Innovation Strategies for Smart Specialisation (RIS 3), the European Commission defines „Smart Specialisation Strategies“ as following:

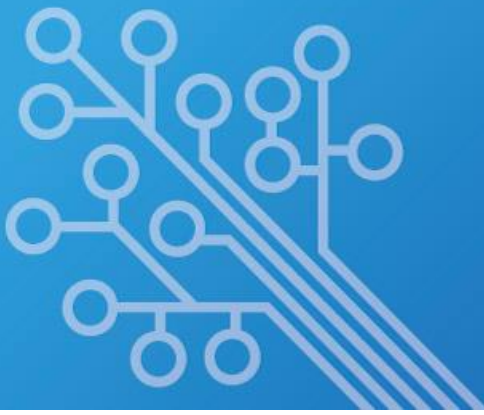
National/regional research and innovation strategies for smart specialisation (RIS3) are integrated, place-based economic transformation agendas that do five important things:

- They focus policy support and investments on key national/regional priorities, challenges and needs for knowledge-based development, including ICT-related measures;
- They build on each country's/region's strengths, competitive advantages and potential for excellence;
- They support technological as well as practice-based innovation and aim to stimulate private sector investment;
- They get stakeholders fully involved and encourage innovation and experimentation;
- They are evidence-based and include sound monitoring and evaluation systems.

Within the INTERREG IVc Project BORDWIIS+ (Boosting Regional Development with ICT-Innovation Strategies), partners from 8 European regions aim to contribute to the development of smart specialisation strategies in the field of ICT in their respective regions and to formulate recommendations for the collaboration between partner regions. In two preparatory steps the partners analyzed existing ICT policies in their regions and accomplished ICT-inventories, collecting quantitative as well as qualitative data on the respective regions. It is the aim of the tendered study to go one step further and to compare the findings of the ICT inventories. These steps will be the basis for the final publication "ICT Innovations Strategy for European Regions: Recommendations for Regional Specialization".

The study "Comparative analysis concerning the innovation potential of information- and communication technologies (ICT) in eight European regions" analyses the specific assets and potentials in European ICT regions being partners of the EU funded BORDWIIS projects according to the following questions:

- What are the specific characteristics of the ICT sector in the region?
- What are the relevant benchmarks?
- What is the specific technological profile in the region's ICT sector?

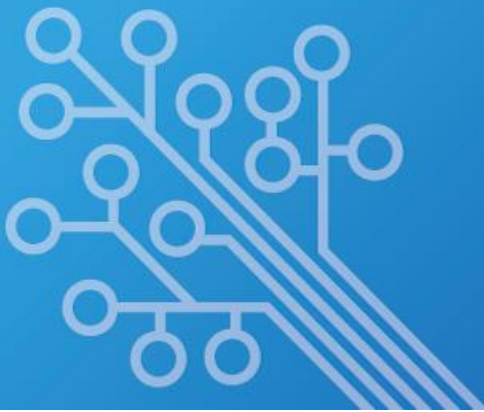


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- Are the specific interfaces to other relevant sectors /fields of technology in the region?
- Which governance structures have been put in place to support the region's ICT sector development?

Based on these lead questions, smart specialisation scenarios have been described and a SWOT analysis carried out for each region. Following this, recommendations both for individual regions and for their collaboration have been described.

Regional inventories that have been provided by the project partners are the core information source of the analysis. The interaction with the project partners has been a constitutive element of the study: Preliminary results have been presented at a project meeting in Tartu, Estonia. Following this, all project partners have been invited to give feed-back (in writing and through telephone interviews). In particular, the project partners have been asked to assess the ideas for further collaboration within the project group.



## 2 Regional Status Quo

### 2.1 North Rhine-Westphalia – Germany

#### 2.1.1 Status Quo

##### 2.1.1.1 Fact Sheet

###### *The region at a glance*

North-Rhine-Westphalia is the most populous German federal state. With a population of 17.8 million people (21.8 % of the German population), NRW earns EUR 582.1 billion, 22.0 percent of the German GDP. Internationally, NRW holds 18th position – ahead of Turkey. NRW generates 4.5 percent of the European GDP (EU-27).

###### *ICT Market*

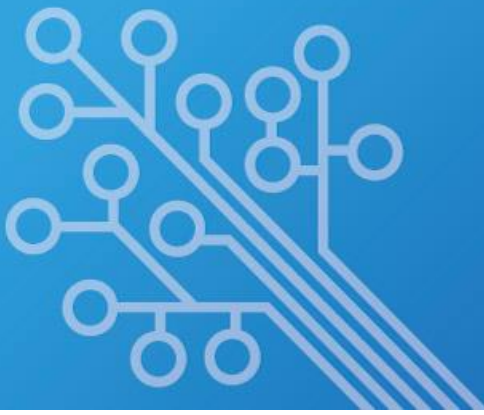
The ICT sector in North Rhine -Westphalia is shaped by the following characteristics

- Medium and especially small enterprises are the backbone of the ICT sector in North Rhine-Westphalia: The vast majority of companies (24.300 that is 91.19 % of all ICT companies) have 9 employees or less. There are 2250 (8.4 %) companies with 10 to 249 employees. The share of companies with 250 to 500 employees is 0.18%; that of companies with over 500 employees amounts to 0.2% of all ICT companies. The companies with the largest turnover are Deutsche Telekom AG, Vodafone and E-Plus.
- The ICT sector is part of an innovation system in which established industries such as the automotive industry, machine tool and mechanical engineering or the energy industry play a predominant role. These firms are customers and potential partners. They are in an ongoing process of structural change, which means a need for new, smarter solutions.
- North Rhine-Westphalia has the highest density of higher education and research institutions in Europe. There are 6 Fraunhofer Institutes with an ICT research focus; the two federal funded Spitzencluster ("leading edge clusters") have a strong ICT orientation. NRW has 69 universities and technical colleges with 590,300 students. In the study year there are about 44,300 students in informatics and more than 19,000 in electrical engineering<sup>1</sup>. Nevertheless, there is a total of nearly 38,000 vacancies for ICT professionals (university graduates and vocationally qualified persons).

The most important export countries for the ICT sector are The Netherlands, France and China; the most imports come from China, Japan and the Netherlands.

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<sup>1</sup> <http://www.it.nrw.de/statistik/d/daten/eckdaten/r513hoch2.html>



## North Rhine-Westphalia – Germany

### *Benchmarks*

- Compared with Germany as a whole, the ICT sector in NRW represents the German average: NRW accounts for 21.07 % of the German ICT employees and 21.81 % of the ICT firms. Telecommunications plays a prominent role: this sub-sector accounts for 25.71 % of all employees and 78% of the turnover in Germany (as the headquarters of a number telecommunication companies are located in NRW and turnover is attributed to the location of the headquarter).
- Weaknesses can be observed with respect to patent applications, R&D expenditures and start-up dynamics: NRW's share in German patent applications is 11.5 %, its share in R&D expenditures is 6.3% and it ranks fifth among German federal states (excluding city states) in the start-up statistics.
- The EU Innovation Index for 2010 ranks NRW in seventh position among German federal states; the Innovation Indicator 2012 of the Deutsche Telekom Foundation and BDI ranks NRW in thirteenth position nationwide in international markets.

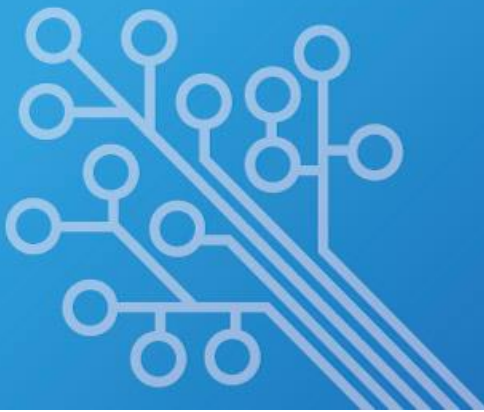
### *Technological competencies*

Particular competences can be observed in the following fields:

- Complex networked and intelligent systems: there are particular strengths in high-level R&D in this field. Moreover, complex networked and intelligent systems are an important leverage to stimulate structural change and growth in the established NRW industries.
- Mobile solutions: 86 % of the German mobile telephone market is accounted for by NRW companies. Further important fields with high growth potential are mobile TV and location based services. Machine to machine communication is on the agenda of both SME and the "big players".
- ICT Security: with more than 200 firms and 20 higher education and research institutes engaged in this field, NRW is one of the ICT security hot spots in Europe.
- Software: With respect to turnover, NRW companies are successful in this field but usually rank behind their counterparts in Southern Germany. Cloud computing becomes increasingly important and offers new chances both for software development as well as for applications, for example in the logistics sector.

To summarize, NRW has an excellent starting position to develop networked and intelligent systems that are based on already existing strengths in the mobile solutions sub-sector and profit from the specific competencies in ICT security and software development.





## North Rhine-Westphalia – Germany

### *Cross-Innovations*

NRW's advantage is that it is the home to established industries that can benefit from the impulses of ICT sector. These are in particular:

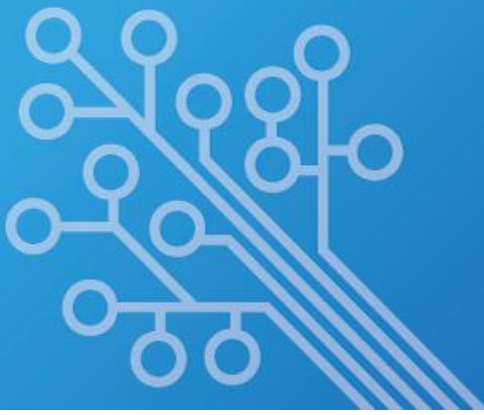
- **Mechanical Engineering:** With 1,383 firms and 198,710 employees, mechanical engineering in NRW accounts to 22.3 % of the German turnover. Intelligent production systems, summarized under the term "Industrie 4.0" pave the way for the future and numerous corresponding initiatives and projects have already been set up in NRW.
- **Energy:** NRW is Germany's no. 1 energy state. It supplies 30% of the electricity required in Germany. 35% of German industrial electricity is consumed in NRW. Innovative activities are focused, among others, intelligent energy systems. ICT is the key.
- **Logistics:** With 27,800 companies and 284,000 employees the logistics sector is the backbone of the booming trade location NRW. Due to the growth of internet trade and new consumption patterns, the logistics sector is expected to grow in the coming years. ICT based supply chain optimization is among the key fields of innovation.
- **Automotive:** With 237 companies and 83,570 employees, the NRW automotive sector has an annual turnover of 31.8 bn. Euros. New and upcoming topics are autonomous driving, the connected car or electro mobility - developments that require ICT.
- **Health Care / medical technology:** Ageing population and a growing health consciousness are the growth drivers in this sector that employs 1.1 million people in NRW. "Networked and biohybrid medical system" is a field of innovation with particularly high growth potential.

### *Governance*

In 2007, the state government set up a cluster strategy – meanwhile developed into a cluster and lead market strategy – that, among others, focuses on the ICT sector. It is the aim of the cluster policy to strengthen already existing strengths and to identify and develop new potentials.

Accordingly, a cluster management has been installed in the field of ICT that, in a participatory process involving the relevant stakeholders, elaborated 10 theses for the development of NRW as a digital industry base. Cyber Physical Systems have been identified as the driving force in this process. Examples of CPS relevant for the location NRW are Smart Grids, Smart Home, Intelligent Medical Systems, Production 4.0, and intelligent logistics and transport systems. Accordingly, an interdisciplinary CPS Network has been initiated, aiming at the development of an "ICT Roadmap 2020". In a continuous process, the Roadmap will be a critical cornerstone for ICT research and development in NRW.

Parallel to the setting up of a cluster management, within the framework of so-called "innovation competitions" funding for innovative projects has been provided. These are calls for projects in the thematic areas of the NRW clusters which were co-funded by the ERDF. Currently, there are no calls for proposals which is considered a substantial disadvantage for the ICT sector in NRW.



## North Rhine-Westphalia – Germany

Innovation competitions which are foreseen to start again in 2014 are considered a key driver in the establishment of CPS competencies in NRW and to bring them into the market.

There are further funding programmes on state and federal level:

- Zentrales Innovationsprogramm Mittelstand of the German Federal Ministry of Economics and Technology. This programme offers R&D support for SME. One key feature is administrative simplicity.
- Go-innovative which supports innovation consultancy services for firms.
- "KMU innovativ", a funding programme of the German Federal Ministry of Education and Research targeting SMEs.
- ICT 2020, the research framework programme of the German Federal Ministry of Education and Research.
- The innovation voucher, a scheme of the state of NRW, supporting the access of SME to high-level research institutions and university departments.

### *Framework conditions conducive to regional innovativeness*

There are certainly numerous framework conditions conducive to regional innovativeness. The NRW example has shown that the following factors are outstanding:

- Organisations which are rooted in the regional "scene" and are able to bring together the relevant actors, to develop shared visions and strategies and support the implementation of these strategies. Examples are the cluster management structures or the business associations such as ECO – the association of the German internet industry.
- Funding programmes which are aligned with the thematic priorities in the region and the regional strategies in their timely dimension.
- Continuity both with respect to strategies and funding.

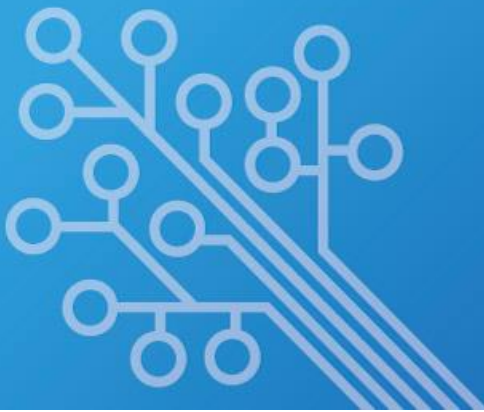
### **2.1.1.2 Smart Specialisation Scenario**

#### *Specialization profile*

The current specialization profile of the region is based on the outstanding competencies in

- Complex networked and intelligent systems,
- Mobile solutions,
- ICT Security, and
- Software.

Together with strengths in established industries, there is a vast arena for the application of these competencies within the framework of Cyber Physical Systems (CPS).



### *Market relevance*

Due to their high application relevance in the economic sectors that are the backbone of the NRW economy, CPS have an enormous potential to generate growth and employment and to stimulate economic change. Behind this background, implementing CPS in sectors such as mechanical engineering, the automotive sector or medical technology will increase the overall competitiveness of the NRW economy.

### *Potential answer to global challenges*

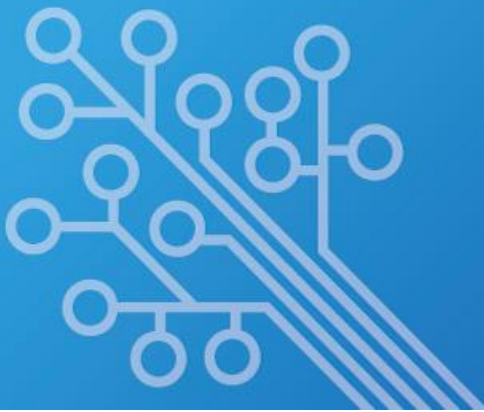
Cyber Physical Systems offer answers to a number of global challenges:

- Need for more resource / energy efficiency: Smart grids, optimized supply chains or networked production processes offer an enormous potential to save resources and energy.
- Mobility: Mobility patterns are changing – people increasingly ask for holistic mobility services and networked solutions. Cars become communication devices and means of transport are increasingly connected. Apps for intermodal mobility solutions are one possible answer.
- Ageing population: The share of older people increases. At the same time, these people want to stay as independent as possible. Ambient assisted living devices are one solution.

### *Vision for the future*

#### **NRW: A renowned location for the development and application of Cyber Physical Systems**

As a strong R&D location that builds on its production assets, the region has particular chances in connecting its ICT capabilities with its strong industry sectors. Thus, the existing strengths can be utilized to contribute to economic transformation in the region. Building up a competence center for Cyber Physical Systems, connecting ICT research and development with other industries, will be an important measure to reach this aim.

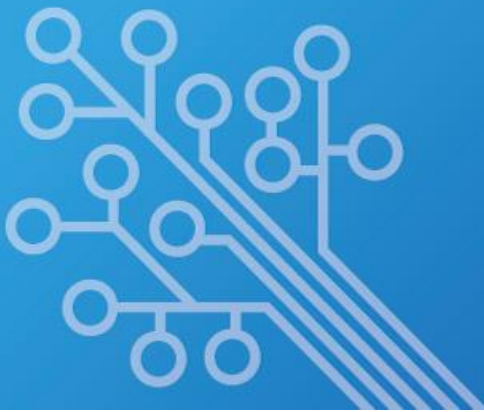


## North Rhine-Westphalia – Germany

### 2.1.2 SWOT-profile

Starting from the Status Quo as described above and building on the chances, in particular with respect to further develop, test and apply the competencies in CPS, the situation in NRW can be summarized as following:

<p><b>Strengths</b></p> <ul style="list-style-type: none"> <li>- Overall economic strength of ICT sector</li> <li>- Extensive know-how in enabling technologies: embedded systems, machine-to-machine (M2M) communications, sensor networks, software engineering, CPS</li> <li>- SME-dominated ICT landscape with wide production spectrum</li> <li>- Powerful ICT region with future-oriented focal points, networked industries, and local as well as regional technological centers</li> <li>- Comprehensive support facilities for business start-ups</li> </ul>	<p><b>Weaknesses</b></p> <ul style="list-style-type: none"> <li>- Lack of a cooperative mindset</li> <li>- Low profile ICT sector both nationally and internationally</li> <li>- Average nationwide position in innovation</li> <li>- Low start-up ratio in hi-tech sector, few start-ups straight from university</li> <li>- Rigid production structures in need of modernization</li> <li>- Lack of transparency in funding support and financing facilities</li> <li>- Internationalization of ICT sector requiring expansion.</li> </ul>
<p><b>Opportunities</b></p> <ul style="list-style-type: none"> <li>- Surging growth of international IT market with excellent growth prospects for enabling technologies</li> <li>- Enabling technologies drive innovation throughout the economy</li> <li>- High demand for intelligent solutions (smart grids, e-mobility, telemedicine, embedded systems in production technology etc)</li> <li>- ICT creates workplaces for qualified people</li> <li>- Readiness to invest in strong business areas</li> <li>- High creative potential</li> </ul>	<p><b>Threats and challenges</b></p> <ul style="list-style-type: none"> <li>- Lack of potential for links with national and international ICT developments</li> <li>- General deterioration of economic and financial situation</li> <li>- Political shifts impacting and changing legal frameworks</li> <li>- High dependence on funding programs</li> <li>- Growing gap between 'digital avant-garde' and 'digital outsiders'</li> <li>- Increasing power consumption by ICT diminishes positive impact across the board.</li> </ul>



### 2.1.3 Recommendations

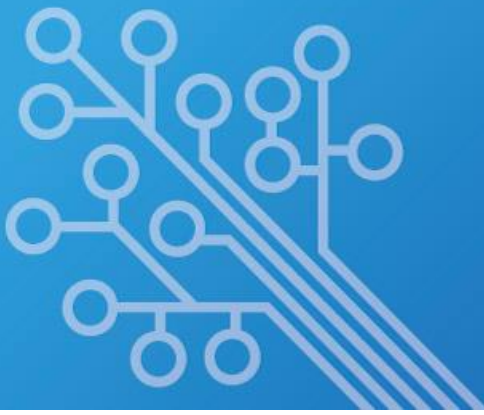
#### *Developing strengths and chances*

- The identified focus on CPS and the development of corresponding strategies and working groups are an excellent starting point. This orientation should be maintained.
- Particular attention should be paid to NRW-specific pilot projects within the framework of which NRW specific regional R&D measures representing the different fields of application of CPS should be supported.
- In addition, it is crucial to further develop the approach in projects supported by various funding sources. Existing programmes especially on German federal level (ZIM) should be used. It is also recommended to start projects with an explicit market development orientation such as demonstration projects or regional test beds. It is expected that the upcoming Horizon 2020 programme contains an SME facility that is focused on market oriented projects. Measures to develop international markets should also be envisaged. Examples are partnering activities with other regions with the aim to use these regions as a test bed for solutions developed in NRW (for example networked solutions in the energy or mobility industries) or the building up of test, demonstration and (possibly) training centres in which potential customers from abroad can better get to know the solutions developed in NRW.

#### *Counteracting weaknesses*

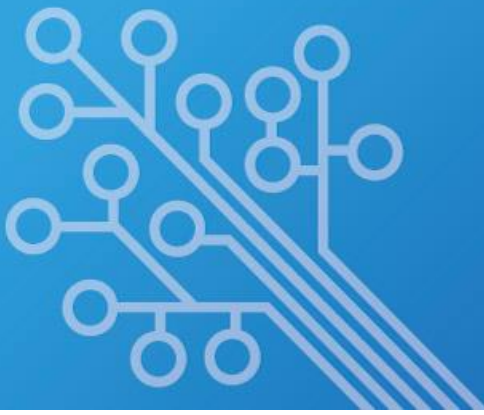
The regional analysis has clearly shown that there are weaknesses in NRW. Among them are the looming lack of qualified workers, financial shortages, a comparatively low performance of the R&D sector and a comparatively low start-up activity. Therefore, the following points should be envisaged:

- ICT startups in the especially in the field of CPS covering the needs of the NRW industry should be further stimulated. Thus, existing programmes to support entrepreneurial activities should be extended and attractive infrastructures (incubators) provided for start-up companies. A powerful instrument to boost successful entrepreneurial and start up activities is to bring together (potential) founders and experienced entrepreneurs.



## North Rhine-Westphalia – Germany

- One weakness is the lack of financial means for start-ups and company growth. One crucial problem here is that companies prefer loan financing over venture capital financing. It should be discussed in as far measures to promote a more venture capital orientated culture should be put in place. Moreover, building up contacts with potential venture capitalists could be an option.
- The looming shortage of skilled labour could develop to a major obstacle for economic development. Training initiatives, diversity programmes and a “welcome” culture are among the measures aiming to boost the regional potential and increase the attractiveness of the location as a place to work.
- Increasing R&D spending and especially fostering the collaboration between the research sector and industry is a necessity. Potential measures are to stimulate the financial contributions of firms (e. g. within the context of public private partnerships) and to support the relevant actors in the acquisition of EU and federal funds. The ERDF co-financed innovation competitions should be launched again.
- Supporting open innovation processes is important for creating the basis of an open minded innovation area, where new and unorthodox ideas can emerge. One aspect is to include the demand side: Future users of CPS products will increase the “density of ideas” and thus contribute to more innovative and user-friendly products.



### 2.2 Region Øresund

#### 2.2.1 Status Quo

##### 2.2.1.1 Fact Sheet

###### *The region at a glance*

The Øresund region is a transnational region in southern Scandinavia that consists of Skåne on the Swedish side and Zealand, Falster, Møn, Lolland and Bornholm on the Danish side of the Øresund strait, connected by the Øresund Bridge.

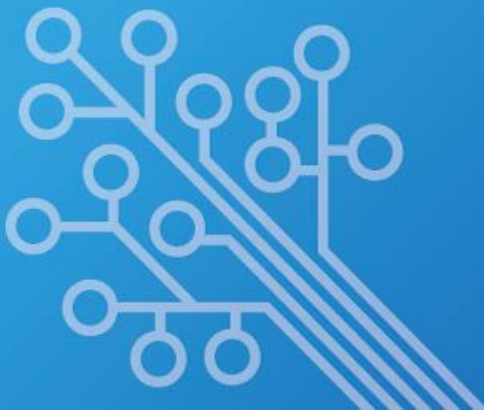
As of 1 January 2010, the population of the region has been calculated to 3.7 million. The annual turnover of the region accounts to EUR 97.4 billion. There are 7 science parks and 165.000 students in the region.

###### *ICT Market*

The ICT sector in Øresund is shaped by the following characteristics

- The region is highly knowledge intensive with the ICT sector playing a predominant role.
- There are about 80.000 people employed in the ICT sector (70% in Greater Copenhagen Area (CPH), 30% located in Skåne) working in close to 8.500 companies (75% located in CPH, 25% located in Skåne). All together they have a turnover of about EUR 22 billion. This means that 7% of the entire workforce works in ICT, generating 23% of the regions total turnover.
- A characteristic for the Øresund ICT region is that most of the R&D is conducted within firms rather than in public institutions. The total number of R&D staff is around 43.000. The ICT sector accounts for more than 13.000 of these. This means that more than 30% of the R&D staff in the region is employed in the ICT sector. In comparison, there are about 700 public ICT researchers in the region.
- By far the largest sector is service and consultancy (61% of workforce); followed by ICT wholesale (20%); Telecommunication (14%) ICT manufacturing (largest 5%).
- There is a VC scene in the region but it seems as it is rather risk averse with firms having trouble raising the needed capital.
- More than 50% of the employees work in a foreign-owned company.
- Big players in the region are: Ericsson, IBM, Microsoft, Axis Communications, Cisco Systems, Telia Sonera.





### *Benchmarks*

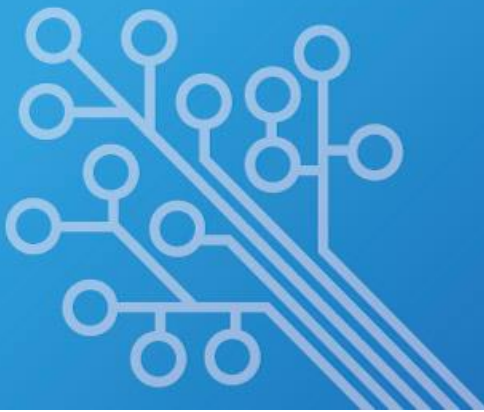
- The Øresund region is among the leading ICT clusters in Europe. It is larger than the better known clusters in Barcelona and Cambridge as well as the neighbouring clusters in Helsinki, Oslo, Hamburg and Berlin.
- According to the most recent Regional Innovation Scoreboard 2012 from the European Commission, Copenhagen and Skåne have been ranked as Innovation Leaders and are renowned for their innovation capacity.
- There is a comparatively high start-up activity of about 1000 start-ups in the region's ICT sector each year.
- TOP 5 ranking in Network Readiness and E-Readiness for Denmark and Sweden. The Technological infrastructure has high level. Internet, mobile- and wireless penetration are above average.
- As compared to metropolitan areas such as London or Ile-de-France, foreign investment is rather low.
- A benchmarking study conducted by the Berlin Institute for Innovation and Technology showed that the cluster organization Cluster 55 outperforms most other cluster organizations within ICT when it comes to matchmaking, building of network etc.

### *Technological competencies*

The following Technological competencies are of the particular relevance for the Øresund region:

- Over all, the regional ICT activities can be characterized by an issue or application driven approach to ICT: Accordingly, firms are particularly strong in topics such as sustainable (smart) cities, e-Health/welfare tech, security, embedded systems for smart products, robotics, sound acoustics, finance and e-government. This application approach reflects the other economic strengths in the region.
- Top research takes place mainly in the following areas:
  - Interdisciplinary Applications
  - Artificial Intelligence
  - Software Engineering & Programming
  - Neural Networks
  - BIG Data
  - Security & Monitoring
  - Software Engineering & Programming
  - Business, Operations Research & Management Science





These Technological competencies reflect the focus areas in the Swedish national agenda to promote innovation through ICT support.

### *Cross-Innovations*

The “issue” or “application” driven approach is a strong indication that the region already follows a cross-innovation approach. Accordingly, the following strong sectors offer the greatest potential for ICT induced innovation and growth:

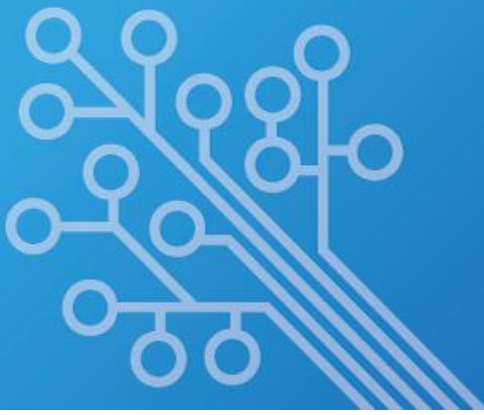
- Health sector  
Already a good part of new ICT start-ups focuses on e-health, telemedicine, welfare technologies and pharma 2.0. The health sector is very large (62 % of all employees in SE/DK) and possesses a strong cluster called Medicon Valley, operating on biotech and pharma.
- Material science  
The European Spallation Source (ESS) will be built in southern Scandinavia as an intergovernmental project with seventeen European countries as partners.
- Smart/sustainable cities  
In the Øresund Region several projects have been carried out. Potential topics are the cleantech sector, building sector, energy sector transport sector etc.
- Finance and security  
More than 15 percent of the new start-ups created in the Øresund region are created within the financial sector
- Food  
Øresund Region has a leading position in Food research.

### *Governance*

The cross-border region has developed specific governance structures: Since 1993, local, regional and national authorities have cooperated in the regional policy forum Øresund Committee. The forum consists of representative of the regions and larger municipalities. Their task is to align (regional) policies. However, they do not have a real constitutive power. A commission of civil servants, the Øresund Commission, handles the day-to-day administrative tasks.

As one result, funding structures continue to be national oriented: On the Swedish side, these are, among others, “The Swedish Research Council”, “Tillväxtverket”, and “VINNOVA”. The main funding organisations in Denmark are the Councils for Strategic Research, Technology and Innovation, Research Policy and Independent Research.

Further problems associated with the cross-border approach are different currencies (Sweden does not have the Euro) and differences in national procurement regulations. Furthermore, growth effects seem to concentrate on the Danish side of the border with the flow of commuters mainly moving from Sweden to Denmark.



The outstanding ICT cluster organization is cluster 55, a successor organization of Øresund IT, founded in 1999. Among the activities of the cluster organization are internationalization, match-making and fundraising. Located at Lund University, the cluster organization characterizes itself as a bridge between businesses and academia, operating as an open arena for innovations within IT and its cross areas.

Further cluster organizations in the regions are

- MediconValley (Life Sciences)
- Copenhagen Cleantech Cluster (Environmental Technologies)

### *Framework conditions conducive to regional innovativeness*

Among the factors supporting regional innovativeness are:

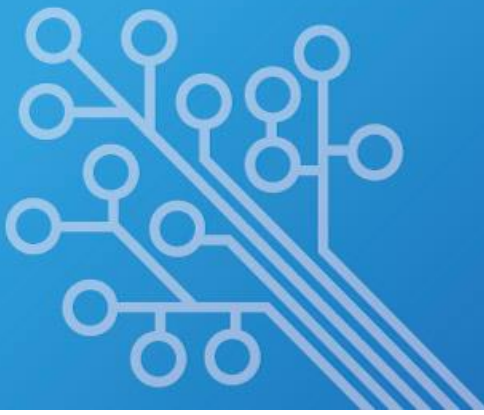
- Skilled workforce, openness for new technologies and new ideas and a well developed technological infrastructure.
- Long tradition as a knowledge intensive region in which innovations such as the Bluetooth, the mobile phone, ultrasound technology, the fiberscope, the telegraphone and the ink jet printer were developed.
- There are good possibilities for start-ups and entrepreneurs to obtain funding for their initial business activities. Support facilities for start-ups include: Inkubator ApS, Nyföretagarcentrum, IDEON incubator, MINC incubator, idelinjen, LINC, Media evolution city, The Orbit, Scion-DTU, CAT Innovation, Accelerace, Vaeksthus Hovedstaden and more.
- Competitive climate pushes firms to innovative work.
- Venture capital environment in the region consists of Business Angels Networks, Venture Capital funds and Capital funds. However, many new ventures are having trouble raising the capital needed for the second phase of a business initiative.

### **2.2.1.2 Smart Specialisation Scenario**

#### *Specialization profile*

The specialization profile of the region is “issue” or “application” oriented, i.e. the ICT sector is considered as an “enabler” in numerous other industries. A particular focus is on smart applications in the fields of

- sustainability (sustainable (smart) cities),
- health/public services (e-Health/welfare tech, e-government) and
- security (e. g. in finance).



### *Market relevance and potential answer to global challenges*

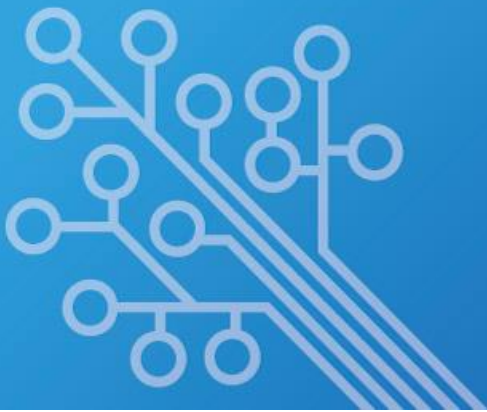
With the three core topics above, the region has the potential to develop solutions to three global challenges that will pave the way for the emergence of new markets:

- Sustainability solutions are needed for example in order to push forward the energy transition or to provide solutions for fast growing urban agglomerations.
- An ageing population, tightened financial limitations of and, at the same time, increased expectations in the services of the health sector require new and smart e-health / welfare tech solutions.
- Civil security is an increased need in a networked world where the supply networks can lead to breakdown despite the robust technologies used.

### *Vision for the future*

**The Øresund Region: An internationally renowned trans-border innovation hub for smart and sustainable society.**

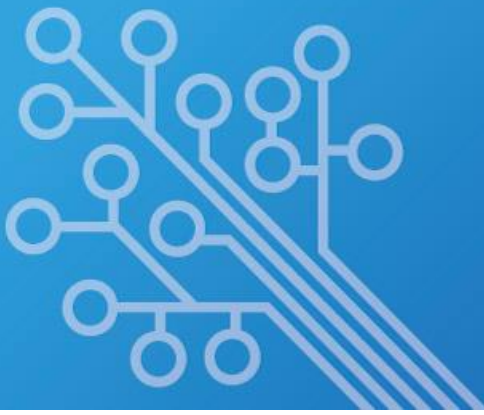
The Øresund Region already is one of the most profiled ICT locations. A strong R&D landscape and an extraordinarily high share of ICT in turnover and employment are the key assets. A vision for the future is to use these capabilities to make the region a laboratory for green, healthy and secure growth.



## 2.2.2 SWOT-profile

Starting from the Status Quo as described above and building on the chances, in particular with respect to further develop the region into a laboratory for green, healthy and secure growth, the strengths, weaknesses, opportunities and threats of the IT sector in the Øresund Region can be summarized as following:

<p style="text-align: center;"><b>Strengths</b></p> <ul style="list-style-type: none"> <li>- Renowned for innovation capacity; ranked as Innovation Leaders since 2007</li> <li>- Highly educated work force → knowledge based industry</li> <li>- Innovation friendly climate → region as a laboratory or test bed for new solutions</li> <li>- Good possibilities for start-ups and entrepreneurs for initial business activities (about 1000 start-ups every year)</li> <li>- High share of international firms → "bridgehead" SME's internationalisation</li> </ul>	<p style="text-align: center;"><b>Weaknesses</b></p> <ul style="list-style-type: none"> <li>- Financial limitations due to risk-aversion in venture capital environment</li> <li>- Cluster organization located in Sweden with Swedish (financial) support. Danish authorities only involved via the Øresund Region governance structures.</li> <li>- Funding support through national institutions; no funding via the Øresund Region.</li> <li>- Full economic integrations hampered, for example through different currencies and procurement regulations.</li> </ul>
<p style="text-align: center;"><b>Opportunities</b></p> <ul style="list-style-type: none"> <li>- Extension of linkages to other strong ICT locations in the Baltic Sea Region (for example within the context of the Baltic Sea Region macro-regional strategy)</li> <li>- Making use of the market chances arising from societal needs such as coping with the energy transition and urbanization, meeting increased demands toward the health system or civil security.</li> <li>- Profiting from a technology friendly attitude by using the region as a test bed or laboratory for advanced ICT solutions</li> </ul>	<p style="text-align: center;"><b>Threats</b></p> <ul style="list-style-type: none"> <li>- Insufficient alignment of national/regional funding policies might impede trans-border project collaboration</li> <li>- Firm growth impeded through insufficient supply of finance.</li> </ul>



### 2.2.3 Recommendations

#### *Developing strengths and opportunities*

- The specific profile of the region should be further developed and made more recognizable.
- A great chance lies in using the region as a test-bed for advanced ICT solutions – perhaps even in a cross-border context (e. g. payment systems for cross-border electro mobility or better linking the health systems in the two neighbouring regions).

#### *Counteracting weaknesses*

- The cross-border orientation offers enormous chances. At the same time, there is still some way to go to come to real economic integration. One possibility might be to come from an alignment of funding systems to a regional support framework (for example a fund that is dedicated to co-finance projects of inter-regional importance).
- The lack of finance is a problem throughout most of the ICT industry in Europe. One solution could be to join forces throughout the Baltic Sea Region to attract foreign capital. By doing so, the region has higher chances to compete with locations such as London or Ile-de-France that, as large metropolitan regions, currently attract an extraordinary high share of foreign capital.

#### **Sources**

**BORDWIIS (2013).** ICT Inventory for the Øresund BORDWIIS-Partner Region, Lund 2013

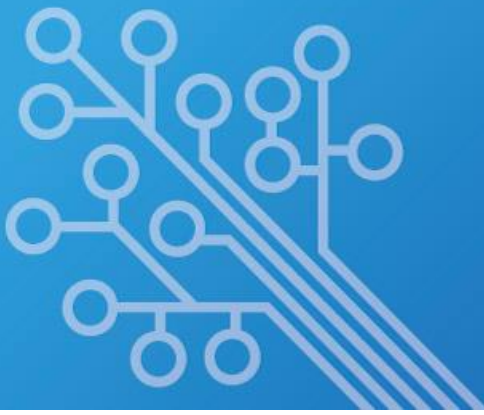
**Hansen and Serin (2010).** Innovation, R&D and education in the ICT sector in the Øresund Region, Roskilde 2010

**Hansen and Serin (2010).** European ICT clusters – an overview of selected ICT clusters in Europe, Roskilde 2010

**Hansen and Serin (2010).** The structure of the ICT cluster in the Øresund Region, Roskilde 2010

**Institute for Innovation and Technology (2009):** Øresund IT Benchmark Report, Berlin 2009

**Kooperation international (2009):** Cluster Kopenhagen / Øresund Region, cluster profile on the BMBF funded international cluster portal



## 2.3 Estonia

### 2.3.1 Status Quo

#### 2.3.1.1 Fact Sheet

##### *The region at a glance*

Estonia has a population of about 1.3 million people<sup>2</sup> and a nominal GDP of about 22 billion EUR<sup>2</sup>. It is bordered to the north by the Gulf of Finland and to the west by the Baltic Sea. It is neighbored by Latvia, Russia, Sweden and Finland (across the Baltic Sea)<sup>2</sup>. The territory of Estonia covers 45227 km<sup>2</sup>.<sup>2</sup>

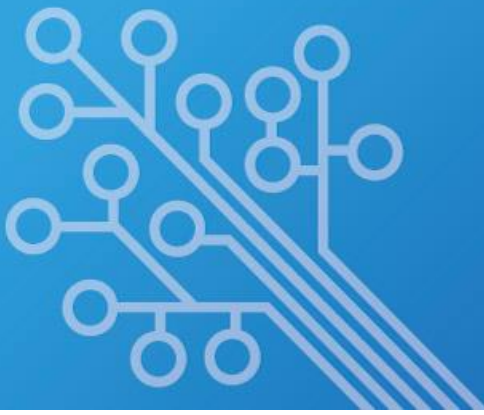
##### *ICT Market*

The ICT sector in Estonia is shaped by the following characteristics.

- About 2400 companies are active in the Estonian ICT sector, contributing to 5% of total sales in business activities in Estonia. Close to 20,000 employees (3% of all employees in Estonia) are currently working in the ICT sector. The total turnover of the ICT sector has increased rapidly over the past three years (2009: 1.6 billion EUR, 2010: 2.0 billion EUR, 2011: 3 billion EUR).
- The Estonian ICT sector is constituted of the following branches:
  - Production of computer and electronic products
  - Information and communication equipment wholesale
  - Software publishing
  - Telecommunication
  - Computer programming
  - Consultancy and related activities
  - Data processing
  - Hosting and related activities
  - Web portals
  - Repairing computers and communication equipment

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<sup>2</sup> <http://en.wikipedia.org/wiki/Estonia>



### *Benchmarks*

- Estonia produces more start-ups per capita than any other country in Europe.
- Patent applications in Estonia are below the EU average. Although there are innovative technologies and R&D players, a significant proportion of R&D players choose to not apply for patents, but keep their inventions secret.
- Estonia is one of the most wired countries in Europe and is recognized as a leader in e-government<sup>2</sup>.

### *Technological competencies*

Estonian ICT companies have had impressive success in the application of new technologies. This can be exemplified by the introduction of online services by Estonian banks in the 1990s, mobile parking payment solutions and location based services. Skype, a VOIP and instant messaging service and software application was developed by Estonian software developers and is another example for innovative products. Furthermore Estonia has been one of the top countries in terms of the accessibility of public e-Services and became the home of the NATO Cooperative Cyber Defense Centre of Excellence in 2008, motivated by a previous successfully defend against a large-scale cyber attack.

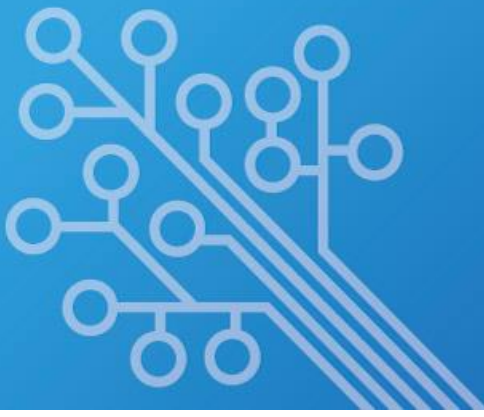
Powerful solutions like e-Voting, e-Health and e-Cabinet originate from Estonia, which is currently a training ground for countries that want to introduce these e-society applications. More than 40 countries around the world apply e-solutions originating from Estonia.

### *Cross-Innovations*

The Estonian existing innovative ICT competences can elevate cross-innovations in the following sectors (result of Estonian ICT foresight EST\_IT@2018):

- Education
- Health care
- Manufacturing
- Energy
- Financial services
- ICT security





### *Governance*

The Estonian Parliament adopted the Research and Development and Innovation Strategy for 2007-2013, which is currently being implemented. Based on this strategy, a National ICT Program for the period of 2011-2015 was approved. The main tasks include:

- raise the quality of ICT area higher education and international competitiveness
- increase the capability of ICT area research and developments
- tighten the cooperation between the state, universities and ICT sector companies;
- increase participation of Estonian universities and companies in international ICT area coop.
- support the practical ICT research and development activities.

In addition, there is support for start-ups by the Government.

### *Framework conditions conducive to regional innovativeness*

There are numerous framework conditions conducive to regional innovativeness. Among the most important are:

- The telecommunications market in Estonia was deregulated in 2001. As a result of early liberalization and intense competition, Estonia has a rather well developed communication network.
- Start-up support by support organizations and foundations that provide informational and financial help for entrepreneurs and start-ups such as the Estonian Development Fund and Enterprise Estonia.
- Increased investment in R&D (2.41 percent of GDP exceeds the EU average of 2.03 percent (2011))

### **2.3.1.2 Smart Specialisation Scenario**

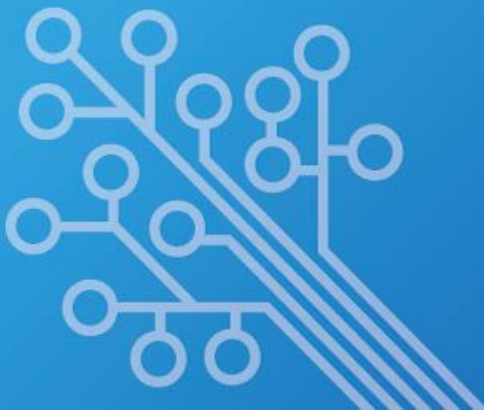
#### *Specialization profile*

The current specialization profile of the region is based on the outstanding competencies in

- development of intelligent user-friendly interfaces
- application of new technologies
- public e-Services

In cooperation with the potential cross-innovation areas of education, health care, manufacturing, energy, location based services and the financial service sector, advanced solutions especially in the mobile sector form the (potential) regional specialization profile.





### *Potential answer to global challenges*

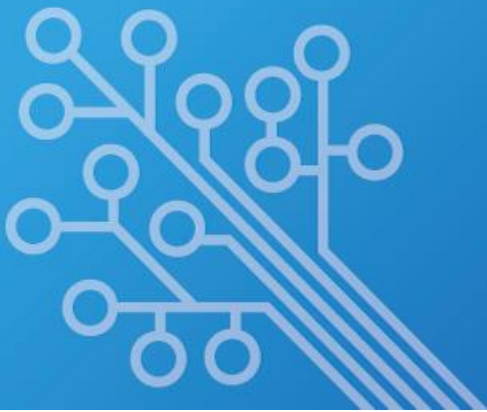
Future applications and advanced mobile solutions offer answers to a number of global challenges:

- **Mobility:** People increasingly ask for holistic mobility services and networked solutions. E.g. cars become communication devices and means of transport are increasingly connected. Apps for intermodal mobility solutions are one possible answer.
- **Ageing population:** The share of older people increases. At the same time, people want to stay as independent as possible. Ambient assisted living devices are one solution.
- **Dynamic Technology and Innovation:** New Innovations will change our lives with increasing pace. Robotics and the internet of things will need applications and user-friendly interfaces.
- **Global knowledge society:** Demand for modern education will increase worldwide. This will require global and mobile access to information and knowledge.

### *Vision for the future*

#### ***Estonia: A renowned location for the development and application of advanced mobile solutions for the service society***

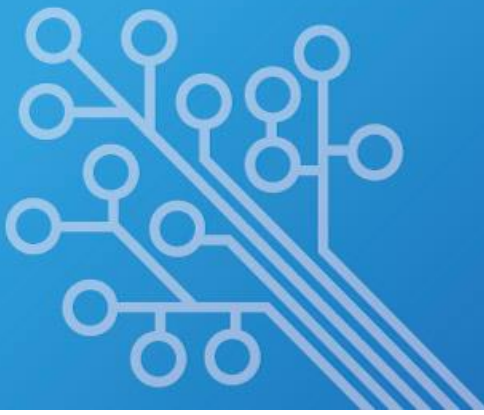
As a competent region for the application of new technologies and public e-Services, high investment in R&D, well developed communication networks and distinct start-up support, Estonia has the chance to connect these competences with service-consuming industries like health, e-government, financial services, education etc. to develop new applications.



### 2.3.2 SWOT-profile

Starting from the Status Quo as described above and building on the chances, the situation in Estonia can be summarized as following:

<b>Strengths</b> <ul style="list-style-type: none"><li>- Clearly recognizable regional profile</li><li>- Well developed communication network</li><li>- High-level research institutes and departments</li><li>- Highest start-up activity in Europe</li><li>- Neighborhood to strong Scandinavian ICT economies</li><li>- Location at the intersection of two trading blocks: EU and CIS</li></ul>	<b>Weaknesses</b> <ul style="list-style-type: none"><li>- Low export quota</li><li>- Industry structure SME-dominated</li><li>- Not enough critical mass for SME landscape to develop international markets</li><li>- Insufficient access to venture capital and financing</li></ul>
<b>Opportunities</b> <ul style="list-style-type: none"><li>- Growth expectations in relation to mobile services, e-government, e-health etc.</li><li>- Fast growing markets in Asia, BRIC</li></ul>	<b>Threats</b> <ul style="list-style-type: none"><li>- Availability of financial resources (financial crisis)</li><li>- Shortage of Human Capital</li></ul>



### 2.3.3 Recommendations

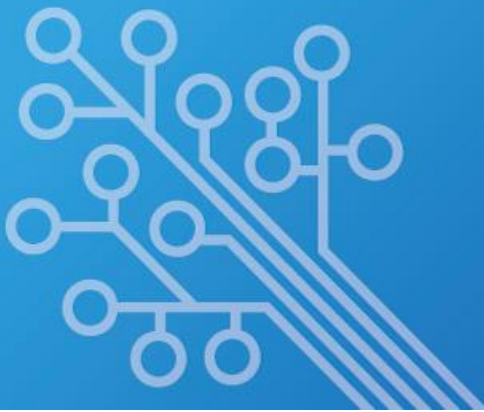
#### *Developing strengths and chances*

- The clearly recognizable regional profile with focus on application of new technologies is an excellent precondition to gain synergies by strategic liaison with service-consuming industries.
- It is crucial to sustain the high start-up activity to find new and markets in relation to mobile services, e-government, e-health where growth expectations are high.

#### *Counteracting weaknesses*

The regional analysis of the ICT Inventory has shown weaknesses in Estonia. Therefore, the following points should be envisaged:

- The existing ICT knowledge as well as the start-up activities should be supported by a “promotion window to the world” to build up contacts with potential venture capitalists and market areas at global scale.
- Support of the SME dominated industry to gain innovative solutions.



### 2.4 Central Hungary Region

#### 2.4.1 Status Quo

##### 2.4.1.1 Fact Sheet

###### *The region at a glance*

The Central Hungary Region is one of the seven statistical regions in Hungary. It includes Budapest and Pest County<sup>3</sup>. In 2010, more than about 600,000 enterprises in Central Hungary employed about 1.2 million people, generating a GDP of about 14 million HUF (ca. 45,000 EUR) – that is 50 percent of state GDP. Central Hungary Region covers 6919 km<sup>2</sup>.

###### *ICT Market*

The ICT sector in Central Hungary Region is shaped by the following characteristics:

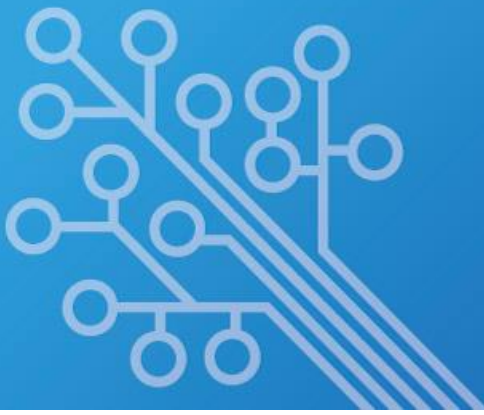
- ICT represents one of the most dynamic sectors of the Hungarian Economy.
- Between 2002 and 2007 the Hungarian ICT market grew by 50%.
- Companies employ 140,000 people in the ICT sector, accounting for 3.37% of the total employment.
- ICT expertise (21% of persons are employed with ICT specialist skills) is predominantly determined by the region's geographical location.
- The Hungarian ICT sector is expected to contribute 5.9 percent to the Hungarian GDP by 2020 (According to analyses, internet is going to create 88,000 new jobs in traditional and creative industries and is responsible for the establishment of further 44,000 undertakings.).
- A number of ICT companies have headquarters in Central Hungary (Microsoft, SAP, IBM, Siemens, CISCO, TATA, Balabit Kft., Satyam, Oracle, T-Systems, Getronics, Samsung, HP, Nokia, GE).
- Currently, the Hungarian ICT market is only partially developed as there is limited space for seed and venture capital investors.

###### *Benchmarks*

- In ICT employment Hungary ranks No. 3 in the European Union.
- On Global Innovation Index Ranking (GII) Hungary represents the 25th position out of 150.
- On European Innovation Scoreboard Ranking Hungary's innovation performance together with the Czech Republic, Italy, Malta, Poland, Portugal, Slovakia and Spain is below that of the EU27 average. Relative Strengths are in Human resources and Economic effects.

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<sup>3</sup> [http://en.wikipedia.org/wiki/Central\\_Hungary](http://en.wikipedia.org/wiki/Central_Hungary)



## Central Hungary Region

- The Global Connectivity Scorecard Ranking states that Hungary has the 23th position ahead of only Poland and Greece.
- Hungary's share of ICT in GDP (5,8 % as compared to 5%) and ICT employment (3,9 % as compared to 2,7 %) above European average.
- In the field of ICT export and import Hungary possesses second position compared to the EU countries (2010).
- Comparatively low ranking in eBusiness readiness.
- Medium rank in e-government indicators.

### *Technological Competences*

*Competences can be observed in the following fields:*

- Many ICT companies with long track records in Hungary have begun relocating research and development activities (HP-Compaq, Nokia, Siemens, Ericson, and SAP).
- ICT expertise is predominantly determined by the region's geographical location closely linked to well-developed infrastructure, transparent legislative framework. Therefore it became increasingly attractive to ICT corporations in the last decade.
- Hungary is an assembly platform for exports by international ICT firms.

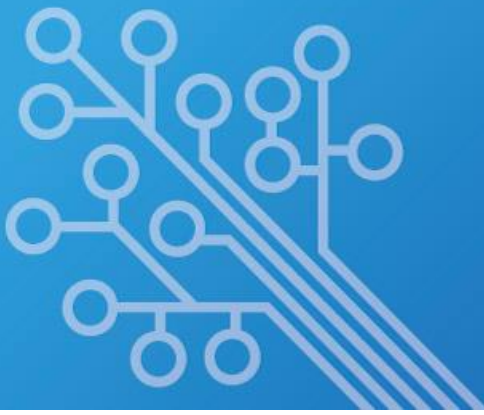
### *Cross-Innovations*

Very strong cooperation between industry (mainly multinational firms) and academia:

- Infopark, Budapest
- Innovation and Knowledge Centre, Budapest
- eScience Knowledge Centre, Budapest
- Oracle Competency Center, Budapest
- CISCO Networking Academy Program, Budapest
- SAP Competency Centre – Budapest Technical College

Potential themes for cross innovations (with a link to clusters in the specific fields):

- Healthcare
- Mobility and Multimedia
- Medical care and prevention



### *Governance*

There are National Programmes and initiatives in support of RDI and ICT

- New Széchenyi Plan (2011)
- National Spatial Development Concept (2005)
- New Hungary Development Plan - ICT priority axis (2007-2013)
- National Research and Development and Innovation Strategy 2020 (at the stage of public consultation)
- Digital Switchover Strategy (2007-2012)
- Digital Renewal Action Plan
- NIS strategy as part of National Security strategy
- Technology platforms and initiatives:  
(eVITA National Technology Platform and NESSI Hungary Software and Services National Technology Platform)

### *Framework conditions conducive to regional innovativeness*

- Hungary shows a certain priority with respect to the support of R&D activities in the ICT sector.
- Good presence of international ICT companies.
- Attractive to ICT corporations due to well-developed infrastructure, transparent and legislative framework.

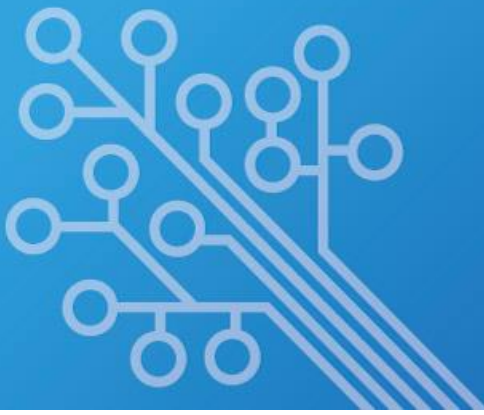
### **2.4.1.2 Smart Specialisation Scenario**

#### *Specialization profile*

The current specialization profile of the region is based on the potential themes for cross innovations:

- Healthcare
- Mobility and Multimedia
- Medical care and prevention

In connection with the geographical location, its well-developed infrastructure and the interconnected support of R&D activities that interact with other technologies.



## Central Hungary Region

### *Potential answer to global challenges*

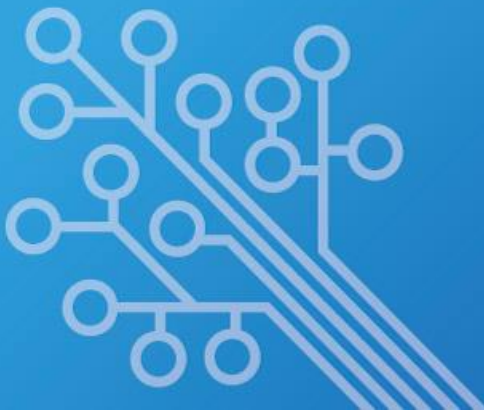
Ageing population: The share of older people increases and leverages the need of diagnosis, treatment, and prevention of disease, illness, injury, and other physical and mental impairments. ICT is a need to deliver quality medicines and technologies.

Mobility: People increasingly ask for holistic mobility services and network solutions. Cars become communication devices and means of transport are increasingly connected. Apps for intermodal mobility solutions are one possible answer.

### *Vision for the future*

#### ***Central Hungary Region: An international R&D Hub with a focus on health and mobility applications***

As a geographical well placed location with well-developed infrastructure and an existing cluster-network and specialization in the fields of biotech, IT, education and knowledge creation, lighting and electrical equipment, pharmaceuticals and transportation and logistics these existing strengths can be utilized.



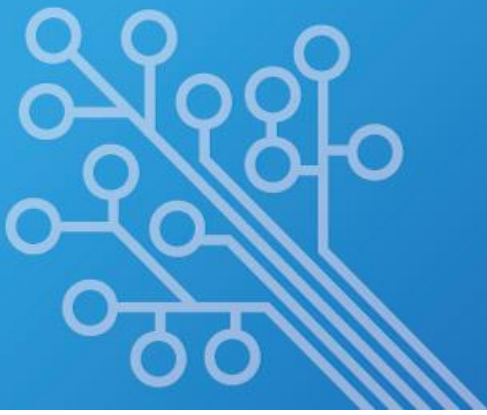
## Central Hungary Region

### 2.4.2 SWOT-profile

Starting from the Status Quo as described above and building on the chances, the situation in Central Hungary can be summarized as following:

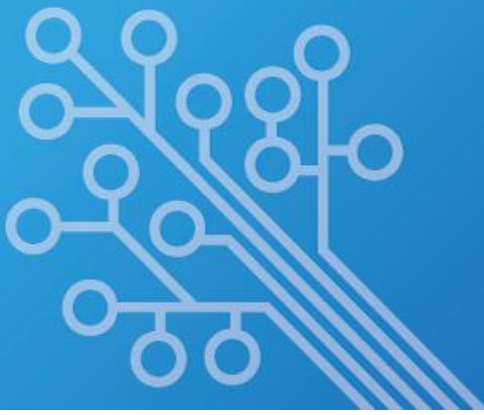
Strengths	Weaknesses
<ul style="list-style-type: none"> <li>- Strong IT sector, also in international/global perspective</li> <li>- Transparent legislative framework</li> <li>- highly qualified IT expertise profile</li> <li>- ICT courses integrated into the primary and secondary education curricula</li> <li>- Competitive wages for ICT experts</li> <li>- favourable clustering experience</li> <li>- global innovational environment</li> <li>- R&amp;D HQs of numerous MNCs based in Budapest</li> <li>- narrow well-connected innovative SME significant FDI attraction</li> <li>- well-developed venture capital sector (owing to the favourable effects of JEREMIE I. and II. programmes on capital funding of start-ups and enterprises in initial phases)</li> <li>- growing business ICT usage well-functioning broadband infrastructure (nearly 100% coverage across the country)</li> </ul>	<ul style="list-style-type: none"> <li>- Currently no specific regional profile identified (Suggestion: ICT for Health and Pharma, Environmental Technologies, Mobility/Automotive)</li> <li>- Low level of active ICT user skills in graduates</li> <li>- Low business expenditures on ICT</li> <li>- weak cooperation between public and private R&amp;D</li> <li>- low expenditure on R&amp;D among SMEs</li> <li>- low capitalization of SMEs</li> <li>- general mistrust against ICT development programmes (e.g. high level of non-eligible costs in the funding model, misinterpretations regarding innovative content of proposals)</li> <li>- no available direct funding resources allocated for start-ups</li> <li>- heterogeneous corporate culture for IT developments</li> <li>- significant regional, social and demographical disparities regarding digital literacy</li> </ul>
Opportunities	Threats
<ul style="list-style-type: none"> <li>- High growth potential in the selection fields of application / cross innovation</li> <li>- Location at the heart of central Europe → well connected both to more western and more eastern neighboring states</li> <li>- growing investor trust towards Hungary</li> <li>- developing mobile communication technologies fastens the spreading of digital literacy</li> </ul>	<ul style="list-style-type: none"> <li>- Stability of political framework conditions</li> <li>- Bottlenecks of education funding</li> <li>- Continuing market relapse Growing migration of qualified ICT workforce</li> <li>- Worsening investment environment, drop in FDI</li> <li>- lasting unfavourable economic climate</li> <li>- brain drain, migration</li> <li>- Liquidity problems of SMEs due to the crisis</li> </ul>





## Central Hungary Region

- Strengthening regional differences in ICT (central region vs. other regions)
- the size of domestic market hinders the successful creation of innovations
- disability of domestic actors to develop on sustainable growth path
- presence of applicants for daily financial survival
- delays in the implementation of E-governance Operational Programme, State Reform Operational Programme programmes



### 2.4.3 Recommendations

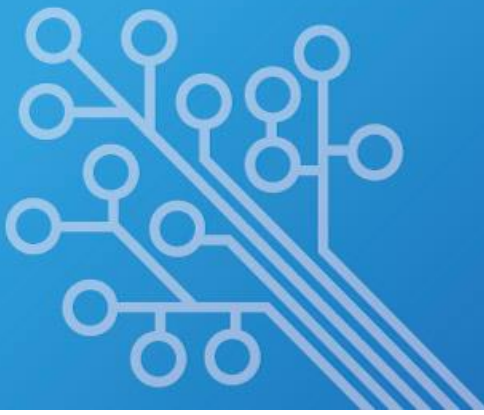
#### *Developing strengths and chances*

- The existing infrastructure for learning and qualifying in the ICT sector is an excellent starting point for the development of an international R&D hub. With highly qualified IT expertise in combination with a base of R&D headquarters of numerous companies being present internationally, the surrounding for a growing ICT sector persists.
- It is crucial to support and develop an innovative SME basis for fast, flexible and creative R&D. Ideally the innovative SMEs will be strengthened and increase in number - especially in the overlap to the application specializations health, pharma and mobility.

#### *Counteracting weaknesses*

The regional analysis has clearly shown that there are weaknesses in the Central Hungary Region. Among them are the current lack of specialization and the low capital base of SMEs. Therefore the following points should be envisaged.

- Start-up funding programmes as well as a platform for the connection between innovative SMEs and start-ups with capital investors should be installed to enable high risk research and application relevant development in a generative surrounding.
- The smart focusing on applications with regional specific strengths should be realized. According to the above described smart specialisation scenario the focuses should be on:
  - ICT for Health and Pharma
  - Environmental Technologies
  - Mobility/Automotive.



### 2.5 Region Asturias

#### 2.5.1 Status Quo

##### 2.5.1.1 Fact Sheet

###### *The region at a glance*

Asturias has a population of about 1.1 million people (2.4 percent of Spain) on an area of 10,604km<sup>2</sup> (2.1 percent of Spain). It is bordered by Cantabria to the east, by Castile and León to the south, by Galicia to the west, and by the Bay of Biscay to the north.<sup>4</sup> As of 2008, the GDP per capita of Asturias stood at 22,640 EUR (90 percent of the European average).<sup>4</sup>

###### *ICT Market*

The ICT sector in Asturias is shaped by the following characteristics:

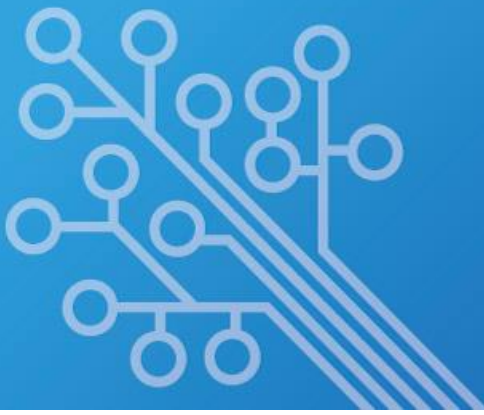
- The ICT business is focused on application development, the provision of operation and maintenance of computer and communication systems.
- With currently 6,106 people employed, the region contributes to 1.4 % of the nation's ICT turnover. Dominant is the Madrid region with a share of about 50%. However: since 2000 the region's share has significantly increased (turnover +100%, while +89% in Spain and 78 % in Madrid region).
- In 2010, 638 firms were counted in the ICT industry. 95 percent of them have less than 10 employees. Therefore a strong role of SMEs is existent.
- The arrival of companies from outside Asturias generated more than 1,662 new jobs.
- On a longer timescale, the ICT sector is growing (employment and turnover doubled between 2000 and 2010); a consideration of the last years, however, shows the opposite trend: turnover and employment decreased since 2007/08.

###### *Benchmarks*

- In the time period 2000-2010, the ICT sector in Asturias doubled employment and turnover and grew faster than the ICT sector in national average. (As mentioned in section ICT market before, the turnover and employment actual decreases since 2007/08.)
- In Asturias about 67.1 percent of all homes are connected to the internet via broadband connection. This percentage is slightly higher than the national average of 66.7 percent.

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<sup>4</sup><https://en.wikipedia.org/wiki/Asturias>



### *Technological competencies*

Particular competences can be observed in the ICT services industry: Programming, consulting and other computer-related activities (58 % of companies), computer repair (25% of companies) are the main activities. The main fields of application are energy, transport, and medicine. ICT manufacturing has limited presence in Asturias.

In a regional workshop the following topics with existing experience have been identified:

- Energy: Diagnosis, predictive maintenance and electric vehicle (smart models, electronics and batteries)
- Transportation: contactless cards (for rail transport), GPS applied to measurements, smart fleet management, RFID applied to airport emergency systems
- Medicine: Analysis of medical image and forensic application.

### *Cross-Innovations*

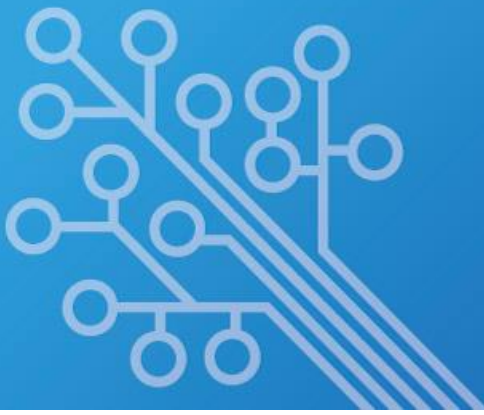
Considering Asturias' profile, there are the following application areas to generate cross-innovations:

**By economic sectors** – Asturias has a strong industrial base (21.78% of the regional economy (2011)) where three branches of activity concentrate more than 82 percent of the turnover and more than 75 percent of industrial employment. The industries are:

- metal industry
- the extractive industry
- energy
- water and waste
- Food, beverage and tobacco industry.

**By markets** – In Asturias the traditional markets agro-food, energy and construction are established and connected with the availability of endogenous resources.

**Public-sector-related** – Furthermore, by the planning of infrastructure, the public sector has boosted the markets of health, environment, transport and logistics and security.



### *Governance*

The support of the administration stands out in physical and knowledge infrastructures, as well as the promotion of the use of new technologies by society, both companies and citizens.

- Since 2004: specific plans for developing the Society of information and the ICT sector, in partnership with all the stakeholders involved.
- Effort of the regional administration to attract investment, offering public aids, spaces and facilitating research and economic activities.

### *Framework conditions conducive to regional innovativeness*

There are the following framework conditions conducive to regional innovativeness:

- Generation of employment by arrival of companies from outside Asturias (more than 1,662 jobs); factors contributing to this: better costs (compared against Madrid, for instance) and the availability of qualified labour force and the proximity to clients.
- Strong collaborative culture.
- ICT start-ups overrepresented in the group of publicly funded start-ups.
- International cooperation: CTIC group: implementation of public policies of the Information Society and Social Innovation; development cooperation programmes through international bodies (transfer of innovation methods, strategies, technological development).

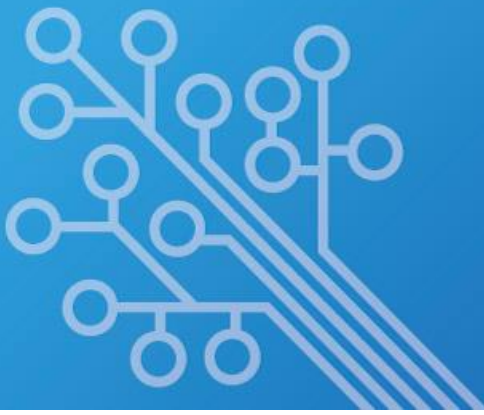
### **2.5.1.2 Smart Specialisation Scenario**

#### *Specialization profile*

The current specialization profile of the region is based on the competencies in ICT services:

- ICT services industry
- Programming
- Consulting

In cooperation with the strong applications in energy, transport and medicine, future solutions are possible. Furthermore, the chance to develop novel ICT solutions by user- and applicant-proximity is given.



### *Potential answer to global challenges*

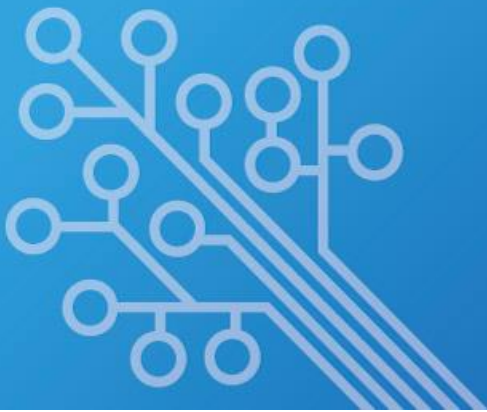
Future ICT solutions can offer answers to number of global challenges:

- **Mobility and Transport:** People increasingly ask for holistic mobility services and networked solutions. User-friendly solutions are indispensable for successful services. High growth rates are expected in these fields of application.
- **Health and medicine:** Solutions for individual care and networked health solutions are the trends of the future and offer huge market potential.
- **Dynamic Technology and Innovation:** Innovations will change our lives with increasing pace. Robotics, Internet of things, will need applications and user-friendly interfaces.

### *Vision for the future*

#### ***Asturias: The region as a test bed for developing advanced user-driven ICT solutions***

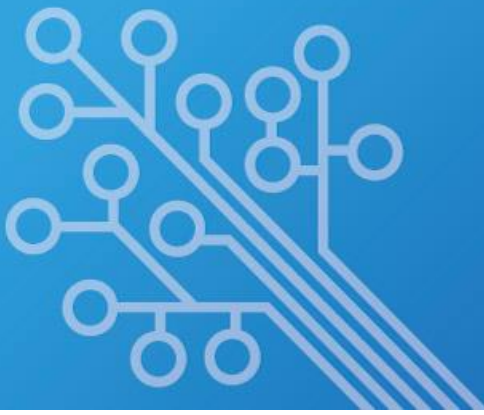
As a competent region for IT services, Asturias has the chance to adopt the user allocated part of development. User friendly Interfaces and handling concepts make the difference between successful and abortive solutions in the future.



## 2.5.2 SWOT-profile

Starting from the Status Quo as described above and building on the chances, the situation in Asturias can be summarized as following:

<b>Strengths</b> <ul style="list-style-type: none"><li>- Focus on value intensive ICT service sector</li><li>- Attractive location for firms outside Asturias to invest in the region: comparatively low cost and well qualified labor</li><li>- Attractive public infrastructure for open innovation</li><li>- Promotion of the use of ICT by companies and citizens</li></ul>	<b>Weaknesses</b> <ul style="list-style-type: none"><li>- Comparatively low profile in national context</li><li>- Under average turnover capita</li><li>- Decreasing turnover and employment since 2007/2008</li></ul>
<b>Opportunities</b> <ul style="list-style-type: none"><li>- Trends toward user-driven innovation, innovation in ICT services and e-government</li></ul>	<b>Threats</b> <ul style="list-style-type: none"><li>- Availability of financial resources (public funding, loans etc.)</li></ul>



### 2.5.3 Recommendations

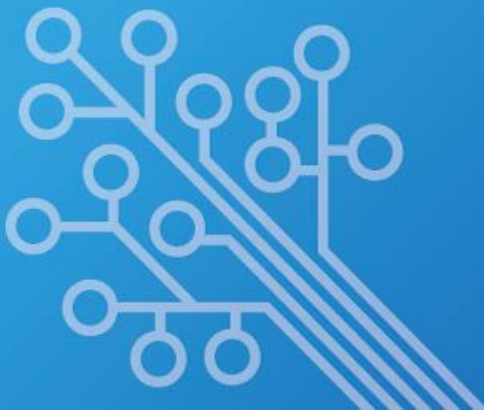
#### *Developing strengths and chances*

- Asturias looks back on distinct experience in open innovation, user innovation. These experiences can be developed to the vision of a test bed for user-drive ICT solutions. Using and applying the intelligence of the crowd offers the opportunity to generate successful future perspective.
- It is crucial to train and educate qualified labor to attract firms outside Asturias for invests, furthermore.

#### *Counteracting weaknesses*

- The main weakness at the moment is the economic downturn, connected with a shrinking public sector and, accordingly, decreasing public support for innovation. This problem cannot be solved on a regional level alone.
- However, there are numerous possibilities that do not necessarily require substantial public financial engagement – for example the organization of matchmaking, aiming at the formation of consortia e. g. within the context of Horizon 2020, or the exchange of experience. The structures that have been created in the BORDWIIS project might be a good starting point for this.





### 2.6 Region Lorraine

#### 2.6.1 Status Quo

##### 2.6.1.1 Fact Sheet

###### *The region at a glance*

Lorraine is one of the 27 regions of France and has a population of about 2.36 million people (2012) and a nominal GDP of 55.4 billion EUR (2011). The territory of Lorraine covers 23,547 km<sup>2</sup> and borders Germany, Belgium and Luxembourg.<sup>5</sup>

###### *ICT Market*

- Lorraine has about 10,000 private structures (companies and production units linked to a company) whereof 2 percent (2,200) can be attributed to the ICT sector (2011). These firms employ about 12,000 people.
- Within the ICT sector, four main groups of activity can be mentioned:
  - Manufacture of electronic equipment (industrial activities)
  - Distribution (retail and wholesale)
  - Telecommunications (services)
  - IT Services
- In the time period 2000 to 2007, about 1,900 private structures were created in ICT sector.

###### *Benchmarks*

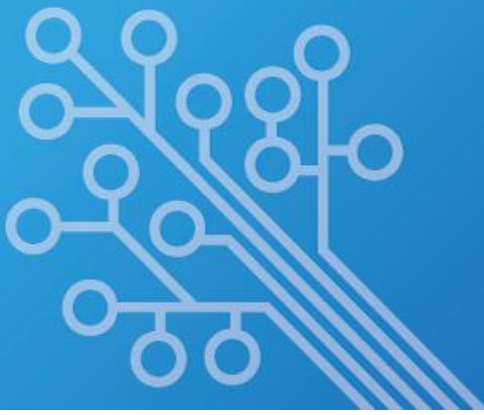
- In the fields of Research in ICT science and mathematics Lorraine is among the top five in France (7.5 percent of national capacity).
- Lorraine's number of firms is lower than the French average (share of ICT firms in all firms 1.4 percent as compared to 2.5 percent in France).
- Lorraine shows relatively low patent intensity as compared to other French regions (top region: Ile de France).

###### *Technological competencies*

Lorraine's Technological competencies within industrial ICT are distributed among manufacturing of electronic equipment (22.8 percent of jobs), distribution /retail and wholesale (9.9 percent of jobs), Telecommunication / services (38.7 percent of jobs) and IT Services (28.6 percent of jobs).

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<sup>5</sup> [https://en.wikipedia.org/wiki/Lorraine\\_%28region%29](https://en.wikipedia.org/wiki/Lorraine_%28region%29)



Additionally, Lorraine represents 7.5 percent of national R&D capacity in ICT and mathematics. The following research institutions have high potential for technology transfer:

- Inria: Institut National de Recherche en Informatique et en Automatique – Nancy - Greater East (fundamental applied research within the fields of science and technology of information and communication (STIC).
- IAEM Scientific centre (information technology, automation, electronics and mathematics) at the University of Lorraine (in link with Inria and CNRS); 350 research professors and 75 researchers with strong presence e.g. within the fields of information technology, systems security and safety.
- IMS: Information, Multimodality and Signal (SUPELEC); 30 people including 15 researchers and teachers- researchers developing expertise in statistical signal processing, digital and symbolic training and intensive computation.
- OPTEL: Optics and Electronics for Telecommunication (SUPELEC); about 20 people including 8 researchers and teachers-researchers are on the physics of lasers, non-linear optics and photorefractive effects for telecommunication applications.
- UMI GeorgiaTech – CNRS; about 30 people including 15 researchers and teachers- researchers are working on secured telecommunication and nanotechnology solutions.

### *Cross-Innovations*

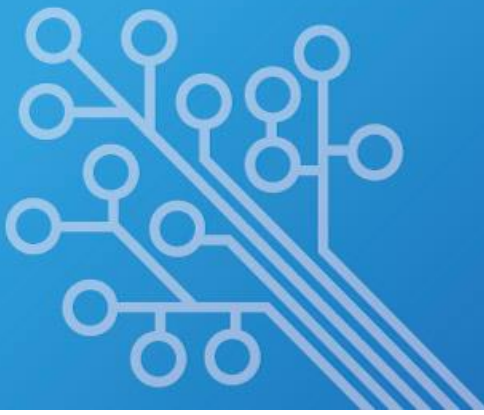
Lorraine has strong application sectors suitable for cross-innovations related to ICT:

- **Health:** Entrepreneurship increased continuously since 2005 with nearly 730 creations in 2011. 82 firms, 3156 employees, 766 million euro turnover. The Health sector is particularly strategic for Lorraine and issues related to its development certainly pass through the transfer of innovative ICT.
- **Security:** The IAEM centre brings together 350 research professors and 75 researchers from the EPSTs; in total, it represents almost 850 people. Strong presence within security and safety, links are also being forged with the SJPEG faculty (legal sciences) relating to issues around rights and information technology, as well as with the CLCS faculty (philosophy of science). Additionally, the near Luxembourg with its strong banking sector demonstrated interest in terms of new markets.

### *Governance*

There are five scientific and technological research poles (PRST) including one PRST dedicated to ICT ("Modelling, Information and Digital Systems"). The financial volume is 7 million EUR during 7 years (2007/2013) for 6 structuring projects:

- Analysis Optimization and Control (AOC)
- Experimentations and Large Scale distributed computing (EDGE)



- Situated Computing (IS)
- Safety and Security Systems (SSS)
- Automatic Language Processing and Knowledge (TALC)
- Biomolecules Modelling and their interactions (MBI)

In 2009, the French State has set up a huge funding program called “Investments for the future” and proposes a global envelop of 35 billion EUR.

### *Framework conditions conducive to regional innovativeness*

With the Lothaire network a high broadband link between higher education and research centres in Lorraine exists. Via the RENATER network, the Lothaire network is linked to the internet. Extension to Luxembourg and Wallonia was done by transborder-cooperation; in a close future, it is expected to be extended to Germany.

### **2.6.1.2 Smart Specialisation Scenario**

#### *Specialization profile*

The current ICT specialization profile of the region is based on the competencies in

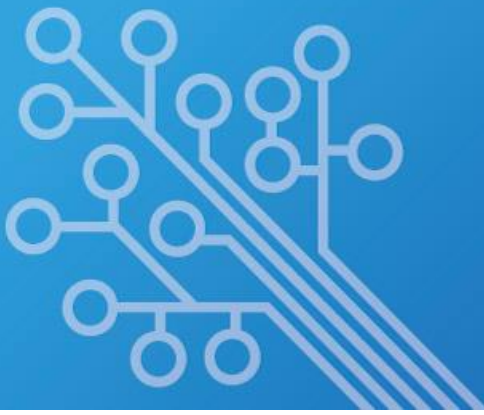
- Applied research within Science and Technology on Automation
- Security and safety of computer/technology systems
- Data, information and knowledge

In cooperation with potential cross-innovation area health, advanced solutions for the future are possible.

#### *Potential answer to global challenges*

With their focus on the two fields of application “health” and “security” the region addresses two societal challenges:

- **Health:** In health research, new or improved, often personalized, diagnostic procedures and therapies are being developed to more effectively help sick people. And new approaches and methods of prevention are being sought help to not to allow diseases to emerge. Medical advances, often incorporating ICT solutions, will also help to reduce costs. Improved living conditions, peace and social security systems in industrialized nations led to a changing age structure of the population. ICT helps to deal with these developments.

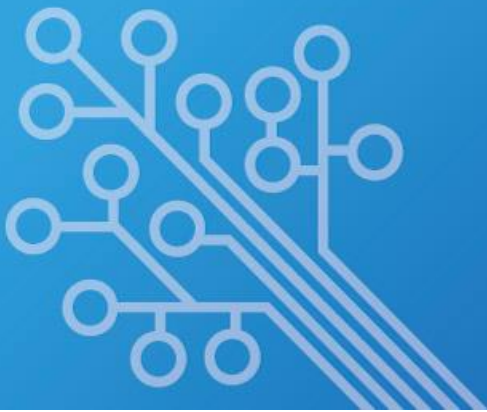


- **Security:** Modern democratic societies increasingly ask for solutions to protect infrastructure from terrorism, sabotage, organized crime, and the consequences of natural disasters or accidents. ICT helps to develop new security solutions to protect critical infrastructures and supply chains.

### *Vision for the future*

#### ***Lorraine: A renowned location for smart ICT solutions in the health care and digital security sectors***

As a competent region for digital safety and security, Lorraine has the chance to connect these competences with the health care sector.

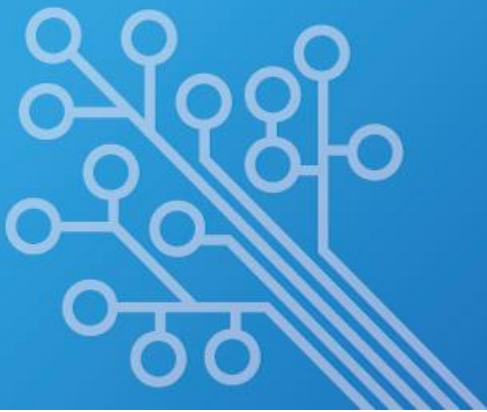


## 2.6.2 SWOT-profile

Starting from the Status Quo as described above and building on the chances, the situation in the targeted cross-innovation themes in Lorraine can be summarized as following:

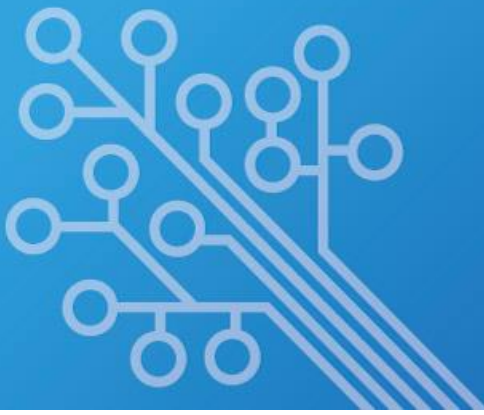
Specific SWOT Profile in the cross-innovation field health:

<p style="text-align: center;"><b>Strengths</b></p> <ul style="list-style-type: none"> <li>- positioning of the Regional Health Authority</li> <li>- support of the Lorraine Regional Council</li> <li>- dynamic Hospital Centre IT policy</li> <li>- creation of University of Lorraine</li> <li>- presence of high-level research labs</li> <li>- structures for research and technology transfer</li> <li>- telemedicine, instrumentation and engineering for health disability and aging</li> <li>- skills in almost all health technology areas</li> </ul>	<p style="text-align: center;"><b>Weaknesses</b></p> <ul style="list-style-type: none"> <li>- deficit of synergy (stakeholders,...)</li> <li>- partnership between SMEs and Research Centres</li> <li>- hospital deficits</li> <li>- no funding to support demonstrations models</li> <li>- difficulties focusing on specific projects and topics</li> <li>- unequal distribution of digital equipment</li> <li>- difficulty obtaining seed capital</li> <li>- limited presence of digital economic sector</li> <li>- moderate start-up-activity</li> <li>- lack of SMEs, SMEs' network and big firms in the field of ICT</li> </ul>
<p style="text-align: center;"><b>Opportunities</b></p> <ul style="list-style-type: none"> <li>- increasing need to use digital resources (ehealth)</li> <li>- young doctors (familiar with ICTs)</li> <li>- legislative and regulatory changes boost the sector</li> <li>- aging of population (development of home care)</li> <li>- innovative projects (GCS Télésanté) Lorraine</li> </ul>	<p style="text-align: center;"><b>Threats</b></p> <ul style="list-style-type: none"> <li>- other French regions have already implemented health ICT strategies</li> <li>- the momentum in other regions and countries</li> <li>- lack of financial incentives</li> <li>- health sector's tendency towards immobilism</li> <li>- no stabilized standards</li> </ul>



## Specific SWOT Profile in the cross-innovation field digital security:

<p style="text-align: center;"><b>Strengths</b></p> <ul style="list-style-type: none"> <li>- original and high-quality academic sector</li> <li>- INRIA / High Security Laboratory (university and research context)</li> <li>- High-level institutional teams in the field of digital safety (SZIG, SGDSN, DGPN, DZRI)</li> </ul>	<p style="text-align: center;"><b>Weaknesses</b></p> <ul style="list-style-type: none"> <li>- Poor knowledge of digital security issues (decision-makers are not concerned)</li> <li>- SME/SMI often too isolated</li> <li>- Shortage of trained people</li> <li>- Weak presence of a digital-related economic sector</li> <li>- Lack of synergy between the parties involved</li> <li>- Lack of expertise and development of what exists</li> </ul>
<p style="text-align: center;"><b>Opportunities</b></p> <ul style="list-style-type: none"> <li>- Promising scientific results (virology and network security)</li> <li>- Potential of interdisciplinary work</li> <li>- Possible synergy with university of Luxembourg</li> <li>- Responsive companies at crossroads of Europe</li> <li>- Growing market (regulations relating to data protect.)</li> <li>- Data center development on Alzette-Belval</li> <li>- Global strategy for construction and sustainable development that takes digital into account</li> <li>- Growing need for training on digital security skills</li> <li>- Obligation of secure personal data (CNIL)</li> </ul>	<p style="text-align: center;"><b>Threats</b></p> <ul style="list-style-type: none"> <li>- Brain and technology drain</li> <li>- Vision too centered on existing business</li> <li>- Academic sector vision too disciplinary</li> <li>- Policy of large invitations for tender</li> </ul>



### 2.6.3 Recommendations

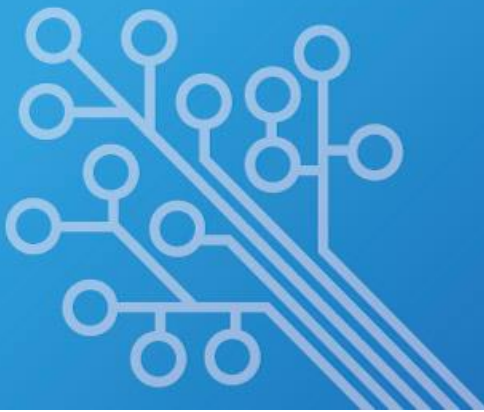
#### *Developing strengths and chances*

- Coordination between actors could be improved, mainly between public and private actors.
- Cooperation in the framework of the Greater Region area, because of the strong potential of transborder cooperation.
- Need of dedicated trainings in order to foster the attractiveness of the territory and to keep talented people in regional SMEs.

#### *Counteracting weaknesses*

- Promote the access to funding and guarantees, especially to facilitate a quick introduction of products on the market.
- Dedicated funding could be mobilized in order to enable the growing of SMEs and to facilitate the commercialization of results from research.
- Select priority projects.





### 2.7 Region South-East Romania

#### 2.7.1 Status Quo

##### 2.7.1.1 Fact Sheet

###### *The region at a glance*

The Region in the South-East of Romania is the second by size among the eight regions of Romania. It includes Braila, Buzau, Constanta, Galati, Tulcea and Vrancea. The region has about 2.8 million inhabitants and covers about 35.762km<sup>2</sup>. The region's economy is rather focused on agriculture and natural resources. The South East Region of Romania earns about 13.10 billion EUR (2010) and disposes an employment rate of 53 percent (2011). Within the region, 1,054 innovative firms are active.

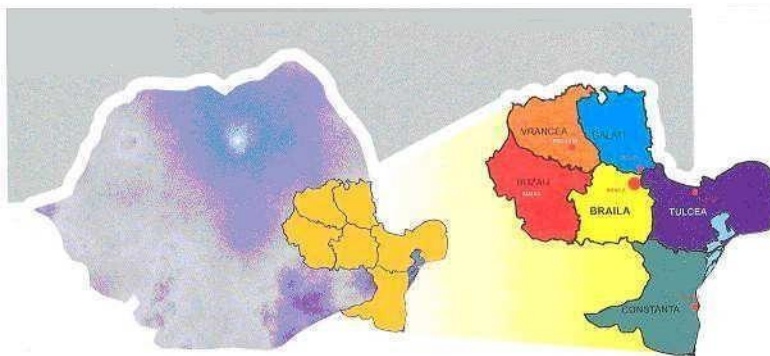


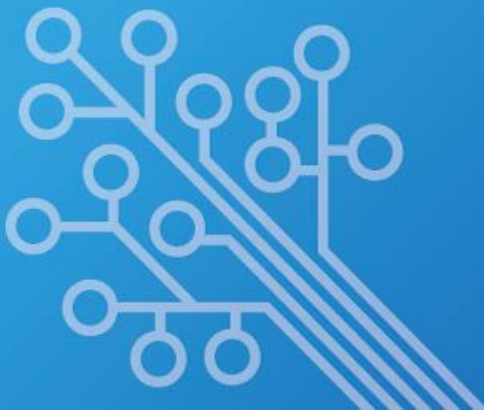
Figure 1: South East Region of Romania

###### *ICT Market*

The ICT sector in Romania is shaped by the following characteristics:

- During the time period 2008-2010, the ICT sector in Romania is characterized by decreasing indicators:
  - decreasing number of firms (-10%)
  - decreasing employment (-7%)
  - decreasing turnover (-3.3%)
- Contribution of the ICT sector to the overall GDP is comparatively small
- The ICT sector in the region achieves a relative high export quota (41 %)
- Low level of collaborative R&D, mainly driven by scientific collaborations and not by firms.





## Region South-East Romania

### *Benchmarks*

- Compared to the European average, Romania has
  - low productivity of the economy in general (50% of European average)
  - low share of innovating companies (25% of EU average)
  - very low number of patents (1% of EU average)
- Compared to other Romanian regions, the south-east shows the lowest percentage of employees in research (0.11 percent).

### *Technological competencies*

The Technological competencies in the field of ICT are constricted to software development and IT services, as well as consultancy and web portal services. Established areas of application are food industry and life product management.

### *Cross-Innovations*

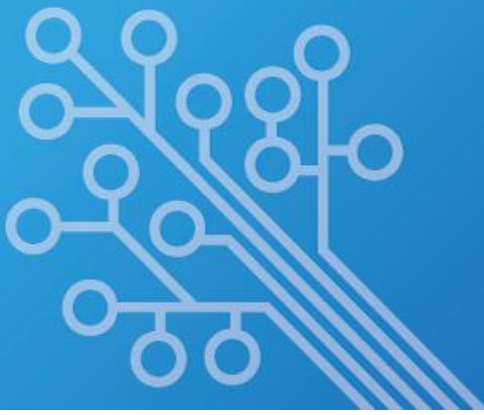
The following sectors are backbones of the regional economy and offer potential for cross-innovation:

- Agriculture (ca. 40% of overall employment)  
(corn, rape, horticulture, fruit trees, wine, animal production esp. goats, pigs and fowls)
- Tourism, logistics
- Many economic fields in Romania are based on natural resources (e.g. wood industry, construction materials)
- Petrochemical industry, metallurgical industry, equipment industry, shipbuilding industry, building materials, textile and garment industry, food industry; mainly processing industry but highly diversified industry often concentrated in the big towns.

The universities in the south-east region have experience in the following fields:

- Lower Danube University from Galati: leading experience in research in food industry and agriculture
- Ovidius University from Constanta: Important research centre for physics and virtual reality studies.

Relevant technological trends are machine-to-machine communication, sensor networks, embedded systems, RFID, cloud computing.



### *Governance*

The government set up a regional ICT strategy with a strategic objective 2015 and initiated, together with local authorities, the Software Park Galati. Additionally, there are two business incubators as well as a favourable legislative framework for R&D infrastructure development.

However, a survey initiated among the main stakeholders unveils that authorities should do more for companies and better appreciate the role of SE RDA in bringing together all the parties.

### *Framework conditions conducive to regional innovativeness*

- Penetration of broadband infrastructure has quickly increased in the last years in Romania; status 2011: 44% have Internet access, 25% have broadband access.
- Romania lacks business infrastructure being able to compete in the national and international markets, especially in innovative and high tech sectors (logistics, equipment, utilities, and space).
- Regional competitive advantages: balanced regional economy, strategic location, high quality of human resources.
- Major economic sectors: ICT, manufacturing, ship-building, agrofood, tourism.

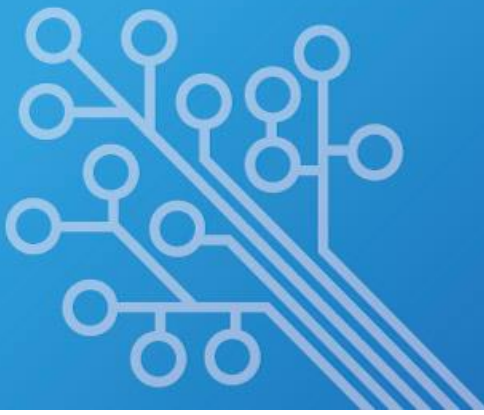
### **2.7.1.2 Smart Specialisation Scenario**

#### *Specialization profile*

The current specialization profile of the region is based on the competencies in software development and ICT service. In cooperation with potential cross-innovation areas like agriculture, (marine) tourism and ship building and logistics, future specialized solutions are possible.

#### *Potential answer to global challenges*

With the specific specialization profile outline above, the region might be able to offer new and sustainable mobility solutions. As mobility patterns are changing, people increasingly ask for holistic mobility services and networked solutions and new markets are developing. ICT plays a predominant role here: The development of information, communication and traffic management systems will help to develop intelligent transport infrastructures. Research on intelligent logistics concepts and the use of mobile services can help drastically reduce resources. Applications in tourism and maritime sector have the potential to profit from and, at the same time, contribute to this trend.

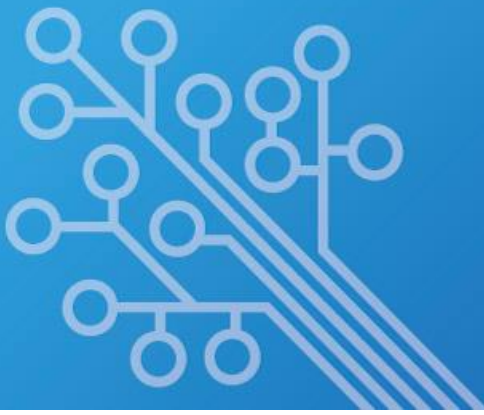


## Region South-East Romania

### *Vision for the future*

#### ***East Romania: ICT for advanced mobility solutions with a specialization on tourism, maritime transport and services (e. g. for the agricultural sector)***

The location is characterized by the service sector and established industries. Existing ICT capabilities can be used to advance the service sector and the established industries. Chances are in connecting services providers, e. g. in the tourism or transport sector.

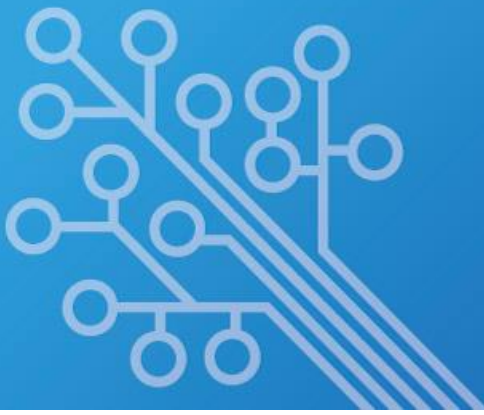


## Region South-East Romania

### 2.7.2 SWOT-profile

...can be summarized as following:

<p style="text-align: center;"><b>Strengths</b></p> <ul style="list-style-type: none"> <li>- geographical position (European and Asian markets)</li> <li>- presence of sustainable transports (railway and ship)</li> <li>- large agricultural areas and fertile soils</li> <li>- well developed diversification and tradition in tourism</li> <li>- highest accommodation capacity in Romania</li> <li>- flexible and qualified labour force (qualification level)</li> <li>- high-structured local administration</li> </ul>	<p style="text-align: center;"><b>Weaknesses</b></p> <ul style="list-style-type: none"> <li>- high transport costs (low accessibility)</li> <li>- safety level (traffic, transport, tourism infrastructure)</li> <li>- low use of renewable energy</li> <li>- high level of population poverty</li> <li>- low productivity in agriculture</li> <li>- low level of quality price relation in tourism</li> <li>- low level of SMEs development</li> </ul>
<p style="text-align: center;"><b>Opportunities</b></p> <ul style="list-style-type: none"> <li>- constitution of Pan-European transport corridors</li> <li>- increase in demand for bio-products / biotech</li> <li>- establishment of industrial areas alongside the Danube-Black-Sea channel</li> <li>- increasing demand for tourism in Romania</li> </ul>	<p style="text-align: center;"><b>Threats</b></p> <ul style="list-style-type: none"> <li>- proximity to highly attractive areas (Moldavia and Ukraine)</li> <li>- growth trend of energy consumption</li> <li>- high risk of natural calamities</li> <li>- inability and delay to comply with EU quality standards (agricultural products)</li> <li>- foreign currency rate fluctuations</li> <li>- competition generated by the foreign tourism areas</li> </ul>



### 2.7.3 Recommendations

#### *Developing strengths and chances*

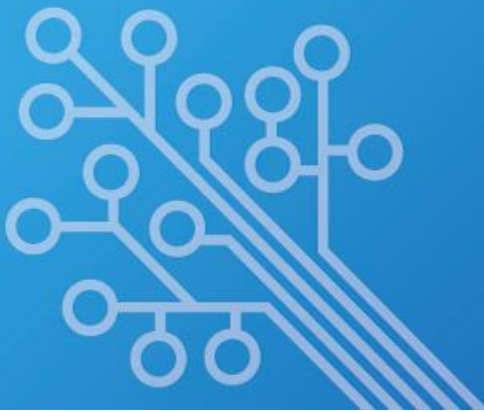
Give innovation support for the sectors tourism and agro-food to develop and unlock the potential of ICT applications:

- Within the agro-food sector, enhancement of competitiveness is possible by using ICT competence to improve access, use and quality of information in the agricultural sector, fisheries and aquaculture (e.g. to gain productivity). Emerging clusters in agriculture, farming & animal husbandry, food & beverages should be supported to initiate partnerships between the sectors: research, private and application.
- Within the tourism industry, enhancement of competitiveness can be initiated, too. It is crucial to come from the well developed and traditional tourism and refine the portfolio with state of the art ICT solutions as additional benefit. Advance in quality- price relation is recommended and can be pushed forward by ICT solutions. The flexible and qualified labor force as well as the existing high accommodation capacity can help to encourage tourism industry. International visibility is an important key to successful development; additional needs should be identified.

#### *Counteracting weaknesses*

The regional analysis has shown that there are weaknesses in the south-east region of Romania. Among them are high transport costs, a low level of safety (traffic, transport, and infrastructure) and a low productivity in agriculture. Therefore the following points should be envisaged:

- Extension and development of programmes to support entrepreneurial activities of university graduates in the cross-innovation related topics. Fruitful, creative and sustainable start-up companies are desirable.
- The low level of safety in traffic, transport and infrastructure potentially constrains the development of tourism. Specific upgrading of infrastructure to strive for safer traffic and transport should be envisaged. ICT might be part of this endeavor.
- The large areas of agriculture show low productivity. ICT solutions and technical upgrade of machinery and organization allow overcoming this weakness.



### 2.8 Region Tuscany

#### 2.8.1 Status Quo

##### 2.8.1.1 Fact Sheet

###### *The region at a glance*

Tuscany has a population of about 3.7 million people (2012) and a nominal GDP of about 106 billion EUR (2008). The territory of Tuscany covers about 23,000 km<sup>2</sup>. Tuscany is known for its landscapes, traditions, history, artistic legacy and its permanent influence on high culture. Tuscany is famous for its wines, is regarded as the birthplace of the Italian Renaissance and boasts museums, as a result. Tuscany has over 120 protected nature reserves, making Tuscany a popular tourist destination that attracts millions of tourist every year.<sup>6</sup>

###### *ICT Market*

The ICT sector in Tuscany is shaped by the following characteristics:

- About 8,581 ICT enterprises are active in Tuscany; most of them are located in the provinces of Florence and Pisa. There is strong public R&D (KETs) but weak R&D activities in the private sector.
- The Italian ICT market decreased in 2010 (-1.4 percent) and 2011 (-4.1 percent) which led to increasing unemployment, especially among females and the young. The main activities in the ICT sector are
  - ICT manufacturing (680 enterprises)
  - ICT service connected to manufactured production (1,653 enterprises)
  - ICT intangible products (6,248 enterprises)

###### *Benchmarks*

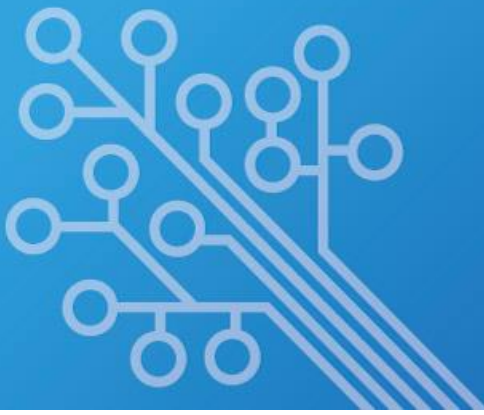
Regarding different disciplines Tuscany ranks as follows in the EU27 group:

###### Science & education:

- Tuscany is No 16 in the EU 27 ranking of regional scientific density (publications).
- R&D personnel in Italy (in full-time equivalent units) amounts to 3.8 per thousand inhabitants and is therefore under the European average of 5.1 per thousand.
- Low numbers of S&T graduates, but gaps between genders are less accentuated in Italy than in many other European countries.

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<sup>6</sup> <http://en.wikipedia.org/wiki/Tuscany>



### Broadband internet

- The use of fixed network broadband connections is in line with the EU27 average.
- The number of internet users is considerably lower than the European average.

### Innovativeness:

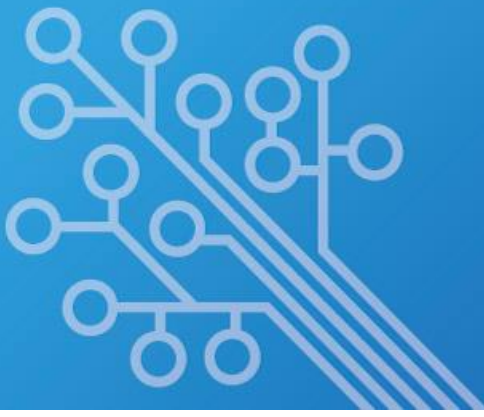
- Number of innovative enterprises is slightly above the European average.

### *Technological competencies*

- Participation in FP 7: Tuscany is particularly strong in health, ICT, nanosciences, new materials and production technologies (i.e. key enabling technologies, KETs); leading regions: Lazio and Lombardy.
- Qualification for three of the six EU-FET-Pilot activities: Robot companions for citizens, IT future of medicine, human brain project.
- There are several KET-related topics Tuscany works on
  - artificial vision, video-surveillance, digital libraries and natural interaction;
  - telecommunications, microwave and wireless systems and applications
  - electronics and microelectronics
  - satellite systems and applications
  - radar and antennas systems and components, radar imaging
  - applications for domotics, robotics virtual reality, haptic interfaces e-health,
  - bioengineering and biomedicine, bioinformatics
  - application for space, nautical, aeronautical and defense sectors
  - technologies, systems and applications for cultural heritage management
  - optical fibers, photonic and laser communication
  - remote sensing and monitoring
  - informatics and software development
  - security-related technologies, systems and applications.

### *Cross-Innovations*

Tuscany's economic system is heavily based on manufacturing. With over 325 thousand workers (27.2 percent of the workforce), manufacturing is the main engine driving the regional economy. Additionally the region is attracts numerous tourists (340,000 workers are employed in hotel and



restaurant business). Both topics – manufacturing and tourism – allow combination with ICT in the future. Further fields that might profit from ICT applications are

- financial and insurance brokering activities and business services ,
- mechanics, leisure boating, automotive and railway transport,
- production linked to ICT, optoelectronics (photonics), medical devices, pharmaceuticals and biotechnologies.

### *Governance*

Governmental driven main axes in the last ERDF period (2007-2013) were:

- Enabling infrastructure, in two distinct types of "technological" and "knowledge";
- E-services, policies for the provision of community services,
- E-communities, political access and participation;
- E-competitiveness policies for sustainable economic development.

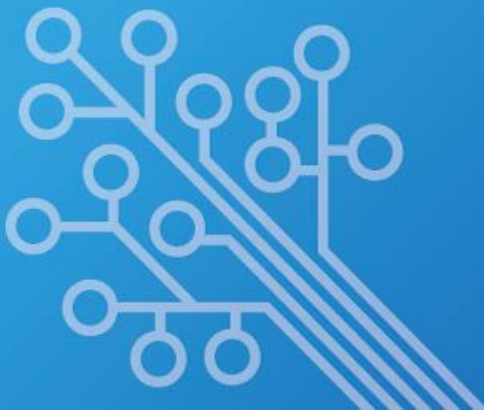
In the next ERDF period there will be particular attention to:

- policies for industry, handicrafts, tourism, trade;
- policies for education, training and employment;
- Policies for culture;
- Policies for infrastructures and mobility;
- Health policies;
- Inclusion policies.

### *Framework conditions conducive to regional innovativeness*

- International visibility due to the exceptional cultural, artistic and landscape heritage (tourist attraction).
- The diversity of topics Tuscany works on enables thematic broad sources for innovativeness.





### 2.8.1.2 *Smart Specialisation Scenario*

#### *Specialization profile*

The current profile of the region is shaped by many sided Technological competencies that show several junctions to manufacturing. In cooperation with the internationally known cultural and artistic profile of the region, these competencies can be further developed and contribute to regional growth in face of the economic crisis.

#### *Potential answer to global challenges*

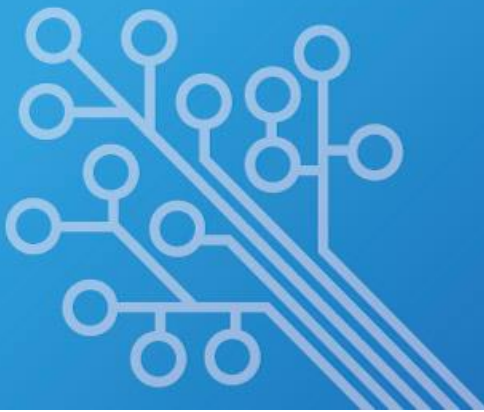
Creativeness, future manufacturing and the combination either offer answers to a number of global challenges:

- Scarcity of resources: Manufacturing strongly depends on primary material. In future several materials run short and have to be recycled. Another possibility is to come back to reparation of damaged or defect assemblies. Current and future innovations in manufacturing help to produce spare parts (cf. Dynamic technology and innovation); know how in creativity and design is required to compose models and innovative approaches.
- Dynamic technology and innovation: Current and future innovations need and bear faster access to prototypes via rapid manufacturing processes with small production batches. 3D printing, scanning and other technologies will be ready in short times and need ICT to generate, develop and administer e.g. models. Creativity is the ingredient which draws the distinction between reproduction and further development.

#### *Visions for the future:*

#### **ICT link up with key enabling technologies to contribute to structural change in the manufacturing sector.**

Tuscany's innovation system can be characterized by the following elements (1) a strong traditional and networked manufacturing sector (2) strong research capabilities in Key Enabling Technologies and (3) a missing link between the two strengths. ICT solutions could contribute to bridge research and manufacturing capabilities and thus structural change in the manufacturing sector that is currently severely hit by the economic crisis.



### 2.8.2 SWOT-profile

...can be summarized as following:

<b>Strengths</b> <ul style="list-style-type: none"><li>- strong ICT sector, linked to, among others, KETs (optical technologies, biotechnology etc.)</li><li>- "Industrial Districts"</li><li>- internationally well-known hub for luxury goods and design</li></ul>	<b>Weaknesses</b> <ul style="list-style-type: none"><li>- low level of firm R&amp;D</li><li>- university-firm interaction still in the process of being developed</li></ul>
<b>Opportunities</b> <ul style="list-style-type: none"><li>- use the region's international reputation to expand into new, fast growing markets (mobility, health)</li><li>- current crisis as a catalyst for ICT induced structural change esp. in the manufacturing sector</li></ul>	<b>Threats</b> <ul style="list-style-type: none"><li>- availability of financial resources (public funding, loans etc.)</li><li>- systemic disintegration in the manufacturing sector due to economic crisis</li></ul>

### 2.8.3 Recommendations

#### *Developing strengths and chances*

- The identified strengths in manufacturing and creative surroundings are an excellent starting point for a structural change towards future manufacturing.
- It is crucial to develop innovativeness from present creativity paired with technological competence. The region is able to give impulses to the development of new international trends due to its international reputation and framework conditions.

#### *Counteracting weaknesses*

- Current private investments in research and development are insufficient and have to be increased. Without adequate public support (e. g. with respect to attractive loans etc.) it will not be possible to develop internationally competitive R&D structures.
- One weakness is the lack of interaction between universities and firms. (Collaborative project) funding for SMEs and creative start-ups fosters the generation of creative and forward-looking enterprises.

### 3 Comparative Analysis between the Regions

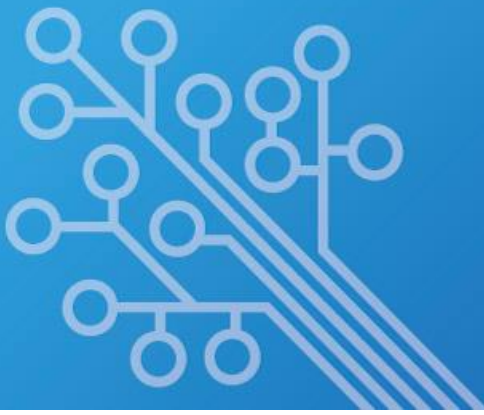
#### 3.1 Regional diversity

The regions in the BORDWIIS project differ with respect to size, economic strengths, competencies and capabilities. These differences, at the same time, very well illustrate the Smart Specialisation Approach that is built on the core assumption that regions are different and that this difference is an asset for all regions. The "Guide to Research and Innovation Strategies for Smart Specialisations (RIS 3)" outlines how the regional profile influences regional innovation strategies (see Figure 2). Three types of regions – knowledge hubs, industrial production zones and non S&T driven regional economic systems – with several sub-categories are distinguished and corresponding strategic orientations suggested: building on current advantages (science-push, technology-led or a mix), supporting socio-economic transformation, catching-up (towards the creation of knowledge-based capabilities).

Type of region	Main strategy		
	Building on current advantages (science push/technology-led or a mix)	Supporting socio-economic transformation	Catching-up: Towards the creation of knowledge-based capabilities
<b>Knowledge hubs</b>			
Knowledge and technology hubs	●	○	○
Knowledge-intensive city/capital districts	●	○	○
<b>Industrial production zones</b>			
S&T intensive production regions	●	○	○
Skill intensive regions	●	●	○
Medium-tech manufacturing and service providers	○	●	○
Traditional manufacturing regions	○	○	●
<b>Non-S&amp;T-driven regional systems</b>			
Service-led and natural resource-based regions	○	○	●
Structural inertia or de-industrialising regions	○	●	○
Primary sector intensive regions	○	○	●

Legend: ● main priority; ○ strategic choice; ○ low priority.

Figure 2: Innovation strategies for different types of region according to knowledge intensity;  
Source: OECD (2011), *Regions and Innovation Policy*. OECD Publishing, Paris

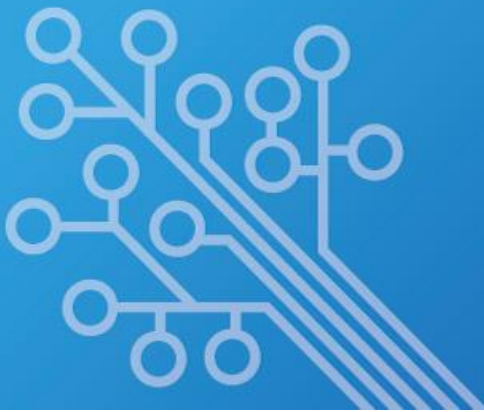


## Regional diversity

Following this systematic, the regions participating in the Bordwiis project might be characterized as following:

<b>Name of region</b>	<b>Type of region</b>
North Rhine – Westphalia – Germany	Science and Technology intensive production region
Øresund Region – Denmark & Sweden	Knowledge and technology hub
Estonia	Knowledge and technology hub
Central Region - Hungary	Knowledge intensive city/capital districts
Asturias - Spain	Skill intensive region
Lorraine - France	Science and Technology intensive production region
South-East Region - Romania	Medium tech manufacturing and service provider
Tuscany - Italy	Skill intensive region

From this classification follows that the analyzed regions will both build on existing strengths and will most probably also follow strategies for socio-economic transformation. Accordingly, the smart specialisation scenarios (see section 3) take both perspectives into account.

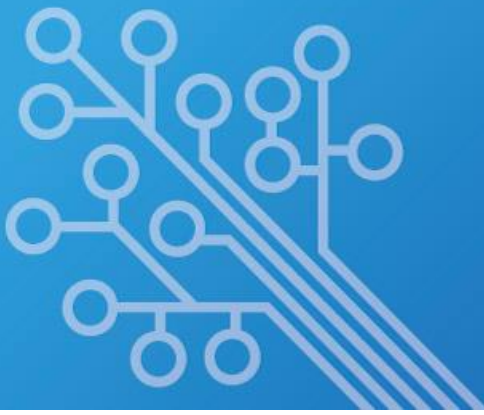


## Smart Specialisation Scenarios

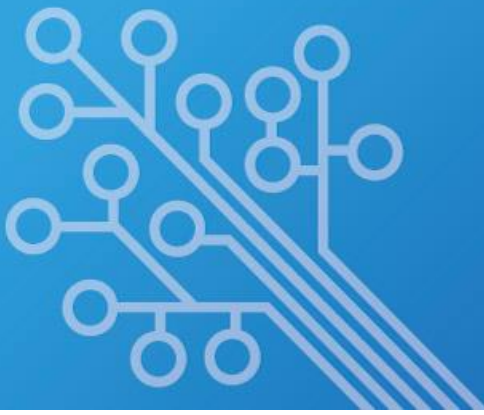
### 3.2 Smart Specialisation Scenarios

For each region, the scenarios describe a vision and aims concerning its future development. Factors that have been considered in the scenarios are the type of the region, specific current strengths as well as the future potential. Particular attention was laid on the aspect of “cross-innovation” - fields of application of ICT with a high growth potential.

Region	Smart Specialisation Scenario	Strategy recommendation
North Rhine – Westphalia – Germany	Renowned location for the development and application of cyber physical systems	As a strong R&D location that builds on its production assets, the region has particular chances in connecting its ICT capabilities with the production sector. Thus, the existing strengths can be utilized to contribute to economic transformation in the region.
Øresund Region – Denmark & Sweden	The Øresund Region – an internationally renowned trans-border innovation hub for smart and sustainable society.	The Øresund Region already is one of the most profiled ICT locations. A strong R&D landscape and an extraordinarily high share of ICT in turnover and employment are the key assets. A vision for the future is to use these capabilities to make the region a laboratory for green growth.
Estonia	Advanced mobile solutions for the service society (health, e-government, financial services, education)	As a competent region for the application of new technologies and public e-Services, high investment in R&D, well developed communication networks and distinct start-up support, Estonia has the chance to connect these competences with service-consuming industries like health, e-government, financial services, education etc. to develop new applications.
Central Region - Hungary	An international R&D hub with a focus on health and mobility applications	As a geographical well placed location with well-developed infrastructure and a existing cluster-network and specialization in the fields of Biotech, IT, Education and knowledge creation, Lightning and electrical equipment, Pharmaceuticals and Transportation and logistics these existing strengths can be utilized.
Asturias - Spain	The region as a test bed for developing advanced user-driven ICT solutions.	As a competent region for IT services, Asturias has the chance to adopt the user allocated part of development. User friendly Interfaces and handling concepts make the difference between successful and abortive solutions in the future.
Lorraine -	A renowned location for	As a competent region for digital safety and



France	SMART ICT solutions in the health care and digital security sectors	security, Lorraine has the chance to connect these competences with the health care sector.
South-East Region - Romania	ICT for advanced mobility solutions with a specialization on tourism, maritime transport and services (e. g. for the agricultural sector).	The location is characterized by the service sector and established industries. Existing ICT capabilities can be used to advance the service sector and the established industries. Chances are in connecting services providers, e. g. in the tourism or transport sector.
Tuscany - Italy	ICT link up with key enabling technologies to contribute to structural change in the manufacturing sector.	Tuscany's innovation system can be characterized by the following elements (1) a strong traditional and networked manufacturing sector (2) strong research capabilities in Key Enabling Technologies and (3) a missing link between the two strengths. ICT solutions could contribute to bridge research and manufacturing capabilities and thus structural change in the manufacturing sector that is currently severely hit by the economic crisis.



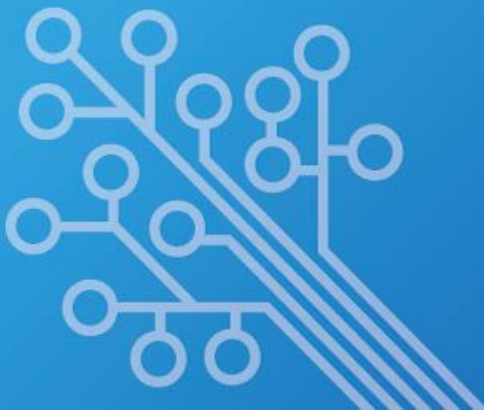
## Framework conditions conducive to regional innovativeness

### 3.3 Framework conditions conducive to regional innovativeness

While “hard” technological competencies have been at the core of the comparative study so far, there are also numerous “soft” factors conducive to regional innovativeness. Following their detailed discussion in the different chapters on the regions, they can be categorized and summarized as following:

- Strong economic sectors that will profit from cross-innovative activities with the ICT sector
- Competencies in other high tech sectors and key enabling technologies, allowing for the development of high tech systems
- Funding programmes taking into account the specific needs of the respective regional innovation system (e. g. financial support for SME, start- up funding, bringing together science and industry, allowing for test-bed and demonstrators etc.)
- Access to finance (e. g. supportive venture capital environment, loans for SME etc.)
- Existence of support facilities such as helpdesks, incubators, living labs etc.
- Existence of (cluster) organizations as an interface between public bodies and regional actors (firms, research institutions, financial institutions, etc.); the crucial success factor seems to be that these organizations are well accepted both in the world of public bodies and the worlds of research, economy etc.
- Attractive living conditions (cultural heritage, natural assets, etc.)
- Skilled workforce and favourable cost structure (e. g. rent for office buildings, costs of living etc.)
- Positive attitude toward new technologies
- ICT infrastructure (broadband infrastructure, internet access) and information literacy of the population
- Competitive climate within the region AND collaborative culture (“coopetition”)
- Presence of international ICT companies and their R&D departments as a “signal” for favourable framework conditions that might attract further investors.





## Potential for cooperation and further exchange of experience

### 3.4 Potential for cooperation and further exchange of experience

One core element in the analysis of the regional profiles was the identification of potential for cooperation and exchange of experience. Two aspects have been considered in this:

- Collaboration in thematic (R&D; innovation) projects
- Deepen the exchange of experience between the regions with respect to current challenges and future instruments.

A first list of potential topics for collaboration has been presented at the milestone meeting in Tartu. The discussion of these findings in the project group revealed that there is a general interest in continued collaboration. However, there appears to be a need to learn more about the terms and conditions. Accordingly, in the telephone interviews with the project partners this aspect has been addressed as well. These interviews have shown, however, that this aspect requires further discussion both internally on the side of the project partners as well as on project level. One aspect that has been made explicit in the discussion is that there is a perceived “gap” between the partner regions in the old member states and those in the new ones.

Before this background and to give a sound basis for further discussion, a list of potential topics for collaboration is given. Moreover, we outline implementation scenarios. By doing this, we also address the question of how to better link regions in “old” and “new” member states.

#### *Thematic cooperation potentials*

By comparing the specific profiles of the regions and the supposed smart specialisation scenario the following potential topics for cooperation have been identified:

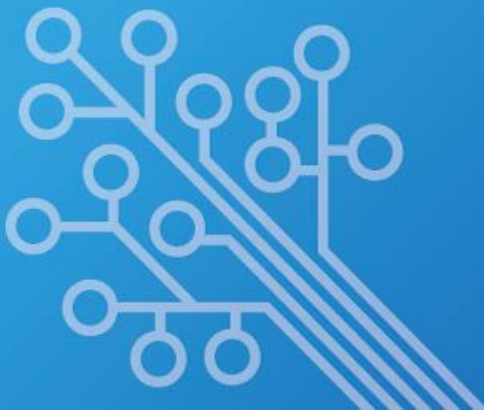
- Development of smart mobility solutions (connected car, traffic management solutions, intermodal transport solutions; also with a view on tourism)
- Linking ICT and production technologies (“cyber physical systems”, industry 4.0)
- ICT Solutions in the health sector
- Digital security and cyber defense
- e-government and innovative public procurement
- e-learning.

#### *Exchange of experience*

Especially with a view on the SWOT analyses and the identified weaknesses and needs for actions, the following topics for a continued exchange of experience are suggested:

- Measures to develop the labour force (qualification, attraction of talent)
- Innovative support schemes in times of austerity policies (financial instruments, incentive schemes etc.)





## Potential for cooperation and further exchange of experience

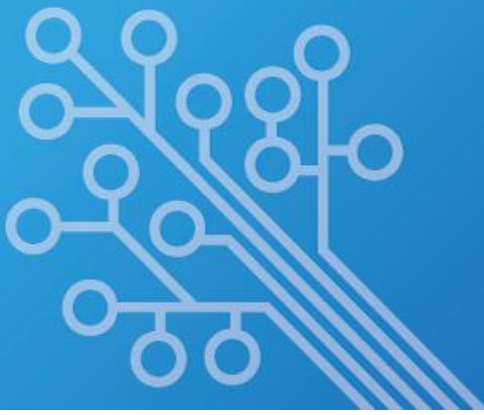
- “Scaling-up” of SME’s (access to finance, absorptive capacity, market development, etc.)
- Resource efficiency in the ICT sector
- Norms and standards (e. g. in production, the health sector etc.)
- Open innovation

### *Implementation scenarios and sustainability of the Bordwiis network*

- Flexible, need oriented cooperation: The potentials for cooperation presented above are an offer to the participating regions. Regions will not be obliged to participate; flexibility means that regions can choose according to their needs. New topics may be added over time.
- Cooperation framework: We suggest that one or more project partners take the lead as a moderator of continued activities. This involves, among others, the continuous monitoring of topics, invitations to joint activities (see below) and strategic information, e. g. about upcoming funding opportunities. In the ideal case, the cooperation framework is based on a MoU (for a template see ANNEX 1).
- Information platform: By using already existing resources (e. g. Basecamp or working groups on linked-in), information about recent developments and need for support can be exchanged. Experience has shown that such an information platform needs an “animator”. This could be one of the tasks of the moderator of the informal network (see above). If there is a specific interest of a relevant number of partners in one topic, a (virtual or physical) working group might be established to exchange experience and further identify possibilities of cooperation. One possibility would be to organize an annual “BORDWIIS Day” within the framework of which the partners meet and discuss a specific topic of joint interest.

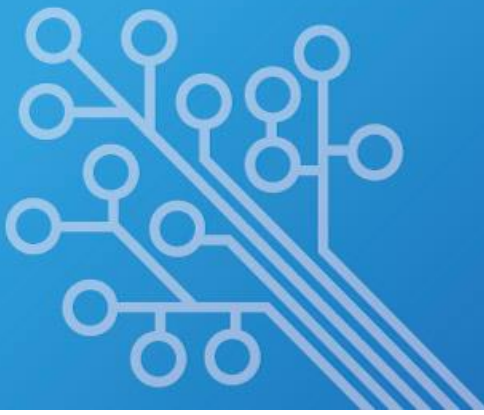
It is expected that in the future interregional cooperation programme (successor of INTERREG IVc) so called Mainstreaming Projects can be funded. These are interregional cooperation projects which allow partners to work together on a shared regional policy issue in the fields of R&D&I, SME and CO<sub>2</sub>-reduction/resource efficiency. Mainstreaming projects are suggested as one potential source of funding to continue BORDWIIS’s activities in a systematic and structured way.

- Projects: The analysis of the different regional profiles has demonstrated that there is a potential for joint R&D&I projects. Especially within the context of the upcoming Horizon 2020 programme there will be funding opportunities. Collaborating in projects means:
  - Project partners continuously monitor calls, for example in Horizon 2020.
  - As soon as a promising call is published a decision will be obtained whether a project proposal shall be envisaged.



## Potential for cooperation and further exchange of experience

- It will be the task of the project partners to stimulate a project partnership. That means to mobilize potential partners and support them to form a project consortium.
- It is not expected that the project partners themselves are involved in the realization of R&D&I projects! This means that there will be no financial or in-kind obligations.
- However, it might be considered to support the project, e. g. through communication, dissemination activities etc.
- Linking regions in “old” and “new” member states: A number of tools have been developed to bring together actors from different regions and thereby to strengthen capacities in regions in the new member states. Examples are teaming and twinning activities and so-called “ERA-Chairs”.



## Potential for cooperation and further exchange of experience

### 4 Conclusion

In April 2013, the Smart Specialisation Platform in Seville organized a workshop on Priority Setting and Collaboration in Information and Communication Technologies (for a report please see [http://s3platform.jrc.ec.europa.eu/documents/10157/130815/Report\\_Pilot\\_WS\\_Priority-setting\\_ICT\\_10June2013\\_FINAL.pdf](http://s3platform.jrc.ec.europa.eu/documents/10157/130815/Report_Pilot_WS_Priority-setting_ICT_10June2013_FINAL.pdf)).

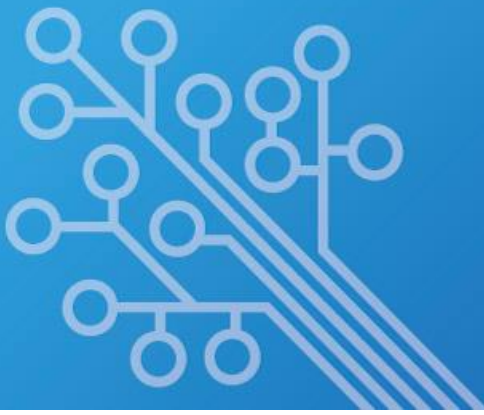
It was the aim of this workshop to bring together regions working on ICT Smart Specialisation Strategies. The outcome of this workshop very much reflects the results developed above.

In particular, this study revealed that, in most cases, regional ICT strategies focus on the transformative potential ICT have on other – often well established industry – sectors. Strategies that focus on pure ICT value chains are the exception rather than the rule. This result is also one core message of the present study.

A second aspect that the Seville workshop discussed in more details was inter-regional collaboration with the aim to better understand the needs of other regions and to find partners to work with. Results are congruent with those of the present study but also go beyond:

- Thus, for example, it has been discussed whether within the framework of a network of ICT regions some regions might serve as European “test beds” for technologies being developed by partners within in the network.
- A second aspect that was mentioned was “open data”. Here the idea was to make these data available to all partnering region. One prerequisite for this would be inter-operability.

One point of the discussion was the impulse to the formation of such a European network and its funding. Concerning both points a role of the European Commission has been expressed. With respect to funding, INTERREG funding and the alliance model (PPP platform models) have been discussed. However, several partners expressed the need of dedicated money to the specific purpose of networking among European ICT regions. Before this background, a continued BORDWIIS consortium as outlined in chapter 3.4 might have the chance to become a “role model” for the development of such a European network. Developments on the level of the European Commission should be observed.



## Potential for cooperation and further exchange of experience

### 5 APPENDIX: Template „MEMORANDUM OF UNDERSTANDING on the continuation of the BORDWIIS network“

This Memorandum of Understanding represents an *agreement* between the participating BORDWIIS partners, whose signatures are appended hereto for the establishment of a BORDWIIS network that comes into place after the phase during which the BORDWIIS project was funded by the European Commission.

#### 1. OBJECTIVE AND GOALS

1.1 BORDWIIS has been funded under the European Commission's INTERREG IVc scheme for the period xxx to xxx. It has been the aim of BORDWIIS, to create a sustainable network of regions that helps them to boost their development with smart specialisation strategies and achieve goals which will make everyone's life better.

1.2 It is the objective of this Memorandum of Understanding to maintain a sustainable cooperation of the project partners collaborating in BORDWIIS beyond xxx by forming a BORDWIIS network without establishing any new organisation structures.

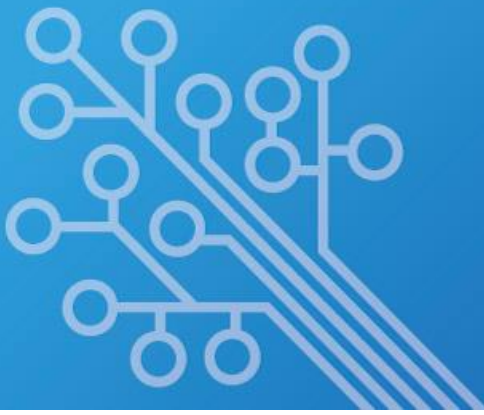
1.3 This cooperation shall be mainly leveraged through the maintenance and enhancement of existing networking activities that are considered both desirable and beneficial to all partners on an on-going basis.

#### 2. ACTIVITIES

2.1. The partners agree to continue the following activities:

- a) Maintenance of a contact network: The partners agree to regularly inform all partners about contact changes both on the organisational and personal level. To this aim a web 2.0 community on LinkedIn has been created.
- b) Continuation of the exchange of information: The partners agree to regularly inform the BORDWIIS network about relevant ICT related news and activities. They can do this via the project platform "Basecamp" or through the above mentioned web 2.0 community.
- c) Provision of mutual support in tools related to ICT programme management: A mechanism has been established to support partner search.
- d) Maintaining a joint learning process through thematic meetings/workshops on CRC related issues: In order to keep the network alive, at least one workshop on CRC related issues per year is foreseen.

2.2. The partners express their will to contribute to these activities. However, the participation in activities such as BORDWIIS workshops is not compulsory.



## Potential for cooperation and further exchange of experience

### 3. MANAGEMENT OF THE NETWORK / MECHANISMS OF COOPERATION

3.1. The overall management of the BORDWIIS network will be shared by xxx and xx who will be conjointly responsible for the administration and animation of the network. Joint activities shall be agreed upon by the Partners at the beginning of each working year. Based on the suggestions of the partners, the overall management will provide annual work plans).

3.2. In any case when a decision is needed by the Partners an electronic voting mechanism shall be used. Each duly signed Partner of the BORDWIIS network shall have one vote and a decision is valid if the simple majority of the Partners participating in the voting agree with it (i.e. this means 50% of the partners voting + one). A unanimous decision (of the Partners voting) is needed in the following cases:

- enlargement of the network (entry of a new Partner)
- changes in the Memorandum of Understanding
- changes in the overall management of the network
- acceptance of the (yearly) work plan.

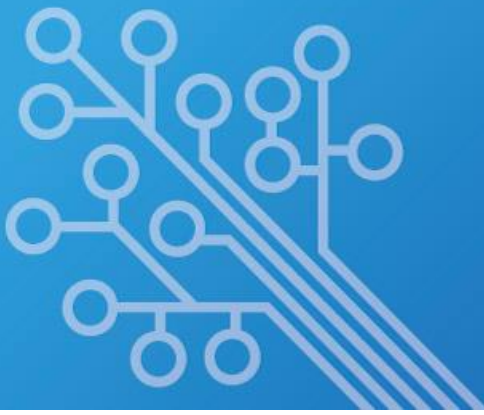
3.3. New Partners can be proposed by each Partner or can apply at the lead partner for inclusion into the network on their own. New Partners will be requested to sign the Letter of Engagement. After signing the Letter of Engagement the rights and responsibilities of the New Partner will be equal to those of all Partners.

3.4. After the initial duration of the agreement of two years, any Partner may request the termination / withdrawal of its participation in the BORDWIIS network at the end of each working year by giving three month written notice of termination to the other Partners. In case a Partner being responsible for the overall management of the network requests the termination of its participation, the remaining Partners shall find a new management within three months after the written notice of the resigning partner.

### 4. FINANCE

4.2. No financial obligations are foreseen. Workshop-related costs are born by the BORDWIIS partners on an individual basis, and based on a participation fee allowing coverage of the cost of the organisation of the workshop.

4.3. The BORDWIIS network shall be in the position to make applications to the European Commission or other organisations for funding of projects and enhanced networking structures further extending the scope of the BORDWIIS network.



## Potential for cooperation and further exchange of experience

### 5. TERM OF AGREEMENT

5.1. This agreement shall become effective after the signature by at least xxx members of the BORDWIIS project. It is the prerequisite of the first (and each following) working year to enter into force to have at least xxx Partner organisation committed to the BORDWIIS network. The signed Letters of Engagement of the Partner organisations are included into Annex 1 and form an integral part of this document. Signature by members shall be taken to include approval of their respective organisations.

5.2. This Agreement shall expire if less than xxx Partners are willing to contribute to its activities or on the expiry date stated in paragraph 6.1.

### 6. DURATION OF NETWORK

6.1. The agreement shall remain in effect for a term of two years from xxx onward.

6.2. Thereafter the agreement will be extended on a year by year basis with the implicit permission of the Partners unless there are opposition to it or the conditions of expiry (see 5.2.) take effect.

### 7. GOVERNING LAW AND DISPUTE RESOLUTION

7.1. This agreement shall be governed by the substantive laws of Belgium and the parties submit to the jurisdiction of the Belgium courts. In case of dispute concerning this agreement, the complaining party shall notify the other involved party by written letter.

*Date and signature*

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For more information,

please contact us on:

[info@bordwiis.eu](mailto:info@bordwiis.eu)

[www.bordwiis.eu](http://www.bordwiis.eu)