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European Cluster Observatory

Priority Sector Report

Clusters in the Mobility Industry:
Automotive and Tourism Sectors

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20 December 2010 – deliverable D09-2

cip competitiveness and innovation framework programme

European Commission
Enterprise and Industry

Executive summary

This document offers an introduction to cluster approaches to the current transformation of Europe's Mobility Industry. Results are presented from a mini-study based on available industry statistics and other indicators while focusing on information and communications technology (ICT) as part of Enabling Sectors influencing selected Application Sectors. The results should add value also to a wider understanding of innovation in the services.

Here, the concept of 'clusters' is used to describe and explain the empirical phenomenon of geographical concentration of industrial, innovation and other economic activities. Focus is put on localised clusters able to foster new products and processes that support mobility. 'Cluster policies' across Europe are perceived as policy commitments to advance existing clusters and the emergence of new clusters. 'Cluster initiatives' are practical actions taken to strengthen cluster development, which may or may not be the result of a particular cluster policy.

The authors use statistics on clusters and cluster initiatives to explore ICT as enabler of applications that support mobility. There are indications of a strong dynamics in between specialised clusters in the Enabling Sectors and the Application Sectors under scrutiny. Interviews with a limited number of industrial innovation specialists confirm functional linkages and causal relationships. From a long-term perspective and in hindsight, localised clusters with advanced mobile ICT as the principal competence area seem to have been real drivers of new applications into a wide variety of application areas, including tourism services, automotive and other transportation equipment and related services, etc.

Today, it seems as if the specialised clusters in the Application Sectors have become more of drivers of new products and solutions by exploiting effectively mobile ICT competencies that have become re-located and 'implanted' into Application Sector clusters. For example, in the cases studied in this mini-project, a variety of advanced mobile ICT competencies have become fully integrated elements of the automotive clusters. Highly specialised ICT professionals have been recruited and advanced ICT companies have migrated to the automotive cluster. In parallel, the automotive clusters under study have become nodes in pan-European networks, tapping into ICT clusters elsewhere and thereby enlarging their competence base by first-tier supplier relations outside of the localised cluster.

The mini-study was performed in the fall of 2010 by Bearing Consulting Ltd. (UK) in cooperation with Copenhagen Business School under the auspices of the European Cluster Observatory. Project tasks and related assignments were given by the European Commission's Directorate General for Enterprise and Industry. The European Cluster Observatory is part of the Commission's initiative to offer a communications platform along with networking services that enable professional interaction among European cluster organizations and their members.

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1. Introduction: Clusters and the Mobility Industry

This document offers an introduction to cluster approaches to the current transformation of Europe's Mobility Industry. We combine first-hand fact-finding and analysis with already available industry statistics and other indicators on clusters located across Europe. Focus is put on information and communications technology (ICT) as part of Enabling Sectors that influence various Application Sectors.

More specifically, the purpose of this study is to:

- identify **Mobility Industry initiatives** in Europe in terms of:
  - leading firms
  - industry networks/initiatives
  - cluster organisations
  - national R&D projects (public and public/private)
  - science parks
- select and define **Enabling Sectors** and **Application Sectors** relevant for Mobility
- produce statistical maps of Application and Enabling Sectors
- identify and analyse overlaps and dynamics between Enabling Sectors and Application Sectors

The investigations were conducted during one month in the fall of 2010. The results reported below should add value also to the understanding of innovation in the services. It is part of a 'mini-study' under the auspices of the European Cluster Observatory and carried out on assignment from the European Commission's Directorate General for Enterprise and Industry.

Cluster competencies, production and innovation: In this mini-study, the concept of 'clusters' is used to describe and explain the empirical phenomenon of geographical concentration of industrial, innovation and other economic activities. Focus is put on localised clusters of competencies that are able to help foster new products and processes that support mobility. 'Cluster policies' across Europe are perceived as policy commitments to advance existing clusters and the emergence of new clusters. 'Cluster initiatives' are practical actions taken to strengthen cluster development, which may or may not be the result of a particular cluster policy.[1]

More generally, the clusters and cluster initiatives under study contain projects that are typically organised as collaborations among public and private sector actors, such as business firms,

[1] Cf. European Commission: *The concept of clusters and cluster policies and their role for competitiveness and innovation: Main statistical results and lessons learned.* Brussels: European Commission, Directorate-General for Enterprise and Industry. Commission Staff Working Document SEC (2008) 2637 (Europe INNOVA/PRO INNO Europe Paper No. 9).

government agencies, and academic institutions. Characteristically, such clusters involve a broad range of actors, assets and supporting activities. The support activities could be supply-chain development, market intelligence, incubator services, attraction of foreign direct investment, management training, joint R&D projects, marketing of the city or region, and the enhancement of technical standards.[2] The functional governance of a cluster program or related initiative (involving diverse actors that do cooperate as well as compete) could be critical to the cluster's survival, development and ultimate success.

Some clusters are deeply anchored in traditional manufacturing and even craft-based production while still being able to invent, renew and innovate products and processes. Other clusters are more specialised, for example on science-based technology, while fostering radically new, original products. The varieties of clusters across Europe are great. This is also a reason why this mini-study has been set to contribute mapping and profiling of various cluster organisations that support advancements of the European 'Mobility Industry'. In particular, we have been looking into clusters that strive for excellence in their undertakings. By emphasizing knowledge-intensive, science-based and high-tech cluster activities, we address a cluster's dynamics of creativity, entrepreneurship and innovation.[5]

Clusters, cluster dynamics, and the Mobility Industry: Clusters are a global phenomenon that exists in a multitude of sizes and shapes and by a variety of stakeholders. By clustering together, firms can achieve economies of scale and scope and lower their transaction costs due to geographical proximity and increased interaction often based on trust. In this document, clusters of competencies refer to local or regional concentrations of horizontally or vertically linked firms that specialise in related lines of business together with supporting organizations, though definitions as to what exactly constitutes a cluster may vary greatly.[6]

Clusters generally contain firms that compete against each other, although co-operation remains a common feature. Inter-firm co-operation and other networking could lead to strong horizontal bonds among the firms, sometime supported by universities, R&D institutions and other organisations. In other clusters vertical links may prevail.

The co-location of different types of clusters presented in this report suggests that there are important synergies between sectors in the same localised clusters such as ICT and automotive and ICT and tourism. This document summarises what we see as possible complementarities among sectors in a given locality. Knowledge-intensive services seem to benefit significantly from co-location with

2 Delimitations and definitions used here and in other parts of the document are drawn from documents by the European Clusters Observatory. www.clusterobservatory.eu.

[5] Chapain, C. et al: *Creative clusters and innovation: Putting creativity on the map,* London: NESTA Research Report, 2010. See also Feldman, M.A. and Audretsch, D.: "Innovation in cities: Science-based diversity, specialization and localized competition, *European Economic Review,* Vol 43, 1999, pp.409-429.

[6] Möhring, J.: "Clusters: Definition and methodology", Chapter 1, in OECD: *Business Clusters: Promoting Enterprise in Central and Eastern Europe,* Paris: OECD, 2005, pp 21-31. See also Porter, M., *The Competitive Advantage of Nations,* London: Macmillan, 1990; Porter, M., "The Economic Performance of Regions", *Regional Studies,* Vol 37, 2003; and Sölvell, Ö., G. Lindquist and C. Ketels, *The Cluster Initiative Greenbook,* Stockholm: Ivory Tower AB, 2003.

specialised manufacturing and other production with related engineering. In this wider sense of overlapping competencies, a cluster can be a source of agglomeration economies (when the proximity of firms produces collective benefits) contributing to innovation and economic growth.[7]

New relevance of clusters: More often than in manufacturing industries, services are typically created closer to the end-user. It is easy to find examples of service innovations that have evolved as dialogues with customers helping to pull the design and experimental development in the direction of their needs and, at the same, creating real market demands. Therefore, it could be assumed that such functional interaction will be made easier by taking place in localised clusters of relevant competencies. However, for this mini-study, the authors have not had the chance to investigate this issue in full detail.

By nature and definition, services innovations are relatively more intangible compared to product innovations and more easily modified. Hence, they are also more easily adapted to a local context and other given circumstances. These characteristics make service innovations easier to diffuse, adapt and re-design. A resourceful innovation environment, with professional and other advanced demands well developed, could stimulate companies in a city-region to develop radically new service applications and solutions.

Clusters across borders and sectors: As geographic focal points, we have identified and used a limited set of ICT clusters in regions that are connected through the operations of business companies and supporting institutions — located across the EU 27 area. These ICT clusters are part of what we call Enabling Sectors. We then focus on the specialised clusters related to the automotive and tourism industries, which we have labeled Application Sectors. In the intersection between the Enabling and Application sectors we identify and describe Mobility Initiatives. For further details, see Chapter 4 on methodology.

Two cluster types selected: For this mini-study, we have linked our empirical investigations to two interconnected, already well-recognised clusters of specialised competencies or Application Sectors in the European economy: the automotive and tourism sectors. Both sectors are examples of fostering rapidly developing mobility services, based on ICT. To a certain degree, auto transportation and tourism (broadly defined) are interconnected.

Based on analysis of these clusters, we have tried to detect some of the current and emerging dynamics in the sectors selected for scrutiny. As one of our analytical points of departure, we began by looking at principal drivers of innovation and change.

> *"Relating to mobility services linked to location, such as mobile retail, social networking and banking, these are driven in the short term by private demand and by the marketing effort of*

[7] Chapain, C. et al, *ibid*.

design-based consumer-oriented handsets producers." While, "as regards mobility services serving more directly the needs for transport of persons, machinery, goods and livestock, such as goods transport and supply services, chain management and new transportation services, these are very much linked to medium- and long-term drivers such as income, climate change, trade, demography and urbanisation." 8

"As regards services linked to transport and logistics such as goods movement and supply, supply chain management, here the drivers are more linked to medium and long term drivers such as income, urbanisation and demography. More commercial services linked to needs depending on the location of the user such as e-business and new media, mobile banking, mobile networking, tourism and retail, are more linked to drivers in the short term such as levels of offer in connectivity, society and culture, strong marketing and product design."9

[8] Both quotes are taken from the Briefing Note by DG Enterprise and Industry (November 2010) to the authors of the current report, pp 5-6.
[9] Ibid.

2. Mobility and the new communications infrastructure

What is mobility?

For the purpose of this report we define mobility as follows: *"Mobility is to have access to and ability to use information and communications services independently of location."*

In general terms 'mobility' is defined as the quality or state of being mobile. Mobility-enhancing information and communications technology (ICT) allows a person to access, process and communicate information while moving from place to place, from job task to job task, located in different physical spaces.

Contemporary Europe benefits from an expanding telecom and Mobility IndustryMobility Industry offering seamless end-to-end solutions and whole packages of specialized services tailored for a wide variety of user groups. The user groups may include professional users as well as school children and elderly persons under medical care. They gain advantage by new functions and new ways of using mobile and wireless technologies (including satellite-enabled ICT applications) that enhance mobility. They benefit from positive network effects. Like water and electricity services, mobility services and related infrastructure are perceived as an easily available utility that enhances value creation across the economy and into the wider society.

More and more, ICT is being recognized as a toolbox to achieve 'sustainable mobility', which implies less travel and more effective and responsible use of natural and other resources without compromising the ability of the next generation/s to meet their own needs. In short,*"…mobility that meets the needs of society to move freely, gain access, communicate, trade and establish relationships without sacrificing other essential human or ecological requirements today or in the future."*[1] For example, mobile ICT is being looked upon as a way to achieve appropriate transport planning strategies by an inclusive multi-sector approach to planning.

Radical advancements in the communications infrastructure: Mobility is not only about persons moving while retaining access to required information and being able to communicate by electronic means. What has come to be called the Mobility Industry based on modern ICT is much more than these functionalities, available to individuals on-the-move. In Europe as well as in the rest of the world, there is an increasing variety of systems, where information could be transferred and used by always being up-to-date and otherwise relevant for companies and their staff as end-users. Navigation and positioning systems are just two of several components of such systems. Within a couple of years Europe will have Galileo, its own GNSS (Global Navigation Satellite System) with much greater

accuracy and flexibility of interaction than the American GPS and other currently available satellite-enhanced systems.

Today, there is also a wide variety of hybrid positioning systems offering internet access by combining Bluetooth sensors, WiFi access points, wireless internet signals inside buildings, and other positioning systems. The next generation networking (NGN) implies further consolidation of several mobile ICT functions and mobile networks, making use of multiple broadband services.

Information systems as a utility: The information infrastructure for mobility, facilitated by advanced satellite systems and by other means, has improved radically during the past decade. For example, position-based information systems are becoming a utility, something that is technologically robust and easily available at relatively low costs for the end-user. Massive amounts of usable data from all fields of society have become easily available to end-users while they are on-the-move. In Europe (and also in remote regions of the world), the information infrastructure for mobility is of great benefit to business firms, public authorities and numerous other organisations as well as to individuals acting as citizens, students, consumers, travelers and tourists, etc.

Matching the radical advancements in communications infrastructure, the processing power of modern electronic devices, including mobile phones and similar devices being used to improve mobility, has grown exponentially while the costs for processing of data have come close to zero. The storage costs of vast amounts of information are also coming close to zero. The prices for access to satellite data are coming down and global competition may lead to radical improvements in the availability of on-line data.

Radical restructuring of services: These major changes in the communications infrastructure (whether general or specific) offer new opportunities to restructure activity sets related to mobility in ways that previously were considered impossible. For example, to improve mobility by using ICT, services can more easily be broken up or become unbundled. Activity sets, which used to be closely linked to each other, are being shattered. Activity sets, which used to be diverse, can be re-bundled or just brought together and automated.[10] In this document, we try to identify and explore specific locations in Europe, where such restructuring activities seem to be fostered and, particularly, where advanced mobile applications are being enabled. By combining statistical methods with qualitative studies, clusters and Mobility Industry initiatives in selected sectors are being identified, explored and reported.

[10] Normann, Richard: *Reframing Business: When the Map Changes the Landscape,* Chichester: Wiley, 2002, Chapter 2. This book and others on innovation in the services by the same author represent pioneering research.

3. Mobility and the transformation of services

High-quality service layers: Mobile ICT of today enables greater access to basic services as well as advanced sets of services in all parts of society. For example, mobile ICT substantially improves the ways and means of delivering services for banking and other financial services, education and training, healthcare and wellbeing, etc. It stands out clearly from a range of other studies of mobile ICT[11] that the creative use of mobile technology, when combined with innovative business models, could make a critical difference in value creation for companies, citizens, travellers and other end-users as well as for the producers of the services. A precondition for swift change seems to be that the companies are operating within conducive framework conditions, influenced by progressive policymaking. Obviously, the development of 'smart' mobile phones, seamlessly connected to internet, and other mobility-enhancing devices offer more comprehensive communication channels, promote greater flexibility in service delivery, and stimulate innovative ways of communicating and interacting.

Innovation and mobile ICT: While the dynamics through innovation in manufacturing industries is relatively well examined, Europe's service industries are much less explored and investigated.[12] One reason for the lack of data and analysis is the fact that there is considerable diversity in and between services industries. Some of the services industries – especially knowledge-intensive business services such as engineering design – are closely linked to particular manufacturing and other goods producing industries. They may even be integrated into these manufacturing industries and, thus, highly dependent on them. Other services are detached from such integrated value chains. They could, for example, be provided by small companies with a limited knowledge base and narrow business scope.[13]

The current innovation patterns seem to be derived from a goods-services continuum, where the service production characteristics seem to dominate at one end and goods producing characteristics dominate the other end.[14] For example, as already indicated, manufacturing industries have ample opportunities to improve the customer value of their offerings simply by bundling their product with follow-on services such as automatic position-based information services for car or truck owners involved in an accident, having engine problems or wanting to temporarily improve the power effect of

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[11] Dutta, Soumitra, Irene Mia: *Global Information Technology Report 2009-2010: ICT for Sustainability.* Paris: INSEAD/Global Economic Forum.

[12] Some of the text in this section of the document stems from our report of satellite-enhanced mobile services: Andersson, Niklas, Jan Annerstedt, Magnus Fransson: "No waiting for Galileo: European satellite enabled services already on the move. Report from an empirical mini-study on clusters, partnerships and the advancement of new services". Document produced by Bearing Consulting Ltd. (UK) for the European Commission (DG Enterprise and Industry): Brussels: European Commission/Bearing, July 2010.

[13] The European construction and real estate sectors and all the services that are part of or close to these sectors is a good example of satellite-enabled support systems that have become integrated into the daily operations of these industries as a tool also for competition. For example, road- and bridge-builders have found the satellite-based applications and solutions easy to advance in order to enhance the quality of the services. Cfr. Bröchner, J. (2010). Innovation in construction. *The Handbook of Innovation and Services: A Multi-disciplinary Perspective*. F. Gallouj and F. Djellal. Chichester, Edward Elgar: 743-767.

[14] Cf. the European Innobarometers such as the one for 2009. http://cordis.europa.eu/innovation/en/policy/innobarometer.htm, and the methodology behind.

an engine on route. In these situations, mobile ICT could become of immediate and significant convenience.

New business models: These and other changes in mobile service applications coincide with the more fundamental transformation of the services components of the economy and of the wider society more generally. The transformation could simply be depicted by the use of ICT to enhance rapid replication, to re-bundle a variety of services components, to mass-customise new service offerings, etc. Even more important for the two Application Sectors that we explore in this mini-study (presented later in this document) is the fact that manufactured products are increasingly being embedded within service offerings.[15] By this trend, traditional sector boundaries are being blurred. Mobile ICT applications and solutions bring previously unrelated products and processes into new business models thereby opening up for new competition and new modes of value creation.

SMEs get access to global service markets: The business models for the companies and institutions providing mobile ICT applications have benefitted from so-called 'network effects' that allow and make easy even for very small firms to enter and succeed commercially in large scale on the global market. For example, the platforms for commercial diffusion of mobile applications through companies like Apple (App Store), Google (Android Market) and Nokia (Ovi Store) have radically improved the speed, direction and other conditions for new mobile services.

Service packages may include manufactured products: For the auto industry, the much-enhanced ICT infrastructure for mobility has changed the way trucks, cars and other vehicles are being sold or otherwise made available for end-users. Increasingly, services related to transportation, repair, preventive maintenance, insurance, accident prevention, flexible engine power, route planning, etc. are being bundled and sold or leased in a wide range of segmented markets, depending on the changing needs among end-users. For business companies, the core competence and capability is less related to selling products, but more related to original sets of service offerings. More and more, manufactured products have become integrated and sold as part of service packages. In fact, an increasing variety of products are even transformed into services and delivered to the end-user through mobile ICT infrastructure.

User-driven innovation: For the end-users, for those who put ever-new demands on down-stream mobile services, the past ten years represent a radical transformation deep into a more mobile information society, where hundreds of thousands of mobility-enhancing applications and solutions have become available at very low or no costs.[16] Today, it is easy to find applications and solution that have been invented due to new requirements and demands by user communities such as students,

15 Zysman, John, et al: "The digital transformatioin of services: From economic sinkhole to productivity driver", Berkeley: BRIE Working Paper, 2010.
16 Andersson, Niklas, Jan Annerstedt, Magnus Fransson: "No waiting for Galileo: European satellite enabled services already on the move. Report from an empirical mini-study on clusters, partnerships and the advancement of new services". Document produced by Bearing Consulting Ltd. (UK) for the European Commission (DG Enterprise and Industry): Brussels: European Commission/Bearing, July 2010.

service technicians and urban commuters. One such example is the 'smart' mobile phone or the Personal Travel Assistant (PTA) with on-line mobile access to the internet that enables passengers and other travelers to plan and re-plan their journeys in detail while already on route. Fast, technically robust and user-friendly interfaces among solutions will indicate 'green route' options, new traffic problems and sudden changes in the individual's agreed meeting times and venues. For the individual traveler, while using public as well as private transportation, this type of mobile application assures flexibility and allows well-informed decision-making. At the same time, the mobile information systems could provide the local and regional transport authorities with vital intelligence on routes most heavily trafficked, helping them to continuously improve specific transport situations in real time.

'Context-aware' computing: As more and more services companies are embracing mobility as a foundation for their service provision, they become part of a significant overall trend that extends ICT further into mobile and wireless technologies and 'smart' computer devices, whether they are physical devices to be carried around, or devices installed in cars and other vehicles or in other machines.[17] A principal trend in ICT-enhanced mobility is labeled 'context-aware' computing. Relevant data and other information is made available according to contextual positions, which could be the location or the relationship between one person and another person with a desire to meet (or not to meet). For a tourist to be in proximity of a particular site could allow for instant access to a number of services. For a company or institution providing such services, 'context-aware' computing will enable them to increase the value they deliver to each customer and to further develop products and services to the specific needs of the customer.

'Context-aware' computing is not new. The trend goes back many years. However, as the mobility infrastructure becomes more of a utility, always available in the background, and when the quality of 'smart' mobile phones and other mobile devices increases rapidly, these services have now become much more efficient and effective. In recent years, new features on the mobile devices such as RFID chips (radio frequency identification) have added further value to these advantages. For example, with additional communications devices, RFID chips (e.g. on goods in a container) could be tracked and monitored constantly by satellite-enhanced information infrastructure.

Facebook, Twitter and other social networking applications have also become mobile, requiring further enhancements of the internet infrastructures and driving a steady increase in data storage and data processing capacities world-wide. This has already influenced the concepts of mobile communication as well as cost-effectiveness (such as cloud-based service delivery) and the integration of social networking and corporate business processes.

[17] Paul Taylor: "A tricky balancing act: cost, risk and innovation", *Financial Times*, October 27, 2010

4. Methodology: how the study results were achieved

One analytical point of departure for this mini-study is the prevailing tendency of ICT firms and firms in some related lines of business (along with their supporting institutions) to concentrate some of their design and development capabilities geographically in order to achieve more of concentrated efforts and economies of scale and of scope. In this mini-study, we are applying a cluster approach, since even globally operating corporations make significant local and regional footprints, when anchoring some of their capabilities in selected cities and city-regions. They seem to do this while extending their local and regional resource base, broadening their innovation and productive systems. By becoming involved in localised clusters of competencies, companies could reach far beyond the firm's own designated competencies and add new features to their core competencies.

Localised clustering does not exclude systematic global sourcing and other business links across the globe. Yet, by clustering capabilities, firms can win access to new technology and related knowledge and lower their transaction costs when developing new products and processes. However, we recognise that our research methodology will have to be adapted to include also the specific circumstances of each cluster under scrutiny. There is no one-size-fits-all type of clustering, but many varieties depending on firm composition, area of ICT, application sector, and even cluster organization and governance

In order to approach the large and partly undefined issue area of mobility, the report begins its summary of the mini-study's results by the framework described in Figure 1 and by exploring data on cluster employment from the European Cluster Observatory. Given the limited time available for the mini-study, the objective is to map clusters and Mobility Initiatives using data. The ambition is to identify regions and other localities that are likely future sites for Mobility Initiatives. In order to enrich the statistical material and describe better the cluster dynamics, we are going beyond the existing statistical data to include also other material of relevance to more detailed studies of mobility clusters in the selected regions.

As a first step, economic sectors of relevance to the Mobility Industry have been divided into two categories, Enabling Sectors and Applications Sectors.

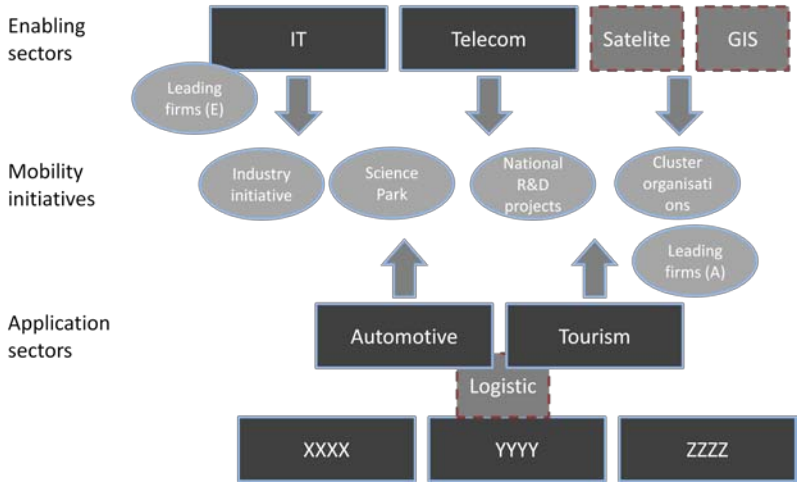
Enabling Sectors; In this mini-study we will look at three Enabling Sectors, IT, Telecom and Geographical Information Systems/Satellite systems. The IT and telecom sectors are studied from a statistical point of view and the study of Geographical Information Systems (GIS)/Satellite systems is based on case studies and interviews.

Application Sectors; In order to describe the interaction between the Enabling Sectors and Applications Sectors this mini-study is focused on two of the largest among the Application Sectors in Europe, Automotive and Tourism.

A principal hypothesis in this mini-study is that Mobility Industry initiatives are likely to emerge in the intersections between the Enabling Sectors and the Application Sectors.

Once we have identified regions with strong clusters in the Enabling Sectors and each of the Application Sectors, these are cross-analysed in order to identify the intersections. This cross analysis is described in Chapter 7. In Chapter 8 some of the 'mobility industry' initiatives are described and further discussed.

Figur 1. Overview of the Mobility sector



The statistical elements of the research are based on data and methods from the European Cluster Observatory. Due to the general lack of data, unified definitions and time constraints, it has not been possible to gather and process much of new statistics.

In order to align this mini-study with other studies and lay a solid foundation for future analytical work, the definitions of the Enabling Sectors and Application Sectors follows the definitions made by the Cluster Observatory to the extent possible. Despite our search for methodological clarity and cohesiveness adjustments have been made. These adjustments are described in the Appendix. As a complement to the statistical research method, interviews with selected experts on mobility have been executed with representatives of the relevant industries. Interview respondents include business professionals, cluster manager, professors and other university researchers and other specialists with relevant knowledge on mobility. See the list of interviews performed in the Appendix.

Definitions

For the purpose of this report we define mobility as follows:

"Mobility is to have access to and ability to use information and communications services independently of location."

As discussed earlier, 'mobility' is a broad area that could be defined in a number of ways. At times, for each industrial area, there has often been a specific definition.

"Mobility from a telecom perspective is to have access to the personal communication and IT environment independent of location. The goal is total seamlessness, independent of Device, Access Technology and Location." Björn Hallare, Independent Telecom Consultant,Sweden.

"Mobility is to receive and send data and information to and from Mobile Objects. From a telematic perspective this could be seen as travel in a vehicle and have access to mobile services." Jan Unander, Telematic Valley, Sweden.

"Mobility is persons and things on the move away from home/base." Karl Rehrl, Salzburg Research, Austria.

For this report, when working with cluster definitions and the statistical data of this report, we have used the Cluster Observatory's definitions on specialisation and on focus;

Focus is the share of the sector's employment in the whole region's employment. This measure relates employment in the cluster to total employment in the region.

Specialisation compares the proportion of employment in a cluster category in a region over the total employment in the same region, to the proportion of total European employment in that cluster category over total European employment. If a region is more specialised in a specific cluster category than the overall economy across all regions, this is likely to be an indication that the economic effects of the regional cluster have been strong enough to attract related economic activity from other regions, and that spill-overs and linkages might be stronger. Specialisation is also well-known notion in the literature as the "Location Quotient".

Delimitations

In this report we have worked with a standardised set of industries and sectors as described in this chapter and in the methodological Appendix. Naturally there are other ways of looking at mobility and

different service layers. One example of another method to describe mobility is for example found in a report by Moving the Economy and ICF Consulting that studies areas described in Table 1[18]

Table 1. Example of a broader definition of Mobility Industry, from Moving the Economy and IC Consulting

- **Telecommunications & Wireless Technologies**
- **Goods Movement & Supply Chain Management**
- **Financial Services, Banking and Investment**
- **Information Technology based services**
- **Transportation Operations and Services**
- **Geomatics**
- **Tourism and Retail**
- **Intelligent Transportation Systems**
- **Transportation – Equipment**
- **E-business & New Media**
- **Real Estate Construction, Planning, & Operations**

Although broader and more creative definitions might lead to other insights and perspectives, the latter definitions could be part of discussions on policies and on trend analysis. In this report, focus has been to find practical definitions on industry sector level and to be able to use existing Observatory data in order to describe the Mobility Industry from a geographical point of view.

Sources

In this the report we have used standard statistical material from the Cluster Observatory over clusters based on employment in EU 27 area. As a consequence of this there are some sectors that are not mapped due to definitions of data and the nature of the statistical NACE 2.0 codes. In order to describe those sectors efforts have been put into qualitative descriptions to paint a more detailed picture and identify trends and tendencies.

With those limitations, some clusters and companies might have been omitted. One such example is GPS-devices that are part of the broad NACE 2.0 code “26.51 Manufacture of instruments and appliances for measuring, testing and navigation”. If this category had been included, the statistical data would also have included areas such as manufacture of meteorological instruments, manufacture of polygraph machines and manufacture of radiation detection and monitoring instruments. Such a wide definition and source material could have diverted the study from its objectives and purpose.

Another limitation due to the source material is the fact that it is not possible to identify specific employment and clusters data related to relevant subsectors such as data on Mobile ICT services.

In the Appendix the Enabling and Application Sectors are described in terms of NACE 2.0 codes.

[18] Moving the Economy and IC Consulting, Building a New Mobility Industry Cluster in the Toronto Region, 2002

5. Mapping Enabling Sectors

This mini-study is focused on three Enabling Sectors: IT, Telecom, Geographical Information Systems/Satellite Systems. These Enabling Sectors were selected since they are particularly relevant for the Mobility Industry. Unfortunately, they are all relatively broadly delimited and defined. Yet, they should cover the principal enabling capabilities of the Mobility Industry.

The IT and Telecom Sectors are well defined statistically. When analysed in this report, the statistical definitions in terms of NACE 2.0 codes follow the definitions already used by the European Cluster Observatory. See the description in the Appendix.

Geographical Information Systems/Satellite Systems are not defined by easily available statistics. For this mini-study, this means that it has not been possible to elaborate and analyze the issues by statistical means. Instead they were explored by interviews of industry experts and other specialists.

Overview of Enabling Sectors

The processing power of modern electronic devices, including mobile phones and similar devices, has grown exponentially while the costs for processing of these data have come close to zero. The storage costs of enormous amounts of information are also coming close to zero. The prices for access to satellite data are coming down and global competition may lead to radical changes in the availability of on-line data.

Almost all respondents in this mini-study point at the development of mobile broadband in various forms as the single largest enabler for mobility services and innovation. Now, when this is in place, the initiatives have moved from the European telecom infrastructure suppliers, such as Ericsson and Nokia, to the US suppliers of platforms and operating system for devices, mainly Apple and Google/ Android.

The information infrastructure, facilitated by satellite navigations systems such as the US standard GPS and the yet to be launched European system (Galileo), has improved radically during the past decade. The sophisticated, position-based information systems are becoming a utility, something that is technologically robust and easily available at relatively low costs for the end-user. Massive amounts of relevant data from all fields have become easily available.

For the end-users, for those who put ever-new demands on downstream services, the past ten years represent a radical transformation deep into a more mobile information society, where hundreds of thousands of satellite-enhanced applications and solutions have become available (even for quick downloads) at very low or no costs.

The business models for the companies and institutions providing applications have benefitted from so-called ‘network effects’ that allow and make easy even for very small firms to enter and succeed on a large scale on the global market with only very small investments. For example, the platforms for

commercial diffusion of music and of mobile applications through companies like Apple and Nokia have changed the conditions for mobile services.

It is likely, though, that the satellite-enhanced services will be seen more and more as a basic utility, which tends to become robust, standardised (in its essential features of delivery) and easily available at relatively low costs, if any. This will positively influence the wider demand, particularly for downstream services.

In Agriculture and related services, positioning is used to improve harvests by utilizing better available equipment and land. This gives immediate effects on efficiency and on production. The larger effects should come when establishing larger systems, which integrate positioning with monitoring and other satellite services. Once available, such systems can be used also for other purposes such as financing and investments.

Given its size and current use of GPS, the pan-European transport sector will benefit largely from system development in order to integrate European infrastructure, save costs and improve efficiency. Today there are management and navigation systems and services based on GPS but a lack of standardization in Geographical Information Systems and maps stands in the way for larger systems.

Statistical cluster distribution Enabling Sectors

According to Cluster Observatory data there are five regions in Europe that show strong specialisation (over 2) in both the selected Enabling industry sectors. These are listed in Table 2.

Table 2. Regions strong in both of the selected Enabling sectors

Region	Region name	Employment IT	Employment Telecom	Specialisation IT	Specialisation Telecom
UKJ1	Berks, Bucks and Oxon	30 184	26 162	3,00	2,04
SK01	Bratislavsky kraj	7 559	9 902	2,73	2,81
FI18/FI20	Etelä-Suomi/Åland	17 882	27 921	2,39	2,94
DE23	Oberpfalz	7 401	9 795	2,49	2,59
SE11	Stockholm	25 206	24 002	4,22	3,15

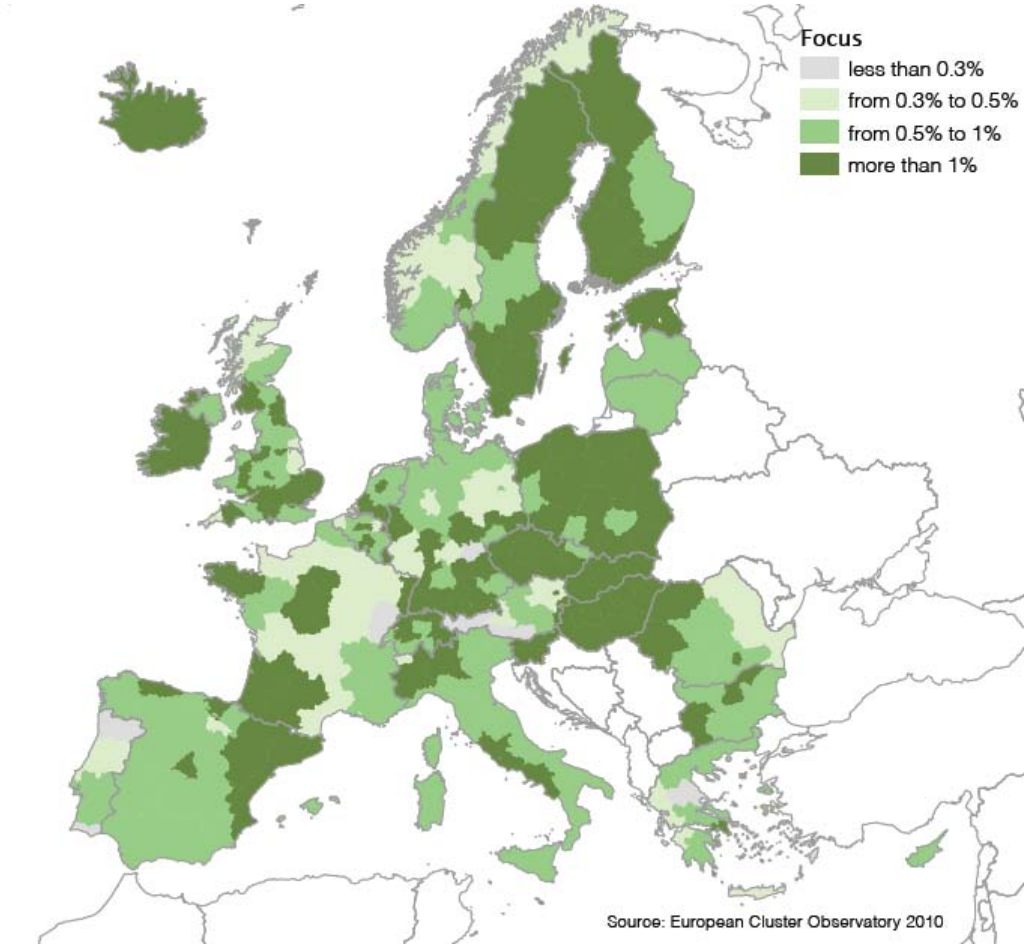
The Telecom and IT sectors are related and (in some perspectives and definitions at the company level) overlapping. For that reason and in order not to miss regions, we have also added regions that do not score high in each of the individual sectors, yet show very high value on the combined IT and Telecom Specialisation (over 5). Thereby, we can identify three additional regions.

Table 3. Regions specialised in IT and Telcom combined

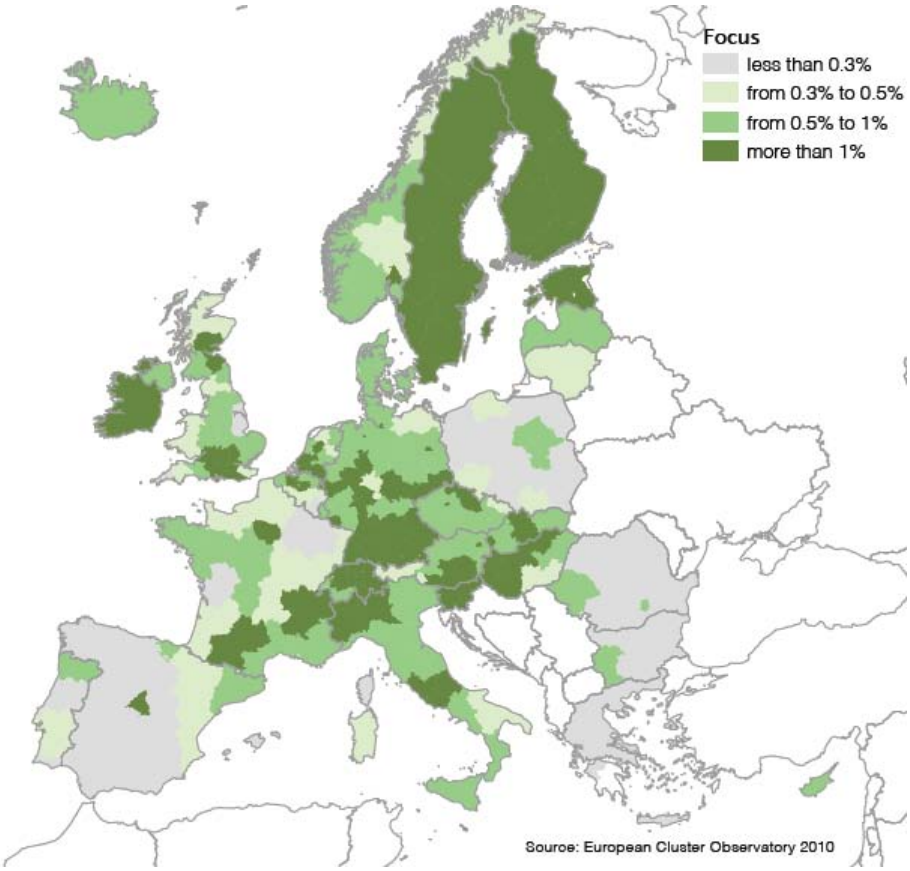
Region	Region name	Employment IT	Employment Telecom	Specialisation IT + Telecom
DE25	Mittelfranken	33 814	9 741	7,38
FI1A	Pohjois-Suomi	2 656	7 465	6,27
RO42	Vest	5 535	41 852	5,35

On the basis of our framework model (in Figure 1), these eight regions should be a good nurturing ground for innovation and development. Hence, from an enabling perspective, we will focus efforts to look for mobility initiatives in these regions.

Map 1 Focused clusters, Enabling Sector - IT



Map 2 Focused Clusters, Enabling Sector - Telecom



Qualitative cluster distribution of Enabling Sectors

The Enabling Sectors Geographical Information Systems and Satellite Systems are currently not defined statistically. To map these capabilities, cluster initiatives and cluster organisations active in the regional industry were identified and interviews conducted in order to gain new insights. Table 4 lists some of the organisations identified in the process of investigation.

Table 4. Identified organisations in the GIS and Satellite industries

Location	Organization	www	Main focus
Westösterreich	GIScluster Salzburg	www.giscluster.at	Geographical Information systems
Norra Sverige	Future Position X	www.fpx.se	Geographical Information systems
Niedersachsen	GiN	www.gin-online.de	Geographical Information systems
Brandenburg	GEOkomm networks	www.geokomm.net	Geographical Information systems
Oberpfaffenhofen	The Bavarian Aerospace & Satellite Navigation Clusters	www.bavairia.net	Satellite and Aerospace
European Network	ESA Business Incubation Centres	www.esa.int/esaMI/Business_Incubation/index.html	Satellite Navigation
European Network	European Space Incubators Network (ESINET)	www.esinet.eu	Satellite Navigation

6. Mapping Application Sectors

As described earlier in the report, this mini-study puts focus on two Enabling Sectors, Automotive and Tourism. They were selected since they are in the forefront of the Mobility Industry and therefore could provide an abundance of relevant source material hat other sectors may not yet have. As a contrast to the Enabling Sectors described in Chapter 5, the two Application Sectors chosen are more diversified. Therefore, they are described separately, despite the fact that they could be functionally connected through the end-users and the wider market.

The Automotive and Tourism Sectors in Europe are well defined statistically. When analysed for this report, the statistical definitions in terms of NACE 2.0 codes follow the definitions used by the European Cluster Observatory, as described in the Appendix.

In addition to the statistical analyses, the conclusions depicted in this report are based on interviews with industry experts and other experts. The goal has been to give an explorative perspective on two Application Sectors to identify mobility initiatives as well as drivers behind the initiatives.

Mobility in the Automotive Sector

The automobile industry is one of the economically most important industries in Europe with a very high export quota. The automotive industry has come to include high-tech products, where the complexity of the transportation requirements, public policy and user-demands encourage linkages between technologies and solutions for example in lightweight construction and power train systems, in board electronics and safety engineering or interior design. Innovation and cluster cooperation have become essential to sharpen the edges of competition.

With the entry of microelectronics and modern telecom solutions to the global auto industry, like for many other branches of industry, this industry has incorporated more and more new varieties of electronic devices. These electronic devices and systems are increasingly linked up with telecom/internet infrastructure. There is no producer of cars, busses, trucks and specialised vehicles for professional use that does not benefit from advanced applications of today's information and communications technology. Compared to its European competitors, the US auto industry has focused more on ICT application for 'car entertainment', while the European and Japanese auto industries seem more focused on the use of ICT for a variety of transportation-related services.

Today, most carmakers in Europe install 'infotainment' systems in their vehicles as standard equipment. More and more, these systems also include automatic communicative interaction with local weather services, traffic control centers, road payment systems, rescue organisations, repair agencies, hotel reservation and other visitors' services, etc. The automotive sector (cars, trucks and other vehicles) is expected to become a particularly strong growth market for manufacturers of in-vehicle information and communications systems become more interactive or 'intelligent', while being linked directly to other communications devices such as RFID.

In some areas of importance for the use of telecom in vehicles (forestry, road construction equipment, etc.) the continuous flow of activities to be performed with the use of these vehicles is critical. Hence, mobile ICT equipment is installed to monitor continuously these vehicles as part of preventive and other maintenance, production planning, driver's safety functions, rescue service management, etc. If a critical component of such equipment fails, a whole transportation systems process, perhaps involving hundreds of persons or more, could also fail. The contextual impact of such a failure might lead to enormous, unintended consequences.

Mobility in the Tourism Sector

Tourism broadly defined is one of the fastest growing economic sectors in Europe and worldwide. The sector is per definition a Mobility Industry and the rapid development of enabling technologies in the form of ICT has changed the industry dramatically.

- The travel industry is the largest e-commerce branch.
- In 2007, for the first time in the USA, more trips were booked online than offline.
- More than 70 % of travelers get their travel information and trip recommendations from family and friends
- 42% of travelers booked online (and using user-generated content) consider the opinions of other travelers to be highly trustworthy and influential. (JupiterResearch)
- A traveler with unclear travel plans tends to visit an average of 22 sites before booking a trip or hotel (comScore)

Source: www.tripwolf.com/en/press/about

The tourism sector is dominated by 'micro-firms' and small and medium-sized enterprises (companies with 1 to 249 employees). The vast majority of tourism companies employ fewer than 50 staff members. According to production value (in absolute terms) the United Kingdom, Italy, France, Germany and Spain generate the highest revenues in Europe's tourism sector. In some of the smaller countries, such as Austria, tourism also contributes sizeable added value to the economy. The new EU member countries as well as the associated states in Central and Eastern Europe have experienced massive growth rates in their tourism sector – both incoming as well as outgoing tourism.

Statistical cluster distribution Application Sectors

The Application Sectors focused in this mini-study, Automotive and Tourism, are more regionally specialised than the selected Enabling Sectors. In the Automotive Sector there are 39 regions that show high degree of specialization (over 2) and in the Tourism Sector 27. Confer the Appendix.

Significant for both the automotive and tourism sectors (and contrary to the selected Enabling Sectors) is the fact that some regions in Europe specialise very heavily such as Tirol (Austria) in Tourism and Västsverige (Sweden) in Automotive.

Table 5. Top 10 regions specialised in Automotive

Region	Region name	Employment Auto	Specialisation Auto
SE23	Västsverige	40 499	7,27
DE11	Stuttgart	112 784	6,83
FR43	Franche-Comté	21 275	6,27
ITF5	Basilicata	8 251	6,10
DEC0	Saarland	15 644	4,58
DE21	Oberbayern	82 142	4,50
DE73	Kassel	18 420	4,47
CZ02	Stredni Cechy	26 203	4,33
DE90	Niedersachsen	113 760	4,30

Map 3. Focused clusters, Application Sector - Automotive

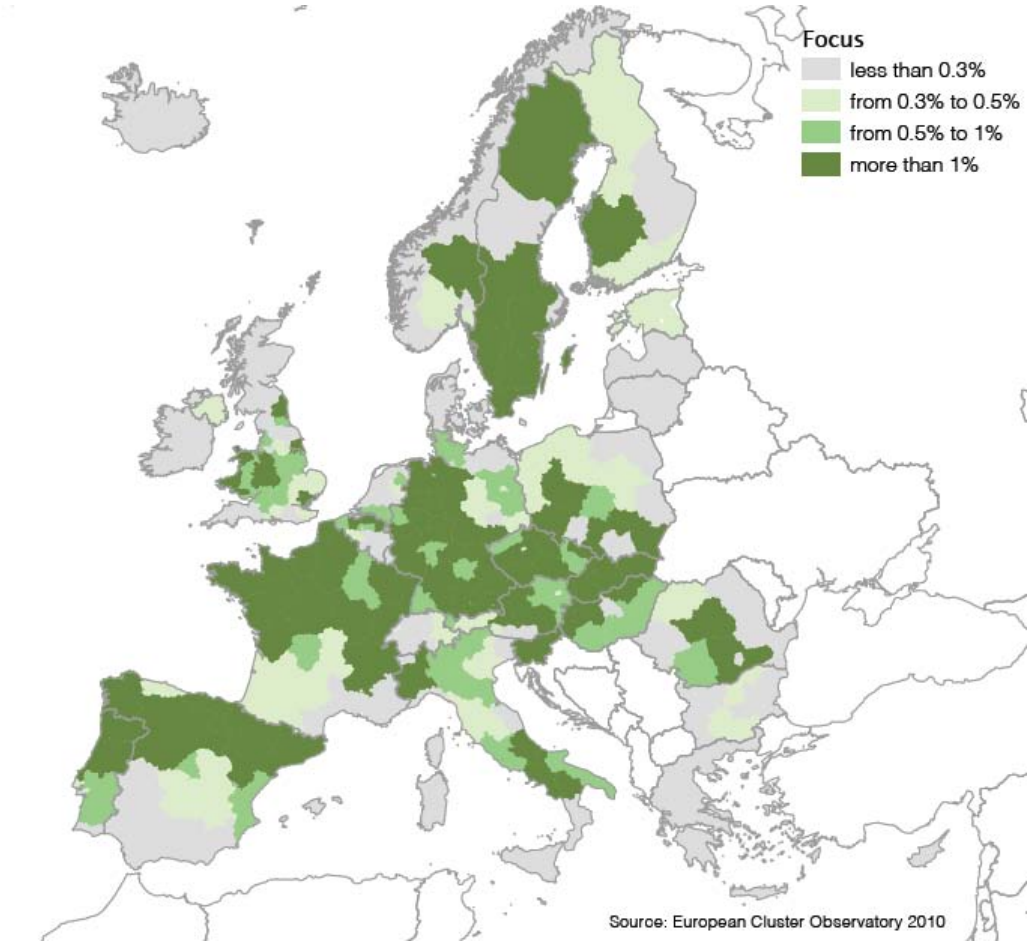
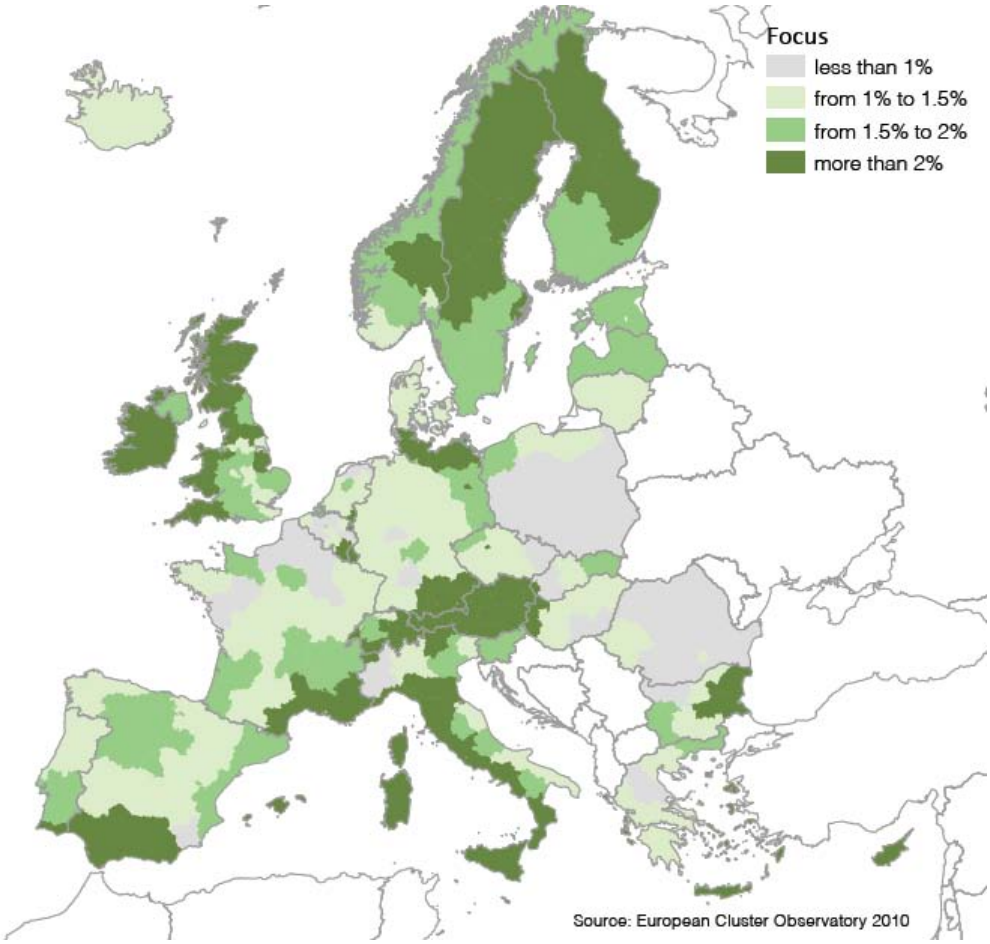


Table 6. Top 10 regions specialised in Tourism

Region	Region name	Employment Tourism	Specialisation Tourism
AT33	Tirol	31 965	7,76
PT30	Madeira	9 079	6,18
ITD1/ITD2	Trentino Alto Adige	35 403	5,74
ES53	Illes Balears	44 069	5,52
GR42	Notio Aigaio	10 707	5,45
ES70	Canarias	75 750	5,31
ITC2	Valle d'Aosta	3 925	5,23
PT15	Algarve	14 798	5,19
AT32	Salzburg	19 048	5,14
GR22	Ionia Nisia	7 465	5,08

Map 4. Focused clusters, Application Sector - Tourism



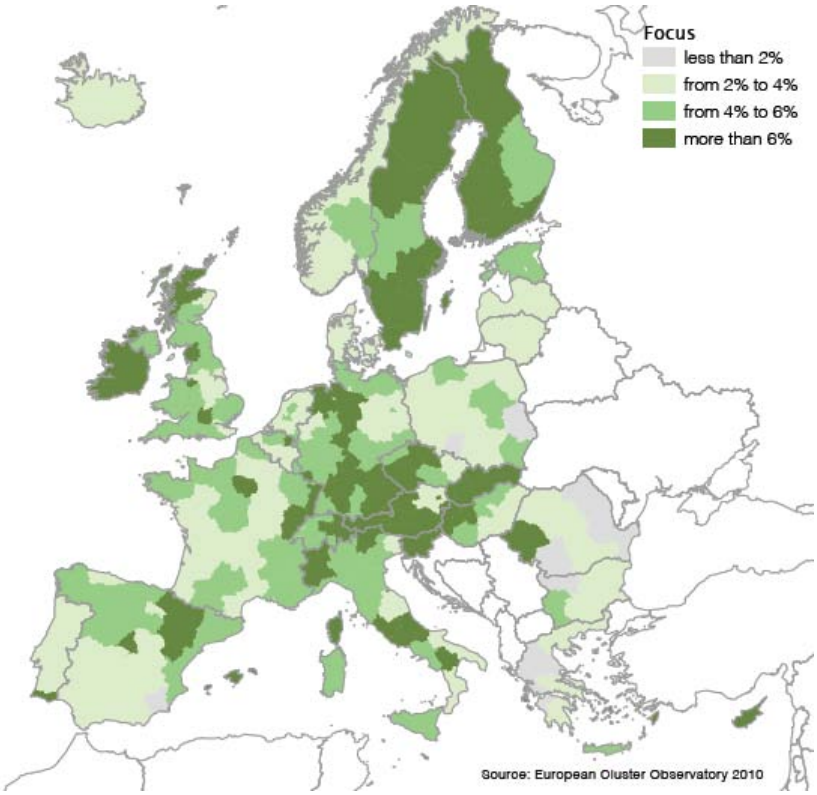
According to our framework model (summarised in Figure 1) the regions listed in this chapter could operate as seedbeds and good nurturing grounds for specialised innovation and related economic

growth. Consequently, we have concentrated some of our analytical efforts from an enabling perspective in finding mobility initiatives in these geographical areas.

7. Cross-mapping of Enabling and Application Sectors

Within the analytical framework of this mini-study, five industry sectors are scrutinised in order to gain initial insights into the geographical areas where mobility initiatives have emerged or are likely to emerge. The selection of sectors and relevant background information on the sectors were summarised in the previous chapters. Of the five selected sectors, four sectors can be described in statistical terms by using available data: Automotive, IT, Telecom and Tourism.

Map 5. Focus areas in Enabling and Application sectors



On an aggregated level, Map 5 provides an overview of where the four sectors are focused. Table 7 lists the regions with the most concentrated focus.

Table 7. Regions with highest total Focus and Specialisation

Region	Region name	Employment	Specialisation	Focus
AT33	Tirol	34 680	2,94	14,35
SE23	Västsverige	65 271	2,65	12,96
SK01	Bratislavsky kraj	36 516	2,47	12,05
ITD1/ITD2	Trentino Alto Adige	43 290	2,45	11,96
DE21	Oberbayern	187 541	2,33	11,37
DE11	Stuttgart	166 771	2,29	11,17
AT32	Salzburg	23 427	2,20	10,77
AT21	Kärnten	16 286	2,19	10,69
ITC2	Valle d'Aosta	4 680	2,18	10,62
PT30	Madeira	9 125	2,17	10,59
ES53	Illes Balears	48 141	2,11	10,29
SE33	Övre Norrland	11 313	2,09	10,23

The data summarised in Table 7 provides indications on where mobility initiatives are likely to emerge. Yet, further analytical work is needed when interpreting the data depicted. Moreover, adjustments may have to be done to depict more of the reality behind the indicators. For example, the industries are distinctly different in terms of employees, size and number of companies, etc. The number of employees shown does not help identify and further describe clusters and cluster initiatives as discussed in Chapter 1 and later.

In order to complete the picture and benefit from the analytical framework summarised in figure 1, a cross analysis of the clusters is performed. This exercise was set up to identify highly specialised areas in the 'Enabling Sectors' and in one or more Application Sectors.

Table 8 Regions with high Specialisation in Enabling and Application Sectors

Region	Region name	High Specialisation Enabling Sector	High Specialisation Application Sector
SK01	Bratislavsky kraj	IT, Telecom	Automotive
SK02	Zapadne Slovensko	Telecom	Automotive
DE21	Oberbayern	IT	Automotive
DE12	Karlsruhe	IT	Automotive
HU22	Nyugat-Dunantul	IT	Automotive
HU21	Kozep-Dunantul	IT	Automotive
AT21	Kärnten	IT	Tourism
IE00	Ireland	IT	Tourism
MT00	Malta	IT	Tourism

According to the data in Table 8, there is not a large number of geographical regions specialised in both the selected Application Sectors and the selected Enabling Sectors. Moreover, when looking into

the Table 8 details, we have to remember that Malta, for example, is a very small region in terms of total employment, which might give too high a rank in comparison to its actual importance. A high degree of specialization and a large number of employees do not necessary imply a resourceful and innovative cluster. For some regions the number of employees might just be a consequence of outsourcing of manual work due to low labour costs. Instead, the real ‘cluster of competence’ might be located in another geographical region, perhaps close to the company headquarters.

When looking at Map 5 we find that some of the regions are very close to each other; this is especially significant for southern Germany/Austria/Slovakia but applicable also for other regions. This means that we have to be observant on the larger context of the region and its resources. For example, the regions that we have identified statistically might not be the most appropriate to study in terms of new and innovative mobility initiatives. In the following chapters we will look into clusters and localised ‘mobility industry’ initiatives.

8. Mobility Industry initiatives

In this chapter, and in Chapter 9, we will identify and discuss Mobility Industry initiatives. For this purpose, we will apply part of the analytical framework summarised in Figure 1. We are not aiming for a full-scale picture of the fast-growing Mobility Industry, but to point at some significant new features of the industry and the drivers behind.

Table 9. Overview of actors mentioned and discussed in this chapter

Actor/Mobility initiative	Type	Website
Greater Speyside	Cluster organisation	www.greaterspeyside.com
CEIIA	Cluster organisation	http://www.ceiia.com
Rich Communication Suite (RCS)	Industry network /initiative	www.gsmworld.com/our-work/mobile_lifestyle/rcs/index.htm
Bavarian Innovation and Cooperation Initiative for the Automotive Suppliers Industry – BAIKA	Industry network /initiative	www.bayern-innovativ.de/baika
The GENIVI Alliance	Industry network /initiative	www.genivi.org
Hungary Tourism	Industry network /initiative	www.hungary.com
The Travel and Tourism Research Association	Industry network /initiative	www.ttra-europe.org
TomTom	Leading firm	www.tomtom.com
Ericsson	Leading firm	www.ericsson.com
Nokia	Leading firm	www.nokia.com
Bosch Automotive parts	Leading firm	www.boschautoparts.com
Audi	Leading firm	www.audi.com
Delphi	Leading firm	www.delphi.com
BMW	Leading firm	www.bmw.com
Scania	Leading firm	www.scania.com
Logica	Leading firm	www.logica.com
WSP	Leading firm	www.wspgroup.com
Ramboll	Leading firm	www.ramboll.com
Clean Mobile AG	Leading firm	www.clean-mobile.com
TagMyLagoon	Leading firm	www.veniceconnected.com
Tripwolf	Leading firm	www.tripwolf.com
TeleFOT	R&D projects (public and public/private)	www.telefot.eu

Mobility Initiatives in the Enabling Sectors

The main actors in the development of the infrastructure that underpins and otherwise strengthens the ongoing development of the European Mobility Industry include the telecom equipment suppliers such as Ericsson and Nokia along with the telecom operators. A principal enabler with regards to Europe's Mobility Industry (in the context of the Enabling Sectors identified in this mini-study) is the rapid market

penetration of mobile broadband and flexible market opportunities for 'smart' mobile phones and other mobility devices.

When it comes to the telecom operators they may face strategic challenges from the flexibility achieved by end-users and companies with new business models designed specifically for the Mobility Industry.

"The traditional telecom operators are confused over what to do now, they want to do what Apple and Google are doing but don't know how to. One way to go might be to bundle third part applications with standard communication services." Björn Hallare, Independent Telecom Consultant.

Although the equipment suppliers historically have taken the main initiatives, they are not the principal leaders in innovation and the development of new mobility services anymore. Yet, they continue to invest heavily in the mobility services and solutions and in related areas. Examples of initiatives in Mobility Industry coming from the telecom industry include IMS (IP Multimedia Subsystem) and Rich Communication Suite (RCS). Both examples of industry effort focused on providing mobile phone communication beyond traditional voice service.[19] Critics state that much of those services already are available from Internet service providers. According to experts interviewed for this project, the equipment suppliers have a hard battle in front of them in order to keep up with the fast moving service development of today, which is led by others.

> *"As it is today all the drivers are from the internet side and the telecom industry are laggards."* Björn Hallare, Independent Telecom Consultant.

When discussing with mobility experts from various fields of specialty much attention was given to the positioning systems and Geographical Information System (GIS). GIS and positioning systems are swiftly becoming an integrated part of the overall enabling infrastructure of the Mobility Industry. The impact from this infrastructure is already significant to a wide variety of mobility applications. Recent examples are new types of interactive games and flexible business applications such as fleet management in far-reaching transport systems involving large numbers of individual travelers. According to experts interviewed on GIS and positioning systems, the new Mobility Industry initiatives are coming from the Application side and is often initiated by European systems integrators and consultancy firms such as Logica, WSP, Sweco and Ramboll on assignments from end-users.

One European company that has been a global Mobility Industry driver and still in the forefront of new positioning systems is TomTom, a Dutch company. According to its website:

> *"TomTom is the world's leading provider of location and navigation solutions. Headquartered in the Netherlands we have over 3,000 employees worldwide. More than 45 million people use*

[19] Se for example www.nokia.com/press/press-releases/showpressrelease?newsid=1189463

our solutions every day, in the form of dedicated portable navigation devices (PNDs), in-dash car systems or tracking and tracing solutions for fleet management. In addition, hundreds of millions of people use TomTom's digital maps on the internet or mobile phones."[20]

Yet, despite its current technological strengths and its advanced system of detailed maps used for geographic positioning, TomTom is frequently mentioned during our expert interviews as an example of pioneering European companies in the global Mobility Industry that need to adjust business models and market strategies to come closer to the end-user needs of sophisticated and more specialised services. According to several of the experts interviewed, the force of innovation in the Mobility Industry is increasingly coming from new user demands that may be interpreted by consultancy companies in urban design, transportation logistics, rescue and emergency hospital services, hotels and tourism agencies, social services to the elderly, etc.

Within the framework of this mini-study on mobility, we have noted that much of the drive and many of the initiatives in the 'Enabling Sectors' seem to have moved away from European telecom and Mobility Industry to US suppliers of platforms (such as Apple, Google/Android).

This happens when the key differentiators have become new business models and on-line platforms for marketing innovative solutions. Technology (such as mobile broadband and other telecom) is no longer as effective a 'driver' as before. Instead ICT is more of a utility that is everywhere available, robust and low-cost. Much more than before, the innovative platforms and distribution channels are now commercially more easily exploited by small and medium-sized innovative companies.

The competitive situation might change when a new wave of mobile applications and services are rolled out to new and perhaps different types of customers, adding new demands on user relevance, adaptation and the easiness of use. Here the Europe's traditional strengths in the services could serve as a basis for new industries, cluster initiatives and business operations.

Mobility Initiatives in the Application Sector - Automotive

As known and shown in Chapter 6 the parts of the European automotive industry is highly concentrated to the southern parts of Germany with Bavaria and Baden-Württemberg as center points. Several clustering initiatives in Southern Germany is coordinated by the organisation Bayern Innovativ. They coordinate more than 19 clusters and cluster projects in the region. One of their initiatives is the "Bavarian Innovation and Cooperation Initiative for the Automotive Suppliers Industry" (BAIKA), a network founded in 1997. With more than 2,200 companies and institutes worldwide, of

[20] http://investors.tomtom.com/overview.cfm

which 1,100 in Bavaria, BAIKA could be the leading such project initiative in all Europe. The slogan of BAIKA is “Innovations for tomorrow’s mobility”.

According to the interview with automotive cluster management within Bayern Innovativ[21] the cluster remains technology-driven. One of the focal points for the automotive cluster is “Electro Mobility”, which include the systems of energy and power supplies of the vehicles, which involves mobility services using broadband and other telecom solutions. Moreover, in the same cluster, there are companies that converge on the whole chain of mobility and new sets of mobility services. Here, the drive comes from the large car manufacturers such as Audi, BMW and Volkswagen as well as from the first-tier suppliers such as Bosch and Delphi. Due to radical changes in the energy and power supply areas it is very hard to predict which will be the leading companies in 10-15 years and which technologies and, probably more importantly, which business models and modes of value creation that will be dominant. The fact is that many of the large corporations of today are very active, while the same is true also for the small innovative companies, some of which with market positions in new niches, based on a particular technology-based mobile solution or other advantage.

One interesting issue related to the European Mobility Industry from an automotive perspective is the new value chains that emerge when mobility in terms of transportation and related services meet other industries and move in previous unexpected directions. One example of a company that has gained attention in this field is Munich-based Clean Mobile.[22] The company is one of the world leaders in electrically driven trains within the Light Electric Vehicle Industry (LEV).

Within the same area of Europe’s Mobility Industry, auto companies like Scania and Volvo Trucks have developed automatic systems for reporting accidents, where one of their vehicles is involved. Here, reports will be transferred automatically over mobile broadband to alert service companies about a vehicle that might need be rescued and repaired.

Today, since many years, some truck producers and other transportation equipment companies, sell ‘transportation functions’ rather than equipment for transportation. An example could be an internet-based service order to expand temporarily (via satellite communications) the engine power in a truck that should pass the Alps or other mountain ridge. By an extra fee, the transportation company owning the truck will ask the equipment manufacturer or a service company to release (again via internet communications) more horsepower on an hourly basis during a given time period.

On a Pan-European level there are large-scale projects involving clusters of competences from different geographical areas that make up one or several European mobility initiatives. One example being TeleFOT a Large Scale Collaborative Project under the Seventh Framework Programme, co-

[21] Interview with Holger Czuday at Bayern Innovativ.
[22] www.clean-mobile.com

funded by the European Commission's DG Information Society and Media within the strategic objective "ICT for Cooperative Systems".

> *"TeleFOT aims to test the impacts of driver support functions on the driving task with large fleets of test drivers in real-life driving conditions. In particular, TeleFOT assesses via Field Operational Tests the impacts of functions provided by aftermarket and nomadic devices, including future interactive traffic services that will become part of driving environment systems within the next five years. Up to 3000 drivers in TeleFOT-equipped vehicles will be driving around in eight of the Member Countries involved in the project (Finland, Sweden, Germany, UK, France, Greece, Italy and Spain)."*[23]

In the TeleFOT project some of the involved clusters, companies and authorities are located in regions that were identified as highly significant (in Chapter 5) such as Västsverige in Sweden and Etelä-Suomi/Åland in Finland. Besides this, we have found participants located in regions not identified with our statistical approach, such as parts of Greece and parts of Great Britain and Germany. These latter agglomerations are not immediately recognised as important clusters or cluster initiatives by the employment statistics used in this mini-study.

According to interviews with automotive professionals, the auto industry traditionally has not incorporated much of electronics in transportation vehicles. Times have changed. Navigation equipment and systems within and around transportation vehicles have become a major tool for enhancing user value. More and more, navigation and tracking are integrated services in new vehicles. Here, the auto industry appears to be highly dependent on their 'first-tier suppliers' for advanced electronic devices and communications systems. It seems that the in-house innovations are rare.

Many suppliers have co-located with their main client companies, thereby able to interact closely and functionally with their neighbors, forming more resource-rich clusters of competencies.

In relation to mobile ICT applications, there are at least two types of R&D activity taking place in the auto industry: Competitive R&D and Pre-Competitive R&D. The Competitive R&D is specific for one company and performed by or for that company. The Pre-Competitive R&D is R&D performed by a joint effort by several auto companies or by a supplier that offers its innovations to more than one auto company. An example of Pre-Competitive R&D is the auto industry's "mapping of new technologies" of particular relevance to the industry.

[23] www.telefot.eu/files/file/1_TeleFOT_1stSH_Forum_Mononen(1).pdf

Mobility Initiatives in the Application Sector - Tourism

From a Mobility Industry perspective, the European tourism sector have been studied and described by a 2006 eWatch study, initiated by the European Commission's Directorate General for Enterprise and Industry. The study was performed by Saltzburger Research, located in one of the best-known tourism clusters in Europe (cf. Chapter 6). Some of the conclusions are summarised in the quotes below:

> *"Overall, customer expectations and market competition are the main drivers of e-business in the tourism sector, while the small size of most companies and the considerable costs associated with acquiring technologies constitute the main barriers for a stronger uptake of e-business. Considering ICT adoption and size of companies, the most outstanding result is that small tourism companies are more active users of e-business compared to their counterparts from other industries."....*

> *"As interactive maps become ever more sophisticated and GPS-enabled mobile devices become the standard, mapping technology will increasingly play a major role in the travel industry – before, during and after the trip. Especially location-based services to receive location- and context-aware information while travelling will become more popular" ."*[24]

Since 2006, when this eWatch study was published, there has been a significant development of mTourism, driven by advanced uses of mobile ICT and by the rapid penetration of internet-enabled 'smart phones'. A large market has opened up due to mobile access to internet, geo-positioning of relevant contents as well as the possibility for user-generated content.

> *"Nobody can neglect the power of Facebook and others social medias and there is a need to be proactive in this fast transforming mTourism market."* Markus Lassnig e-Tourism expert.

Cote d'Azur or the French Riviera is probably among the first European clusters of competencies that have embraced ICT to create and deliver mobile service for tourists, conference participants and business visitors. The cluster initiative emerged about ten years ago. Engaging local and regional authorities, chambers of commerce, agencies for travel, accommodation, events, etc., IBM Europe and other service-oriented companies developing new applications and solutions based on mobile ICT were among the pioneers. IBM France became deeply involved in what was then called mTourism programs, which soon became a hub for exchange of mobility experiences. European prices were awarded for particularly inventive and pioneering mTourism solutions as part of the first years of cluster activity.

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[24] eBusiness Watch, Sector Report No. 8/2006, e-Business in the Tourism Sector, Dec. 2006, prepared by Salzburg Research Forschungsgesellschaft on behalf of the European Commission, Enterprise & Industry Directorate General. To be downloaded from www.ebusiness-watch.org/studies/sectors/tourism/documents/Tourism_2006.pdf

The early cluster on the French Riviera and similar pioneering clusters for mTourism in Germany, Sweden, etc. seem to have suffered in their growth of early activity because of the generally slow development of relatively cheap and easy-to-handle mobile devices. More recently, along with the massive launch of 'smart' mobile phones, the cluster participants, including principal user groups (such as conference participants, festival attendants, museum visitors), seem to have created new, more advanced demands. This has given the cluster companies new ideas for invention and better resources for experiments and full-scale testing, and generally led to higher ambitions for enhancing mobile services and solutions.

Within the framework of this mini-study, it has not possible to identify one single flagship initiatives of mTourism or eTourism. Instead, we have found a large number of 'smart' mobility initiatives. One indicator of the new importance of the Mobility Industry is the growing number of tourist destinations that are using mobile ICT to enable platforms for place promotion and to enhance the experience of the individual tourist visiting a particular site. One example of an mTourism initiative receiving European attention is Hungary Tourism's application for 'smart phones'. Hungary Tourism allows users of 'smart phones' easy access to browse offers to tourists among hotels, restaurants, museums, scenic sights and spas. A comprehensive database of 25,000 locations across Hungary provides a variety of choices of accommodation and leisure activities.

In 2009, the Municipality of Venice launched a mobile service to guide tourists wanting to discover historic places in the city. "We anticipate that the solution will help the Municipality propel tourism and improve the quality of life for both citizens and tourists of Venice," Vice Mayor Michele Vianello declared. The project combines well-known technology for mobile telecom infrastructure (such as w-lan) and the visitors' mobile phones. To begin using the mobile service, the visitor downloads an application ("TagMyLagoon") on the mobile phone. For example, the application allows the visitor to interact with a network of passive tags, placed at various sites in Venice. By taking a picture of tag after tag, the visitor receives information in real time of the places he or she visits.

The TagMyLagoon application was developed by IBM as a pilot Human Centric Solution in cooperation with the Venice Municipality. It is expected to become an innovative application that will evolve into 'augmented reality', involving a city-wide cluster of users and producers of visitor services. The open architecture should allow users anywhere at any time to access information about tourist destinations, traffic and accommodations by using their own wireless devices and a city's existing WiFi or other mobile network. The simplicity of the localization system by the use of a city's existing network implies robustness and low maintenance costs as well as cost-effective mass-market diffusion. By new or emerging satellite-enhanced positioning systems, the service offerings using the individual's mobile devices among tourists and citizens will make mobility services even more interactive.

A third example of a similar initiative comes from the greater Speyside area in Scotland (www.greaterspeyside.com). What makes this initiative stand out from the others is that it's a private initiative started by two former owners of a hotel in the area. The initiative aims at increasing

knowledge of the area to visitors, where the cluster provides a Measurable tool for Promotion and Marketing, as well as increase co-operation between local companies and act as forum for Networking / Potential Partnerships and Collaboration.

> *"Effective use of the Internet is now critical to the future success of Scottish tourism and tourism related businesses. The greaterspeyside.com initiative provides local companies with a major opportunity for cost effective global marketing and promotion. GreaterSpeyside.com is truly innovative and provides a solid technology foundation for local tourism industry collaboration and global marketing of the area for mutual benefit. It uses the full range of emerging Internet technologies and provides real value to both potential visitors to the area and to local tourism businesses."*[25]

As shown, Mobility Industry applications of this kind are now becoming common in cities and regions across Europe, making it easy for citizens, visitors and other users to interact with sensors and devices by helping the service providers to locate, reach and guide visitors. These mobile applications permit service providers to measure, control and eventually predict and optimise flows and routes of visitors.

In Hungary, as e have just summarised, one single mobile application acts as a planning aid, a guide book, and a navigation system, providing its users with all the tools required for a vacation or day-trip. The application's comprehensiveness and the use of user-generated content and comments, in a new technical implementation make Hungary Tourism an example of best practice in the area of m-Tourism and Culture and provide an example of how mobile technologies can be a real aid while travelling.

In the case of Venice, with its extremely fragile ecosystem and degradation of its historic and artistic treasures, there is an urgent need for regulation of foot-traffic. The Venice Municipality needs cost-effective ways to use existing information and communications technology to guide tourists throughout the city and disperse some of the crowds into less trafficked areas, while improving the experiences of the visitors and enhancing the lives of its citizens.

In contrast to those regional initiatives that aim at promoting a certain place, city or region, we should remember that the publishing houses have traditionally been in lead with content generation. They all have digital offerings but their strategies are not clear, they know that they can´t neglect the digital wave but today it seems that they mainly see it as a complementary service and an ad on.

One example of mobility from the content side is the Austria-based company Tripwolf (www.tripwolf.com) that offers user generated content in combination with the traditional publishing house Footprint Books in a free smart phone. A mobility service set included in this application is an

[25] Dr Jim Hamill, Institute for Customer Advantage, University of Strathclyde, quote from www.greaterspeyside.com/membership.html

Augmented Reality Viewer where the viewer can see the places in a new light and by downloading the application get maps without expensive data roaming charges.[26]

Besides the technology push summarised in this chapter, the main mobility initiatives in the tourism sector seems to be coming from the end-users and from the industry itself, both in terms of traditional content owners (such as the publishing houses) and from the places and region. The opportunities opened up by mobility services are used by many regions as marketing channels in order to promote the regions and the particular place. Soon, all places in Europe can be expected to have some digital/mobile strategy and mobility initiatives in order to promote themselves and in the end attract more visitors.

The initial hypothesis that regions with a specialised tourism sector should be drivers of innovation and new services in mobility perspective seems to be true in one sense; there are a large number of initiatives in countries such as Austria, France and Italy. On the contrary this should be counterbalanced by two factors, one being that traditionally the southern parts of Europe is not so strong in ICT as the northern part and two the fact that regions that have a strong tourism due to the attractiveness of the geography as such does not have to be the most innovative in order to attract visitors.

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[26] http://www.tripwolf.com/en/page/iphone

9. The dynamics of the Mobility Industry

New Mobility Industry initiatives are likely to emerge in the intersections between the Enabling Sectors and the Application Sectors. This was the initial, general hypothesis for this mini-study. The first results from the mini-study confirm the hypothesis. Yet, to make the results more comprehensive and the mapping of the intersections between the Enabling Sectors and the Application Sectors more complete, additional empirical work needs to be done. The study should continue in order to allow for more detailed findings and general conclusions.

We have focused on clusters and cluster initiatives when exploring the depth and intensity in the interactions between ICT as enabler and various areas of applications that support mobility. Here, too, more investigations need to be conducted in order to understand better the actual dynamics of the contemporary European Mobility Industry.

During the course of this mini-study, we have found clear indications that there could be a strong and forceful dynamics in between the Enabling Sectors and the Application Sectors. Our interviews with a limited number of industrial innovation specialists in various clusters confirm functional linkages and causal relationships. From a long-term perspective and in hindsight, localised clusters with advanced ICT (and especially mobile ICT) as the principal competence area seem to have been real drivers of new applications into a wide variety of application areas, including tourism services, automotive and other transportation equipment and related services, etc.

Today, however, it seems as if the specialised clusters in the Application Sectors have become more of drivers of new products and solutions by exploiting effectively mobile ICT competencies that have become re-located and ‘implanted’ into the same Application Sector cluster. For example, in the cases studied in this mini-project, a range of mobile ICT competencies have become fully integrated elements of the automotive clusters. Highly specialised ICT professionals have been recruited and advanced ICT companies have migrated to the automotive cluster. In parallel, the automotive clusters under study have become nodes in pan-European networks, tapping into ICT clusters elsewhere and thereby enlarging their competence base by first-tier supplier relations outside of the localised cluster.

We have noted that similar patterns of relocation have emerged in other specialised application clusters such as those of tourism, conferences and other events.

A general explanation could be that mobile ICT and the competencies that follow are perceived as a utility, delivered at high quality independently of location. Becoming an even more generic field of technology, mobile ICT is considered part of the ‘basic platform’ for many different types of applications and market-driven solutions in virtually any sector of the economy and the wider society. In addition, the highly developed infrastructure of today’s Mobility Industry allows a redistribution of innovative capabilities that was not possible only a decade ago.

Appendix: On methodology

This Appendix contains a follow-up on the methodology used in this mini-study. Some of issues raised below were already presented in the previous parts of this document, especially in Chapter 4 (Methodology: How the study results were achieved). For example, we provide further details on the issue of classification of available and new indicators on the sectors under investigation. For more details, please consult the source material in the reference material and in the studies available at the website of the European Cluster Observatory at www.clusterobservatory.eu.

Statistical Definition of Enabling and Application Sectors

The statistical definitions of the Enabling and Application Sectors follow the definitions used by the Cluster Observatory in terms of NACE 2.0 and are described below. For the Automotive Sector some adjustments are made in order to get more useful statistical data and exclude clusters that are not relevant in the mobility field. The excluded sectors are 22.19 Manufacture of other rubber products, 23.11 Manufacture of flat glass and 23.12 Shaping and processing of flat glass.

IT (Enabling Sector)
26.11 Manufacture of electronic components
26.12 Manufacture of loaded electronic boards
26.20 Manufacture of computers and peripheral equipment
58.21 Publishing of computer games
58.29 Other software publishing
62.01 Computer programming activities

Telecom (Enabling Sector)
26.30 Manufacture of communication equipment
27.31 Manufacture of fibre optic cables
27.32 Manufacture of other electronic and electric wires and cables
27.90 Manufacture of other electrical equipment
28.23 Manufacture of office machinery and equipment (except computers and peripheral equipment)
61.10 Wired telecommunications activities
61.20 Wireless telecommunications activities
61.30 Satellite telecommunications activities
61.90 Other telecommunications activities

Tourism (Application Sector)
49.32 Taxi operation
55.10 Hotels and similar accommodation
55.20 Holiday and other short-stay accommodation
55.30 Camping grounds, recreational vehicle parks and trailer parks
55.90 Other accommodation
77.11 Renting and leasing of cars and light motor vehicles
92.00 Gambling and betting activities
93.21 Activities of amusement parks and theme parks

Automotive (Application Sector)
29.10 Manufacture of motor vehicles
29.20 Manufacture of bodies (coachwork) for motor vehicles manufacture of trailers and semi-trailers
29.32 Manufacture of other parts and accessories for motor vehicles
30.40 Manufacture of military fighting vehicles

Other statistical definitions

Employment

The number of employees working in a region/sector, represented by full-time equivalents where available and otherwise by the total number of persons employed.

LQ / Specialisation

Specialisation is also well-known in the literature as the Location Quotient. If a region is more specialised in a specific cluster category than the overall economy across all regions, this is likely to be an indication that the economic effects of the regional cluster have been strong enough to attract related economic activity from other regions to this location, and that spill-overs and linkages will be stronger. The 'specialisation' measure compares the proportion of employment in a cluster category in a region over the total employment in the same region, to the proportion of total European employment in that cluster category over total European employment (see equation).

Focus

If a cluster accounts for a larger share of a region's overall employment, it is more likely that spill-over effects and linkages will actually occur instead of being drowned in the economic interaction of other parts of the regional economy. The 'focus' measure shows the extent to which the regional economy is focused upon the industries comprising the cluster category. This measure relates employment in the cluster to total employment in the region.

If the number of employees in a cluster is less than 1,000 persons, the cluster is not given any stars to prevent the appearance of very small insignificant clusters.

Alternative approaches used in the literature are, for example, the measures of employment concentration (Gini coefficient or similar measures) or the share of employment in regional clusters identified as strong. The employment concentration measure can be applied either within the regional economy or within the cluster category across regions; in the former instance it comes close to our measure of 'Focus', in the latter, to our measure of 'Specialisation'. The measure for the share of employment in strong clusters comes close to a combination of our measures for 'Size' and 'Specialisation'. In our view the '3-star' approach offers a new way to combine these perspectives. The three approaches do give comparable results, although at a more detailed level some differences can occur.

Enterprises

The number of enterprises in a region/sector.

Regions with high specialisation in Tourism

Region	Region name	Employment	Specialization	Enterprises
AT33	Tirol	31 965	7.76	5 495
PT30	Madeira	9 079	6.18	1 104
ITD1/ITD2	Trentino Alto Adige	35 403	5.74	8 545
ES53	Illes Balears	44 069	5.52	
GR42	Notio Aigaio	10 707	5.45	
ES70	Canarias	75 750	5.31	
ITC2	Valle d'Aosta	3 925	5.23	743
PT15	Algarve	14 798	5.19	1 533
AT32	Salzburg	19 048	5.14	2 906
GR22	Ionia Nisia	7 465	5.08	
AT21	Kärnten	10 984	4.23	2 109
UKM6	Highlands and Islands	11 474	4.20	
UKD1	Cumbria	11 274	3.64	
CY00	Cyprus	20 623	3.41	2 785
AT34	Vorarlberg	7 212	3.41	1 012
FR83	Corse	4 195	3.30	738
AT11	Burgenland	3 336	3.27	409
IE00	Ireland	57 067	2.99	2 228
GR43	Kriti	13 017	2.98	
UKK3	Cornwall and Isles of Scilly	8 967	2.91	
MT00	Malta	5 944	2.78	1 083
PT20	Açores	2 833	2.54	740
DE80	Mecklenburg-Vorpommern	20 965	2.43	2 202
AT22	Steiermark	13 342	2.25	2 137
UKE2	N Yorks	13 006	2.23	
CH07	Ticino	5 894	2.20	439
UKK4	Devon	15 771	2.10	

Regions with high specialisation in Automotive

Region	Region name	Employment	Specialization	Enterprises
SE23	Västsverige	40 499	7.27	264
DE11	Stuttgart	112 784	6.83	208
FR43	Franche-Comté	21 275	6.27	52
ITF5	Basilicata	8 251	6.10	33
DEC0	Saarland	15 644	4.58	57
DE21	Oberbayern	82 142	4.50	126
DE73	Kassel	18 420	4.47	27
CZ02	Stredni Cechy	26 203	4.33	108
DE90	Niedersachsen	113 760	4.30	262
BE22	Limburg (BE)	11 644	4.22	41
DE22	Niederbayern	15 739	4.17	61
ITF2	Molise	3 196	4.13	15
DE26	Unterfranken	17 936	3.96	54
SK01	Bratislavsky kraj	12 494	3.73	28
SE33	Övre Norrland	4 329	3.54	84
DE12	Karlsruhe	37 160	3.49	114
ITC1	Piemonte	52 750	3.24	712
SE21	Småland med öarna	7 410	3.09	131
HU22	Nyugat-Dunantul	14 547	3.09	
ES22	Navarra	9 360	3.08	
AT22	Steiermark	11 363	2.96	59
CZ05	Severovychod	21 956	2.86	104
HU21	Kozep-Dunantul	14 518	2.86	
SK02	Zapadne Slovensko	11 377	2.70	49
FR25	Basse-Normandie	11 158	2.57	85
SK03	Stredne Slovensko	6 763	2.57	25
ES24	Aragón	16 125	2.56	
FR41	Lorraine	16 191	2.55	85
ITF1	Abruzzo	10 552	2.52	104
UKG3	W Midlands	32 165	2.44	
FR42	Alsace	14 681	2.42	64
PL32	Podkarpackie	9 377	2.31	153
BE23	Oost-Vlaanderen	10 549	2.28	46
FR30	Nord - Pas-de-Calais	26 348	2.24	112
DEB0	Rheinland-Pfalz	28 145	2.24	134
AT31	Oberösterreich	11 489	2.21	69
CZ03	Jihozapad	13 863	2.20	84
FR23	Haute-Normandie	12 059	2.13	61
BE21	Antwerpen	13 767	2.03	48

Interviews

2010-11-10 – Meeting with Professor, Christer Karlsson, Copenhagen Business School, Denmark.

2010-11-18 – Telephone interview with Johan P. Bång, CEO, Future position X, Sweden.

2010-11-16 – Telephone interview with Dr. Karl Rehrl, Head of Intelligent mobility department, Salzburg Research, Austria.

2010-11-16 – Telephone interview with MMag. Harald Suitner, CEO GIS cluster Salzburg, Austria.

2010-11-18 – Telephone conversation with Ing. Viliam Gonda, director of Department of informatics and communication Slovak Chamber of Commerce and Industry, Slovakia.

2010-11-18 – Telephone interview with Tímea Balážová, Project Manager, Slovak Investment and Trade Development Agency, Slovakia.

2010-11-19 – Telephone Interview and mail correspondence with Lenka Čelková Manager, The Faculty of Operation and Economics of Transport and Communications, University of Žilina, Slovakia.

2010-11-22 – Telephone interview with Gabriel von Lengyel-Konopi, Head Technology-Marketing Bayern Innovative, Germany.

2010-11-22 – Telephone Interview with Holger Czuday, Head of Automotive, Bayerische Innovations- und Kooperationsinitiative Automobilzulieferindustrie - BAIKA", Germany.

2010-11-23 – Telephone interview with Jan Unander, Executive Director, Telematics Valley, Sweden.

2010-11-24 – Telephone Interview with Björn Hallare, former Strategic Product Manager IMS Ericsson, now working for a large telecom company, in this report Independent Telecom Consultant, Sweden.

2010-11-25 – Telephone interview with Martin Snygg, Coordinator FPX-Lab, Future position X, Sweden.

2010-11-25 – Telephone interview with Dr. Markus Lassnig, Kompetenzzentrumsleiter e-Tourismus, Salzburg Research, Austria.

2010-11-25 – Conversation over Facebook with Wille Wilhelmsson, CEO and Founder of Feber.se, Sweden.

About the European Cluster Observatory

The European Cluster Observatory, launched in June 2007, is the most comprehensive database and knowledge platform for clusters and regional competitiveness in Europe. It is managed by the Center for Strategy and Competitiveness (www.hhs.se/csc) at the Stockholm School of Economics, and is funded by the European Commission, Directorate General for Enterprise and Industry.

The European Cluster Observatory website offers:

- Cluster mapping tools providing information on more than 40 cluster categories in over 250 European regions
- Regional competitiveness data and regional framework conditions
- Information, maps and lists of cluster organisations, science parks and other types of
- organisations involved in clusters
- A library that works as an open European depository for various cluster-related documents
- Reports on regional competitiveness, clusters, cluster policies and transformation of the European economic landscape

Please visit the European Cluster Observatory at **www.clusterobservatory.eu**.