Real distances matter. Regional concepts of innovation and regions of innovations

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1 ABSTRACT

"The revenge of Geography" was the title of an article in "The Economist" responding to an earlier article in the same journal in 2001. Even earlier, the book "The death of distance" (1997) emphasized the role of the internet and hypothesized that real distances will lose importance in real life through the development of internet applications. This article builds on existing and well discussed spatial concepts and the foundations of GIscience as a discipline over the last years and tries to avoid repeating the 'unique selling point' of spatial data. Instead it emphasises overlaps and synergies between GIScience research and regional innovation research.

2 SPACE MATTERS

When coming from a GIS or Geography background it seems to be natural to start with a slogan like "space matters". Space matters in the issues political scientists, economists, urban planners, public administrators and other social scientists and public policy professionals study. In the 1980s and 1990s GIS and spatial analysis methods were dominated by natural resource applications and by studying physical processes. Spatial analysis is entirely absent from most social science and public policy research methods. Increasingly, spatially integrated social science seeks to correct this shortcoming by integrating spatial concepts and GIS operations into social science.

The European Union's concept of the 'Information Society' claims that the spatial aspect is pertinent to a majority of information aspects (see ESPON Project 2.1.1 Territorial impact of EU Transport and TEN policies). The spatial dimension is a key component of the 'context' of objects, and affects our daily lives and actions. It is the concept of 'location' that provides the best general means of connecting virtual and real worlds. This connect in turn is required to provide business models for the information economy.

Understandably, GI-technology has been established to a certain degree in a few economic sectors, such as natural resource management, forestry, or spatial planning. Newer fields include real estate, insurance business or the health care sector, concerning epidemiology, hospital management and patient care logistics.

In general, economic interest in GI has risen significantly in the last few years and there is a strong demand from different branches for better data access, data standards and geodata business models, just to name a few hot topics in GIscience research.

3 INNOVATIONS AND REGIONS

Agencies being responsible for innovation transfer and business development have very little tradition in using spatially explicit tools. This may seem not to be logic since city and regional planners deal with physical space. They must understand spatial relationships between land use and transportation in the cities and regions they are planning. Spatial analysis of planning issues can help them plan more effectively (Huxhold et al. 2004). Planning support systems can inform their practice and are effectively supported by GIS-based applications. Still, spatial analysis is currently very limited and the question highlighted in the title of this paper – do real distances matter? – is not actively addressed.

The interaction between new technologies and job markets often appears in a linear economic argumentation. "This implies a modification in the productive combination of factors, the evolution of the relative productivity of each factor, and a change in the demand for each factor" (Ramioul 2006:100). Thus, technological changes are analysed basically in terms of economic growth, job creation and job destruction in different sectoral changes.

An obvious problem in assessing the actual effects of innovation on qualitative and quantitative features within a region is the fact that it is impossible to isolate the 'net effects' of technological change from the effects of other factors influencing the regional labour markets. The latter are only to some extent bound up

with technological innovation. Other factors include, for instance, market developments that affect labour in terms of changing demands on qualifications and skills. One recent, central example is the ongoing division of labour worldwide which affects both, unskilled and highly qualified workers. Another major effect is the growing demand for knowledge-based work in advanced economies.

Information technology has instigated a broad range of both, product and process innovations. As we will discuss below, the same holds true for the GIS and Geospatial information market. IT has and is still introducing new products to the markets; some of them have established cross-sectoral applications and needs, e.g. Internet applications and mobile phones.

An open question, though, is whether collaboration and the exchange of knowledge are made easier by geographical proximity. Typically, GIS and Geoinformatics had and still have a major focus on "tangible" information. When it comes to innovation many soft factors are relevant to explain why in some cases regions are known for innovative milieus and in other cases not. Ponds et al. (2007) stress the tacit character of knowledge. Geographic analyses still have proved the role of proximity in interaction between research institutes and firms as a crucial factor in innovation processes. Recently, a number of scholars criticised this view on geographical proximity as being oversimplified and argued that the precise role of geographical proximity for knowledge exchange and collaboration still remains unclear (Boschma 2005). In addition, we have to take into account that innovation in industry is different from scientific research (Gittelmann & Kogut 2003). What seems to be open is the question if exactly this difference is one of the reasons that a successful innovation region needs both, science-based research and industry R&D.

In our experience and in accordance with the state of the art literature the interaction between technological innovation and its measurable impact on e.g. labour markets cannot adequately be predicted either by economic models or by empirically based concepts. There are many factors and social constellations which must be pieced together to obtain a more complete picture of innovative regions. Nevertheless, one central argument for new technologies in public debates is the expected 'job growth' ensuing from future technologies. In fact, a whole range of technologies are expected to form the basis of new economic markets in the very near future and we expect Geospatial Information technologies to become one of the driving forces. Although there are other roots (see http://www.oreillynet.com/pub/wlg/3017) including the company Keyhole which was bought by Google later, the launch of the software Google Earth in July 2005 clearly marked a the beginning of a new area in the history of digital processing of Geographic information. Beyound technology, the major shift concerns the ability to annotate a publicly available (public or commercial) database and leverages a participation concept where everyday computer users can – for the first time in history – become producers of geoinformation. This change in the Geoinfomation world has become even more dynamic with the late but massive investments of Microsoft in this field including the launch of Microsoft Virutal Earth in 2006.

Next to information technology in general, biotechnology and nanotechnology and Geospatial technologies are increasingly mentioned as drivers in the culmination of different types of technology influencing and shaping our daily life. Since the gap between the development of a technological prototype and its adoption in the market can take several years these effects are difficult to predict. Or, as shown by past experience, the expected effects turn out to be less important than the unexpected ones. For example, the economic success of mobile technology was practically unpredictable, as were its social and cultural effects. The mass introduction of the Internet at the beginning of the 1990s offered a change in the technological paradigm of production and distribution patterns, and the various and complex effects it had on the labour markets were not foreseen either. For Geospatial technologies rapid technological developments are still ongoing but their potential and full impact on society are difficult to predict since they depend on external factors such as future data policy and organisational structures.

Ponds et al. (2007) analysed the role of geographical proximity for collaborative scientific research in science-based technologies between universities, companies and governmental research institutes. The authors argue that, in the case of collaboration between academic and non-academic organisations (such as academic-company relations), geographical proximity may be supportive in establishing successful partnerships between organisations with structurally different institutional backgrounds. Geographical proximity may help to overcome these problems, because of a common interest in exchanging labour, accessing local funds and mutual trust induced by informal contacts and interaction. By contrast, when

organisations with the same institutional background collaborate in research, that is when institutional proximity is high as in the case of two universities, successful interaction is less dependent on geographical proximity as collaboration takes place within a common framework of incentives and constraints. Thus, Ponds et al. hypothesized that research collaborations between organisations with different institutional backgrounds occur more often over short geographical distances than research collaborations between organisations with the same institutional background. In essence, the authors could demonstrate that Geographical proximity can be very important in a more indirect way by overcoming possible difficulties due to differences in institutional or organisational backgrounds such as in academic-company or academic-governmental collaboration. In the reminder of this text we will build on these concepts and will elucidate a regional case. In the absence of hard data we use a narrative presentation style – untypical for a Geoinformatics paper – maybe less unusual for a GIscience paper.

4 CLUSTERS AND INNOVATION CONCEPTS

Clusters consist of different interest groups. All stakeholders involved in a technology-oriented (regional) innovation strategy need to have a common understanding of their manifold relations with respect to the market.

A systems approach to innovation may be characterised by the acknowledgement that innovations are achieved through a network of various actors - innovators, local clusters and the cross−fertilising effects of research institutions - supported by institutional structures. In this context, regions have become more and more the "bases of economic coordination and governance at the meso−level between the national and the local (cluster or firms)" (Lundvall & Borrás, 1997, p 39, and Asheim & Coenen, 2004). The current situation in Salzburg, namely a range of regional instruments complementary to national programmes and schemes, reflects this argument. Hence, the increasing importance of the regional level is acknowledged by various studies on clusters in Europe. There is a common understanding that regional resources and collaboration are pre-requisites in stimulating economic activity in the clusters which ultimately constitute a Regional innovation system (RIS). Althoug there is no 1 to 1 relationship, Clusters and RIS are closely related. Clusters are sector-specific and characterised by a (relatively) high density of functionally related actors. RIS on the other hand, can (but need not) stretch across several sectors. Clusters and RIS may co−exist in the same region and the RIS may in fact contain several clusters. However, a cluster is not necessarily part of a regional innovation system.

With the above mentioned cooperation between Salzburg and NRW (BRIDGE2GEO) the clusters[1] of both regions build up strategic networks in selected industries (Tourism, Health, Energy, Trade, and Environment and Security). Keeping in mind that Tourism and Health are key sectors in Salzburg's innovation strategy (and Energy has been declared to become one) – BRIDGE2GEO is therefore the attempt to integrate GI more strongly in the region's innovation system.

The double impact of the above mentioned transdisciplinary projects with exemplary character is being realised in a cooperative project concerning regional energy resources. An analysis of the Bonn/Rhein-Sieg Regions renewable energy potential, energy consumption and the potential for energy autarky has been developed by a Salzburg research institution (iSPACE) in close cooperation with the regional business development agency (Rhein-Sieg). In the process of generating a strong simulation tool to support decisions on different social levels various players are integrated (politics, business politics, real estate investors, renewable energy industries, house owners…).

Starting from a geoinformation tool based on the regions energy ressources a regional innovation process has been triggered. Different elements and stakeholders of a broad economic and social movement caused by growing difficulties to guarantee for regional energy supply shall be structured on the basis of a public interactive tool reflecting regional energy potentials. Thus, the GI-input triggers a regional innovation system concerning a distinct problem (energy) and at the same time gets a strong impulse for further transdisciplinary R&D-activity in a distinct regional technology focus (GI).

[1] While in Salzburg a formal cluster has been established in 1999 (see www.giscluster.at) in NRW there is currently no formal structures but an increasingly strong interest group which shall evolve into a formal cluster

Technology transfer is a key determinator of a region's innovation potential. The number of research actors within the RTD-driven GI-clusters is considerable. Research is done by SMEs and research institutes alike. Problems arise through "cooptition" (cooperation and competition) which shall desribethe double-faced relation of "co-operating" but "competing" within a cluster/network). Thus, for all actors involved, including regional authorities, the development of an overall regional RTD strategy is essential for a sustainable RTD policy within the European Research Area.

5 THE SALZBURG REGION AS A GI RESEARCH HOT SPOT

In the **official regional strategy plan** (Wirtschaftsleitbild des Landes Salzburg) Land Salzburg (the province of Salzburg, its government respectively) has declared the support of SMEs in the process of Innovation and Technology Transfer (ITT) to be a prime target in order to achieve increased competitiveness of the region.

To this end, a **concept for building "visible" and sustainable ITT in the region** has been elaborated by the Institute of Logistics and Business Management, Hamburg Technical University. The concept foresees a wide range of ITT-building measures. Some of the most relevant ones are recently further developed jointly by the region of Salzburg and North-Rhine Westphalia (NRW) within an EU-FP7 project called BRIDGE2GEO.

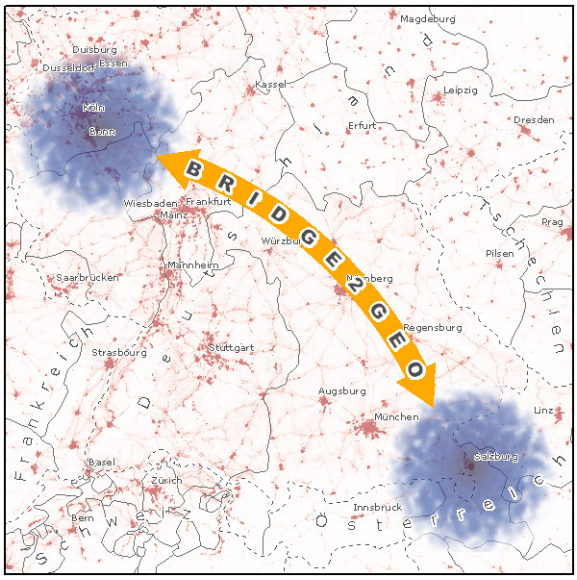

Fig. 1: The two innovation regions which are target and platform within the EU proct BRIDGE2GEO.

In the Wirtschaftsleitbild, Geographic Information has been defined as a promising sector of the region for which a bottom-up approach shall be applied. Such an approach requires initiative of stakeholders, and the initiatives of the RTD-driven network in the region, the **GIS-Cluster Salzburg**, have led to a **joint collaboration with the regional authorities** which has become manifest in the BRIDGE2GEO proposal. NRW has supported Geographic Information since 1999 by the **"Spatial Data Infrastructure (SDI) Initiative NRW"** (German: GDI-NRW), which, in 2006, was embedded into one of the NRW Innovation Clusters. Although the cluster development in North Rhine Westphalia started much later, it is politically high on the agenda. With support from the state chancellery, the GEOcluster NRW serves as a roof organisation for cluster activities in different regions. The shaping of regional Geoinformation clusters concentrates around the universities of Bonn and Münster as networking activities have received a strong initial impulse by these research institutions. The cluster management has been taken up by local regional authorities like technology and business development agencies which serve as platforms for joint activities (e.G. joint exhibitions at fairs) of GI-SMEs and research institutions. In this context, the embedment of SME business activities in an overall "GeoBusiness region"-identity was controversially discussed within the SME community.

For simplicity, we consider the two cases as being contrary in regard to their maturity / immatureness. Today, in both regions GI industry is characterized by small-scaled economic structures and by a strong involvement of research institutions also in economically relevant activities.

The Clusters in NRW and Salzburg have a pre-dominant focus on GI as an interdisciplinary and cross-sectional matter ranging far into today's Information & Communication Technologies (ICT).

The role of GI is reflected in the structure of the regional (NRW, Salzburg) clusters. In NRW, a strong contribution – and influence – of state authority is given by the role of the "Landesvermessungsamt NRW" whose director presides over the NRW GEOcluster. Here, the "sovereign character" of geodata has twofold effects. The political regard for this topic signifies more than just the market turnover of GI-industries, in fact, the macroeconomic benefit of a broad and intelligent use of geodata has been taken into focus at a politically high level ("Bundeskommission Geoinformationswirtschaft" c/o Federal Ministry of Economy). On the other hand, there is a strong controversy about business models reflecting the role of state institutions (Landesvermessungsämter) in a more appropriate way to support a broader use of GI.

In Salzburg, the interdisciplinary character and the wide range of possible application of GI finds its structural response in a strong and somewhat dominant role of research institutions. Under this influence, SMEs tend to act more development- than product-orientated and prefer very small and volatile structures.

On the whole, the span between regional maintenance and regional rights to geodata and rapidly developing global systems (Google, Microsoft) is a challenge to regional innovation concepts bundling regionally grown expertise of individual stakeholders. The role of communication has become more important: the locational aspect of data belonging to different subsystems (as health, energy, a.o.) needs a very precise transdisciplinary exchange. A clear location-based view of - e.g. epidemiological – questions means a new dimension of solution-oriented thinking, which has to be developed interactively.

The regional innovation system has to support both: a public attention to the – rapidly developing – role of geodata and GI-systems as well as communication structures supporting the development of transdisciplinary pilot projects which are apt to demonstrate the broad economic and social benefit from geoinformation.

Why do innovation cluster sometimes work and sometimes not? Why did it work in the case of Salzburg and GIS/Geoinformatics? Simply speaking: we don't know it exactly. It worked. As the reader will expect the scientific answer is much more complex and will still not be complete. One widely known effect is in colloquial terms called the godfather effect. Sometimes one single person can at least start an innovation process if the the innovation comes at the right time and falls on fruitful ground. It is known from many examples that a very small group of persons or even a single person can stimulate the innovation regionally.

A second aspect taken into consideration within our topic is the multiplicity of scales in interrelations. Research has relatively rarely addressed the issue how various spatial system dimensions actually relate to each other or could be combined (Bathelt & Depner, 2003; Bunnell & Coe, 2001; Cooke, 2002; Fromhold-Eisebith, 2007). Especially when it comes to bridge geographic scales in studying innovation, Fromhold-Eisebith (2007) goes even further and claims that theoretical considerations have hardly been connected with ideas for application, and she claims that most work has rather been descriptive instead of constructive. This paper does not include empirical studies about the history of the GIS – GIscience innovation system in Salzburg. We can only descriptively report for the case of Salzburg with relatively little delay GIS-related research started around the year 1986/87 regionally (SAGIS feasibility study), around the year 1988 nationally (various GIS implementations in federal, pronvincial or regional authorities including the Austrian "Länder" (provinces) and several national park adminstrations.

the concept of a Geo-Information Society is built on three pillars: (i) geospatial data as digital representation of much of our world, (ii) positioning services putting people, assets and other 'objects' into this context, and (iii) mobile telecommunication connecting everything and providing access for users (Fig 2).

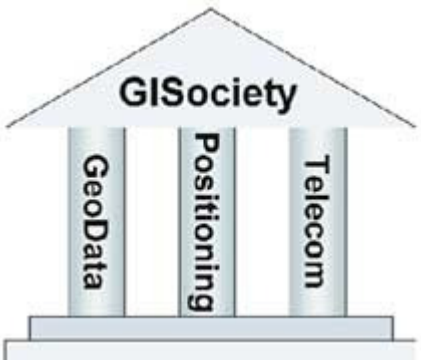

Fig 2 The Geo - Information Society

Future societies will have to deal with the integration of geospatial data into daily life – in general public and in economy.

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