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Constructing Regional Advantage at the Northern Edge

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Abstract

In this paper we have analysed how a territorially contextualized triple helix model can contribute to the formation of regional innovation systems. We have argued the need for changing target levels, towards a more systemic approach based on collective, community-based learning, as well as aim of innovation support, towards more pro-active behavioral change based on associative governance. As empirical illustrations we have made comparisons between three contrasting clusters representing different knowledge basis, and their actual and potential linking to regional innovation systems of different types. The three clusters were the furniture cluster of Salling in Denmark with a synthetic knowledge base and a grass-root RIS; the agrifood cluster in Saskatoon, Canada, typically analytical based with a dirigiste RIS; and lastly the food cluster of Scania, Sweden, currently under construction but with the ambition to shape a networked RIS, drawing on both analytical and synthetic knowledge bases.

Constructing Regional Advantage at the Northern Edge

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Introduction

Pressed to secure competitiveness and employment in a globalizing economy, with firms competing for markets around the globe, policy makers in OECD countries have become increasingly interested in concepts related to the learning economy (Lundvall and Johnson, 1994) as well as the knowledge-based economy (OECD, 1996). This arguably paradigmatic change in thinking 'real' economic development is grounded in two basic ideas: firstly that knowledge is the most strategic resource and secondly that learning is the most fundamental activity for the competitiveness of firms, regions and nations[1]. According to this rationale, innovation is essential for economic growth, thus, the contemporary economy is understood beyond the perspectives of mainstream economics (Lundvall, 1998). This notion lies at the core of the systems of innovation approach. Characteristic for this approach is the acknowledgement that innovations are carried out through a systemic networking of various actors underpinned by an institutional framework (Edquist, 1997)[2]. These actors often belong to the 'triple helix' of industry, university and government (Etzkowitz and Leydesdorff, 2000). Institutions, understood as sets of common habits, routines, established practices, rules or laws, regulate the relations and interactions between these actors (Edquist and Johnson, 1997). Initial and breakthrough work on innovation systems was predominantly carried out on the national level, gathered under the National Innovation Systems (NIS) approach (Freeman, 1987; Lundvall, 1992; Nelson, 1993). In the meantime, a set of varieties of innovation systems have been established taking sectors (Sectoral Innovation Systems), technologies

[1] As suggested in the term, the learning economy puts more emphasis on the activity of (both adaptive and developmental) learning while the knowledge-based economy is more concerned with the stock of knowledge as well as with new knowledge creation. In Asheim and Coenen (2006) we argue that the former is more inclusive as it encompasses all sectors in an economy (as opposed to the latter which has a heavy focus on high-tech sectors).

[2] The distinction between learning and knowledge-based economies, furthermore, implies the use of different definitions of innovation systems. In a learning economy a broad definition of innovation systems as constituted by D(oing), U(sing) and I(nteracting) is applied. Such innovation systems are typically found in non-R&D based learning economies (e.g. Denmark), mainly producing incremental innovations. On the other hand, in a knowledge-based economy a narrow definition of innovation systems characterised as a S(cience), T(echnology) and I(nnovation) based system is favoured. This type of innovation system more often generates radical (product) innovations than a broadly defined innovation system (Jensen et al., 2005).

(technological systems) or specific territories (Regional Innovation Systems) as their point of departure [3].

In fact, one can witness an increased attention for the importance of geography in the learning economy. This is partly due to a set of regional success-stories, such as that of the highly innovative Silicon Valley (Saxenian, 1994), as well as the popularity of the cluster concept (Porter, 1990; 2000). Increasingly, a "concentration of 'interdependent' firms within the same or adjacent industrial sectors in a small geographic area" (Isaksen and Hauge (2002, 14) is seen as *the* source and carrier of competitive advantage. This argument can be traced back to the enhanced capacity of territorial agglomerations to promote innovation among its constituents (Marshall, 1919). The cluster concept has proven to be highly user-friendly, diffusing easily among a wide variety of policy-makers across the world. Even though it has received sharp criticism for being too fuzzy both in terms of its key concepts and its geographical demarcations (Martin and Sunley, 2003), its proliferation has contributed substantially in promoting endogenous regional economic development based on innovation and interactive learning between territorially agglomerated economic agents (Benneworth and Henry, 2003).

At the conjunction of the systems of innovation approach and the cluster concept we find the Regional Innovation Systems (RIS) approach, first introduced by Cooke (1992) and further developed by (among others) Asheim and Gertler (2005), Braczyk et al. (1998), Cooke et al. (2000) and Nilsson et al (2003). It provides an amalgam of earlier ideas and theories on territorial innovation models in a knowledge-based and learning economy (Doloreux, 2002). A regional innovation system is generally defined as the systemic interaction between (1) the regional production structure or knowledge exploitation subsystem which consists mainly of firms, especially where these display clustering tendencies and (2) the regional supportive infrastructure or knowledge generation subsystem which consists of public and private research laboratories, universities and colleges, technology transfer agencies, vocational training organizations, etc. The RIS approach takes its vantage point in localized learning processes and 'sticky' knowledge

[3] For a state-of-the-art overview see Fagerberg et al. (2004).

as a source of competitive advantage for firms, regions and countries (Asheim and Isaksen, 2002). It emphasizes the territorially grounded nature of learning processes, either involving local or extra-local knowledge flows (Asheim, 2002). Thereby learning between economic actors is considered an inherently social process (Lundvall, 1992), opposing traditional, neo-classic approaches which have reduced knowledge to ubiquitous free-flowing information. It can be interpreted as situated action in which the organizational and institutional context provides structures and shared meanings for action and communication in which people are able to learn (Nooteboom, 2000).

Similar to clusters, the RIS approach has found considerable resonance among policy-makers, particularly as a tool to promote innovativeness among small and medium-sized enterprises (SMEs) by connecting them with the regional innovation support infrastructure (Asheim et al., 2003a). Compared to cluster-based policy tools, the RIS approach employs more explicitly a systemic perspective on innovation (Edquist, 1997) as its guiding principle. As such it seeks to enhance stronger collaboration and association between innovating partners (Cooke and Morgan, 1998) recognizing that innovation is fundamentally a localized (though not exclusively local), path-dependent and interactive process between the triple helix of industry, government and university (including other higher education and research institutes). In the introduction to the second edition of the book 'Regional Innovation Systems' Cooke (2004a) explains the continuing Nordic success in the new economic geography of the 21st century through sectoral specialization in an increasingly entwined and interdependent regional triple helix. This could partly be attributed to the typical 'coordinated' (Hall and Soskice, 2001) or 'social-democratic' (Amable, 2000) variety of capitalism, which fosters economic coordination and collaboration, typically found in these countries and its regions. Following the aforementioned argument that learning is an inherently socially situated process, we argue that it is important to acknowledge and analyze how the knowledge dynamics of the triple helix within regional innovation systems can be shaped differently because of industry-specific and territorial-institutional (multi-level) dimensions.

In previous work we demonstrated how there is a different logic in constructing regional innovation systems dependent on the predominant industrial knowledge base. (Asheim and Coenen, 2005). In a synthetic knowledge base, innovation takes place by application or novel combination of existing knowledge which highlights the importance of applied, problem related, engineering knowledge often produced through inductive processes. In industries drawing on a synthetic knowledge base the main aim is to support and strengthen localized learning of an existing industrial specialization, i.e. to promote historical technological trajectories based on 'sticky' knowledge. In an analytical knowledge base, innovation is more strongly shaped through the creation of truly new knowledge which highlights the importance of scientific knowledge often based on deductive processes and formal models. In industries drawing on an analytical knowledge base it is a question of promoting new economic and technological activity at the start of an industrial life-cycle requiring close and systemic industry-university cooperation and interaction in the context of e.g. science parks, located in proximity of knowledge creating organizations (e.g. (technical) universities).

Especially now that RIS and cluster policy have become more and more common and widespread, it has become increasingly important to address industrial and territorial differences in order to make such policy more effective (and avoid best practice models). Taking an actor-based vantage point, this chapter addresses the question how a dynamic and contextualized triple helix model can contribute in constructing regional innovation systems that are sensitive to their industrial and territorial preconditions. In doing so it dismisses a static perspective on RIS but acknowledges Etzkowitz and Leydesdorff's (2000) argument that within an innovation system "the subdynamics and the levels are […] reflexively reconstructed through discussions and negotiation in the Triple Helix" (p. 113). Thus, a dynamic triple helix model refers not only to changing relationships between university, industry and government but also to internal transformations within each of the spheres (e.g. university's 'third mission' of direct contribution to industry as well as to society in general). The objective of this chapter is to take a closer look at how localized learning processes and interactive innovations are shaped differently among industry, university and research centres and the public sector in different regional

innovation systems by comparing three contrasting RIS. For this purpose we choose to compare a typical synthetic knowledge based, market-driven, grass-root RIS – furniture production in Salling, Denmark – a typical analytical knowledge based, science-driven dirigiste RIS – agrofood in Saskatoon, Canada – as well as current efforts to construct a networked RIS for the food industry in Scania, Sweden[4]. The following section elaborates further on the rationale and form of RIS policy. This is followed by a closer look at social capital and collective learning in communities of practice as specific conceptual tools underlying the construction of RIS. The last section provides the case-study based comparison between the Salling, Saskatoon and Scania regional clusters followed by the conclusions.

The added value of regionalizing innovation policy

Before we start addressing how RIS could be constructed, it would be necessary to discuss the arguably increasing popularity of the regional level for innovation policy. In other words, what is the added value of a regionalization of innovation policy? Even two typical proponents of the national innovation systems approach 'admit' that "the region is increasingly the level at which innovation is produced through regional networks of innovators, local clusters and the cross-fertilizing effects of research institutions" (Lundvall and Borràs, 1999, 39). Edquist et al. (2002) are however more cautious with regard to the importance of collaboration between firms and the regional knowledge infrastructure based on disappointing results in their survey on product innovators in the Swedish East-Gothia region. Various other empirical studies across a range of industries and regions observe that both local and distant networks are often needed for successful cooperative innovation projects (e.g. Cooke et al., 2000; Gertler and Levitte, 2003; Lagendijk and Oinas, 2005).

To simply assume that collaboration in innovation is best facilitated within the confines of a region due to the virtues of spatial proximity between co-located enterprises would not reflect the realities of on-going globalization processes in the learning and knowledge-based economy (Cooke, 2005). While the presence of social interaction, trust

[4] The concepts grass-root, dirigiste and networked RIS originate from Cooke (1998).

and local institutions represents important supporting conditions for clustering (Maskell et al., 1998) this does not necessarily exclude that both local and non-local knowledge is needed for successful cooperative, innovative projects, in order to go beyond the limits of the region (Asheim and Herstad, 2003; Cooke et al. 2000; Isaksen, 2005; Tödtling et al., 2005). Similarly, the 'local buzz, global pipeline' metaphor stresses the complementary non-local connections that clusters need to tap into to absorb new and valuable knowledge created in other parts of the world and which prevent an adverse cognitive and economic lock-in (Bathelt et al., 2004). This affirms that interactive learning does not need to be territorially confined as the actual explanatory power of proximity does not pertain to its quality of being physically close together as such but because of closeness in terms of relations (e.g. through organizations and networks), reference and knowledge (e.g. norms, values, rules of thought and action) (Coenen et al., 2004; Torre and Gilly, 2000). Rather, the inherently interlocked character of a regional system in overarching structures and institutions refers to a state of *multi-level interdependence* (Howells, 1999). This does not imply any claims for total regional economic sovereignty yet allows for core economic activities within a value chain (including their governance structure) to be concentrated in specific regions (e.g. in the form of clusters) (Asheim and Coenen, 2006). In this light, the systems of innovation approach offers a more pragmatic and policy-benign interpretation of systems as innovation networks underpinned by an institutional framework (Kaufmann and Tödtling, 2001) compared to a Luhmanian social systems interpretation (Bathelt, 2003) which tends to 'over-abstract' the substantial and material content of innovative interaction (Asheim and Coenen, 2006; Miettinen, 2002). As such, regional innovation systems are conceived as open, socially constructed and linked to global, national and other regional systems of innovation within a multilevel governance perspective (Cooke et al., 2000).

Thus it is important not to interpret a RIS as a NIS writ small. Even though the definition of a RIS certainly resembles that of a NIS, i.e. the specific national interplay between the prevailing economic structure and the institutional set-up (Lundvall and Maskell, 2000, p. 362), an important distinction lies in the notion of embeddedness. This refers to the importance of personal relations and networks for economic action and outcomes

ingrained in a social and cultural context through social integration (Granovetter, 1985). Innovation system analyses on the national level often involve a plethora of actors and institutions (i.e. system integration). This makes it difficult to study how embedded learning processes actually take place across the totality of the national system. The problem is sometimes resolved by focusing on specific, important and innovative sectors in the national economy (see for example Edquist and Lundvall, 1993), which, in turn, are often regionally concentrated (e.g. the industrial district of Sassuolo in Emilia-Romagna in the Third Italy (Russo, 1989)). Against this background, Mietinnen (2002) concludes in his review of NIS literature to employ more disaggregated 'reduced-form innovation systems' as the basic unit of analysis. This does not conflict with received wisdom that the national environment remains highly significant for innovating firms (Asheim and Gertler, 2005; Cooke 2004b; Gertler 2004) nor does it downplay the importance of extra-local knowledge. It can be argued, however, that RIS provides a more grounded approach to situate socially and institutionally contextualized empirical analysis of innovation systems acknowledging the role of embeddedness to its full right.

In this context it is crucial not to treat geography as simply referring to physical space but as socially constructed, relational space (Morgan, 2004). In a regional innovation system it is therefore insufficient to only rely on the static assemblage of innovating agents and institutions. The system derives its salience from localized and dynamic patterns of communication, search, learning, knowledge-sharing and innovation. For this the regional innovation system leans on its clusters' scope for enhanced knowledge creation and circulation.

> "When firms co-locate, a spatially defined community is usually formed that makes it easier for them to bridge communication gaps resulting from heterogeneous knowledge endowments. The innovative capabilities of firms are enhanced because co-location can provide them with an arsenal of instruments to obtain and understand even the most subtle, elusive and complex information of possible relevance" (Malmberg and Maskell, 2002).

The term 'community' acknowledges that the innovative milieu should not be taken for granted but recognizes its deeply constructed nature. However, the assemblage of actors

can be extended to include the two other constituents of the triple helix, namely university and government, as important players.

Following insights gained from economic geography and regional studies, regions are more and more seen as starting points for national and supranational (e.g. EU) policy measures pursuing not only traditional redistribution targets (exogenous regional development) but progressively also as active arenas of economic force and growth in their own right (endogenous regional development) (Cooke et al., 2000). From an innovation policy point of view, the latter rationale is of course most relevant. In line with our previous argument about the sharper analytic focus of the RIS approach, regionalization holds the potential for improved 'on-the-ground' policy know-how about the specific conditions of the regional action level. Measures can thus be formulated, implemented and monitored in a more targeted way. As Nauwelaers and Wintjes (2002, 205) argue:

> "The non-anonymous relations, the complementarity of activities and the historical setting are stressed in the regional context. […] Further, in order to find out and articulate what a particular region or firm needs, or what is lacking concerning innovation, regional proximity and communicative interaction may be needed to address the tacit and latent aspects of such needs."

However, all this stands or falls with the capacity of the policy apparatus to embrace a more discursive and interactive approach to policy-making, which aims to bring about a process of collaborative problem-solving between the public and private sectors within the region (Cooke and Morgan, 1998; Henderson, 2000). As such it is crucial not to merely lean back and assume that the regional level is "the basic level at which there is a natural solidarity and where relations are easily forged" (EC, 1994 quoted in Henderson and Morgan, 2001) but to recognize the need for deliberate and conscious efforts on the part of firms, public agencies and research and education institutes.

In sum, when accepting that the regional level qualifies as an effective starting point to enhance innovation, the RIS approach is regarded as the most comprehensive intellectual framework to guide policy action (Asheim et al., 2003a; Landabaso, 1997) because it

provides an amalgam of earlier ideas and theories on territorial innovation models in a knowledge-based economy (Doloreux, 2002).

Approaches to regional innovation policies

Drawing on findings from the SMEPOL[5] project, SME innovation policy tools can be classified in two dimensions, resulting in a four quadrants table (Figure 1) (Asheim et al. 2003a). The table distinguishes between two main aims of the support tools. Some tools aim at giving firms access to resources that they lack to carry out innovation projects, i.e. to increase the innovation capacity of firms by making the necessary resource inputs available, such as financial support for product development, help to contact relevant knowledge organisations or assistance in solving specific technological problems. The other type of instruments have a larger focus on learning, trying to change behavioural aspects, such as the innovation strategy, management, mentality or the level of awareness in firms.

Figure 1: Two-dimensional classification of main innovation policy instruments (Asheim et al., 2003a)

	Aim of innovation support	
Target level of support	*Assign lacking resources to firms: Support the accomplishment of innovation projects*	*Learning to innovate: Change firms behavior*
Firm oriented	Financial support Brokers	Mobility schemes
(Regional) system oriented	Technology centres	Upgrading of regional innovation systems

Following a more pro-active and dynamic perspective to innovation policy, the objective of policy instruments is not solely to provide scarce resources (such as financial assistance) to innovating firms per se, but also to promote learning about R&D and

[5] SME policy and the regional dimension of innovation. SMEPOL was financed by the EU Commission's TSER (Targeted Socio-Economic Research) programme.

innovation and the acquisition of new routines within firms. Lack of demand is often a bottleneck for financial incentives to innovation activity, i.e. that firms initially do not see the need to innovate, or alternatively, that firms do not have the capability to articulate their need for innovation. Some policy instruments should, therefore, also attempt to enhance demand for initial innovation activity of firms (i.e. apply a learning perspective), and, thus, must include an explicit behavioural aspect with an ultimate policy target of promoting the endogenisation of innovation activity of enterprises.

The other dimension includes the target group of instruments. Some tools focus on innovation and learning within firms, to lower the innovation barriers of firms, such as lack of capital or technological competence. Other instruments to a larger extent have regional production and innovation systems as their target group, aiming at achieving externalities or synergies from complementarities within the regions. The barriers may for example be lack of user-producer interaction or lack of relevant competence in the regional knowledge organisations to support innovation projects.

In the SMEPOL project the need for a more system-oriented as well as a more pro-active innovation based regional policy was emphasized. A re-orientation of what was called *the target level of support*, changing innovation policies towards SMEs from being firm-oriented to *a (regional) system-oriented* perspective has already gained a growing attention among researchers and policy makers (see e.g. the research project 'Nordic SMEs and regional innovation systems' funded by Nordic Industry Fund (Asheim et al., 2003b)). However, the second part of the recommendation concerning the *form and focus of support*, which is crucial for more pro-activity and implies a change of focus from allocation of resources for innovation to focusing on *learning aiming for behavioural value-added* has not been implemented to the same degree.

Constructing RIS: social capital and community-based learning in a triple helix

We argue that the shift towards more pro-active policy fits well with a (dynamic) triple-helix perspective, which has been given an increased attention among policy makers as well as researchers within innovation research. However, so far this perspective has been

applied in a rather static way, more like a heuristic device than as a basis for actual policy formulations. This is also the weakness of the approach, as it does not give much guidance concerning how a triple-helix based collaboration could be functional, operational and implemented in concrete policy settings in order to contribute to constructing regional advantage. In order to achieve this, theoretical and practical advice must be developed partly with respect to how collaboration between the three actors of the triple-helix, i.e. the industry, university and government, should be externally organized, and partly with respect to how knowledge creation and innovation oriented work should be organized internally among the different actors, thus turning the macro-, meso-, and micro-levels of the triple-helix into knowledge creative environments (Hemlin et al., 2004). Independent of the specific triple-helix context policies have been formulated and implemented promoting SME's contacts with R&D institutes and more frequent use of R&D, while universities at least in Finland and Sweden for some years have been given a so called 'third role', i.e. to cooperate externally with the surrounding society in addition to doing research and teaching. However, so far little or nothing has been done concerning changing behaviour of the third actor of the triple-helix, i.e. the government, as well as with the triple-helix system as a whole. An important part of this is to develop a more innovation oriented public sector in a sustained fashion, which means focusing on pro-active learning to innovate at both universities and government at different geographical levels (national, regional and local), in addition to doing the same with the private sector.

However, surprisingly little work has been conducted on the interactions in terms of knowledge flows and learning linkages connecting the (triple-helix) actors in a network of an innovation system (Archibugi et al., 1999). This fits uncomfortably with the dynamic perspective implied in the learning economy and calls for a shift from a static position of possession of knowledge to a more dynamic position of practice of knowledge (Amin and Cohendet, 2004; Brown and Duguid, 2002). In policy terms such a shift towards a pro-active, learning-to–innovate based policy is often recognized in the concept of 'regional experimentalism' (Sabel, 1996 in Henderson, 2000: 349) in which the triple helix of industry, government and university

> "work in small-scale repeated interactions in an attempt to (re)define regional development support services and priorities in a collective manner, establish specific targets and responsibilities, and monitor outcomes in a way that facilitates learning on the part of those in a position to respond. This regional development agenda relies less on learning as a means of incremental adaptation to existing routines, than as a form of strategic and experimental goal-setting which, it is argued, can help firms and regional support organizations question the validity of existing support structures and adapt to future challenges".

In this, regional experimentalism bears close resemblance to the notion of regional development coalitions (Asheim, 2001; 2002) and system-oriented, learning-based policy tools (Nauwelaers and Wintjes, 2002). Examples of such regional innovation policy can be found in the European Commission's article 10 programs: RTP (Regional Technology Plan), RIS (Regional Innovation Strategies) RITTS (Regional Innovation and Technology Transfer Strategies) and the most recent Innovative Actions. Also the Norwegian REGINN program as well as in the Swedish VINNVÄXT program (a more detailed account is presented in the last section) have incorporated a more comprehensive innovation policy approach building on broad participation and engagement and with emphasis on collective learning.

Henderson and Morgan (2001) argue that the regional level is particularly apt for this new kind of policy paradigm because it allows all stakeholders to act on *local knowledge* and because this level is deemed most appropriate for building *social capital* by which they refer to "a relational infrastructure for collective action predicated on trust, reciprocity and the disposition to collaborate to achieve mutually beneficial ends" (p. 19) sustained through regular face-to-face interaction. Taken together, these assets are considered to be conducive to collective learning processes. In this context, the authors employ a modest (and one may even argue, circumscribed) understanding of learning as "new and more purposeful conversations about joint solutions to common problems as a prelude to building more robust and more sophisticated forms of institutionalized voice" (p. 19). In his evaluation of the Welsh RTP policy program Henderson (2000) critically questions whether this predominantly discursive approach will result in truly new and path-breaking strategies due to vested interests and the risk for parochialism on behalf of the stakeholders. Indeed, social capital, as defined above, provides important positive

associative effects for networks of heterogeneous agents in the triple helix geared to interactive innovation (Cooke, 2003) but it also involves risks and disadvantages (Woolcock, 1998). On the positive side Adler and Kwon (2002) mention that social capital facilitates broad access to relevant knowledge and information-sharing. However the strong solidarity with in-group members, in itself considered a positive feature, may backfire through institutional and cognitive lock-in. "The ties that bind may also turn into ties that blind" (Powell and Smith-Doerr, 1994: 393). Moreover there is a lot of confusion around the sources and consequences of social capital. In a policy context it would be pragmatic to acknowledge that trust and reciprocity are a by-product of sociality rather than a primordial cultural and institutional disposition (Amin and Cohendet, 2004). This distinction is somewhat similar to the one made by Wolfe and Asheim (2003) between social capital based on organizational and institutional innovation (i.e. bridging) and social capital rooted in civicness (i.e. bonding) (Putnam, 2003). Nonetheless, as regards 'building' social capital the question remains whether trust, reciprocity and associative norms and values are prerequisites for collective action or whether the causality runs the other way around. When viewing social capital as a structural property of larger groups, that has often been shaped unintentionally, this provides challenges to RIS policy both in terms of its aim (towards changing behaviour) and target level (towards the system level).

Given the possible limitations to intentional social capital building, it could be more useful to focus on collective learning and innovation processes in the triple helix allowing social capital to be built along the way. In this, broad participation and engagement remains a guiding principle but, arguably, more closely coupled to the principle of collective learning. Without discounting the importance of trust, reciprocity and associative norms and values for collaboration we therefore concentrate on the concept of 'communities of practice' as this shifts attention primarily to what groups do (Bowles and Gintis, 2000). Communities of practice are defined by the communal (shared) practice of its members, by which is meant undertaking and engaging in a task, job or profession while communicating regularly with one another about their activities (Brown and Duguid, 2002). Its members are informally bound together by shared experience, expertise and commitment to a joint enterprise (Gertler, 2004). They are able to produce

and internalize shared understandings through collaborative problem-solving. Furthermore, these communities are increasingly seen as the key sites of knowledge formation, exchange and learning. They seem to accommodate the situated, pragmatic and interactive nature of learning processes 'in action' within and across organizations in a more realistic way than individual-centred or classical organization-centred approaches (Amin and Cohendet, 2004). Moreover, the notion of communities overlaps with the growing prevalence of alternative organizational forms, especially of temporary, flexible, project- or task-focused groupings, noted by Grabher (2002).

It would be fair to say that the community-of-practice literature has provided a way forward in drawing attention to the social platforms, where collective learning takes place and is carried out. As such, communities can stretch across organizations and can thus be regarded as an important boundary spanner in the triple helix of a RIS. Similar to social capital, however, there are limitations to the feasibility to construct learning communities, highlighting their strength in their unintentionality and by-product character (Swan et al., 2002). Before we continue with a discussion of the case studies of three RIS to analyze their triple helix dynamics as well as the importance of social capital and community of practice based learning, it is important to contextualize these RIS in their national frameworks.

The national frameworks of regional innovation systems and policies

In order to further deepen the understanding of what types of innovation policy and collaboration to promote in different environments, the question of national governance structures and supporting regulatory and institutional frameworks have to be taken into consideration (Asheim and Gertler, 2004). For this we draw on a Nordic project carried out by The STEP group in Oslo, aimed at identifying differences in innovation profiles among the Nordic countries, with precisely a focus on the relations between national institutional conditions and innovation policies and strategies. This analysis gave the following differences of innovation strategies (Mariussen, 2004)[6]:

[6] Mariussen, Å. (2004): From regional coalitions to commercial innovations. Presentation at seminar on 'Future challenges and institutional preconditions for regional development policy' – Nordic program for

- The *technology based* strategy of *process innovations* and *complex product improvements*, through R&D investments in large industries, characteristic of the heterogeneous economy of Sweden
- The *research-driven* high tech strategy focusing on *radical product innovations*, in Finland with Nokia as the entrepreneurial champion
- The *market-driven entrepreneurialism* of Denmark characterized by *non-R&D based, incremental product innovations* especially within consumer goods sectors

The two most contrasting nations with respect to innovation policy among the Nordic countries are Finland and Denmark. Swedish innovation policy is strongly inspired and influenced by, and, thus, at least in part resembles the Finnish policy, however, it lacks the strong, top-down governmental based and coordinated initiatives and implementation strategy. On the other hand the Swedish policy has ambitions of finding a better balance between top-down and bottom-up initiatives implying a stronger regional focus (i.e. the strategy of constructing regional innovation systems through the VINNVÄXT program (see last section for a more detailed presentation)). Finland's innovation policy is to a large extent rooted in the economic crisis in the beginning of the 1990s, when the government started to invest heavily in science-based R&D and education in order to promote a restructuring of the economy away from the heavy dependence on natural resources towards R&D as the basis for future economic growth. Finland is, thus, internationally perhaps the most significant example of a country implementing an endogenous, top-down planned, systemic innovation policy. Innovation policy in Finland has primarily been a national policy with a very strong science and technology orientation. Typically, the Finnish innovation policy is strongly embedded at the highest governmental level through the Science and Technology Policy Council, where also top managers from private business (e.g. Nokia) take part, and with TEKES as the main

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regional research 2000-2004, Nordregio, Stockholm, September 2004. In our context we primarily focus on Denmark and Sweden, as two of our cases are located in these countries, however, we are also shortly referring to Finland partly because its innovation policy most sharply differs from the Danish one, and partly because Finnish innovation policy for a long time has been an inspiration for Swedish policy, and for the last couple of years also for the Danish one. The report also contains analyses of innovation policies in Norway and Iceland.

operating agency. This guarantees the legitimacy of the policy as well as underlines how important it is considered to be, and also secures that the innovation policy initiatives are well coordinated and orchestrated between the various ministries within the government. Finnish policy makers see the industry-university relations as a crucial edge in global competition, and more innovative firms in Finland than in other European countries cooperate with universities.[7] [8]

In addition to Finland Canada has been an object for policy learning by VINNOVA (Swedish Agency for Innovation System responsible for the majority of innovation policy initiatives in Sweden among them the VINNVÄXT program), which is the Swedish counterpart to the Finnish TEKES, however, with a much smaller budget. The Canadian government has wholeheartedly endorsed innovation as key to its economic and social performance in the recently published 'Canada's Innovation Strategy' which serves as a blueprint for the country's innovation policy. It builds on four pillars:

- 'Knowledge performance': raising Canada's R&D performance
- 'Skills': targeted at education and human capital
- 'The Innovative Environment': innovation and upgrading within the public sphere
- 'Strengthening Communities': regionalization of innovation policy and cluster policy.

Considering the last pillar, a convergence between regional innovation and cluster policy can be witnessed. In this, collaboration spanning across the triple helix of business, university and public sector is advocated. Moreover, the provinces have already gained quite a lot of authority in designing their own innovation policies through the considerable extent of devolution in the Canadian federal-provincial system. Canada's innovation policy distinguishes itself also through a firm emphasis on human scientific capital, targeting new sectors of the economy (e.g. agricultural biotechnology).

[7] The information on Finland is taken from a publication from Science and Technology Policy Council of Finland: 'Knowledge, innovation and internationalisation'. Helsinki 2003.
[8] An interesting aspect concerning the role of universities in Finnish innovation policy is the fact that they have taken up the role of knowledge transfer organisations.

Thus, Finland and Canada have pursued a supply driven innovation policy with the government playing a strong role (more so in Finland than in Canada partly due to its federal-provincial system) as the initiating and coordinating decision-maker. In contrast, Denmark has followed a demand driven innovation strategy. This means that the (mostly) sectoral innovation systems found in Denmark are not constructed (or built) through explicit innovation policy initiatives, such as in Finland (and which Sweden is aiming to do) but are a result of more or less systemic pattern of cooperative behaviour developed over time between firms, the knowledge infrastructure and public authorities in an institutional framework that could be characterised as a 'coordinated industrial district' (Whitley, 1999) (in contrast to the 'collaborative national business system' found in Sweden (Whitley, 1999)). This could only partly be explained by the dominance of SMEs in the Danish economy compared to Finland and Sweden[9]. As indicated above, this has resulted in non-R&D based, incremental product innovations with a relative low knowledge content, and only infrequently based on original design development. Already in 1993 Edquist and Lundvall noted that

> 'the survival of small scale and artisan-like production has fostered a kind of corporatism, very different from the Swedish. Small, independent entrepreneurs in Denmark will often be quite negative to central union power, but at the same time, often willing to cooperate locally with their workers and their representatives. (…) This small-scale corporatist model often involving a flexible use of reasonable advanced production equipment and a continuous development of incremental product innovations has its strength in flexible adaptation' (Edquist and Lundvall, 1993, 275).

This 'decentralised industrial creativity' (Bellandi, 1994) has so far produced solid economic results with a relatively low unemployment rate (lower than in Finland). However, the unknown future challenge facing Denmark is if its knowledge base is sufficient to cope with the increasing knowledge intensity of products and processes in the globalising learning economy.

[9] Additionally, Danish public policy has the strongest tradition in non-interventionism among the Nordic countries.

Three examples from the Northern Hemisphere

In this empirical section three case-examples of regional innovation systems located in the northern hemisphere are given. The discussion of the two already 'working' regional innovation systems is followed by an analysis of current efforts to construct a regional innovation system for the food industry in Scania, Sweden, through the aforementioned VINNVÄXT program.

a) Saskatoon, Canada: a dirigiste RIS based on analytical knowledge

The first case entails the agricultural biotechnology cluster in and around Saskatoon, the largest city in the Canadian province of Saskatchewan. We choose this case study, which mainly draws on the original work by Cami Ryan and Peter Philips because it illustrates the strong interdependence between the players of the triple helix in an analytical knowledge base setting. This peripheral region located on the prairies of central Canada hosts only 5% of all biotech companies in Canada yet generates 61% of the gross revenues from biotechnology in the agrofood sector in 1999 (Ryan and Philips, 2004). In fact, Saskatchewan's success can be directly attributed to its self-defined agricultural biotechnology cluster in Saskatoon hosting about 35 companies which represent 30% of Canada's total agricultural biotechnology industry (Ryan and Philips, 2004). Confirming our argument about constructing an analytical knowledge based RIS through close and systemic industry-university cooperation and interaction at the start of an industrial life-cycle and technological regime, it is argued that the RIS originated in the research efforts of two regionalized national research institutes: Agriculture and Agri-Food Canada (AAFC) and the National Research Council's Plant Biotechnology Institute (NRC-PBI). NRC-PBI originated from the Prairie Regional Laboratory which was established in 1948 by the federal government on the grounds of the University of Saskatchewan campus to do research aligned to the agricultural needs of the prairie region (e.g oilseed crops). In 1983 the federal government, recognizing the emergence of biotechnology as a potential growth sector, decided to concentrate all its plant biotechnology activities in Saskatoon transforming the Prairie Regional Laboratory into the NRC-PBI. This strategy of creating a 'niched' critical mass of research capacity and scientific excellence sparked, though arguably without any direct intentions, a process of cluster building by attracting

agrochemical and seed companies into the region (e.g. Becker Underwood, Bioriginal and Philom Bios) and stimulating new, technology-intensive firm start-up in agrofood biotechnology. Philips et al. (2004) report that, while large multinationals play an important role as global listening posts, the majority of the cluster's private enterprises are small (only three establishments employ more then 50 people) and relatively young (73% has been established since 1990). Based on a survey among the clusters' firms, the authors also find that skilled locally available human capital and the presence of specialized research institutes and universities serve as the most important cluster advantages identified.

Ryan and Philips (2004) argue that the success of Saskatoon's agricultural biotechnology cluster can be explained by a twofold knowledge management strategy on behalf of the actors characteristic for typical triple helix dynamics. Partly, it has been up to each of the actors, i.e. university, research institutes and business, to exploit its key-competences and focus on its 'primary activities', namely research and teaching, development and commercialization. At the same time, there has been a development towards hybrid, overlapping activities through collaborative efforts between university, research institutes and business. Exemplar innovations based on this model are the development of the renown 'canola' crop, a new rapeseed variety with low erucic acid and low glucosinolate levels making it suitable for food-applications, and the development of herbicide-tolerant canola, a 'world-first' among transgenic crops. In fact, canola can be considered as a strategic platform technology for the cluster enabling further crop performance improvements and crop diversification. Moreover, the collaborative efforts that underpin these innovations are often brought into practice by means of research teams that consist of members of the various organizations each bringing in their specific sets of competences.

Thus, the Saskatoon case provides a clear example of how unintended cluster development evolved into patterns of more institutionalized, localized interactive innovation. Business was initially attracted to Saskatoon primarily because of its scientific reputation rather than because of its reputation of being 'an entrepreneurial

university' (Etzkowitz and Leydesdorff, 2000). Nonetheless, collaborative research in applied fields as envisaged in the triple helix soon started to lift off. It can be argued that on the operational level, the communities of scientists and engineers[10] brought together in concrete research teams serve as organizational boundary spanners 'translating' science into technology and visa versa. A recent example is the strategic research alliance between NRC-PBI and Dow AgriSciences Canada signed in 1999 worth 10 million Canadian dollars over a five-year period (PBI, 2002). In a gradual, bottom-up, path-dependent process (canola served as the guiding technological regime) the communities of scientists and engineers across firms and research centers generated the scientific and commercial localized success-stories fuelling reciprocity and collective understanding and respect (i.e. broadly defined social capital). Thus, it is important to recognize that the regional innovation system took a long time (a few decades) to be constructed through active, practice-related collaboration between (communities in) heterogeneous organizations of the triple helix.

The role of the national government has also been an important one because of its historic decision to localize the country's scientific capacity in plant biotechnology through the establishment of the AAFC and NRC-PBI labs and their scientific personnel thereby providing a crucial sticky (yet at that time unanticipated) cornerstone for the cluster (Malmberg, 2003). Furthermore it can be observed that in recent times the various strata of government, including the Province of Saskatchewan, have started to operate in closer triple helix collaboration in order to continue Saskatoon's previous success. These policy actions can be seen in the light of two potential risks for the further growth and development of the cluster. The establishment of Innovation Place, Saskatoon's science park with strong support from the regional government, the National Research Council's IRAP program (Industrial Research Assistance Program) primarily aimed at aligning scientific and commercial competences as well as the recent opening of NRC-PBI's Industry Partnership Facility (built in partnership with the Province of Saskatchewan), all seek to foster the start-up and growth of small, knowledge-intensive firms in order to

[10] Even though biotechnology can be considered as a predominately analytic knowledge based industry, some of its applications in agriculture have a more synthetic nature.

prevent an unbalanced dominance of large multinationals. Moreover, these initiatives clearly seek to provide pro-active, systemic innovation support at the regional level. The second risk involves the dependence on canola as the dominant scientific and technological regime. Against this background the construction of the Canadian Light Source Synchroton is aimed to add a new configuration to the existing cluster structure. It is expected to attract more than 2000 scientists from all over the world, diversifying the local, scientific knowledge base. Time will tell to what extent these programs will help the cluster in Saskatoon to sustain its former success in constructing a science and research based, dirigiste RIS.

b) Salling, Denmark: a grass-root RIS based on synthetic knowledge

The second case entails the Danish furniture cluster in Salling located in the North-West of Jutland, which is based on the original work of Mark Lorenzen. We choose this study as it clearly illustrates triple helix interaction against a synthetic knowledge base (on which the production of wooden and upholstered furniture and related wood products in the basic/home market segment is clearly founded). Lorenzen (2003) reports on an impressive economic growth in the cluster over the past decades despite high factors costs. Between 1972 and 1992 the number of firms grew with approximately 80% and employment in the cluster tripled while overall employment in Denmark decreased. In 1996, 54 firms employed 2388 employees, the majority of which are small and medium sized. This successful performance is ascribed to a high degree of flexible specialization within the cluster; a phenomenon typical for industrial districts (Asheim, 2000). Each of the firms has developed its own dedicated niche through specialization in specific parts of the value chain in combination with an extensive local network of stable yet flexible embedded inter-firm relationships allowing for economies of scope. This combination allows for sustained gradual innovation often involving relations across firm boundaries. In terms of product innovations the firms in Salling mainly design varieties with regard to style, materials and colors based on the existing product-line. Completely new products types are typically introduced only once a year. Process innovations necessarily follow these new product designs. Here, the shift from hardwood to other materials, notably plywood, is considered as the most dramatic shift that the cluster witnessed. Internally,

experimentation on the factory floor and product revision based upon employees' ideas are key mechanisms for the firms to innovate. More important, however, are interactive innovation activities which take place through vertical networks between producers and their suppliers (in collaboration with existing suppliers or by reshuffling inputs from other suppliers) as well as through horizontal networks (e.g. matching product designs in order to offer fuller product lines). Lorenzen (2003) highlights the importance of shared values, common norms and trust among managers to sustain local, inter-firm relationships (i.e. social capital) as a crucial local asset for the cluster's success. Characteristic local conventions are (Lorenzen, 2003, 20):

- Craftsmanship: Most managers take great pride in their artisan skills developed through engagement with furniture production for most of their career.
- Entrepreneurship: To be the owner of the firm and to maintain control over it is the norm among Salling managers.
- Economic interdependence: "Most producers see themselves as a part of a economic community with other furniture producers, and are eager to signal that they take seriously the necessity" (Lorenzen, 2003, 20).
- Local solidarity: Many producers adhere to being an active member of a local social community and support its existence and continuation actively through e.g. the local Cabinetmakers' Guild.

In general, the local Cabinetmakers' Guild, the local branch of the national Association of Danish Woodworking Industries, provides a crucial socializing venue for the (managers of the) firms to exchange information, coordinate inter-firm relationships and reproduce the above norms and values.

Contrasting the more dirigiste inclined Saskatoon case, the Salling case makes a typical example of an SME based, grass-root regional innovation system strongly embedded in its local territory with a clear inclination towards market-driven incremental innovation. Nearly all firms have originated from the region and behavior in line with the above norms and values seems indispensable for new (and existing) firms to 'fit' into the cluster. Typical for a RIS based on a synthetic knowledge base, innovation is strongly shaped by the existing industrial specialization. Firms are the most important players and

most of the learning processes are thus intra- and inter-firm based. As mentioned above, social capital is considered an important feature to explain this cluster's success. However, it is important to point out that the high level of local community-based mutual dependence and its underpinning social conventions have been actively created over the past 15-20 years. Lorenzen (2003, 25) emphasizes the role of "cumulative causation" through repeated and intense interaction in dyadic firm relationships (e.g. producer-supplier) and, on a collective bases, through participation in the Cabinetmakers' Guild. Taking a closer look at these collective social learning processes it is important to note that most of the real interaction is embedded in the actual network of firm managers/owners. In the intense, socializing activities of this local community, group-identity is created and reproduced (cumulative causation). Most of the collective social learning is informal, based on gossip, advice and information sharing. Against this perspective, the managers function as effective boundary spanners between the firms.

Adopting a triple helix perspective, it thus needs to be acknowledged that in this case the role of university and government is limited for learning processes which is typical for a grass-root RIS compared to a dirigiste RIS such as the one in Saskatoon. Interestingly though, the local technical school plays an important role in producing an immobile local labor force trained with the particular artisan skills needed to work in the furniture industry. In fact, the school has been concerned with the demands of the industry right from its establishment in 1871. Also the role of the local government is mainly directed to 'hands-on' support for the existing structure of the cluster (e.g. the local economic development office's help in attracting more trainees as cabinetmakers). To conclude, at face-value it could be assumed that mere physical proximity between firms stimulates the localized learning processes underpinning the clusters innovative success. But when going beyond the surface, a strong case is made for the more bounded communities of managers (and partly the workers) as the real embedding mechanisms of this cluster. Through broad and active participation and engagement in this local community of practice, facilitated in the Cabinetmakers' Guild, social capital is actively created and maintained. Based on own observations and extensive interviewing Lorenzen (2003) in fact opposes the idea that the norms and conventions were learned in the pre-industrial

past. He stresses that the community-based social capital is heavily interdependent with inter-firm and collective learning through cumulative causation over a relatively long but recent period of time (the last 15-20 years).

c) Scania, Sweden: a networked RIS under construction

While the above two examples are based on existing and well-documented working RIS, the following example concentrates on a RIS 'under construction'. It comprises the VINNVÄXT program 'Innovation i Gränsland' (Food Innovation at Interfaces) aimed to construct a regional innovation system in and around the food industry in the Southern Swedish province of Scania. VINNVÄXT resides under the Swedish Agency for Innovation Systems, VINNOVA. The purpose of "VINNVÄXT: Regional growth through dynamic innovation systems" is

> "to promote sustainable growth in the regions based on international competitive ability, by successively developing or further developing the functioning, dynamics and effectiveness of innovation systems in functional regions at an international level." (VINNOVA, 2001, 4).

By 'functional regions' the program defines the geographical boundaries of its projects based on the location of those groups/coalitions/partnerships that apply to the program and their core activities instead of defining them on the basis of given administrative regions. The program requires explicitly that such a functional region has to be constructed around a triple helix involving active participation from the business community, research organizations, politics and public administration. This specific focus on triple helix collaboration originates in the program's central problem identification vis-à-vis Swedish regional economic development: the asserted lack of a system-based approach to innovation among politics and public administration, the business community and research organizations. The main 'accusations' are that regional politicians and public administrators are insufficiently engaged in harnessing active economic growth and development, relying too much on redistributive regional policy. Colleges and universities have been aligning their research and education programs insufficiently to the needs of their region. Companies have been paying insufficient attention to the assets available in their regional environment. By constructing regional

innovation systems, VINNVÄXT seeks to overcome this perceived lack of systemicness. The general characteristics of the program are:

- Competition-based selection procedure
- On-going process support, education, monitoring and evaluation
- Long-term perspective (the program runs for 10 years).

VINNVÄXT's total budget comprises 600 million Swedish crowns (approx. 70 million €) built on the principle of co-financing (the applicants stand for 50% of the budget). VINNOVA provides each selected regional program 10 million Swedish crowns per year (total budget 20 million) over a period of maximum 10 years. It has identified a set of critical factors and attributes as guiding principles for its regional programs. These overlap significantly with the guiding principles of regional experimentalism. We shall illustrate this by means of the 'Food Innovation at Interfaces' application.

'Food Innovation at Interfaces' has been granted funding as a VINNVÄXT program in 2003. The application was written by the network organization 'Skånes Livsmedelsakademi' (Scanias food and beverages academy[11]) whose members are from the triple helix of business, research organizations and regional public administration. The application builds on the shared strategic vision to increase the added value of the regions's food industry's products and services. It intends to do so through a focus on "multi-disciplinary innovation projects in the borderland between different knowledge bases" (SL, 2003, 3). The project builds on the recognition that the Swedish food industry as well as important related areas such as logistics and machinery is heavily concentrated in the country's most Southern region Scania (see also Porter (1990)). A strong case can in fact be made for a Scanian food cluster in terms of a geographical concentration of similar or related industries. The total growth of the cluster is however rather low as parts of the sector are dominated by typically Fordist bulk production aimed at price competition and economies of scale (Nilsson et al., 2002). The program acknowledges that this is not an economically sustainable situation and, hence, aims to access new, more specialized and knowledge-intensive segments of the market such as high-quality

[11] Translation by authors.

niche products, convenience foods, ecological foods and functional foods (defined as artificially developed food with added ingredients that demonstrate scientific evidence of positive health-related effects). To make this shift, it is conceived that companies need to collaborate more actively with the existing knowledge infrastructure found in Scania. Both Lund University and the Swedish Agricultural University in Alnarp (located between Lund and Malmö) have indeed aligned parts of their education and research activities to the historical presence of the food industry in Scania. For example, already early in the 20th century firms and organizations in the regional farming community as well as the Swedish state supported and collaborated with scientists in plant breeding through the Svalöf Institute (which was part of Lund University) to develop better seeds for the agricultural conditions prevalent in Sweden (Holmberg, 2003).

Within 'Food Innovation at Interfaces' triple helix collaboration is organized both on a strategic and operational level. The board of the program consists of representatives from the regional food industry, universities as well as regional government and serves as a reference group for the program as a whole. On an operational level, the program is divided in four main project areas: Food and Health - Functional Foods, International Consumer Marketing, Good and Convenient Food on a Large Scale, Innovations in Theory and Practice. These project areas reflect the broad scope of activities that the program aims to cover, targeting analytic knowledge-based innovation (e.g. in Food and Health - Functional Foods) as well as synthetic knowledge-based innovation (e.g. in Good and Convenient Food on a Large Scale). Within these project areas, various projects are carried out drawing on collaboration in a public-private or triple helix context coordinated by project managers which often are affiliated with organizations that have substantial previous experience with such collaboration.

Of course, 'Food Innovation at Interfaces' is still at the start of its program and it is therefore impossible to assess its actual impact for the Scanian food cluster. However it is clearly underpinned by the principle of broad participation and engagement because of the stipulated involvement of all players in the triple helix. By jointly endorsing a strategic vision for the industry in the region a platform for action is created. This

strategic vision (a shift towards more knowledge-intensive food production) is put into practice by concrete projects in which all partners are brought together to stimulate collective learning processes by interacting. The combination of both top-down and bottom-up associative innovation activities clearly point to the ambition of the program to construct a networked RIS. In fact, the majority of the actors are already in place. It is therefore mainly a question of forging linkages between the firms in the cluster and the knowledge infrastructure in order to strengthen these currently fragmented sub-systems. In this, the different projects serve as temporary alliances to facilitate collective (community-of-practice based) learning and increased mutual understanding and reciprocity. Moreover, the actual mix of actors involved strongly depends on the nature of the innovation project in terms of knowledge profiles and competences needed.

Conclusion

In this chapter we have analyzed how a territorially contextualized triple helix model can contribute to the formation of regional innovation systems. We have argued the need for changing target levels, towards a more systemic approach based on collective, community-of-practice based learning, as well as aim of innovation support, towards more pro-active behavioral change based on associative governance. As empirical illustrations we have made comparisons between three contrasting clusters representing different knowledge basis and national policy contexts, and their actual and potential linking to regional innovation systems of different types. The three clusters were the furniture cluster of Salling in Denmark with a synthetic knowledge base and a market-driven, grass-root RIS; the agrofood cluster in Saskatoon, Canada, typically analytical based with a dirigiste, science-driven RIS; and lastly the food cluster of Scania, Sweden, currently under construction but with the ambition to shape a networked RIS, drawing on both analytical and synthetic knowledge bases.

All cases show that the construction of a RIS takes place within a dynamic triple helix set-up but with differing roles for the actors dependent on the industrial and territorial-institutional context. The Canadian case is a clear example of initially unintented cluster development following the decision by the federal government to regionalize specific

public research facilities and activities, which in turn attracted the attention and presence of agrochemical and seed firms and spurred the establishment of new, knowledge-intensive firms in agricultural biotechnology. Given the analytical knowledge base of this industry, the catalytic role played by the regionalized research infrastructure is characteristic for this dirigiste RIS. Drawing on successful collaboration in public-private research communities, federal and provincial government, university and research centers and industry have subsequently decided to initiate a formal regional innovation system policy. In the Danish furniture cluster, collaborative innovation is much more rooted in market-driven relations between firms. Typical for Denmark, the (grass-root) RIS is characterized by non-R&D based, incremental product innovations where the technical school and local government play a more indirect but still supportive role. In line with the synthetic knowledge base of the furniture industry, this support is mainly demand-led following historical path-dependencies. This case also clearly shows how social capital is created as a by-product of collective learning processes (predominantly between firms) underpinned by a strong sense of belonging to a local community of practice. At present the Swedish policy program 'Food innovation at interfaces' cannot be conclusively assessed on its aim to construct a networked regional innovation system. Yet it clearly provides evidence that preconditions for a systemic perspective and learning-to-innovate framework through frequent and continuous collaboration between national and regional public bodies, universities and research centers and industry are in place, fostering a shared strategic vision (top-down) and joint innovation projects (bottom-up).

This brings us back to the aforementioned issue whether social capital and community-of-practice based learning can be actively mobilized in a triple helix. One the one hand, they are important ingredients for a new, pro-active and systemic understanding of regional innovation policy. On the other hand, the strength of these ingredients lies in their unintentional and informal character. This dilemma could be resolved by recognizing that a more dynamic perspective on RIS requires a stronger recognition of the fact that innovation policy is inherently tied to the uncertainty surrounding the development of new knowledge (Eriksson, 2005) which is at odds with a rigid planning strategy. Adopting such an approach implies a stronger focus on the process perspective

of innovation policy. Moreover it opens up possibilities to adjust policy programs and measures along the way to its completion. As a necessary condition for this approach it requires nonetheless broad and active participation of all the stakeholders (i.e. the triple helix) in order to collectively learn to innovate in a systemic perspective. Also in this perspective, all policy stakeholders need to be aware of the fact that the construction of RIS takes place within its industrial and territorial-institutional context. This does not mean that policy learning cannot take place yet it acknowledges the need to actively monitor changes as well as to reflect and act on these. Taking respective overarching national frameworks into consideration, such developmental learning thus provides a possible remedy to institutional borrowing or learning-by-cloning which involves a more passive and unimaginative adaptation to changed conditions (Cooke, forthcoming; Eriksson, 2005).

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