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Resilient City-Regions - Mission Impossible? Tales from Finland and Beyond about how to Build Self-Renewal Capacity

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Markku Sotarauta

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Introduction

Human history is full of successes and failures; time and time again we have witnessed how life alternates between joy and sorrow. Occasionally, we live in stable and peaceful times, but quite often our lives are shaken by major economic and societal transformations. During the last decade or two we have once again seen in a very concrete manner how the world is changing. Some cities have risen in prosperity, others have declined. New professions have come into being; old ones have receded into history. The future seems to be an open, constantly evolving entity. It is not something waiting somewhere around the corner only to be anticipated and planned for, but something that is with us today, that is popping out in front of our very eyes. The future is being discovered, created and shaped all the time; it is emerging from manifold processes.

The early 21st century seems to be dominated by an almost compulsive need to find new pathways to the future. All over the world policy-makers have been chasing new buzz-words in their endeavours to show how dynamic their city-regions are. In ten years we have witnessed a rapid flow of key ideas: concepts ranging from clusters to networks, from knowledge to innovation, and from learning to creativity. Many city-regions have indeed changed according to these lines, and many policy-makers have found new food for thought. So, the new practices of economic development policy in the city-regions range from pure rhetorical gimmicks to dynamic action. Sometimes it is difficult to distinguish these two extremes from each other.

It is always easier to find out the elements of success and/or failure in retrospect than to find new development paths for the future, and new modes of action in the middle of uncertain and open-ended situations. Quite often development surprises policy-makers; sometimes the surprise is pleasant and sometimes it is less so. Even the most 'learned' of the city-regions with well-developed foresight capacity every now and then encounter unexpected situations.

At all events, city-regions need continually to find out how to adapt to changing environments without ending up as captives to their economic fate, and it seems that resilient regions cope with the changes better than less resilient ones (Sotarauta & Srinivas, forthcoming). In resilience, strategic adaptation emerges as crucial. In strategic adaptation, both adaptation to the changing environment and the strategic choices of actors play a significant role. Strategic adaptation in general

endows regions with a capacity to change their destiny by adapting themselves to changes and reshaping their local selection environments.

From these points of departure this paper examines how to stimulate real change in city-regions. More specifically, how do localised adaptation processes, institutions and intention of a policy-network drive strategic renewal? Hence the discussion centres on what are the key-elements of self-renewal capacity of city-regions. The approach adapted here emphasises both policy intentionality and emergent developments. In this kind of setting self-renewal capacity emerges as a key concept. For me self-renewal capacity represents, on the one hand, a way to understand how policy intentionality and emergence encounter in practices of economic development. On the other hand, self-renewal capacity directs our attention to those functions and processes that ought to be embedded in the economic development of city-regions one way or another.

My thinking on self-renewal capacity is inspired both by contemporary innovation and knowledge oriented regional development studies and by evolutionary thinking. When referring to policy-making, I limit my attention to economic development policy and especially to innovation policy. By innovation policy I refer to those policy efforts that are focused on developing local innovation environments and enhancing the capabilities of local organisations to contribute to innovation processes, and by these means to promote change in the region.

To highlight the significance and the main functions and processes of self-renewal capacity I draw especially of several case-studies on transformation processes of Finnish city-regions. In addition, to contrast Finnish experiences with experiences from other countries I draw on empirical observations from the Local Innovation Systems project[1].

From creativity, innovation and learning to self-renewal capacity

Transformations

In the early 2000s, city-regions are engaged in a fiercer global rivalry than before in creating or attracting activities generating wealth for their citizens. There now exists a large body of studies stressing that global sources of knowledge and localised knowledge are crucial in competitiveness of city-regions. These knowledge pools may arise from the concentration of sectorally or cluster specific firms and other relevant organisations. Bathelt et al (2004) suggest that both 'the information and communication ecology created by co-location of people and firms within the same industry and place or region and global pipelines, i.e. channels used in accessing knowledge external to city-region, offer advantages for organisations engaged in innovation and knowledge creation'. As they state,

> local buzz is beneficial to innovation processes because it generates opportunities for a variety of spontaneous and unanticipated situations, global pipelines are instead associated with the integration of multiple selection environments that open different potentialities and feed local interpretation and usage of knowledge hitherto residing elsewhere (Bathelt et al. 2004).

In an industrial society, borders between nations, institutions, organisations, municipalities, etc. largely determined the position of city-regions; in a global economy, however, borders are fuzzier than before. Now that the positions of both organisations and regions are determined by their competencies and skills to learn and develop themselves in a continuous process (Sotarauta & Bruun 2002), this seems to be leading to a polarised development through increased differentiation in innovation and economic growth between the 'successful' and the 'unsuccessful' regions. (Asheim & Dunford 1997) It also seems that fortunes change, and that the 'successful' ones may lose their touch in the hearts of global flows; and fortunes surely have changed during the transformation from industrial to some kind of knowledge-based economy.

As Safford (2004) states, the Silicon Valleys of the Second Industrial Revolution had names like Akron, Detroit, Pittsburgh and Rochester. In Europe we might add Ruhr and Manchester, and from the Finnish point of view, being the birthplace of industrial Finland, Tampere should be added to the list of 'industrial stars'.

The stars of the industrial era have been forced to find a new position in a new situation. For example, in Tampere, three major transformation processes have taken place. First, the textile industry declined and disappeared (only a few highly specialised textile firms have survived). Second, against a background of industrial recession dating back to the oil crisis of the 70s and the severe national economic recession of the early 90s, the engineering industry succeeded in reinventing itself, renewing and developing technology of an increasingly high level. Third, new and rapidly growing business sectors emerged; particularly, in the 1990s, the information and telecommunications technology clusters grew rapidly. (see Sotarauta and Srinivas 2005; Martinez-Vela and Viljamaa 2004; Kostiainen and Sotarauta 2003)

As in Tampere, so also in Akron and Rochester (USA) the ever fiercer global competition and structural changes led to industrial crisis. Once Akron was known as the 'tire capital of the world', and the core of industrial concentration was formed by such prominent companies as Goodrich, Goodyear and Firestone Tire and Rubber. In Rochester, Bausch and Lomb emerged as the country's first mass-producer of eye-glasses, goggles and microscopes, and Eastman Kodak emerged as a world's leading producer of cameras and photographic film. All these firms faced fierce foreign competition in the 1970s and 1980s, and as a result of this thousands of production jobs were lost. (Safford 2004.)

Another Finnish city, Turku, did not face such industrial transformation as did Tampere, Akron and Rochester; hence it did not have such external triggers to force it to move into new policy-making regimes as was the case in other case-regions mentioned here. Not until the 1990s did Turku face the need to redefine itself. At that time, national recession and fiercer global competition resulted in a slow decline in its economic base. Therefore the attention of policy-makers then turned to the emerging biotechnology cluster. (Srinivas & Viljamaa 2003)

Not limiting myself only to European and US cases, I turn my gaze also to Hamamatsu, Japan. As with the other cases also, Hamamatsu is a manufacturing intensive region that has striven to survive in the ever tighter global competition. It too has faced the challenge of industrial hollowing. The region has seen several waves of industrial transformations, first in textile and related equipment, second in musical instruments and automobiles. The manufacturing base facing increasingly tough pressures and many companies planning to move their production offshore, the region has been forced to look for the next potential industry. (Hatakenaka 2004)

Policy directions

Even though the transformation processes have their local characteristics, at a general level the nature of transformation from industrial to knowledge economy has many similarities in different parts of the world. Globalisation seems also to lead towards convergence of development strategies. A few years ago, learning regions were popping up in different parts of the globe, and now, in the early 2000s, all over the world policy-makers aim, at least in their main speeches and development documents, to attract 'creative class' by enhancing tolerance and developing cultural offerings (see Florida 2002).

Creativity is global 'pop, must and in', and in addition to that, the modern evergreen of development policies, clusters, are alive and well. In addition, a huge literature on science, innovation, technology, expertise and interaction--focused studies has emerged (see e.g. Camagni 1991; Storper 1995; Brazcyk et al. 1998; Florida 1995; Maskell 1996; Morgan 1997; Kautonen et al. 2002; Cooke 2002; Sotarauta & Bruun 2002), and policy-makers in many regions have indeed sought to counter the decline in traditional industries and the challenge of a globalised economy by developing new knowledge-based high-technology clusters and enhancing interaction between academia and firms. It seems to be clear that all this is not only rhetoric; both research and policy are greatly affected by these developments.

In the case of city-regions described above, economic transitions have led to new policy regimes. Tampere is one of the Finnish examples of how the combination of a strong knowledge infrastructure, corporate vision and leadership and active local economic development policy can succeed in avoiding the fate of so many old industrial regions. (Martinez-Vela & Viljamaa 2004) However, the building of new local capabilities began already in the 60s, when the City of Tampere was active in inducing two universities to move from Helsinki to Tampere. The City of Tampere has indeed been in many ways influential in building and changing its institutional set-up for knowledge production and education; hence it has been instrumental for decades in creating institutional foundation for future clusters and innovations. Without the institutional rearrangements of the 60s and 70s, The Finnish ICT boom of the 90s would not have touched Tampere. With proper institutional set-up in place, the information and telecommunications technology cluster had a chance to grow rapidly indeed in Tampere too.

In its transformation process Turku is a bit different from Tampere. Turku did not have such an ICT-focused educational and research basis as some other Finnish cities did. Therefore it did not have local capabilities needed to enable an ICT boom, and consequently, when facing the danger of hollowing out of its economic base, it aimed for a new identity in a high-technology arena by merging various sub-fields of R&D using biotechnology such as food, materials and pharmaceuticals. (Srinivas & Viljamaa 2003)

These efforts have been different from many other Finnish cases in that the public sector has not played a very active role in the early stages of development. The emergence of a biotechnology cluster in Turku is based on a strong university research activity in the fields of natural and medical sciences and the old pharmaceutical and diagnostic industry. The mobilisation of local resources and the successful attempts to influence national S&T policy have mainly been a result of a network of individuals working in industry and in universities, rather than a general strategy of the universities or the local government. Resource-scarcity and national science and technology policies pushed the universities forward to new kinds of cross-university, cross-departmental work that have been particularly innovative and open to interactions with industry. Turku is thus less 'new' in terms of its emergence, and more intentional through the creation of a new identity. (Srinivas & Viljamaa 2003)

As in the Finnish cases, so also those in Akron and Rochester as Safford (2004) show us that the crisis was quite largely due to companies' and other organisations' apparent inability to innovate. Companies addressed this issue by acquiring portfolio companies, building new research capabilities in different areas of technology and moving some innovation activities to places to be more cutting edge. And as in the Finnish cases, so also in Akron and Rochester, community leaders responded to industrial crisis by a set of new policy interventions. Policy-makers for their part aimed to promote conversations among firms in ways that

might, as Safford states, approximate the creative cacophony that prevailed in the emerging high-tech hotspots.

By channelling resources to research and development through universities, states hoped to build on universities' strong reputation in the community and their innovation-oriented resources to help upgrade innovation processes in these communities. These efforts were directed especially at upgrading local capabilities in order to meet the requirements of increasingly demanding global markets. In general, states left it up to the universities and their potential industry partners to define exactly how this arrangement would work in practice. In fulfilling this mission, the universities took significantly different approaches. In Akron, the university went for bridging the structural holes, that is linking the research taking place at the university labs and the research and development laboratories of companies. In Rochester, the aim was to strengthen institutional capacity and/or thickness and social capital. (Safford 2004)

In Hamamatsu, according to Hatakenaka, policy-makers have done virtually everything possible to promote economic development during the last decades. The region has built infrastructure for industry, and developed a technopolis. The co-location in technopolis was however not enough to foster interaction among the key players, and after realising this, collaborative research projects among multiple firms and universities were actively aimed for.

Optoelectronics is currently emerging as a next economic cluster having potential to form the new core of the economic base. So far it is a small cluster of companies with one globally prominent company. Companies that have diversified into optoelectronics have done so mainly in response to changing user needs, mainly arising outside of the region. However, the many efforts to develop optoelectronic clusters have not yet produced desired results, and this is due to the gradual isolation of Shizuoka University from industry. The academics were unable to play expected roles as technological coordinators. In addition, central government superstructures distracted local players from the content of initiatives. Consequently, there has been little evidence of either dynamic growth or interactions among key players. It seems that proactive technological coordinators (e.g. public research institutes or university professors) were not able to get corporate parties to come together regularly. (Hatakenaka 2004)

The evidence presented by Hatakenaka points out that in Hamamatsu government incentives have not been enough in bringing actors together.

First, most of the programmes come with central government conditions and priorities that may in fact be more distracting than appealing to the regions. Centrally designed funding programmes are often based on hastily designed directives, or they demand a quick turn around to meet central government requirements, and that leads easily to poorly prepared local proposals. Hatakenaka

stresses that nationally orchestrated programmes need to be stabilized so that the proposal solicitation process and the subsequent evaluation provide incentives for well thought through proposals, rather than quick fixes on fictitious stories to meet central preferences.

Secondly, it is not easy to orchestrate such regional efforts effectively, as they require considerable content knowledge on the specific aspects of the technology. There have to be local and neutral players who are capable of coordinating such efforts, and these are in short supply. (Hatakenaka 2004)

The basic puzzle

Most of the regional development studies and policy efforts briefly discussed above are, broadly speaking, focused on the economic change of regions. The aim often is to understand and direct the processes that lead to changes over time in the mix of products and services that are produced within city-regions and, therefore, the focus has been

a) on *innovation*, i.e. the first applications of new inventions, and also on *innovation systems* and *innovation environments* (mechanisms supporting innovation processes),

b) on *learning*, i.e. on the various ways by which new processes, products, technologies, etc. are absorbed by individuals, organisations and systems, and lately also, rather prescriptively,

c) on *creativity,* in other words on the 'fountainheads' of innovation.

The basic puzzle that policy-makers are faced with is how to adapt to changing environment, not like driftwood in a stream but with purpose. At least in Europe, in their efforts to promote economic development policy-makers' attention is traditionally directed to development programmes, systems, funding schemes, best practices, etc. They quite often focus on grand efforts that gain visibility. Recently, as the cases also show, the efforts have been targeted at bringing universities and firms together, hence opening new paths for competence building, with varying success of course.

Promotion of knowledge-based economic development requires better understanding of how city-regions generate development from within; here flexibility of existing institutions, structures and mind-sets emerges as crucial. As Boschma states, policy-making has not traditionally been keen on flexibility, but it may be essential in stimulating innovation and creating truly innovation-supporting local environments with strong global pipelines. The local environment needs to be

transformed if a region wants to benefit from new emerging technologies. At the same time we need to acknowledge that organizations and institutions usually do not adapt spontaneously, due to the many inertial forces. Consequently, restructuring old organisations and institutions, creating new ones, and making new connections emerge as crucial. (Boschma 2005)

All the city-regions discussed above have aimed to do exactly this, but more or less as a reaction to a crisis on hand; they have been forced to change, to adapt to a changing environment. However, quite often the reactionary policies are based on seeds planted years or decades earlier, often in the form of organisational institutions that have 'people working in the future' before the rest of us even realise that something is actually changing.

For future crises, it should be asked more often than what we do nowadays, what kinds of functions and processes are essential in an unbroken procession of reinterpretation and reinvention to enable entire city-regions to adapt strategically. In many city-regions that could be labelled resilient, that have been capable in bouncing back from the industrial decline, concerted actions to adapt to a changing environment from within, strategically, have played a crucial role in economic development, often in concert with various national policies.

Before discussing in more detail how the key processes of self-renewal are embedded in the every-day life of city-regions, I now discuss the nature of emergence, and return also to roles of policy-making from a directed emergence point of view.

Towards directed emergence

Many of the practitioners and the regional development studies do not recognise confusion, ignorance and chance as forces causing and directing development. Policy often aims to eliminate uncertainty, but in thinking adopted here various organisations engaged in economic development are seen to consist of people who do not always know what it is that they do not know, and therefore do not know how they will react when they will know *it* (Allen 1990, 569). In this thinking ambiguity may be a source of innovation and development (Sotarauta 1996; Lester & Piore 2004). This, as evolutionary approaches usually do, brings up the importance of uncertain and unexpected outcomes in the development of city-regions, and reminds us that it is hard to predict where and when major transformations will occur.

If we take this kind of view seriously, we might end up concluding that policy-making does not have a role to play in directing the change processes. Dalum et al. (1992, 298) state that in this kind of evolutionary thinking there are implicit

arguments favouring non-intervention. So, there seems to be little room for effective policy-making; yet as the cases suggest, policies have a role to play, actually sometimes somewhere they may appear crucial. By all means, my intention here is not to propagate the idea of laissez-faire, but to raise some notions about research and policy-making, drawing on evolutionary approach and emergence; hence the aim partly is to understand familiar policies from an alternative viewpoint.

Finding alternative entry points to economic development policies is important, since new substance knowledge and information are emerging all the time that feed new insights to policy-processes. But why, as it seems to me, are we not fully able to utilise new knowledge and insights? Where are the lively visions and bold strategies when decisions are made? Why, after good strategic planning procedures, does everything seem to continue just as before? What prevents the visions from being created?

I guess we know all too well the answer, drawing on Dryzeck (1993):

1) the general laws of society, on which it is believed the strategies of public actors can be based, are difficult to define in a watertight way - they are almost unattainable;

2) social goals are rarely pure and simple. Values are usually open to question, vacillating and many-sided;

3) the intentions of actors may override the causal generalisations of the policy-makers and planners. People may simply decide to do things differently;

4) interventions aimed at the course of development cannot be empirically verified without the intervention being realised. (Dryzeck 1993, 218.)

I would add that in the economic development of city-regions we have a tendency to forget the diversity of human life and our societies. The muddled nature of development vanishes when presenting the future in the form of visions, scenarios, etc. In these, depending on the matter in question, the future seems to be either exquisite and glorious or depressing and gloomy, with the often very confusing world relegated to the background. Quite often strategic planning, for example, is about reducing uncertainty and ambiguity, but in resilient city-regions, I argue, ambiguity and emergence are not only problems but quite largely sources of change and innovation.

The concept of emergence directs our attention to such qualities that appear 'from nowhere' as a result of the many intertwined processes of many single organisations and individuals. Quite often it seems as if 'things simply happen'. (Johnson 2002) Emergence underlines the unpredictable nature of development. It

is not goal seeking or directed 'at the level of the whole' in the sense that there would be some kind of specific desired outcome which could be planned and whose behaviour could be precisely predicted or controlled (Mitleton & Papaefthimiou 2000).

More specifically emergence can be defined as an overall system behaviour that comes out of the interaction of many participants and cannot be predicted or 'even envisioned' from knowledge of what each component of a system does in isolation. (Holland 1998; McKelvey 1999) Emergent systems, as a whole, develop organically and without any predestined goals even though their elements, organisations and individuals have explicit goals to pursue. According to this view on the course of events, change does not occur without any general laws or objectives. The capacity of emergent systems to learn, experiment and grow is not, however, based on general laws governing the behaviour of the whole, but general laws directing the parts. (Johnson 2002; see also Sotarauta & Srinivas 2005)

For policy-makers, emergence appears as alarming. If taken seriously it suggests that economic development is uncontrolled and we should not pretend otherwise. Having said that, I am compelled once again to stress that resilience or self-renewal capacity is not based on a limited role of policy-making and on development arising purely from the interaction of free individuals and free markets. When accepting emergence and adopting an evolutionary approach to policy-making, also the viewpoint towards policies and their role vis-à-vis to actual development changes.

Our earlier studies (Sotarauta & Srinivas 2005) suggest that instead of linear policy-making, we need directed emergence where the nexus of intentionality and freely emerging processes is the crucial target of attention. Consequently, in policy-making we should be more sensitive to recognising the potential of emergent developments and possible routes to the future, and to finding the best possible policy-making approaches to each situation, location and time in question, recognising the emerging processes and not creating totally new invented policies from scratch.

In practice this suggests that policy-makers ought to know much better what is going in their own region to build on existing strengths and capabilities in regions to stimulate innovation. Policy-making could focus directing local emergence, creating local selection environments that buffer between local and global, responding to local problems, upgrading local environment, strengthening connectivity between organisations, etc. (see also Boschma 2005)

Even if various interactive models, highlighting learning, partnership, etc., are nowadays stressed more than earlier, there are substantial differences in how policies and policy-making virtually interact with emergent development. The success of Silicon Valley, for example, is based above all on the dynamic interaction between individuals and individual organisations, and overall development has

strong emergent tendencies. In Finland, considerable efforts have been made to anticipate development and to attain consensus at all levels and in ways to influence the course of events. For example in Tampere, knowledge intensity has become the spearhead in the development strategies of the City of Tampere and the whole city-region. However, the emergence of a knowledge base and the development of structures and thought models supporting it have been a long process. They have not been born in one strategic plan or development programme, but as a consequence of several plans, and especially as a consequence of individual perseverance and years of work (see Kostiainen & Sotarauta 2003).

The birth of the knowledge-based economy in the City of Tampere could be summarised as follows: from the 1950s to the 1980s its structures were reinforced on the basis of the development view of individual people and small active groups, and accelerated by their active co-operation. By the end of the 1980s the city had progressed towards developing both knowledge-based economy and information society, even if not using these concepts, but in the mid-1990s certain formalisation and systemisation of new thinking were still missing.

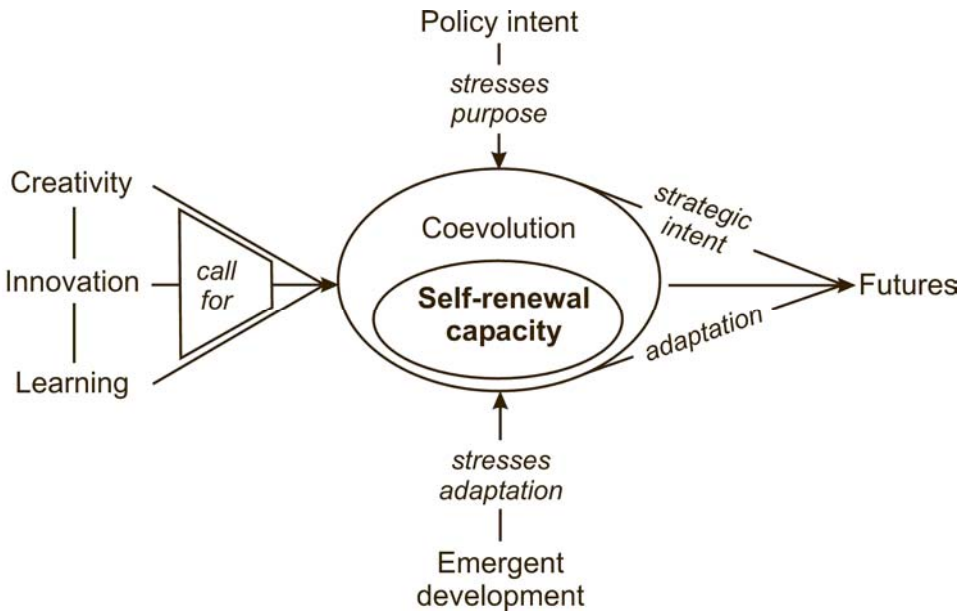
The general spirit of the time as well as the strong thought models and interaction relationships shaped by industrial culture and tradition slowed down the transition from emphasizing the traditional industry into knowledge, innovation and expertise. In the 1990s, along with the economic recession and the change in the spirit of the time in Finland as a whole, the significance of the knowledge-based economy began to be more broadly understood in the city. Supported by earlier structures and institutions, technology and innovation activities were more focused on; in other words, the innovation environment was consciously strengthened. After the mid 90s the knowledge-based economy was institutionalised to become a part of the development thinking and development activities of Tampere through strategic planning. (see Sotarauta & Kostiainen forthcoming)

As Bruun (2002) states, in Turku the new biotechnology-focused strategies were, at first, based on building production facilities for firms that needed them. It was soon realised that there was no-one managing the bio-grouping as a whole and that such management was desperately needed for the development of the bio-entity. The City of Turku took that role upon itself, and founded a new structure and organisations for this task - Turku Science Park and Biovalley Ltd. However, it should be noted that the BioTurku trajectory did not follow established decision-making channels, but was, rather, created through a mixture of old and novel forms for decision-making. Horizontal collaboration between people and organisations (sometimes formalised, sometimes informal) was at least equally as important as the vertical decision-making hierarchies of, for instance, the city and the universities. Seen from a BioTurku-perspective, the locus of initiative has been constantly on the move, and the bio-grouping has been dynamic, self-transforming, rather than a static structure. (Bruun 2002.) Observations made by Bruun apply

also to many development trajectories of Tampere; they also have been a mixture of formal and informal, horizontal and vertical.

At this point I am inclined to conclude, in other words to remind us of the basic message of this paper, that the capacity of city-regions to deal with change and to reinvent themselves is characteristic of resilient city-regions, and that in resilience strategic adaptation is crucial. Consequently, what matters is whether the mind-sets of people and key institutions of a city-region are flexible and responsive to change. This kind of dynamic set of capabilities seems to be crucial in the competitiveness of city-regions in the long-run. Based on the conceptual discussion above, and the cases briefly discussed, the general conceptual framework in which self-renewal capacity of city-regions is rooted appears as in figure 1

Figure 1. The basic conceptual frame for self-renewal capacity



The main functions and processes of self-renewal capacity

Self-renewal capacity represents a set of processes that can be intentionally designed for the future on the one hand, but that are the core of adaptation on the other hand. Therefore, my aim is to develop the concept of self-renewal capacity, first for future empirical analysis of co-evolution of policy-intention and emergence, secondly for policy-makers so that they would have deeper conceptual tools to understand their roles in long-term development.

Starting from the word *capacity*, and using a dictionary definition, capacity can be defined to refer to *a measure of the amount of work a system can perform*, and also to *the power of receiving and holding ideas, knowledge, etc*. Hence if capacity refers to an ability to perform or produce something, self-renewal capacity can simply be defined as the set of capabilities targeted at renewing oneself in a continuous process.

According to Ståhle (1998), self-renewal capacity refers to organisation's overall capacity to master changes in its strategies, operations and knowledge. Thus, as she states, it is always based on the organisation's overall ability to deal with information, knowledge and innovation. In the context of economic development policies, self-renewal capacity is by definition an attribute of several organisations. Therefore one should always be aware of the question where in an ecosystems specific self-renewal functions are located, and how they are integrated to other functions.

I have tentatively identified the key processes of self-renewal capacity. They are aimed at giving birth to a new series of empirical questions for forthcoming studies, rather than full-blown answers.

Self-renewal capacity is based on the following functions: exploration, exploitation (problem-solving), absorption, integration and leadership.

Exploration and variety

Environmental selection theories emphasise that successful firms undertake similar strategic renewal activities, and aim their actions at strengthening and *exploitin*g existing core competencies. This is in contrast with theories stressing managerial intentionality that suggest that firms adapt by behaving differently and exploring new competencies. (Flier et al. 2003). Most organisations display a tendency to prefer exploitation to exploration (March 1991). Therefore there is a danger to fall into a 'competence trap' (Levinthal & March 1993).

As the cases above show also, entire city-regions can fall into competence trap. It seems clear that city-regions need search processes at both city-regional and cluster level. Exploration needs to be enabled so that emergent properties can be recognised as early as possible. Hence strategic adaptation to changing situations is more likely than without exploration. When a city-region, or some of its industries, is faced with constraints, it needs to find new ways of action and to discover new patterns of relationships, structures and processes – it need to recreate local sets of capabilities. As the cases suggest, those city-regions that have institutions, organisations and people engaged in explorative activities have better chances to

bounce back than those city-regions whose explorative activities are fewer or even non-existent.

I define **exploration** as radical search for entirely new solutions. Exploration adds new activities to the current repertoire of an organisation or increases its geographic scope (Flier et al. 2003). This kind of exploration may be deliberate, or it can be implicit and emergent. Exploration assets are integral to successful transition, but exploration is a difficult act for social entities, since the value of the existing asset profile is likely to be uncertain, and since existing assets may bias the search and discovery process. The latter is of major concern. (Kash & Rycroft 2002) Quite often the economic development policy of a city-region provides various organisations with more or less intentionally designed structures, but the question whether it supports well enough learning, exploration and evolution emerges.

Further, do policies support divergence and variety, which are essential elements in triggering the emergence of new processes and products, and enabling the emergence of new modes of behaviour? Relying too much on planning and control in both the policy process and its outcomes emergence may be blocked, and thus one of the key objectives of development policies disabled: the creation of new ways of action in concert with changing environment. All this means that in policy-making we need to move away from linear causal propositions, stressing the planning – decision-making – implementation – evaluation cycle, and add better understanding of the role of exploration and the direction of emergence into our repertoire.

To strategically adapt to changes it is necessary for city-regions and their key-clusters constantly to explore their spaces of possibilities (see more about space of possibilities Mittleton-Kelley and Papaefhtimiou 2000). Exploring the range of spaces of possibilities provides entire city-regions with better chances to adapt when facing the unexpected. The skills and knowledge pools needed in exploration processes are both internal and external to the respective city-region. Hence we should not only ask what the most important exploration processes are, but also what organisations in a specific cluster are responsible for them, and how they are integrated to everyday action. Exploration aims to stretch the space of possibilities, and this helps city-regions to discover and create totally new patterns of relationships, structures and processes. Let us take South Ostrobothnia as an example.

In the 90s, South Ostrobothnia faced the innovation challenge with a thin institutional capacity geared to innovation. In regional development policy-making many small, yet from a regional perspective large and integrated steps towards engagement in the knowledge economy had been taken. In spite of new developments and significantly changed perceptions among policy-makers, most of the firms in the region did not see the need to integrate themselves with the

knowledge economy and its operational models. (Sotarauta & Kosonen 2004; Kosonen, forthcoming) The main problem was that in the region there were basically only few firms engaged in some kind of exploration; thus the entire region had severe difficulties in understanding new informational and global modes of operation.

To solve these problems policy-makers aimed to connect themselves with the main Finnish universities; that is with those people who were engaged in research that was (and is) relevant for the firms in South Ostrobothnia. There is no space here to discuss the ways South Ostrobothnians have developed the self-renewal capacity (not using this concept, my interpretation), but the most important elements have been

a) linking the main organisations to relevant knowledge pools and processes external to the region,

b) going through several strategic planning processes in different combinations and hence finding the place for the region in a knowledge economy as a region specialised in applications of knowledge produced elsewhere (strengthening absorption capacity), and

c) collective efforts to solve the organisational and institutional problems in creation of local innovation environments with stronger national pipe-lines.

In Tampere, as mentioned above, the institutional basis created for exploration decades ago has turned out to be important later. The two universities induced from Helsinki to Tampere, and against the spirit of time, eventually formed the institutional foundation for many exploration processes. In the 80s and 90s, the local innovation environment was strengthened by founding several specialised development agencies and research centres for, among other tasks, bringing academics and business people together. These agencies' main task is to act as integrators and managers of collective interpretation processes. After severe difficulties, Tampere has emerged as a strong location of knowledge creating and utilising activities. Of course there are many factors contributing to successful transition, but one issue worth mentioning here is relatively active and strong exploration in computer science and related issues since the 1960s; therefore many organisations in the 90s had better chances to adapt to knowledge economy and information society developments.

Innovation is nowadays a more systematic process than earlier. Still inventions can happen in unexpected places, at unexpected times, and through chance interactions (Lester & Piore 2004). City-regions need spaces for the intended and unexpected to encounter; they need explorative spaces. Lester and Piore warn that there are signs that economies are losing the spaces where the unexpected happens. If explorative spaces[2] disappear, and rational and clear-cut short-term

problem-solving processes are overly emphasised. This endangers not only invention and innovation processes but also more generally economic and societal futures oriented development processes.

As Lester and Piore (2004) also state, there is an inherent conflict between the nature of exploration and the contemporary business environment. While exploration requires openness, disclosure and long-term perspective, economic competition fosters opportunism, secrecy, and, sometimes suspicion. There is also a tendency in economic organisations to push explorative processes to the margin and overemphasise analytical problem-solving and short-terms results. However, as Lester and Piore have observed, economies need public spaces within which explorative processes can develop spaces where fears of the risk of private appropriation of information do not disrupt the conversations and open-ended search for 'something new' (Lester & Piore 2004). The problem also is that our capabilities in recognising open-ended exploratory parts of the development and innovation processes are not well enough developed; we simply do not have a vocabulary for it.

As has become obvious, in directing emergence institutions, capabilities, interpretations, connectivity and integration emerge as crucial issues. As Boschma (2002) states, having access to information flows, internal and external to the respective region, is central in future development. As he further states, the higher the number of (potential) connections with the outside world, the larger the (potential) benefit for each local agent. On the other hand, the higher the amount of knowledge sources in a given city-region, the higher the number of (potential) connections with the outside world, and the more information there is available through extra-territorial linkages to each local agent (Boschma 2002).

Connections, a variety of knowledge sources, stimulate economic and innovation activity in a city-region; they act as a stimulus, providing complementary capabilities. By enhancing connectivity both internally and externally, policy-makers cannot influence what actually will happen, but they can create new platforms for new unexpected things to happen. It is not possible to control emergence, but it is possible to direct it. A rich variety of internal and external connections also influence cognitive proximity. As Nooteboom states, too little cognitive distance means often a lack of sources of novelty (Nooteboom 2000). Organisations require access to heterogeneous sources of information both in their own city-region and beyond, which provide new impulses and ideas, and bring new variety.

Based on this discussion of the basic tenets of exploration, it is now possible tentatively to conclude that, to enable exploration, city-regions can strengthen the institutional capacity for exploration, create and develop explorative and interpretive spaces, increase variety, and make sure that there are enough attracting and rooting forces for the individuals engaged in exploration.

Absorption, problem-solving and integration

It may go without saying that exploration is not enough alone for continuous self-renewal, but the knowledge created in the explorative processes ought to be **absorbed**. Drawing on Cohen and Levinthal (1990, 569-570), absorptive capability refers to abilities to identify, assimilate and exploit knowledge from the environment. Cohen and Levinthal have also argued that the ability to evaluate and use outside knowledge is largely a function of the level of prior related knowledge, and one might conclude that successful absorption is based on well functioning exploration. Absorptive capacity seems to be important for exploration too. Cohen and Levinthal (1990, 137) suggest that the higher the absorptive capacity, the more likely it will be that firms will focus more on opportunities provided by the environment, independent of current performance criteria. They even suggest that firms having well developed absorptive capacity will tend to be more proactive; as they have later stated, fortune favours the prepared (Cohen and Levinthal 1994).

Outside sources of knowledge are critical to the self-renewal processes in general, and as part of absorption, also replication and imitation of new knowledge, inventions and innovations produced elsewhere appear essential in self-renewal capacity. However, since direct replication without proper adjusting to local situations is seldom effective, interpretation is also needed in fitting the new pieces and prevailing institutions and culture together.

Interpretation in this context refers to collective sense-making processes, where the respective system is either consciously or unconsciously reinventing its basic beliefs and assumptions about itself and the environment. By interpretation it is seeking to renew the mind-sets of key-actors and also to prevent deadlocks, or to resolve them by maintaining or creating conditions for open debate. In such conversations, efforts are made to accept that there is no *best* perception as such, and that for successful integration the existence of differing perceptions is of more use than the elimination of differences in interpretations (Termeer & Koppenjan 1997)

As Lester and Piore (2004) state, quite often development and innovation processes operate in **problem-solving** mode that is rational and clear-cut, starting often with researching and identifying customer needs, and continuing via developing a new design concept that will best solve the problem. In this kind of process the task is broken into component parts, and then the resources are organised to finalise the project. Even though this kind of process is vital for the self-renewal capacity of firms, it has a fatal flaw. It is based, state Lester and Piore (2004), on the importance of listening to the voice of the customer. Quite often, however, the customer does not really know what he or she wants. There are innovations that have emerged from open-ended conversations between developers and customers, and not from well-defined problem-solving process.

The same applies to promotion of regional development, where city governments and regional development agencies are expected to listen to the voices of firms and inhabitants, but where both firms and inhabitants often lack the vision for a whole region. Our earlier studies show that in city-regions also development often has strong emergent properties (see Sotarauta & Srinivas 2005 and forth), but they also show that strong problem-solving capacity may be crucial for entire industries to grow and eventually end up renewing core competencies too. In Tampere, mechanical engineering companies have shown very well developed capabilities in problem-solving and, for example, Tampere University of Technology has played an especially important role in recent decades as a provider of skilled labour, technical know-how and problem-solving abilities relevant to the local industry. The interaction between it and industry has been dense and versatile (see also Martinez-Vela & Viljamaa 2004).

Not aiming to renew core competencies problem-solving is quite largely based on exploitation. Even though short-term and pragmatic problem-solving produces more tangible and quick solutions compared to exploration, city-regions ought to promote both exploration and exploitation processes with good capabilities in absorption and integration. This is exactly what policy-makers in Akron, Rochester, Hamamatsu, Turku and Tampere have aimed to do, isn't it, to encourage exploiters from the firms to pool with explorers from the universities and in that way to help firms to renew their core competencies, and launch processes that may lead to the renewal of core competencies of universities too. We also need to remember that experimentation or exploration may be present anywhere in the ecosystem, at lower levels or sometimes even on the margins of the overall system. The crucial question seems to be whether there are any organisations engaged in exploration in the locale and/or connected to such processes elsewhere.

Integration refers to all those functions and processes that enable, in combining a versatile and many-sided set of information and actors and their competences and resources together for adaptation, and for design and implementation of effective strategies and projects to promote regional competitiveness and hence to create a distinctive knowledge pool to form a core of competitiveness. Integration can be achieved through institutions, networking and socialisation (Sotarauta, forthcoming). *Institutions* refers to the webs of relations involved in development policies, which interlink public development agencies, firms, and educational and research institutes in more or less collective action, based on both strong and weak ties; thus institutional capability is here seen to be part of integration. (Healey et al 1999) Institutions frame the development efforts and processes, and provide activities at individual and organisational level. Of course, institutions may have either a positive or a negative influence.

Networking refers to the forging of mutual dependency, loyalty, solidarity, and horizontal co-operation based on trust and reciprocal support among organisations and individuals. *Socialisation* refers to producing shared and often tacit knowledge

that leads to social integration of actors which goes far beyond the institutions and networking. Thus the ability to network competently and efficiently to utilise informal relations is significant. Therefore the ability to share feelings, emotions, experiences and mental models becomes important. (see Nonaka & Konno 1998.) As in absorption, also in integration, interpretation emerges essential.

I argue also that **leadership** is crucial in the self-renewal capacity of city-regions. Without proper leadership, self-renewal capacity may remain static and turn out to be a hollow shell. Hence, leadership is here seen as a driving force providing exploration, integration, absorption and problem-solving with direction, energy and vision. Most of all, in the context of economic development of a city-region, leadership is needed to cross organisational, institutional and cultural boundaries and to aim for orchestrated efforts in a narrow isthmus between design and emergence.

In this context, leadership is needed for directing emergence, not for control. Self-renewal capacity needs people who significantly influence the thinking and behaviour of others, and who venture into unexplored territory, guide the other people to new and often unfamiliar destinations, and are thus going before and showing the way. Leaders have a greater range of assets than others to stretch the constraints. This differentiates leaders from managers. All in all, leadership is needed to build the organisation, institutions, structure and mental models for the future, that is, to secure new resources and develop new capabilities, and by those means position the region and its organisations to take advantage of emerging opportunities, and adapt to change. (Sotarauta, forthcoming)

Conclusion

Basically, the question in this paper is about change: how to cope with changes in the environment and how to stimulate change if the city-region is stagnating. Referring to the regional development or transformation of regions is easy of enough just so long as all one means by this rhetoric appellation is that 'regions change'. Many things change. The crucial issue is the mechanisms that produce this change; what sorts of mechanisms play what sorts of roles in the change in different contexts. The world of societal and economic change is full of hollow *change and development* rhetoric, and in contemporary discourse many kind of attributes are stressed for change. I see going back to basics as an important issue for future development of regional development studies and policy-making. Hence we need to think more often than we are used to, how the capacity to change is embedded in the various systems.

Many scholars and practitioners alike stress teleological explanations, and hence the importance of shared purpose, consensus and co-operation as important factors

in pursuing change. Others stress individual aims, competition and scarce resources as crucial forces in economic change. These views are often well argued from their own point of departure (whatever it is - social capital, competition, strategic planning, etc.), but they seldom ask these questions explicitly from change points of view. The main question is, what are the factors that stimulate real change? Instead of prescriptively stating, for example, that innovation systems, interaction of academia, firms and public sector are needed for change (etc), I have stressed the need to better understand the co-evolution of emergence and policy intentionality and, based on that, our capabilities to direct emergence.

All in all, change is always a complex and not at all a self-evident process. Rather it may be depicted as adaptation to a changing environment in which organisations, universities and development agencies, and individuals like researchers and other experts have an active role to play, with many purposes that are in continuous interplay with the selection environment. As far as I understand insufficient attention is paid to long-term development processes, and to the active role of actors. Especially, my understanding is that the co-evolution of policy and emergent development, and of agency and environment, has been neglected in this context. (Srinivas & Sotarauta 2005)

We maintained earlier (Sotarauta & Srinivas 2005 and forthcoming) that many practitioners and scholars do not appreciate the emergent nature of economic development. Therefore they continue their efforts to better implement designed strategies or to design more 'implementable' strategies. This approach allows no space for learning from developmental mistakes, nor does it recognise that policy is as much about action as it is about analysis. Therefore, distinguishing forms of development that are relatively spontaneous from those that have taken shape with considerable conscious policy formulation and co-ordination is an important task, because it provides us with clues as to what we can direct, how, to what extent, and under what circumstances. Both policy and localised emergent development have some interplay and adapt to each other, but as we have suggested this interplay is understudied as a two-way process. (Sotarauta & Srinivas forthcoming)

The basic message of this Hot Topic is that resilient city-regions are more likely to cope with rapid changes in the environment than less resilient ones; and that strategic adaptation plays a crucial role in resilience. We have learnt to understand environmental selection processes pretty well, and also how environmental forces change the destinies of entire city-regions. We also have a good picture of the role and processes of strategic choices made by policy-makers. But we know far less about how emergence and strategic choices interact with each other in time. In strategic choice the question, however, is not only about choices for the future. Strategies in practice are all the time constructed, moulded and adapted in co-evolutionary processes with the selection environment. Therefore, the role of strategic choices and plans seems to be especially important in the reinterpretation processes that create shared understandings in a given social entity that is

developing, to deal with the problems of external adaptation and internal integration.

So, my assumption is that all the processes of self-renewal capacity serve in resilience. Without proper empirical data to root the discussion, and without real-world situations, my discussion here is overly abstract in nature. The cases highlight the need for and some aspects of self-renewal capacity, but since the data have been collected for other purposes, they do not reveal the true nature of self-renewal. It is highly probable that self-renewal capacity has different manifestations in different contexts, also that the relationship between the key-processes may vary. One of the main issues here has been tentatively to identify what are the key-processes of self-renewal capacity, and to open the debate on how they may arbitrate between emergent development and policy intentions, how these processes interact, how the combination of individual processes affect the renewal of a city-region or a cluster, and how as a whole they shape the processes.

For policy-making, the basic message can be summarised as follows:

- In the economic policy-making city-regions should stop chasing the latest global buzz words and best practices to be imitated directly, focus more on actual local issues and capabilities, and aim that way to adapt to the global economy
- The development system, and policy-makers, ought to serve the local emerging potential, both people and organisations, and not vice versa, as the case too often is
- In policy-making it might be about time to move from a *forcing partnership* to a *real partnership* mode where the arrogance of 'policy wisdom' is scaled down, and real open dialogue between relevant parties is initiated

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Notes

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[2] Lester & Piore (2004) use the concept of interpretive space and refer basically the same as explorative space here

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