Incorporating futures research into regional knowledge creation and management*

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Available online 19 March 2005

Abstract

This article focuses on future-oriented knowledge within regional innovation networks. Concrete regional tools and institutional settings aiming to enhance knowledge creation and management in such networks are needed. To enable planning for the future, there is a need for regional visionary capability. Resource-based futures research may make an important contribution in reducing the insecurity that regions face in the turbulent environment. When foresight processes are not absorbed into the regional strategy making processes, ‘black holes of regional strategy making’ come into existence, and future scenarios are built without taking into consideration the path-dependency of a region.

This article attempts to reduce the gap between futures research, on the one hand, and regional knowledge and innovation management, on the other hand. It highlights the concept of self-transcending knowledge—the ability to sense the presence of potential. It then introduces a new, systemic model for knowledge creation and management in regional innovation networks. Utilising methods from futures research in creating self-transcending knowledge in a regional knowledge management system is proposed as a fruitful way of enhancing regional visionary capability. The article thus advocates combining approaches and methodologies from futures research with those of knowledge management in a novel way.

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1. Introduction

The importance of the regional level in research has risen during the last two decades (see, e.g. [53,55]). Vast literature in the fields of, for instance, evolutionary and institutional economics, network theories, innovations and learning systems as well as sociology has focused on regional level questions. The regional level is increasingly seen as a proper level in fostering economic, social, cultural and political activities by policy measures aiming to increase the well-being of citizens. The factors of competitive advantage are thus strongly related to regions’ institutional ability to create and process knowledge in a rapidly changing environment [40]. Knowledge and learning are crucial competitiveness factors in the ‘learning economy’ [34,35]. The ability to learn (and forget) is essential for economic performance, not the stock of knowledge [34, p. 35]. However, knowledge itself may also be seen rather as a process than a stock [29].

The concept of learning economy also stresses innovation as an essential source of competitiveness. Innovations emerge as non-linear processes deeply embedded in normal social and economic activities and as processes of interactive and collective learning [1,33]. Collective learning is a process of dynamic and cumulative knowledge creation that has, due to its interactive character, numerous synergy advantages [7]. Besides knowledge spill-overs, synergy advantages emerge because of increasing trust in the collective learning process. An intensive process of interaction is included in the creation of new knowledge [41,43]. In non-linear innovation processes, multi-directional information flows are emphasised in creating and combining knowledge. Many different kinds of actors are involved in innovation processes. These views raise the question of the role of socio-cultural structures in innovation processes [1,44,45].

From a regional point of view, innovation is often understood as a locally embedded process that takes place within the regional innovation system (see [6,9,12,13,53]). A regional innovation system consists of different kinds of innovation networks. Typical characteristics of regional innovation networks are that (i) they are often formed of heterogeneous groups of different kinds of actors including representatives of firms, universities, technology centres and development organizations as well as nowadays also various public organizations and non-profit organizations and alike, (ii) they have usually been able to create a common vision and goals towards which they are striving and (iii) they are looser structures than an innovation network of one company or even an innovation network formed by several firm partners (cf. [25]; for further discussions, see also [22,23]).

The rapid techno-economic development, systemic and complex nature of innovation processes and multi-level networked development environment set special demands for regional innovation policy activities. This environment is ‘crying for’ concrete regional tools and institutional settings aiming to enhance knowledge creation in regional innovation networks—tools that foster the regional innovative, visionary, leadership, networking and learning capabilities as well as build social capital in the interactive innovation environment. Critical questions are:

– How can we utilise futures research and incorporate future-oriented views into regional knowledge creation and management?
How is it possible to create a trustful atmosphere and social cohesion in regional innovation networks?

How can we build a common knowledge management system for innovation networks?

How and what kind of knowledge should be transmitted in such networks?

This article provides answers to the above questions on the basis of existing research literature, but in a practically oriented manner. The objective of the article is to suggest ways in which actors of innovation networks can develop ‘a common language’ and modes of interpretation as well as trust in order to overcome some of the uncertainties characterising innovation processes (cf. [34])—and take into account the importance of future-oriented views.

2. Futures research in the turbulent environment of regions

2.1. Regions—path-dependent vagabonds

One of the most cited theoretical frameworks describing the present techno-socio-economic paradigm is that of post-modern society (for example, [2–4,10,18,31]). An influential representative of this approach, Bauman, describes the agents in modern and post-modern societies with the metaphor of pilgrims, tourists and vagabonds [4, p. 240–241]. Pilgrim is modern because he has a goal for his journey. Vagabond is post-modern because he is wandering from one place to another without a goal, believing he will find something satisfactory in each place. The journey continues, because a vagabond always believes that there is some place offering something better. Post-modern frees the agents from the bonds of time: the past does not force, and the future does not have a colonising effect. The post-modern theory of Bauman also claims that it is impossible to anticipate what happens in the future.

It is tempting to assess a region as a subject in the post-modern society. Are regions vagabonds, tourists or pilgrims? Mainstream regional science is strongly opposing the suggestion that history does not matter. On the contrary, regions are considered to be strongly path-dependent [24,36,54], which limits future paths that are available. The resource-based view of regional development emphasises the crucial importance of resource configurations gathered in the past. These resources are presumed to be valuable, rare, inimitable and non-substitutable in order to give sustainable regional competitive advantage. The framework of dynamic capabilities focuses on the processes aiming to renew these resource configurations over time (see, e.g. [54]). At the regional level, dynamic capabilities can be defined as the region’s ability to generate competitive resource configurations in interaction in a turbulent environment [24].

Indeed, setting solid and rigid goals in the present turbulent world could be difficult and even dangerous [4]. However, when understood properly, futures research provides tools to obtain useful visions also at the regional level. Solid and rigid goals are not and should not be the aim. There is a need for a special regional dynamic capability: visionary capability. In this context, it refers to ‘a region’s capability to outline, in multi-actor networks, the possible potential development trajectories based on paths that have been
travelled and opportunities emerging from the changing environment’ [22]. Regions in the post-modern society could be characterised as vagabonds being strongly dependent on their past—and having to continuously make new decisions under insecurity. This insecurity can be reduced by using resource-based futures research and promoting regional visionary capability.

2.2. What could futures research contribute at its best in the regional context?

There seems to be a growing need for futures research in every sector of the modern society. The development that the industrialised societies are now going through will probably become more dramatic than any earlier development phase. The change process takes place in such a short period of time that it may lead to solutions and outcomes that are very difficult to anticipate [50, p. 19–25]. On the other hand, Coates and Coates, for instance, claim that from a global perspective, there are only few new experiences, but at the national or regional level, events take place that are so unfamiliar as to create an inability to anticipate and plan for them [8, p. 187]. Because of this unfamiliarity, the concept of ‘foresight’ has become popular and fashionable during the last decade. Foresight is an attribute or a competence; it is a process that attempts to broaden the boundaries of perception in four ways:

- By assessing the implications of present actions, decisions, etc. (consequent assessment);
- By detecting and avoiding problems before they occur (early warning and guidance);
- By considering the present implications of possible future events (pro-active strategy formulation);
- By envisioning aspects of desired futures (normative scenarios) [51].

A central subcategory of futures research is technology foresight and assessment. Its basic philosophy has changed somewhat during recent years. Previously, more focus was laid on an approach that stressed outside objectivism during the assessment process, but nowadays the so-called constructive technology assessment has gained more popularity. It means that also those who will utilise or produce emerging technologies take part in the technology assessment process in order to influence the shaping of those technologies [16, p. 20]. This gives an additional justification for multi-actor innovation networks and incorporation of future-oriented views into their work.

Special attention has been paid to technology foresight and assessment processes during recent years also at national and international levels. The main reasons for this are, on the one hand, the rapid technological development as well as the threats and opportunities connected to this rapid development and, on the other hand, the concern that technology assessment and foresight procedures of today do not serve the technology-political decision-making or the strategy processes of companies well enough [16, p. 33]. The regional level needs to be emphasized, too, as well as the inclusion of a wide variety of actors and organizations, not only companies.

Since the late 1990s, the Finnish innovation system and technology development procedures have gained fame in many international comparative reports. Thanks to this
success, there is the willingness to further develop national technology policy on the basis of already existing structures [16, p. 41]. However, in many reports written in the last few years, there has been one common finding—namely that there should be better coordination of foresight activities at national, regional and institutional levels and that foresight activities at each level should be further strengthened. Besides the methodological competence, the importance of problem-based approach is stressed—as well as the need to incorporate in the process also views of technology users [16, p. 131].

2.3. The black hole of regional strategy making

The regional level was found in a European Commission Green Paper to be the best level for providing firms with the necessary support for innovation. Regional innovation system policies are intended to improve interaction between the knowledge infrastructures, firms and institutions. In addition, these policies respond to individual and collective need for innovation. They are thus developed to support a region’s endogenous potential by encouraging the diffusion of technologies on a regional scale [13, p. 248]. They cannot, however, concentrate on present circumstances only but should contain foresight processes and future-oriented considerations.

Horton [26] discusses the elements that should constitute a successful foresight process. According to her, successful foresight consists of three consecutive phases:

1. Phase one comprises the collection, collation and summarisation of available information and results in the production of foresight knowledge.
2. Phase two comprises the translation and interpretation of this knowledge to produce an understanding of its implications for the future from the specific point of view of a particular organization.
3. Phase three comprises the assimilation and evaluation of this understanding to produce a commitment to action in a particular organization [26].

Possibilities of successful foresight do not have to be limited to individual organizations. National and regional level foresight processes can support R&D priority setting and definition of R&D focus areas, if they are appropriately designed. Flexible integration of technology foresight and technology assessment practices into the strategy work of individual organizations (companies and research institutions) is needed in order to better manage the technological development and to create long-term competitiveness [16, p. 6]. When the foresight process is not rooted deeply enough into already existing structures and competences of a region, there is a danger that results of the foresight process are not absorbed into the regional strategy making process. This is what Sotarauta, Kautonen and Lähteenmäki [52] call ‘the black hole of regional strategy making’.

According to Dosi, two striking features of the nature of innovations are their cumulativity and uncertainty [14]. Cumulativity means that the present development is to a large extent built on the past (cf. the concept of path dependence). Uncertainty, on the other hand, does not include only the difficulty to anticipate what happens in the future but also the multidimensional nature of risks. The basic motive behind technology foresight and technology assessment is to minimize these risks [52].
It has proved to be difficult to find unique and creative strategies by means of regional strategic planning. In many cases, those carrying out the foresight processes have ended up analysing global technology trends or the ‘state of the art’ of the region, and neglected the analysis and development of those actors who are to fulfil regional strategies. In practice, visions and strategic goals remain at a far too general level, and in technology foresight processes, one ends up bringing forth new and exciting trends that, in fact, do not have any connections to the ‘real world’ and to practices of different organizations in a region. The foresight process as a whole thus does not provide a creative tension between the present and the future [52].

Besides visions and strategies that remain unclear and do not guide the selection of means, there is a danger that knowledge gained through a technology foresight process remains unconnected to everyday life and actions of organizations in a region. Furthermore, when the strategy remains unclear, organizations end up carrying out ‘single’ projects that are easier to accept but, unfortunately, also have minimal effects. When connected to a technology foresight or technology assessment process, the black hole manifests itself in two ways: (i) new future-oriented knowledge cannot be utilised in renewing regional visions and strategies and (ii) the future-oriented knowledge does not affect current activities at everyday level (see Fig. 1) [52, p. 31–32].

Within technology foresight and assessment, the following features can cause the birth of a black hole:

- In the foresight process, technological trends are recognized, but companies or other organizations that are the potential users of new technologies cannot utilise this new knowledge, because not enough attention has been paid to developing their competences.
- One has not enough courage to take the insights brought up by new knowledge into practice because of the fear that other actors might oppose them and that it causes too much trouble to convince these actors. In practice, this means that even though actors

![Fig. 1. Black hole of strategy making as connected to the technology foresight process. Source: [52, p. 32].](image-url)
can recognize technological trends, they cannot reach consensus concerning the appropriate actions to be taken.
- One believes that new future-oriented knowledge itself is enough and pays too little attention to communication and management of the foresight process—due to the false assumption that ‘good future-oriented knowledge’ automatically turns into action [52, p. 32].

These features are the ones that are being focused on in regional knowledge creation and management as advocated in this article. It is argued that by means of a systematic knowledge management approach, also good future-oriented knowledge is more likely utilized and turned into action. Moreover, the potential danger that technology foresight and assessment is too narrowly technology-oriented and fails to take into account or remains unconnected to other relevant trends in the society may be reduced.

3. Learning and knowledge in loose multi-actor networks

3.1. The nature of knowledge

The discussion of knowledge as a regional asset often deals with the nature of knowledge and its meaning for regional development. The role of tacit and explicit knowledge has been investigated in many works (cf. [1,34,41,47,48,50]). Explicit knowledge is understood as easily codifiable and, therefore, easy to transfer with the modern technologies—making it, in principle, available everywhere. Tacit knowledge, again, cannot be transferred easily over distances, because it is not expressed in explicit form. It may be argued that tacit knowledge is a more valuable asset in the regional context. However, local knowledge infrastructures also contain ‘sticky’ knowledge [1]—explicit knowledge that is generally based on a high level of individual skills and experiences, collective learning processes and a well developed institutional framework—making that kind of knowledge very difficult to transfer between regions [11]. We consider, however, that sticky knowledge and the more easily transferable explicit knowledge are not two separate categories, but explicit knowledge is nearly always to some extent sticky. Only the level of stickiness varies. In this article, sticky knowledge is understood as a sub-category of explicit knowledge. As such, the topic of sticky knowledge seems to deserve further investigation in the context of regional innovation networks.

Scharmer [49, p. 68–69] introduced the concept of ‘self-transcending’ knowledge. It is ‘tacit knowledge prior to its embodiment’—the ability to sense the presence of potential, to see what does not yet exist. It is usually associated with artists. Scharmer cites Michelangelo, who, talking about his sculpture of David, said: “David was already in the stone. I just took away everything that wasn’t David”. The ability to see a David where others just see rock is what distinguishes the truly great artist. Today’s leaders also are faced with the challenge of figuring out what in their environment may contain the potential new ‘David’, but they also have to figure out how to take away everything that is not David. Understanding hidden trends is extremely important.
Fig. 2 depicts the three forms of knowledge by Scharmer using the model of an iceberg. We have added sticky knowledge as a sub-category of explicit knowledge. Above the waterline is explicit knowledge. Below the waterline are the two types of tacit knowledge. Self-transcending knowledge is neither outside nor inside the knower [49, p. 76]. Within regional innovation networks, self-transcending knowledge seems particularly important. There also seems to be a close relationship between innovativeness and self-transcending knowledge. At least as a process, there would seem to be similarities with regard to how innovations and self-transcending knowledge emerge and are produced.

3.2. Knowledge management in regions

According to Nonaka and Reinmöller [40], in order to design knowledge-creating areas, all the processes by which knowledge is converted need to be supported within the region. Special attention should be directed at knowledge management at the regional level. Nonaka and Reinmöller [40, p. 421] claim that ‘industrial regions can provide the necessary explicit knowledge and tacit knowledge through collocation’. With regard to practical arrangements, they note that ‘physical proximity can guarantee frequently scheduled meetings, where face-to-face communication enhances the sharing of tacit knowledge’ [40, p. 415].

Regional development and innovation networks are also characterised by physical proximity. In this sense, they have important advantages in comparison with so-called virtual organizations or virtual teams within one company or between companies. Earlier research has shown that face-to-face communication would be needed in such structures in order to build trusting relationships between people (e.g. [20,38,46]). Otherwise, collaboration partners, particularly individual employees stay distant or completely

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2 As to the concepts, although many authors (cf. [42]) distinguish clearly between knowledge creation and knowledge management, the discussion of their differences in the context of regional multi-actor innovation networks is beyond the scope of this article.
unknown to each other. This, again, makes building of trust and overcoming of prejudice problematic. Organizations and individual employees in them do not sense that they are part of a network and how their work affects the work of other people in other organizations [38]. In regional innovation networks, such difficulties may be easier to overcome due to physical proximity—but they need to be acknowledged and knowingly combated against.

3.3. The SECI/ba model of knowledge creation

Nonaka and his colleagues have focused on the creation of tacit and explicit knowledge as well as on the interaction between explicit and tacit knowledge in collective learning. Tacit knowledge is seen to be a more important factor than explicit knowledge especially in non-linear innovation processes causing incremental innovations.3 Nonaka and Takeuchi [41] set their focus on ‘knowledge conversion’ (interaction of the two types of knowledge) in networked innovation processes. Nonaka and Takeuchi’s learning cycle (the SECI model) consists of four phases of knowledge conversion:

– socialisation (from tacit knowledge to tacit knowledge);
– externalisation (from tacit knowledge to explicit knowledge);
– combination (from explicit knowledge to explicit knowledge);
– internalisation (from explicit knowledge to tacit knowledge).

The aim of the SECI model is to cause a learning spiral where the collective learning process increases knowledge in the network. Knowledge conversion takes place in certain forums or arenas (ba in Japanese). Ba can be a concrete or virtual place where knowledge conversion occurs. Different kinds of knowledge processes need different kinds of bas. Each phase of the SECI model corresponds to a specific ba (for details, see [39]):

– *Socialisation to originating ba* (the sharing of tacit knowledge between individuals through physical proximity and face-to-face contacts; the socialisation phase in originating ba creates a common understanding and social capital among group members);
– *Externalisation to interacting ba* (the expression of tacit knowledge and its translation into comprehensible forms that can be understood by others; takes place in interacting ba, where dialogue is the key to knowledge conversion);
– *Combination to cyber ba* (the conversion of explicit knowledge into more complex sets of explicit knowledge so that new knowledge generated at the externalisation stage transcends the group in analogue or digital signals; cyber ba represents the combination phase where combining new explicit knowledge with existing information and knowledge generates and systemises explicit knowledge);
– *Internalisation to exercising ba* (the conversion of explicit knowledge into tacit knowledge by embodying explicit knowledge in action and practice by using

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3 However, attention to tacit knowledge should not lead to overlooking the role of explicit knowledge and the quality of information that forms the basis for explicit knowledge (cf. [38]).
simulations or experiments to trigger learning by doing processes; exercising ba facilitates the conversion of explicit knowledge to tacit knowledge).

A discussion on the critique concerning the SECI/ba model is beyond the scope of this article. Readers are referred to [23].

3.4. Knowledge management systems for regional innovation networks

How well can the SECI/ba model then be applied to a loose regional innovation network? The model is designed for organizations having a clear leadership and a hierarchical structure enabling decision-making and control in the knowledge creation process. On the contrary, a regional innovation network lacks a clear leadership, which potentially makes it more difficult for the learning spiral to function. We consider—as does Nonaka himself—the SECI/ba model to be sufficiently applicable to regional development and innovation networks. After all, modern firm organizations that Nonaka and his colleagues investigated, and where knowledge is created, are no longer hierarchical but, rather, networked entities. Knowledge creation and management do not differ essentially in these kinds of environments, although differences can be seen in the ways of practical application as well as in leadership and general management.

Research has barely been done on knowledge management systems for loose regional multi-actor networks. These networks have emerged only fairly recently in Finland, which may be one reason for this lack of research. Smaller and more homogeneous environments such as companies may be easier to investigate, but first steps are only taken in wider innovation environments. Kostiainen [30] has applied the ba concept for a regional development network of Tampere urban region in Finland. It is a loose multi-actor network consisting of cities and municipalities, research and educational institutions, development organizations, technology centres, state agencies and key companies in the region. The application by Kostiainen is presented in Fig. 3.

Kostiainen’s practically oriented application seems quite possible to implement in different kinds of networked environments, but it fails to address creation, diffusion and utilisation of future-oriented knowledge in a systematic manner. In addition, we argue that knowledge assets and knowledge vision are additional elements that need to be included in such schemes.

3.5. Knowledge assets and knowledge vision

Knowledge assets—the inputs, outputs and moderating factors of knowledge creation and management—lay the foundation for knowledge creation. Knowledge assets could be categorised into four types: (i) experimental knowledge assets meaning tacit knowledge shared through common experiences, (ii) conceptual knowledge assets meaning explicit knowledge articulated through images, symbols and language, (iii) systemic knowledge assets meaning systemised and packaged explicit knowledge and (iv) routine knowledge assets meaning tacit knowledge that is routinised and embedded in actions and practices [43].

The SECI/ba model describes how the knowledge conversions occur in an interactive innovation process. However, it does not tell how to lead the process. Nonaka et al. [43]
have created the concept of knowledge vision to give a direction to the process. To be able to create and manage knowledge successfully, a network needs a vision to synchronise the network. This is especially important in regional multi-actor networks where actors have very different backgrounds. The knowledge vision gives a direction to the knowledge-creating process and the knowledge created in it by asking such fundamental questions as ‘What are we?’, ‘What should we create?’, ‘How can we do it?’, ‘Why are we doing this?’ and ‘Where are we going?’. The knowledge vision defines the value system that evaluates, justifies and determines the quality of knowledge that the network creates [43]. The knowledge vision should be based on a common knowledge context [27]—or a common knowledge basis that can be defined as ‘a common language that enables communication and co-ordination’ [15, p. 169].

4. Incorporating self-transcending knowledge into regional knowledge management

4.1. Additional knowledge conversion processes

A special challenge is incorporation of self-transcending knowledge into the SECI/ba model in order to avoid black holes in regional strategy making. We argue that this requires that two additional phases are taken into account: (i) the conversion of self-transcending knowledge to tacit knowledge (embodiment) and (ii) vice versa, the conversion of tacit knowledge to self-transcending knowledge. Within a regional innovation network, these processes are both collective and individual. The network, however, needs to facilitate, support and systematise the processes, which is why they
need to be included in the knowledge management system. The first-mentioned process may be seen as taking place in ‘imagination ba’ and the second in ‘futurising ba’. New concepts are proposed for these processes to illustrate their nature:

- visualisation (from self-transcending to tacit); self-transcending knowledge is embodied from the abstract to visions, feelings, mental models, etc. and
- potentialisation (from tacit to self-transcending); tacit knowledge is disembodied and forms the basis for sensing the future potentials and seeing what does not yet exist.

4.2. Visualisation/imagination ba

Within imagination ba, different types of futures research are argued to be central (forecasts, scenarios and expert-based statements). Assuming underlying factors of causal relationships, a forecast of a phenomenon’s future development can be made. In highly complex systems, however, a long-term horizon in a forecast is particularly difficult to maintain. Scenarios often use more qualitative data, for describing observed trends, and project them into the future—stimulating an open debate. Regional scenarios built by, for instance, researchers—and when properly introduced and utilised—are likely to provide a fruitful basis for discussions in regional innovation networks. In the Delphi method, experts’ statements of future phenomena are utilised to arrive at a description of a plausible future. A combination of scenario and Delphi techniques is argued to be suited in the environment under study in the present article.

Informed intuitive opinions of specialists are the core of Delphi. The aim to reach a consensus and thus greater objectivity (cf. [28,37]) also characterises Delphi, whereas in regional innovation networks, a common position of a group of experts does not seem necessary. Rather, Delphi as expressed by Linstone and Turoff [32, p. 3] is more appropriate: ‘Delphi may be characterized as a method for structuring a group communication process, so that the process is effective in allowing a group of individuals, as a whole, to deal with a complex problem’. Of the group of ‘Delphi-inspired techniques’ (the conventional, policy and decision Delphi types; [56,57]) the Policy Delphi seems, therefore, most suitable. The objective is for it to act as a forum for ideas and to expose the range of positions advocated and the pros and cons of each position [5].

When using the Delphi method, it is considered important to include experts also from outside of the regional innovation network in question—an unprejudiced selection of different experts. The same applies to scenarios and the selection of researchers who prepare them. As Gummesson [19, p. 97–98] notes: “Innovations in industries are often introduced by those who do not have knowledge of a particular industry, those ‘without history’ who are not committed to a ‘this is what we do in our industry’ approach but are instead prepared to meet and adjust to the requirements of the present marketplace”.

4.3. Potentialisation/futurising ba

With regard to futurising ba the Delphi techniques and scenarios may be of use here also. It needs to be kept in mind that the knowledge creation process does not take place in a chronological order, but all the different bas exist simultaneously. The process
continuously produces weak signals for the future. The central question is how to bring up to the front the weak signals elicited throughout the process—to document them for utilisation as the basis for Delphi.

4.4. A revisited model for knowledge creation and management

A revisited model of a learning cycle including self-transcending knowledge—visualisation and potentialisation—as well as knowledge vision is introduced in the following. It has been given the somewhat humorous but descriptive name of ‘rye bread model’ [23]. The knowledge-creating process reforms the knowledge assets and is steered by knowledge vision from the centre of the model. Knowledge creation occurs in the defined bas using the SECI learning spiral and knowledge conversions. The model is depicted in Fig. 4.

Fig. 4 illustrates an approach that can be taken into practice in various ways, depending on the network in question—it’s needs, characteristics and phase of network development. The practical content of each ba thus has to be defined at the level of an individual network, which is beyond the scope of this article. Research and testing is in progress in the Lahti region, Finland. Certain examples may be found in Harmaakorpi and Melkas [23].

The rye bread model is a follow-up to the Regional Development Platform Method (for further details, see [24]). The method is a basis for finding potential regional resource configurations—regional development platforms—and forming innovation networks to exploit the potential existing in the platforms (for an assessment of its usability, see [21]). The rye bread model is a conceptual description of how to promote collective learning and innovativeness in these networks using the existing regional resource base. It can be turned into a concrete regional tool by including lists of appropriate actions for the different bas, as was done by Kostiainen in his application (cf. [30]).

4.5. Facilitating visualisation and potentialisation

The approach to regional knowledge creation and management that we propose in this article is novel and being tested in practice. There are certain issues that have already come out as important factors in facilitating the processes of visualisation and potentialisation:

– acknowledging the existence of the future-oriented level of knowledge (self-transcending knowledge) in collective learning and knowledge creation;
– documentation, in some form or another, of the experiences gained during originating ba and exercising ba. For instance, expert exchanges quite likely result in many new insights and ideas, but as people are generally very busy at work these days, many of these are quickly forgotten, although they might be extremely useful as such or when developed further. This is related to the importance of the evaluation process of ideas

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4 The name was given to the first drafts of the model that looked very much like a traditional Finnish rye bread. The descriptive name has so far been retained despite minor changes in the layout of the model.
[17] as part of knowledge management. This process is usually very poorly arranged in individual organizations [17], and the situation is likely to be even worse in regional innovation networks;

– paying special attention to keeping the structure of the innovation networks unbiased and unconventional—during the starting phase and continuously, to trying to find and engage people who are talented in creating self-transcending knowledge, and to ensuring that participation in the networks brings some added value to all the actors. It is also important to ensure that all kinds of employees are able to participate in the innovation networks and have the role they wish; that their superiors acknowledge the importance of this and provide possibilities time-wise, for instance. It is often the case that only managers and others at higher levels who perhaps have less day-to-day knowledge of practical operations are represented in innovation networks. Support and space are seen as especially important in the case of self-transcending knowledge;

– doing research on best practices in facilitating these processes and looking into further methods of futures research; and

– doing research on how tacit and explicit knowledge facilitate the creation of self-transcending knowledge.
5. Discussion

This article focused on knowledge creation and management with an emphasis on future-oriented knowledge in regional innovation networks. It set out to consider and justify why it is important to study these topics in the context of such networks. The regional level has become increasingly important, and regions face new challenges that place high demands on abilities to innovate and learn. Concrete regional tools and institutional settings aiming to enhance knowledge creation in regional innovation networks are needed—tools that foster the regional innovative, visionary, leadership, networking and learning capabilities as well as build social capital in the interactive innovation environment.

Regions were understood in this article as path-dependent vagabonds. To be able to plan for the future, there is a need for a special regional dynamic capability: visionary capability—the capability to outline the possible potential development trajectories based on history and opportunities emerging from the changing environment. At its best, resource-based futures research can make an important contribution to reducing the insecurity that regions face in the turbulent environment.

Foresight was discussed in this article as a process that attempts to broaden the boundaries of perception in several ways. Earlier research has shown that those carrying out foresight processes have often ended up analysing global technology trends or the ‘state of the art’ of a region, and neglected the analysis and development of those actors who are to fulfil regional strategies. When foresight processes are not absorbed into the regional strategy making processes, ‘black holes of regional strategy making’ [52] come into existence. Future scenarios are then built without taking into consideration the path-dependency of a region. The existing resource configurations, however, set the basis for future development and, therefore, regional futures research has to be tightly connected with an audit of the region’s resource base. The present article is one attempt to reduce the unfortunate gap between futures research and foresight, on the one hand, and regional knowledge and innovation management, on the other hand.

After discussing the nature of knowledge and bringing forth the concept of self-transcending knowledge—the ability to sense the presence of potential, to see what does not yet exist—we introduced a new, systemic model for knowledge creation and management in regional innovation networks (‘the rye bread model’). It is argued that implementation of such a model contributes to creating a trustful atmosphere and social cohesion in regional innovation networks. The role of future-oriented knowledge in such networks, and in regional development generally, is particularly important. Knowledge management systems for regional multi-actor networks have been studied reasonably little, and without incorporating futures research. Utilising methods from futures research in creating self-transcending knowledge in a regional knowledge management and creation system was seen in the present article as a fruitful way of enhancing the regional visionary capability.

It was argued in this article that incorporation of self-transcending knowledge into regional knowledge management systems requires that we take into account (i) the conversion of self-transcending knowledge to tacit knowledge, and (ii) vice versa, the conversion of tacit knowledge to self-transcending knowledge. Within regional innovation
networks, these processes are both collective and individual. The network, however, needs to support and systematise the processes—as well as the other knowledge conversion processes (tacit—explicit and vice versa). The article discussed ways in which such processes can be facilitated, such as the Delphi method. With the future-oriented concept of self-transcending knowledge as a link between the two, the article thus advocated the possibilities of combining approaches, theoretical frameworks and methodologies from futures studies with those of knowledge management in a novel way.

References

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