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## **WHY TRIPLE HELIX?**

**Abstract:** Knowledge creation today increasingly takes place within the overlapping areas between universities, industry and government. One model explored for the processes taking place has been the triple helix model. In this paper we address our understandings and experiences of the triple helix-figuration. We formulate situated knowledges about how to start building a local innovation system, NetPort.Karlshamn, in a small town in the south of Sweden. The practices within NetPort.Karlshamn can exemplify one way of understanding a triple helix system and why this kind of cooperation is important and a prerequisite for becoming functional, innovative and developmentally strong. We recognize the necessity for a co-evolution process, where relevance and situated knowledges compose keystones. We notice the transformation of the situated knowledge production in our context to move *from* contract negotiation focus *towards* co-evolution focus. The theoretical frame is reinforced by technoscientific reflections.

### **Introduction**

The Blekinge region has undergone tremendous structural changes during the 1990s from a dependence of heavy industry and military service to a focus on ICT development in industry and the education system with a new technical university, Blekinge Institute of Technology (Nilsson, Uhlin 2001). This experience implies recognition of techno- and research politics deeply rooted in understandings of knowledge and technology production as processes, which occur in distributed systems (Gibbons *et al* 1994, Nowotny *et al* 2001). In other words, knowledge creation today increasingly takes place within the

overlapping areas (or on the boundaries) between universities, industry (private sector) and other local/regional/national/international actors (public sector). These processes are no less prominent, when located in the Blekinge region and in the research and development carried out at Blekinge Institute of Technology (BTH).

We – researcher and director respectively – have been deeply involved in the complex development process of a distributed knowledge and technology producing system characteristic for what is called NetPort.Karlshamn. The practices within NetPort.Karlshamn can exemplify one way of understanding a triple helix system and why this kind of cooperation is important and a prerequisite for becoming functional, innovative and developmentally strong.

Since the year 2000 a new university campus is evolving at BTH. The campus in question is situated in the town Karlshamn at the western part of the Blekinge region, Sweden. The university, the local government and trade & industry are actively cooperating partners in a local innovation system<sup>1</sup> called NetPort.Karlshamn<sup>2</sup> or hereafter NetPort.

In this paper we address our understandings and experiences of the Triple Helix-figuration. We formulate situated knowledges about how to start building the innovation system NetPort in a small town in the south of Sweden.

## 1. Triple Helix model

One model explored for the processes taking place, when the three main actors university, industry and government are to co-operate, has been the triple helix model stating that these actors are increasingly working together.

Uhlin and Johansen (2001) offer an interesting interpretation of the triple helix model within the context of innovation processes in the following citation;

*The Triple Helix model states that three institutional spheres (university, industry and government) which formerly operated at arms' length are now increasingly working together, with a spiral pattern of linkages emerging at various stages of the innovation process, to form a „triple helix“. Etzkowitz and Leydesdorff (1997) furthermore argue that a spiral model of university-indus-*

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<sup>1</sup> A local organisation/system/within which several active partners cooperate for creating innovations, economic and societal growth.

<sup>2</sup> [www.netport.se](http://www.netport.se)

try-government relations is required in order „to capture the evolution of multiple linkages at different stages of the capitalisation of knowledge”.

Reality is never easy but rather disturbingly complex. A model or figuration like the triple helix is comparatively straightforward to communicate and use as a boundary object (Star 1995) for mutual interpretation and as an understanding tool for cooperation. However this figuration opens up our minds for the necessary but multifarious processes involved. Uhlin and Johansen (2001) continue with comments on this.

*The complexity of the reality that the Triple Helix model indicates is envisaged by four dimensions in which these linkages are said to emerge in the innovation process. First, there are internal transformations in each of the helices, e.g. universities more and more (are forced to) behave in an entrepreneurial way in order to finance education and research. Second, each one of the helices influences the others, e.g. university-industry strategic alliances. Third, there are „spin-offs” of trilateral networks and organisations from the interactions among the three helices in order, for instance, to promote regional development.... Fourth, there is a recursive effect on these exchanges among institutional spheres, both on the spirals from which they emerge and on the wider society. Etzkowitz and Leydesdorff summarise this spiral-like mode of knowledge production by saying that „knowledge is no longer transferred, but co-developed”.*

*The Triple Helix model builds upon some assumptions that are not easily digested. One is that the triple helix by nature is unstable; „it remains an emerging construct on top of the underlying communications”, and „this complex system continuously reorganizes itself with reference to its past”. The triple helix thus emerges from tri-lateral arrangements in favour of further development possibilities. But these emerging possibilities are by definition not given. The institutional basis of the system is thought of as a kind of laboratory for testing mutual expectations.*

As Leydesdorff and Etzkowitz (2001) are uttering a transformation is taking place in the functions of university, industry and government as each institution increasingly can assume the role of the other. They exemplify this by putting the following questions. A university can be expected to produce scientific results, but is it in addition expected to produce new technologies, and if so, to what extent? A government is expected to provide rules and regulations, but can it also be expected to provide venture capital?

Before we go into a discussion about prerequisites for triple helix processes, we want to present our empirical work and practice in creating this kind of processes.

## 2. NetPort as an Innovation Node and Triple Helix Experiment

### *Background*

An initiative was taken in the middle of the 90s to establish a non-profit organization, NetPort with the objective to develop a knowledge centre and persuade the university to found a campus in Karlshamn. The local government of Karlshamn wished to supplement the traditional industry with knowledge and service industry out of a structure transforming perspective. This was motivated by the necessity of broadening the trade & industry as well as to give existing companies support for their competence process. The local government and representatives for the trade & industry decided to jointly start the development work in order to create growth for Karlshamn.

The economic expansion of the Blekinge region has been successful due to the establishment of university campuses at the other two main towns of the region, namely Karlskrona and Ronneby. Establishing NetPort is a complementary investment in the Blekinge region<sup>3</sup> aiming at building a competitive and strong ICT region. Telecom City and Soft Centre are corresponding local innovation systems in Karlskrona and Ronneby respectively. These are in full operation within their focus areas that is telecommunication and software development. The centring of media technology, experience industry and intelligent transport systems at NetPort will make the region stronger and more complete in its ICT profile. In order to maximize the impact of the university campus establishment in Karlshamn, a robust and close cooperation between the university, industry and local government is needed.

The development project NetPort was approved to get started in 1999. The project gains resources to work as a dynamic actor in the interplay between industry, the local government of Karlshamn and BTH. The expected results are increased competence supply to existing companies and public sector along with the setting up of new companies and businesses within the service and knowledge sector.

### *Profile*

NetPort is developing a Competence Centre focusing media technology, experience industry and intelligent transport systems. The Competence Centre constitutes the hub for the actors, who in joint actions deal with knowledge and research from the university and practi-

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<sup>3</sup> See [www.regionblekinge.se](http://www.regionblekinge.se)

cal needs and applications in industry, trade and public sector. The local government orders and use services as well as contributes as a service body towards the other actors by supplying premises, infrastructure and other social services in accordance to the needs.

In what we use to call the NetPort model, we try to illustrate this type of organisation, see the Figure 1.

NetPort rests on a triple helix foundation, where the owners are the industry, university (BTH) and the municipality of Karlshamn. In the lowest, first module in the figure the operational activities are handled by the two employed in NetPort. The activities range over lobbying, marketing the trademark, member recruitment, participating in a number of different meetings, networking, trust building *etc.* The second section consist of three modules with the focus areas of NetPort, new media, experience and intelligent transport systems (ITS). In these modules the core content of NetPort is developed. The third module on the top is the incubator explained as the future growth in the form of new companies within the focus areas of NetPort. This incubator has increased its number of start ups from one to seven companies within one year. An advancement of the incubator in Karlshamn is under way in a merging process towards a joint incubator system in the whole Blekinge region. By joining three local incubators into one larger incubator a national strength is expected.

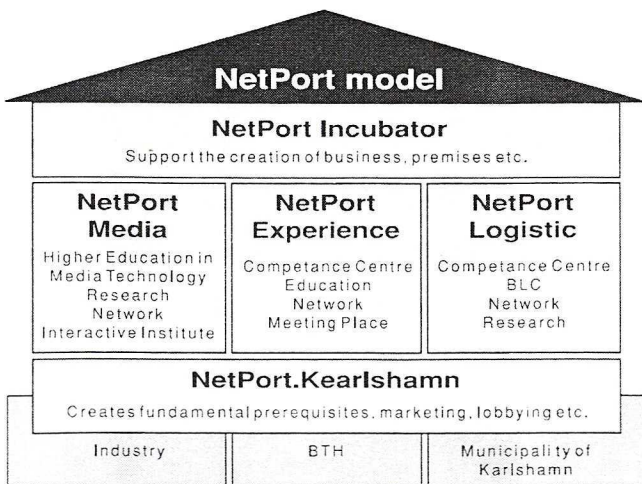


Figure 1. NetPort model

## *Visions*

### *NetPort.Karlshamn*

The vision of NetPort is to be a leading Competence Centre focusing media technology, experience industry, intelligent transport systems. At the year 2010 the goals are to enrol 1500 students at BTH, have the number of new jobs raised to 500 within the focus areas of NetPort, have 1000 more inhabitants in Karlshamn compared to the year 2000.

### *The local government of Karlshamn*

Karlshamn will expand with new inhabitants, companies and job opportunities. The growth must be anchored in a socially and environmentally sustainable development.

### *Blekinge Institute of Technology*

The mission of Blekinge Institute of Technology is to be internationally competitive and to lead nationally in the profile areas: applied information technology and social and commercial development. The university cooperates closely with business and commerce at local, national and international level as well as with the local, national and international community. In this way the university ensures the profile is firmly anchored in the needs and practices of the society.

## *Results so far*

When NetPort started, three overall goals were set as mentioned above. The operational timeframe of the process runs from year 2000 up to and including 2010. The goal fulfilment after three years and nine months is the following.

<b>Indicator</b>	<b>Goal 2010</b>	<b>Result 2004-08-31</b>
Number of students at campus		
Karlshamn, BTH	1 500	400
Number of new jobs in Karlshamn	500	122
Number of additional inhabitants	1 000	250

The local government has invested 19,3 million SEK on research development, establishment support for the university *etc.* The value of the external resources given back to the same municipality within the same investment project is more than 21,5 million SEK.

It is obvious that NetPort is fulfilling its objectives so far. At the same time *we can verify the corresponding public revenues is matching the costs of establishing NetPort already after 4 years of existence.*

For the municipality of Karlshamn a tax surplus is expected within the coming 7 years excluding the costs to run NetPort. This impact and result would not been achieved without an initiative like NetPort.

It is important to create prerequisites for an independent and economically sound NetPort. The aspect of economically sustainability is not the main driving force for this initiative but to have one additional leg to stand on for the development of the municipality of Karlshamn. It is doubtless that the places having a university get a national advantage in several ways. Karlshamn belongs to this division.

If we in spite of this look at the economical aspect and involve the concept of pay off-time, we can clearly notice that it is economically justifiable to invest in university expansion and in resources for the further development of NetPort. If we pay attention to the fact that the university has much greater possibilities to attract students and succeed in the higher education programs in the special focus areas when located to Karlshamn rather than to other places, we find the investment costs have already been taken. There are considerable potentials to have a sound and expanding economy in the years to come, given NetPort continues to develop well.

After four years the academic activity at the new campus has resulted in 4 licentiate theses and 2 doctoral theses.

NetPort has until now revealed to be a flourishing and successful project. The university campus is established. The local government has built the first two house blocks (6 000 square metres) of the physical area of NetPort at the most attractive place in the town of Karlshamn. All of the premises space is already rented – most of it by the university but also by companies, NetPort and the local government. During spring 2004 the projecting started of stage 2 including 2 new house blocks (4 500 square metres). Arriving at a decision on stage 2 is expected in the end of 2004.

### **3. Prerequisites for Triple Helix processes**

There are a number of prerequisites for a triple helix process to become functional. In the following we are presenting and discussing some of the most important ones. We include in the discussion additional experiences in order to clarify our statements.

#### ***Knowledge processes***

The triple helix model focuses mainly on the outer frame of the processes, the knowledge infrastructure. The actual knowledge and development processes are more explicitly discussed within concepts like

mode 2 (Gibbons *et al* 1994, Nowotny *et al* 2001). Some characteristics of mode 2 knowledge productions are:

- situated in the context of application,
- distributed knowledge processes,
- development of robust knowledge,
- subject to multiple accountabilities.

The mode 1 is expressed as carrying the tradition of the academy, that is strict demarcation lines between academy and politics, academy and commercialization as well as keeping a linear understanding of research and knowledge exploitation (ivory tower tradition).

Leydesdorff and Etzkowitz (2001) however comments the knowledge processes in the triple helix model in quite an advanced way by saying that *„the dynamics of interactions among discursive perspectives are complex because the participants are able to relate to different systems of reference, also in response to perceiving each other’s positions. The language of cause and effect, of independent and dependent values, assumed a single and stable universe, in which fixed relations were predominant. When the change in these relations becomes the focus of the analysis from network perspective, the purpose of institutions and organizations, that could previously be taken for granted, become uncertain and can therefore be redefined.“*

### ***Distributed knowledge production***

We can observe distributed knowledge processes to frequently exist and to hold relevance within technical faculties and especially in dynamic sectors like information and communication technology (ICT). At a university like BTH characterized by an explicit profile in applied ICT, this reality becomes daily explored. The possibilities to obtain a deep understanding of distributed knowledge production are thus extensive. One example comes from BTH in the NetPort context and comprises research and implementation of technology focusing real time rendering 3D applications for the visualization of light, material and shadows. The incentives for this research come from a game development company with a staff member, who at the same time makes master and PhD thesis work at the university.

### ***Robust knowledge***

If our aims are to produce knowledge encountering the need of society and being robust enough for sustainable purposes, then we have to be serious about how we understand our knowledge producing systems. Socially robust knowledge can only be produced in a mixed environment. The knowledge will then be exposed to more intensive testing in various contexts. It will not be pre-determined but open to re-negotia-

tions. (Nowotny *et al* 2001). In addition the site of problem identification moves from the academy to the agora<sup>4</sup>, where science meets society and contextualisation occurs. What we face are processes of non-linear character far from our traditional perceptions of sequential processes in first knowledge making in basic research followed by applied research or dissemination to exploitation of the knowledge in products for a private or public market. Nowotny *et al* (2003, p. 191) articulated this issue clearly in „reliable knowledge, the traditional goal of scientific inquiry, is no longer (self?) sufficient in the more open knowledge environments that are now emerging; knowledge also needs to be ‘socially robust’, because its validity is no longer determined solely, or predominantly, by narrowly circumscribed scientific communities, but by much wider communities of engagement comprising knowledge producers, disseminators, traders and users.”

Strathern (2003, p.275) adds „Accountability is, of course, at the heart of the argument about socially-robust science, and its converse, scientifically robust accountability.”

### **Society speaks back**

What is highlighted in our referred literature is that science and society are subject to the same driving forces in:

- generation of uncertainties and risks<sup>5</sup>;
- pervasiveness of a new economic rationality;
- transformation of time and space (not the least as effects of ICT);
- demands for self-organising capacity.

You can describe these processes as science and society are becoming transgressive fostering society to talk back to science. Jasanoff (2003, p.225) address the driving force for society to speak back in stating that uncertainties and risks are „part of the modern human condition, woven into the very fabric of progress. The problem we urgently face is how to live democratically and at peace with the knowledge that our societies are inevitably ‘at risk’”.

Another important dimension of how science and society now speaks back and forth is the issue of input of resources and output of results. In the linear way of thinking science and society we are used to focus on the input of resources whether it comes from the Government, public or private funding agencies etc.. Gulbrandsen (2004) argues that „One of the most pressing interrogations for science policymakers the last 20-30 years has centred on output; how to secure an output from research that

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<sup>4</sup> The agora is central places for public life (NE). The concept agora embrace the political arena and the market place – and goes beyond both (Nowotny *et al* 2003, p. 192).

<sup>5</sup> Beck 1992.

*complies with economic, social, cultural and ethical concerns. Or reformulated to suit our more immediate concern: How can universities assure that choices made by scientists and engineers on campus contribute to responsible innovation? This challenge has by no means been satisfactorily answered."*

It gets increasingly evident that 'society speaks back' in requiring to take part not only in the input phase but in the whole process (which more likely are non linear) up to the output of results. We have experienced in the NetPort context and on a municipality level how society represented by the local government explicitly manifest the *need* and *engagement* in being involved in the whole input – operation – output process. „Input is not enough”<sup>6</sup>.

The *need* comes from the budget process in the local government to have local tax resources approved for the input to NetPort including research and infrastructure requests of the university. The local government directors need good arguments of the relevance of this 'investment' in order to convince the local parliament to vote in favour of the 'investment'.

The *engagement* comes from the mutual 'project' of fostering sustainable development of the (local) society. The prerequisite for this 'project' is a triple helix-like process, which in our case is nurtured by a constant, almost daily, dialogue. In this dialogue, which is a kind of agora, mutual understandings starts to find its expressions and that in very concrete ways and a co-evolution process takes place. For us, who have been involved, we talk about an „establishment of the institution of a 'kitchen cabinet'". *A generous, open, inviting, allowing arena had to be created for the construction of new questions and dreams.... We need a lot of 'kitchen cabinets' on campus to cater for the polycentric, interactive and multipartite processes of knowledge-making we may dream of. A vision that entails transformative processes, changing research cultures and „teaching smart people how to learn”*<sup>7</sup>. (Gulbrandsen 2004).

### ***Technoscientific reflections***

We emphasize the notion of situated knowledge in our technoscientific reflections. Haraway (1991, p. 196) stresses that what we can reasonably bring about in our knowledge production can never be more than partial translations. Translations are always interpretative, critical and partial. These constitute the very condition to be heard, when we are claiming rational knowledge. Rational knowledge is founded within

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<sup>6</sup> Statement by the local government commissioner in Karlshamn.

<sup>7</sup> See Argyris (1991) and Nowotny *et al* (2001).

a process of ongoing critical interpretations among a number of interpreters. Rational knowledge includes power sensitive conversations. The world and its phenomenon, Haraway states, neither speaks itself or disappears in favour of one particular chosen interpreter or master decoder. The codes of the world do not find themselves silently waiting to be read.

We can ask ourselves why the research activity like the one at the division of Technoscience Studies is deeply involved in the development of NetPort and is one of several driving forces in these development processes. To be very straight forward the answer is to be found in some identified potentials of this research (Rydhagen, Trojer 2003), namely;

- to expand the knowledge frames and practices for technology development in increasingly complex realities;
- to open up preferential rights of interpretation in selections of standards, which always are reality producing activities;
- to contribute with competences for situating knowledge and for context dependence concerning resource allocation and cooperation between high-income and low-income countries;
- to develop epistemological infrastructures relevant to a society heavily dependent on research and technology;
- to establish new arenas for developing understandings of relations between research, political sector and industry;
- to create driving forces for inter- and transdisciplinary constellations.

### *Trust for co-evolution*

On a daily life level at NetPort emphasis has been put on building trust among the partners<sup>8</sup>. We have tried to acknowledge accountability both concerning distrust among local people, companies and politicians as well as concerning challenges within the spheres at BTH uncomfortable with transformations changing the role of a more traditional university.

### *A Quadruple Helix*

What we have learned to fully acknowledge during developing NetPort is that the Triple Helix model can't perform the function of an innovation system without a fourth intertwining actor. This fourth actor points to the importance of a broker function. The broker role including knowledge management is often overlooked in the processes of cooperation between industry, university and government, not the least in a north

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<sup>8</sup> The issue of trust is further explored in for instance Ekdahl *et al* 2000; Stevrin, Uhlin 1996 and Putnam 1994.

European context. The most obvious broker person in the actual case is the director of NetPort. But we find the vital broker (and transforming) functions also within the main actors and believe us or not within the university. The profession of this knowledge broker is also called network coordinator or innovation organizers (Leydesdorff and Etzkowitz 2001). One of their tasks is to translate between different sectors and languages and to get those people, who are used to work only in one domain, to perform tasks in several and be motivated for dynamic co-development.

### Comments

To summarize our discussion on triple helix processes we recognize the necessity for a co-evolution process, where relevance and situated knowledges compose keystones. We notice the transformation of the situated knowledge production in our context to move *from* contract negotiation / input focus *towards* co-evolution / the whole chain (input-operation-output) focus. The higher demand is obvious on the university and other stakeholders to argue for their relevance, in order to become an accepted partner in a robust innovation system. From a university perspective this demand does not make academic knowledge production less motivating, less quality strong and a less desirable occupation, on the contrary.

What are the challenges NetPort is facing in the near future? The foremost challenge to encounter is the added value the core activities of NetPort have to develop on a local, national and international level. The requirement is an intensified cooperation between the three profile areas. At the same time the main triple helix actors – university, local government and industry – have to go further in the process of trilateral arrangements, assuming the role of the other when needed and join in the efforts for the added, unique value of NetPort.

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