Beyond technology foresight: Theoretical background, practical experiences and opportunities for transition environments

from

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1. Structural change, innovation policy and regional foresight – Opportunities for transition countries?

The role of foresight as a policy tool has been increasingly discussed during the last years. In particular the European Union (EU) became a crucial driver for theoretical considerations and research, practical experiments and dissemination of foresight.[1] Against this background the current paper attempts to draw the attention to the role of foresight exercises in innovation policy strategies in old industrialised regions. The paper's aim is furthermore to consider transfer opportunities of both the theoretical concept of foresight and practical experiences from its application in a large industrialised region – the Ruhr area in Germany - into transition environments.

According to a definition of the European Joint research centre, foresight "is a systematic, future-intelligence-gathering and medium-to-long-term vision-building process aimed at present-day decisions and mobilising joint action."[2] This definition involves five essential elements: (1) anticipation, (2) participation, (3) networking, (4) vision building and (5) action.

The foresight process is thus very similar both to learning and innovation processes. Foresight (FS) promises to fertilise learning and innovation, and vice versa. It is in particular the participative and network enhancing effect which makes FS an important tool in today's innovation policies. As new innovation theory has shown, learning is the basis for any innovation process. Learning itself is dependent on the inter-action not only of individuals but of firms and organisations in a given territory. In chapter 2 we will go into some details with regard to this discussion.

Old industrial regions generally suffer from a decline in economic activities in one or more sectors of industry which used to be the pre-dominant economic drivers in the past. Declining industrial output, insufficient growth and rising labour market problems are usually the consequence. The policy challenge is thus to support the creation of new (innovative) and sustainable income and employment opportunities.[3]

As stated above, the innovation performance and the economic prosperity increasingly depend on the capacity to successfully organise and implement learning processes. Innovation systems, networks of firms and clusters thus have been

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1 See for example http://www.cordis.lu/foresight

2 EUROPEAN COMMISSION, JOINT RESEARCH CENTRE (INSTITUTE FOR PROSPECTIVE TECHNOLOGICAL STUDIES IPTS) (2001), A practical guide to regional foresight, download under: http://foren.jrc.es,.

3 For a theoretical discussion see also GUTH, M. (2000), From Technology Policy for Regions to Regional Technology Policy: Towards a new Policy Strategy in the EU, Discussion Paper No. 78, European Institute for International Business Relations at the University of Potsdam.

identified as interesting stimuli for growth and the creation of new employment and income opportunities. FS exercises with their participative approach and network enhancing effects promise to support the generation of innovation and learning orientated structures and systems. In chapter 3 we will present the Ruhr area in Germany as an example for a region facing structural change problems for more than 40 years. In particular we will look at the evolution of innovation policies through the last decades and against this background we will then discuss experiences from a FS application in one town in the Ruhr area.

Innovation and innovation policy can be regarded also as an important driver for industrial restructuring and civil conversion in the transition countries in particular in Eastern Europe, in Russia and in the newly independent states (NIS). However, in a recent report, presented by the Ministry of Industry, Science and Technologies of the Russian Federation (MinIST), Russia's severe difficulties in developing a coherent innovation policy within the present macroeconomic conditions and in the current weak legal and institutional framework were very well outlined. Russia enjoys an impressive scientific potential, a good education system and a large pool of qualified specialists. On the other hand, industrial or entrepreneurial innovation is underdeveloped. Insufficient investments in RTDI (in per cent of GDP), minor engagement of enterprises in innovations, lack of equity capital, insufficient state support to firms and generally high costs were identified as main factors hampering innovation.[4] One can also notice that research and innovation systems in Russia are in their infancy. Links between academia and industry hardly exist. The same applies for regional innovation systems.

The paper thus aims to discuss, to what extent foresight exercises might be an efficient tool to support transition economies – in particular Russia – to develop a consistent innovation policy. With some general reflections and consideration for transferring the FS approach into transition environments we will therefore wrap up the discussion.

2. *FORESIGHT AS TRIGGER FOR INNOVATION SYSTEMS*

At first glance it is rather surprising when a new management methodology enters policy conceptions of a supra-national organisation like the European Commission. Foresight (FS) however has not only been disseminated by Commission's services in the framework of the open coordination concept or with regard to simple exchange of good practice. FS is also being actively supported by the European Structural Funds and the so-called Sixth Framework Programme for Research, Technological

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[4] See OECD (2001), Bridging the Innovation Gap in Russia, Paris, p. 8ff.

Development and Demonstration (FP6). The reason behind the appealing attraction of FS seems to be on the one hand the fact, that FS is not a simple tool but a tool box consisting of a variety of different methods like scenarios, expert panels, workshops and brainstorming sessions, Delphi exercises, mind mapping or SWOTs. More important however are the network enhancing effects and the participative approach. FS supports learning processes and structures, and by that innovation systems. The systemic view of innovation however, is the central point for current innovation policy conceptions in EU-Europe both at national and at regional level. The paper's focus lies more at the regional application of foresight rather than at huge national foresight exercises.

2.1 SYSTEMIC VIEW OF INNOVATION, LEARNING AND INTERACTIVITY

The systemic view of innovations was introduced into the discussion by writings from LUNDVALL[5] (1992) and NELSON[6] (1993). With these new approaches, the traditional linear model of innovation where a fundamental basic research via applied research activities and feasibility trials leads to new marketable products became less relevant. New innovation models no longer describe innovation as a linear but as a systemic process. Innovations are being described as the result of interactions and feed-back loops of different actors in so-called innovation systems.

In systemic models "learning" represents an important concept. Learning, or the capacity to successfully implement learning processes respectively, becomes a crucial determinant for innovation processes.[7] Generally literature differentiates between individual and institutional learning. Interactivity (or learning by interaction) is seen as the key to effectively transfer individual into institutional learning.[8] Successful institutional learning – in this view – is no longer only determined by high levels of interactivity within organisation. The interactivity <u>between organisations</u> is thus becoming increasingly important for a single institution.[9] This is pushing forward the network or cluster orientated approach into the focus of innovation theory!

Furthermore, learning situations are very often similar to teacher-pupil relations where the pupil trusts in the competences and in the authority of its teacher. Learning builds upon both codified and tacit knowledge. Tacit knowledge often is embedded in personal know-how and skills and in specific working routines. Learning thus obviously requires a minimum level of trust amongst the knowledge distributor and the recipient. The same applies for institutional learning as well. Without a certain

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5 See LUNDVALL, B.A., Ed. (1992), National Systems of Innovation: Towards a Theory of Innovation and Interactive Learning, London.

6 See NELSON, R.R., Ed. (1993), National Systems of Innovation: A Comparative Analysis, Oxford.

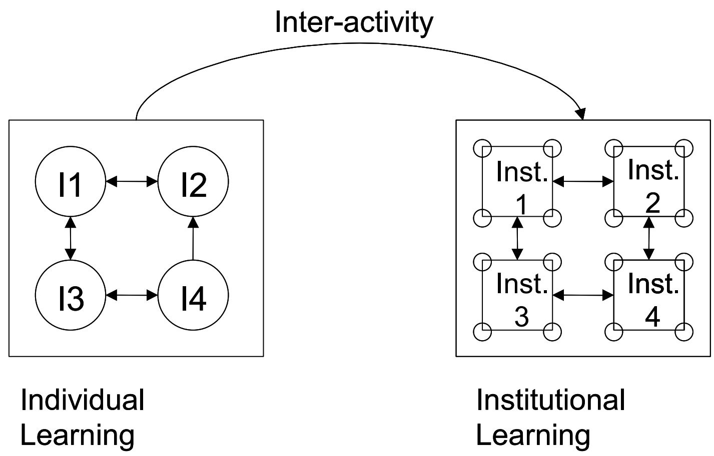
7 The standard reference for this is FLORIDA, R. (1995), Towards the Learning Region, in: Futures, 27, p. 527-536.

8 See e.g. OECD (2001), Cities and Regions in the New Learning Economy, Paris, p. 15.

9 See ibid., p. 17.

minimum level of trust institutional learning can not take place. Trust therefore is a crucial brick for building networks and clusters as breed places for institutional learning and innovation.

Graphic 1: Individual and institutional learning



Politically speaking, the theoretical model presented above supports the insight for framework conditions for institutional learning to be regarded as important success factors for (regional) innovation strategies. Pure technological issues, in contrast, lose in relevance. The policy lesson deriving from this is straightforward: policy measures intended to support innovation activities should no longer solely focus on technological aspects. Public actions should rather focus on improving the individuals' capability to learn and they should facilitate and support the interactivity amongst the relevant actors in innovation systems. This explains the huge interest cluster and network orientated approaches have gained both amongst policy designers and practitioners.[10]

2.2 *Foresight, learning and regional innovation structures*

Foresight as a technique has a clear process orientation. Due to its participative and network orientated approach FS supports learning structures and actual learning in particular at inter-institutional level.

Seen from that angle, foresight exercises directly contribute to the emergence of regional innovation orientated structures, be them innovation systems, clusters or so called competence fields. Even if foresight exercises objectively fail in the sense of mobilising optimal action in an ex-post view, they strengthen the regions through the creation of innovation systems.

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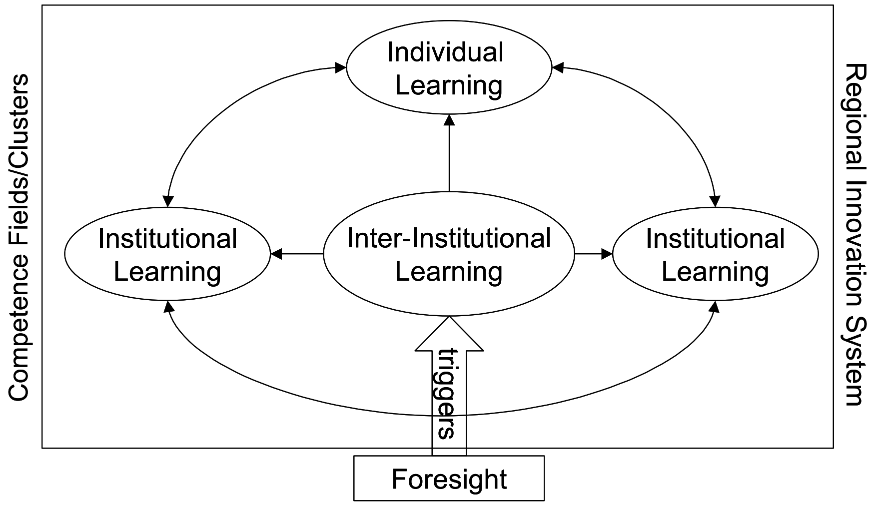
10 A good overview (in German language) of cluster orientated regional innovation policy approaches can be found at: http://innovative-milieus.zenit.de/

Graphic 2: Foresight, learning and regional innovation structures



Against this background, Foresight tools which were used during the 1990ies to a considerable extent at national level may also apply at regional level and provide an opportunity for regions with structural problems to return to a sufficient growth path. The research supported by the European Commission on regional foresight[11] showed that FS techniques cannot and should not be regarded as a miracle remedy. However, the socio-economic processes that have to be managed for example by old industrialised regions - like the Ruhr area in Germany, the Nishny Novgorod or the Tula region in Russia - on their way to regional learning, innovation and sufficient growth are rather complex and challenging. FS promises to be provide support and structured process assistance for structural change and transformation pathways.

In the next chapter we are thus going to present experiences and lessons from a concrete FS exercise conducted in region facing problems of structural industrial change for a good 40 years: the Ruhr area in Germany.

[11] EUROPEAN COMMISSION, JOINT RESEARCH CENTRE (INSTITUTE FOR PROSPECTIVE TECHNOLOGICAL STUDIES IPTS) (2001).

3. OPPORTUNITIES FOR FORESIGHT IN REGIONS FACING INDUSTRIAL STRUCTURAL CHANGE: THE CASE OF NORTH-RHINE WESTPHALIA IN GERMANY

In summer 2002 started a Foresight exercise in the competence cluster “Innovative metals” in Duisburg[12]. Duisburg is a typical town inside the Ruhr area, marked by its montan industrial history and facing serious structural problems. Coal, steel and mining industries which amounted for many decades for most jobs are still facing serious challenges, resulting from unfavourable factor conditions, declining terms of trade and increasing competition pressure due to new competitors in Eastern Europe or in Asia. Hence, existing competencies in the production of crude steel and metals are no longer sufficient for sustained economic success in this competition race in a globalised economy.[13] Intelligent innovations in the metal sector are needed which lead to improved products and/or elaborated primary products which are endowed with special features and attributes. In this challenging situation new product and process ideas are required as well as new forms of cooperation between all players in the metal sector. Under these circumstances Foresight becomes an appealing policy tool as it promises additional value in terms of future orientated information, new know-how, identification of common projects and generally improved inter-action amongst the relevant stake-holders thus leading to an innovative milieu where new stimuli for the creation of alternative income and employment opportunities can be bred. It is therefore no surprise, that responsible policy makers for the Ruhr area too, identified FS as a promising new policy tool.

In the following parts we will briefly describe the evolution of policy responses in the Ruhr area towards the process of structural change. To this end we will also show the rationale behind the application of the FS tool in this area. Finally we will present the actual implementation as well as the results of a concrete FS exercise in Duisburg, a typical town in the Ruhr area.

3.1 FROM PROTECTIONISM TO INNOVATION ORIENTATED STRUCTURAL POLICY AT THE RUHR

The Ruhr area is the industrial core region of the state of North Rhine Westphalia (NRW), a major German Land with some 18 million inhabitants. The Ruhr valley (Ruhrgebiet) represents the biggest industrial conurbation in Europe (5.4 million

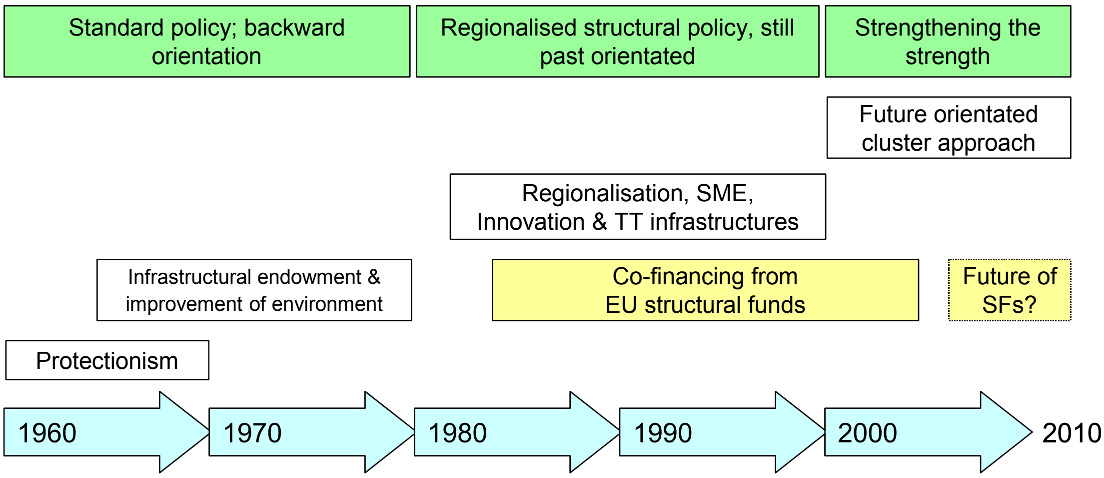
12 This initiative, carried out by ZENIT, was financed by the Land NRW and the European Union (objective-2 resources).

13 This illustrates for example the situation in steel production in 2003: The European steel industry produces approximately 160 million tonnes of crude steel per year, which represents about 20% of world steel production. China produces around 19% of world steel production, Japan 12% and USA 10%. The estimated turnover of the European steel industry is € 80-90 billion among which 1% is allocated to R& D, see: KERR, P. (2004), Technology Platforms, from definitions to Implementations of a Common Research Area, TP_Kom_06042.doc, Brussels.

inhabitants). For a period of a good century the Ruhr valley was dominated by coal and steel which brought enormous economic strength and prosperity to the region, to NRW and to Germany as well. [14] With the first reduction in mining in the late 1950ies and the emergence of the steel crisis in the early 1970ies the Ruhrgebiet entered into a phase of severe industrial change.

The policy response towards the crisis evolved in three main phases which are being presented below. An overview is provided in the following grahic.

Graphic 3: Evolution of innovation policies in North Rhine Westphalia



At the beginning of that process policy responses were driven by the perception the coal and the steel industries' economic problems were more or less cyclical phenomena. Thus policy actions were to a large extent to the type of protectionism. The first Ruhr programme (Ruhrprogramm) in 1968 which was succeeded by the Nordrhein-Westfalen programme (1975) focused on the improvement of the Ruhr valley's infrastructural endowment. That was in particular a massive investment into the region's highway system, a modernisation of housing and last not least the foundation of universities and polytechnics. Still we can argue, that the policy was of a curative approach with a strong backward orientation meaning that the policy goal

[14] A detailed overview about the industrial and structural policy issues in North Rhine Westphalia is given in IKING, B. (2004); Promoting Industrial Change in structurally disfavoured regions, The case of the „Ruhr Valley" in Germany with special emphasis on the current restructuring plan of the city of Dortmund, in: Comparative Study on Industrial Regeneration of Advanced Cities in Korea, Germany and Japan; Paper Book published by the Incheon Development Institute on the occasion of the Symposium on 6th October 2004 in Incheon/Südkorea, download at http://www.idi.re.kr/libs/download.php?tb_name=files&uid=994 (p. 97-118) or http://www.zenit.de/d/regionalinnovation/download/PromotingIndustrialChange.pdf

was the re-creation of the strength of the coal and steel industry rather than the pro-active search for future orientated fields for economic activities.

The second phase in the policy evolution started with the implementation of the so-called action programme Ruhr (Aktionsprogramm Ruhr) which was endowed with some 6.9 bill. DM for 1980-1984. The programme intended to combine a bundle of different measures, which went beyond the scope of measures traditionally applied in economic development programmes:

- direct subsidies for coal and steel;
- support for SMEs;
- new services;
- R&D and technology transfer;
- improvement of the qualification structure;
- protection of the environment;
- infrastructure;
- urban development and improvement of housing conditions.

In this second phase in the evolution of innovation policy for the Ruhr area we can identify first really innovation orientated actions. From the end of the 1980s this policy was also very much supported by the European Structural Funds since the Ruhr became a so-called objective 2 region within the European regional support system thus enjoying tremendous financial in flows from Brussels. Alongside with the European funding a regionalisation of both the structural and the innovation policy can be observed.

Although structural change in the Ruhr area made progress since the 1980s the economic situation remained unfavourable: GDP growth rates were lagging behind West German average and unemployment remained high. The whole region still is not able to exploit its capacities and its strengths and it cannot return to a sufficient growth path. To this end, the policy concept for the Ruhr entered into a third phase at the beginning of the new century. In order to overcome the weak policy results the Länder government started to introduce the concept of competence fields or clusters both in structural and innovation policy making. Competence fields in NRW do have at least two dimensions: the region and a specific technology orientation. The objective is on the one hand to a shift of the policy focus: away from a policy which aims at overcoming identified structural deficits towards a policy which fosters and exploits regional strengths. On the other hand the regional partnership and the networking will be improved: broader partnerships (in particular participation of enterprises) and a higher degree of devolution of strategic decision making competencies are currently being discussed.

This re-orientation in policy concepts towards competence fields or clusters is a good step towards the application of foresight. The state technology and innovation agency in NRW (ZENIT)[15] therefore proposed to the Länder government to conduct a foresight pilot in one specific region in one particular competence field.[16]

3.2 The Technology Foresight Concept for the Cluster "Innovative Metals" in Duisburg[17]

The starting point for the FS exercise in the city of Duisburg can be seen in a study commissioned by the city administration on the sector of "Innovative materials". The Duisburg study was triggered by a broader analysis a the level of the Land, where new materials had been identified as a competence field within NRW. The Duisburg study included a SWOT[18]-analysis for the field "Innovative Materials" in the town.

The actual Technology Foresight project started in summer 2002 with some basic work. Project goals were the enforcement of a higher competitiveness in the competence field "Innovative Metals in Duisburg" by a moderated FS process that should increase the relevant knowledge of all involved actors and hence improve their knowledge base for future strategic decisions. The project was also about improving the intensity and effectiveness of internal networking and about increasing the co-operation between the policy, science and industry actors in the town (inter-institutional learning).

In a first phase awareness was risen amongst the key actors through 35 personal visits in which the goals of the project were explained. Main interest of the guided interviews was to find out which instruments and tools the enterprises were already using in order to gather information about relevant future technological developments. It was also intended to explore how this information was used for own strategic decisions. As a result just a few starting points for firm-integrated systematic means in the sense of "Technology Foresight" could be identified. A more striking result was, that the interviewees demanded especially improvements in the framework conditions, e.g. "networking between actors", "employment situation versus qualification requirements", public administration, climate for business start ups, self- and foreign image of the region. This were not exactly starting points for FS exercises in the narrow sense but here we could embark with concrete projects aiming at improved competitiveness for the cluster. These interview results represented also

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15 See www.zenit.de

16 The ZENIT concept was based on the results of the work for a high level expert group of the European Commission. See: GUTH, M. (2002), Strategic Improvement of regional RTDI policy and regional development policy through a systematic use of foresight methods: the case of regions facing severe industrial structural change. Issue paper for the High Level Expert Group on "Mobilising the European Foresight potential for an enlarged European Union; Brussels, download: http://www.regional-foresight.de/download/Strategicimprovement.pdf.

17 see also IKING, B. (2004); Vorausschau für eine regionale Vernetzung im Ruhrgebiet, in Wissenschaftszentrum NRW, in: Wissenschaftszentrum Nordrhein-Westfalen, in: Jahrbuch 2003/2004, 1st Edition 11/2004, ISBN - 3-929483-22-X, Düsseldorf, p. 165-176.

18 SWOT is the acronym for **S**trengths, **W**eaknesses, **O**pportunities and **T**hreats.

the basis for the workshop concepts that were conducted in June and November 2003.

The first workshop aimed at achieving clearly defined initiatives and projects. Within the moderated workshop session the key actors worked out the most important technological trends in the sector of innovative metals. This was followed by an identification and assessment of existing competencies and weaknesses in the area in question. By contrasting the results of these two steps allowed us to enter into the last working step which aimed at identifying marketable projects which can be realised by the workshop participants themselves.

Table 1: Workshops steps – condensed description

Working Step	**Methodology**
Project introduction: Contents and Goals	Presentation
Step 1: What are the two most striking technological developments in the area of innovative metals?	Card based moderation cards/participant; collect, cluster, assess, limit
Step 2: What are the two most important core competencies of the region Duisburg in the area of innovative metals?	Card based moderation cards/participant; collect, cluster, assess, limit
Step 3: Which competencies are missing in Duisburg in the competence filed “Innovative metals”?	Shout: collect and cluster contributions
Step 4: Which measurements and activities would prepare the actors in Duisburg in the competence field „Innovative metals“ best on the identified technology trends?	Group work: 3 groups à max. 6 persons, afterwards presentation and discussion of results
Final discussion and coordination of further steps	

3.3 Workshop results

The workshop participants identified as the most striking developments in the area of “Innovative metals” the themes “Composites” and “Light construction” (strength, light materials) with seven callings. Another important development will be advancements in the area of functional surfaces (wear and corrosion resistance, nanotechnology) (seven callings each) and control systems in material production (four callings).

The workshop participants mentioned also following future trends: corrosion free reinforcing bars, highly resistant wires, high grade materials and jointing technology (combination of different materials).

The mentioned future trends have been cross-checked by a questionnaire sent to national experts in industry, research and science. The experts confirmed the relevant trends identified by the participants of the Duisburg FS exercise to a very high degree. There is a far reaching consensus that especially the technological developments in the areas composite materials, “light construction”, functional surfaces and progresses in “consistency characteristics of steel” will influence future demand of clients and mark technical specifications of future products along the production line.[19] This means that competitiveness will be influenced in future by the ability of firms to integrate and implement quality and functional characteristics in their products demanded by their orderers and/or customers, alone or in cooperation with others.

In a second working existing strength and weaknesses of the location Duisburg in relation to the identified relevant technological trends in the competence field under scrutiny were worked out (see table 2). There are some considerable strengths in the innovative metal cluster Duisburg available:

- Research and Development in the area innovative metals (R&D laboratories, melting plants, measurement technology and nanotechnology) (seven callings)
- Production Know-how (jointing technologies, IHU-Technologies, tailored blanks, process know-how, 3-D-surface measurement technologies) (ten callings)
- Surface treatment, refinement and coating (three callings)
- Pioneer developments (two callings)

In the next step existing deficiencies in the competence field “Innovative metals” Duisburg were identified. Main deficiencies are:

- Qualification and training problems that lead to qualified personnel problems in the production area
- Insufficient application know-how (partly a qualification and training problem)
- Missing links between the actors
- Marketing problem of existing strength

[19] However, there is one remarkable result of the workshop. The areas composite materials (four of seven callings) and light constructing (six out of seven) had been mentioned mainly by non-SMEs. On the other hand it were mainly the SMEs (four out of five callings) that mentioned the area “Functional surfaces” as important technological development in the future.

- Missing superior coordination of activities, resources and competences
- Bad location image

Table 2: Strength and Weaknesses of Duisburg in the cluster "Innovative metals"

Trends	Significance for Duisburg	Strength Duisburg	Weaknesses Duisburg	
Composite materials	++	control systems in production +++	Qualification and training problem, missing potential leaders	Missing network between existing competence field actors - no superior coordination
Light Construction	++	Production Know-how in the area jointing technology ++	location image	
Functional surfaces	++	surface processing +	Missing interaction between university and industry	
Highly resistant steel	++	Competence in R&D ++	Marketing of existing competencies	
Hardenable steel	+			
Magnesium surfaces - refinement	+	No competencies		
environmental standards - emissions, floating particles, Diesel emissions	+	pioneer work +	climate problem, Emissions	

The final working step consisted of a synergetic merger of results. Three working groups were founded. In each group representatives of the city, two or three SMEs, one representative of a multinational company and one representative of the science sector were brought together. The duty of each working group (WG) was to work out practical and concrete measures which would prepare best the actors of the Duisburg cluster on the identified future trends. The core results of this final working step are illustrated in table 3, p.14.

The measures and projects worked out in this process have finally undergone a validation process. This validation aimed at setting priorities. The premise was to choose projects that can be implemented in short or medium term. The workshop participants decided to concentrate on three measures, which will be finalised by the three working groups autonomously.

Table 3: Project proposals to increase the competitiveness in the competence field „innovative metals“

Source	Identified strength /weakness	Possible solutions
WG 1 / WG 2 / WG 3 WG 1 / WG 2	- Lacking transparency about actors and firms - Lacking communication - Lacking information	- Create firm profiles of all Cluster members - create a network for internal communication - cooperation/networking via internet portal - establish a forum university-SMEs-Duisburg mayor
WG 2	Image improvement, location marketing	- Public Promotion campaign
WG 3	Networking between actors (along the production line)	- Development of functional materials
WG 3	Missing qualified personnel	- Cooperation agreements /tunings between

Following concrete measures have been chosen for implementation:

WG 1: Creating firm profiles of all existing firms in the cluster “Innovative metals” in Duisburg

WG 2: Creation of a strategy concept to improve the image of the location Duisburg and its competencies in the field of innovative metals.

WG 3: Systematic development and enlargement of a forum “Innovative materials”, in which concrete projects between the university of Duisburg and enterprises in Duisburg shall be defined and implemented.

The working groups are still in work and progress their goals.

3.4 FINAL RESULTS AND GENERAL LESSONS

The FS approach in Duisburg led to the following results at the level of the cluster:

- Identification and description of key competences and deficits (bottle-necks);
- Identification of major trends with significant impact to Duisburg;
- Formulation of concrete measures (better information flows, industry university cooperation in apprenticeship);

In addition to that, we can draw some general conclusions with regard to the feasibility of FS exercises:

- The foresight tool is suitable to create competence field related synergy potentials.
- For the success of FS activities it is essential that the relation between the actors within a cluster is based on a critical level of trust
- The FS instrument as such deepens trust between the participating actors and is hence, a perfect instrument for efficient networking.
- The process generates findings and results that lead to projects and activities that are suitable to increase the competitiveness of the participating actors.
- For public decision makers the support of sector specific technology foresight initiatives is an appropriate way to increase information transparency, support networking activities and to give impulses for economic innovation processes.
- FS processes can suit to improve the difficult relation between science and industry.
- Technology Foresight processes do not result necessarily in the development of elaborated instruments that illustrate future developments by "pushing a button". But it can be expected to work out pragmatic proposals for improvements which offer the involved actors a maximum of benefit and competition enhancing effects.

As far as we are concerned, successful FS exercises in clusters need professional preparation. Not all clusters are feasible to implement a FS. According to our research, three things are of utmost importance: [20]

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[20] The following remarks derive from experiences throughout the implemented Technology Foresight Process in the Cluster “Innovative Metals” in Duisburg. The findings have been confirmed by the results of a field research with more than 170 network managers; see also: IKING, B. (2004) Successful Networking – Preconditions and success factors; results of written interviews of 122 German and 57 foreign Network managers in June/July 2004; Mülheim an der Ruhr, download at http://www.zenit.de/d/regionalinnovation/download/Erfolgsfaktoren-Netzwerkarbeit.pdf

1) FS can strengthen network building and clustering – but a critical level should be there from the beginning (it is very difficult to start from the scratches).

2) Neutral moderator or facilitator of the process.

3) Critical mass of participants

We regard these three points as vital preconditions for cluster orientated FS exercises.

(1) The addressed competence field must have a certain maturity. The demand for advanced maturity derives from the experience that the addressed network/competence field must have established already a sufficient level of trust between the involved actors. As long as single actors distrust other actors, open exchange of ideas and know-how is impeded. For this reason it is also important that the workshop participants are not in a too big market rivalry. Under those preconditions a future and result oriented co-operation of actors would be impossible to manage. Hence, a workshop based technology foresight process cannot be successfully implemented under conditions of distrust.

(2) The FS process must be moderated and implemented by a neutral institution and/or person free of own interests. Claiming for a neutral moderator for the FS process has mainly to do with the same crucial factor "trust". An open minded and result oriented participation of key actors in a competence field during the workshops is impossible if just one single participant believes that the workshop moderator acts for his own sake!

(3) The third basic precondition for the implementation of a FS exercise is that the addressed cluster comprises a critical mass of know-how holders from all relevant areas, e.g. SMEs, R&D-institutes, university labs, consultants, branch associations, local politicians, science institutions, promotion agencies for trade and industry, etc.[21]

The question still remains, what to do if the number of participants and trust level have not yet met the necessary thresholds. Against our experiences these situations claim for pre-FS exercises. A pre-foresight can consist of all tools and methods of normal FS project. However, the objectives are focusing on network enlargement and deepening (trust building activities) rather than on the formulation of joint development visions of a given competence field.

[21] Michael Porter defines a cluster (competence field) as follows: „Geographic concentrations of inter-connected companies, specialised suppliers, service providers, firms in related industries and associated institutions like for example universities, standards agencies and trade associations, in particular fields that compete but also co-operate."

4. SOME GENERAL POLICY REFLECTIONS AND APPLICATION POTENTIALS FOR FORESIGHT IN TRANSITION ENVIRONMENTS

For a good decade Russia and the western NIS states (new independent states) are reforming their economies towards a market orientation and they are about to rebuild their society on the basis of fundamental liberties, political stability and democratic rules. Recent surveys and studies (OECD, World Bank, EU Commission) have revealed that the transformation process comes along with fatal economic and social consequences: increase of poverty, sharp rise in social disparities, high unemployment, health problems, drug abuse etc. Furthermore, the three countries in our focus suffer from large and inefficient production sectors which still demand a huge part of the nations' material and financial resources.

The situation is somehow comparable to the process of structural change in old industrialised regions in mature western economies. It is evident thus, that we can regard innovation and innovation policy as an important driver for industrial restructuring and civil conversion in these countries as well. However, recent policy documents have shown e.g. Russia's severe difficulties in developing a coherent innovation policy. Russia enjoys an impressive scientific potential, a good education system and a large pool of qualified specialists. On the other hand, industrial or entrepreneurial innovation is underdeveloped. Insufficient investments in RTDI (in per cent of GDP), minor engagement of enterprises in innovations, lack of equity capital, insufficient state support to firms and generally high costs were identified as main factors hampering innovation.[22]

In addition comes the traditionally supply orientated behaviour of research institutions which are not able to adapt their service to current demand. Comparable situations can be observed in the Ukraine and for example in Moldova as well. As a result, innovation activities dramatically declined in these countries which led to a blockage of the transformation. At the end of the 1980s for example, Ukraine had reached almost the same level of patent licensing as developed countries. Since then the situation has deteriorated dramatically and respective figures went down to very marginal figures.

One can also notice that research and innovation systems in Russia and other NIS countries are in their infancy. Links between academia and industry hardly exist. The same applies for regional innovation systems.

[22] See OECD (2001), p. 8ff.

Against this general background numerous other policy initiatives have been developed and implemented. In Russia the government started to build the foundations for a national innovation system. For example, a system of state science centres has been set up. A series of Federal Science and Hi-tech Centres in strategic science and technology areas is being developed. Furthermore, a network of innovative technology centres has been established. A new foundation for small business support in science and technology has been recently established.[23] In the Ukraine first institutions focusing on innovation infrastructure started during the mid 1990s with the support of TACIS or USAID. Some 50 of such organisations are currently operating in the Ukraine and they are partly organised in the Ukrainian Association of Business Incubators and Innovation.

Despite the already ongoing initiatives aiming at building innovation structures or systems as well as technology transfer initiatives as driver for modernization and adaptation of industry and society in the cited transition countries, there are major challenges ahead! Obviously no single "remedy" is available to solve the problem. On the other hand, releasing the immense resources which are bound in inefficient use in old industries and to allocate them into modern growth, income and employment generating sectors would be a major step ahead!

Here theoretical considerations and the practical experiences in structural policy matters described above support policy makers in focusing their activities on the improvement of existing strengths rather than on the reduction of identified weaknesses. Innovation policies in the sense of “Strengthening the Strengths” lead directly to concrete cluster and competence field supporting approaches.

Against this background, foresight seems to be an interesting tool for the emerging regions in transition environments, *as* long the described lessons as well as the preconditions are borne in mind:

1) The relations between the key actors should be built on trust, which was shown as the key factor for successful learning processes and result orientated Technology Foresight processes.

2) Policy makers can support these activities financially (and should so); but FS processes are not suitable as playing fields for policy driven creative impulses.

3) Success promising FS initiatives need competent and neutral moderator.

As we have seen, a key problem for the successful economic transformation in Russia and other NIS countries is the virtual non-existence of national and regional

23 See OECD (2001), p 10.

innovation systems. Foresight processes provide the potential to develop in a broad partnership approach joint visions for desirable future scenarios in regions which are often suffering from an inherited industrial mono-structure.

The process itself can support the building of new regional structures and systems. New interfaces - in particular the hitherto weak university/industry links – can be created. FS thus can contribute to the creation of regional innovation systems and by that to an improved transition process.

With regard to participation and networking FS is of particular interest in transition environments. While networking - without doubt – is a necessary precondition for organising regional learning systems, in Russia and other NIS this approach is facing the risk to revitalise the old gangs of nepotism. The broad participation (policy makers, universities, firms, institutions, NGOs and so on) which is a crucial element of FS, will however help to reduce this risk. Participation assures a policy milieu with rather high degrees of transparency, in which fraud, corruption and nepotism can hardly be hidden.

Obviously, foresight is not a panacea – neither in western countries nor in Russia or in the NIS countries. However, FS bears huge potential to overcome major deficits in the innovation performance:

- With the help of FS, transition regions can exploit the network effects;
- FS can be used as a tool to diversify predominant old industrial structures; and
- FS is an appropriate tool to priorise research activities.

LITERATURE

EUROPEAN COMMISSION, JOINT RESEARCH CENTRE (INSTITUTE FOR PROSPECTIVE TECHNOLOGICAL STUDIES IPTS) (2001), A practical guide to regional foresight, download under: http://foren.jrc.es.

FLORIDA, R. (1995), Towards the Learning Region, in: Futures, 27, p. 527-536.

GUTH, M. (2000), From Technology Policy for Regions to Regional Technology Policy: Towards a new Policy Strategy in the EU, Discussion Paper No. 78, European Institute for International Business Relations, University of Potsdam.

GUTH, M. (2002), Strategic Improvement of regional RTDI policy and regional development policy through a systematic use of foresight methods: the case of regions facing severe industrial structural change. Issue paper for the High Level Expert Group on "Mobilising the European Foresight potential for an enlarged European Union; Brussels, download: http://www.regional-foresight.de/download/Strategicimprovement.pdf.

IKING, B. (2004); Promoting Industrial Change in structurally disfavoured regions, The case of the „Ruhr Valley“ in Germany with special emphasis on the current restructuring plan of the city of Dortmund, in: Comparative Study on Industrial Regeneration of Advanced Cities in Korea, Germany and Japan; Paper Book published by the Incheon Development Institute on the occasion of the Symposium on 6th October 2004 in Incheon/Südkorea, download http://www.idi.re.kr/libs/download.php?tb_name=files&uid=994 (p. 97-118) or http://www.zenit.de/d/regionalinnovation/download/PromotingIndustrialChange.pdf

IKING, B. (2004) Successful Networking – Preconditions and success factors; results of written interviews of 122 German and 57 foreign Network managers in June/July 2004; Mülheim an der Ruhr, download http://www.zenit.de/d/regionalinnovation/download/Erfolgsfaktoren-Netzwerkarbeit.pdf

IKING, B. (2004); Vorausschau für eine regionale Vernetzung im Ruhrgebiet, in Wissenschaftszentrum NRW, in: Wissenschaftszentrum Nordrhein-Westfalen, in: Jahrbuch 2003/2004, 1st Edition 11/2004, ISBN - 3-929483-22-X, Düsseldorf, p. 165-176.

KERR, P. (2004), Technology Platforms, from definitions to Implementations of a Common Research Area, TP_Kom_06042.doc, Brussels.

LUNDVALL, B.A., Ed. (1992), National Systems of Innovation: Towards a Theory of Innovation and Interactive Learning, London.

NELSON, R.R., Ed. (1993), National Systems of Innovation: A Comparative Analysis, Oxford.

OECD (2001), Bridging the Innovation Gap in Russia, Paris., p. 8ff.

OECD (2001), Cities and Regions in the New Learning Economy, Paris.