Paper Title: On the usefulness of a GUI / Triple Helix framing when designing effective technology stimulation policies

Name of main author: Andrea Kurz

Names of co-authors
Walter Aigner, Johanna Berndorfer, Constanze Stockhammer.

Author's position and affiliation
Researcher, Vereinigung High Tech Marketing

Street address (not country!), telephone, fax
Lothringerstraße 14/6, A-1030 Vienna, Tel ++4317182530 Fax: ++4317182530-50

Country: Austria

E-mail ak@HiTec.at

Triple Helix 2002

To track- conveners: Track 2 resp. 7

Mats Benner, RPI, Lund University, mats.benner@fpi.lu.se

Ulf Sandström, SISTER, Stockholm, ulf@sister.nu

Elizabeth Shove, Lancaster University, e.shove@lancaster.ac.uk

Barend van der Meulen, University of Twente, b.j.r.vanderMeulen@wmw.utwente.nl

Triple Helix 2002 - Track 2 resp. 7

On the usefulness of a GUI / Triple Helix framing when designing effective technology stimulation policies

Andrea Kurz, Walter Aigner, Johanna Berndorfer, Constanze Stockhammer.

Abstract

National governments commission preparatory studies and the entire designs of technology stimulation programmes to outside experts. The rationale behind this threefold: firstly, outsourcing helps solve a capacity problem, as peak workloads occur in the preparation process; secondly quality is enhanced when a pre-qualified idea is handed over to someone trusted by the idea champion; and thirdly, commissioning the design process allows the public authority to fully participate in what is typically a Triple Helix setting today, while taking the role of a moderator would unduly limit its chances to do so..

This paper presents experiences from the design phase of two very ambitious Austrian science-technology stimulation programmes (1. Stimulating truly innovative embedded systems technology and 2. Innovative satellite navigation related services). Throughout the design process, the study team focused not only on the state-of-the-art in national technology programming, but integrated the Triple Helix frame of reference when designing the programme and interacting with the three communities concerned (researchers, industry and government).

Data is derived from an action-research approach and extensive qualitative interviewing prior to participant observation during several Open-Space events (Open-Space Technology OST).

The Triple Helix frame of reference helped to effectively speed up the transfer of these emerging technologies into later stages of technology commercialisation (Jolly, 1997).

Yet, results show clear limits to the acceptability of Triple Helix approaches. The main problems encountered were traditional role perceptions and traditional programme evaluation criteria. Due to the longitudinal character of the action-research approach we still can show, how the Triple Helix concept helped organisations to learn faster and to make essential adoptions.

1 How do we know? – Experiences made when designing technology stimulation programmes

"…questions concerning scientific capacity and priority setting are implicit in all discussions about science policy. They are both *difficult* and *inescapable*" (de la Mothe,1999, p. 373, emphasis added). In smaller countries those issues are central to decisions about policy directions and instruments (Marceau, 2002, p. 209). What Marceau says here for "smaller countries" like Australia and Canada is even more important in Austria. Adding to complexity, there are two ambiguous empirical findings concerning the Austrian economy: While macroeconomic indicators on productivity, employment and growth imply stable and competitive performance, comparisons of industrial structures and innovation potential reveal considerable shortcomings (e.g. Peneder 1999, p. 239). Policy researchers argue that in general most innovations are incremental and the planning horizon is rather short (Tichy, 2000, p. 3). Yet there is sufficient evidence that there are global technology leaders and innovation champions among Austrian SMEs and university-spin-offs. This is why R&D stimulation measures are being proposed and implemented on the regional and national level.

Recently, preparatory studies and even the entire design of technology stimulation programmes have often been commissioned to "non-governmental organisations". One department in the Federal Ministry of Innovation in Austria has regularly assigned these tasks to business consultants and hybrid, non-university research groups. The existence of this practice together with a specifically high readiness of the individuals in charge of the two programmes to engage in larger informal settings, have set us in the position to exploit new forms of community building and Triple-Helix related 'planning'. The authors, members of a small, independent, interdisciplinary group of researchers, undertake to critically review the experiences they made, when designing national technology stimulation programmes in 2001 and 2002.

Both programmes we were commissioned with by the Federal Ministry of Transport, Infrastructure and Technology had a highly specific and ambitious thematic focus: One dealt with "Embedded systems", an IT-topic of ever-growing importance. The other programme sought for "innovative satellite navigation related services". Both thematic issues are currently part of highly dynamic programming activities for the 6th Framework Programme. In order to handle such topics properly, it pays for to be an interdisciplinary team; almost all team members hold a degree or have received professional training in another discipline, besides their graduation in business administration. On top, knowledge on IT and Space

Technology has been acquired in a number of large ESA and EC collaborative industry research projects.

The thematic focus was specified by the Ministry in close co-operation with several experts from university and industry. Other fixed conditions were, for instance, the amount of funds available, the degree of innovation sought ("radical") and the administrative framework required to fit into EC-approved national funding schemes. However, the study team was free to choose the methods, both for estimating response and future impact of the suggested programme ideas, and for further specifying the design of these national technology stimulation programmes. From our experience it was clear that all methods should enhance interaction with and among representatives from the ministry, national funding agencies, all kinds of research institutions concerned, industry, and technology-prone SMEs; while previously there had been only some occasional communication in the small leading-edge group of experts from university and industry. So it seemed only natural to apply the concept of the Triple Helix as a frame of reference. But was it useful as well?

2 How useful is it to take the Triple Helix approach? – Problem definition and outline of this paper

Designing a technology stimulation programme is a complex task, given the trade-off between maximising the benefit for all stakeholders (GUI and the taxpayer); coping with limited resources; striving for smooth implementation in a yet emerging community of local university-industry collaborations; and all the same maintaining the high ambition of the programme idea: i.e. broadening the community in order to reduce the technological risk and to legitimate the effort, while keeping the extremely narrow and ambitious focus, apt to effectively stimulate existing excellence even with small public spending. But how do you focus a group of highly diverse, leading-edge experts, when the future and success of the technology are largely unpredictable? And on top, budget and time to finish the design process are limited also. These goals and constraints given, the question of how useful it is to take the Triple Helix approach when designing a technology stimulation programme will be discussed.

To this end the following steps are taken. Firstly a basis is established by a review of selected literature on the state of the art in technology stimulation policies and programme design, including criteria for programme evaluation. This will serve as a benchmark for the Triple Helix approach (*section 3*). The characteristics and implications of the Triple Helix framework lead to certain assumptions and expectations concerning the usefulness of this approach (*section 4*). In order to maintain and further stimulate the dynamic momentum and creative potential of the system, the methods applied were carefully selected. On top, *Section 5* comments on some empirical insight gained as to the merits of this process. In

order to complement the analysis of the usefulness of the Triple Helix approach, limitations – be they systematic constraints or unintended shortcomings – are discussed (*Section 6*). Draft recommendations as to the usefulness of the approach described and an outlook into further fields of investigation (Section 7) will probably stimulate discourse.

Of course this study can cover only some of the research topics concerned. In particular, we didn't extend the approach to virtually all stakeholders, including the general public – an approach advocated e.g. by Chopyak and Levesque (2002). Marceau extends his analysis not only to user, but makes the information flow between the partners in the production scheme his main object of analysis (Marceau, 2002, p. 216). While the approach seems very promising, it was not possible to follow it, given the time and budget constraints the authors encountered.

3 What is state of the art in technology stimulation policies and programme design? − Selected literature as a benchmark for the Triple Helix approach

There is consensus that technology stimulation policy is an important part of innovation policy. As early as 1996 the "Action Plan for Innovation in Europe" published by the EC stressed this coherence. Namely its goals were: foster a genuine innovative culture; set up a legal, regulatory and financial framework conductive to innovation; gear research more closely to innovation. The importance of the links between science and the rest of the innovation process for the performance of the innovation system as a whole is rightly taken for granted. Its effect on GDP and employment is substantial in most European countries. An important question posed in this context is: "If we're so clever, how come we ain't rich?" (Arnold, Whitelegg, Thuriaux, 1999, p.3). This is the major gap addressed by state of the art technology stimulation policy. This connection also surfaced in ongoing FP 6 preparatory activities: there, action was taken to significantly extend the time horizon of co-funded research because a significant gap in medium-term research had been detected.

But there are other serious constraints and emerging trends affecting the policy options for furthering innovation. (Marceau, 2002, p. 212). Firms recognise the need to collaborate in innovation and to make use of the skills of business customers and suppliers, that could contribute to optimising solutions offered. GUI build new organisational links (Triple Helix) and hybrid organisations establish. Countries recognise the need for coherent innovation policies and its influence on the competitive advantage of a nation or region. Not unlike the rest of the innovation system, universities face changes such as: emerging and disappearing sources of research funding, growth in the complexity of multidisciplinary research projects, inclination to shift the focus of research to more commercially oriented questions, and a surge in university industry collaborations (Jankowski, 1999, p. 55).

The latter is an area, where public funding is increasingly targeted at. In almost all EC-countries academic-industry and enterprise-enterprise collaboration is supported nationally , according to findings published in a Commission Staff Working Paper (31.1.2002), which benchmarks national RTD policies. Are other trends addressed likewise? The authors of this paper hold that this is only occasionally so – unless a Triple Helix approach is taken.

Yet, the ideal role of "government" in technology-politics as proposed by Rycroft and Kash (1999, pp. 212-216) would comprise most tasks:

> *Climate Setting*. Culture, regulations and best practice standards can both enhance and impede innovation. Policy can modify climate, yet within limits.
>
> *Surveying*. Intelligence–gathering and –dissemination are central to innovation success in knowledge-based technologies. Governments can offer necessary support by technology assessments, technology road maps and the like.
>
> *Co-ordinating*. In order to foster the creation of networks and co-operations, national governments can ensure that the various organisations know of each other and can interact.
>
> *Gap-filling*. This task is heavily debated in the US. For European technology policy the existence of a gap due to substantial market failure is one of the qualifying conditions to take action.

These goals should likewise be considered when designing technology stimulation programmes.

Standard models for such a design process are the systems approach proposed by Guy et al. (1998, p.34) and the good practice model proposed to the EC by Arnold et al. (1995). Some of it is reflected in Larédo (1997). The authors define four conceptual levels (politics, programmes, projects, participants) and two evaluation elements. These units are mutually linked, in order to form learning loops (ELSA-approach). Stakeholders' (e.g. consultants') influence on the system is considered quite high and is allowed for. Since one level sets basic conditions for the following, there exists a hierarchical structure (politics →→→participants). This is why furthering bottom-up - communication seems particularily important, in order to allow for learnings. The design process comprises amongst other things: validation of the programme strategy, forcast of the number of proposals to be expected for each topic, analysis of the concept, suggestions for the programme framework, the issue of project evaluation criteria and evaluation regimes.

"Thus, research sponsors influence the framework for research performance and the networks which form part of the research environment" (Benner and Sandström, 2000, p. 293). They do so by funding certain fields of technology and by setting certain standards for

evaluation. This is why critique like the one expressed by Begg, Fagerberg and Guerrieri (1999) has to be taken serious. They maintain that while the EU-Framework Programmes are useful in financing specific scientific research, too "little effort has, however, gone into promoting capability amongst users of new technologies and in providing a social and institutional setting, that encourages their implementation" (p. 237). It will be discussed below, if a Triple Helix approach would contribute to a solution for these shortcomings.

Research sponsors influence research performance by project evaluation criteria. Equally programme evaluation criteria affect the programme concept. In Austria these criteria have been set by the Council for Research and Technology Development (2001, pp. 3-7). They include, among others, quantitative measures like the leverage effect of the funds invested. The additional research investment of industry caused by the programme is extremely difficult to judge – especially for ambitious programmes with higher risk and yet a lot of spill-over and climatic effects. Similarly it is difficult to judge the influence of the programme on the national R&D-quota, another evaluation criterion stipulated. Those models which draw on quantitative measures alone seem less suited for the dynamic innovation policy situation described above. A positive counter-example is the set of indicators developed by Roessner, Porter et al. (1996, p. 137). It is based on a skilful combination of statistical and expert-derived data designed to anticipating the future high-tech competitiveness of nations. We expect that evaluation criteria for Triple Helix approaches will draw on such combined sets of measures.

4 What is special about the Triple Helix approach to programme design? – Definition, implications and perceived usefulness

Having taken a look at standard innovation policy and programme design, these findings will now be contrasted by the Triple Helix concept, namely Triple Helix III (e.g. Etzkowitz and Leydesdorff, 2000, pp. 111ff).

Presently most countries try to attain this Triple Helix III configuration (Etzkowitz and Leydesdorff, 2000, pp. 111ff). It depicts a knowledge creation and transfer network, that is made up by three overlapping spheres (academia, state, industry). A variety of institutional arrangements – hybrid organisations – emerge at their interfaces. Organisations involved witness and undergo dramatic changes (e.g. Peeters, 2002; and Belleval, 2002; taking space agencies and their activities as an example). The metaphor of a triple stranded helix skilfully mirrors the dynamics inherent to this system.

Transition to such a system can be encouraged or hindered by the funding system. Firstly, rules for funding will have considerable effect on the formation of networks within and between the strands of the helix, they may add to or halt the dynamic momentum. Secondly

project evaluation criteria will influence the practice of performing research: collaborative or isolated; inter- or intra-disciplinarily; striving for academic excellence or applicability (Benner and Sandström, 2000, p. 294).

In other words: designing a technology stimulation programme in line with the Triple Helix concept is considered useful *hypothetically* for the following reasons:

> *Interaction of all stakeholders* is key for matching goals, expectations and constraints when designing a technology stimulation programme.
>
> *Trust and openness* take time to develop. Numerous occasions for networking evolve in a Triple Helix approach and further mutual understanding.
>
> *A greater understanding* of each others worlds is beneficiary to all partners. Policy decision making – a complex process, not an event – profits from the insights into the strategies and decision structures dominating industry and academia (Lomas, 2000, p.140). In addition, collaboration in funded projects helps bridge the divide between the scientific and business communities which is caused by the traditionally low level of personnel exchange and the disincentives for risk taking (Lehrer, 2000, p. 97).
>
> *Technology transfer* will profit from co-creation and mutual trust between academia and industry, and will be furthered by a well-selected set of framework conditions stipulated by the funding scheme.
>
> *Commercialising new technologies* will be a more logical, smooth extension of the R&D process (Jolly, 1997, p.18; Poole and Moore, 2002). Technology stimulation programmes must not stop short as soon as users come into sight. User involvement will be an important point when selecting adequate methods for Triple Helix approaches.

As can bee seen easily, most of the tasks defined for successful innovation policy in section three would be covered: the climate would be influenced positively (*Climate Setting*) and interaction would contribute to greater understanding and to *Co-ordinating* players in the Triple Helix. Technology transfer and commercialising new technologies may be defined as *Gap-filling*. Thus, the Triple Helix seems rather advantageous, and is considered useful hypothetically.

5 Which methods did we find adequate to a Triple Helix approach? Methods, selection criteria and empirical insights

When selecting methods applicable in Triple Helix settings, the main goal was not to discourage any of the positive effects stipulated above. Furthermore it was intended to gather naturally occurring data (Silverman, (2001), pp. 285ff) which reflects true life practice,

not espoused processes (Seely-Brown and Duguid, (2000), pp 95-97). Moreover methods had to be adequate to the complexity of the task and the inherent dynamics of the Triple Helix system. Besides we follow Kuhlmann (2001, p. 961), who holds that "…innovation policy is characterised by more or less institutionalised "negotiations" between multiple self-interested groups of actors (…) in innovation systems and between them." Methods chosen were to further such interaction processes.

Consequently an Action Research approach (e.g. Levin and Greenwood, 2001, p.105) seemed appropriate. This is why:

- Action Research is context-bound and addresses real-life problems. This is why timely availability of results is an issue.
- Action Research is a form of inquiry where participants and our team co-generate knowledge. This knowledge creation is the result of collaborative communicative processes. All participants contribute to them. Diversity of experiences is treated as an enrichment of the research/action process.
- The meanings constructed in the inquiry process lead to social action. In turn, reflections on action lead to the construction of new meanings.

With the Action Research approach and the Triple Helix model in mind, selecting methods for data generation and sense-making was rather straightforward. Qualitative interviewing and Open Space workshops fulfil most requirements mentioned.

Qualitative interviewing is a time-consuming yet rewarding method, which is essential, when the subject matter is very complex, when the expected knowledge gap is wide, and when reasons for certain perceptions and strategies are an issue.

When estimating the expected response to technology stimulation programmes, interviewing can help reveal the aspirations of the organisation regarding research strategy. Most of the time it was the interviewer, who stimulated a process of detecting and verbalising emergent strategic options (Eden and Ackermann, 1998, p.79). Thus a thought process was initiated, and the interview intentionally promoted the idea of doing research into the topics proposed and in the way intended (e.g. collaborative). Though one may advocate that this will bias the study outcome, it is essential for building awareness and encouraging involvement in the process of not merely designing a programme, but, what is more, in the process of building and enhancing a GUI-network in the field addressed.

As regards interviewing practice: "response rates" tend to be close to 90%, since most experts are interested in new funding schemes and like the idea of influencing the outline of a programme. Non standardised formats – a mere list of topics to cover – allow for a natural flow of the interview and please the high-level experts, who feel they keep in control of the

interaction. There is room for surprise and for naturally occurring data, which exist independently of the researcher's intervention (Silverman, (2001), pp. 285ff). When observed carefully and interpreted skilfully, data should closely resemble “reality”. This is why, when interviewing, researchers spend time and money for putting interviewees at ease, e.g. by visiting them in their premises, by being well-prepared,… Or they just observe what happens, when the tape is turned off.

While in qualitative interviewing some interviewer influence can never be ruled out, Open Space Technology (OST) proposed by Owen (1997) allows largely unbiased interaction. Open Space workshops have no keynote speakers, no fixed agendas, no pre-announced schedules of workshops. Instead, participants create their own conference, while already being there.

According to Michael Herman (http://www.openspaceworld.org/), “Open Space works best when the work to be done is complex, the people and ideas involved are diverse, the passion for resolution (and potential for conflict) are high, and the time to get it done was yesterday”. As complexity and time pressure are often present and since the communities interested in an emerging funding scheme are very heterogeneous and multifaceted, the method seemed appropriate. In view of the authors, it met these expectations and exceeded some.

Open Space participants should know, why they attend the workshop. Admittedly this approach sounds unfamiliar in the first place, but once the funding agency and a lead expert have registered to participate, acceptance of the method is not a big issue. On top, it is important for this methodology that, in order to give valid results, only those participants are present, who are really interested in the subject – matter and the mutual exchange within a yet emerging community. Therefore the pros and cons of inviting potential users and other organisations further down the value chain of a technology to these OS-workshops, should be carefully evaluated. They may not be interested in (roughly) matching research goals and discussing the details of a funding scheme. Nonetheless, experience we made suggests, that the effects of their presence were positive. They address the relevance of certain aspects of the research topic for innovative applications, state “real life” problems and profit from getting into contact with emerging consortia.

Open Space practice: Workshops can serve for generating data, when accompanied by participant observation. Several observers should be present, but it is crucial not to influence the natural occurrence of data by up-front power point presentations and by strictly moderating the exchange of ideas. Yet, if too many themes are proposed to be handled in the available time-frame, it is a good idea to have the topics weighted by the participants.

Interviewing and Open Space workshops were carried out consecutively. The sequence chosen resembled the Lead User Research process suggested by von Hippel, Churchill and

Sonnack (1999). The study team proposed an action plan and after having been commissioned with performing the task, learned in detail about ideas and visions of the awarding authority. At the same time, best practice in technology stimulation programmes, as perceived by the clients, was surveyed. Having completed this initial fact-finding stage and after having read a considerable amount of literature on the thematic field of expertise covered by the programme, top experts were interviewed. This generated leads for further interviews and helped considerably in developing a guideline for interviewing prospective participants. Focus was on gathering data on the expected funding regime and the strategic importance of the topic. The Open space workshop with experts, prospective proposers, the client and users of the technology, not only helped improve the programme concept, but – among other things – considerably enhanced the emergence of consortia and the trust of the client in study results. Drawbacks of the approach are discussed in the following section.

Lead User Research Process	**HiTec's Triple Helix Approach to Programme Design**
Stage 1: Project Planning	
• Develop Master-Plan • Learn about current marketplace	• Propose action plan • Learn about ideas and visions of the awarding authority • Best practice in technology stimulation programmes
Stage 2: Trends/Needs Identification	
• Interview top experts • Conduct literature searches • Select specific needs to focus on	• Interview top experts from GUI, • Generate leads for further interviews • Develop interview guide with issues to focus on
Stage 3: Preliminary Concept Generation	
• Interview lead users and experts • Gather data for business case • Define new product requirements • generate concepts	• Interview prospective participants • Gather data on expected funding regime • Have strategic importance of the topic judged by research groups
Stage 4: Final Concept Development	
• Invite to lead user workshop • Hold workshop – improve concepts with lead users/experts • Finalise concept	• Invite to Open Space workshop, phone experts • Hold workshop – improve programme concept with experts/prospective proposers • Finalise technology stimulation programme
Project Wrap-Up	
• Evaluate outcomes • plan next commercialisation steps	• Review results with client • see to timely launch

Table 1: Hitec's Triple Helix Approach to Programme Design

6 What are the limitations of the Triple Helix approach to programme design? – Systematic constraints and unintended loss of momentum

Like all models and concepts, the Triple Helix framework has its limitations. Some are systematic constraints, some are due to unintended interference of measures or inadequate implementation.

Of the latter, delayed implementation will spoil a considerable proportion of the merits of the approach. Belatedness may be due to budget constraints, changes in responsibility within the government or changes in government itself (both programmes designed saw three Federal Ministers already). It can even be time consuming to get a programme going once all high-level decisions have been made – simply because speed seems to be a non-issue in legal procedures. The loss of time makes some research ideas obsolete due to loss in competitive edge; other projects are discontinued because consortia disintegrate since research priorities changed. Thus most of the information on projective response to the programme turns obsolete.

In the case of satellite based value added navigation services we simply oversold the initiative in the eyes of some researchers and SMEs. This is because our first community building event took place two years ago and the start of the first funded projects is still pending. Open Space Technology with its strong bias for self-organisation and for immediate action clearly punishes the moderator if he has to withdraw helplessly when administrative routines delay the initiatives.

Secondly, evaluation criteria have not been adopted to the Triple Helix approach. Thus there is no generally accepted way of comparing the proposed programme design to other approaches.

In Austria, there are two programme evaluation criteria that have to be followed: leverage effect of the funds invested and the impact of the programme on the national R&D-quota; (this is an unsatisfactory situation for ambitious small scale programmes in a highly dynamic technological environment, where there even is competition between scientific paradigms). Both criteria are extremely difficult to track back to a single research programme and do not mirror Triple Helix goals like enhanced networking. Like many other criteria and models for allocating resources to research programmes (e.g. Kauffmann et al., 2000), they measure merely output, not knowledge, the core factor of production in the “knowledge based economy”.

Additionally you still have to show evaluators, that there is substantial market failure and that public spending will not interfere with market forces and intellectual property issues. This

requirement is frequently opposed to the goal of funding research that may be of relevance to enterprises and users. Surveying and matching research strategies of enterprises and academia turns more or less obsolete in such boundary conditions.

Even our partners in the ministry were not entitled to change this evaluation practice. An overview of alternative methods for the evaluation of research projects is available from Arnold and Balázs (1998, pp 33-34). Likewise “subjective“, narrative methods, like case studies, and user- (for a programme: participant-) surveys seem very appropriate to evaluate programmes in the Triple Helix. In any case one should, before starting the assessment of a technology transfer programme, see to involving all key stakeholders at the earliest stages, in what is to be assessed and why (Heslop and Fadaie, 2002).

A systematic constraint of the pure GUI approach has been solved in Triple Helix III (Etzkowitz, Leydesdorff, 2000, p. 111) and in the re-examination of the terms government, university, industry suggested by Larédo and Mustar (2001, p. 508). We share their perception that, for instance, research-agencies, non-university research institutes and SMEs should be included in the model. Even though, many naturally appearing institutions have the image of “grey” and are perceived as acting in a legally unclear space (Aigner et al., 2000, p. 179). We’d like to add another case in point: Business consultants are still systematically excluded, though they play an increasing role in counselling government and start-ups. Some even consider them a constituent of new approaches in Community Action Research (Senge and Scharmer, 2001).

Not intended by the model, but largely induced by the new organisational settings in the “knowledge-based economy” are conflicts of interest and unclear role perceptions. The main difference to the funding agency is, that its role changed from a regulating to a catalytic one (Benner and Sandström, 2000, p. 300). University institutes are more often than not swamped with expected speed and flexibility. For a more detailed compilation of the impact of roles and role-attributions see Aigner and Meinhard (2002, track 5 in this proceedings volume).

As far as the study team’s role and selling the Triple Helix approach is concerned, we incurred some argumentation problems (esp. when professionally organising large scale informal gatherings). We think this was not only so, because techniques used were new to auditors in public administration, but also because we are a small institution and have only recently established contracts with these governmental bodies. We cover some of the experiences we made when consulting to policy and, in doing so, relied on results of qualitative interviewing and informal data gathering mechanisms, in a reflective paper presented recently (Kurz, Aigner and Meinhard, 2002, publication by Sage pending).

7 How useful is it to take the Triple Helix approach when designing technology stimulation programmes? – Conclusion and outlook

When analysing usefulness from an efficiency viewpoint, the Triple Helix approach will be rated unfavourably, since time consumption is considerably higher than when a standard approach is chosen.

Taking the most popular evaluation criteria (leverage effect, impact on R&D quota, existence of substantial market failure) as an indicator for usefulness seems inappropriate since they do not mirror network enhancement and intended effects of the programme on the practice of performing research (collaborative, interdisciplinary). Still, public authorities expect that the the research programme designed will meet with administrative evaluation procedures. For the time being there are still high chances that the mainstream in technology policy assessment mainly looks for hard facts and impacts. Therefore all activities in the context of a more active participation of governments within the Triple Helix frame are easily considered irrelevant. This is especially true, when policy evaluation is done by economists with a dominant interest in quantitative data from official statistical sources. From this point of view, usefulness is rather limited.

Yet, all propositions about usefulness depend on the goals defined.

If faster learning and technology transfer is sought, the Triple Helix approach seems favourable for those organisation, which have sufficient learning capacity and intention. Some institutes stick to their routines, while others take the opportunity for boundary spanning, establish links to peripheral experts and are open to more radically new concepts. Research into this aspect is currently carried out by the Socrobust project (Laredo, Shove et al.: Http:www.lancs.ac.uk/users/scistud/shove.htm.

On the other hand we understand that most of what we value and see as highly relevant is considered folklore and even detrimental to the division of power between government and the recipients of research grants. One may hold that the approach is not useful, since it brings about role conflicts.

Enhancing community creation, networking and the formation of consortia is pragmatically speaking not the task of programme designers. Yet, if a strictly linear approach (design first, find consortia at a later point in time) is taken, the response will be hard to predict. The difference that it will make to the researchers is the following: their effort to find a rewarding research question and to build successful consortia will be considerably higher without a Triple Helix approach.

The methods described are capable of capturing emerging research issues. This might be of some relevance for wording the thematic focus, in order to adjust it where appropriate, and for finding research fields that could be covered in future calls

As for interviews and OST workshops we have been told, that participants see a clear advantage of an approach where bilateral interviews help them voice their emerging technology strategies and their input to programme design. They see a clear advantage of a focussed bottom up meeting – where they get feedback on the relevance of their idea. Some may still feel that meetings on a bilateral level are more efficient. Yet, the study team is well-advised not to support high-flying expectations regarding the influence the input will have on the design of the programme launched and on timelines promised.

The Triple Helix framework fosters joint preparation of research programmes on a (near) peer-to-peer level. Yet in the end governmental bodies often are bound by delays beyond their control. Governments are no enterprises. It remains to be seen whether a collaboration of these by-definition unequal partners will meet other community's intuitive expectations and role attributions. In the meanwhile it is always easy to punish the study team instead, if they helplessly withdraw when administrative routines delay all initiatives.

Bibliography

Aigner, W, Meinhard, D (2002): New and emerging good practice of regional innovation clusters to university-industry and university-government interaction. Reflections on findings from good-practice-cases documented for European Space Research and Technology Centre (ESTEC). 4th Triple Helix Conference; Copenhagen 2002; Track 11.Triple Helix and regional innovation clusters.

Aigner, W, Meinhard, D, Berndorfer, J (2002): How role perception and role attribution hinder successful university-industry and university-government interaction in cooperative research and development projects. 4th Triple Helix Conference; Copenhagen 2002; Track 5. Rethinking the role of professions in knowledge society.

Aigner, Walter; Flynn, Diane; Hasenauer, Rainer; Meinhard, Dieter; Mercer, David; Russell, Peter (2000): *Institutional Framework Requirements For Effective Distributed Innovation Systems In European Space Research*. In: Harris, R.A.; Raitt, David: Academic and Industrial Cooperation in Space Research – Conference Proceedings, Graz, pp. 175-182.

Arnold, Erik; Balázs, Katalin (1998): *Methods in the Evaluation of Publicly Funded Basic Research*. Technopolis Ltd., Brighton.

Arnold, Erik; Boekholt, Patries; Keen, Patrick (1995): *Good Ideas in Programme Management for Research and Technological Development Programmes.* A Report to the VALUE Programme. Technolpolis, Brighton.

Arnold, Erik; Whitelegg, Catherine; Thuriaux, Ben (1999): *Research 2000 or Research 1950?*. Technopolis Ltd., Brighton.

Begg, Iain; Fagerberg, Jan; Guerrieri, Paolo (1999): *Conclusions and Policy Implications*. In: Fagerberg, Jan; Guerrieri, Paolo; Verspagen, Bart: *The Economic Challenge for Europe: Adapting to Innovation Based Growth*. Edward Elgar Publishing, Cheltenham.

Belleval, Christophe (2002): *Faster Conception of Radically Innovative Systems: The Strategic and Organizational Challenge for Space Agencies*. Space Policy 18, pp. 215-219.

Benner, Mats; Sandström, Ulf (2000): *Institutionalizing the Triple Helix: Research Funding and Norms in the Academic System*. Research Policy 29, pp. 291-301.

Chopyak, Jill; Levesque, Peter (2002): *Public Participation in Science and Technology Decision Making: Trends for the Future*. Technology in Society 24, pp. 155-166.

Commission of the European Communities (2002): *Commission Staff Working Paper – Benchmarking National RTD Policies: First Results*. Brussels, 31.01.2002.

De la Mothe, John (1999): *Building Capacity and Setting Priorities in National Science and Technology*. Prometheus 17 (4), pp. 373-386.

Eden, Colin; Ackermann, Fran (1998): *Making Strategy*. Sage Publications, London.

Etzkowitz, Henry; Leydesdorff, Loet (2000): *The Dynamics of Innovation: From National Systems and "Mode 2" to a Triple Helix of University-Industry-Government Relations*. Research Policy 29, pp. 109-123.

European Commission (1996): *Action Plan for Innovation in Europe.*

Fagerberg, Jan; Guerrieri, Paolo; Verspagen, Bart (1999): *The Economic Challenge for Europe: Adapting to Innovation Based Growth*. Edward Elgar Publishing, Cheltenham.

Guy, Ken; Clark, John; Balazs, Katalin; Stroyan, James; Arnold Erik (1998): *Strategic Options for the Evaluation of the R&D Programmes of the European Union*. Technopolis Ltd., Brighton.

Herman, Michael: *Open Space Technology*. Worldwide Open Space: http://www.openspaceworld.org/

Heslop, Louise A.; Fadaie, Kian (2002): *The 3 Bs of Impact Assessment of Technology Transfer Programs: Rationale, Technique and a Case Example from the Canada Centre of Remote Sensing*. International Journal of Technology Transfer & Commercialisation 1 (3), pp. 217-248.

Hippel, Eric; Churchill, Joan; Sonnack, Mary (1999): *Lead User Methodology – Breakthrough Products and Services with Lead Users*. Oxford University Press, Oxford.

Jankowski, John E. (1999): *Trends in Academic Research Spending, Alliances, and Commercialization*. Journal of Technology Transfer 24, pp. 55-68.

Jolly, Vijay K. (1997): *Commercializing New Technologies*. Havard Business School Press, Boston.

Kauffmann, Paul; Unal, Resit; Fernandez, Abel; Keating, Charles (2000*): A Model for Allocating Resources to Research Programs by Evaluating Technical Importance and Research Productivity*. Engineering Management Journal 12 (1), pp. 5-8.

Kurz, Andrea; Aigner, Walter; Meinhard, Dieter (2002): *Presenting Results of qualitative research to public research administration bodies*. Proceedings of the first

QUAL_RCAT_Workshop, Vienna, 8 – 11 April 2002. Publication with Sage, London pending.

Kuhlmann, Stefan (2001): *Future Governance of Innovation Policy in Europe – Three Scenarios*. Research Policy 30, pp. 953-976.

Larédo, Philippe (1997): *Technological Programs in the European Union*. In: Etzkowitz, Henry; Leydesdorff, Loet: Universities and the Global Knowledge Economy. A Triple Helix of University-Industry-Government Relations. Pinter. London.

Larédo, Philippe; Mustar, Philippe (2001): *General Conclusion: Three Major Trends in Research and Innovation Policies*. In: Larédo, Philippe; Mustar, Philippe: Research and Innovation Policies in the New Global Economy. Edward Elgar Publishing, Cheltenham, pp. 497-509.

Larédo, Philippe; Shove, Elizabeth et al.: *The SOCOROBUST – project*. http://www.lancs.ac.uk/users/scistud/shove.htm.

Lehrer, Mark (2000): *Has Germany Finally Fixed Its High-Tech Problem?*. California Management Review 42 (4), pp. 89-107.

Levin, Morten; Greenwood, Davydd (2001): *Pragmatic Action Research and the Struggle to Transform Universities into Learning Communities*. In: Reason, Peter; Bradbury, Hilary: Handbook of Action Research. Sage Publications, London, pp. 103-113.

Lomas, Jonathan (2000): Connecting Research and Policy. Isuma: Canadian Journal of Policy Research 1 (1), pp. 140–144.

Marceau, Jane (2002): *Divining Directions for Development: A Cooperative Industry-Government-Public Sector Research Approach to Establishing R&D Priorities*. R&D Management 32 (3), pp. 209-221.

Meinhard, Dieter, Aigner, Walter (2002): Innovation problem solving in different Triple Helix contexts. The Triple Helix Conference, Kopenhagen.

Owen, Harrison (1997): *Open Space Technology – A User's Guide*. Berrett-Koehler Publishers, San Francisco.

Peeters, Walter (2002): *Effects of Commercialisation in the European Space Sector*. Space Policy 18, pp. 199-204.

Peneder, Michael (1999): *The Austrian Paradox: "Old" Structures but High Performance?*. Austrian Economic Quarterly, 4/1999, pp. 239-247.

Poole, Graham R.; Moore, Roger (2002): *A Theoretical Model of Commercialisation*. International Journal of Technology Transfer & Commercialisation 1 (1,2), pp. 201-215.

Rat für Forschung und Technologieentwicklung (2001): *Forschungsstrategie Austria "2,5% + plus" - Wohlstand durch Forschung und Innovation*. Wien.

Reason, Peter; Bradbury, Hilary (2001): *Handbook of Action Research*. Sage Publications, London.

Roessner, J. David; Porter, Alan L.; Newman, Nils: Cauffiel, David (1996): *Anticipating the Future High-Tech Competitiveness of Nations: Indicators for Twenty-Eight Countries*. Technological Forecasting and Social Change 51, pp. 133-149.

Rycroft, Robert. W; Kash, Don E. (1999): *The Complexity Challenge – Technological Innovation for the 21st Century*. Printer, London.

Seely-Brown, John; Duguid Paul (2000): *The Social Life of Information*. Harvard Business School Press, Boston.

Senge, Peter; Scharmer, Otto (2001): *Community Action Research: Learning as a Community of Practitioners, Consultants and Researchers*. In: Reason, Peter; Bradbury, Hilary: Handbook of Action Research. Sage Publications, London, pp. 239-249.

Silverman, David (2001): *Interpreting Qualitative Data*. 2nd Edition, Sage, London.

Thomke, Stefan; Nimgade, Ashok (1998): *Note on Lead User Research*. Harvard Business School Note: 9-699-014.

Tichy, Gunter (2000): *The Innovation Potential and Thematic Leadership of Austrian Industries*. Institut für Technikfolgenabschätzung (ITA), Wien.