Project n°: CIT5-028519

Project acronym: U-Know

Project title: Understanding the Relationship between Knowledge and Competitiveness in the Enlarging European Union

Instrument: Specific Targeted Research Project (STREP)

Thematic Priority: CITIZENS-2004-1.2.2 Understanding knowledge

SECOND PERIODIC ACTIVITY REPORT (12 MONTHS)

Period covered: from 1 March 2007 to 29 February 2008

Date of preparation: 27 May 2008 **Duration:** 12 months

Project coordinator name: Johannes Stephan

Project coordinator organisation name: Halle Institute for Economic Research (IWH)

Revision: First draft

Contents

PART 1 – PROJECT OBJECTIVES AND MAJOR ACHIEVEMENTS DURING THE FIRST AND SECOND YEAR

PREPARATORY SECTION PARADIGMS, KNOWLEDGE CONCEPTS, AND THE NETWORK ALIGNMENT APPROACH (MARCH 06)

Objectives

With respect to the analytical framework for the project, the first objective is to map the variety of existing knowledge concepts and their underlying rationalities, as well as their limitations and potential impacts on policy making. It is demonstrated how the 'network alignment' approach can be applied as a tool to understand 'knowledge' in its varieties across the enlarging EU in a context of its growing complexity. With respect to the management of the project, the objective is to proactively target the academic community.

Objectives for the 1-st reporting period and achievements

The primary objective was to provide all researchers with a common intellectual starting point to enter into collaborative research (D1). This task was achieved by the researchers from CEE (represented by Dietmar Paier), SPRU (represented by Nick von Tunzelmann), and NIFU-STEP (represented by Mark Knell) by preparing outline papers and presentations for the theoretical framework that forms the philosophical basis of the U-Know project. Those were presented and discussed at the first project kick-off meeting. At this meeting, the workpackage leaders coordinated working sessions on cooperation and common research methods, all couched into the instrument of the TORs. Following the discussion of the presentations of the theoretical framework, Dietmar Paier coordinated the finalisation of those outline papers (D2).

SECTION 1 INNOVATION AND TECHNOLOGICAL CHANGE IN THE FIRM (APRIL 06 – FEBRUARY 08)

Objectives

In the enterprise sphere, the first objective is to increase our understanding of the relative impact of internal and external determinants on knowledge creation in the enterprise sphere and the effects of knowledge creation on firms' competitiveness. Knowledge creation is here exemplified by the innovation process at the firm level and represents the interface between firms' own creativity, their contacts with externally structured networks, and their 'absorptive capacity'. The factors underlying this innovation processes are scope, intensity, and knowledge content/character and are mapped from a sectoral as well as country perspective as a prologue to the differentiation of networks. The second objective in the enterprise sphere is to generate a better understanding of mechanisms/channels, determinants, and intensities of knowledge flows between firms. Knowledge flows are exemplified through international transfer of knowledge and technology via foreign direct investment (FDI). Particular emphasis is placed on FDI-activity involving new member states as confronting hierarchical power relationships with embedded networks. Research linked to the first and second objective contributes towards policy development at the cross roads of national/regional FDI, R&D, and innovation policy. The third objective in this sphere aims to establish, how market structures are determined by market-specific knowledge processes, and in particular, what market structures are typically found in knowledge-intensive product markets. This provides the necessary information to discuss the political implications of interventions with a view on social gains and losses from oligopolistic / monopolistic market structures.

Objectives for the 1-st reporting period and achievements

The most important objectives for the first year included (i) to browse the available empirical and theoretical literature on the functioning and organisation of knowledge

creation at the level of the firm to develop the state-of-the-art reports, and (ii) to determine in the TORs how best to organise the planned empirical research. The TORs for the deliverables D4, D7, D10, and D11 and their respective sub-units were developed and then presented and discussed at the kick-off meeting in Halle. Following this discussion, the terms of cooperation were agreed upon and the complete TORs readily delivered (see Annex 1 to this activity report). The participants and researchers involved in this section of the project included the IWH, the IER, NIFUSTEP, SPRU, UoT, GEA, BC, and since January 2007 also the new partners HSRC and UCT. The development of state-of-the-art reports was coordinated by the workpackage leaders (Mark Knell for WP 1.1, Boris Majcen for WP 1.2, and Ulrich Blum for WP 1.3) and the reports were finalised on time (D4a&D7a, D10a). In the case of WP 1.1 (on innovation) and WP 1.2 (on technology transfer) the reports were amalgamated. This follows the suggestion in the discussion that the project's particular focus on foreign ownership in those two fields justifies a combined states-of-the-art report that avoids redundancies. Both researchers from IER and from NIFU-STEP (Matija Rojec and Mark Knell) assumed collective responsibility for editing this combined report. WP 1.3 has developed its own separate state-of-the-art report, and the researchers from IWH (Johannes Stephan) and GEA (Dragos Pislaru) assumed collective responsibility for this report. Additional research effort in this section led to further papers and reports dealing with particular issues that the researchers have been working on for U-Know (D4a2, D4f, D7d, D7e, D10b).

The first objective of section one is concerned with the innovation process at the firm level. This research is implemented by workpackage 1.1 under the guidance of M. Knell (NIFU-Step). The participant IER implemented research addressing the question of innovation determinants (D04b) and the impact of innovation on firms' performance (D04d) in an integrated approach using firm level data for Slovenia. Participant in NIFU-Step focuses on the link between innovation and firms' productivity growth (D4d) using firm level data from the Czech Republic. The partners HSRC and UCT jointly implemented research on the determinants in firms' innovation activity in South Africa (D4TTC_1b/1b). Participant HSRC implemented the research on absorptive capacities and technological trajectories (D4TTC_2a) as well as the origin and nature of external sources of knowledge (D4TTC_2b). The participant IWH implemented the research at the firm-level of analysis looking specifically at relation between human capital and innovation by using a German firm level data set (D04f). In a related contribution, the participant NIFU-Step looks at the determinants innovation collaboration between firms and other organizations innovation within a cross-section of thirteen countries (D04b). Whereas participant UoT analyses the character of knowledge in external/internal sources used in the innovations process of firms. Apart from the determinants of innovation and the impact of innovation on firm performance, the workpackages also looked into sectoral differences in the innovation process. Here, the participant UoT analysed whether the firms' propensity to collaborate and/or innovate differs across manufacturing industries in Estonia. In addition, the participant UoT scrutinised the role of high-tech industries in enhancing innovativeness of resource-based industries at the example of the wood industry in Estonia (D4e).

The second objective of section one deals with international transfer of knowledge and technology via foreign direct investment (FDI). This research has been conducted in the framework of workpackage 1.2 led by M. Rojec (IER). Participant

IER scrutinised the effect of foreign ownership on firms' ability to innovate in sample of Slovenian firms (D7b). The same research team analysed the incidenc of horizontal and backward spillovers from FDI using the most comprehensive firm level panel data set available for transition economies (D07c). Furthermore, the participants IER, GEA, and IER implemented a survey of foreign subsidiaries in Slovenia, Croatia, Romania, Poland, and East Germany. This created a unique database of about 730 interviews with foreign subsidiaries across the five countries with a particular focus on the organization of R&D and innovation related processes. This forms the basis for subsequent analytical work employing individual country datasets or the full cross-country dataset. In terms of analytical work researchers from the participant IWH delivered contributions that scrutinised the relationship between foreign subsidiary heterogeneity, technological capability, as well as linkages to the regional innovation system at the example of the East German dataset (D07e). Furthermore, the participant used the cross-country database in order to look at the role of absorptive capacity (D7f) as well as the role of IPR (D7g) in technology transfer. Researchers from IER and IWH jointly drafted a paper (D8) that addressed to which extent existing policy measures are appropriate in order to maximise technological diffusion and spillovers effects from FDI in host economies. Finally the workpackage team decided to organise the policy briefing (D9) on foreign direct investment and innovation systems on two separate occasions. The first occasion was a presentation of micro evidence from the survey of foreign subsidiaries in East Germany at the investment promotion agency "Invest in Germany (IIG)" and selected participants from the Federal Ministry of Economics and Technology as well as the Federal Ministry of Transport, Building and Urban Affairs in March 2008. The second occasion is going to be a workshop involving policy makers, Invest in Germany (IIG), foreign enterprises, the academic community in November 2008.

The third objective of section one is concerned with the relationship between market structures and knowledge intensity. During the second year the participants IWH and GEA continued their research efforts to inquiring how market structures differ in particularly knowledge-intensive product markets and how much of the observed structural differences are rooted in the specific properties of knowledge involved. Prior work was further refined by econometric analysis using industry data from eight European countries (see D10b). The authors of the study attempted: (a) to econometrically determine the shape of the relationship between market structure and knowledge intensity as knowledge intensity gradually increases; (b) to find out whether the result of the descriptive analysis hold controlling for other determinants of market structure; and (c) to scrutinize what influence public or private knowledge characteristics have on the relationship. The participant UoT conducted a further study of IPR regimes in an innovation-based economy. The authors consider the opposite effect of IPRs on market structure, i.e. increasing concentration or reducing competition, by way of patent blocking. A conceptional paper addresses the economic value and legal implications of IPRs as well as firms' infrastructural requirements and the role of entrepreneurial universities with regard to IPRs (D10c1). This conceptional paper was complemented by a case study of Estonian biotech spin-offs (D10c2). The partner GEA started to work on an analysis linking the issue of foreign direct investment to market concentration and thereby established an interesting link between the work conducted in WP1.2 and WP1.3. Finally the participants IWH and GEA reviewed the implications of these results for competition

policy. In particular, the authors raised the question as to how competition policy should treat concentration and cooperation between firms in knowledge-intensive sectors (D11). During the final year, the participant SPRU is going to finalise the work on the evolving relationship between knowledge-intensive industries and user industries in Europe (D10d). In addition, the participant GEA plans a policy-briefing of the results generated in this workpackage (D12) with Romanian Competition Council for May 2008.

SECTION 2 LEARNING, HUMAN CAPITAL FORMATION, AND GOVERNMENT (APRIL 06 – FEBRUARY 08)

Objectives

In the education sphere, the first objective is to increase our understanding of the link between the public funded science systems and industry, and to develop a characterisation of such a link in a knowledge based society. Hereby, the EU may learn from the South African experience with special reference to the newly acceding countries. Further on, SA expects to gain inside of their own experience by analyzing the situation from a different perspective. The second objective in this sphere is to explore the supply of entrepreneurial education and other specific skills in selected European higher education institutions, as well as the demand for entrepreneurial skills in the industry of selected European countries. The final objective of this section relates to the government sphere. The aim is to assess the interrelatedness of policy making in the fields of research, education, and innovation, with different understandings of what knowledge is and how knowledge is functioning in economies.

Objectives for the 1-st reporting period and achievements

The most important objectives for **the first year** included (i) the development of state-of-the-art reports, and (ii) to develop and agree upon the TORs for deliverables and sub-units of deliverables. The TORs for the deliverables D13, D14, D15, D16, D17, D18, D19 and D20 and their respective sub-units were presented and discussed at the kick-off meeting in Halle. Following this discussion, the terms of cooperation were agreed upon and the complete TORs readily delivered (see Annex 1 to this activity report). The participants and researchers involved in this included NIFU-STEP, SPRU, the IWH, GEA, UoT, and since January 2007 also the new partners HSRC, UCT, CSIR, and PGWC. The development of state-of-the-art reports was coordinated by the workpackage leaders (Antje Klitkou for WP 2.1 and Olaf Spilling for WP 2.2) and the reports were finalised on time (D13a, D16a). There is no state-of-the-art report for WP 2.3, because this WP involves largely a policy-advising efforts which are already very well detailed in the “Description of Work”. In this section, WPs 2.1 and 2.2 both developed their own separate state-of-the-art report. For both reports, researchers from NIFU-STEP were responsible coordinators and edited those reports and in this case, own explorative research was conducted by the respective research (Antje Klitkou and Olaf Spilling) with the active contribution by researchers involved in these WPs. Additional research effort in this section led to further papers and reports dealing with particular issues that the researchers have been working on for U-Know (D13d, D16b).

Objectives for the 2-nd reporting period and achievements

During the **second project year,** the research objectives of section two have been by and large implemented. The first objective of this section aims at increasing our understanding of the link between the public funded science systems and industry and has been implemented in the framework of workpackage 2.1. Here**,** the

participants NIFU-Step and SPRU finalised the work on a meta-analysis of co-authorship and co-inventorship between science and industry (D13b) across countries, sectors, science and technology fields, and over time. Similarly, the partner HRSC assessed to which extent public universities a resource for innovation in South Africa (D13TTC3a). Whereas the prior two contribution looked at the outcomes of science industry linkages, participants NIFU-Step and SPRU implemented the research on funding and organisational conditions of the science industry linkages (D13c) in a cross-country comparative research setting exploiting existing and new evidence. In addition the partner NIFU-Step and IWH paid particular attention to the impact of patenting and IPR regulation at European universities (D13d) on the knowledge diffusion in the science-industry context. Again, this research has been complemented with work by HSRC on conditions for sustaining competitive university spin-off firms in the ICT sub-sector in South Africa (D13_TTC3b). Finally, the partner NIFU-Step prepared a draft paper on the policy implications from evidence on funding, organisational conditions, and characteristics of research outcomes of the science industry link in selected EU countries (D14). It was presented and discussed at the project workshop in Oslo (Jan 08). After consultation with the project coordinator the workpackage leader A. Klitkou (NIFU-Step) suggested to organise the policy briefing (D15) during the final project year.

Second objective of section two addresses the issue of entrepreneurial education selected European countries and has been implemented in workpackage 2.2 led by O. Spilling (NIFU-Step). Here, the participants NIFU-Step, GEA, IER, IWH and UoT contributed to a very comprehensive survey on the provision of entrepreneurship education in Norway, Germany, Romania, Estonia as well as Slovenia (D16d). This approach facilitated a comparative analysis across more advanced and catch-up economies from Europe. While D16d analysed the supply side of entrepreneurial education and related programs, the participant GEA and NIFU-Step look at the 'demand side' i.e. the need for entrepreneurial education by focusing the relative performance of the entrepreneurial function Norway, Germany, Romania, Estonia as well as Slovenia (D16e). In the final sub-deliverable (D17) the participant GEA and NIFU-Step assess the appropriateness of current policy approaches in the field of entrepreneurial education against the background of evidence that emerged from the work in this workpackage so far. The policy analysis is conducted at the level of the European Union as well as in Romania and Norway as national level case studies contrasting an advanced and post-transition country. The workpackage leader has organised two events in order to implement the policy briefing exercise in this workpackage (D18). The first will take place in a meeting with representatives with the Norwegian Ministry of Education, and the second is going to be an open entrepreneurship education conference at a later stage in 2008.

The final objective of section two is concerned the relationship between belief systems, perceptions of knowledge, and innovation policy at the national and European level. This issue is at the heart of workpackage 2.3 under the joint leadership of P. Koch (Norwegian Research Council) and M. Knell (NIFU-Step). The partner NIFU-Step organised in cooperation with the Norwegian Research Council a European open workshop on policy learning and public private partnerships (D20) in February 2008. On the conceptional side, the workshop reviewed approaches taken in prior large scale research projects and corresponding evidence of policy learning instruments. These conceptional and analytical insights were contrasted with firsthand experience by representatives in charge with national level R&D and

innovation policy design and implementation. The contribution (D19_TTC 4) of the South African partners to this workpackage reflected on the idea of the learning economy in a catch-up situation, described how the learning economy informed policy and strategy, and analysed the extent to which implementation followed policy and strategy. The researchers assessed network (mis)alignments across the three domains of ideas, policy, and implementation as well as across different levels of governance. In particular, the participant HSRC traced the way in which the concepts of 'knowledge' and the 'learning economy' have been represented in South African policy across a wide array of cross-departmental policy and looked at the implementation of these policies (D19TTC_04a). The partner CSIR focused on the alignment of the science councils and the private sector to national technology missions and R&D strategies (TTC_04b). Further the participant UCT focused on the question of institutional network alignment between the public sector and the private sector in the context of formulating and implementing industrial policy at the regional level at the example of the Micro Economic Development Strategy (MEDS) for the Western Cape province in South Africa (D19TTC_04c). The final contribution (D19TTC_04d) under the authorship of partner CSIR focused on an evolving set of policy interventions aimed at improving the technology transfer activity of South African public research organisation.

SECTION 3 RELATIONSHIP BETWEEN INSTITUTIONAL ARRANGEMENTS AND ORGANISATIONAL CONDITIONS FOR KNOWLEDGE GENERATION (DECEMBER 06 – FEBRUARY 09)

Objectives

The first objective focuses on the societal fabric required to match demand for and supply of human capital and skills in the evolving knowledge based society. The research draws on the analyses of the changing combinations of skills required for the continued expansion of knowledge-intensive processes and products in modern society. This bears implications in particular for policy learning and specific forms of network governance. The second objective is to examine the form and function of intellectual property rights regime in terms of their role to support the knowledge process. This serves to consolidate and augment our current knowledge of the changing IPR systems and the implications for the knowledge-based society.

The third objective is to develop our understanding of the impacts of socio-cultural attitudes and non-economic motivations on the knowledge process and how these impacts differ for different knowledge characteristics. The fourth objective is to analyse network alignment in innovation systems to institute new forms of interaction between the different agents of knowledge creation, production and diffusion to harness latent knowledge-based capabilities. Particular attention is going to be paid to the reconstruction of 'regional' and 'national systems of innovation' in CEE countries as well as South Africa. The final objective is to conclude all policy-relevant results generated in the project to contribute to the development of knowledge- and innovation policy for building the advancement of the knowledge based society.

Objectives for the 1-st reporting period and achievements

The intention of section 3 of the project is to synthesize the research results generated in sections 1 and 2. This implies that WPs of section 3 draw on research output of sections 1 and 2 after having reached a sufficient level of finalization. However, two WPs (3.3 and 3.4) of section 3 already started in month 10. Both involve some own additional empirical analyses. Therefore, the here the objectives for the **first year** were the development of common research methods at the meeting

in Brighton. The meeting for WP 3.3 was conducted under the responsibility of UTN and Dietmar Paier of CEE compiled the report for this meeting. It included the researchers of CEE (Dietmar Paier), IWH (Jutta Günther and Cornelia Lang), UTN (Matteo Ploner and Stefano Comino). The results of their discussions is compiled into a report (D27). The meeting for WP 3.4 was conducted under the responsibility of SPRU (Nick von Tunzelmann) and included the researchers of SPRU, CEE, IWH, IER, UTN, and the representative of our new partner HSRC Jo Lorentzen (who participated without funding, because the contract was not yet signed).

Objectives for the 2-nd reporting period and achievements

During the second year, the implementation of research objectives of section three progressed substantially. The first objective of section three focuses on the demand for and supply of human capital as well as the appropriateness of existing governance mechanisms. This objective is implemented by workpackage 3.1. Here, the participant SPRU prepared a review of EU-wide and British experiences in the job-matching area (21a). This was complemented with a case study on the matching of supply and demand of labour in Hungary (21a). The study focuses on graduates with tertiary education as a specific segment of the labour market that is highly important to the knowledge economy. It is envisaged that this work is going to be completed during the final year, by including a similar case-study for Romania (GEA) and corresponding evidence on the extent of job-matching on the Norwegian labour market based on prior work in WP 2.2 (participant NIFU-Step).

The second objective of section three examines the form and function of intellectual property rights regime in terms of their role to support the knowledge process. This workpackage started in November 2007. The workpackage leader Birgitte Andersen (BC) prepared two contributions as part of the explorative analysis of the form and function of IPR regimes in normative and empirical terms (D24b). Furthermore, she coordinated the collaboration amongst the participants in order to implement the survey the changing relationship between IPR regimes and the underlying institutional arrangements for knowledge creation and utilization (D24c) in this workpackage during the fourth project workshop in Asker/Oslo (Norway) in February 2008. This will be followed by a second meeting in London.

The third objective is to develop our understanding of the impacts of non-economic motivations and socio-cultural attitudes on the knowledge process. This research is operationalized through workpackage 3.3 under the leadership of D. Paier (CEE). Within this workpackage the participant UTN is dealt with the issue of non-economic motivations. The participant finalised a summary on state-of-the-art in researching on non-economic motivations and the knowledge process (D28a). In subsequent work the partner UTN focused on non-economic motivations and the knowledge process by employing empirical evidence from controlled experiments (D28b). Complementary to this the participant UTN looked at survey evidence a survey of social cooperatives in the Italian no-profit sector in order to analyse non-economic motivations and the knowledge process (D28c). Finally, the interrelationship between policy making and non-economic motivations (D28d) was considered at the example of open source projects. The participant plans to organise a meeting to present findings of the research to directors of non-profit organizations (D29) during the final year of the project. With regard to the role of social-cultural attitudes in the knowledge process, In spring 2007, the participant CEE provided a conceptual outline on science-industry links (D30a) and a matrix for the document analysis on the perception of science-industry links in national policy papers (D30d). Based on this, the partners CEE, IWH, NIFU-Step, and IER carried out a corresponding

analysis of selected policy documents. The interim results of this cross country analysis were presented at the Ljubljana meeting in September 2007. At this meeting, the partners agreed on the following working steps necessary to implement the fieldwork study on the mutual perceptions of science and industry (30b, 30c) from February 2008 onwards.

The fourth objective of section three is the analysis of network alignment in innovation systems and encapsulated in workpackage 3.4 under the leadership of N. Von Tunzelmann (SPRU). The participant (CEE) produced a paper on network analysis methodology (D33b) which serves as starting point for the subsequent implementation of the research looking at knowledge characteristic in networks (33c). In addition, participant SPRU in cooperation with UoT finalised a contribution (35c) that indicates the main directions of the development of national innovation systems in the new EU member-states as catch-up economies emerging from a period of systemic change.