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Innovation Landscapes

A study on innovation approaches in three selected EU member States

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A. EXECUTIVE SUMMARY

This paper is a result of a four and a half month study on innovation approaches in three selected Member States in relation to the EU level. Due to time constraints the paper concentrates only on three well classified Member States in the latest EU Innovation Scoreboard: Germany, Finland and the UK[1].

Boosting innovation is one of the cornerstones of the EU2020 strategy for growth and employment adopted by the European Council. "Innovation Union" is indeed the first flagship initiative mentioned in the EU2020 document. In this framework, national innovation policies play a key role to attain EU2020 and Innovation Union goals. Therefore, the purpose of this paper was to collect, describe, analyze and compare the national innovation schemes and policies of these countries according to the innovation cycle, from policy definition to work programmes and then from project level to exploitation. . The aim was also to detect similarities, links or divergences between national and European innovation policies, measures and instruments, and to draw conclusions on it for future initiatives at the EU level.

The Innovation Union Communication sets out a number of practical tools to enhance innovation (e.g. standardisation, knowledge transfer, SME specific measures) but till now no analysis of the national policy measures has been made. This fact triggered the need and curiosity to compare the national with the supranational level regarding innovation.

An impressive number of actions have been detected in the analysed countries for each step in the innovation process. The outcome is that several policy instruments are similar. Differences can be found in the amount of resources, or in the innovation environment/structure and in how effectively policy measures are used and reshaped. Since the majority of these actions have been initiated in the past couple of years, it is difficult to assess the efficiency of these actions yet, apart in Finland, a country characterised by a strong evidence-based decision-making, from forward-looking studies to evaluation.

The factual information is retrieved and complied from public sources, web sites and official documents.

STRATEGY LEVEL

1. Forward looking activities

Decision-makers, both in public and private sectors, are more and more interested by foresight studies. Public administrations tend to consider forward-looking activities as a governance tool, in particular in the areas of science, technology and innovation (Borup, 2003; Saritas, 2007). In that sense, several Member States have established foresight institutions, and even at the EU level there are attempts to develop forward-looking activities. For instance, the Swedish Presidency of the European Union proposed to the Council to include in its conclusions an invitation for the Member States and the Commission to implement foresight activities (European Commission, 2009) and a "European Forum on Forward-Looking Activities" is now being constituted. What follows shows forward-looking initiatives related to innovation in the three reference countries.

[1] See http://ec.europa.eu/enterprise/policies/innovation/facts-figures-analysis/innovation-scoreboard/index_en.htm online.

Innovation was always the driving force behind the label "Made in Germany".[2] The **German High-Tech Strategy** was the first policy measure developed involving all relevant stakeholders in the research and innovation sector: Federal Government, Federal Länder, Foundations, Industry and the Science Council. Its integrated approach allows coordinating better the R&I actions. Thus, it is not surprising that the High-Tech strategy has become a reference at EU level. The Federal Government wishes to extend the successful approach of the High-Tech Strategy to the rest of Europe as set out in its paper.[3] This is not seen as a one-way street; it is about working together to develop consistent innovation policy approaches and to interlink their programmes with those of European partners. The driving role of Germany to define EU-strategies in the area of industrial technologies is underlined also in the Ex-Post Evaluation of FP6 at Strategic Level (Oxford Research and KMFA, 2010).

Great emphasis is put in the High-Tech Strategy on knowledge and technology transfer from science to industry, which means the exploitation side of the innovation cycle with a stronger focus on the commercialisation of results. This is in fact also similar to the strategy of UK's innovation agency, Concept to Commercialisation, building on the innovation landscape in the UK.

Also the drafting of the **UK's Ten-Year Science and Innovation Investment Framework 2004-2014** was similar to Germany's High-Tech Strategy concerning the involvement of all relevant stakeholders in its development. The White Paper **Innovation Nation** already before the publishing of the EC Communication Innovation Union from 2010 set out the strategy of the Department for Innovation, Universities & Skills and that of the UK's Government regarding innovation.

In Finland there is a strong tradition concerning foresight studies, which are strongly linked with decision-making, both in public and private sectors. The **Finnish National Foresight Network** is an inter-ministerial forum for cooperation and exchange of information established under the Prime Minister's Office. Member of this thematically structured network are both experts form the public and private sector. The most important input to the national policy elaboration is the "strategic policy reviews", drawn up by the Research and Innovation Council. The latest policy developments are the **Research and Innovation Policy Guidelines 2011-2015.** With the suggestive title "Finland in an open world" the national strategy intends to tackle the low level of internalisation of the innovation system. The priority actions formulated in the guidelines are similar to the ones developed on the European level to foster innovation: focus on human resources, high-quality knowledge, the efficient transfer of knowledge and its exploitation and commercialisation.
Moreover, there is an entire chapter assigned to the EU and Finland's role regarding innovation as follows: "Finland takes the initiative in reforming the EU's research and innovation policy. Structures that support participation must be strengthened. [...] The flexibility of the EU programmes to changes in the operating environment and response to business needs must be improved. This will increase the participation of companies in EU cooperation and link Finnish research and technology programmes more closely to EU-level programmes" (Research and Innovation Policy Council, 2010, p.8).

Linking domestic programmes to EU research and development programmes should be made easier, according to the guidelines. Further on, research and innovation funded by the EU "should always aim to create European added value". From Finland's perspective, cooperation in education, research and innovation within the Nordic and entire Baltic area needs to be significantly strengthened, and especially in a way that would also promote

[2] See Speech given by Prof. Dr. Reinhard Bettzüge, Ambassador of the Federal Government of Germany to the Kingdom of Belgium on Germany's Research and Innovation Policy, Ambassadors' Lecture Series, University of Leuven, 24 February 2011, p. 9.
[3] See http://www.bmbf.de/pub/hts_2020_en.pdf online.

broader cooperation at the EU and global level. Thus, the message is more multilateral cooperation between different parties. As to that, Finland sees itself already in innovation partnership with the EU.

The priority areas are similar in all foresight programmes. These are the main topics addressed also at EU level: energy-efficient city, personalised medicine, electric mobility, intelligent communication systems, well-being and health, global food etc.

In all three countries the foresight activities to anticipate technology and market needs are built through dialogue between main stakeholders (state, university and industry).

2. Regional research and cluster of excellence initiatives

Sub-national levels have also a key role to play to strength European innovation. Creating external economies of scale, following the example of Silicon Valley, is at the core of several regional and local initiatives, as well as clustering policies.

In that sense, the **Excellence Initiative** as well as the **Top Cluster Competition** are local and regional innovative measures in the German research and innovation landscape. They opened a debate on elitism, a phenomenon that was to challenge a certain historically conditioned German tradition. A good example of how this initiative has a practical impact is to be found in the city of Karlsruhe. Karlsruhe's central and winning idea in the competition to become a university of excellence was the merger of its renowned university with the research institute, which is part of the Helmholtz-Association. Together, they have formed the Karlsruhe Institute of Technology (KIT). It is a unique merger between university and research, between education and innovation.[4]

The **BMBF Innovation Initiative "Entrepreneurial Regions**" aims at contributing to develop internationally competitive centres of excellence in Eastern German Regions. It helps them to target their research activities towards high-tech markets and enable successful transfer of research results into industry in order to promote process and product innovation. The idea is to prepare their smart specialisation into "Regions of Knowledge". However, this measure was seen in Germany as less successful.

The regional dimension of innovation policy is covered in **Finland** through the centre of expertise programme, the cohesion and productivity programme and the regional centre programme. The **Centre of Expertise Programme** is similar to its German counterpart a knowledge transfer measure. The aim is to enhance regional competitiveness and to increase the number of high-tech products, companies and jobs. To achieve this goal, the programme is used to implement projects reflecting the needs of industry, to encourage industry, research and training sectors to co-operate, to ensure rapid transfer of the latest knowledge and know-how to companies and to exploit local creativity and innovation.

As part of **UK's Technology Strategy Board's** new plan for innovation, a new network of technology and innovation centres/clusters in specific fields will be established from 2011 on to create momentum for innovation. (E.g., the Technology Strategy Board is investing up to £1m in innovative digital projects with a focus on the 'tech city' around Old Street and Shoreditch in East London. The competition aims to support this hotspot of digital and creative industries by enabling companies to go further and/or faster towards commercial success.[5])

[4] See here also the speech given by Prof. Dr. Reinhard Bettzuege, Ambassador of the Federal Government of Germany to the Kingdom of Belgium on Germany's Research and Innovation Policy, p. 8.
[5] See http://www.innovateuk.org/_assets/Live%20from%20proofing%20300311/Press%20release%20Tech%20City%20Launchpad%20flyer.pdf online.

These measures targeting regional level innovation can be found in all three member states in line with EU policies.

WORK PROGRAMME LEVEL

1. Public-private partnerships

Public-private innovation partnerships have an important role in the innovation process on all levels: local, regional, national and European. Enterprise is logically the key player for innovation, but the low private share of R&D investment in Europe, compared with countries like the US or Japan, is a well-know European competitive disadvantage. In that sense, public-private partnership can produce a financial leverage, incentivising higher shares of private R&D expenditure.

The **Innovation Alliances** Programmes in Germany are **Public-private Partnerships (PPP)**, whereas the public-private proportion is 1:5. At the EU level this proportion is very much different regarding the PPPs, for which the EC is the main contributor (around 70%). It is questionable how an ideal PPP funding scheme should look like: having the private sector as main actor? Can innovation be driven by the public sector or has it to be by definition the private sector, either as industry involved, or as funding body? This can be regarded as a weakness in the EC innovation policy: even if the EC creates the bases for innovation, at a certain level, there are no incentives to the private sector to become the main actor.

The public-private funding scheme looks differently in the other Member States. The link between industry and academia is well established in Germany. While in Germany an average of 25% of PPPs funding comes from public institutions, in Finland the average is 40-50%. The operating methods of public research funding in Finland will be renewed with the new Tekes (Finnish Funding Agency for Technology and Innovation) strategy by introducing two new operating modes: a model that strives to generate new companies and business activities and one that focuses on foresight in strategic research.[6]

In the UK it was stressed the need to increase participation of industry in R&D investments. The Science and Innovation Investment Framework 2004-2014 specified a target for Gross Expenditure on R&D (GERD) to represent 2.5% of GDP by 2014. Industrial spending was expected to contribute around two-thirds of total investment. At the EU level some PPP projects are financed in around 60-70% through public money, in contrary to the British future trend.

An example of public-private link in the UK is given by the thematical **Innovation Platforms**. They bring together stakeholders form Government, business and academia addressing important issues.

In Finland with the establishment of the foundation-based Aalto university in 2010 ("where science and art meet technology and business") the grounds of a new type of university have been set that is meant to link education and research with business and entrepreneurship. Can this be an alternative and an example for the education landscape to be followed also in other Member States? The **Aalto university** foundation is co-financed by the Finnish Government (500 million €) and at least 200 million comes from private sources (donations). If the university succeeds in achieving a certain amount of fundraising during a year, then the Government will pay 2.5 euros for each euro that is raised in donations.

[6] See TEKES Annual Review, Helsinki 2010, p. 3. See http://www.tekes.fi/u/annual_review_2010.pdf online.

This model presents some similarities with the **European Institute of Innovation and Technology** (EIT), based in Budapest, which will be one of the pillar of the future Horizon 2020.

2. Development of adequate skills

This is one of the key issues related to innovation. However, according to the Interim evaluation of FP7 it can be still regarded as "the forgotten side of knowledge triangle" (European Commission, 2010, p.11).

In the area of research and innovation on industrial technologies, ESIC ("Exploitation Strategy and Innovation Consultants") merits to be mentioned. ESIC is an initiative which goal is facilitate a positive impact of EU-funded R&D projects in terms of exploitation and innovation, through tailor-made assistance to projects. This initiative is promoted by the Directorate Industrial technologies of DG RTD in order to support projects on their road to exploitation. Experience shows that the most common risk towards innovation concerns precisely market-related knowledge and skills (Caocci, 2009; Alquézar, 2011).

In the UK there are plenty of initiatives linked to skills, education and training. This may be do to the fact that the UK's educational system is traditionally characterised by high fees and qualifying university diplomas after three years of studies. In periods of low unemployment, this represent a strong incentive to abandon studies very early after the Bachelor. The UK faces a problem of high skills shortages, especially in science and technology fields (Bawden, 2010). In spite of this situation, one of the first actions of the current government was to introduce a new education reform, considered equivalent to a privatization of university teaching, with an 80% cut of public funding, effectively tripling the cost of university tuition. The measure was much contested, with enormous demonstrations of young people between November 2010 and January 2011 (Chessum, 2011).

In 2012, according to the Office of Fair Access, the estimated average fee across the sector will be £ 8,393[7]. This means, that the consequences on equity, not only in terms of access to education, but also for a future inclusive society, can be dramatic.

To tackle skills shortages, the UK has an advantage compared with other European countries: migration. Like the USA, the UK remains an attractive place for highly skilled migrants. Therefore, the issue of provision of highly skilled workers can be (partially) solved by "importing" people. But it is not at all surprising that the UK policy on innovation insists a lot on education, training and skills. Already the name of the BIS department ("Department for Business, Innovation and Skills") suggests the emphasis on skills at the government level. A skills strategy paper, **Skills for Sustainable Growth**, has been launched in 2010 in the UK together with **The Growth and Innovation Fund**, a £50 million a year fund to help businesses grow through investments in trainings. A good example for a Joint Investment Programme as set out by this fund is the Cooperative Award in Science and Engineering (CASE, a good example of collaboration which has benefits for both parties (public and private).

It is nevertheless interesting to observe that the orientation is completely different than in Finland. In this Nordic country, educated people are considered as the main asset. Finland faced its big economic crisis of the 1990s with an innovative policy, based on investments on education and research. UK's emphasis for skills comes from the consciousness about one of their weaknesses for competitiveness, while for Finland education and training is a strength.

[7] See http://www.guardian.co.uk/commentisfree/2011/jul/13/tuition-fees-privatisation-education online.

In Finland there has always been a special focus placed on developments of skills and skilled labour. The success of the Finnish information and communications technology industry was dependent on the availability of a skilled labour supply. The Nokia case shows that the initial breakthrough in the telecommunications sector was made possible by the availability of specialized skills, largely built up as a result of the mix of technical solutions chosen by the many competing telecom operators. The 1980s were characterized by shortages in the Finnish labour market and companies invested substantial funds in specialized in-house training programs, sometimes in collaboration with universities. By the early 1990s, the shortage of educated manpower had come to the attention of the government, and a broad expansion programme in higher education was initiated. The total intake in universities nearly doubled in the five years between 1993 and 1998, and the number of students in polytechnics tripled over the same period. This increase in the supply of labour has been essential for the expansion of the information and communications technology cluster (Roos, 2005).

Similarly, also the German Ministry for Research and Education in order to overcome the shortage of qualified labour in Eastern Germany created the **Higher Education Pact 2020**. Despite high unemployment, some sectors and regions in the new federal states face shortages of skilled labour and this can hinder innovation. The new Länder, facing a decline in the number of new entrants by 63,000 between 2011 and 2015, will continue to receive lump sums from the Federal Government and the Länder to enable them to maintain their capacities and reduce the strain on West German Länder.

3. Measures targeting SMEs

SMEs are the main target group in all national innovation schemes seen so far. To support SMEs, all three Member States have developed several funding instruments including innovation vouchers, tax credits (UK, Finland, Germany), business services etc.

In Germany, there is tailored support for SMEs at all stages of the process though different programmes: The **ZUTECH programme**, which is a special part of the Industry Community Research Programmes scheme or The **Central Innovation Programme for SMEs**. The technology-oriented visiting and information programme in Germany is another instrument addressed to SMEs that provides support for knowledge exchange, learning and co-operation among companies. Managers from SMEs are invited to a leading firm in a certain field of technology. They can learn how leading firms organise their innovation processes and how they proceed in technology development. They can discuss different approaches and learn from the experience these leading firms made. At the end, learning should increase innovation activities and innovation success in SMEs. This instrument is a good measure to contribute to the capacity building by transferring the skills requested for innovation.

The **ERP Innovation programme** is very interesting and different from the actions at the EU level. It shows some similarities with the Risk Sharing Finance Facility (RSFF) at EU level, but it focuses on SMEs engaged in research and high-tech start ups and, indeed, market introduction expenses. Research processes for SMEs are expensive, costly and are simultaneously associated with high risks. They are often confronted with so called spill-over effects; therefore the risk for them is much higher than for large companies. Thus, there was the need for a kind of SME promotional policy as translated in this measure (Fraunhofer ISI, 2009).

The SME patent initiative as part of the SIGNO programme in Germany provides support for patents, something that will be established in the new ESIC starting from 2012. In Germany one can find well-developed tools to facilitate the link between research and standardisation through the "Transfer of R&D results through standardization (TNS)" programme, a unique model in Europe, which was designed also for the EC level. The IPR

support in Finland is very developed due to the Finnish Innovation Foundation. Perhaps it is an example to follow by the European Union. Finland even has a national strategy concerning intellectual property rights.

In 2010, Tekes funding prioritised companies seeking growth like start up in internalisation. In 2010 in Finland, 61% of enterprise project funding was allocated to SMEs. The participation of SMEs in research programmes should be more facilitated according to the recent Guidelines of the Research and Innovation Policy Council (2010, p. 34).

To support SMEs, the UK has developed several funding instruments (including vouchers, tax credits) and a one-stop business service called "Business link".

5. Use of innovative tools like awards and prizes

The idea to establish a **European Innovation Prize** was mentioned in the Innovation Union Communication. Also the Finnish innovation agency Tekes was in favour of such a project. It would be, however, interesting to see the developments in terms of innovation and breakthrough research after having been awarded such a prize on a national and later European level. This would help to assess the impact of these instruments.

National experiences exist. In Finland, the **Innofinland** competition is a real success. Over two hundred participants took part in the annual Innofinland competition last year. The prize is awarded to Finnish businesses, organizations or persons whose ideas, inventions or innovations have significantly promoted business activities, entrepreneurship in general and the introduction of innovations to the market. In Germany a similar type of competition was launched this year, the **German High Tech Champions Award.** The German High Tech Champions competition has the role to promote research in Germany abroad and to assist technology developers and inventors at German universities and other research institutions while increasing their success in the international research environment.

The **Cooperative Awards in Science and Engineering (CASE)** in the UK is again a good example of how to link education and innovation. Bringing together universities, research institutions and enterprises enable to establish an innovation chain. This is a good example for cooperation with a win-win situation for both sides.

6. Service innovation

Service innovation as seen in Germany and Finland is another initiative on a topic that could be further developed at the European level. Both countries have developed programmes targeting not only innovation in the service sector but also highlighting the role of services in the industrial sector.

Services Engineering is widespread in companies in Germany and related degree programmes are already part of university curricula. Service Engineering is seen as driver of innovation in SMEs. Service innovation in Germany was defined as something that "directly facilitates customers, meeting their needs and desires" (Reichwald, 2008, p.11). The programme of the Federal Government aims to create a bridge between research and the innovation system in the services sector. This has meant a systematic development of services for business and society through publically funded service research. Current areas of research funding are "Service quality and skilled service work" (2008-2011) (indeed again emphasis on skill development) and "service productivity management" (2010-2014). This is also where demand and user oriented approach is addressed as set out in the strategy papers in Finland. In this concept, value creation with the customer is a key issue. Service innovation means in this approach the

development of customer-centric (rather than production based) service business models implying also the development of business skills and competences. Providing business-related services (process change and improvements, the bundle of complementary services to address complex problems in production) to support innovation is something that could be done also at European Union level as underlined in the Ex-ante assessment of FP7 using the ESIC tool.

The Serve programme in Finland organises also opportunities for building partnerships between programme participants and foreign research groups and companies. These opportunities include, for example, study visits and seminars organised together with foreign partners. Serve programme aims also to create collaboration between similar service innovation programmes and initiatives in the European Union. So this is clearly an opportunity to strengthen the links between the national and EU level.

7. Innovative public procurement

Public procurement as one of the innovation policy instruments is present in all three Member States. It is an idea that appears in the Innovation Union Flagship, but not fully implemented at EU level yet. Indeed, the future Horizon 2020, that will replace FP7, proposes tools to innovate through public procurement, like pre-commercial procurement. The case studies presented in this report could serve as possible best practice example of how it can be realised.

Finland and the UK have developed, respectively, an "innovation procurement plan" and an "action plan". The main difference between them is that in Finland, public innovation is not focused on service innovation. In fact, service innovation in Finland concentrates on business, not on the public sector .
In Germany, public procurement is less developed than in the two other countries. The innovation aspect is still not the most important argument in allocating a public procurement bid but since 2009 improvements have been made especially in the field of green procurement, linking innovation to public procurement. The Act on the Modernisation of Procurement Law (GWB2009) § 97 from 2009 wants to mark a new era in the German public procurement system: "Social, environmental or innovative requirements are explicitly mentioned as selection criteria. These requirements must have an objective connection to the procured products and must be evident from the specification." But at the same time is also mentioned that "the economically most advantageous tender shall be accepted".[8] In order to tackle the very high shortcoming in the promotion of innovation it was said that the public procurement of innovation should be defined as a legal aim to change procurement strategies in the medium term and the use of functional specifications and acceptance of variants (procedure and award regulation -) should be prescribed.[9] According to a survey from 2008 by Birgit Aschhoff and Wolfgang Sofka of more than 1,100 innovative firms in Germany public procurement seems to be the least important for innovation activities. Only 5% of the firms are involved in public procurement contracts which contribute significantly to the firm's innovation activities, with 1% relating to defense procurement and 4% to other procurement. In contrast, domestic universities and research institutions are important sources of information for 13% of the firms. 18% implemented innovations which were triggered by regulation and laws. The most prevalent of the four types of intervention is public funding. One third of the firms receive R&D subsidies (Aschhoff et al., 2008).

It was often highlighted the restraining innovation effect of sector specific rules and regulations regarding public procurement in the different member states. Rules and

[8] See http://ec.europa.eu/enterprise/policies/innovation/policy/lead-market-initiative/files/weber_en.pdf online.
[9] See http://ec.europa.eu/enterprise/policies/innovation/policy/lead-market-initiative/files/weber_en.pdf online.

regulations tend to make procurers risk aversive, as seen in Germany (where the price is a more important criterion) but also in Finland (Stern, 2011).

EVALUATION LEVEL

Finland has an evidence-based innovation system, in which, together with foresight studies, evaluations and impact assessments have an explicit role (even if for others this evaluation culture seems too severe sometimes). This means that those policies and instruments that evaluated well are going to be kept and others will be changed according to their efficiency. In that sense, the Ministry of Employment and the Economy will launch an evaluation of the operations, results and effectiveness of Tekes in 2011. The evaluation will be performed independently by external experts. An evaluation of the Academy of Finland will take place in 2012. Thus, it is ensured that the services offered by funders are allocated in a focused and appropriate way and that they are sensible in terms of developing the competence needs and activities of customers.

In the UK all organisations that support research and innovation will be evaluated systematically in the future. The operations of research and innovations funders have expanded and the funding they allocate has increased positively. This has increased the need to evaluate the effectiveness and impact of all public support service providers in a more comprehensive and precise manner.

Also in Germany, the Commission of Experts for Research and Innovation underlined in its report for 2010 that 1% of the research funding should be allocated in the future to the evaluation of research by government departments and the results should be made visible.

PROJECT LEVEL AND EXPLOITATION LEVEL

1. Entrepreneurship assistance

Many measures have been developed in Germany targeting the continuum research-innovation, with IPR support actions, commercialisation support actions (market studies, feasibility, etc.). This is in line with the ideas mentioned at the European level for the future Horizon 2020. These actions are twofold:

–Technical - expanding the exploitation side of projects to get them closer to the market, and

– Managerial - Creating an entrepreneurial science society (through programmes like ERP Start-up Fund, High-tech Start-up Fund and EXIST - Start-ups from Science, Business Link etc).

Many venture capital programmes providing financial and managerial help for improved entrepreneurial assistance or the innovation vouchers (go-inno) are intended to improve the innovation landscape in Germany in line with the European Union's Innovation Strategy. Since in Germany the innovation system is mainly publicly driven even concerning the start-up support system, it could be argued that these public v**enture capital** institutions may reduce the incentives to create a real-private venture capital system. The same can be seen in Finland.

In Germany the start ups are relatively low and also show a long-term downward trend also because young innovative enterprises often have initial difficulties establishing a stable customer basis. In order to support them in this phase, a certain proportion of public acquisitions should be reserved for the products of such companies, suggested the Expert Commission. This can help them to become established and stimulate follow-up orders from other companies. In the USA this approach has been used successfully for

more than 25 years as part of the Small Business Innovation Research programme (SBIR). In order to broaden the impact of public start-up support, experts suggested initiating a support programme. In the best case, this project to provide support for young, innovative enterprises could be extended to cover all of Europe. This would in their opinion contribute to overcoming the fragmentation of the European market, in particular for start up enterprises (Commission of Experts for Research and Innovation, 2010).

The inadequate availability of risk capital is a serious problem for the German innovation system because such capital is crucial to provide a sound capital basis for young, innovative enterprises. In Germany only 0.04 % of GDP is used for venture capital investments, in Finland 0.07%, in the UK 0.15%.

The idea of growth entrepreneurship, supporting businesses and innovations is very strong in Finland. Finland allocates a considerable amount of money in support of financing start ups (9.9%) and to innovation in services (9.7%). There is considerable financial support (venture capital, business angels, etc.) toward this. The question is however the same: to what extent do they produce a financial leverage, attracting private funding.

UK's national campaign **"Make your Mark"** in trying to bridge the gap between "thinkers" and "doers" provides a lot of resources to inspire people to think in enterprising and innovative ways. Over two million people have participated in this initiative since 2004, an impressive number. There are also a lot of other financial instruments to boost entrepreneurship like the **Enterprise Capital Funds**, the **UK Innovation Investment Fund** or **Corporate Venturing Scheme**.

In line with these entrepreneurship objectives is also the business plan competition, **Venture Cup** in Finland. The idea of this initiative is to help students, researchers and others to take their business idea from concept to actual start-up. This measure aims to combine technical and managerial exploitation action: promote entrepreneurship/start-up (including incubators) and commercialisation of innovation (including IPR). This is an example of activity between education and innovation, a link that is missed at the EC's level.

As far as the exploitation side is concerned, the German Expert Commission for Research and Innovation in its report of 2010 suggested establishing a **Commercialisation Fund** to improve the transfer of research findings and exploitation of research results. A very similar measure was suggested by the Ex-post evaluation of NMP (FP6) at Strategic level (Oxford Research and KMFA, 2010). The idea of a **Commercialisation Strategy** and **Commercialisation Platform** was expressed by this evaluation report, to create a new policy instrument with the primary aim of bringing European technologies to the market.

UK's national innovation system targets the exploitation side measures as set out in the Technology Strategy Board's (TBS) new strategy document, **Concept to Commercialisation.** Here many innovation supporting measures are addressed: innovation through public procurement, start-up support for SMEs, demonstration exercises and knowledge exchange.

SOME CONCLUSIONS

Innovation policies in Germany, Finland, UK and the EU are mostly based on the same principles and tools. They also follow similar strategies: centres of excellence, support to SMEs, knowledge platforms, new forms of knowledge exchange, etc. Practically the same initiatives and actions can also be founded at European level. The main differences between the three innovation systems appear in their focus and structure:

– Finland strongly focuses on social aspects, while Germany is mainly industry-driven. The UK is probably somewhere in between.

– Finland presents a very integrated model, in which the different actions and tools are linked each other. For instance, governments and private companies demand foresight studies that really influence decisions and policy… that are afterwards evaluated, leading to policy changes. Such integration is so evident in other countries or at the EU level, where actions to promote innovation are (still) more fragmented.

On the other hand, some areas, like innovative procurement or prizes, are not very developed. Even if legislative measures have been implemented, there is no evidence about their concrete implementation and/or impact. In fact, information on the real impact of such policies is generally still lacking. Comparable data on results and impacts of innovation policies and instruments would be very welcome.

Are the similarities found between these three systems and the EU's one due to the leading role of Germany, Finland and the UK within the EU for innovation issues? Is it simply a problem of lack of creativity and innovative ideas amongst decisions-makers in the field of innovation? It would have been certainly very instructive to compare these findings with those from newer EU Member States and Third Countries.

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INNOVATION LANDSCAPE IN GERMANY[1]

I. STRATEGY LEVEL

1. Improvement of foresight activities to anticipate technology and market needs

1.1. Ideas. Innovation. Prosperity – The High-Tech Strategy 2020 for Germany aiming at building bridges between science and industry.

Translate ideas into practice: The High-Tech Strategy places innovation policy at the heart of government action. It is the first national strategy to show how Germany can become and remain a global leader in the most important cutting-edge technologies. The High-Tech Strategy was first adopted in 2006, reaffirmed in 2009 and expanded into the High-Tech Strategy 2020 in 2010. Its goal is to create lead markets, to intensify cooperation between science and industry and to further improve the framework conditions for innovation. The strategy defines five areas that represent challenges of global dimensions: *Climate/Energy, Health/Nutrition, Mobility, Safety and Communication*. The High-Tech Strategy aims to enable science and industry in Germany to pioneer solutions in these fields. It aims to use forward-looking projects to shift the focus of research and technology onto concrete social and global goals. Forward looking projects set out in the High-Tech Strategy 2020 are the following:

- The carbon-neutral, energy-efficient and climate-friendly city
- Intelligent reorganisation of the energy supply system
- Renewable raw materials as an alternative to oil
- Improved treatment of illnesses with personalised medicine
- Improving health with an optimised diet
- Leading an independent life in old age
- One million electric vehicles in Germany by 2020
- More effective protection for communications networks
- Achieving higher Internet use with lower energy consumption
- Making it possible to access and experience the world's knowledge in digital form
- The future world of work and work organisation

The High-Tech Strategy calls for strategic partnerships and innovation alliances that pool strengths and create synergies strengthening cooperation between industry and science. In particular, dynamic small and medium-sized enterprises (SMEs) in Germany are receiving technology funding to increase the incentives for research partnerships. Although the High-Tech Strategy is a national initiative, it is firmly integrated into European growth policy. The High-Tech Strategy can thus be regarded as one of the building blocks of the Europe 2020 process, with which the European Commission and the European Council are focusing attention on education, research and innovation.[2]

1.2. The Internationalisation Strategy of 2008 wants to bring together the world's best minds.

a. Strengthening cooperation between the best researchers: Accordingly, the Federal Ministry of Education and Research (BMBF) has initiated various measures, including the *Alexander von Humboldt Professorship* that enables outstanding researchers to undertake long-term research stays at German universities. The successful *Sofia*

[1] This report is based on ERAWATCH, INNO-Policy TrendChart findings and on the documents available on the website of BMBF (the Federal Ministry for Education and Research) and BMWi (The Federal Ministry of Economics and Technology).

[2] BMBF German Ministry for Education and Research: High Tech Strategy for Germany, Bonn/Berlin 2006. See http://www.bmbf.de/pub/hts_2020.pdf online.

Kovalevskaya Prize for up-and-coming young researchers is being continued. Furthermore, existing and new scholarship programmes are increasing German students' mobility and Germany's attractiveness for foreign undergraduate and postgraduate students. Cooperation with the world's best teams is also being fostered by the increasing international orientation of funding programmes as well as numerous bilateral and multilateral agreements.

b. Gaining access to international innovation potentials: German business collaborates with the best partners worldwide, enabling them to benefit from the latest discoveries and developments and at the same time strengthen Germany as a centre of innovation.

c. Sustainably strengthening cooperation with developing countries in the fields of education, research and development: The Internationalisation Strategy regards the developing and newly industrialised countries as important partners for international cooperation. German researchers will cooperate with their colleagues as equals and thereby establish partnerships with future centres of research and industry. This initiative also involves improved training for specialists and managers in developing countries. Specially adapted and coordinated instruments of development cooperation and scientific-technological cooperation form important prerequisites for collaboration between researchers.

d. Assuming international responsibility to overcome global challenges: Germany's research policy goals are closely linked with its foreign and development policy goals in order to tackle global challenges. Dialogue with the G8 and OECD countries has been established on an international research agenda and Germany has assumed a leading role. Its subjects are climate change, securing energy supplies and combating poverty and infectious diseases.

e. Promoting innovation and research in Germany: Goals defined in the Internationalisation Strategy are being realised, for example, in the initiative to „Promote Innovation and Research in Germany", which the Federal Government initiated in 2006. Under the heading "Research in Germany" it is encouraging increased cooperation with specific countries and in selected subject- and country-related fields where Germany is traditionally strong.

The initiative launched by the Federal Ministry of Education and Research (BMBF) to "Promote Innovation and Research in Germany" has been presenting Germany's research achievements and opportunities to the international community since November 2006 under the brand "Research in Germany - Land of Ideas". The initiative additionally sets thematic and regional priorities which each run for a period of 1.5 years. One of the goals of the initiative is to promote German research in specific research areas. The choice of priority topics is made in line with the thematic fields of the High-Tech Strategy. So far, these have focused on two key thematic fields: Nanotechnologies and Environmental Technologies. The current thematic focus is on Production Technologies.

The initiative also seeks to strengthen and expand R&D collaboration between Germany and selected target countries. With its recent initiative "India and Germany - Strategic Partners for Innovation", the Federal Ministry of Education and Research (BMBF) aimed to support cooperation between Germany and India in fields of collaborative research from 2008 to 2010. Under a pilot campaign, the first regional measures to promote Germany as an innovation location were conducted in South Korea in 2006 and 2007.[3]

[3] BMBF German Ministry for Education and Research: Strengthening Germany's role in the global knowledge society. Strategy of the Federal Government for the Internationalization of Science and Research, Bonn/Berlin 2008. See http://www.bmbf.de/pub/Internationalisierungsstrategie-English.pdf; http://www.research-in-germany.de/research-landscape/r-d-policy-framework/60128/internationalisation-strategy.html online.

1.3. Excellence Initiative promotes outstanding research projects and institutions at Germany's universities.

A total of €1.9 billion will be available to universities in the first two selection rounds between 2006 and 2012, 75 percent of which will be provided by the Federal Government. Specifically, the Initiative for Excellence competition comprises three project-oriented funding lines, which are to be continued:

• Research Schools for young scientists offer structured PhD programmes in excellent research environments and in broad areas of science. In the first two rounds, 39 research schools will receive an average of €5.7 million each for a period of five years.

• Excellence clusters have the aim of establishing internationally visible and competitive research beacons at universities which can cooperate with non-university research establishments, universities of applied sciences and the private sector and which offer an excellent environment for young scientists. The 37 clusters selected in the two current rounds of funding are receiving an average of €31.8 million each.

• The funding of "Future concepts for top-class research at universities" has the aim of further enhancing the profile of nine selected universities. To be eligible, a university has to have at least one excellence cluster, one research school and a convincing overall strategy for improving its research profile. The total budget for this line of funding is €210 million. So far, nine universities have presented concept proposals that have met the approval of the international panel of experts.[4]

1.4. Joint Initiative for Research and Innovation aims to improve the competitiveness of German research.

The Joint Initiative for Research and Innovation is designed to give financial planning security to institutions that are jointly funded by the Federal Government and the Länder (Fraunhofer Society, Helmholtz Association, Max Planck Society and Leibniz Association) as well as the German Research Association (as a research funding organization). Their funding is to increase by 5 percent every year between 2011 and 2015. In addition, they can receive additional funds if they establish new organizations or change their form of funding. This will give them room for maneuver and enable them to trigger dynamic developments despite the rising costs. By continuing the pact for research and innovation, the Federal Government and the Länder want to achieve the following research policy goals:

- Trigger dynamic developments in the science system
- Create dynamic and performance-enhancing networks in the science system
- Develop and implement new international cooperation strategies
- Establish sustainable partnerships between science and industry
- Recruit the best and persuading them to stay in Germany long-term

Based on these research policy goals, the science and research organizations, as partners in the Joint Initiative, have issued their own declarations stating what measures they plan to take to achieve the goals and contribute to increasing the competitiveness of the German science system. The declaration of the Joint Science Conference regarding the research policy goals, the decision of the heads of the Federal and the Länder governments regarding the financial framework, and the declarations of the science and research organizations together make up the Joint Initiative for Research and Innovation.[5]

1.5. Higher Education Pact 2020 aims at increasing student numbers and international competition.

[4] See http://www.bmbf.de/en/1321.php online.
[5] See http://www.bmbf.de/en/3215.php online.

The Federal Government and the Länder agreed on a Higher Education Pact in June 2007 to create good educational opportunities for the next academic generation while maintaining universities' research performance.
The number of young people qualified to enter university is set to increase significantly by 2020. At the same time, international competition demands that universities put a greater emphasis on research. In order to maintain the performance of institutions of higher education and give more new entrants access to university, the Federal Government and the Länder have decided to continue the Higher Education Pact 2020. The Federal Government alone is providing more than €5 billion for the second programme phase from 2011 to 2015. The aim is to give the 275,000 additional new entrants expected between 2011 and 2015 a chance to pursue a high-quality university education. Providing one-off payments for research projects supported by the German Research Association will increase universities' ability to develop new strategies.
According to the BMBF, this Pact has already achieved considerable success. It has stopped the downwards trend in the number of new university entrants and sustainably strengthened research at German universities.[6]

2. Improved dialogue with innovation related stakeholders

The *Commission of Experts for Research and Innovation* (Expertenkommission Forschung und Innovation – EFI) provides scientific advice to the German Federal Government and periodically delivers reports on research, innovation and technological productivity in Germany. A key task is to provide a comprehensive analysis of the strengths and weaknesses of the German innovation system in an international comparison. Furthermore, Germany's perspectives as a location for research and innovation are evaluated on the basis of the latest research findings. EFI presents proposals for national research and innovation policy.[7] The Commission of Experts for Research and Innovation is similar to the European Advisory Group (EAG) on the EU level.

Federal Research Minister Professor Annette Schavan established the *Industry-Science Research Alliance* in order to promote closer links between knowledge and skills related to research and innovation. It is a forum in which leading representatives from science, industry and politics discuss potential strategies for strengthening Germany as a high-tech location. The Research Alliance includes 19 members from the spheres of science and industry. They are responsible for accompanying the implementation of the High-Tech Strategy.
The Research Alliance identifies obstacles to innovation, defines research tasks, and offers concrete recommendations to science, industry and politics. Each member of the Research Alliance acts as a "promoter" for one or more fields of innovation and cross-cutting areas of the High-Tech Strategy. The promoters develop suitable recommendations for the Federal Government in their respective areas of responsibility. The work of the Research Alliance helps to create stronger links between skills and knowledge related to research and innovation. In the dialogue between science, industry and politics, new opportunities and existing obstacles to growth are identified. The goal is to create the conditions necessary to ensure that more ideas are realized in Germany.[8]

A special form of promoting innovations on different policy levels has been the initiative of the former German Federal Chancellor Gerhard Schröder, *Partner für Innovation* ('Partners for Innovation'), founded in 2004 as a joint initiative with the objective to get people, institutions and companies in Germany together to encourage and to support the implementation of innovative concepts in areas of high importance for German society and economy. For this purpose, a high level working group, chaired by the chancellor and

[6] See http://www.research-in-germany.de/research-landscape/r-d-policy-framework/60122/higher-education-pact.html online.
[7] See http://www.e-fi.de/expertenkommission.html?&L=1 online.
[8] See http://www.hightech-strategie.de/en/81.php online.

involving top representatives of the Private Sector and of other stakeholder groups has identified 13 priority themes. Working groups (impulse committees), consisting of representatives of the relevant stakeholder groups and supported by a professional support structure were established to identify, develop and implement "lighthouse" projects in these areas. Private Sector representatives participate as members in all working groups and have the leadership in approximately half of them. According to the available documents, this initiative has yielded already a considerable amount of valuable innovation projects which are driven by the members of the initiative. In addition, working groups on structural issues, e.g. the group on exchange processes between the Private Sector, research and politics are developing valuable proposals for improving the German Science and Innovation System.[9]

The German government under Angela Merkel has taken up this initiative and constituted two new bodies. The *Research Union Economy-Science* ('Forschungsunion Wirtschaft-Wissenschaft') held its first meeting on June 23, 2006 as a new top-level advisory council which focuses on advising the Federal Minister of Education and Research on the implementation of the German government's Hightech-Strategy. It consists of 13 members of which 7 are Private Sector representatives and is chaired jointly by one enterprise representative and one research public research representative. In a complementary role, the *Council for Innovation and Growth* ('Rat für Innovation und Wachstum'), chaired by the Chairman of the Supervisory board of one of Germany's largest global industrial firms, was constituted in May 2006 to advise the German Chancellor on related issues, e.g. the faster conversion of research results into commercially relevant technologies and products.[10]

2.1. The Leading Edge Cluster Competition

The high-performance clusters formed by business and science that enter into strategic partnerships are set to boost Germany's innovative strengths and economic success.
In each round of the competition (up to 15 clusters in three rounds of competition), up to EUR 200 million will be made available to up to five Leading-Edge Clusters over a period of no longer than five years. The implementation envisages a matching level of financial participation on the part of businesses and private investors. Clusters are arranged with respect to regional representation.

2.1.1. BioRN – Biotechnology Cluster Rhine-Neckar: The Biotechnology Cluster Rhine-Neckar (BioRN) in and around Heidelberg embraces some 100 partners from industry, science and politics. These include the German Cancer Research Center (DKFZ), the University of Heidelberg, the Heidelberg University Hospital and the European Molecular Biology Laboratory (EMBL), as well as the health care companies Roche (Mannheim), Abbott (Ludwigshafen) and Merck-Serono (Darmstadt). The objective of the BioRN cluster is to occupy and maintain a leading position in Europe in the field of personalised medicine and cancer.

2.1.2. Cool Silicon – Energy Efficiency Innovations from Silicon Saxony: Cool Silicon aims to make communications more climate-friendly and to become one of the world's leading locations for energy efficiency in electronics.
The Leading-Edge Cluster comprises more than 60 companies and research facilities, including the Technical Universities of Dresden and Chemnitz, as well as the companies Globalfoundries, Infineon and X-FAB. In the long term, the cluster aims to make communications more climate-friendly and to become one of the world's leading locations for energy efficiency in electronics.

[9] Private Sector Interaction in the Decision Making Processes of Public Research Policies Country Profile: Germany, p. 10. See http://ec.europa.eu/invest-in research/pdf/download_en/psi_countryprofile_germany.pdf online.
[10] See www.proinno-europe.eu/doc/germany.pdf online.

2.1.3. Forum Organic Electronics in the Rhine-Neckar Region: The work of the Leading-Edge Cluster Forum Organic Electronics concentrates on environment-friendly energy production employing organic photovoltaics. The flexibility and transparency of the organic electronics-based components facilitate new application areas such as transparent solar cells on windows. The cluster pools the expertise of more than 20 companies and research facilities. *The partners cover the entire value-added chain, from research into new materials and the design of components to the marketing of applications.* The cluster includes the DAX-listed corporations BASF, Merck and SAP, as well as the universities of Heidelberg and Karlsruhe. To facilitate interdisciplinary collaboration under one roof, the leading cluster partners established the application-oriented research and transfer platform InnovationLab GmbH, which is also responsible for the management of the cluster.

2.1.4. Aviation Cluster Hamburg Metropolitan Region: The goal of the Aviation Cluster is to establish itself as an international centre of excellence for "A new kind of aviation" and to attain a top position in aviation research and technology. The world's third-largest location in the civil aviation industry possesses expertise which stretches over all facets of aircraft construction, aircraft maintenance and airport operations. The Leading-Edge Cluster embraces companies such as Airbus, Lufthansa Technik and Hamburg Airport, but also 300 small and medium-sized enterprises, research facilities such as the German Aerospace Centre (DLR) as well as training and qualification facilities.

2.1.5. Sollarvalley Mitteldeutschland: In the Solarvalley Mitteldeutschland cluster, the partners from industry and research work on optimising products and production technologies in photovoltaics. 98 co-ordinated projects are working on the fundamental issues along the entire value-added chain of crystalline and thin-film silicon solar modules and preparing their transfer to production. The Leading-Edge Cluster comprises 29 companies, nine research facilities and four universities. The partners include leading manufacturers such as Bosch, Schott, PV Crystalox, Q-Cells and SMA, as well as suppliers such as Jenoptik, Roth & Rau and Jonas & Redmann. The cluster is striving to achieve a measurable breakthrough in the use of solar power in Germany. An envisaged mile-stone along the way is the grid parity of photovoltaically generated electricity from 2013 at the latest.

2.1.6. EffizienzCluster LogistikRuhr: The EffizienzCluster LogistikRuhr develops decentralised and autonomous logistics services along the entire value-added chain. The key issues in the cluster include adaptable logistics systems, goods traffic management and logistical organisation expertise. The focus here is on the optimisation of logistical services with regard to the use of resources and energy. There are 120 companies and 11 research institutes working in the cluster. Among these are the Fraunhofer Institute for Material Flow and Logistics, the Technical University of Dortmund, the University of Duisburg-Essen, the corporations REWE, Deutsche Post and Deutsche Bahn, as well as numerous small and medium-sized enterprises.

2.1.7. Medical Valley European Metropolitan Region of Nuremberg: The leading national position of Medical Valley EMN is founded on the active networking of industry, science and health care, as well as their innovative strength. The partners in the Leading-Edge Cluster already occupy leading positions in many medical technology product categories in the global market. They further enhance their positions with the continuous development of outstanding innovations in the key areas imaging diagnostics, intelligent sensors, therapy systems and ophthalmology, as well as in the cross-sectional field horizontal innovations for product and process optimisation. Besides numerous small and medium-sized enterprises, one of the world's market leaders in medical technology - Siemens Healthcare - is part of the cluster. The long-term objective is that a model for the optimal provision of health care will emerge in the cluster region. By networking medical technology, health care and the health economy, the European Metropolitan

Region of Nuremberg intends to generate important new stimuli for the development of the health care sector in Europe.

2.1.8. MicroTEC Südwest: The MicroTEC Südwest cluster in the tri-border region where Germany, France and Switzerland meet focuses on highly innovative microsystems which can be transferred to numerous user industries such as mechanical engineering or medical technology, where they trigger long-term economic effects. The cluster's main emphasis lies on its two flagship projects "In-vitro diagnostics" with market leader Roche Diagnostics and "Robust and efficient sensors" with market leader Robert Bosch. With some 340 cluster partners MicroTEC Südwest embraces predominantly small and medium-sized enterprises, as well as other market leaders and excellent universities and research institutes in this area of technology. The Leading-Edge Cluster MicroTEC Südwest has set itself the goal of becoming the world's leading research, development and production location for intelligent products with integrated micro-systems technology.

2.1.9. Munich Biotech Cluster: The field of personalised medicine is identified a major future market. Diagnosis and therapy concepts are developed here which are tailored to the patient's individual predispositions and symptoms. A key issue is meeting the challenges of today's drug development such as improving safety and efficacy, reducing development periods and cutting costs. Over 100 partners from the midmarket biotech industry, large corporations, scientific institutions and clinics in and around Munich work together in the cluster on over 40 projects in the areas oncology and cardiovascular and autoimmune diseases. Today, Munich is already one of the leading pharmaceutical and biotechnology locations in Europe. The vision of the Leading-Edge Cluster is to establish it as an international excellence and model region for personalised and target-oriented medicine.

2.1.10. Software-Cluster: The objective of the Leading-Edge Cluster in the region in and around Darmstadt, Walldorf, Kaiserslautern, Karlsruhe and Saarbrücken is the transformation of business software into emergent software which combines the manufacturers' different components dynamically and flexibly, thereby better fulfilling the complex requirements of digital companies.[11]

2.2. The BMBF Innovation Initiative "Entrepreneurial Regions"

This initiative fosters dialogue with regions to prepare their smart specialisation strategies through 'Regions of Knowledge'. The programme aims at contributing to develop internationally competitive centres of excellence in Eastern German Regions which are focussing their research activities towards high-tech markets and enable successful transfer of research results into industry in order to promote process- and product innovation. The objective is to enable the development of sustainable economically successful and international competitive clusters. Support is provided to existing excellent research units in East German universities and other public research institutions. 12 selected centres are supported to further develop their future strategies including organisational and financing concepts. In a second phase 6 centres will be receive support to implement the strategies/concepts developed. At the centre of the implementation activities will be the formation of two young researchers working groups.

The main rationale of the programme is to strengthen the East German economy's knowledge base. Although the activity targeted is basic research, potential economic relevance ("innovation competence") must be demonstrated. Public research institutions in East Germany have either been newly created or underwent major changes following the re-unification of Germany. The hope and goal of this programme is to help these

[11] BMBF German Ministry for Education and Research: Germany's Leading-Edge Clusters, Bonn/Berlin 2010. See http://www.bmbf.de/pub/deutschlands_spitzencluster_de_en.pdf; http://www.hightech-strategie.de/en/468.php online.

institutions develop, with a strategic vision towards technology and industry, a clearer profile. An additional aspect is the funding of young, creative inventors who in the German system encounter institutional obstacles to working independently.The BMBF Innovation Initiative "Entrepreneurial Regions" stands for innovation-oriented regional alliances which develop the region's identified core competences to clusters on a high level and with strict market orientation. With this aim in mind, the Federal Ministry of Education and Research (BMBF) has systematically developed a series of programmes for the New German Länder since 1999. The programme lines improve the conditions for innovations and set the course for the long-term success of regions ("clusters") in the New German Länder:

2.2.1. Improved treatment Innovative Regional Growth Cores (since 2001), with GC Potential (since 2007): The "Innovative Regional Growth Cores" programme focuses on initiatives with market potential which can be realised in the mid- to long-term. Ideas and activities from the regional innovation alliances should be oriented towards economic implementation on the market right from the start. The initiatives are provided with professional consulting services in the development of their innovation concept, which is based on a business plan. Each year, new initiatives are included in the three-year development support phase. Budget: EUR 149 million until 2012.

Since its start in 2001 the "Innovative Regional Growth Cores" programme has continuously been developed further. In June 2007 the programme GC Potential was added. Applications for both programmes are received continuously. Budget allocated: EUR 5.1 million until 2011.

2.2.2. Innovation Forums (since 2001): The goal of the programme "Centres for Innovation Competence" from 2002 (German: Zentren für Innovationskompetenz, ZIK) is to establish interdisciplinary centres of excellence at universities and research institutes in East Germany. These centres will engage in internationally competitive top-level research together with young researchers from Germany and abroad and should be able to make commercial use of their results in the mid- to long-term future. The focus of the programme hence is the financing of two internationally staffed groups of young scientists. The budget allocated for the first round was EUR 147 million until 2016 (EUR 70 million thereof for the second round of financing) and for the second one EUR 73 million until 2014.

2.2.3. Centres for Innovation Competence (since 2002): The "Innovation Forums" programme of 2001 is directed towards regional alliances in the early stages of development and existing initiatives aiming to reach a new level of quality in their field of innovation. The development support over a period of six months and at a maximum of EUR 85,000 serves to trigger an "ignition spark". The focus of the support is an "innovation forum", a two-day event which provides a basis to promote knowledge transfer, to establish contacts and to position the alliance in the competitive landscape. 120 initiatives have been supported up to date with a total budget of EUR 7.8 million.

2.2.4. InnoProfile (since 2005): With the "InnoProfile" programme of 2005, the BMBF focuses on the cooperation between young scientists of a region and regional business. The ministry thus supports cooperation on a common technology between groups of scientists from public research institutes and local companies. These alliances are considered to have the potential to shape the economic competence profile of their region. Since June 2005 a total of 42 initiatives have been selected for support. The budget available until 2013 is EUR 140 million.

2.2.5. ForMaT (since 2007): With its programme "ForMaT" introduced in 2007, the BMBF aims at making results of public research better and faster usable for the economy. For one, the intention is to motivate scientists to analyse the economic usability of their studies in an early phase of their research. For another, the programme supports interdisciplinary cooperation: science and technology departments form a team with

economics or business faculties. This team then develops exploitation concepts and puts them jointly into practice. The first phase of the programme included 86 concept teams, whereas in the second phase there were 33 innovation labs. The budget allocated has been EUR 60 million until 2012.

2.2.6. InnoRegio (1999-2006): The programme "InnoRegio" started in 1999 as an open-themed contest ("bottom-up" approach) and serves as the basis for the other programmes. The aim was to establish self-supporting innovation networks which pool the innovation potentials of their region to a competitive performance profile through new forms of cooperation. A total of 23 regional initiatives with a wide variety of industry specialisations and topical points of emphasis were selected for support from among 444 applicants and supported until the end of 2006 with a total budget of EUR 230.6 million.

All programmes represent the basic principles of the BMBF innovation support policy and thus of "Entrepreneurial Regions": lateral thinking, cooperation, strategic planning and entrepreneurial action. The programmes' aspirations are based on the fact that the most innovative products and applications are almost exclusively the result of highly specialised and integrative knowledge from many sources, minds and organisations of widely varying origins and orientation. In "Entrepreneurial Regions", this philosophy is closely tied to an entrepreneurial approach and is based on four guidelines:

• Only the best from the region - innovation based on regional strengths
Innovation is the key to successful economic development. "Entrepreneurial Regions" promotes outstanding innovation potentials ("strengths") in the region.

• Innovations: taking action together in a creative and strategic manner
Innovation potentials are set free in regional alliances made up of members from the industrial, scientific, academic and administrative community. "Entrepreneurial Regions" demands a binding, consistent strategy with a symbiosis of flexibility and creativity from the initiatives.

• Innovations with market orientation
"Entrepreneurial Regions" initiatives must be based on strategically designed concepts and a long-term marketing strategy. This also holds true for R&D projects. The background: entrepreneurial thinking, planning and action are pivotal to the success of regions.

• The BMBF's aim: regions with clear profiles based on outstanding technological platforms
The aim of "Entrepreneurial Regions" is to develop regional alliances into regions with a clear profile - regional clusters. This can only be achieved when emphasis is placed on top quality from the start of development support onward. The BMBF manifests this claim to excellence of the supported initiatives through its standards of the funding guidelines and the accompanying evaluation.[12]

II. WORK PROGRAMME LEVEL

1. Design of topics: technical aspect closer to the market

-Involvement of SMEs / Streamlining funding instruments / PPP

The German Federal Ministry of Economic and Technology (BMWi) has the task of promoting growth and employment. Research and innovation as key factor in achieving

[12] BMBF German Ministry for Education and Research: InnoProfile. Wirtschaftsorientierte Nachwuchsforschungsgruppen geben Regionen in den Neuen Ländern ein neues Profil, Bonn/Berlin, 2009. See http://www.unternehmen-region.de/en/54.php; http://www.bmbf.de/pub/innoprofile.pdf online.

growth and new jobs is promoted along three different funding lines: Innovation, Research cooperation and technological consulting. Within the funding line of "Innovation", the BMWi supports young technology businesses in the development of new products, processes and services. One of these programmes is the ERP Innovation Programme.

1.1. ERP Innovation Programme

The programme provides financing of market-oriented R&D (i.e. applied research and technological development; Programme Part I) and expenditures for market introduction of innovations (both products and services; Programme Part II) including fixed investment for innovation activities in firms (for programme part II: only SMEs). Both programme parts can be used independently from each other, but it is also possible to combine the two. The programme offers SMEs a loan which typically consists of two tranches: a classical bank loan (though offering below market-rate interest rates) and a subordinate loan (50 to 60 percent of the total loan, depending on the size of the total loan). There are especially low interest rates for very small firms. As for the subordinate loan, no collaterals are needed. The loan is delivered through the house bank of the SME, which receives the money to finance the loan from the state-owned KfW Banking group. Repayment of the loan typically starts after 2 years for the bank loan tranche and after 7 years for the subordinated loan tranche.

The rationale behind this programme was the fact that SMEs suffer from a lack of access to credit financing of innovations while at the same time they have limited in-house resources to finance R&D and innovation, particularly in case of a high minimum size of R&D and innovation projects. The financing situation is particularly unfavourable for R&D intensive small firms with a high risk exposure. In order to open-up a market for loans to finance R&D and innovation in SMEs, the Federal government has launched the ERP innovation programme a long time ago. Since then, the programme is regularly adjusted to changes in the financial market and the way SMEs tend to organise the innovation projects, as well as their specific financing needs.[13]

Within the funding line of "Research cooperation", the BMWi supports joint research projects of medium-sized enterprises and research institutes. Funding takes places within the following programmes:

1.2. The Industrial Community Research Programme (IGF)

This programme offers direct grants for R&D projects which are carried out by sectoral research institutions or - on behalf of these institutions - by consortia of companies and/or research organisations. The programme is solely accessible to 106 sectoral research institutions that are members of the Association of Industrial Research Organisations (AiF). These institutions have been founded by SMEs from certain sectors in order to carry out R&D that is in the joint interest of the member firms. The ZUTECH programme is a special part of the IGF scheme and aims at developing new solutions for structural renewal of the SME sector of the German economy on the base of high-grade technologies. Objective of the programme is the mitigation of structure-related disadvantages of SMEs in R&D activities. Joint R&D is intended to support co-operation with institutes of higher education and industry related research institutes and thereby diversify risks associated with R&D activities and put SMEs in the position to participate in the R&D results.
Among the policy priorities are the support to sectoral innovation in manufacturing, R&D cooperation (joint projects, PPP with research institutes) and support to technology transfer between firms.

1.3. Central Innovation Programme for SMEs (ZIM)

[13] See http://www.invest-in-hessen.de/mm/ERP_Innovation_programme_0512.pdf online.

The Federal Ministry of Economics and Technology integrates the previous programmes PRO INNO II, NEMO and InnoNet in one support measure ZIM - The Central Innovation Programme SME. The goal of the integration is to increase transparency and to reduce administrative costs of SMEs with respect to federal funding. ZIM rests on three pillars: support of co-operations, support of networks and individual support to firms.
Individual support to firms is limited to firms in East Germany. The aim of the measure is to support the innovativeness and competitiveness of SMEs. Beneficiaries are SMEs and public research organisations. The measure is part of the High-Tech Strategy of the German government that integrates innovation support measures. The measure supports innovation activities by SMEs, supports industry/science collaborations and technology transfer. In the course of the establishment of the ZIM initiative, a general information service for all support measures was established ("Lotsendienst"). This service is free of charge and provides information to firms about public support measures at one single phone number.

The programme has the target to advance the economic developement in the New Laender, by supporting regional initiatives, including whole clusters of companies. By sharing technology and problem solving, SMEs can form regional platforms, which are able to stand the competitive pressure. These so-called growth poles will not only consist of enterprises, but also of public research organisations/universities and other actors. Therefore, the programme supports education and R&D of these co-operation projects, to boost innovation activities in these areas. The programme supports in detail basic and applied research as well as technological development conducted by firms. All R&D projects should have a clear commercialisation focus from the beginning on. A key attempt of the initiative is to transfer R&D results into innovations, increasing the application and exploitation side of the projects.

In Eastern Germany, innovations are mostly created by SMEs. The most important opportunity for the companies is the co-operation with public research organisations. By defining themes and strategies together in the planning phase, the innovation progress can be more effective. For strengthen up the innovation progress in the New Laender, the Programme is implemented as a tender, where a thematic focus has to be defined.
The programme has no predefined technology focus, but regional growth poles are required to focus on a specific product market and field of technology. As a result, the programme supports certain fields of technology according to the technological focus of the regional initiatives that were selected for funding under the programme, i.e. the programme follows a bottom-up approach of defining technology fields to be funded: ICT, Biotechnology, Nanosciences and nanotechnologies, Materials, Health, Food, agriculture and fisheries, Energy, Industrial production, Services, Transport, Environment (including climate change); and other.
A large number of national studies on Germany's technological performance (see www. technologische-leistungsfaehigkeit.de) reveal a significant lack in innovative performance of the East German enterprise sector, resulting from an unfavourable size structure (predominantly small firms) and a perceived lack of links between industry and academia. This programme, as a number of other initiatives of the Federal Government, attempts to overcome these barriers by establishing regional clusters of SMEs and improving the linkages between the enterprise sector and public research organisations.[14]

1.4. Innovation Alliances

Innovation alliances are a new instrument of public support to industrial innovation that provide funding for strategic cooperation between industry and public research in key technology areas that demand a large amount of resources and a long time horizon, but promise considerable innovation and economic impacts. Through a public-private

[14] IAO Fraunhofer Institute for Industrial Engineering: Mapping Innovation Policy in Services (IPPS). Country Report Germany, Stuttgart 2007, p. 11. See www.proinno-europe.eu/doc/germany.pdf; http://www.foerderinfo.bund.de/en/2636.php online.

partnership, the Federal government provides funding for R&D and other innovation-related activities for specific, long-term co-operative R&D projects. Public funds are complemented by private money from industry, typically at a proportion of 1:5 (public:private). Each innovation alliance is set up through an industry initiative, is organised as a long-term co-operative research project and involves several industry partners as well as public research organisations. Nine innovation alliances have been established so far, each focussing on the development of new path-breaking technologies in specific sectors and cross-cutting areas.
In order to develop new path-breaking technologies, long-term investment of substantial size and the integration of knowledge from various private and public sources are needed. The innovation alliances offer a framework for enterprises and public research organisations to co-operate on a longer term on specific innovations. R&D activities can range from fundamental research to prototype development.
Each of the currently *nine innovation alliances* target a specific field of technology: automotive electronics, organic light emitting diodes, organic photovoltaics, lithium ion batteries, molecular imaging, digital product information, carbon nano tubes, applied virtual technologies for product cycles etc.
Projects can be submitted by consortia of public and private actors at any time. Since innovation alliances are long-term large-scale partnerships of industry and science, they typically emerge out of previous activities, often funded under the Thematic R&D Programmes. Proposals and project designs are often developed jointly by the consortia and the programme administering agency that is responsible for the respective field of technology. Innovation alliances will receive funding as long as industry is ready to commit substantial private funding, typically covering at least 80 percent of total project costs.
Projects are selected based on a quality assessment of the new technology to be developed (i.e. it has to be a break-through technology of global impact that will strengthen the competitiveness of the German economy) and a high-level commitment of the industrial partners to cover the bulk of funding needed to realise the R&D project.[15]

2. Design of topics: development of non technical aspects

Programme "Innovative Services" (1998-2005)
In 1998, Germany's Federal Ministry of Education and Research (BMBF) responded to the perceived lack of service mentality among the country's businesses and research organisations by launching its first service research programme, thus laying a vital foundation for the comprehensive development of services in Germany. The initiative's key instrument involves promoting ideas, concepts, strategies and models designed to add the necessary new impetus to the successful, stable realisation of the country's potential as a location both for living and for doing business, at the same time securing employment.

Programme "Innovation with Services" (since 2006)
In March 20062, the new service research programme "Innovation with services" was launched by the Federal Ministry of Education and Research. It has a budget of € 70 million and a planned duration of 5 years.
The main topics of the programme are: the innovation management for services - (development of methods and tools, technology design for successful service innovations), innovation in growth sectors of the German economy - (business services, services for elderly people) and human resource management in service companies - (work design, i.e. skilled service work and life long learning).

Germany has realised the innovation potential of services. The aim behind this programme is to achieve for the service industry the same excellence as in the industrial

[15] See www.proinno-europe.eu/trendchart/.../Country_Report_Germany_2009.pdf online.

production technologies. Through the strengthening of the services sector a signal should be sent also to the production technology sector in rethinking their interactions. Then, technology transforms services and vice versa. Illustrative examples can be found in the area of social media applications, where customer-related value added services are the starting point for the redesign of technical solutions. The social aspect is more and more important in the mutual transformation between technology and service. [16]

Thus, a special focus of the programme are transfer activities. One important goal of the programme is to implement the research finding into practice. Moreover, the programme is designed as a "learning programme", i.e. upcoming calls for proposals will reflect the results of current projects as well as general trends in the service sector.[17]

A new component of the high-tech strategy is the Federal Government's **"Action Plan Services 2020"**. The Federal Ministry of Research aims with this action plan at a holistic view of innovation processes, where services and technologies are linked together. Technologically-oriented R&D research and services research has to be connected to tackle the societal challenges of our time.[18] The technological and research know-how has to be linked.
With around 14 million € annually promotes the Federal Ministry for Education and Research
cross-sector projects include the exploration of drivers and barriers to the success of innovations in services. The funding program deals aims at improving the conditions and the development of standards and standards for services. With this shall Germany be prepared to meet the requirements of European Services Directive and to implement it adequately in order to break down the existing barriers and to promote cross-border trade with services.

3. Development of Prizes/Awards

3.1. German HighTech Champions Award (GHTC)

Fraunhofer (Europe's largest application-oriented research organisation) launched the competition for this award for the first time on 28 February 2011 with a call for proposals in the Solar/PV field. Winners of the nationwide GHTC competition are awarded the title "German High Tech Champions" in their respective field and will be honored at corresponding international events. Aiming at exchanging information between scientists and industry as well as at identifying R&D needs, the German High Tech Champions will present actual business cases at these events, which will be strictly application oriented rather than academic ideas. [19]

3.2. "Innovative ICT start-up competition" 2011

The Federal Ministry of Economics and Technology (BMWi) supports with the innovative start-up competition companies that wish to go into business with innovative information and communication technologies (ICT). The semi-annual competition is in the current round until 31/05/2011 open for applicants.
Interested parties are invited to submit one idea paper with a maximum of 10-15 pages on which their idea is summarized. In a second step the idea will be presented to the jury orally in max. 60 seconds. There will be awarded six major prizes of EUR 30,000 and

[16] See Positionspapier der Initiative »Social Science Service Research« (3sR), April 2010, available at: http://www.interaktive-arbeit.de/files/3sr-positionspapier.pdf online.
[17] IAO Fraunhofer Institute for Industrial Engineering: Mapping Innovation Policy in Services (IPPS). Country Report Germany, Stuttgart 2007, pp. 8-10. See www.proinno-europe.eu/doc/germany.pdf; BMBF German Ministry for Education and Research: Innovationen mit Dienstleistungen, Bonn/Berlin, 2006.
[18] See http://pt-ad.pt-dlr.de/_media/Aktionsplan_2020.pdf.pdf online.
[19] See http://www.fraunhofer.de/ueber-fraunhofer/wissenschaftliche-exzellenz/german-high-tech-champions-award.jsp online.

further 15 prizes of EUR 6,000. In addition, the winners will receive coaching and training programs according to their needs. A special prize will be awarded by the Attensity Europe GmbH, SAP AG and Siemens AG worth €10,000.

4. Public procurement

In Germany, public procurement spending is around EUR 260 billion a year and thus makes up about 12% of GDP.[20] It is gaining ground but compared to other countries such as the UK, it is till underdeveloped. However, the innovation aspect in the German public procurement practice is rather marginal as stated in the Frequently Asked Questions of the National Procurement Agency:

"We are pleased about innovative and high-quality products – but we don't always buy the best available on the market. We will procure the products which cover our demand most economically. Even if competitors' products are not equal to your product, they might fulfil our requirements better and possibly even cheaper. Thus, please offer adequate products." (Question: my product is outstanding – no one else can offer something like that – thus, we have to get the contract in any case!)[21]

On the sustainable procurement website (www.beschaffung-info.de), there is reference that innovation in sustainable products and their diffusion into the market can be fostered by procuring those goods. Sustainability here means not only ecologic but also economic and social sustainability, i.e. also innovation fits in here (e.g. sustainable energy/energy efficiency products).

Although it is emphasised that the interests of SMEs in public procurement contracts need to be taken into account by various measures, procurement contracts are usually granted to the cheapest bid not to the most innovative one. Furthermore, firms who received funding in the past are more likely to be selected for public funding again. Moreover, a firm's size and knowledge capabilities increase the probability of entering the scheme.
In Germany there is a process of re-orientation under way. At the central governmental level a focus group has worked towards new recommendations for innovative procurement. This includes considerations as supporting lead markets through public procurement and introducing a procurement award for agencies having procured innovation. This is expected to raise awareness at all levels; however, an implementation strategy of these guidelines to make actors comply is not foreseen for the time being.[22]

No pre-commercial procurement measures found.

Two cases studies[23]
The first case deals with the procurement of new lighting systems in the state and city of Hamburg to meet objectives in terms of saving energy as well as sustainability. These systems were procured for all 1,500 public buildings. This created effects of scale and critical mass. Furthermore, the procuring agency has been allocated its own item of the

[20] Birgit Aschhoff /Wolfgang Sofka: Innovation on Demand – Can Public Procurement Drive Market Success of Innovations. Discussion Paper No. 08-052 of the Center for European Economic Research, p. 3. See http://econstor.eu/bitstream/10419/24748/1/dp08052.pdf online.
[21] Study on the Structure of the German public procurement system, p. 3. See ftp://ftp.cordis.europa.eu/pub/innovation-policy/studies/3_germany.pdf online.
[22] ISI Fraunhofer Institute Systems and Innovation: Research Innovation and Public Procurement. Review of Issues at Stake Study for the European Commission (No ENTR/03/24) Final Report, 2005, pp. VII-VIII. See http://cordis.europa.eu/innovation-policy/studies/full_study.pdf,; ftp://ftp.zew.de/pub/zew-docs/dp/dp08018.pdf online.
[23] ISI Fraunhofer Institute Systems and Innovation: Innovation and Public Procurement. Review of Issues at Stake. Study for the European Commission (No ENTR/03/24), Final Report, 2005, pp. 47-48.

budget and an according competence for all questions referring to energy consumption, which produced a situation where the agency was able to work independently. This was backed by the well-developed life-cycle oriented evaluation culture, a clear political mandate and support by the highest authorities. The major lesson to be learned from this case lies in the usage of first the interposition of a large and well experienced local enterprise (i.e. to use their knowledge, connections and experience) und second preliminary talks strictly separated from the actual procuring process to ensure the process could be coped and to get information on the available properties as well as opportunities for cost reduction. Moreover, the spill-over effect towards private businesses created by the environmental partnerships and the according support programme is remarkable.

In the second case, the City of Heidelberg has procured a "most modern" voice over IP system for its administration, especially for the interface with the citizens. The procurement process is characterised by an innovation-friendly culture and clear political mandate. On that basis, the unit responsible for the ICT equipment in the city organised the procurement itself, exploiting a sound technical and market expertise. The procurement is a good example of the importance of in-house technical expertise, permanent market and technology monitoring, including a routine and direct contact to market players, an intensive – highly confidential (formal confidentiality clause!) – dialogue with potential suppliers to reconcile concrete needs with technological possibilities of suppliers. Furthermore, the innovation was procured in a first step with a limited number of installations to reduce the risk; subsequent units may be bought in the open market.

III. EVALUATION LEVEL

1. Support to applicants

Innovation Relay Centres
Steinbeis-Europa-Zentrum (SEZ) is consortium leader of the IRC Stuttgart - Erfurt - Zürich, which is the Innovation Relay Centre for Southern Germany and the German speaking part of Switzerland with two consortium partners - THÜRINGEN innovativ GmbH in Erfurt and from April 2000 until March 2005 OSEC Business Network Switzerland in Zürich.

The IRC Stuttgart - Erfurt - Zürich has been very successful: A comparison of achievements of the whole network with those of the IRC Stuttgart - Erfurt - Zürich shows that 10% of the network results currently stem from the IRC Stuttgart - Erfurt - Zürich. The good results can largely be attributed to the good infrastructure of the regions as far as industry and research are concerned, however a substantial contribution to the results is made by the IRC's team - it is well established, professional and has a low staff-turnover rate. These factors have resulted in three "Good Practices" and one Benchmark being delivered to the network in the last two years.
The three partners have highly complementary factors as all three regions are very dynamic in innovation, technology development and entrepreneurial activities. The combination of one highly developed EU region with one less developed (objective 1 region) and a non-EU region is certainly a successful approach.
SEZ profits from a highly industrial region with well established regional technology transfer structures and incubator systems. The network of the Steinbeis Foundation offers services through its branches (some offices are also situated in Thuringia and Switzerland), which give additional access to technology experts. The technology transfer experience within Steinbeis as well as the services offered to the incubator scene in

Baden-Württemberg in co-operation with the universities is also of added value for the partners.[24]

2. Evaluation measures

On behalf of the Federal Government of Germany, the Commission of Experts for Research and Innovation presented its report for 2010 and it was underlined that 1% of the research should be allocated in the future to the evaluation of research by government departments and the results should be made available.[25]

The Expert Commission for Research and Innovation in its report from 2010[26] suggested establishing a Commercialisation Fund to improve the transfer of research findings and exploitation of research results. This would go beyond the existing approaches in programmes such as the EXIST Transfer of Research or the High-Tech-Start-ups Fund.[27] The same commission suggested also the need for more support for companies in the standardisation process. For SMEs there is a lack of incentive to pursue standardisation alone because competing companies will also profit from the standardisation, so support for business is needed in this regard.[28]

For the continuation of the High-Tech Strategy was proposed that the focus should be put on particularly important fields, identified on the basis of foresight processes. The High-Tech Strategy should concentrate on a maximum of ten fields of technology. This involves harmonising these fields with those identified in the foresight process and with the investment priorities in the private sector.[29]

It was suggested that the cutting-edge technology and knowledge intensive services should be expanded and the expenditure increased. The expansion of R&D expenditure in Germany's private sector has been below average in an international comparison.[30] There was also more effective interaction between public research and industrial innovation suggested: this is the case when the fields of cooperation and the R&D topics of both sides fit well together and projects are synchronized. However, there are noticeable differences between the R&D portfolios of German companies and the research portfolios in the public sector. Companies from areas of cutting-edge technology, like pharmaceuticals and biotechnology, network and in internet technology tend to stimulate the innovation process more, but they are less represented in Germany.[31]
Long-term trends and international comparisons show that Germany is losing ground. Other countries, particular in Asia, have invested much more in R&D and their economy is clearly directed towards knowledge-intensive services and cutting-edge technology. Their rapidly expanding domestic demand and well-trained workforces also make these countries attractive for direct foreign investments.

Research and innovation policies should be in the eyes of the expert commission also more targeted at selected fields of technology and new models of cooperation between the public and private sector should be created.[32] The German private sector should

[24] See http://www.steinbeis-europa.de/388.html online.
[25] Commission of Experts for Research and Innovation (EFI), Berlin (Ed.) (2010): Research, Innovation and Technological Performance in Germany - EFI Report 2010, EFI Berlin, p. 8.
[26] Commission of Experts for Research and Innovation (EFI), Berlin (Ed.) (2010): Research, Innovation and Technological Performance in Germany - EFI Report 2010, EFI Berlin.
[27] See EFI Report, p. 20.
[28] See EFI Report, p. 20.
[29] See EFI Report, p. 44.
[30] See EFI Report, p. 34.
[31] See EFI Report, pp. 41 et seq.
[32] See EFI Report, p. 10.

increase the proportion of their gross value added spent on R&D. Policy makers are called on to support this by establishing innovation-friendly framework conditions.[33]

It was also stressed that there should be favourable conditions for innovation rather than special innovation programmes for eastern Germany. The main challenges faced by policy-makers concerning innovation in eastern Germany are the persistent weakness of R&D in the manufacturing sector and the underdeveloped knowledge-intensive services. But twenty years after unification, Germany has now a largely uniform R&I system. Certainly, the innovation potential and innovation performance in the new Länder has not yet reached the level of the old Länder, but the evident weakness of the eastern German university and research landscape are not fundamentally different form those of the structurally weak regions of western Germany. The Expert Commission sees no longer the need to develop new programmes specifically for R&I policies in eastern Germany. The primary task of the R&I policies of the Federal Government is to strengthen the overall position of Germany in the competition for innovations. Strengthening the innovation location involves providing support for agglomerations where innovation is already well-developed. The demographic problems represent also a key constraint on the innovative potential of the new federal states. There is a threat of shortages of skilled personnel. (But this is also a serious issue on the EU level). [34]

Also the desirability of R&D tax incentives was underlined by the expert commission. The inadequate availability of risk capital is a serious problem for the German innovation system because such capital such capital is crucial to provide a sound capital basis for young, innovative enterprises. In Germany only 0.04 % of GDP is used for venture capital investments, in Finland 0.07%, in the UK 0.15%. In Germany the start ups are relatively low and also show a long-term downward trend also because young innovative enterprises often have initial difficulties establishing a stable customer basis. In order to support them in this phase, a certain proportion of public acquisitions should be reserved for the products of such companies, suggested the Expert Commission. This can help them to become established and stimulate follow-up orders from other companies. In the USA this approach has been used successfully for more than 25 years as part of the Small Business Innovation Research programme (SBIR).19 A similar approach has been proposed in France. In order to broaden the impact of public start-up support, the experts suggested initiating a support programme together with the French government. In the best case, this project to provide support for young, innovative enterprises could be extended to cover all Europe. This would in their opinion contribute to overcoming the fragmentation of the European market, in particular for start up enterprises.[35]

Additionally, a better coordination between all levels of funding was suggested because there is a failure of coordination made worse by excessive decentralization and overlapping in the provision of research support, without that the results have been transferred to marketable products. The High-Tech Strategy was an important step towards overcoming this coordination problem. However, the implementation of the strategy was the responsibility of the individual ministries and the associated project funding institutions and advisory bodies. So far, little use has been made of the opportunities for improved cooperation between the ministries offered by the High-Tech Strategy as stated in the EFI report.[36]

The programmes are distributed among different ministries, various project funding institutions and Federal States. Whereas the large part of R&D expenditure in the old Länder is provided by the private sector, R&D in the new federal states is mostly government funded. The cutting-edge technology in the new federal states and in Berlin

[33] See EFI Report, p. 44.
[34] See EFI Report, pp. 64 et seq.
[35] See EFI Report, p. 25.
[36] See EFI Report, p. 43.

is better represented than in West Germany. The photovoltaic industry example. Also SMEs in the new federal states play a much more important role in conducting research and development than they do in the old Länder. Companies in East Germany invest a greater proportion of their revenues in innovation processes than companies in West Germany.[37]

IV. PROJECT LEVEL

1. Improved entrepreneurship assistance

Technology Venture Capital Programmes
The Federal Venture Capital Programmes are special programmes for technology-based companies. They consist of different subprogrammes:

1.1. ERP Start-up Fund
The ERP Start-up Fund offers co-investment as a complement to a private lead investor for early stage investment. The ERP start-up fund provides support funding in areas such as setting up and consolidating a business, research and innovation (all fields) and economic activities. The fund is open to small commercial technology firms whose main offices are in Germany. Firms must meet the EU's defined criteria for small businesses (fewer than 50 employees and an annual balance sheet or turnover of no more than €10 million).[38]

1.2. High-tech Start-up Fund
High-Tech Gründerfonds invests venture capital in young, high-opportunity technological companies implementing promising research results in an entrepreneurial manner. Over the next five years, The Fund not only wants to provide technologically oriented company foundations with the start-up capital, it also wants to ensure the necessary supervision and support for their management. The main target group are spin-offs of public research institutions and universities as well as corporate spin-offs. In average, start-up projects will receive funding of about 0.5 million. Funding is delivered through a combination of equity investment and second-tier loan. In the first years, enterprises will be lifted from interest payment.

Background and rationale of the programme is that although German research occupies a premium standing in international comparison, far too few of its results flow onto the German market. Technological company foundations help to balance this deficit by transferring technologies from science to commercial applications. Particularly at the beginning, high-tech companies require venture capital that is scarcely available in Germany itself. Since the downfall of the New Economy, young, innovative high-tech companies have had a hard time finding investors. And this is where the High-Tech Gründerfonds product & services range comes in.
The list of policy priorities includes support to risk capital; support to innovative start-ups; promotion of entrepreneurship/start-up (including incubators); pre-competitive research; applied industrial research; commercialisation of innovation (including IPR).

The High-Tech Gründerfonds Team of Investment Managers offers the new start-ups valuable support on a partnership basis. High-Tech Gründerfonds works with a pool of experienced experts, from which the founders can select their special coach. Coaching usually starts during the development stage of the business idea and ends when follow-up financing has been achieved, or once the enterprise has achieved sustainable, self-financing from cash flow.

[37] See EFI Report, p. 63.
[38] See http://www.kfw.de/kfw/en/index.jsp online.

Interested company founders that want to start-up their own business based on a technology-oriented innovation project have to submit a proposal containing an overview of a potential business plan, technical information on the (planned) innovation and the likely market potential. The concept sketches must bear the reference of a coach, an investor or a research institution. Proposals are evaluated by a project management and technology-specific steering committees. So far, three such steering committees are planned: Software/information technologies, Life Sciences/New Materials, Telecommunication and Media.

If the result of the examination of the concept is positive, the founders will receive a preliminary Terms Sheet with the High-Tech Gründerfonds conditions for participation and the application for financing. The Fonds will then decide accordingly whether it will initiate the process of due diligence. In the framework of due diligence, High-Tech Gründerfonds conducts a structured examination in which it obtains a number of items including an expert report regarding the technological basis, the degree of innovation and the market chances of the project. One of the three Investment Committees, each consisting of five members, reaches a decision regarding the entry into a participatory investment in the company. Based on this, the High-Tech Gründerfonds submits an offer for participation to the technological companies.[39]

1.3. EXIST - Start-ups from Science

EXIST is a support programme of the Federal Ministry of Economics and Technology (BMWi) aimed at improving the entrepreneurial environment at universities and research institutes and at increasing the number of technology and knowledge based company formations. The objectives of the programme are: to establish a lasting "culture of entrepreneurship" at universities and research establishments, to support consistent transfer of scientific knowledge into commercial output, to promote the enormous potential of business ideas and entrepreneurial personalities at universities and research establishment in a targeted manner, to increase the number and the chances of success of innovative business start-ups.

Therefore EXIST includes three different programme lines, called "Culture of Entrepreneurship", "Business Start-Ups Grants" and "Transfer of research!". Even though the rate of establishments in the technological field is low, the potential in creating jobs is higher than in other fields. For that reason EXIST tries to support the activities at universities and research institutes for increasing the number of new foundations. Policy priorities include support to innovative start-ups incl. gazelles, support infrastructure (transfer offices, training of support staff), knowledge transfer (contract research, licences, research and IPR issues in public/academic/non-profit institutes).[40]

1.4. BMWi Programme -Innovation vouchers (go-inno)

Innovation vouchers are being offered by several German federal states to promote innovation in small and medium-sized companies. They help with, for example, paying for feasibility studies, calculations or simulations. The advantage of innovation vouchers is their extremely low level of bureaucracy and that they are very quickly implemented compared to other funding programmes. Innovation vouchers are limited to around EUR 10,000.
The programme supports consultancy services for innovation management in small businesses including the development and implementation of product and process innovation and the identification of potential funding sources. The financial support for consultancy services is 50 per cent over all three levels. The programme is not focused on any particular technology, product or industry, but supports the development and introduction of product and process innovations.

[39] See http://www.high-tech-gruenderfonds.de/ online.
[40] See http://www.exist.de/exist-gruenderstipendium/index.php online.

The instrument starts with an initial consultancy session which is free of charge. The initial session also comprises an evaluation of the innovative ability including an innovation audit and an evaluation report according to the European IMP³rove assessment method.
After the initial session, three modular performance levels will help the SMEs reach their innovation objectives:

Performance level 1 - business audit and feasibility study: Evaluation of the innovation potential and innovation ability of their organisation by using a proven set of procedures and techniques; recommendations on further steps will be made. Result: feasibility study for an actual concrete innovation project.

Performance level 2 - realisation concept: Market analysis to assess current and future technologies, development of a realisation concept, identification of potential technology providers/cooperation partners and sources of funding, advice on submission for grant application. Result: concept of an innovation project including implementation plan and funding.

Performance level 3 - project management: Monitoring of the innovation project, management of concept implementation including project controlling, final evaluation of the innovation project and implications for current and future projects. Result: product and/or process innovation.[41]

2. IPR Support

-Collaborative research and knowledge transfer

2.1. Patent Information Centres and Thematic Information Centres

Patent Information Centres provide access to scientific and technological information that is contained within patents, registered designs and trade marks for firms and private inventors. *Thematic Information Centres* aim at improving the access to various databases relevant for innovation activities by firms and research organisations. The *Private Information Agencies* allow SMEs who can not afford to have, or choose not to develop, their own databases to call on professional information brokers to do their information inquiries.

Providing information relevant for innovation projects to firms (particularly SMEs) which may be difficult to access through market mechanisms because SMEs would need to invest into specific search capabilities while only rarely having the need to access patent or thematic information. The list of policy priorities include measures to raise awareness and provide general information on IPR; research infrastructures; support infrastructure (transfer offices, training of support staff); consultancy and financial incentives to the use of IPR. Information centres cover all fields of technology. Each of the thematic information centres focuses on a specific field, e.g. engineering, chemistry, agriculture, environmental technologies, etc.[42]

2.2. Innovations against piracy

With the funding initiative "Innovations against piracy", the Federal Ministry for Education and Research promotes cooperative research projects between companies (in particular SMEs) and research institutes. These projects seek to develop innovative solutions for protecting against piracy. The initiative focuses on producers of capital goods and seeks – through publicly funded research projects – to enable them to develop effective concepts for protecting against piracy, for example through approaches that integrate aspects of

[41] See http://www.inno-beratung.de/foepro/go/index.php?navanchor=1710006 online.
[42] See http://www.piznet.de/ online.

design, production and information technology within their highly complex machines and facilities which are in demand worldwide. The objective is to attain clear technological leadership in the field of "product-integrated copy protection". The announcement of the initiative "Innovations against piracy" forms part of the Federal Government's High-Tech Strategy. The project is still in development but it appears interesting to have a technological approach coming from the national level to fight counterfeiting. [43]

2.3. Messe Frankfurt against Copying

The 'Messe Frankfurt against Copying' scheme is a classic example of a counterfeiting and pirary 'hot spot' in a trade fair context with co-ordinated legal advice, other advisory support and enforcement services available in-situ to exhibitors via a stand at the Frankfurter Messe trade fair. Support is available to all exhibitors, whether SMEs or not. The success of the scheme has led to it now being replicated at trade fairs outside Germany. The managing institution is Messe Frankfurt Exhibition GmbH in partnership with a network of IPR enforcement bodies from the public and private sectors. The 'Messe Frankfurt against Copying' initiative is widely regarded as a successful scheme. The number of confiscations has fallen markedly (at some Messe Frankfurt events by as much as 30%) while applications for design registration are increasing. Some 5,000 people came to its stand at the 2007 Frankfurt trade fair. [44]

2.4. SIGNO - Protection of ideas for commercial use

SIGNO (until 2007: INSTI) supports SMEs, individual inventors and universities in using IPRs to protect and commercialize their innovative ideas. This is to stimulate the transfer of technology. SIGNO is continuing the Federal Government's former patent exploitation campaign. It supports 24 patent and commercialization agencies located at institutions of higher education. 6,800 companies and people setting up in business have already received support under the SIGNO-SME patents campaign. 75% of the inventions have been patented. The firms concerned have created approximately 1,400 jobs.

SIGNO comprises three sub-programmes: *SIGNO Universities* offers support to universities for making better use of IP commercialisation infrastructures available to universities (particularly the Patent Commercialisation Centres established under the DE_72 programme) and to establish demand-oriented commercialisation strategies at universities (incl. industry-science cooperations). *SIGNO Enterprises* runs three individual measures: The SME Patent Initiative offers grants to SMEs that want to use IPRs for the first time. The Innovation Market measure provides a marketplace for inventors and innovators to find companies that assist them in financing and bringing their products onto the market. The Innovation Action aims at enabling enterprises and start-ups to establish internal innovation processes on a permanent base by offering consulting services through a network of IP consultants. *SIGNO Inventors* runs two measures: The Inventor Clubs aim at supporting and promoting the creative potential of inventors by offering a platform for the exchange of experience and advice for inventors and young creative individuals. The Inventor Information Service provides inventors with key information on how to use IPRs. This activity continues the support to private inventors through the former Fraunhofer Patent Bureau (DE_6) which ended at the end of 2007. The goal of the initiative is to overcome information and financial barriers to use IPRs by SMEs and individual inventors and to raise awareness about the relevance of IPRs for commercialising innovations. [45]

3. Development of strategic pre-normative research approach to support standardisation

[43] See http://www.innovaccess.eu/iesm_germany.html online.
[44] See http://www.innovaccess.eu/iesm_germany.html#7 and http://www.produktionsforschung.de/index.htm online.
[45] See http://www.signo-deutschland.de/content/index_ger.html online.

Research & Development Phase Standardization
To promote the concept of R&D phase standardization, DIN (Deutsches Institut für Normung – German Institute for Norm) has established a special committee answerable to the Presidial Board. It unites high-ranking representatives of the scientific and economic communities. Its remit is to examine possible areas of interest and, where appropriate, to initiate corresponding activities. Areas in which work is already in progress are, i.a., laser technology, integrated optics, microsystems, thin-film engineering, information technology, environmental technology, e-learning, e-commerce, e-government, knowledge management, and last but not least the field of services.

Many new technical systems are developed with such rapidity that standardization in its traditional form cannot adequately keep pace. Characteristic for many innovative technologies, however, is that the resulting systems are so complex that without some form of normative structuring they will not function. Such complex systems are further characterized by their development proceeding in iterative stages that do not initially produce a stable "state of the art", as it has been the traditional object for standards to document.

For this reason, DIN has introduced the specification concept to create specifications (DIN SPEC) faster and hence in step with rapidly developing technologies. This involves a proactive approach to questions of standardization very early on in the overall process, which can then benefit from the timely formulation of recommendations on structural aspects of the developing product/system. The aim, then, is to define and agree on specifications at the R&D phase that can serve as jump-off points for further phases in the development process. The normative instruments designed to facilitate this are referred to by DIN collectively as R&D phase standardization.

The specification DIN SPEC (PAS) 1041 »*Outsourcing technology-driven knowledge-intensive business services*«, developed in another INS project, gives businesses guidelines which will greatly facilitate the planning and performance of outsourcing projects. The »Developing and applying standards for manufacturing execution systems (MES)« project resulted in the founding of an international working group under German leadership which has drawn up proposals for a new standards project.
In the automotive technology sector, the 2009 INS project »*Standardization needs for alternative drives & electro mobility*« provided an overview of the current state of standardization in electro mobility, and gave recommendations for action and concrete suggestions for important standards projects.[46]

3.1. The Innovation with Norms and Standards (INS)
The project supported by the Ministry of Economics and Technology since 2006 is helping small and medium-sized enterprises (SMEs) in particular to cope with often very complex standardization processes.
Early support for innovative research and development projects makes it possible to detect and elaborate standardization potential promptly during the process involved in generating products, systems and services. Relevant fields of standardization are identified at an early stage, safeguarding the pioneering role in future technologies.
The German government underlined its corresponding awareness of this issue in its High-Tech Strategy adopted in summer 2006: "Early consideration of standardization aspects in the research process and in the implementation of research results in the high-tech sphere brings Germany competition advantages." The Federal Ministry of Economics and Technology initiated the project "Innovation with Norms and Standards" as a long-term special project. The aim is for this project to promote awareness in German industry of the role played by standards and specifications as an innovation-relevant factor that is important for market success, supporting German industry in the face of international competition while at the same time enhancing and fortifying the transfer of know-how

[46] See http://www.ebn.din.de/cmd?level=tpl-home&languageid=en&contextid=ebn&print=true online.

and technology from research into standardization. In this way, standardization acts as an indicator for the implementation of innovations on the market.
Projects are selected according to the following criteria: degree of innovation, benefit for German industry, urgency, European or international significance (CEN/CENELEC or ISO/IEC) and concurrence with the INS scope. Projects will begin in early 2012, possibly accompanied by a call for tenders to support the projects. Maximum project term: 2 years.

Examples of completed and on-going INS projects: safety of fuel cells (since 2009) and ultra high voltage (UHV): transmission of electrical energy in the ultra high voltage range (since 2008)
New projects 2010:
• Evaluation of the energy yielded by photovoltaic modules;
• Development of measurement and analysis methods for measuring the environment conditions for using ocean wave energy and ocean current energy;
• Pulsed radiation in radiation protection;
• Standardization of nanotechnology for electrical and electronic products and systems;
• Qualification of optical components for concentrating solar technology;
• Starter kits for standards on communication with systems using local energy supply.

3.2. Transfer of R&D results through standardization (TNS)

One aim of the funding measure is the gradual integration of research results to industry and business by transferring latest research findings into norms and standards.

Through the grant project the following contents and objectives can be promoted:
• development and implementation of strategies for the transfer of results via standardization
• organization of events to inform interested parties from science and economy at an early stage on standardization and on the recovery potential (Verwertungspotenzial) of norms and standards as well as to include professional representatives and potential standards users in standardization work in time
• taking specific measures to develop and accompany norms and standardization
• considerations of standardization in terms of technology convergence
• preparation of the initiation of new standards and standardization projects on national (DIN / DKE), European (CEN / CENELEC) or international (ISO / IEC) level (based on standardization-relevant research results)
• Preparation of the transfer and representation of research results in existing and newly to be established standardisation and regulatory bodies, taking into account the German interests.

Grant recipients can be companies with business operations in Germany, especially SMEs and universities or non-university research facilities. Non-autonomous federal agencies with R&D tasks will receive for cooperation projects with industrial companies, universities
or other research funding bodies a grant as an assignment. The grant is a non-repayable grant (project funding) in the form of a proportional funding/pro-rata funding. The total amount of benefits for a company / university/research and scientific institution under this policy is limited to EUR 150,000. The project duration should be at least 6 and a maximum of 24 months.[47]

V. FOLLOW-UP TOWARDS EXPLOITATION

[47] Neufassung der Foerderrichtlinie "Transfer von Forschungs- und Entwicklungsergebnissen (FuE) durch Normung und Standardisierung", 1 March 2010, pp. 2-3. See http://www.ebn.din.de/sixcms_upload/media/2929/Endfassung_Foerderrichtlinie_FuE.pdf online.

1. Valorisation or dissemination of results

With its promotion measure "*Validating the Innovation Potential of Scientific Research – VIP*" the Federal Ministry of Education and Research helps turning results promptly from basic research into innovations. This financial measure allows researchers to valorise commercially their ideas. Often, there is a gap between the idea and the market and through this measure the innovation potential of a research can be verified and validated. Through the validation the risks for the industry to invest into the development of a product, process or service will be minimised. VIP finances projects from different sectors, which prove the technical feasibility and the economic potential of the projects through demonstrators and developments, evaluative analyses, technical advancements towards process and product demands and analyses of the application potential.
The validation process provides different valorisation modalities: licences can be given and research cooperations with the industry sector can be established. This financial measure addresses universities and public research institutions for a maximum of three years. The allocation cannot exceed the sum of €500.000 per year. Furthermore, through the involvement of an "innovation mentor" it is to be secured that the financed projects are oriented towards the requirements of the innovation process.[48]

2. Open access to the results of publicly funded research

Open-access.net is an online information platform on open access issues. The Universities of Bielefeld, Göttingen, Constance and the Free University of Berlin jointly operate the platform. The new platform enables not only scientists to gain comprehensive information about open access. Open access literature is defined as free of charge for users providing online access to digital scholarly material worldwide. Since the Berlin Declaration on Open Access to Knowledge in the Sciences and Humanities in 2003 open access has gained increasing significance within the academic world. Various academic institutions, research funding agencies as well as a growing number of universities have already signed the Berlin Declaration. Accordingly, the German Research Foundation (DFG) encourages scientists to provide an open access version of the research it has funded. The publications are either to be deposited in discipline-related or institutional electronic archives (repositories) following conventional publication, or to be published in a recognised peer-reviewed open access journal. Meanwhile, the advantages of worldwide free and unrestricted access to scientific research are beyond controversy. For researchers, using open access maximises their research impact, increases their visibility and raises their reputation. Users are benefiting from open access as well: They can access relevant information on the Web worldwide at any time. However, discipline-related information pages are still under construction. As a result, specific information on open access is currently not available for every discipline. But all users are explicitly invited to contribute to the platform by submitting additional news, information and suggestions. [49]

3. Brokerage events

There are regularly organized brokerage events in Germany covering different fields of research.

VI. CONCLUSIONS

[48] See http://www.validierungsfoerderung.de/ online.
[49] See http://open-access.net/de/austausch/presse/pressemitteilungen/pressemitteilung_start_englisch/ online.

These findings show that in Germany one can detect many of the innovation toolbox measures developed and proposed at the European level by the Commission towards an Innovation Union. Many of the provisions to be implemented by the next Common Strategic Framework are already in use in Germany. Germany is offering a variety of innovation funding instruments and measures, involving both levels (the federal and the state/Länder level) as well as several coordination mechanism, stakeholder groups and expert councils. Programmes and measures are continually redesigned according to new challenges.
The Federal "High-Tech Strategy 2020" can be considered an adequate measure of the German innovation policy. It led to an increase in funding for research and development and made national R&I policies more effective. The regional dimensions of innovation policy represented through the "Top Cluster Programme" and the Innovation Initiative "Entrepreneurial Regions" are important tools, the latter developed especially for the new Länder (Eastern Germany) to enhance their economic development. In Germany, there is a strong industry-science linkage in the developed policies and programmes. The "Innovation Alliances" are a new instrument of public support to industrial innovation that provides funding for strategic cooperation between industry and public research in key technology areas. A particular focus is put on SMEs while developing new thematic R&D programmes boosting innovation. In addition to thematic R&D programmes, a number of activities in increasing excellence in basic research have been undertaken like the "Excellence Initiative" to promote top level research at universities or the "Joint Initiative for Research and Innovation" targeting the main public research organisations.

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INNOVATION LANDSCAPE IN FINLAND[1]

I. STRATEGY LEVEL

1. Improvement of foresight activities to anticipate technology and market needs

1.1. Finnish National Foresight Network

At the central level, the Government Foresight Network is an inter-ministerial forum for cooperation and exchange of information established under the Prime Minister's Office. The most important input to the national policy elaboration are the strategic policy reviews, drawn up by the Research and Innovation Council, every third year since 1987, defining the strategic directions, structural framework and goals of research, technology and innovation policy.[2] Periodically or occasionally, also other organisations (SITRA, Tekes, VTT, Academy of Finland etc.) publish their own foresight reports, policy papers and proposals. In general, policy design and delivery at national level are characterised by a high degree of openness, public consultation and evidence-based decision-making.[3]

The Foresight Network has two primary operative models:
• Theme groups gather together experts to recognise significant forces of change with regard to the future of Finland.
• The Foresight.fi website launched in the autumn 2008 gathers together foresight information from Finland and abroad.

The very best Finnish foresight experts and decision-makers from the public and private sectors, the research community, and NGOs will be invited to join the theme groups. The theme groups define the focus areas for their work in the first workshop. After this, the focus areas will be discussed in specially-dedicated workshops. The workshops will draw up a summary of their work, which defines the key challenges and opportunities as well as recognises practical measures to answer them. The Foresight.fi website will make the results available to all the interested parties.

Foresight.fi, launched 2008 is the website of the National Foresight Network, a network of Finnish organizations that conduct regular foresight work. The aim of the National Foresight Network is to raise awareness of Finland's new challenges and opportunities so they can be discussed, studied, and considered in decision-making. The activities of the National Foresight Network are coordinated by Sitra, The Finnish Innovation Fund. The Foresight.fi website provides information and discussion on trends that affect Finnish society. Its aim is to be an open meeting place for foresight information and interested discussants. Foresight.fi equally welcomes experts, decision-makers and all citizens interested in futures.[4]

1.2. FinnSight 2015 - Science and Technology in Finland

FinnSight 2015 is a joint foresight project of the Academy of Finland and Tekes, the Finnish Funding Agency for Technology and Innovation. The project was carried out in

[1] This report is based on ERAWATCH, INNO-Policy TrendChart findings and on the documents available on the website of ministries, public funding institutions and research organisations in Finland.
[2] See the list of publications at http://www.minedu.fi/OPM/Julkaisut/julkaisulistaus?lang=en online.
[3] See INNO Policy TrendChart Country Report for Finland, 2007 and INNO Policy TrendChart European Innovation Progress Report 2009, p. 52.
[4] See http://www.foresight.fi/info-in-english/ online.

2005-2006. The foresight project examined the change factors that have an impact on Finnish business and industry and on Finnish society, identified future challenges of innovation and research activity and analysed such areas of expertise which will foster the well-being in society and the competitiveness of business and industry by means of scientific research and innovation activities. The focus in foresight was on social and global issues. The core of the foresight project comprised ten expert panels, each of which was composed of twelve experts. The areas that emerged most prominently were the management of global risks, energy and environment issues, the renewal of the health care system as well as ICT and biosciences applications. All of these areas require science and technology cooperation that is based in human needs. FinnSight was a foresight process of two funding agencies with different but complementary roles in R&I, therefore it was imperative to achieve a proper balance in addressing the intertwined components of research (of key concern to the Academy of Finland) and innovation (of key concern to Tekes) in the R&I system. These panels were composed by researchers and industrialists with two chairpersons, one from academia and one from industry.
The following foresight topics were addressed:

- Learning and Learning Society
- Services and Service Innovation
- Well-being and Health
- Environment and Energy
- Infrastructures and Security
- Bio-expertise and Bio-society
- Information and Communications
- Understanding and Human Interaction
- Materials
- Global economy

FinnSight 2015 has provided also valuable inputs to the National Innovation Strategy. [5]

1.3. The Finnish National Innovation Strategy 2008

A steering group chaired by Esko Aho, President of Sitra – The Finnish Innovation Fund, was appointed for the preparation of the innovation strategy. The steering group submitted its proposal for a national innovation strategy to the Ministry of Employment and the Economy on 12 June 2008. Based on this followed a Government's Communication on Finland's National Innovation Strategy to the Parliament. These documents set the goal of pioneering in innovation activity in selected sectors of innovation. The Communication presents four strategic choices deemed crucial for the future of the Finnish innovation system: innovation activity in a world without frontiers, demand and user orientation, innovative individuals and communities, and systemic approach.

Finland's national innovation strategy, drafted 2008, emphasises user-driven innovation and demand-driven innovation policies. Public procurement volumes in Finland are an important factor in demand-driven innovation policy with a volume of approximately EUR 22 billion, corresponding to 15 per cent of the country's gross domestic product. User-driven innovation policy emphasises innovation that is steered by user needs (paying attention to the needs of customers, consumers and citizens, incentives, shared innovation processes), in which the utilization of user information, cooperation in product development between users and companies, and users' own innovation activities, are central.
The intention is, therefore, to develop public procurement practices, in order to create opportunities for and encourage innovative procurements. As part of the implementation

[5] Totti Könnölä et.al: FinnSight 2015 – A National Joint Foresight Exercise: Foresight Brief No. 164, 2009, pp. 1-4. See
http://www.foresightplatform.eu/wpcontent/uploads/2010/04/EFP_Brief_No._164_FinnSight_2015_2_.pdf;
http://www.finnsight2015.fi/ online.

of Finland's national innovation strategy, the Ministry of Employment and the Economy outlined a policy framework and action plan laying down the key elements of a demand and user-driven innovation policy. The Action Plan was adopted in 2010 and it will be running until 2013.
The strategy includes 10 development guidelines: reinforcing the competence base for broad-based innovation activity; internalisation of the innovation environment and operating in a world without borders; strong and networked innovation centres; internationally competitive system of training and higher education; developing the Finnish environment to support growth business; strengthening demand and user orientation; central government's corporate steering and systemic approach; resources for innovation activity.
The innovation governance structure was also reorganized: The two most central organisations in the innovation system, the Science and Technology Policy Council and Tekes have been restructured. The first, the central body for policy elaboration was rebranded the Research and Innovation Council in 2009 to stress the increased significance of horizontal innovation policy and know-how. The role of Tekes as the core implementation agency for financing R&D and innovation has been transformed and now, besides funding technological innovations (its main role initially), it also supports service-related, design, business, and social innovations. [6]

1.4. Research and Innovation Policy Guidelines 2011-2015

The policy guidelines set out the Finnish research and innovation priorities for the five year period as follows: adequacy and renewal of human resource, creation of high-quality knowledge and competence in Finland**,** the efficient transfer of knowledge and the exploitation of knowledge and expertise and the creation, introduction and commercialisation of innovations.[7]
Resources will be allocated towards priority areas like SHOKs, expertise in software, as well as the bio sector and nano-sector. There will be a shift from traditional R&D towards a broad-based system of research and innovation through the involvement of different actors (enterprises, R&D organisations, customers/users), the combination of technological and non-technological innovations (research and development, business, marketing and organisational innovations), public and private service and other innovations.[8] These are all priority actions that have been detected on the European level as boosting innovation.

1.5. Tekes Strategy – Growth and wellbeing from renewal 2011

Tekes funding under the new strategy will be targeted as follows: one third for projects implemented by universities and research institutes and two thirds for enterprise R&D and innovation projects.
Targeting of project funding for enterprises: one third for young SMEs, roughly one third for established enterprises with less than 500 employees and less than one third for enterprises with more than 500 employees if external impacts on other actors are significant, or if the company is essentially reinventing its business operations.
The funding will be channelled through different operating methods: around 40 % for customer initiatives based on demand and around 20 % for research programmes of the Strategic Centres for Science, Technology and Innovation (SHOK), around 25 % to focus areas through Tekes programmes and around 15 % to other strategic choices.

[6] See Demand and User-driven Innovation Policy, Framework and Action Plan: Publications of the Ministry of Employment and the Economy, Innovation Department. 48/2010, pp. 1-106, here pp. 14 et seq.; see also the European Innovation Progress Report 2009, European Commission, pp. 47-53, here p. 48. See www.proinno-europe.eu/page/admin/uploaded_documents/EIPR2009.pdf online and Government Communication on Finland's National Innovation Strategy to the Parliament, October 2008. See http://www.tem.fi//l=en&s=2411 online and see the International Evaluation of the National Innovation Strategy, pp. 1-96, here p. 14. See http://www.tem.fi/index.phtml?l=en&s=3161 online.
[7] See Research and Innovation Council of Finland: Research and Policy Guidelines for 2011-2015, p. 6.
[8] See Ibidem, p. 17.

Regardless of the channel used, all projects funded will be based on customer ideas and plans.

How will the new strategy be reflected in practice?
Focus on forerunners will cut down on the number of projects funded and mean increased financing for individual projects. Tax breaks for R&D activities that may be introduced will help to provide incentives for a larger number of companies. Increasing funding for young companies will mean taking higher risks, resulting in both greater benefits and a larger number of failures. Further more, international cooperation will be a cross-cutting theme in all Tekes activities. In public research, international cooperation will be a key funding criterion. In particular, Tekes will invite enterprises seeking growth in globalisation to take up the challenge, while its funding will be restricted to globalisation of R&D and innovation activities and planning of international business activities. Customer-driven value network projects and programmes aiming at reinventing the business will underline focus on customers and demand. More flexible funding for innovative experiments will speed up the uptake and commercialisation of research outcomes. In addition to current forms of joint projects, the renewal of public research will give rise to operating modes that create new business opportunities and generate areas of expertise vital for Finland. Tekes will encourage its customers to devise total solutions for end customer needs, making no difference between services and industries, or technological and intangible development. [9]

1.6. Strategy on internationalisation of education, research and innovation 2010-2015

Policy premise was the fact that the Finnish Innovation System is less international than often thought because it does not attract talented/educated immigrants and multinational enterprises' business activities. As a result of this strategy, Finnish innovation centres as a new kind of partnership model have been established abroad: the first in Shanghai (FinChi) in 2005 and the second, FinNode, was opened in the Silicon Valley, California in 2007. During the first half of 2008 new centres were opened in St. Petersburg, Russia and in Tokyo, Japan. Thus, Finland developed research co-operations with all the major global stakeholders: China, USA and Russia.

The Finnish innovation centres, established in global hotspots of economic development and R&D promote internationalisation of Finnish companies, attract foreign companies and investors to Finland and strengthen knowledge flows to and from abroad. The centres have been established jointly by Finnish public actors. The actual coalition varies somewhat depending on the spot, but in most of the cases the centres' founding organisations include Tekes, Finpro, VTT, the Finnish Innovation Fund Sitra, and the Academy of Finland. The international Innovation Centres are one tool in the promotion of the internationalisation of national poles and clusters of excellence. Their task is to ensure that investment in innovation goes to the right place and has an impact through links with international innovation centres. Thus, they serve both companies and researchers. The aim is to assist companies to enter the target country's market faster and easier, and to promote Finland as an attractive investment target to R&D companies. The innovation centres also promote research cooperation and researcher mobility. They provide contacts and cooperation agreements with local research institutes, universities and authorities. In addition, the centres are involved in foresight activities concerned with Finnish innovation activity as well as reviewing development and trends of R&D and innovation in respective host country.
List of policy priorities: Support to technology transfer between firms, support to innovation management and advisory services, improvements in innovation support services, in particular for dissemination and technology transfer, the encouragement of cross-border knowledge transfer, including from foreign direct investment. Innovation centres are intended to provide in their host countries a common "one-stop-shop" of

[9] See www.tekes.fi/fi/document/49702/tekes_strategy_engl_2011_pdf online.

major Finnish public sector actors involved closely with innovation. As such, there is no extra funding available related to these innovation centres. Operating costs are covered on in-kind basis by the participating organisations.
Main conclusions of the evaluation: In 2007, the Ministry of Trade and Industry commissioned a performance evaluation of FinChi Innovation Centre operating in Shanghai since 2005. Generally speaking, FinChi Innovation Centre is seen to represent a new kind of service concept, which aims at promoting collaboration between Finnish and Chinese firms and research units. The evaluation team concluded that from the perspective of export promotion and internationalisation of Finnish companies FinChi can be considered as an advanced concept. The common physical premises turn out to have a positive impact on accessibility of key organisations and mutual interaction. On the other hand, the centre's impact on innovation activities of the Finnish companies was assessed more modest than what was originally pursued. Furthermore, significance for making good use of Chinese expertise in Finland had remained low during the first operating years. The evaluators recommended that a more explicitly articulated model should be established for promoting innovation activities. In view of the evaluators, this model should be closely integrated with the instruments of the Finnish system of innovation. The evaluation also put forward an idea to expand representation of the Finnish innovation actors to cover research and education policy actors. Further, it was proposed that attracting the Chinese investments to Finland should be organised into a systematic model of practice.[10]

2. Improved dialogue with innovation related stakeholders

Chaired by the Prime Minister, Finland's Research and Innovation Council plays an important role in the innovation policy making: it is the coordinating body between the Ministries on research and development, it provides a platform for policy discussions among Ministries, industry, funding organisations, unions, universities and government officials; it defines the overall guidelines for government research and development funding. Finland has made considerable achievements towards a coordinated National Innovation System. The foremost organisations responsible for science and technology policies are the Ministry of Education and the Ministry of Trade and Industry. The Ministry of Education handles matters relating to education and training, science policy, universities and polytechnics, and the Academy of Finland. The Ministry of Trade and Industry is in charge of matters pertaining to industrial and technology policies, the Finnish Funding Agency for Technology and Innovation (Tekes), and the VTT Technical Research Centre of Finland. Nearly 80 per cent of the government R&D funding is channelled through these two ministries. The high frequency of consultation, deliberation and effective linkage creation between government, its programs, and industry has been productive.[11]

II. WORK PROGRAMME LEVEL

1. Design of topics: technical aspect closer to the market

- Involvement of SMEs / Streamlining funding instruments / PPP

[10] See Ville Valovirta, Torsti Loikkanen and Jani Saarinen (2007) FinChi Innovation Center, Evaluation and Recommendations (in Finnish). Ministry of Trade and Industry Publications 23/2007. See http://www.tem.fi/files/18156/FinChi_arviointi.pdf online; see also the Internalisation of the Finnish Science and Technology, Science and Technology Council of Finland, 12 November 2004. See www.minedu.fi/export/...innovaationeuvosto/.../internationalisation.pdf online.

[11] Göran Roos et al: National Innovation Systems: Finland, Sweden & Australia compared. November 2005. Report prepared for the Australian Business Foundation. Intellectual Capital Services Ltd. pp. 1-32, here p. 7 et seq.

1.1. Strategic Centres for Science, Technology and Innovation (SHOKs)

The Strategic Centres for Science, Technology and Innovation established in Finland are new public-private partnerships for speeding up innovation processes. Their main goal is to thoroughly renew industry clusters and to create radical innovations and to create a long-term cooperation between industry and academia. These Centres (SHOK in Finnish) develop and apply new methods for cooperation, co-creation and interaction. International cooperation also plays a key role in the operation of the Strategic Centres. Testing and piloting environments and ecosystems constitute an essential part of the Strategic Centres' operations. In Strategic Centres, companies and research units work in close cooperation, carrying out research that has been jointly defined in the strategic research agenda of each Centre. The research aims to meet the needs of Finnish industry and society within a five-to-ten-year period investing between EUR 40 and 60 million annually per centre.[12]

Six centres are in operation:

- Forest cluster: Forestcluster Ltd
- Metal products and mechanical engineering: FIMECC Oy
- Built environment innovations
- Information and communication industry and services: TIVIT Ltd
- Energy and the environment: CLEEN Ltd
- Health and well-being: SalWe Ltd

How does it work?

SHOKs operate in the form of a non-profit limited company. The partners include key companies (large and small), universities and research institutes in a topic area, responsible for running each SHOK. The research strategy is drawn up and decisions on its implementation are made by the partners. The research carried out by the SHOKs is strategic, pre-commercial, and as a rule not associated with short-term market goals. All IPR is shared within the project in a controlled manner, so it is open innovation.

An average of 40% of research conducted by the SHOKs will be cofounded by companies. The state will fund the setting up of the SHOKs and research carried out by them. After receiving the SHOKs' application, public funding providers will decide which part of the research programme they will finance. Key public funding providers are Tekes and the Academy of Finland. The SHOKs will also apply to EU research programmes for funding. The goals set by establishing the SHOKs were: allocating limited national resources productively; closer cooperation between the business sector and scientists; creating world class expertise and the critical mass required by it in strategically selected fields; generating knowledge that is new on the global scale and making an efficient use of it; increasing the international pull of Finland and thus attracting more international cooperation and funding.[13]

Tekes almost doubled its funding for SHOK research programmes in 2010 to nearly 100 million Euros. In two years' time, Tekes intends to increase this figure to some 20% of its funding. Greta expectations are attached to the results of SHOK activities. SHOK research programme focus on long-term work and it is currently too early to assess their success. However, the government stresses the importance of evaluating the SHOK activities as soon as the Centres are fully operational and it is possible to assess the results achieved.[14]

1.2. Centre of Expertise Programme (OSKE)

The Centre of Expertise Programme is a knowledge transfer measure. The aim is to enhance regional competitiveness and to increase the number of high-tech products, companies and jobs. To achieve this goal, the programme is used to implement projects reflecting the needs of industry, to encourage industry, research and training sectors to

[12] See http://tekes.fi/en/community/StrategicCnetresforSciencetechnologyandInnovation/360/, online.
[13] See www.tekes.fi/en/...0.../tekes.../strat_centres.pptx, online.
[14] See TEKES Annual Review 2010, Helsinki 2010, p. 5.

co-operate, to ensure rapid transfer of the latest knowledge and know-how to companies and to exploit local creativity and innovation. The new Centre of Expertise Programme period started in 2007 and runs until 2013. The operational model of the programme has been redefined and now builds on the clusters of expertise which function as the new platform for development of inter-regional co-operation. The programme focuses on internationality in R&D and business activities, boosting the growth of knowledge-intensive companies and linking the programme closer to national innovation policies. The Government has approved 13 nationally significant clusters of expertise and 21 Centres of Expertise to the Centre of Expertise Programme for the period 2007–2013.
The idea is to utilise high-level expertise as a resource for business activities, the creation of new jobs and regional development. The centres of expertise specialise in certain selected fields. One task is to strengthen regional critical mass by pooling local, regional and national resources in these fields. The annual budgets include EUR 3, 25 million for operating costs. Budget is financed through central government appropriations which cover around half of the expenditures and with the self-financing counterpart from cities and municipalities. Also the Structural funds are utilised in the regions eligible.

List of policy priorities: Cluster framework policies, support to sectoral innovation in manufacturing, support to innovation in services. The creation and development of innovation poles, networks and incubators bringing together universities, research institutions and enterprises, including at regional and local level, helping to bridge the technology gap between regions in the innovation process are addressed by the measure. Promotion of entrepreneurship/start-up (including incubators); awareness-raising amongst firms on innovation; pre-competitive research; commercialisation of innovation (including IPR); co-operation promotion and clustering; diffusion of technologies in enterprises; innovation management tools (including quality); improving the legal and regulatory environment.

Main conclusions of the evaluation: According to the official, externally-commissioned evaluation of the first programme period (1994-1998), the main results of the programme concerned the increase of co-operation, both at regional and national level. The State Audit Office (October 2001), in its own evaluation, considered the Centre of Expertise Programme as a top act of the Finnish Regional Policy. Mid-term evaluation of the second programming period (1999-2002) indicated that the programme has created altogether: 7100 new knowledge-intensive jobs, 9000 preserved jobs, 500 new high-technology companies, 1800 new innovations, 40000 persons educated. The ex-post evaluation of the programme period 2000-2006 came to the conclusion that implementation of the previous period was largely successful both at the national and the centre of expertise levels, even though certain development needs in the national coordination was identified. National competition was considered to enable the programme to succeed in profiling regional innovation policy, promoting specialisation and channelling resources to the development of regional spearhead fields. Also specialisation has taken place, but the lack of cooperation among CoEs continues to cause some overlapping of functions.[15]

2. Design of topics: development of non-technical aspects

2.1. Venture Cup Finland

Venture Cup Finland is a three-stage business plan competition that helps students, researchers and others to take their business idea from concept to actual start-up through hands-on coaching and feedback and inspirational workshops/events. The competition is primarily designed for researchers, teachers and students, yet it is open to everyone. During the three stages of the competition, participating teams go through a demanding process of education, coaching and screening, developing their business ideas

[15] See http://www.oske.net/en/ online.

into complete business plans with a clear focus. Venture Cup offers a series of lectures especially adapted to the different steps of the competition and developing the business idea. The lectures are free of charge and also free for everyone to attend. Basic questions will be covered, such as how to write a business plan, and also more specific matters such as patent rights. At the same time they offer a possibility to network with coaches and other like-minded people. The network of coaches is one of the most valuable aspects of the Venture Cup concept. Coaches - representing a variety of professions and companies - have provided hundreds of hours of free advice and counselling for participating teams.
Main sponsors are the Ministry of Trade and Industry, Tekes and McKinsey&Company. Thus, the organisation of the business plan contest is based on public-private co-operation.

Background and rationale: A lack of innovative growth-oriented small and medium-sized firms and start-ups is one of the major repeatedly identified weaknesses in Finland. Therefore, motivating innovative and growing businesses and a broadening of the base of innovative, internationally competitive, growth-oriented companies has recently become one of the focus areas in the domestic innovation policy.
List of policy priorities: support to the creation of a favourable innovation climate (e.g. roadshows, awareness campaigns), support to innovative start-ups, including gazelles; support to risk capital; innovation prizes, including design prizes; better access to domestic and international finance; efficient and affordable means to enforce intellectual property rights. No direct funding for the participants is available. Aspects of the innovation process addressed by the measure: promotion of entrepreneurship/start-up (including incubators), commercialisation of innovation (including IPR).

2.2. Serve - Pioneers of Service Business 2006-2013

Serve is a Tekes programme aiming at the creation of new knowledge in service innovation and encouraging the development of innovative and internationally competitive service concepts in companies. Originally, the programme was designed to run until 2010, however, the period of the programme was decided to be expanded until the end of the year 2013. Serve provides Finnish companies and research organizations with project funding, national and international networks through seminars and industry specific forums as well as tools to support product management and IPR questions.
Serve's strategic focus areas are as follows: scalable and internationally competitive service concepts; competitive service business models and management of service business; growth and internationalisation of service companies; customer's role in service business; competitive service market and innovative service culture.
The programme participants are expected to develop novel service concepts in the following industry areas: knowledge-intensive business services (KIBS); industrial services; financial and insurance services; trade; real estate services and logistical services.

The participants come from companies, universities and research institutes. Serve approaches service innovation from the multidisciplinary viewpoint, which combines theoretical and methodological knowledge from different scientific perspectives. The research groups participating in the programme represent several disciplines, including management sciences, technological sciences, social sciences and arts.

Background and rationale: The decision to launch the Serve programme was based on the one hand on growing importance of services for the economic growth and employment, and on the other on the finding that innovation system and policies have not adequately encouraged innovation in service industries. In addition, in Finland, as in many other countries, the organisation of public services is facing challenges, and there are changes foreseen in the division of service production between the public and private sector service providers. In order to improve the productivity and the quality of services, there is an urging need for systematic research and service development tools and

processes for the service sector as well as for the manufacturing industries. Development of innovative service concepts is seen as a tool for strengthening the global competitiveness of service industries and improving the performance of both public and private sector organisations.

Selection criteria: The enterprise projects to be funded by Tekes are generally selected by evaluating: the business to be generated; the technology, innovation and competence to be developed; the resources available; the cooperation to be developed and used; the social and environmental well-being factors to be promoted and the impact of Tekes funding and expert services. The public research projects to be funded are selected by evaluating: the technology and competence to be developed; the cooperation to be developed and used; the utilisation of results and the resources available.
Only organisations based and registered in Finland are eligible to receive financing through Tekes programmes. However, Serve promotes cooperation between Finnish and international research groups. International cooperation not only includes benchmarking and networking, but also joint research projects, subcontracting, technology transfer and collaboration in marketing and distributing the project results. Serve encourages open cooperation between different countries in the area of service innovation and is interested in joint projects, especially in the area of academic research. The total budget for the original programming period 2006 - 2010 was estimated to be approx. EUR 100 million, of which half is Tekes funding and the other half comes from the participating companies. Also, participating research units contribute to funding. Three fourth of the total funding is directed at company projects. By January 2009, the total volume of Tekes funding allocated through the Serve programme was EUR 46 million, of which EUR 15 million went to academic research projects and EUR 31 million to company projects. Most funding has focused on knowledge-intensive business services (KIBS) and industrial services.[16]

3. Development of Prizes/Awards

3.1. The Millennium Technology Prize

The Millennium Technology Prize is awarded for a specific groundbreaking innovation that directly promotes people's quality of life, contributes to the realisation of social values and encourages sustainable development. The international Selection Committee considers both the current and the potential future impact of the innovation. The Millennium Prize aims to bring technology closer to people. The prize is awarded by the Millennium Prize Foundation, an independent fund established by Finnish industry and the State of Finland in partnership. Nominations for the prize can be made by academies, universities, research institutes and industrial organisations. The one-million euro prize is awarded every second year. The Millennium Technology Prize has its roots in the 1990s, when the proposal for an international prize for humane technology found supporters in Finland and abroad. The idea was first discussed in private Finnish technology organisations and publicised by Academician Pekka Jauho. In 1999, Californian philanthropist Arthur J. Collingsworth urged the Finnish government to take a more active role in encouraging dialogue between humane and technological values.

3.2. Innofinland

The purpose of Innofinland is to promote creativity, skill, entrepreneurial spirit and co-operation in Finland in a practical and creative way in order to nationally improve opportunities for wellbeing. The President of the Republic acts as the patron of the project. Each year, the Innofinland Project includes the following forms of activity: arranging of the Innofinland Contest; regional Innofinland events; and the Innoschool Innovation Event for school pupils.

[16] See http://akseli.tekes.fi/opencms/opencms/OhjelmaPortaali/ohjelmat/Serve/en/etusivu.html online.

The competition is annually built around a specific selected theme to shed light on different shades of innovation as an activity. The focus on different themes aims to broaden the common understanding concerning innovation's role in society, i.e. innovation can take place in various fields and in various forms.

The Innofinland contest is implemented at two successive stages through the regional contests and the nationwide contest. In order to enter, the entry form and the accompanying documentation have to be submitted to the local Employment and Economic Development Centre or to the INNOFINLAND Bureau. An entry can be submitted in one region only. One to three entries from the regions continue to the nationwide contest. Jury members and their experts cannot enter the contest. The entries to the contest will be treated as confidential. If the entry involves protection of industrial property rights, it is the responsibility of the participant to apply for protection. The grounds for the awards include: The idea, invention or innovation has substantially promoted business activities. The activities have furthered the introduction of inventions on the market, the innovativeness of the product or service and the advantage to the customer, the continuity of activities, R&D and level of technology, promotion of employment and the competitive situation in the field.
The Innofinland Bureau is responsible for the practical arrangements of the project together with its regional network. The Regional INNOFINLAND Committees are responsible for planning and carrying-out of events. They also judge and select the winners of the regional contests and take care of local communication in connection with the events and the contest. The programme is co-financed by the private sector and by foundations or charities.[17]

4. Public procurement

Finland is very much aware of the role of public sector in developing, applying and introducing innovations. The annual procurement volume in Finland in the public sector is about EUR 23 billion.
The policy document "Demand and User-Driven Innovation Policy"[18] published in 2010 comprises an Action Plan in order to promote innovation by means of public procurement. The Action Plan developed includes several measures designed to enhance innovation in the public sector via public procurement:
• creation of a group of innovative forerunner cities targeting to renew public services through innovations by focusing especially on public-private partnerships, user-driver activity and procurement of innovations;
• development of procurement on public sector to drive innovations;
• implementation of Government's strategy aiming to promote innovations;
• reinforcement of the role of the organisations that develop public procurement in order to increase knowledge in public procurement of innovations;
• development of incentive models and risk management methods for procurement of innovations.[19]
A funding instrument for public procurement of innovation by the Finnish Funding Agency for Technology and Innovation (Tekes) was launched in 2009 as a result of the national innovation strategy and its findings.
The funding instrument foresees as an objective the improvement of conditions for procuring innovations. For this purpose, it is essential to develop a well-functioning market dialogue between procurement units and suppliers. Fruitful market dialog

[17] See www.innosuomi.fi/en/innofinland.html online.
[18] See Demand and User-driven Innovation Policy, Framework and Action Plan: Publications of the Ministry of Employment and the Economy, Innovation Department, 48/2010.
[19] See Peter Stern et al: How public procurement can stimulate Innovative Services. Report to Nordic Innovation Centre (NICe), Stockholm, Technopolis Group, February 2011, p. 7. See http://www.nordicinnovation.org/no/publikasjoner/how-public-procurement-can-stimulate-innovative-services-new-study/ online.

provides better understanding for procurement units on alternative solutions and suppliers in the market. An active interaction with the procurement units allows also suppliers to participate in the formulation of the tender documents and tender specifications which in turn prevents inappropriate requirements, encourages innovation and focuses on competition among suppliers in areas of relevance i.e. where differentiation can happen.
During the first year of the operation of the funding instrument, Tekes has focused its promotion efforts in energy, environment, construction and health sectors. However, activities in other areas are also eligible for funding. The focus areas have been chosen since they are considered to be important as regards the future demand and societal challenges.
For example, in the construction sector advanced solutions for energy-efficient buildings have already been developed, but the market is tentative in adopting them. The public sector has an opportunity to boost the demand for new solutions by setting more challenging goals for the contractors and investing in new low-energy buildings (catalytic procurement).
In the social and healthcare sectors there is a need for comprehensive reform of services in order to improve quality and productivity. At the same time, the private sector is getting a more significant role in producing the services. In this situation, the public sector has a great opportunity to develop new ways of producing services in partnership with private service producers and hence boost demand for innovations in social and healthcare. The challenges are to define the project and arrange the procurement process in order to leave space for advanced and comprehensive approaches.

The focus areas boosting innovations in public procurement also coincide with the on-going Tekes national innovation programmes. However, the potential projects to be financed are identified in a bottom-up approach by individual public sector entities.
Public procurement units and public utilities both at government and local level can apply for funding for public procurement of innovations. The Tekes funding can be used both for the planning of the procurement (pre-commercial) and for the R&D&I stage as part of the procurement. As the objective of the funding instrument is to promote emergence and diffusion of innovations, one criterion for funding is that solutions procured must not exist in the market or they should result in a new way of operation.

In the first stage, planning of procurement, the government funds between 25% and 75% of total expenses in a single project. In the second stage, procurement or implementation, Tekes provides funding support for the procurer and for suppliers' R&D and innovation expenses.[20]
The funding of the *planning stage* can cover e.g. in-depth analyses of the long-term expectations of end-users and employees, possible new ways to meet the identified needs as well as the service concept design based on functional and quality criteria. External advisors can be utilized in the planning stage, e.g. in legal, commercial and technological as well as user experience issues in order to support the procurement process. One part of the process is also the development of criteria for the assessment of tenders in the planning stage. The planning stage of procurement can also result in the R&D&I project of a supplier. In such a case, Tekes can provide funding directly for the supplier if the project meets the general requirements for innovation funding for companies.
In the *implementation stage* funding can be used for the development work required for the procurement, e.g. for development of new operating models for services.

During the first nine months after the launch of the funding instrument, 13 projects have been accepted for funding. Projects are mainly focused on developing services, especially in the social and healthcare sector, by the local authorities. Sustainable development and energy efficiency are featured as objectives in a few projects. In couple of projects, cities

[20] See Peter Stern, p. 7.

are developing knowledge and operating models for procurement of innovations.

Decisions on project funding by March 2010:

- Outsourcing of municipal engineering/ City of Varkaus
- New life for a city district / City of Riihimäki
- Power plant in Toholampi/ Toholampi Energy
- Energy-efficient district of residence housing / Varsinais-Suomen Asumisoikeus Oy
- Solutions and eco-efficiency of passive office building / Finland's environmental administration
- Project developing procurement of innovations / City of Pori
- Innovative investments / Town of Haukiputaa
- Developing an innovative life-cycle-based procurement model / City of Porvoo
- New innovations and life-cycle targets for the operating environment in education and daycare / City of Jyväskylä
- Sheltered housing for seriously disabled / City of Vantaa, social and healthcare
- Design competition in procurement of services. Case - Competition for developing concepts to diminish homelessness / three projects by Cities of Helsinki, Espoo and Tampere.

Case study 1: Outsourcing of municipal engineering in the City of Varkaus

The municipalities are facing challenges in building and maintaining the community infrastructure such as streets, water pipes, drains and energy supply as their economic situation is tightening. At the same time, private service providers are interested in broadening their service activity to cover also municipal engineering. The City of Varkaus decided to outsource its municipal engineering in 2008. The city established a project to develop and test the process for implementing the outsourcing of engineering service production. The objective of the process was to engage in market dialogue, use competitive bidding and prepare agreements for the outsourcing process, as well as to ensure that service level targets set by the municipality will be reached.

The development of the outsourcing process was funded by Tekes as a project piloting the new funding instrument. The challenge for the procurement unit was to specify the criteria for competitive bidding, to define conditions and models for contracts with suppliers. A Finnish association, RAKLI, representing the interests of property and infrastructure owners, construction clients and user organizations, took part in the project by arranging a market dialogue (procurement clinic) with potential service providers, consultants, contractors and investors. The result of the project was a new operating model and plenty of valuable knowledge in implementing outsourcing applicable also to other cities. RAKLI's role in arranging market dialogue has proved to be successful and it has been engaged also in several other ambitious procurement processes.

Case study 2: Diminishment of long-term homelessness- Design competition in procurement of services

The Cities of Helsinki, Espoo and Tampere established a project with the objective to design a service concept for social and healthcare services in order to diminish long-term homelessness. The challenge was to combine service providers' new operating models with design solutions where facilities are designed to support the service process. A design competition was chosen as a method to generate ideas for innovative service concepts.

The design competition had not been used in Finland in this type of service procurement before, which made the procurement process quite challenging. Tekes funding encouraged and enabled the cities to apply the new way to arrange competitive bidding for service procurement. So far, the projects have produced good practices and new knowledge to be applied in future service procurements.

Preliminary evaluations of the Tekes funding instrument: Due to the short time period these reflections concern mainly experiences related to the application stage. They have been collected on the basis of processing the applications and the discussions with the applicants. The funding instrument is perceived to be necessary and useful by the applicants, but interest for the funding instrument has emerged more slowly than expected. Reasons for that are probably diverse and one cannot make any definitive conclusions at this stage.
The criteria of the funding are seen as quite ambitious since they require that solutions procured must be truly innovative and do not exist on the market, or that the procurement results in new way of operation. The target group of the funding is also a new group of customers for Tekes services and it takes time to reach them and raise awareness of the funding instrument.
The problems in identifying a potential project in procurement organisations are the same challenges as those identified for promoting procurement of innovation in general and which cannot be tackled by a funding instrument alone (i.e. lack of long term planning and comprehensive analyses of needs, risk averse culture, insufficient resources etc). Also the timing and style of decision-making in the local authorities combined with the political decision-making and sector-based budget planning in yearly cycles create challenges for considering innovative solutions to meet their long term needs. Furthermore, as the public sector has little experience in addressing innovations professionally in the procurement, there is a lack of knowledge in procurement practices that encourage innovation.
Once in the procurement phase, it takes time to develop an efficient market dialog. Especially in the social and healthcare sector, the "lack of common language" is perceived as a barrier for fruitful interaction among procurement units and suppliers. [21]

III. EVALUATION LEVEL

Evaluation is a common practice in Finland at programmatic and organisational level. All publicly funded programmes of Tekes, VTT, the Academy of Science, etc. are subject to evaluation, and the organisations themselves are regularly assessed (both internally and externally) and audited in terms of their operational performance and development needs. Thus, there is a very well developed evaluation culture in Finland (shown also by the evaluation of the individual programmes above), being also one of the strengths of the Finnish innovation governance system. Policy instruments as well as research and innovation support organisations are constantly evaluated. Efforts have been made also to establish fruitful interaction between decision makers (government) and the research community.[22]

Nevertheless, the Finnish Parliament when approving the Government's Innovation Strategy called for simplification measures and efforts like those at the EU level due to overlaps in the tasks and instruments of various innovation agencies and the responsibilities of different ministries: "the current system is hampered by a plethora of programme, organisational and innovation policy tools, and the related, partial overlaps. Investments should therefore be judiciously directed, since the innovation policy must be

[21] Kirsti Vilen, Teija Palko: Case study Finland: funding for procurement of innovations in the public sector. Innovation Department, Ministry of Employment and the Economy, Finland, 29.07.2010. See preco.share2solve.org/main/.../Case-study-Finland-revised-07-20101.doc online; Suzan Ikävalko: Pre-Commercial Public Procurement policies in Finland, Culminatum Innovation Ltd Oy, October 2010. See preco.share2solve.org/main/files/2010/.../PCP-policies-in-Finland-2010.pdf. online.
[22] See Marcel de Heide: Monitoring and analysis of policies and public financing instruments conducive to higher levels of R &D investments. Country Review Finland. Technopolis. March 2007, p. 34. See http://ec.europa.eu/invest-in-research/pdf/download_en/finland.pdf online.

capable of meeting both national and global challenges affecting Finland".[23] Also according to the evaluation panel of the Finnish National Innovation System, there are too many small universities covering the same field, furthermore, the public research organisations are operating in a way that is overlapping with university research. In their conclusion, the Finnish innovation system lacks strong coordination mechanisms. This would be in principle the role of the Research and Innovation Council, but it rarely touches upon the division of tasks among various public bodies.[24]

However, the two main weaknesses of the Finnish system - according to the evaluation report - are the growth entrepreneurship and the lacking internationalisation of the system.[25] Experts call for more integration into the European Research and Higher Education Area of Finland: "While the European Union is looking at Finland, to learn from its innovation policy design, Finland should also look more at the European Union."[26] The joint Programme of the Academy of Finland and Tekes, FiDiPro (Finland Distinguished Professor Programme) provides one way to counteract these trends and for further internationalization of Finnish academia. The FiDiPro programme enables distinguished researchers to work in Finland with the best Finnish academic researchers.[27]

Concerning entrepreneurship, the Finnish innovation has been evaluated as having not sufficient financial inducement for a highly-talented individual to choose a risky entrepreneurial career. It was stressed that the Finnish innovation system needs financial inducements like tax incentives, as it is the tax system which determines the distribution of the earnings and value-added generated by a new firm between the state and entrepreneur, as well as potential High Growth Entrepreneurial Firms to pursue international expansion promoting an entrepreneurial culture and related skill sets.[28]

As regards regional innovation, the evaluation panel found innovation-related policies to be rather unsuccessful in compressing the differences in competitiveness among Finnish regions. Some policy actions - innovation or non-innovation may in their opinion even have promoted regional divergence.[29] Thus, the evaluation panel of the Finnish Innovation Scheme came to the conclusion that "regional imbalances should not be of no concern for direct national innovation support, no matter whether promoting knowledge diffusion contributes to regional convergence or peddling creative destruction increases regional disparities".[30] Thus, according to it, the role of innovation policies should be to support firms that move the current technology frontier forward no matter where they are actually located.

IV. PROJECT LEVEL

1. Improved entrepreneurship assistance

1.1. Funding scheme for young innovative companies

Tekes in February 2008 introduced a new funding instrument for young, innovative growth oriented companies. The aim is to provide for the most promising young companies an opportunity to develop their businesses in a comprehensive way, as well as to grow and internationalise their activities faster than in general. Small companies

[23] See http://www.tem.fi/?l=en&s=2411 online.
[24] See Evaluation of the Finnish National Innovation System, pp. 80 et seq.
[25] See Evaluation of the Finnish National Innovation System, p. 6.
[26] See Evaluation of the Finnish National Innovation System, p. 6.
[27] See Evaluation of the Finnish National Innovation System, p. 38.
[28] See Evaluation of the Finnish National Innovation System, pp. 61-69.
[29] See Evaluation of the Finnish National Innovation System, pp. 74 et seq.
[30] See Evaluation of the Finnish National Innovation System, p. 77.

registered in Finland and less than five years old can apply for funding, provided that they have an innovative, knowledge or technology intensive business idea and a convincing plan for implementation. According to the new instrument design, funding will be granted in three separate phases (feasibility, conditions for growth, rapid growth) for the selected companies. In order to be eligible for the next phase, the company has to have achieved the targets set for development in the previous phase. Its full extent, around EUR 1 million, the funding can reach only in later phases. The funding ends at the latest when the company is 8 years old or in case it cannot be any longer considered as a SME.
A lack of innovative growth-oriented SMEs and start-ups has been identified as a major challenge when considering factors affecting future success of the Finnish economy. Accordingly, a broadening of the base of innovative, internationally competitive, growth-oriented companies has in the recent few years become one of the key focus areas of Finnish innovation policy. Small companies registered in Finland and less than five years old can apply for funding, provided that they have an innovative, knowledge or technology intensive business idea and a convincing plan for implementation. Funding will be granted in three successive phases: feasibility (~6 months), conditions for growth (6 months to 2 years), rapid growth (1 to 3 years) for the selected companies. In order to be eligible for the next phase, the company has to have achieved the targets set for development in the previous phase.
When selecting companies, attention is paid particularly to international growth potential as well as team and owners. International growth potential includes business idea, business potential and ambition and potential for growth on international markets. Under the "team and owners" criteria are assessed the commitment and competence of the key persons, the willingness to search and accept new owners and investors to the company, with the requirement that the beneficiary may not be a subsidiary company in the first place.[31]

1.2. InvestorExtra - Financial services for start-ups and micro-enterprises

Finnvera plc is a specialised financing company owned by the State of Finland. Finnvera provides its clients with loans, guarantees, venture capital investments and export credit guarantees tailored to various stages of company development. Finnvera's Microloans and Loans for Women Entrepreneurs are financial products targeted for enterprises employing no more than five people. Microloans are particularly aimed at small businesses that are just starting or are already functional. Loans for Women Entrepreneurs are intended for enterprises where women are majority shareholders and which are managed by women. Both loan forms can be used for investments in machinery and equipment, as working capital, for other start-up or expansion projects and for business development. The loans can be granted in one or more amounts up to a maximum of EUR 35,000. In addition, the Finnvera service portfolio includes other loans and guarantees, such as Development Loans, which are designed to other stages of company development.
The scheme was evaluated by the Turku School of Economics and Business Administration Small Business Institute. Both of the loans contributed to the generation of new jobs by providing a partial funding for 17,036 new jobs. The importance of the scheme has been very significant to self-employment. 60-70% of the enterprises have been employing a maximum of one person, the self-employed entrepreneur. In 1999, 2000 and 2001, 55% of the enterprises were start-ups.
Veraventure Ltd, subsidiary of Finnvera, launched a new service model in February 2008 intended for business angels. Through InvestorExtra web service, potential investment objects are presented to private investors that have registered themselves for the service. The web service is intended for private individuals who are interested in investing in growing and emerging technology-focused companies that aim at international markets. Seed Fund Vera managed by Veraventure can make joint

[31] See http://proinno.intrasoft.be/index.cfm?fuseaction=wiw.measures&page=detail&ID=9344 online.

investments with both funds and private investors. Aloitusrahasto Vera can make joint investments with both funds and private investors. InvestorExtra consists of three core services which include Extranet service, ExtraEvents and a 'targeted search'. Presently, the service is free of charge.
InvestorExtra service has replaced similar types of services managed previously by Sitra (PreSeed services for enterprises in seed and start-up phases) and Finnish Industry Investment Ltd. The Government decision to reorganise risk financing for starting enterprises and concentrate the activities in Finnvera preceded the creation of InvestorExtra service. Finnvera subsidiary VeraVenture launched a new InvestorExtra service model which replaced Sitra's INTRO service which was a marketplace serving private investors and businesses that were seeking initial investment.
InvestorExtra's Extranet service for private investors introduces every month a selection of case companies which originate from the deal flow of Veraventure. ExtraEvents are company presentation events organised every second month on average. Four to six companies per event have a 15 minutes presentation for the audience consisting of private investors. The companies are prepared beforehand to present their case. In addition, ExtraEvents aim to promote networking between investors. [32]

1.3. Seed Fund Vera Ltd

Seed Fund Vera Ltd is a nation-wide seed fund for enterprises at their early stages. With its investment activities, the fund aims to enable, facilitate and accelerate the growth of the target enterprise and develop the enterprise so that it becomes an interesting investment target for other investors and industrial partners. The fund makes minority equity investments in the target enterprises. Normally, the fund's share of ownership in the enterprise is between 15-40 per cent. In addition to equity financing, other possible investment instruments are convertible bonds, bonds with equity warrants and capital loans. The maximum initial investment in an enterprise is EUR 500,000. The initial investment is usually EUR 100,000 - 250,000. The fund has no personnel of its own. Veraventure Ltd, a subsidiary of Finnvera Plc, is responsible for the fund's practical activities. Veraventure Ltd has concluded cooperation agreements with TEKEL (Finnish Science Park Association), Sitra (the Finnish National Fund for Research and Development) and Finnvera plc.
Background and rationale: Establishment of Veraventure Ltd was part of the strategy for reforming the seed capital and service system for innovative start-up companies prepared by the Ministry of Trade and Industry. In June 2005, the Finnish Parliament granted Finnvera plc, parent of Veraventure Ltd, a capital loan of EUR 11,5 million to serve as a capital base for the new capital investment fund. Since then the fund size has grown to EUR 73,6 million. Other investors in Seed Fund Vera Ltd are Sitra, TEK (The Finnish Association of Graduate Engineers), Ilmarinen Mutual Pension Insurance Company, Fennia Mutual Insurance Company and Mutual Insurance Company Pension-Fennia. As a capital investor, Seed Fund Vera Ltd complements the financial market. The fund concentrates on financing enterprises during the period in which they are lacking other public or private investors. The purpose of the fund is to eliminate the point of discontinuity existing between financing schemes for product development and private venture capital investment. The fund invests mainly in technology companies at their early stages and in technology-intensive or innovative service enterprises. The target enterprises should have the potential to develop into growth enterprises.
List of policy priorities: support to innovative start-ups incl. gazelles, support to risk capital, better access to domestic and international finance. In order to be a suitable investment target, the enterprise should have a business plan that is credible and feasible. The enterprise's product or service should have clear, preferably international market potential. Moreover, the product/service should have a significant innovation aspect compared with rivalling products or services. Preferably, it should be possible to obtain a patent for the innovation. In addition, the eligible enterprise should be: growth oriented; a small or medium-sized enterprise registered in Finland; organised as limited

[32] See www.finnvera.fi online.

company; and at an early stage of its development (enterprises under 3 years are preferred). Mode of funding is through subsidised loans (including interest allowances).[33]

1.4. The VIGO Programme

Vigo is an accelerator programme for dynamic start-up companies with potential for global growth. The programme exposes these companies to experienced entrepreneurs and executives and facilitates raising both public and private growth funding.

The nucleus of the programme is formed by the Vigo Accelerators - private companies that are run by experienced entrepreneurs. The Accelerators work hands-on the target companies to develop their business to the next level and secure funding for growth. As independent companies, the Accelerators negotiate on a case-by-case basis agreements with the target companies and investors, including the investment amounts, activities and objectives, ownership amount, possible service fees, etc. The target companies have access to both private and public funding sources. Private sources include venture capital funds, business angels, and the accelerators. The public funding of the programme consists of e.g. funding from Tekes, Veraventure, and Finnvera. All funding providers make independent funding decisions, but the process is coordinated and streamlined. Normal public funding criteria are used in the program.

What does Vigo offer?

- Expertise and Experience: The key personnel of the Vigo Accelerators are experienced serial entrepreneurs with proven international business and entrepreneurial skills. The Accelerators offer proven hands-on expertise from growing international businesses.
- Networking and Connections: The Accelerators and other programme participants have extensive networks to funding sources, potential customers and partners that can significantly accelerate the growth of the target companies.
- Access to Funding: Access to growth funding is a key element of the Programme. The Accelerators invest into the companies and play a key role in attracting additional outside funding to the target companies.
- Risk Sharing and Credibility: The Accelerators actively participate in developing the target companies and carry part of the business and financial risk and help improve the credibility of the companies.
- Acceleration and Quality: The expertise, contacts, and experience of the Accelerators help accelerate the business and funding processes of the target companies and improve their quality.

Who is Vigo for?

The Vigo Programme is intended for young companies that have the prerequisites and desire for international growth. The business idea should be innovative and global in scope. The founders must also be willing to increase the owner pool of the company and seek external funding and expertise to develop the company.

How does Vigo work?

- The Vigo Accelerators: The nucleus of the programme is formed by the Vigo Accelerators - private companies that are run by experienced entrepreneurs. The Accelerators offer their proven business expertise, funding, and extensive contact networks to the target companies. The Accelerators have been selected from the best applicants in their respective fields in a public procurement process.
- Selection: The Vigo Accelerators select their target companies and negotiate the agreements with them independently. The Accelerator can make a financial or a sweat equity investment into the target company.
- Mode of Operation: The key people of the Accelerators participate hands-on in the strategic and operative activities of the target companies as members of the executive

[33] See http://proinno.intrasoft.be/index.cfm?fuseaction=wiw.measures&page=detail&ID=9002 online.

team. The Accelerator can complement the target company's skill set in e.g. sales and marketing. An executive team with added expertise and experience is much better positioned to e.g. negotiate with external funding providers.

The earnings logic of the Accelerators is based on the growing value of the target companies. The Accelerators can then realize this value growth in connection with exits. The Accelerators can also charge a negotiable monthly acceleration fee from the target companies. The target companies can apply for funding from Tekes that can cover the acceleration fees.
The acceleration period lasts 18 to 24 months and at the end of this period, the target company should have the operational and financial wherewithal for fast international growth.[34]

2. IPR Support

2.1. IPR University Centre

IPR University Centre is an institute established by the University of Helsinki and four other universities in 2000. The aim of the Institute is to provide training and carry out research on intellectual and industrial property rights. The work of the Institute is supported by the IPR University Centre Sponsor Association, the membership of which consists of industrial companies and law firms specialising in immaterial rights.
The IPR University Centre organises seminars and training programmes on trademarks, copyrights, Internet-related issues, patenting, intellectual property and international IPR law. The Centre maintains an Internet site that publishes outcomes of topical IPR law cases and other news. The institute's newsletter is published four times a year. Each year the IPR University Centre prepares several legal opinions for Finnish legislators and authorities on issues related to intellectual property law. The Centre has a staff of 5 persons. Relative to its size, the IPR University Centre provides extensive expertise and services in the field of IPR law. Its seminars provide a platform for professional interaction. The Centre has established in its field a wide collaborative network that includes Finnish industry, government officials, and international experts. As a result of its publication activities, the Centre reaches a wide audience interested in IPR issues.[35]

2.2. The Foundation for Finnish Inventions (FFI)

The Foundation acts as a "One-Stop-Shop" for inventors and patentors in IPR matters, as it offers a range of IPR-related services: evaluation of new inventions, guidance, support in issues related to protecting inventions, prototype workshops, legal counselling or help with marketing. Almost all services offered by the Foundation are somehow related to IPR. Expertise is pooled at the headquarters in Espoo, but there are regional outlets in important organisations such as universities and economic development centres. The Foundation services cover a wide range of registrable IPR (patents, trademarks, designs) and non-registrable IPR (e.g., copyrights), and activities are not tailored to specific technology fields or industries. The organisation, however, has only SMEs and private inventors as customers. The Foundation draws on a around 24 experts in different business and technology fields at the head office and an additional workforce of 29 "innovation representatives" operating regionally at almost every Finnish university (14 in total) and at the so-called T&E Centres (Employment & Economic development centres – 15 in total).
The following service elements can be distinguished:
• Advice and evaluation concerning inventions;
• Financial support (risk financing, grants and loans);
• Support by pro-actively marketing and commercialising inventions;

[34] See http://www.vigo.fi/what-does-vigo-offer online.
[35] See www.iprinfo.com/page.php?page_id=41 online.

• Expert advice through cooperation with other IPR support-giving institutions (e.g. patent attorneys);
• Dissemination of information on inventions and license opportunities (by media, in seminars and trade fairs or by their own "marketplace" in the internet (www.inventionmarket.fi);
• Legal and other assistance in licensing negotiations and preparatory agreements;
• Organisation of (awareness-raising) campaigns (for example "Keksi ja Tee" trying to sell/license inventions to companies in one selected region at a time);
• The operation of a prototype workshop, a combined laboratory facility for supported inventors.
The Foundation for Finnish Inventions was established in the early 1970s by a private initiative. While the overall goal of the service stayed the same, the scope of the activities has constantly increased since then. A further impetus to growth was given in the 1990s, when the headquarters was moved into a technology centre, namely Innopol (Espoo Technology Centre). The service has an annual budget of EUR 6.1 million, of which EUR 2.1 million are available for direct support and funding activities (e.g. to subsidise R&D costs); the remaining EUR 4 million cover indirect support to the inventors (incl. personnel costs and out-of-pocket costs for advice, evaluation and marketing of the inventions) and administration including maintenance of database system and IT infrastructure.

The Foundation for Finnish Inventions supports and helps individual inventors and small entrepreneurs to develop and exploit invention proposals. The Foundation's services and funding provide a chain of support throughout the invention process up to commercialisation. The funding provided is risk financing for which securities are not required. The financing can be grants or support funding. The maximum amount of total funding per invention is between EUR 2,000 and EUR 200,000, depending on the project. Modest grants are awarded primarily for concept development costs during the early phases, such as prototype development. Grants are between EUR 1,000 and EUR 2,000. Support funding is intended for the development of inventions. Support funding can be used for costs associated with patenting, product development and commercialisation. Support funding is typically granted in several instalments, totalling between EUR 2,000 and EUR 200,000 per invention. The use of support funding must be reported to the Foundation on an annual basis. Support funding is repayable if the project is commercially successful. The maximum sum repaid equals the amount of support granted, without interest or multipliers. If the invention is not commercially exploited, there is no obligation to repay support funding. The rights to the invention will remain with the inventor.
The advice services and risk financing provided by the Foundation for Finnish Inventions are tailored to a specific target group, comprising individual inventors and small entrepreneurs, which other public innovation support organisations do not cover at all or only marginally.
List of policy priorities: consultancy and financial incentives to the use of IPR, knowledge transfer (contract research, licences, research and IPR issues in public/academic/non-profit institutes), support to innovative start-ups incl. gazelles, measures to raise awareness and provide general information on IPR, improvements in innovation support services, in particular for dissemination and technology transfer, efficient and affordable means to enforce intellectual property rights, applied industrial research, development/prototype creation, and commercialisation of innovation (including IPR).
Selection criteria: Individual inventors and small entrepreneurs with inventive idea are eligible for funding of the Foundation for Finnish Inventions. The Foundation's experts weigh up each invention on a case-by-case basis. All funding granted is discretionary, based on an individual evaluation of the invention. Aspects evaluated cover: market potential; functionality and the technology used; novelty and inventiveness; and business potential.
Main conclusions of the evaluation: The funding provided by the Foundation for Finnish Inventions has not been evaluated separately. However, the activities of the Foundation

have been evaluated twice since the late 1990s. In 1998, an international team assessed the Foundation's operations as part of the broader evaluation of innovation and invention activities in Finland. The results were published under the title "Innovation and invention in Finland: strategies for networking." An international evaluation by Zegveld, Walter; McCarthy, Sean; Lemola, Tarmo. Ministry of Trade and Industry Publications: 1998/3. In 2006, the Ministry of Trade and industry commissioned an evaluation of the performance and effectiveness of the Foundation for Finnish Inventions and its network of invention advisers in the national innovation system. The evaluation team concluded that the Foundation for Finnish Inventions is the only support organisation in Finland with a full-time focus on promotion of inventions made by private individuals and small enterprises. There is still need for the services of the foundation, and it is also considered a reliable and competent provider of services. According to the evaluation report, the natural role of the foundation is to provide assistance in the initial phases of the development of inventions and to act as an adviser to inventors. It was noted also that on its own the foundation does not have sufficient resources for commercialisation of inventions. In order to promote commercialisation, the early phases of the invention process require enhanced co-operation with other innovation actors and improved consideration of user and utiliser views. The foundation's advice and evaluation services were assessed, for the most part, to be flexible and of good quality. At the same time, though, there were identified the needs to find ways to shorten handling times and to improve the transparency of the evaluation process.[36]

2.3. Regional Services – T&E Centres

The Ministry of Trade and Industry, the Ministry of Agriculture and Forestry, and the Ministry of Labour have jointly combined their regional forces in the T&E Centres, which started operating regionally in the mid 90's. There are currently fifteen T&E Centres throughout Finland and they provide a comprehensive range of advisory and development services for individuals, entrepreneurs and businesses. The services of the National Technology Agency of Finland (Tekes) and the services of the National Board of Patents and Registration (NBPR) are available in each centre. The centres offer IPR-related information, material, forms, price lists etc. In collaboration with the NBPR and the Foundation for Finnish Inventors, each centre employs an innovation agent whose task (similar to those of the Innovation Managers in universities) is to promote innovation. They counsel inventors in questions relating to patenting and other industrial property issues, applying for funding and the development of products, in addition to commercialisation.[37]

IPR-Prediagnostics: The pre-diagnosis enables an enterprise to make use of state-of-the-art methods to evaluate its IPR stakes. The system concerns the very small, small and medium-sized enterprises which do not typically make use of industrial property provisions or do so poorly. It relates to all IPRs. The pre-diagnosis is conducted by an expert of the National Board of Patents and Registration, a specialist in industrial property or a consultant proposed by the NBPR.

IdeaPilot: The objective of this project is to demonstrate the significance and effectiveness of the IP-system when promoting new entrepreneurship and developing SMEs, and to create appropriate support services for the target groups. In this context, the importance of creativity, intellectual property and innovations will be emphasized as a promoter of welfare, prosperity and employment. The project will also demystify IP and diminish the lack of information and consequently also prejudices concerning IP-systems.

[36] Pirjo Kutinlahti et al: The Foundation for Finnish Inventions and the Performance and Effectiveness of its Network of Invention Advisers. MTI Publications 27/2006. See http://www.keksintosaatio.fi/default.asp ?docId=140 14 online.

[37] See http://innosuomi.iaf.fi/en/background/te_centres.html online.

InnoConsulting: The InnoConsulting project focuses on training information specialists and consultants together, building up close working relationships during the training course (creating "multi-disciplinary service teams") that would last over the life-span of the project. This should facilitate the provision of patent information-based services to SMEs by competent professionals. These services integrate technical and competitor information (based on patent information) into the product and business development processes of SMEs.

InnoInfo: Enhancing utilisation of information and information services, especially patent information, and developing evaluation methods for assessing the impact of information in R&D and product development in order to support the Finnish Innovation System. Managing institution is the VTT, the Technical Research Centre of Finland.[38]

V. FOLLOW-UP TOWARDS EXPLOITATION

1. Valorisation or dissemination of results

Funding for purchase of innovation services

Tekes launched in early 2008 a funding product for advisory services and innovation support services for small and medium sized companies. SMEs can apply for a grant which supports purchase of innovation services. The aim is to encourage them to develop their business activities in a comprehensive way and to exploit external services for company's innovation activities. Innovation services purchased can for instance relate to commercialisation of new products, services and production methods (incl. market studies and studies on internationalisation and target market's legislation), use of standards, IPRs and their protection, usability and industrial design, knowledge and technology transfer, as well as training supporting strategic renewal and innovation activity.

The background idea is to bring the best innovation-related knowledge available to small and medium sized companies. The funding aims also to encourage companies eligible to exploit more external innovation support services available. Funding can be applied for by using a Tekes application form tailored to small and medium-sized companies. Enterprises can apply for funding at any time.

List of policy priorities: support to innovation management and advisory services; support to technology transfer between firms; addressing innovation-related Lisbon guideline elements: Improvements in innovation support services, in particular for dissemination and technology transfer. [39]

2. Open access to the results of publicly funded research

The open innovation model is not fully utilized in Finland – neither by firms nor by policymakers. Improving the internalisation of the innovation system and, for example, research mobility, is the key in responding to this challenge.[40] One of these supporting initiatives is the Finnish Open Access Working Group.

Finnish Open Access Working Group - FinnOA is an unofficial body promoting open access to scholarly literature in Finland. The group was founded in April of 2003. The members represent faculty and research staff, scholarly publishers and libraries. The current chairman of the group is Marjut Salokannel, University of Helsinki.

[38] See http://www.innovaccess.eu/iesm_finland.html online.
[39] See http://proinno.intrasoft.be/index.cfm?fuseaction=wiw.measures&page=detail&id=9347&CO=4 online.
[40] See the Evaluation of the Finnish National Innovation, p. 58.

Further on, there is an Open Access Self-Archiving Mandate at the University of Helsinki. By a unanimous decision of the university management team the University of Helsinki requires that researchers working at the University deposit copies of their research articles published in academic research journals in the open repository of the University. This decision applies to articles approved for publication from January 1st of 2010 onwards.

In April 2006, a new open access infrastructure initiative, OA-JES, funded by the Ministry of Education, was started. It is coordinated by FinnOA and is a collaboration between the University of Helsinki, Helsinki University of Technology, the National Library of Finland, and the Federation of Finnish Learned Societies. The objectives of the initiative are: 1) to give aid to universities and research institutes in setting up institutional repositories; 2) to inform researchers about how open access is a part of the research process; and 3) to provide an easy-to-use platform for the open access journals of Finnish learned societies. The Ministry of Education will also be funding a digital infrastructure initiative in the centre campus of the University of Helsinki, starting in 2007. The aims will be twofold: 1) to support scholarly open access publishing, which will include repository services both for researchers and for scholarly journals of the departments; and 2) to build a supportive infrastructure for the accessibility and preservation of primary research materials of the departments. The idea is to provide faculty with a comprehensive set of services for their own publications and research materials.[41]

3. Impact assessment

There is in Finland an increasing public demand for extending the evaluation process to enhance the understanding of possible scientific and technological developments and their impacts on the wider economy and society, in order to use the evaluation findings in feasible and sustainable policy design. An effort to develop a commonly accepted framework for impact analysis was initiated by the Science and Technology Policy Council's 2007 statement on the assessment and forecasting of the effectiveness of STI. The need for this framework was reinforced by criticism of evaluation practices in a report by the National Audit Office in 2008 that found that evaluations do "not provide decision makers an opportunity to call R&D actors to account for the achievement of the objectives that have been set for them. This is due to numerous reasons. In spite of the key position of evaluations as a steering instrument in the state administration, neither R&D policy and administrative actors nor other actors in the state administration have been made expressly responsible for producing evaluation information concerning the achievement of objectives". In response to this identified development need in policy intelligence, Tekes and the Academy of Finland started a project on the Impact Framework and Indicators for Science, Technology and Innovation (VINDI).[42]

VINDI - The Impact Framework and Indicators for Science, Technology and Innovation

Assigned by Tekes and the Academy of Finland, Advansis carried out a study on the impact framework and indicators for science, technology and innovation in 2008. The study presented an overall view of the effectiveness of science, technology and innovation, also referred to as an impact framework, and defined the most important indicators of effectiveness. The challenges involved in defining the effectiveness of science, technology and innovation included factors such as the long time period involved and the implicit nature of some impacts. Many international publications on the topic have focused on the indicators concerning input and output factors.
The basic structure of the impact framework complied with the conventional input-activity-output model, with the exception that the model is operated in reverse order.

[41] See http://www.openaccess.fi/info/english.html online.
[42] See INNO Policy Trendchart 2009, p. 52.

The key question from the point of view of the impact framework was what impacts can be expected. The aim was the examination of the impacts on a normative basis and enabling such examination to be used for the strategic development of science, technology and innovation policy.
Within the impact framework, the impacts of science, technology and innovations were examined in relation to four key areas of society and the economy, called impact areas. They are: the economy and renewal, learning and skills, the Finns' well-being, and the environment.
In conclusion, the report stated that there are a great many indicators available addressing inputs, outputs and activities of science, technology and innovation. However, there is a shortage of indicative data about the social and economic impacts of science, technology and innovation, and particularly of indicators that would enable tracing of successive chains of impacts. The report recommends that further work should focus on the four impact areas named above.[43]

5. Brokerage events

There are regularly organized brokerage events in Finland covering different fields of research.

VI. CONCLUSIONS

The development of the Finnish innovation scheme is based on a shift from a technology policy to a broader paradigm of innovation, based on improving competences and skills, on increasing openness in economy and society, with a focus on strengthening education (knowledge creation) and the cooperation in the system.[44]
These latest developments and trend in the Finnish system include: a general increase in public expenditures for innovation, support of innovation in private and public services as well as use of public procurement as a tool enhancing innovation. Finland allocates a considerable amount of money in support of financing start ups (9.9%) and to innovation in services (9.7%).[45] The target aim set by the Government programme was to increase the share of R&D to 4.0 per cent of the gross domestic product by 2011 was achieved already in 2009. The target of R&D investment from the private sector was set at 2/3 which was not realised yet. Business enterprises investment even declined compared to 2008.[46] Funding should be increased for demonstration projects that promote the market access of new products and methods and enhances innovation. Unlike SMEs, Tekes funding for larger companies mainly targets their research activities, not R&D for products and services. One criterion for funding is engagement in cooperation with research organisations and SMEs. Then, large companies are significant network drivers. In research funding, Tekes will focus on large packages that involve close international cooperation: funding applied research (creating new knowledge and skills that can be utilised by the industry) and strategic research (that anticipates the future needs of the business sector – foresight). Accordingly, Tekes has a very strong role in the Finnish innovation system to ensure that "European funding and cooperation opportunities for innovation activities meet the needs of the Finnish business sector and research organisations"[47]. The year 2010 was a year of transformations for Tekes. The share of funds allocated to Tekes programmes in total funding was reduced and investments in SHOKs increased.[48]

[43] See http://www.aka.fi/Tiedostot/Tiedostot/Julkaisut/06_08%20VINDI.pdf online.
[44] See European Innovation Progress Report 2009, p. 47.
[45] See European Innovation Progress Report 2009, p. 43.
[46] See http://www.research.fi/en/resources/R_D_expenditure online.
[47] Tekes, Annual Review 2010, Helsinki, 2010, p. 11.
[48] See Ibidem.

The Finnish Innovation System has many similarities with the policy measures detected at the EU level; what it has is also a level of 'innovativeness' of the national innovation system itself, then some of the instruments and programmes like the Strategic Centres for Science, Technology and Innovation (SHOKs), the Venture Cup Finland or the Foundation for Finnish Inventions (FFI) are very much unique in their policy design. The Finnish system was always some steps before the developments of the EU level. At the same time they were also those (in their quality of innovation leaders) influencing significantly the innovation policies at the EU level.

Further one, the Finnish system with its systematic, methodologically advanced evaluations in education, research and technology and impact assessment (like VINDI - The Impact Framework and Indicators for Science, Technology and Innovation), as well as the consistent implementation of their findings in Finnish innovation policy as part of continuous policy learning and quality control system is impressive. Finland was also the first OECD member country to use the concept of a "National Innovation System"[49] to formulate and implement an education, technology and innovation policy and see it as a common goal of all stakeholders involved at every level. Finnish decision makers in the public administration and in the private sector have agreed together on what drives innovation and on the political potential of innovation promotion. Furthermore, education is seen in Finland as a life long learning process having a holistic approach. Additionally, research and innovation are seen as a continuum in the whole innovation cycle. High growth companies are seen as key innovation drivers. In Finland emphasis is laid also on non-technological innovation, social innovation (well being)[50] but also industries like the game software industry, which is an ever growing market segment. Helsinki is considered the hot spot for mobile start ups. According to the latest report (The Finnish Games Industry 2010-2011) from Neogames, the country's Centre of Games Business, Research and Development, there are 65 games companies in Finland, with over a third of them being established since 2009; 10 in 2009 and 14 in 2010. Total turnover for this sector for 2011 is estimated to be €165 million, up 57 percent on 2010's figure, thanks in part to the *Angry Birds* game.[51] These are thus the strengths of the Finnish system and make Finland one of the best national innovation systems worldwide.

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[50] Therefore it is not surprising that the new 2011 Tekes strategy is called "Growth and wellbeing from renewal".

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INNOVATION LANDSCAPE IN THE UK [1]

I. STRATEGY LEVEL

1. Improvement of foresight activities to anticipate technology and market needs

1.1. UK Government's Foresight Programme

The UK's Foresight Programme is recognised as world leaders in futures thinking within Government, bringing together key people, knowledge and ideas. It enables the government to look beyond normal planning horizons and to identify opportunities that could arise from new science and technologies and to explore the actions to realise those opportunities.
Three programme areas can be detected:

- Foresight projects are in-depth studies looking at major issues 20-80 years in the future.
- The Foresight Horizon Scanning Centre does short projects looking at more discrete issues 10-15 years in the future.
- Foresight Toolkits and Networks look to strengthen futures thinking capacity and share best practice within and across government.

As the Government's 'think tank' on science and technology issues Foresight operates through projects that investigate the challenges and opportunities arising from emerging areas of science and technology or that address major issues for society where science and technology have an important role to play. By drawing on experts from many disciplines in the natural and social sciences, and through the use of proven futures techniques, Foresight helps the Government to strike the right balance between long-term thinking and tackling issues that need immediate attention. Foresight works across Government, supporting strategic thinking and helping departments to formulate innovative policies. First reports and overall approach were very influential. Subsequent activities have aimed to diffuse the benefits of participation to a wider range of companies. Interfaces between traditional sectors have been exploited. [2]

Current priorities focus on: Global Food and Farming Futures, Land Use Futures, Mental Capital and Wellbeing, Sustainable Energy Management and the Built Environment and Tackling Obesities.

1.2. Science & innovation investment framework 2004 – 2014

The Science and innovation investment framework 2004-2014, published in 2004, set out the Government's long-term investment strategy for science and innovation. The overall ambitions of the framework are to:
- Make the UK world-class in all areas of science, engineering and technology;
- Translate the new knowledge generated more effectively into innovation;
- Improve the prosperity and the quality of life in the UK;
- Make the UK the location of choice for Research and Development and high value-added business.

[1] This report is based on ERAWATCH, INNO-Policy TrendChart findings and on the documents available on the website of ministries, public funding institutions and research organisations in the UK.
[2] See http://www.foresight.gov.uk/index.asp online.

The Government measures the performance of the UK research community against two public service agreement outputs: a healthy UK science and engineering base and better exploitation.

The Government's long-term objective for the UK economy is to increase the level of knowledge intensity in the UK, from its current level of around 1.9 per cent to 2.5 per cent by around 2014. The achievement of this target requires substantial growth in business R&D in the UK. This in turn requires a similarly significant growth in the underpinning investment in the public science base, both to supply the skills and research results into the economy, and also to attract mobile business R&D investment into the UK. As this framework sets out, it will also require a continued strengthening of the linkages between the public and private sector research bases.
On the government side, the Spending Review represents a further very substantial investment in the public science base, increasing funding at an average annual rate of 5.8 per cent in real terms over the Spending Review 2004 period (2004-05 to 2007-08). At the same time, there are encouraging signs that, following decades of decline, private sector R&D in the UK is beginning to grow again. The Government is committed to driving this partnership with the private sector forward – the central aim of the ten-year framework.[3]

1.3. The Technology Strategy Board's (TBS) new plan for innovation

In 2008 the first innovation strategy was published, under the title *Connect and Catalyse*, to explain how the TSB will proceed to promote and invest in innovation for the benefit of business and the UK between 2008 and 2011. In order to accelerate the pace of innovation over the coming period, a new strategy document, *Concept to Commercialisation*, was published in May 2011. This builds on the approach that TSB has already developed and also sets out new directions. Key facts and figures as formulated in the new strategic plan for UK innovation, *Concept to Commercialisation* for 2011-12 to 2014-15: The budget allocated for this period will be £1bn. In partnership with business and other funders, it is expected to generate investment of around £2.5bn to drive economic growth. TSB's strategy for business innovation over these years will concentrate on five areas:

- Accelerating the journey between concept and commercialisation;
- Connecting the innovation landscape;
- Turning government action into business opportunity;
- Investing in priority areas based on potential;
- Continuously improving our capability.

Key commitments

Technology and innovation centres: According to TSB, physical centres of excellence have a powerful role to play in helping business to develop and commercialise good ideas. From 2011, TSB will establish and oversee a new network of technology and innovation centres in specific fields and look at how clusters of expertise can create momentum for innovation.

In October 2010, the Government announced that over £200m would be invested in a network of elite technology and innovation centres, to be established by the Technology Strategy Board. Technology and innovation centres are drivers of future economic growth, which create a critical mass for business and research innovation by focusing on specific technologies with strong UK capability and a large potential global market. They aim to achieve global impact in pre-commercial development, which will require coordinated, long-term investment and a competitive element so that they remain relevant and valued by business in the future.

[3] See http://www.epsrc.ac.uk/plans/approach/planning/Pages/govpolicy.aspx online.

From 2011, the Technology Strategy Board is establishing six to eight centres. This investment further bridges the gap between the research base and businesses, helping to commercialise the outputs of the UK's world-class universities and research institutes and complement existing programmes to promote collaboration between these and industry.

New support for high potential SMEs: Small and medium-sized enterprises are regarded to be a major source of the UK's future economic growth. Therefore, TSB will create a co-ordinated package of support and investment for SMEs, helping early stage businesses to accelerate their ideas more rapidly to market and, for more mature businesses with potential, to deliver strong growth. Aim is to make the UK the preferred place to start and grow innovative businesses.

Procurement: Public procurement, at around £220bn per year, offers great opportunities for government to act as an 'intelligent lead customer', encouraging and purchasing innovative products and services which can then go on to further commercial success. TSB intends to develop this potential over the next four years, working across government to make public sector procurement a force for innovation.

Demonstrator projects: Large-scale demonstrators help to overcome barriers, bringing partners together to test and validate what can be done, and so move new products closer to wider application. TSB has enabled highly effective demonstrators in several sectors, and will continue to invest in projects where there is a need and benefit.

New forms of knowledge exchange: Online social networks are a powerful and efficient enabler of connections, bringing people with ideas and resources together. A new online platform is to be developed, to maximise its impact as a place where individuals and businesses can find partners, build collaborations and work on challenges on the road to commercialisation.[4]

1.4. White Paper Innovation Nation

The White Paper Innovation Nation, published on 13 March 2008, sets out the Government's aim of making the UK the best place in the world to run an innovative business or public service. The White Paper Innovation Nation sets out the strategy of the Department for Innovation, Universities & Skills and that of the UK's Government.

The strategy envisaged by the White Paper involves investing in people, foster knowledge creation and diffusion, unlocking talents by investing in research and in the exploitation of knowledge and by using the national regulatory framework, public procurements and public services to shape and foster innovation in any sector. The White Paper Innovation Nation builds on the Government's knowledge economy programme, the 2004 Science and Innovation Investment Framework, as well as the Enterprise Strategy in order to promote innovation across the UK. The White Paper aims at tackling sectors where the innovation challenge is more felt, such as business innovation, public sector innovation, demand for innovation, international innovation and innovative people and places.

It highlights the need for demand-driven innovation complementing the supply-side innovation measures with demand-side policies and the measures to be taken to achieve it:

• Each Government Department will include an Innovation Procurement Plan as part of its commercial strategy, setting out how it will drive innovation through procurement and use innovative procurement practices.
• The Department of Innovation, Universities and Skills (now BIS) will reform the Small Business Research Initiative, refocused on technology based research, prototyping this

[4] Driving Innovation. Concept to Commercialisation. A strategy for business innovation, 2011-2015. Technology Strategy Board, p. 7. See http://www.innovateuk.org/_assets/0511/technology_strategy_board_concept_to_commercialisation.pdf online.

with the Ministry of Defence and the Department of Health and will extend the revised SBRI to all participating Departments by April 2009.
• BIS and the CBI (Voice of Business, lobby organisation for the private sector) will facilitate the interchange of innovation expertise between the public and private sector, including the secondment of private sector experts into the public sector for the purpose of mentoring in pro-innovation procurement.
• BIS and the Better Regulation Executive in the Department of Business, Enterprise and Regulatory Reform (BERR) will work with the Business Council for Britain and others to identify how regulation may promote or hinder innovation.[5]

The White Paper Innovation Nation sets out also the creation of an innovation index by the National Endowment for Science, Technology and the Arts (NESTA) with the aim to measure the UK's investment in innovation and its effects.[6]

2. Improved dialogue with innovation related stakeholders

2.1. Innovation Platforms

Innovation Platforms bring together Government, research funders, and other stakeholders focused on a societal challenge to facilitate the dialogue amongst parties and foster innovation. Their aim is to engage with businesses and the research community by aligning innovation policy and government procurement to deliver quality public services and provide solutions for the market place. Innovation Platforms focus on the integration of a range of technologies and better coordination of policy and procurement resulting in a more efficient provision of public services and enhanced ability of UK businesses to provide innovative products and services. They are set out to ensure that the Government is getting more innovative solutions reducing the associated business risk; they also aim at achieving a better position of UK businesses offering global competitive procurement opportunities developing the Government's procurements potentiality towards the larger global market.
The Innovation Platforms are part of the Government's Technology Strategy. They were launched by the Technology Strategy Board in November 2005 as a new way for Government and business to work together and as an opportunity to generate more innovative solutions to policy and societal challenges.

The criteria used in selecting the proposals reflect the basic principles of upon which the Innovation platforms are based. Innovation Platforms must bring together key Government Departments, academia and business and work towards the aim of identifying where innovation could be used to solve specific problems. Proposals addressing successfully these criteria are short-listed and then discussed/funded. Each platform has its objectives and the projects funded must comply with the specifications of the calls as assessed by a review board authorised by the Technology Strategy Board. Innovation Platforms are exclusively national, as the remit of the TSB is "to promote and support research into, and development and exploitation of, technology and innovation for the benefit of UK business, in order to increase economic growth and improve quality of life".[7]

One example: Low Impact Buildings Innovation Platform
The Low Impact Buildings Innovation Platform aims to help the UK construction industry deliver buildings with a much lower environmental impact. The UK construction market is worth over £100bn per year, and there is growing pressure from customers and regulators for more environmentally friendly buildings, creating new growth opportunities for innovative businesses. The Technology Strategy Board launched the Low Impact

[5] See http://www.nesta.org.uk/library/documents/Towards-an-innovation-nation.pdf online.
[6] See http://www.nesta.org.uk/library/documents/innovation-index.pdf online.
[7] See http://www.innovateuk.org/ourstrategy/innovationplatforms online.

Buildings Innovation Platform in May 2008. The Innovation Platform budget has been increased from £30m to £47m over the initial three years to address the challenge of both new and existing buildings.

The Technology Strategy Board identified the priority areas for the Innovation Platform following a review of published roadmaps, consultations with other organisations, and workshops. Funding was provided to support businesses to innovate in the following six areas:
• design for future climate change: designing buildings that meet the targets set by CLG, are resilient to climate change, and that users want to live and work in;
• design and decision tools: developing integrated, interoperable systems that enable the holistic design of buildings;
• better materials and components: filling in the gaps in what is commercially available with improved buildability, performance and cost;
• build process: adapting the supply chain and build process to deliver low-impact buildings quickly, economically, at scale, and with low levels of defects management and operation of buildings;

From 2008 to 2011 there were a range of activities to support industry to deliver the challenges of low-impact building. These include: commissioning short studies to fill gaps in information, collaborative research and development (CR&D) projects between businesses or between business and academia, demonstrator projects to validate innovative solutions, design competitions, exploring new business models in the sector, development contracts and sandpits (five-day intensive workshops to create intriguing solutions to intractable problems).[8]

2.2. Sciencewise - ERC

Sciencewise is the UK's national centre for public dialogue in policy making involving science and technology issues. The main priority of the Sciencewise programme and now the Sciencewise-ERC is to increase public engagement in science and innovation policy making on complex, debated or emerging scientific issues. The programme does not have a specific thematic focus, since it supports public dialogue in all complex, controversial or emerging scientific areas. However, some priority areas for new projects have been identified by the Sciencewise-ERC based on emerging scientific issues. These are: the use of animals in research, waste management, privacy and data protection, well-being and 'The Golden Years', air travel in connection with climate change, drugs, energy technologies in the home and personal responsibility for combating climate change. Moreover, through the engagement of Sciencewise in the Wider Implications of Science and Technology (WIST) stakeholder engagement process Sciencewise's science horizons project identified the following eight science and technology 'clusters' of interest for the programme: Advanced materials and robotics, energy technologies, body and mind sciences, nanotechnologies, network interactions, security sensors and tracking, information handling and knowledge management.
The Sciencewise-ERC consists of an interactive web-portal that provides information, advice and guidance on public dialogue, mainly to policy-makers (ministers, government departments, advisory bodies, non-departmental public bodies, non-government organisations etc.), but other stakeholders involved in science and technology policymaking as well, such as the society (the public and media), and the scientific community (scientists, businesses etc.). A wide range of other support services is also provided such as a helpline; supporting offline services to all stakeholders (policy makers, science and society) such as one-to-one mentoring, newsletters, 'drop-in' sessions etc.; events and exhibitions such as networking events and best practice workshops etc.; as well as other general awareness raising activities such as public relations and activities to raise media awareness. Funding is still provided in the form of

[8] See http://www.innovateuk.org/ourstrategy/innovationplatforms/lowimpactbuilding.ashx online.

co-funding to Government departments and agencies to develop and commission/procure activities to increase public engagement and dialogue. [9]

II. WORK PROGRAMME LEVEL

1. Design of topics: technical aspect closer to the market

-Involvement of SMEs / Streamlining funding instruments / PPP

1.1. Grant for Research and Development

The Grant for Research and Development is a "Solutions for Business" product which is intended to help small and medium-sized firms introduce technological innovations. The grant provides finances on a range going from micro-project (up to £20,000 or €24,000) to "exceptional development projects" with funding of up to £500,000 or some €620,000. Larger grants are available for projects undertaken in assisted areas of the UK.

The budget is variable and allocated by the Government to the Regional Development Agencies of England on the basis of a set of priorities, including the sectoral characterisation of the Region, the level of economic development and the overall purpose of the grant. The average yearly budget since 2004 has been around £30-35m or €37-43m, exhibiting great variations. Grants are issued to individuals and small and medium-sized businesses in England to help them undertaking research and development activities for technologically innovative products and processes. For small businesses wishing to exploit an innovative idea, these grants provide reimbursed consultancy fees for advice on the steps needed to evaluate and implement their business ideas.

A recent evaluation shows that the long term effects of the Grant system in place are significantly positive in terms of bringing innovation to the market place and improve the competitiveness standing of the supported companies. Spillover effects are also positive at a local and regional level.

Background and rationale: The rationale for the scheme is that lack of access to expertise and/or finance provides a barrier to the introduction of innovation or to innovation-related activities particularly within small and medium-sized businesses.

The range of tailored products offered under this scheme is intended to overcome this barrier through the provision of adequate financing and advisory services. The product is now offered in a range of sizes appropriate to the scale of the project that firms wish to undertake. The grant provided funding on a competitive basis for two distinct types of projects:

(1) a technical and commercial feasibility study into innovative technology AND

(2) the development up to pre-production prototype stage of a new product or process which involves a significant technological advance.

List of policy priorities: Direct support of business R&D (grants and loans); R&D cooperation (joint projects, PPP with research institutes); Support to innovative start-ups incl. gazelles. Pre-competitive research; Development/prototype creation; Commercialisation of innovation (including IPR); Innovation management tools (incl. quality); Applied industrial research; Knowledge transfer (between researchers).

Main conclusions of the evaluation: The 2009 evaluation concluded that the schemes "have been positive and effective in relation to both their intermediate and their longer-term objectives". Specifically, the following findings were highlighted: a small but significant proportion of supported firms reported increases in their productivity and profitability as a result of their projects; strong evidence of increased and improved technology use and adaptation was found; supported firms were more able to raise extra external financial support and showed greater commitment to innovation and R&D; the schemes addressed and helped remove a significant funding gap for R&D / innovation

[9] See www.sciencewise-erc.org.uk online.

projects by SMEs resulting from the risky nature of such investments and the reluctance of investors; through the scheme firms improved their attitude towards R&D and innovation; there was some evidence that investors are more encouraged to put money into R&D; finally, there was strong evidence that the large majority of both Research/Feasibility projects and Development/Exceptional projects achieved their technical and technology objectives and developed prototypes and products.[10]
Moreover, the Grant for R&D since its launch in 2003 and until March 2008 it helped around 1,700 SMEs to research and develop technologically innovative new products and processes providing over £130m (€170m) of grant funding.[11]

1.2. Growth and Innovation Fund

In November 2010 the Government announced in its skills strategy paper, Skills for Sustainable Growth, the establishment of a Growth and Innovation Fund (GIF) of up to £50 million a year. The Growth and Innovation Fund (GIF) has been set up to support new initiatives to increase the contribution skills make to enterprise, jobs and growth. The fund gives an opportunity for employers and government to invest jointly in making sure the country has the skills needed for long-term competiveness in a modern and dynamic economy. It will co-invest in innovative employer-led skills solutions with the potential to make a significant impact on the big skills challenges facing employers. The investment fund will also offer support, in partnership with employers, for specific proposals they make for raising skills in their sectors and industries.

The UK Commission for Employment and Skills and the Skills Funding Agency are working in partnership to deliver the Growth and Innovation Fund. Applicants are invited to develop proposals against one or more of the following three investment strands:

Best Market Solutions: This strand will give urgent priority to those looking to boost business performance and enhance skills through the introduction of new professional standards, including occupational licensing and training levies. It will prioritise action that stimulates employer commitment and investment in Apprenticeships, which may include the establishment of Group Training Associations and Apprenticeship Training Agencies. Employer-backed proposals for other new skills solutions that address major barriers to creating jobs and driving growth will also be welcomed.
National Skills Academies (NSAs): National Skills Academies are employer-led organisations with a leading role in developing the infrastructure needed to deliver specialist skills for key sectors and sub-sectors of the economy.
Joint Investment Programme (JIP): The JIP will invest jointly with employers to provide funding exclusively for the specific qualifications and units of qualifications to meet specific skills needs. Successful applicants will work with approved colleges and training organisations to develop an employer / provider partnership, to deliver specific sectoral provision.[12]

2. Design of topics: development of non-technical aspects

2.1. Make Your Mark

The Make Your Mark national campaign was launched in 2004 by Enterprise Insight, an historic joint-venture between the UK's four leading business membership organisations: the British Chambers of Commerce (BCC), the Voice of Business (CBI), the Federation of Small Businesses and the Institute of Directors (IoD). It is funded and supported by the Department for Business, Innovation and Skills (BIS). The campaign also collaborates with numerous voluntary organisations in the UK. Make Your Mark aims "to drive economic prosperity and social cohesion by increasing the UK's enterprise culture and

[10] A series of case studies are available at: http://www.berr.gov.uk/files/file22002.pdf.
[11] See http://www.business link.gov.uk/bdotg/action/detail?type=RESOURCES&itemId=1074469930 online.
[12] See http://www.ukces.org.uk/assets/bispartners/ukces/docs/gif/gif-prospectus.pdf online.

entrepreneurial behaviour". It coordinates activities of different stakeholders, including its founding and partner organisations, individuals, networks and others, aiming to create an enterprise culture in the UK by inspiring, stimulating and supporting young individuals to be more innovative and entrepreneurial. Make Your Mark runs several campaigns on education, youth, social enterprise, women's enterprise and black and ethnic minority enterprise. Moreover, it raises policy debate and provides advice to policy-makers and practitioners regarding the UK's enterprise culture and entrepreneurship.

Background and rationale: The 2004 report "A government action plan for small business" and its complementing document "Building an Enterprise Culture" published in 2003, set the rationale for government intervention in order to create an enterprise culture in the UK by providing evidence on the nature and extend of the problem. According to them, despite a supportive business environment in the UK, a relatively low level of entrepreneurial activity has been reported. However, according to the reports this does not constitute a market failure in itself. Reports have highlighted the existence of information gaps that lead to low levels of enterprise activity from the society's perspective, since they can prevent the choice of an entrepreneurial career. This gap is not addressed by the market itself due to high costs and the long-term benefits involved in comparison to the private returns and the inability of the private sector to fully assess the social benefits from such a change. Thus, government intervention is necessary in building an enterprise culture. Generally, a gap has been identified between "thinkers" and "doers" in the UK when it comes to enterprising.

In this frame the UK recognises in its Enterprise Strategy the importance of entrepreneurship from both existing and new firms, for innovation and growth and the need to create an enterprise culture. Make Your Mark was introduced to face the lack of such an enterprise culture in society by addressing the information gap, inspiring people to think in enterprising and innovative ways. Moreover, it aims to provide the capabilities to unlock talent in the UK by helping individuals actually act in enterprising ways. In this way it aims to achieve both an attitude and a behaviour change.

List of policy priorities: Support to the creation of favourable innovation climate (ex. roadshows, awareness campaigns); Support to innovation management and advisory services; Support to innovative start-ups incl. gazelles; Innovation prizes incl. design prizes; Promotion of entrepreneurship/start up (including incubators); Development/prototype creation; Diffusion of technologies in enterprises; Improving the legal and regulatory environment.

The Make Your Mark campaign offers a range of resources such as toolkits, guides, checklists, lists of information and financial sources, success stories and blogs, available to everyone through its website. Ambassadors and other types of role models have also been recruited to promote the campaign's objectives and inspire young people by sharing their time and experience. Furthermore, the campaign offers more specific support through specific campaigns, competitions, roadshows and events. Among the Make Your Mark campaigns and activities is the Enterprise Week, a national event that became part of Global Entrepreneurship Week in 2008; the Make Your Mark with a Tenner campaign that aims to inspire young people to become more entrepreneurial by providing them with £10 to make as much money or as much social impact as they can; competitions such as the Ideas MashUp, the Make Your Mark Change Lives campaign to promote social enterprises, the Make Your Mark Challenge as the UK's biggest live enterprise competition; the Make your Mark Clubs and more.

Main conclusions of the evaluation: According to the campaign's portal, the impact of the Make Your Mark Campaign since its launch in 2004, includes "an increase in enterprise participation, aspiration and action amongst young people, helping to create a new generation of entrepreneurs". This is supported by a rise in the proportion of business start-ups by 16-24 year olds from 6.5% in 2003 to 8% by 2007; as well as by the change in attitude of young people considering running a business, with 62% of them considering this option as a top career choice. Moreover, the effect of the campaign on enterprise policy-making and practice is also judged to be significant. Additionally, 110,044 more businesses were started by young people in 2007 than in 2002. A big change has also been reported among the target group regarding their attitudes on

starting a business, with 51.8% of young people in 2007 believing they have what it takes; 21% more than 2002 and presenting a 6% increase on the total population. Women are also found to be catching up significantly. 29% more women started a new business in 2007 than in 2002 representing 4.9% of the total age group of 25-34 years old and compared to a just 9% increase for the same period for men 25-34 years old that reached 9.7% of this age group. Finally, thanks to the You're your Mark campaign 2,242,000 people participated in 18,204 Enterprise Week events since 2004. Finally, according to the Government's Enterprise Strategy 2008 "Enterprise Insight has developed a range of activities and had success in raising the profile of enterprise and social enterprise through their Make Your Mark campaign".[13]

2.2. Basic Technology Research Programme

The Basic Research Technology Programme is sponsored by the former Department for Innovation, Universities and Skills (BIS). The Programme was established in order to provide funding and support for development of tools and concepts applicable to a diverse range of scientific research fields in order to create new generic capabilities. The projects to be funded through the BTRP must be innovative and have an impact over two or more technological fields.

The aim is to contribute to the development of a generic technology base that can be adapted to a diverse range of research problems and challenges spanning the scientific interests of all the research councils. The high level objective of the programme is to engage research institutions active in applied technology research into carrying out basic, more long-term and potentially revolutionary research in the field of science and technology. The Programme does not prescribe a "technology theme" or focus for proposals, it asks applicants to consider the vision and develop their own ideas for enabling technologies that will take the S&T revolution forward.

List of policy priorities: Policy measures concerning excellence, relevance and management of research in Universities; Strategic Research policies (long-term research agendas); Public Research Organisations; Research and Technology Organisation (private non-profit). The Programme aims at the consistent development of the UK scientific and technological capabilities in any field of research/technology in order to provide a knowledge and technology base. Particular attention is placed towards: nanotechnology, biotechnology, imaging, photonics and sensors.[14]

4. Development of Prizes/Awards

4.1. iAwards

The iAwards are awards launched to "recognise and celebrate the best British achievements in science, technology and innovation". Specifically, they aim to show how British companies translate new technologies into innovative products and services that could improve everyday life. A wider objective of the Government is to stimulate commercial interest and help bridge the gap between business and the general public. The initiative is hosted by the Department for Business, Innovation and Skills (BIS), in partnership with entrepreneur James Caan and in association with QinetiQ, a leading international technology-based solutions and R&D services company as headline sponsor.

Background and rationale: The main framework condition that led to the launch of the iAwards was the economic downturn caused by the global economic crisis. The initiative is part of the Government New Industry New Jobs agenda that in view of the economic recession places science, technology and innovation at the heart of the Government policy and emphasises on innovative industrial production for the 21st century. More specifically, the Government sees investment in science, technology and innovation as essential for the creation of jobs and for promoting the UK's global competitiveness under

[13] See http://www.makeyourmark.org.uk/ online.
[14] See http://www.rcuk.ac.uk/basictech online.

the current economic climate. The Government also aims to stimulate commercial interest and bridge the gap between business and the general public. The initiative is further aligned with the HM Treasury's five Grand Challenges for Science faced by the UK. The Grand Challenges were introduced in the 2007 Comprehensive Spending Review. The collaboration of the Government with James Caan, a leading UK entrepreneur, is expected to guarantee media attention and prestige for the initiative. Moreover, the contribution of some of the world's most important technology-based companies, including QinetiQ, SIEMENS, Rolls-Royce, Microsoft, BizSpark and others, as sponsors of the awards further adds to the credibility of the scheme.

There are 13 categories of iAwards:

1. Life sciences
2. Transport
3. Energy and environment
4. Places to live and work
5. Digital communications
6. Entertainment/media
7. Consumer product
8. Cross-application of technology
9. Best collaboration
10. British inside
11. Inward investment
12. The next big thing
13. Best technology start up

Entry is open to single organisations, but also to organisations that collaborate, which should however be represented by a single lead applicant. Eligible applicants should be British companies or organisations who can demonstrate British innovation in science and technology. This means that the development work, the point of origin and primary ownership of the innovation, should be within a UK-registered organisation. Only innovative projects launched in the last two years and for which commercial results information is available, are eligible. The exception is the category "The Next Big Thing", where commercialisation is pending. Projects can only be entered in one category. The same project cannot be entered into the same or other category by different organisations involved in a collaborative project. Each entry for the awards must demonstrate that the innovation can impact on one or more of the five Grand Challenges faced by the UK as specified by the HM Treasury in the 2007 Comprehensive Spending Review: healthcare and ageing population; global competition and national growth; accelerating pace of change through technology and how it can be harnessed for advantage in terms of delivery of services to the nation; global security; finite natural resources versus an increasing population. Also, each entry must specify the British involvement in the innovation and be able to demonstrate that the innovative thinking and development is by a British organisation or team, even if the commercialisation has been via an overseas/global organisation.[15]

4.2. The Queen's Awards for Enterprise

The Queen's Awards for Enterprise are the most prestigious awards for business performance in the UK. Successful candidates receive a range of benefits including worldwide recognition and extensive press coverage. The Awards are presented in three categories: International Trade, Innovation and Sustainable Development. All business units that meet the entry criteria can be nominated for the Awards. To entry the selection process a business must be based in the UK, have at least two full time (or full time equivalent) employees and be able to demonstrate success in the category for which the candidacy is brought forward.

Unsuccessful candidates will receive experts' feedback on the merit of their proposal, assessors' view on the performance of their business and guidance on how to improve

[15] See http://www.iawards.org.uk/ online.

the standing of the business in the market place in view to further re-submission of the application for the Awards. This is a very good measure, as in the end everyone benefits from it.
The Awards are grand occasions where businesses can prove their standing in the marketplace. The ceremony is held in proximity of the 21st of April each year, the Queen's birthday. Representatives of the winning businesses are then invited for an evening with the Queen in Buckingham Palace. The prestige of the Awards is seen by the business community as an occasion to celebrate success, improve their standing in the wider business arena, and boost staff morale. The Awards offer also a PR opportunity in terms of thrusting the company's credibility with customers, suppliers, investors and business partners.
List of policy priorities: Innovation prizes incl. design prizes; Promotion of entrepreneurship /start up (including incubators); Awareness-raising amongst firms on innovation; Pre-competitive research; Applied industrial research; Development/prototype creation; Commercialisation of innovation (including IPR); Industrial design. Innovation Awards are presented to businesses that have either sustained improvement in business performance and commercial success by demonstrating outstanding innovation capabilities over a period of two years or innovation and development continued over a period of five years. Innovative businesses are assessed for invention, design, production, performance, marketing, distribution, and after sale support accordingly to whether they are providers of goods or services.[16]
Main conclusions of the evaluation: By signalling to companies that design and product development are important activities it helps to ensure that more companies work more effectively in product realisation. This kind of leadership and modelling role is strengthened by awards such as the Queen's Award for Enterprise. The Award itself is said to be a strong brand and helps companies market a product, but it is the leadership aspect that is almost more important.[17]

4.3. Cooperative Awards in Science and Engineering (CASE)

Cooperative Awards in Science and Engineering (CASE) is a cross Research Councils scheme in place for funding the training of postgraduate students at PhD level. Projects taken into consideration are those of joint interest to industry and higher education institutions (HE). The sponsor Research Council provides funding to the university, department or supervisor taking on board a PhD student engaged in a research project that involves also an industrial partner. The PhD student receives a stipend for the whole duration of the course (3 to 4 years) and a contribution from the business partner, in the range of £2,000 - £2,500 per annum, a similar amount is also paid by the business to the HE institution hosting and supervising the PhD student. The research is carried out on a topic that is of mutual interest of the student, the hosting HE institution and the company. The student also has to carry out field research in the sponsor company. For this reason the CASE studentships are also a means for companies to tap into highly qualified potential employees. Variants of the standard CASE schemes are also permitted: "Industrial CASE" is a variation of CASE where studentships are allocated directly to an industrial partner and the company sets up its own projects; and CASE-PLUS, where the
scholarship is extend to those students who want to engage in technology transfer activities either in the academic institution or in the company.
The principle behind the scheme is that the sponsor Research Council covers the student's fees and pays the student a stipend plus a small supplement. The collaborating industrial organization has to contribute financially to both the university and the student (the amount of the contribution must be no lower than the annual minima set by the appropriate Research Council in each year of the award). The student works on a PhD

[16] See http://www.queensawards.org.uk/ online.
[17] Finbarr Livesey et al: Investigating the technology-based innovation gap for the United Kingdom. University of Cambridge Institute for Manufacturing, Mill Lane, Cambridge, 2006, p. 44. See http://www.ifm.eng.cam.ac.uk/cig/documents/Innovation_gap_FINAL.pdf online.

topic of interest to the company and spends some time on the company's premises. The scheme is also used as a recruitment mechanism for the company. The PhD projects are jointly devised and supervised by members of academic staff and an industrial partner.
The research projects can be in any field relevant to the programme of the Research Council providing training and facilities in accordance with the interests of the industry sponsor.
The benefits of the CASE award scheme for research students are as follows: the opportunity to work in an industrial or commercial environment on a scientific problem of direct interest to the cooperating body; the opportunity to obtain a higher degree and to improve their prospects of subsequent employment; and an enhanced stipend.
The benefits to the industrial partners are: CASE can provide an economic way of solving research, design or manufacturing problems. The scheme allows industry and commerce to forge closer links with universities and to draw upon their expertise and facilities. The CASE student will spend a definite amount of time of the three to four years working in the laboratory of the industrial partner. This helps to create and develop innovation poles, networks and incubators bringing together universities, research institutions and enterprises, including at regional and local level, helping to bridge the technology gap between regions. The funding is drawn from the promoting Research Council's own funding provisions and is co-financed by the private sector and by foundations or charities.

Main conclusions of the evaluation: Each round of Cooperative Awards in Science and Engineering is evaluated by the sponsoring Council in relation to previous rounds and other collaborative research schemes. CASE has been evaluated positively year on year since its inception as a scheme that bridges the gap between academia and industry. The research councils ask CASE award holders to submit annual reports and use submission rate surveys to look at indicators of success. The programme is considered to fulfil the expectation of constituting a valid means to link industry and academia through training high-level students/researchers and to provide a privileged way for knowledge and technology transfer.[18]

5. Public procurement

5.1. Innovation Procurement Plan 2009 (IPP)

The Department for Business, Innovation and Skills (BIS) is responsible for the UK's policy on innovation procurement. The White Paper, Innovation Nation, highlighted the potential to use the huge purchasing power of the public sector to provide a powerful incentive for business to innovate and develop new products, processes and services. An important commitment in the Innovation Nation White Paper, (March 2008) was therefore for each Government Department to publish an Innovation Procurement Plan (IPP) as part of its commercial strategy, setting out how public procurement can stimulate Innovative Services. The Innovation Procurement Plan sets out the objectives and resources to achieve innovation (addressing skills issues[19] and promoting training opportunities) as follows:
• Increase the capability to procure innovative solutions
• Make innovation a key requirement in large facilities and capital build programmes and the delivery of new services
• Improve the sustainability of operations
• Improve access to contracts for SMEs
• Identify and share best innovative procurement practice

[18] See http://www. publications.parliament.uk/pa/cm200203/cmselect/cmsctech/936/93608.htm for 2002 and http://w ww.publications.parliament.uk/pa/cm200506/cmselect/cmsctech/995/995we02.htm for2005 online.
[19] Here is to mention also the Learning and Skills Council and the Department for Business innovation and Skills, National Skills Academies: already the name of these institutions show the emphasis put also on skills in correlation with other initiatives.

The Public Sector spends 220 billion pounds a year on products and services. Thus, there is a huge opportunity to stimulate demand for innovative products and services. The plan is a guideline on how procurement will be used to drive innovation for the upcoming years. Departments will embed innovation at the heart of procurement practices and will ensure that they engage with UK businesses at an early stage. There two main mechanisms for doing this:
- the Small Business Research Initiative (SBRI), which has been utilised for products rather than services, although some ICT products have had support, which blur the line between the two; and
- Forward Commitment Procurement (FCP).
SBRI is, more specifically, a mechanism to enable innovation in goods and services through the public procurement of R&D. It provides innovative solutions to Public Sector Challenges, a route to market for new ideas, and new business opportunities for Technology Companies.
FCP, on the other hand, is a practical supply chain management tool that creates the conditions needed to deliver innovative, cost effective products and services. It provides a framework for purchasers to seek solutions to unmet needs, rather than specify required outputs, involves early engagement with business in order to identify potential ways of meeting the need, and seeks to go beyond the customary supply chain.

Public procurement is one of five drivers for services innovation. However, no specific initiative is connected to this point. They consist of recommendations on how public procurement processes need to be changed/conditions that need to be met by the procurement processes to boost services innovation, and also refer to the Innovation Platforms with their focus on solutions to major policy and societal challenges such as climate change and an ageing population. These challenges are used as the stimulus for procurement action having to be taken by the relevant Government Department. Procurement is thus part of Innovation Platforms. There is no specific platform for Services Innovation.
In sum, there is a lot of information on the approach to innovation procurement in the UK, and the BIS Business Sectors policies, focusing on services, but practically nothing referring to a UK project/programme/committee focusing on the cross section between the two policy areas Innovation Procurement Policy and Services Innovation Policy specifically.[20]

5.2. The Small Business Research Initiative (SBRI)

The Small Business Research Initiative (SBRI) operates under EU pre-commercial procurement guidelines and is addressed to Small and Medium Enterprises (SMEs) in order to help them gain access to Research and Development opportunities through Government Departments' procurement. Through SBRI, the Technology Strategy Board invites SMEs to pitch their research idea to Government's Departments that have identified gaps in the market and opportunities for innovation. Successful SMEs are given the possibility to develop their ideas through proof of concept contracts funded for up to £100,000 (€113,000), and if the idea is viable, further contracts for development are issued. SBRI does not offer grants to R&D but earmarks a share of the Government's procurement budget to be assigned to SMEs through competitive R&D contracts.
Background and rationale: SBRI is based on a highly successful American scheme to open up to small firms government research and development procurement. The rationale of the measure resides on the observation that the public sector, spending around £160b (€181b) a year on goods and services has a leverage that can be used to foster innovation and influence the innovation potential of SMEs. Although it is

[20] See Peter Stern et al: How public procurement can stimulate Innovative Services. Report to Nordic Innovation Centre (NICe), Stockholm, Technopolis Group, February 2011, pp. 10 et seq. See http://www.nordicinnovation.org/no/publikasjoner/how-public-procurement-can-stimulate-innovative-services-new-study/ online.

acknowledged that fostering innovation through procurement is difficult and risky, the mechanism on which SBRI is based provides some room to manage risks more effectively. In fact, Government Departments run a competition for ideas based on the potential of such ideas to meet departmental needs. Subsequently, successful ideas, reaching the "proof of concept" phase are put through the development phase in order to pilot new technologies and services and validate the outcome against specific Department's needs.
For this reason, SBRI is an effective way of connecting innovative new companies with Government Departments to explore new ideas and bring forward technologies and services. The right of ownership and IP rights related to the outcome remains with the company although some rights of use are retained by the client department.
The policy priorities addressed through SBRI are: Provide opportunities to research intensive small firms by supplying further market opportunities through public procurement; Use of public procurement to increase R&D capabilities of SMEs and kick-start their chance of exploiting the new market opportunities; Capitalise on potential gap in the market in order to create further opportunities for star-ups, new technology-based or knowledge-based businesses.[21]

5.3. Forward Commitment Procurement (FCP)

Forward Commitment Procurement is a procurement model, designed mainly for the public sector, which looks at purchasing from the outcome-based specification need instead of purchasing for the immediate perceived need. It addresses the common stalemate where organisations require products or services that are either not available or are at excessive cost. By using this model it alerts the market to the procurement need and offers to purchase the solution, if the needs are met, once they are available, at an agreed price and specification. This provides the market pull to create the conditions needed to deliver innovative, cost effective products and services and unlocks investment to deliver the requirement.

FCP seeks to encourage industry to develop products to meet identified needs by providing the potential supply chain with confidence that a market will exist for products that meet these needs at the best value for money, i.e. at the optimum combination of whole-life costs and quality. FCP works by generating a credible, articulated demand for innovative goods and services and providing accurate information on the requirements and future needs of customers in the public and private sectors. The initiative brings together progressive thinking and best practice from the private sector's approach to innovation and supply chain management to directly address the lack of demand pull for innovative products. By adopting FCP thinking, public and private sector customers can help overcome the market failures that inhibit the commercialisation of innovative goods and services.

Case study: Hospital of the Future

In order to bring new products to the market BIS and Department of Health (DH) initiated and supported a demonstration FCP project in the NHS in partnership with Rotherham NHS Foundation Trust. The opportunity for innovation was presented by an 8 year refurbishment programme beginning in 2010. This gave a credible sales opportunity, in a defined timeframe, and critically sufficient time for the supply chain to innovate.

Communicating 'unmet needs': Adopting FCP thinking the project team set out what they needed rather than what was available on the market. This was communicated to the supply chain in outcome terms as part of a market sounding exercise:

[21] See http://www.innovateuk.org/deliveringinnovation/smallbusinessresearchinitiative.ashx and http://www.dius.gov.uk/~/link.aspx?_id=0A173A0F048849A89CACFE7E38612F71&_z=z online.

'The Trust wish to achieve a step change in the patient experience; creating a patient centred environment, including the incorporation of highly efficient, smart lighting systems that can deliver economical carbon reductions while at the same time contributing to a pleasant and healthy environment for both patients and staff'. From the Trust's market sounding prospectus
other NHS Trusts joined with the Trust in expressing their interest in buying a solution that delivered these outcomes for their refurbishment and new build projects.
Once the customer's needs have been defined, the next step in the FCP process is to make sure that this valuable market information is communicated to the supply chain. In this case the project team drew on the expertise of the Electronics, Sensors and Photonics Knowledge Transfer Network (ESPKTN). The ESPKTN and other supply chain intermediaries advertised the requirement widely in the trade press and among their members and peer groups.

Engaging with the market place: A Prior Information Notice (PIN) was issued via the Official Journal of the European Union, and this initiated a period of consultation with the supply chain. A market sounding 'Prospectus' set out the requirement in more detail and highlighted the wider market demand in the NHS. The project team enabled dialogue with and among the supply chain, by organising a consultation workshop and by publishing a directory of companies that had responded to the market sounding. The feedback this process stimulated led to the refinement of the outcome based specification and the adoption of innovation friendly procurement approaches.

Outcome based specifications allow room for innovation: The project team listened to the feedback from the supply chain, and the tender was based on an outcome based specification. The detail of the solution and how to achieve the required outputs was left to the individual companies to design test and resolve.

The core requirement outcomes were: A step change in patient experience, i.e. creating a pleasant healing environment with patients being in control of bed zone lighting levels and ambience, whilst providing the lighting to perform clinical requirements and incorporating measures to reduce the risk of hospital acquired infections;

A demonstrable step change in energy efficiency, with progressive improvements in both energy efficiency and operational performance over the life of the project;

A fully installed, maintained and future-proofed service, for example to facilitate upgrading to more energy efficient or better products as they become available'.

Greatly encouraged by the response of the supply chain, the Trust began a competitive procurement exercise in the summer of 2009. A number of high quality proposals were presented as part of the Competitive Dialogue process. Among these were leading medical lighting companies and a pan-European consortium of companies including a lighting designer, architect, building systems manufacturer and lighting manufacturers.

A new and innovative solution on the market: Stimulated by the advance warning of the forthcoming procurement, one consortium worked together in advance of the tender and was subsequently well prepared to come forward with an innovative solution that met, and indeed exceeded, the Trust's expectations. The pro-innovation FCP approach has brought to the market a new and innovative product; an integrated 'future ward' modular solution with integrated lighting and storage which is constructed off-site. Detailed costing, verified by an independent quantity surveyor, showed that the innovative solution will cost the same as a standard ward solution with not only the required step

change in patient experience and lighting efficiency but also with reduced on-site build time and additional benefits.[22]

III. EVALUATION LEVEL

Similar to Finland, the UK has a strong culture of evaluation in R&D policy making and multi-level policy governance. The publication of the UK's Ten-Year Science and Innovation Investment Framework 2004-2014 in 2004 marked the latest culmination of a series of in-depth reviews of the UK's system of innovation. An in-depth system-wide review was undertaken in drawing up the Framework, in which the Government consulted extensively with key stakeholders. These included the scientific community, business, charities and regional bodies, as well as international contacts. A second feature was the engagement of a wide range of Government stakeholders (which also had substantial public sector R&D funding and policy making responsibilities. These included the Treasury responsible for all Government spending), the Department of Trade and Industry (responsible for the Science Budget and several innovation support measures), the Department for Education and Skills, the Higher education Funding Councils, the Research Councils, the Research councils and the then Office of Science and Technology, together with other Government departments with significant scientific and technological portfolios. Main changes during the years have been the shift from direct support to framework support and to a broader policy mix of instruments targeting project-based collaborative research between the science base, especially universities, and industry, R&D capacity building in SMEs and the dissemination of innovation expertise.[23]

According to European Union Competitiveness Report, the British research and innovation system performs well regarding high quality publications, entrepreneurship, patents and the high share of population working in knowledge intensive activities. It has a number of world class universities and competitive strengths in some high-tech and medium-tech sectors such as the pharmaceutical sector. On the other hand, the system underperforms in terms of public and private R&D investment and technological performance. Areas to be improved: access to finance, demand for innovation and skills. The public expenditure on R&D is 0.67 while the business enterprise expenditure is 1.16 points.[24]

Thus, investment in R&D in the UK is low compared to other countries. The gap in R&D intensity between the UK and other countries could arise because of differences in industrial structure. The UK has a higher R&D intensity in pharmaceuticals and services, but a lower intensity in motor vehicles according to the Cambridge Manufacturing Report. To tackle this problem, the UK government has set a target for national R&D spending to be 2.5% of GDP by 2014. This is in line with the Lisbon agenda, which has set a target for the European area to spend 3% of GDP on R&D by 2010. However, this target is still in the case of the UK ambitious, as the increase in R&D spending will have to come mainly from the private sector.[25]

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[22] Case Study: A supplier's guide to Forward Commitment Procurement (FCP). See http://www.bis.gov.uk/assets/biscore/innovation/docs/c/11-995-case-study-suppliers-guide-fcp.pdf online.
[23] Paul Cunningham / John Rigby: Evaluation in the United Kingdom. PROINNO Appraisal, pp. 283-306.
[24] Innovation Union Competitiveness report 2011. Country profile – United Kingdom, pp. 258, 260. See http://ec.europa.eu/research/innovation-union/pdf/competitiveness-report/2011/countries/united_kingdom.pdf#view=fit&pagemode=none online.
[25] Finbarr Livesey et al: Investigating the technology-based innovation gap for the United Kingdom. University of Cambridge Institute for Manufacturing, Mill Lane, Cambridge, 2006, p. 12. See http://www.ifm.eng.cam.ac.uk/cig/documents/Innovation_gap_FINAL.pdf online.

IV. PROJECT LEVEL

1. Improved entrepreneurship assistance

1.1. Enterprise Capital Funds

Enterprise Capital Funds (ECFs) are designed to be commercial funds, investing a combination of private and public money in small high-growth businesses that are seeking up to £2 million (Euro 2.9 million) of equity finance. Each ECF will be able to make equity investments of up to £2 million (Euro 2.9 million) into eligible SMEs that have genuine growth potential but whose funding needs are currently not met. ECFs will fulfil a genuine need by addressing a market gap in the availability of equity finance. Ten ECFs have been launched since March 2006.

List of policy priorities: support to risk capital; support to organizational innovation incl. e-business, new forms of work organizations, etc; support to innovative start-ups incl. gazelles.[26]

1.2. UK Innovation Investment Fund

The UK Innovation Investment Fund (UKIIF) is a Fund-of-Funds launched in June 2009 by the UK Government. It will support a small number of Technology Venture Capital Funds to invest directly in high-tech SMEs, start ups and spin-outs with high potential of growth and innovation. Key sectors such as the life sciences, low carbon technologies, ICT and advanced manufacturing are among its priorities. Through its investments the UKIIF aims to: drive economic growth and create jobs; address the undersupply of risk capital; support the UK venture capital and syndication markets, survive the current economic climate and address structural issues; protect the Government's long-term investment in the science and research base; offer a cost effective solution that provides a market return to private sector investors and a return to the Government. Funding will be provided by the Department for Business Innovation and Skills (BIS), the Department of Health (DoH) and the Department of Energy and Climate Change (DECC) and is also expected to leverage equal investment from private investors from both the UK and overseas. The aim is to create a Fund worth up to £1 billion over its 12-15 year life.

Background and rationale: The launch of the UKIIF is part of series of actions of the Government since 2000, aimed to address a long-identified equity gap in the UK. The equity gap is due to specific market failures including the unwillingness of investors to fund small, high-risk enterprises, limiting thus the availability of equity. Despite several schemes already launched, this equity gap persists and is expected to further widen in light of the global economic downturn. Moreover, the New Industry New Jobs strategy document published in April 2009 identified access to venture capital as one of the critical factors in developing innovative new companies in the UK. In this frame the UKIIF was announced by the Government in June 2009, as part of the Government's strategic plan "Building Britain's Future" that expressed its vision and strategy to support growth and create jobs in order to survive in the current economic climate. The UKIIF is constituted to address the barriers faced by high growth companies in raising equity essential for their growth, by using public money to attract private investments. Apart from addressing the under-supply of risk capital, driving economic growth and creating jobs, the Government aims to help the UK venture capital.

List of policy priorities: support to innovative start-ups incl. gazelles; support to risk capital.

1.3. UK Strategic Investment Fund

In the Budget 2009 the UK Government announced the establishment of the UK Strategic Investment Fund to support targeted investments in industrial projects of strategic importance.

The Strategic Investment Fund aims to strengthen the UK economy's capacity for innovation, job creation and growth. The Fund has a forward-looking perspective as it

[26] See http://www.capitalforenterprise.gov.uk/ online.

aims to ensure that the UK remains globally competitive after it emerges from the economic downturn and in the frame of rising global competition. Investments are made in a range of industrial fields where the UK has already potential competitive advantages, including low carbon vehicles, wind and wave power and renewable chemicals. Moreover, the Fund provides seed capital for the UK Innovation Investment Fund that invests in technology intensive companies.
List of policy priorities: Research Infrastructures; Support to sectoral innovation in manufacturing; Support to risk capital; Promotion of entrepreneurship/start up (including incubators); Pre-competitive research; Applied industrial research; Development/prototype creation; Industrial design; Co-operation promotion and clustering.

Main conclusions of the evaluation(s): The UK SIF Interim Report was published by the Department for Business, Innovation and Skills (BIS) six months after the launch, in October 2009. The interim report concludes that the SIF, up to the date, constitutes an important part of the UK's "commitment to actively preparing Britain's economy for a balanced and sustainable recovery".

1.4. Corporate Venturing Scheme

The main objective of the measure is to provide tax relief to firms involved in corporate venturing, in order to encourage corporate venturing and the support and investment they can provide for SMEs. By doing this the measure further aims to support building relationships between otherwise unconnected companies. The measure includes the following types of tax reliefs: investment relief – relief against corporation tax of up to 20%, deferral relief – deferral of tax on chargeable gains, loss relief – relief against income for capital losses.
Many of the rules of this scheme are similar to the Enterprise Investment Scheme (EIS) rules for individual investors. This scheme provides an investment relief of 20% of the cost of the investment, against the investing company's liability to corporation tax. The measure targets the SMEs that could not get any venture capital investment and those venture capital firms that could invest in such SMEs. The rationale of the measure is that the venture capital investment would enable SMEs to access particular skills or knowledge that would not be possible to reach for them and also marketing channels and complementary technologies. In the same manner, the scheme would allow the venture capital firm to free up some of its resources as well as to gain access to R&D, skills and new ideas.[27]

1.5. Innovation Voucher

The Scheme is designed to encourage small to medium sized enterprises (SMEs) to engage with the knowledge base (higher and further education institutions) in order to promote knowledge generation and transfer to benefit SMEs from gaining external knowledge and collaborations. The Scheme is run at a regional level. The Department for Business, Innovation and Skills (BIS) and the Technology Strategy Board (TSB) are working with Regional Development Agencies (RDAs) in order to provide 500 businesses with innovation vouchers. The number of beneficiaries was increased to 1000 in 2011. The funding made available for the Scheme was up to £ 3 million (approximately € 4.3 million) by 2011. In particular Innovation Vouchers aim to: overcome cultural or social barriers to engage with the knowledge base; help with the costs of innovation for SMEs; provide a more market-based mechanism for allocating some knowledge transfer resources to higher education institutions; incentive first-time engagement with the business support system.
List of policy priorities: R&D cooperation (joint projects, PPP with research institutes); Knowledge Transfer (contract research, licences, research and IPR issues in public/academic/non-profit institutes); Direct support of business R&D (grants and loans); Support to the creation of favourable innovation climate (ex. roadshows,

[27] See http://www.hmrc.gov.uk/guidance/cvs.htm online.

awareness campaigns); Improvements in innovation support services, in particular for dissemination and technology transfer.[28]

2. IPR Support

2.1. Scottish Intellectual Assets Centre

The Scottish Intellectual Assets Centre is a service institution with a rather unique character deliberately offering IPR support covering all forms of IPR protection methods and having the idea of value-driven IPR management at the heart of its offerings (rather than a sole increase of patent activities). The service consists of training and advice sessions with organisations in order to help them to identify IA management issues, appropriate tools and service providers. This session can be one-to-one or with a group of companies.

The IA Centre has no explicit focus on SMEs; the service offerings cover all phases of IPR usage. The service portfolio offered by the IA Centre can be summarised as: education to create awareness; training and advice to build practical knowledge; offering diagnostic and IA audit tools; and signposting to help organisations identify IA management issues, appropriate tools and service providers.

A number of these tools are available on the IA Centre website. They include information booklets, business simulations and games designed to understand issues more fully; and identification and diagnostic tools such as questionnaires, glossaries, and lexicons. In the case of this service, some interventions have been run jointly. Other public sector intermediaries also work closely with the IA Centre to ensure that the specialist service can be accessed as widely as possible. Finally, private sector intermediaries (i.e. lawyers, business consultants), entrepreneurs, and academics have been involved as contributors in delivering the service. The involvement of private sector intermediaries also aims to encourage the development of a private sector supply of IA services in the future.[29]

2.2. Lambert Tool Kit for Collaborative Research

The Government unveiled a set of model agreements to help business-university collaborative working and speed up negotiations for Intellectual Property (IP). The model agreements are part of a "web-based toolkit". The toolkit will help take the hassle out of negotiating collaborative research agreements. It particularly focuses on financial contribution, the use and exploitation of IP, academic publication and confidentiality.

Background and rationale: The Lambert Working Group on Intellectual Property was set up to achieve the above mentioned objective in May 2004 and was also chaired by Richard Lambert. Members of this Working Group included key stakeholders such as the Confederation of British Industry (CBI), Association of University Research & Industry Links (AURIL), Small Business Service (SBS), Regional Development Agencies (RDAs) and a number of UK companies, universities and representative bodies.

List of policy priorities: support infrastructure (transfer offices, training of support staff); measures to raise awareness and provide general information on IPR; support to the innovative use of standards; consultancy and financial incentives to the use of IPR; Encouraging public procurement of innovative products and services; efficient and affordable means to enforce intellectual property rights; Industrial design; Innovation management tools (incl quality).[30]

V. FOLLOW-UP TOWARDS EXPLOITATION

1. Valorisation or dissemination of results

[28] See http://www.dius.gov.uk/ online.
[29] See http://www.ia-centre.org.uk/ online.
[30] See http://www.diu s.gov.uk/innovation/business_support/lambert_agreements%20HIDDEN online.

1.1. Business Link

Business Link is the UK Government's one-stop business support service offering: free and objective information; consultation and diagnosis of business needs; and brokerage towards relevant business support partners from the public, private or voluntary sectors that could provide solutions to these needs. Its central objective is to improve the competitiveness of small firms through improving their access to comprehensive business support, information and advice, helping companies start up and grow. In pursuit of this objective it aims to: increase the use of business support by small firms; rationalise the provision of support to reduce duplication and to make it more coherent and improve the quality of support services.

Business Link supports SMEs locally through regional Business Link organisations and operators that offer online, face-to-face and phone information and counselling; but also through the national website of the service, managed and funded by HM Revenue & Customs on behalf of the cross-government Businesslink.gov programme.

Background and rationale:

Business Link was established as a result of the "one stop shop" for business support initiative announced by the then President of the Board of Trade in July 1992. Nine pilot local Business Links were approved for start up in April 1993 aiming to integrate the wide range of central government small business services. The network was gradually extended thereafter, so that by January 1997 a total of 89 Business Link partnerships, with 241 outlets covering the whole of England, had come into operation. Since then their number has been reduced to 45 in 2000. After a decentralisation attempt in April 2005 and the delegation of administration of regional Business Link services to Regional Development Agencies (RDAs) there are now 15 Business Link operators in nine regions. Thus, from 2005 onwards Business Link delivers its services directly through its local operators, under an Information, Diagnosis and Brokerage (IDB) model, following a market-making approach. After 2007, the role of RDAs was further enhanced, taking up more ownership and responsibility of managing and promoting the brand. However, despite being delivered regionally, Business Link is a national brand owned by the Department for Business, Innovation and Skills - BIS, which is ultimately the body responsible for its success, collaborating with RDAs and with the businesslink.gov.uk programme managers at HM Revenue & Customs. Each Business Link organisation / operator is based on a strategic partnership between local business support agencies.

List of policy Priorities: support to innovation management and advisory services; support to technology transfer between firms; support to the creation of favourable innovation climate (ex. roadshows, awareness campaigns), improvements in innovation support services, in particular for dissemination and technology transfer.[31]

1.2. Knowledge Transfer Networks

The objective of the programme is to improve the UK's innovation performance. It provides the framework for increasing the knowledge transfer of technology into UK-based businesses.

Knowledge Transfer Networks provide businesses and members of business organisations (e.g. Trade Associations), Research and Technological organisations with the opportunity to network nationally and internationally and share mutually beneficial information. It is addressed to businesses and higher education and research institutes in order to build partnerships and stimulate active participation in the technology transfer network with the aim to improve industrial performance; attract and optimise the use of funding by applying road-mapping techniques, market analysis tools and methods; provide a forum for interactions between industry and government policy makers; provide advice on the various support mechanisms available to the research base and business. Knowledge Transfer Networks have already been established in many areas, including also in nanotechnology.[32]

[31] See http://www.businesslink.gov.uk online.

[32] See http://www.berr.gov.uk/dius/innovation/technologystrategyboard/tsb/technologyprogramme/KTN/

1.3. Knowledge Transfer Partnerships (KTP)

KTP is a programme led by the Technology Strategy Board where three-way partnerships are formed between a business (the company partner), one or more recently graduated people (associates) and a senior academic acting as a supervisor (knowledge base partner). The aim of KTPs is to increase interactions between the knowledge base (University, Research Organisation and Further Education Colleges) and companies through the mediation of the associate who during the period of staying in the company will work on a project developed in collaboration with and co-supervised by the partners for a period of 12 or more months and attend to further training.

This measure provides a grant to cover part of the cost of employing a recently graduated person to transfer and embed knowledge into a business from the UK knowledge base via a strategic project. Each Partnership employs one or more high calibre associates for a project lasting one to three years, transferring the knowledge the company is seeking into the business. Each associate works in the company on a project which is core to the strategic development of the business. Associates are jointly supervised by a senior member of the business and an academic or technical staff from the partnering knowledge base organisation. Through contact with businesses, the knowledge base partner is also provided with a relevant and improved understanding of the challenges companies encounter, and their business requirements and operations.

KTPs have been re-launched as one of the main Government's programme of technology transfer since the publication of the Innovation White Paper and the Annual Innovation Report; the Technology Strategy Board, in its renewed pivotal role in delivering the innovation strategy of the government, is leading the programme as a coordinator body and main funder.

List of policy priorities: Knowledge Transfer (contract research, licences, research and IPR issues in public/academic/non-profit institutes); Stimulation of PhDs; Job training (LLL) of researchers and other personnel involved in innovation; Recruitment of skilled personnel in enterprises.

Main conclusions of the evaluation(s): The Programme is evaluated annually and the findings are published in the annual report. Important element of the evaluation is the closing report of each partnership that must be submitted by the participants to an independent review panel. The Assessors review the partnerships and grade the reports. Summary conclusions are then published in the annual report. The main findings published in the 2007/08 annual report show that in 83% of the cases, the participants have benefited from the scheme and that such benefits will positively influence the future performance of the company. In more detail, such improvements are in the areas of new markets creation, increased sales, improved quality, and improved operations. The scoring ranged between 41% and 61% with an average of 52% overall improvement in the four areas.

The knowledge base partners have also expressed a positive outlook on the partnership. 91% of the knowledge base partners declared that they have benefited through staff development, 83% reported benefits to research, and 84% reporting benefits to teaching.[33]

1.4. R&D tax credits for SMEs

The Research and Development (R&D) tax credit for Small and Medium-sized Enterprises (SMEs) scheme aims "to encourage greater R&D spending in order to promote investment in innovation" by providing tax relief to British SMEs conducting R&D. The tax relief can reduce a company's tax bill, by allowing the SME to deduct up to 175% of qualifying expenditure on R&D when calculating its taxable profit. Alternatively, under certain circumstances, the scheme provides for SMEs that have losses a cash sum that

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page12567.html online.

[33] See http://www.ktponline.org.uk online.

they can claim from the HM Revenue and Customs (HMRC) if they surrender the tax relief. The payable tax credit is about £24 for every £100 of qualifying R&D expenditure.
The scheme was introduced to provide a tax incentive in order to encourage Research and Development (R&D) by Small and Medium-sized enterprises (SMEs) based on the Government's belief that the creation of new high-value-added products, processes and services helps the profitability and growth of these companies, and the economy in general.
List of policy priorities: Indirect support to business R&D (tax incentives and guarantees); Innovation strategies; Knowledge Transfer (contract research, licences, research and IPR issues in public/academic/non-profit institutes); R&D cooperation (joint projects, PPP with research institutes).
To be eligible for the scheme, SMEs must spend at least £10,000 (€12,000) a year on qualifying R&D. R&D that is subcontracted to third parties is also eligible, however, contributions to independent research cannot be claimed. The tax credit can be reduced if the R&D project is subsidised or has received a grant. Since the scheme is a 'Notified State Aid' an SME is not eligible if it gets support for the same R&D project through another notified Aid. Companies must make their R&D claim within two years after the end of the relevant accounting period. On the whole, the Government regards the measure as its "biggest single funding mechanism for business R&D". Following the success of the scheme changes have been made to include larger companies.[34]

1.5. Higher Education Innovation Fund

The Higher Education Innovation Fund (HEIF) supports a wide range of knowledge exchange and transfer activities across the whole range of higher education institutions (HEI) in England. The Higher Education Innovation Fund was originally created in 1999 to foster higher education institutions - businesses, the public and third sectors partnerships. The aim of HEIF is to build capacity in English universities for knowledge transfer, knowledge exchange and commercialisation activities that will ultimately benefit England's economic and social standing. The fourth HEIF is allocating funds to the 129 eligible higher education institutions on the basis of an assignation formula calculated on how the institutions respond to the following principles:
• Mission Integration or how the third stream is embedded within the institution's mission together with the teaching and research;
• Diversity or how the HEI diversifies the target sectors in response to the diverse demand brought forward by the economy and society within which it is embedded. It also considers how the resources of the HEI match such demands;
• Engaging Small and Medium-Sized Enterprises (SMEs), or, following the Sainsbury Review, how the strategy of the HEI is geared towards supporting SMEs;
• Sectors, or how the Strategy set out by the HEI meets the demand of the economy and can develop synergies with the Confederation of British Industry, Technology Strategy Board, RDAs, local authorities and individual businesses, as well as the Government and HEFCE;
• Public and Community, or how the strategy drawn by the HEI goes beyond just creating jobs and wealth, but also how the Institution engages with the local community and the third sector;
• Collaboration, while in the past rounds this was one of the main factors in deciding funding allocations, collaborations with other HEIs, the business and the third sectors are considered together with the other principles and evaluated against their efficacy as well as taking into consideration that potentially beneficial collaborations carry a certain amount of risk though, not all can be successful;
• Sharing Best Practices, or how the HEI draws strategic plans entailing dissemination of findings and of innovations, good practice and lessons learned;
• Capacity Building, or how the HEI has put into place provisions to increase its capacity and capabilities by investing in human resources engaged in knowledge exchange activities;

[34] See http://www.hmrc.gov.uk online.

• Engaging Academics, or how the institution has included in its innovation strategy modes of engaging more academic staff and not only those assigned to knowledge exchange duties.
List of policy priorities: Policy measures concerning excellence, relevance and management of research in Universities; Public Research Organisations; R&D cooperation (joint projects, PPP with research institutes); Job training (LLL) of researchers and other personnel involved in innovation. The creation and development of innovation poles, networks and incubators bringing together universities, research institutions and enterprises including at regional and local level are helping to bridge the technology gap between regions. Overall budget is 450,000,000.[35]

2. Brokerage events

There are regularly organized brokerage events in the UK covering different fields of research.

3. Financial instruments

Public Sector Research Exploitation Fund (PSRE Fund)
PSRE Fund was set up to encourage the commercialisation of the intellectual property from research carried out in public sector research establishments (PSREs), including: Government
departmental research bodies; Research Council headquarters and institutions; cultural institutions, mainly those financed by the Department of Culture, Media and Sport (DCMS), such as museums, art galleries and art and heritage organisations; National Health System (NHS) Trusts and other public bodies performing research activities.
Specifically, the PSRE Fund aims to support PSREs: a. Build their capability to exploit their science and technology potential ('Capacity Building') mainly by establishing the necessary infrastructure for commercialisation and also by acquiring other relevant resources (such as skills on IP management, knowledge transfer expertise etc.); and b. Provide seed and early stage funding through the establishment of Seed Funds to support the early stages of the transformation of ideas resulting from public sector research into commercial opportunities, until third party investment can be attracted.
The PSRE Fund represents the Government's commitment, as part of its ten-year Science and Innovation Investment Framework 2004-2014, to maintain a world-leading knowledge base and its emphasis on exploiting research results across the research base in order to transform them into growth for the benefit of the society and the economy. The PSRE Fund contributes to the Department for Business, Innovation and Skills – (BIS) agenda as set out in the 'Innovation Nation' White Paper.
List of policy priorities: Support infrastructure (transfer offices, training of support staff); Knowledge Transfer (contract research, licences, research and IPR issues in public/academic/non-profit institutes); Measures to raise awareness and provide general information on IPR; Consultancy and financial incentives to the use of IPR; Improvements in innovation support services, in particular for dissemination and technology transfer; Efficient and affordable means to enforce intellectual property rights; Promotion of entrepreneurship/start up (including incubators); Pre-competitive research; Commercialisation of innovation (including IPR).
Main conclusions of the evaluation(s): The Department for Innovation, Universities and Skills (DIUS) (now Department for Business, Innovation and Skills - BIS) since 2003/4 runs an annual survey of knowledge transfer activities in PSREs that also evaluates the impact of the PSRE Fund as a funding source for PSREs. Based on the results of the first four surveys, five out of the eight indicators used present an increase: the number of spin-outs of PSREs steadily increased from 69 in 2003/4 to 101 in 2006/7; the number of

[35] See http://www.hefce.ac.uk/econsoc/buscom/heif/ online.

staff (Full-Time Equivalents) employed in commercialisation offices almost doubled (from 385 in 2003/4 to 669 in 2006/7); the income from IP licensing tripled from £33m (€39.7m) in 2003/4 to £116m (€139.8m) in 2006/7, while the income from business consultancy also increased from £36m (€43.4m) to £43m (€51.8m) over the same period. Also the number of business representatives on governing bodies of PSREs increased from 175 in 2003/4 to 207 in 2006/7. However, not all indicators were improved: the number of patent applications remained the same (316 in 2003/2004 and 2006/2007 with minor fluctuations over the years); the number of patents granted decreased from 228 in 2003/2004 to 172 in 2006/2007; and the number of licensing agreements in 2006/2007 (604) almost returned to the 2003/4 levels (621) after presenting a significant decrease in the previous years.[36]

VI. CONCLUSIONS

UK's national innovation system has many similarities with the policy measures detected at the EU level. It shows a deep focus on exploitation side measures as set out in the Technology Strategy Board's (TBS) new strategy document, Concept to Commercialisation. Here many innovation supporting measures are addressed: innovation through public procurement, start-up support for SMEs, tax incentives and knowledge exchange. All this measures are in line with the instruments and policies developed at EU level in order to close the bridge between the product and its commercialisation.

On the work programme level there are also many programmes designed close to the application and exploitation side gap, including demonstration and dissemination of results and instruments that develop non technical activities (design and business plan). The Make Your Mark campaign in support of business innovation environment and entrepreneurial education is a good instrument in this sense.

The iAwards make exploitation visible and acknowledgeable as well as the Queen's Award for Enterprise in Innovation, which recognises companies that have demonstrated outstanding commercial success through innovative products or services.

Science & innovation investment framework 2004 – 2014UK shows similarities with the German High-Tech Strategy. The Science and Innovation Investment Framework 2004-2014 specified a target for Gross Expenditure on R&D (GERD) to represent 2.5% of GDP by 2014. Industrial spending was expected to contribute around two-thirds of total investment.

Emphasis is put on skill development through the Growth and Innovation Fund (GIF) set up in support of initiatives towards better skills for enterprise, jobs and growth, which is in line with the EU-initiatives for better skills.

The public procurement system in the UK is very developed and acts as driving force for innovation, even if service innovation and innovative public procurement are not linked with each other.

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Boosting innovation is one of the cornerstones of the EU 2020 strategy for growth and employment adopted by the European Council. 'Innovation Union' is indeed the first flagship initiative mentioned in the EU 2020 document. The Innovation Union communication sets out a number of practical tools to enhance innovation, e.g. standardisation, knowledge transfer, and specific measures for small and medium-sized enterprises (SMEs), but few analysis of national policy measures has been made. This is surprising, because national innovation policies play a key role in attaining the EU 2020 and Innovation Union goals.

The purpose of this paper is therefore to collect, describe, analyse and compare the national innovation schemes and policies at country level, according to the innovation cycle, from policy definition to work programmes and then from project level to exploitation. The aim is also to detect similarities, links or divergences between national and European innovation policies, measures and instruments, and to draw conclusions from these for future initiatives at the EU level. The document focuses on three EU member states (Germany, Finland and the UK), classified as innovation leaders in the latest EU Innovation Scoreboard.

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