

Growth through expertise

Action plan for research and innovation policy

Ministry of Education and Culture
Ministry of Employment and the Economy

12 December 2012

FOR THE RESEARCH AND INNOVATION COUNCIL

As stipulated in a decision issued by the Research and Innovation Council in autumn 2011, the Ministry of Education and Culture (MEC) and the Ministry of Employment and the Economy (MEE) drafted an action plan for research and innovation policy by the end of 2012 as part of the government's strategy process.

A starting point for the plan have been the numerous development projects, studies, assessments and reports by groups of experts conducted recently in the area of research and innovation policy. Together with the policy guidelines issued by the Research and Innovation Council, the results obtained and the measures proposed in these development projects create an important foundation for the action plan. Another central element in the preparation of the action plan has consisted of the hearings and interaction with the central interest groups of the research and innovation system.

The aim of the action plan is to concretise and enhance the implementation of the government's research and innovation policies and document central development measures and adjustments required in the final half of the present term of government. The action plan has been prepared by the Ministry of Education and Culture and the Ministry of Employment and the Economy. The draft for the plan was discussed in a seminar of the Research and Innovation Council on 8 November 2012, and the comments provided by the Council were taken into account in the preparation of the plan. Upon completion of their work, the Ministry of Education and Culture and the Ministry of Employment and the Economy hereby present the action plan to the Research and Innovation Council.

Helsinki 12 December 2012

Ministry of Education and Culture

Ministry of Employment and the Economy

Proposals for measures by the government

Increasing the attractiveness of Finland and enhancing the internationalisation of the RDI system

1. *Research, development and innovation (RDI) activities by polytechnics are strengthened using special fixed-term funding. (Ministry of Education and Culture)*
2. *The Universities Act is amended setting the target period for the completion of doctoral studies at four years, and universities will revise the requirements for doctoral degrees in science and the arts to make sure they correspond with this timeframe. (Ministry of Education and Culture)*
3. *Appropriations for the budget line item on research infrastructure will be confirmed for 2014 to 2017. In addition, funds from the structural fund period will be directed to research infrastructures that are either national or located in Finland and networks supporting them. (Ministry of Education and Culture, Ministry of Employment and the Economy, Finnish Research Infrastructure Committee)*
4. *Opportunities for long-term research are strengthened by introducing a targeted 10-year funding scheme offered by the Academy of Finland. (Ministry of Education and Culture, the Academy of Finland)*
5. *Arctic research and expertise are strengthened, and foundation for arctic business is constructed. (Ministry of Education and Culture, Ministry of Employment and the Economy, Advisory Board on Arctic Affairs)*
6. *Actions proposed by the ICT 2015 Group appointed to respond to the challenges brought on by the structural change in the field of ICT and the national action programme in health technology and pharmaceutical research to be created as a pilot are utilised to attract international RDI investments to Finland. (Ministry of Employment and the Economy, Ministry of Social Affairs and Health, Ministry of Education and Culture)*
7. *A national programme to ensure the best possible utilisation of EU's research and innovation activities, such as the Horizon 2020 programme, is created as part of the efforts to promote the internationalisation of the research and innovation system. The national support and advisory service for the applicants of EU funding is renewed accordingly. (Ministry of Employment and the Economy, Ministry of Education and Culture)*
8. *The utilisation of immaterial property rights is improved by updating and implementing the national IPR strategy. IPR tax incentives are adopted to improve the opportunities of Finland to utilise investments in research and innovation from both Finland and abroad. Changes in the patent system brought on by the introduction of the European Patent System are duly prepared for. (Ministry of Employment and the Economy, Ministry of Finance)*

A research and innovation system with better quality and more flexibility

9. *The utilisation of research and the institutions' interaction with society are accounted for when developing funding models for higher education institutions. (Ministry of Education and Culture, Ministry of Employment and the Economy)*
10. *The structural development of universities is speeded up by, for example, supporting the identification and enhancing of their core competences using competed special funding in 2014 to 2016. (Ministry of Education and Culture)*

11. *The INKA (Innovative Cities) programme and the negotiation procedure of innovation clusters are used to challenge the most significant urban regions to construct attractive innovation centres and strengthen the Finnish innovation system. (Ministry of Employment and the Economy)*
12. *Public funding instruments are used to ensure that the number of high-quality development platforms for growth companies in operation in Finland corresponds to the number of emerging growth companies. (Ministry of Employment and the Economy)*
13. *The model of Strategic Centres for Science, Technology and Innovation will be reformed based on an evaluation to be completed in February 2013. (Ministry of Employment and the Economy, Ministry of Education and Culture)*
14. *The activities, role and tasks of the Research and Innovation Council will be evaluated by the end of 2013. (Ministry of Education and Culture, Ministry of Employment and the Economy)*

Increasing effectiveness by expanding the scope of innovation activities and increasing experimentation

15. *Measures required to increase experimentation and the preparedness to take risks in the promotion of innovation are determined in cooperation with central actors in the field of innovation. (Ministry of Employment and the Economy)*
16. *The ministries will incorporate plans regarding the methods of promoting research and innovation in their respective administrative branches into their central strategies. Knowledge and utilisation of research and innovation activities in decision making in different administrative branches are improved by increasing practical cooperation between administrative branches. (Ministry of Employment and the Economy, Ministry of Education and Culture, other ministries)*
17. *An operating model is created for establishing lead market areas and implementing measures particularly in the areas of cleantech and bioeconomy and in fields such as intelligent construction and security. A competition for responding to a selected social challenge through innovation is organised as an experiment. (Ministry of Employment and the Economy, Ministry of Education and Culture)*
18. *A target level is set to directing one per cent of public procurement towards purchasing of new solutions in the cleantech field. (Ministry of Employment and the Economy, Ministry of the Environment)*
19. *The generation and diffusion of innovations is promoted by setting a target percentage (such as 2 or 3 per cent) for public procurement that enhances research, development and innovation activities.*

Expertise in procurement is enhanced by strengthening and developing comprehensive support and advisory services in matters of public procurement related to innovation.

Financial and other incentives for procurement related to innovation are developed as part of the Effectiveness and Productivity Programme of central government and the productivity programme of municipalities. (Ministry of Employment and the Economy, Ministry of Finance)

20. *To support the programme on the opening of public data and measures to promote business use of public sector information, education and training, advisory, networking and other support services are compiled into a single entity. (Ministry of Finance, Ministry of Employment and the Economy and other ministries)*

Greater value and new competitive advantages through intangible investments

21. *Shared use of information and openness are promoted by investing in the information infrastructure of managing, distributing and storing digital data related to research and innovation. (Ministry of Education and Culture)*
22. *Intangible investments by companies are encouraged by promoting service innovations, enhancing business activities in the creative sector, endorsing the use of design through the national design programme and advancing the renewal of work organisations in accordance with the National Working Life Development Strategy. (Ministry of Employment and the Economy, Ministry of Education and Culture)*
23. *The government's energy and climate strategy incorporates new business opportunities and measures emerging from the demand for clean energy and outlines measures to support this. (Ministry of Employment and the Economy)*

1. The challenge of competence, competitiveness and renewal

The operating environment of Finnish society, economy and research has undergone a rapid change. International cooperation and competition have intensified, and uncertainties in the global economy have functioned to weaken our expectations for the future. The business sector is currently undergoing severe structural change. Responding to requirements related to the maintenance of the welfare society and sustainable development as well as the need for structural change within society and the economy constitutes the central framework for the research and innovation policy of the present government term.

Finland's competitiveness is based on strong expertise. In Finland, the basic starting points for responding to these challenges through research and innovation activities are good. The implementation of education, science and innovation policies has been based on long-term objectives. Finland has been rated among the top countries in the international PISA study assessing the competencies of 15-year-olds in key subjects and the quality of primary and lower secondary education as well as in international comparisons in the areas of competitiveness and innovation. We have a well-functioning research and innovation system and a high education level.

This, however, is no longer sufficient. In addition to maintaining the funding for research, development and innovation activities at a high level, it is necessary to refocus education, research and innovation activities on all levels. In addition to maintaining a sufficiently broad competence base with the necessary capability to react, we need operating models that encourage constant renewal and the transcending of boundaries, the courage to experiment and take risks and steering methods and incentives to support these objectives. The structures and functions of public educational institutions and research organisations have been renewed to promote their opportunities for action. In the area of innovation policy, the investments made have focused on incentives for research, development and innovation activities, growth entrepreneurship and the demand for innovations using, among other things, means provided by demand- and user-oriented innovation policy.

The long-term development of the overall level of funding for research, development and innovation (RDI) activities has, for the most part, been positive. However, as corporate investment in RDI has declined, the share of research and development costs in GDP has gone down in recent years. In 2012, for the first time, also public investment in RDI underwent a clear decline. In accordance with the government's budget framework decision, the volume of direct RDI funding by the state will go down in real terms until the end of the government term.¹

¹ Out of the state's RDI funding in 2012, 29 per cent (approximately EUR 583 million) was directed to universities. The share of Tekes was approximately 28 per cent (approximately EUR 552 million), the share of the Academy of Finland 16 per cent (approximately EUR 321 million) and the share of state research institutes 15 per cent (approximately EUR 306 million). The funds directed to university hospitals amounted to less than two per cent (EUR 36 million) of the state funding for research. The shares of the universities and the Academy of Finland have increased by some percentage points in the 2000s. The shares of Tekes, state research institutes and university hospitals have declined. According to estimates, the funding for universities will remain on the

The threats facing Finland make it necessary for us immerse ourselves in the development of the research and innovation system even more actively than before. We must continue the restructuring of universities and polytechnics into operating units of higher quality, improve graduation rates and reduce study times in order to secure a competent and innovative workforce. It is also necessary to ensure sufficient and up-to-date research resources and strengthen the internationalisation of the RDI system. Moreover, Finland needs to utilise opportunities for cooperation with the emerging economies; cooperation with Russia is also essential.

Globalisation and technological change require an increase in the general competence level and effective utilisation of workforce. In particular, what are required are sharper definition of distinct competence profiles and the making of choices, investments in persons and organisations capable of high-level scientific research and innovation activities and the utilisation of knowledge produced elsewhere.

Development policies for state research institutes will be annexed to the action programme once the government has finalised decisions concerning the matter.

The parties with primary responsibility for the proposed measures are mentioned in connection with them.

2. Strengthening the preconditions for research and innovation activities in the government term

Increasing the attractiveness of Finland and strengthening the internationalisation of the RDI system

Knowledge, high-level expertise and human capital are the foundation for Finnish society, its most central production factor and elements vital to our survival as a nation. Through their work, experts in different fields generate financial growth, well-being and new innovations and thus contribute to a renewal of both the private and the public sector. The development of expertise requires constant investments in a high-level education, research and innovation system, and in order ensure an enduring foundation for the expertise, also investments in welfare.

In its research and innovation policy, the current government has highlighted measures that improve the quality, efficiency and effectiveness of Finnish education, research and innovation activities in order to promote the well-being and competitiveness of society. The most significant structural change in recent years has been the university reform launched in early 2010 that was used to strengthen creative and modern research and learning environments in universities and to support the opportunities of universities to implement better staff and recruitment policies and offer more attractive career opportunities for researchers. The reform has contributed to the financial and administrative autonomy of universities.

same level in real terms also after 2014 (approximately EUR 549 million). The funding for state research institutes and the competed funding channeled through Tekes will be cut down towards the end of the government term.

The objective of the ongoing reform of polytechnics is to strengthen the role of polytechnics as increasingly independent and responsible educators of experts, reformers of working life and builders of the competitiveness of the regions. The reform is implemented via changes in legislation and the renewal of operating permits.

The reform of the structures of universities and polytechnics and cooperation between the institutions are supported with the appropriate operational and administrative structures. In order to promote quality and efficiency, joint use of facilities, support services and teacher resources transcending institutional boundaries is encouraged. Universities and polytechnics deepen their strategic cooperation in order to improve the effectiveness of expertise in research and innovation. The role of polytechnics in enhancing the vitality and competitiveness of regions is supported and their cooperation with working life is strengthened. Moreover, their RDI activities are developed particularly in connection with developing the production and service sector and welfare services. When carrying out these reforms, we need to ensure that the significance of polytechnics as actors in the field of research and innovation is recognised also when it comes to innovation funding.

Research, development and innovation (RDI) activities by polytechnics are strengthened using special fixed-term funding. (Proposed measure 1: Ministry of Education and Culture)

The aims of raising the competence level and reducing study times challenge the entire educational system. Universities and polytechnics will renew their admissions procedures to enable a quicker transition from upper secondary education to higher education. Measures to develop the study process are used to reduce the rate of discontinuation and expedite graduation and subsequent transfer to working life.

Universities have begun a reform of the structures of doctoral education. The aim is to reduce the number of graduate students without lowering the target for doctoral degrees obtained, which means increasing the level of customisation in doctoral education. The median age of doctoral graduates has not gone down in any significant degree, and the duration of doctoral studies is still approximately seven to eight years. Moreover, career opportunities outside of the academic world are not sufficiently accounted for in doctoral studies.

The Universities Act is amended setting the target period for the completion of doctoral studies at four years, and universities will revise the requirements for doctoral degrees in science and the arts to make sure they correspond with this timeframe. (Proposed measure 2: Ministry of Education and Culture)

The aim is to continue the structural development of the higher education system in order to form attractive clusters of research between universities, polytechnics and research institutes that operate in specific areas of excellence and thus complement each other. The joint research projects and infrastructures of these organisations create new opportunities for international cooperation between basic research and applied research and the research and development activities of companies.

The infrastructures for research, including equipment and the facilities for storing data, are not fully up-to-date. The danger is that Finnish research will be excluded from major international trends due to

deficiencies in infrastructure or lack of competent researchers. Additional resources are needed particularly in new, knowledge-intensive fields and in the funding of nationally significant research infrastructures.

Appropriations for the item on research infrastructure will be confirmed for 2014 to 2017. In addition, funds from the structural fund period will be directed to research infrastructures that are either national or located in Finland and networks supporting them. (Proposed measure 3: Ministry of Education and Culture, Ministry of Employment and the Economy, the Finnish Research Infrastructure Committee)

The overall status of Finnish science has been evaluated as relatively good and stable; however, what remains a concern is that the number of researchers at the very top of their field remains low in Finland. Finland needs more high-quality, leading edge research. In order to develop the preconditions for basic research of an international level, a targeted 10-year research funding scheme should be adopted alongside the current funding instruments in use by the Academy of Finland. The aim is to promote high quality basic research through funding based on scientific quality that is fixed term yet covers a significant time period.

Opportunities for long-term research are strengthened by introducing a targeted 10-year funding scheme offered by the Academy of Finland. (Proposed measure 4: Ministry of Education and Culture, the Academy of Finland)

The Arctic region is undergoing significant changes and has become the target of growing economic and political interest. The Arctic region offers significant opportunities for Finland. However, due to climate change and the increased exploitation of natural resources, environmental risks in the Arctic region, too, are increasing. High level expertise and knowhow are needed in order to understand the change, adapt to it and benefit from it. For this reason, developing expertise and research related to the Arctic region is of primary importance for Finland. The government made a decision on its Arctic policy on 10 October 2012, and an update of Finland's strategy for the Arctic region will be completed in April 2013.

Arctic research and expertise are strengthened, and foundation for arctic business is constructed. (Proposed measure 5: Ministry of Education and Culture, Ministry of Employment and the Economy, the Advisory Board on Arctic Affairs)

International competition over the geographic location of knowledge-intensive companies is intensifying. The challenge for Finland is how to utilise its innovation system and competence base in order to persuade international actors to set up operations in Finland. In this respect, we have not so far been successful in creating a strong image of the Finnish innovation system and related expertise in international contexts. Special attention is now being focused on the matter in the work of the ICT 2015 Group appointed to consider appropriate responses to the structural change in the field of ICT.

In addition, the shifting operating models in RDI activities in the field of health technology and pharmaceutical research offer a tremendous opportunity to, in a coordinated manner, develop Finland into an attractive innovation environment for companies and researchers and research organisations in the field.

In Finland, health technology and pharmaceutical research form a body of expertise with a number of advantages that are unique from an international standpoint. These include a high overall level of competence and top-level expertise in specific research areas (such as diabetes and memory disorders). Conversely, weaknesses of the field include uncoordinated research activities, differing IPR practices between universities, regulation that does not provide the necessary support for innovation activities and lack of international visibility. These factors prevent the full utilisation of the potential in the field. Finland would have the opportunity to attract significant international RDI investment, but this would require systematic development of the field through cooperation between central ministries, financiers and universities.

Actions proposed by the ICT 2015 Group appointed to respond to the challenges brought on by the structural change in the field of ICT and the national action programme in health technology and pharmaceutical research to be created as a pilot are utilised to attract international RDI investments to Finland. (Proposed measure 6: Ministry of Employment and the Economy, Ministry of Social Affairs and Health, Ministry of Education and Culture)

The weaknesses of Finnish research and innovation activities remain the slow internationalisation of the system and low-level of foreign investment. Moreover, Finland has not utilised the opportunities offered by international research funding to a sufficient degree. Finnish researchers' knowledge of the application process, their objectives and activity with reference to the research programmes of the European Union are not at a sufficient level. Increasingly systematic utilisation of international research funding strengthens the preconditions for research and innovation activities and helps Finland develop its scientific expertise.

A national programme to ensure the best possible utilisation of EU's research and innovation activities, such as the Horizon 2020 programme, is created as part of the efforts to promote the internationalisation of the research and innovation system. The national support and advisory service for the applicants of EU funding is renewed accordingly. (Proposed measure 7: Ministry of Employment and the Economy, Ministry of Education and Culture)

Immaterial property rights (IPR) (patent, copyright, trade mark right, design right) are the instruments used to transform creativity into financial activity. Immaterial property rights are utilised in the creation of new business, in technology transfers and licensing and, among other things, as collateral security instruments related to the funding of companies. The national IPR strategy accounts for challenges related to the internationalisation of the operating environment. Most notably, these include the need to create an IPR tax incentive and the challenges created by the internationalisation of patenting activities.

A new feature related to the competition over the geographical location of companies consists of special incentives to do with the taxation of income obtained through the utilisation of the immaterial property rights of companies. Streams of revenue of internationally operating companies are often directed based on who provides the best incentives. In a number of competing countries, incentives for the innovation system are being adjusted render them more favourable as concerns IPR. Greater transfer of IPR from country to country also increases the likelihood of innovation activities shifting from Finland to other countries. As an innovation-driven economy, Finland must take measures to ensure that its research and

innovation activities and their results remain in Finland and encourage international companies engaging in research and innovation activities to set up operations in Finland.

With the realisation of the European patenting system, new challenges are being faced by Finnish courts and authorities operating in the field. Companies, too, are required to update their competence accordingly. The maintenance and development of Finnish expertise in the field is important for the functioning of the innovation system.

The utilisation of immaterial property rights is improved by updating and implementing the national IPR strategy. IPR tax incentives are adopted to improve the opportunities of Finland to utilise investments in research and innovation from both Finland and abroad. Changes in the patent system brought on by the introduction of the European Patent System are duly prepared for. (Proposed measure 8: Ministry of Employment and the Economy, Ministry of Finance)

A more efficient and better-quality research and innovation system with greater flexibility

Long-term basic funding is guaranteed to universities, polytechnics and research institutes, and competed funding is used in a more strategic manner to benefit high-quality research and render the utilisation of research results more effective. The funding models for universities and polytechnics are developed to enable them to account for the quality, effectiveness and level of internationalisation of research, development activities and teaching to a greater degree than previously. However, the funding models do not yet fully account for the utilisation of research results, including aspects such as research implemented in cooperation with companies, due to deficiencies in the knowledge base required.

The utilisation of research and the institutions' interaction with society are accounted for when developing funding models for higher education institutions. (Proposed measure 9: Ministry of Education and Culture, Ministry of Employment and the Economy)

The identification of core competences, distribution of tasks and cooperation between institutions of higher education will continue to require measures. Aside from established structures, less formal operating models encouraging the transcending of boundaries and continuous renewal (such as network and information management) and a sufficiently broad competence base to enable reactivity are also needed. The duties of research institutes are clarified and their position is strengthened through means such as the merging of organisations, focusing on core functions and investing in more problem-driven strategic research.

The structural development of universities is speeded up by, for example, supporting the identification and enhancing of their core competences using competed special funding in 2014 to 2016. (Proposed measure 10: Ministry of Education and Culture)

Global competition between regions is conducted increasingly between innovation environments and alliances between actors operating in them (ecosystems). These ecosystems are often company-driven, although the public sector does play a central role in their operation in aspects such as research cooperation between the public and the private sector and investments in infrastructure.

Regional cooperation will be intensified with the INKA (Innovative Cities) programme to be launched at the start of 2014. The programme encourages major urban areas in Finland to choose strategic focus areas and generate competence-driven business with the help of new kinds of development environments and lead markets. The aim is to use investments in development made by the state and the urban regions in order to generate openings that are based on international competence and also provide international visibility.

Resources from structural funds from the period 2014–2020 are directed to comparable projects in innovation clusters. Major land use, housing and traffic infrastructure projects implemented in cities will be used as new types of development and testing environments for innovations. A region-specific negotiation procedure will be created for the most significant innovation clusters, with participation from national financiers, such as the Finnish Funding Agency for Technology and Innovation (Tekes), the Ministry of Employment and the Economy and, where necessary, the Ministry of Education and Culture and other ministries. The negotiations will be used to expedite the implementation of large project entities and promote national cooperation between the clusters.

The INKA (Innovative Cities) programme and the negotiation procedure of innovation clusters are used to challenge the most significant urban regions to construct attractive innovation centres and to strengthen the Finnish innovation system. (Proposed measure 11: Ministry of Employment and the Economy)

Recently, the volume of Finnish innovation activities has been affected by structural change in the ICT sector as well as low utilisation of research information and low participation in research activities among SMEs. Special attention is thus paid to measures necessitated by the structural change in the ICT sector in policies related to innovation and growth companies.

On the other hand, within a short period of time an internationally significant and rapidly-growing ecosystem of young growth companies emerging as a result of national and regional development platforms for growth entrepreneurs (the Vigo accelerator programme, enterprise development environments in universities and other higher education institutions, commercialisation functions for business ideas developed by large companies, the Product Track concept for private inventors and locally-operating business incubators) and the stream of high-quality projects generated by them has been created in Finland..

These successful operating models have all been able to combine innovative business ideas, the expertise of experienced business coaches and public funding incentives in a way that generates added value. Encouraging results and certain well-known success stories have also increased the level of interest in entrepreneurship as a career choice. The appreciation of entrepreneurship has increased particularly among students in higher education.

Public funding instruments are used to ensure that the number of high-quality development platforms for growth companies in operation in Finland corresponds to the number emerging growth companies. (Proposed measure 12: Ministry of Employment and the Economy)

Strategic Centres for Science, Technology and Innovation (SHOKs) form a central platform for strategic and long-term research cooperation between innovative companies, universities and research institutes. SHOKs

began their activities in 2008 to 2010 and operate in areas central for the future of the Finnish business life and society (energy and the environment, metal products and mechanical engineering, bioeconomy, the built environment, health and well-being, information and communications). The generation of breakthrough innovations of global importance has been established as the goals of the cooperation in order to promote the renewal of key areas in business and society in Finland.

Significant private and public investments are directed to SHOK activities. An international evaluation of the SHOK concept will be completed in February 2013. Based on the results of the evaluation, the functionality and effectiveness of the model will be developed to generate increasingly significant research cooperation between companies, universities and research institutes and in order to renew the key sectors highlighted in the programme.

The model of Strategic Centres for Science, Technology and Innovation will be reformed based on an evaluation to be completed in February 2013. (Proposed measure 13: Ministry of Employment and the Economy, Ministry of Education and Culture)

The development and actors of the Finnish research and innovation system will be monitored through assessments to be implemented at regular intervals. The assessments will be used to generate a broad-based understanding of how the research and innovation system and RDI activities should be developed as the operating environment changes. According to the plan, the assessment targets will also include the Research and Innovation Council.

The activities, role and tasks of the Research and Innovation Council will be evaluated by the end of 2013. (Proposed measure 14: Ministry of Education and Culture, Ministry of Employment and the Economy)

Increasing effectiveness by expanding the scope of innovation activities and increasing experimentation

Finnish RDI policy has relied firmly on a planned and accurately defined operating environment. However, this operating environment is currently affected by growing uncertainties, unexpectedness of change and lower predictability. The probability of risk taking and the emergence of entirely new solutions is lower in the context of a method of operation that has been pre-structured. Policies, too, need to change. It is necessary to identify new ways of operating and funding methods that are functional and effective in conditions involving a great deal of uncertainty. An essential aspect in reacting to changes is allowing for experimentation or various flexible ways of adjusting the contents of the activities at points of discontinuity and in unforeseen situations. When both problems and solutions are unknown, we need to create preconditions for experimentation that generates radical innovations.

Measures required to increase experimentation and the preparedness to take risks in the promotion of innovation are determined in cooperation with central actors in the field of innovation. (Proposed measure 15: Ministry of Employment and the Economy)

The objective of innovation policy is to enhance both the supply and demand of innovations. Innovation policy can be used to promote the demand for innovations through means such as regulation,

standardisation, public procurement of innovations, lead market initiatives and financial and other incentives.

Successful combination of demand- and supply-driven innovation policy may significantly lessen uncertainties related to introducing innovations to the market and shorten the journey of innovations to the market. A primary concern is to contribute to an understanding that each administrative branch has the opportunity to either promote or slow down innovation activities through their actions. In practice, in order to promote innovation activities to benefit the common good, the public sector needs a clear objective, plan and the right incentives. Close cooperation between different administrative branches is one way to pursue this objective. The public sector's own activities in the promotion of innovations should be ambitious and serve as an example for other actors.

The ministries will incorporate plans regarding the methods of promoting research and innovation in their respective administrative branches into their central strategies. Knowledge and utilisation of research and innovation activities in decision making in different administrative branches are improved by increasing practical cooperation between administrative branches. (Proposed measure 16: Ministry of Employment and the Economy, Ministry of Education and Culture, other ministries)

Growing markets and the demand for new solutions expedite the solving of major challenges in society. Policy makers in the field of innovation policy need to consider how growing demand in certain fields could be better utilised as an incentive for innovation activities. In any case, the development of innovation-friendly markets requires cooperation between several different actors and administrative branches as well as cooperation between the private and the public sector.

The ability to recognise growing innovative markets is a precondition for the success of Finnish companies in global competition. Finland needs to establish the areas of application in which we wish to promote a pioneering position for Finnish companies from a global perspective. Establishing the areas of application and choosing the correct measures requires decision-making that transcends the boundaries between administrative branches. What is needed is a model for decision-making that would ensure that the measures taken by the public sector are headed in the same direction.

The government's strategic programme for the cleantech field applies the lead market thinking and brings together development measures and actors in the field to promote the growth, business activities, innovations and internationalisation of the sector. The programme aims to create the best home market for companies targeting the international market in the field of cleantech. One instrument cited is the use of public procurement to promote the adoption of new solutions in the cleantech field.

Aside from the cleantech field, other areas in which the lead market approach could be applied could include bioeconomy, a field based on the use of renewable resources, intelligent solutions in construction and the security sector.

An operating model is created for establishing lead market areas and implementing measures particularly in the areas of cleantech and bioeconomy and in fields such as intelligent construction and security. A competition for responding to a selected social

challenge through innovation is organised as an experiment. (Proposed measure 17: Ministry of Employment and the Economy, Ministry of Education and Culture)

The public sector should encourage companies towards development of new solutions in solving problems central in society. Public procurement should be perceived as a strategic tool in the development of public services. Public procurement can also be used to promote the adoption of new operating methods and technologies, which helps improve the quality and efficiency of services. If one per cent of the purchases of the public sector were used to obtain new solutions, this would constitute a significant addition to the current funding for development and innovation.

The current operating methods in public procurement must be developed so that they create opportunities and incentives for the purchasing of innovations. In particular, it is necessary to improve public sector competence in the area of procurement and lower the threshold for risk taking. In practice, risk taking requires strong support from the management of the organisation.

The public sector should have sufficient incentives for improving the productivity and quality of public services over the long term through the utilisation of new solutions. The incentives should reward the organisation for the adoption of new operating methods. Financial and other incentives should be developed as part of the Effectiveness and Productivity Programme and the productivity programme of municipalities.

Cleantech has been chosen as the first strategic target area for the public procurement of innovations. The aim is to set a target percentage to enhance the adoption of sustainable solutions in the field of cleantech that promote innovation activities. The long-term goal is to expand the goal to cover all public procurement.

An objective is set to direct one per cent of public procurement towards the purchasing of new solutions in the cleantech field. (Proposed measure 18: Ministry of Employment and the Economy, Ministry of the Environment)

The generation and diffusion of innovations is promoted by setting a target percentage (such as 2 or 3 per cent) for public procurement that enhances research, development and innovation activities.

Expertise in procurement is enhanced by strengthening and developing comprehensive support and advisory services in matters of public procurement related to innovation.

Financial and other incentives for procurement related to innovation are developed as part of the Effectiveness and Productivity Programme of central government and the productivity programme of municipalities. (Proposed measure 19: Ministry of Employment and the Economy, Ministry of Finance)

Public data resources may function as a raw material for research and innovation much more effectively than has been the case so far. According to the resolution issued by the government in March 2011, the opening of public data resources proceeds as follows: first, an information policy on the opening of the data is issued, after which the technological and legal infrastructure is strengthened and the application and

service development making use of public sector data is expedited. The Ministry of Finance is about to launch an Open Data programme by which the public sector will expedite the opening and availability of data as concerns its own data resources.

Effective utilisation of public sector data in innovation activities requires the expedition of application and service development projects implemented by companies, the strengthening of research, education and training and advisory services concerning the opening and utilisation of the data as well as new support services that can be used, among other things, to strengthen the innovation activities of communities utilising the open data and the development of data resources to be implemented in cooperation between public authorities and users.

The construction of education and training, advisory, networking and other support services to support the programme on the opening of public information and measures to promote business making use of public information are compiled into a single entity. (Proposed measure 20: Ministry of Finance, Ministry of Employment and the Economy and other ministries)

Long-term storage of digital materials requires a solution that can guarantee that cultural heritage materials, information resources related to research and electronic documents will remain understandable and usable also in the future. Information infrastructure services in the field of culture and research promote cooperation emerging from competences in different fields and accumulate competence. This has significant multiplicative effects on the economy and direct material effects on innovations, social well-being and, as a result, on competitiveness.

The shared use of information and openness are promoted by investing in the information infrastructure of managing, distributing and storing digital data related to research and innovation. (Proposed measure 21: Ministry of Education and Culture)

Greater value and new competitive advantages through intangible investments

The foundation for Finland's international competitiveness has been based on traditional R&D activities and their successful utilisation in industrial products. As the national economy becomes increasingly service-driven, the success of industrial products, too, on the international market will rely increasingly on services associated with the products and combinations of products and services. At the same time, the services become part of the intangible investments and intellectual capital of companies, which consist of aspects such as design, brands, capabilities within the organisation, immaterial property rights and networks. Drawing the line between services and other intangible factors thus becomes increasingly difficult. The innovation activities and competitive advantages of companies are thus formed increasingly upon the foundation of intellectual capital.

In the future, the utilisation of intellectual capital in business and its management should be treated as a thematic whole. Attention should be paid to different methods of encouraging companies to make different intangible investments. It is important to make sure that innovation policies respond to the needs for competence and innovation activity related to the accumulation and utilisation of intellectual capital.

The utilisation of competence, products and services of the creative sector has become a significant competitive factor and source of added value and growth. Companies in the creative sector generate innovations, including new ways of operating, new products, brands, services and service concepts. Design should be utilised more broadly in the innovation activities of both companies and the public sector. The national design programme to be completed in early 2013 will present measures by which to strengthen expertise in the area of design in society.

Some of the most central challenges in the creative sector are maintaining the competence of creative actors in the midst of changes in the operating environment and working life, the availability of external funding, accounting for the specific needs of companies in public business development and funding services and the low rate of value added in products and services in the field due to difficulties in the implementation of copyright. Solutions to the situation are sought in the joint memo by the Ministry of Employment and the Economy and Ministry of Education and Culture: *Generating growth and renewal from creativity – public measures and development guidelines for the creative economy*.

The National Working Life Development Strategy, prepared in accordance with the aims of the government Programme, highlights the significance of innovation for the strengthening of productivity. Ways of organising work within work communities have a significant impact on the creativity of organisations. The capacity for renewal among work communities is affected by the climate within the organisation and structures and operating methods that encourage the emergence of ideas and experimentation with new things on all levels of the organisation. An essential element from the viewpoint of enriching interaction is the bringing together of different individuals and operating cultures. Also cooperation with other workplaces, education institutions and research institutes as well as customers and interest groups is important.

Companies are encouraged to perform immaterial investments by promoting service innovations, business activities in the creative sector, use of design through the national design programme and the renewal of work organisations in accordance with the National Working Life Development Strategy. (Proposed measure 22: Ministry of Employment and the Economy, Ministry of Education and Culture)

A new, greener society generated needs for new solutions. However, a system-level transition requires solutions that also contain non-technological elements, offering significant opportunities for the development of service innovations and new business models. The demand for more comprehensive solutions is supported by a rise in values highlighting sustainable development among consumers. Even though Finland has strong development competence in the area of new environmental and energy technology, challenges associated with the need for energy and climate change have so far been viewed as an impediment for competitiveness rather than an opportunity for new business. Until now, opportunities for new value creation have not been utilised efficiently as concerns the system level and related service innovations.

The government's energy and climate strategy incorporates new business opportunities and measures emerging from the demand for clean energy and outlines measures to support this. (Proposed measure 23: Ministry of Employment and the Economy)