

**GOVERNMENT'S COMMUNICATION ON
FINLAND'S NATIONAL INNOVATION STRATEGY
TO THE PARLIAMENT**

CONTENTS

1 Introduction	3
1.1 Background	3
1.2 Definitions	4
1.3 Strategic premises	5
1.4 Drivers of change in the innovation environment.....	5
2 The current state of innovation activity.....	6
3 Basic choices in the development of innovation policy	14
3.1 Vision for innovation activity	14
3.2 Competence base	14
3.3 Basic strategic choices	15
4 The Government's development guidelines	21
1) Reinforcing the competence base	21
2) Broad-based innovation activity	23
3) Internationalisation of the innovation environment and operating in a world without borders	25
4) Strong and networked innovation centres.....	27
5) Internationally competitive system of training and higher education.....	30
6) Developing the Finnish environment to support growth businesses.....	33
7) Strengthening demand and user orientation.....	34
8) Central government's corporate steering and a systemic approach.....	38
9) Resources for innovation activity	40
10) International review of the innovation system.....	41

1 Introduction

1.1 Background

In line with Prime Minister Matti Vanhanen's Second Cabinet's Government Programme, the Government will prepare a national innovation strategy, outlining the innovation policy for the near future. On account of the economic and socio-political significance of innovation, the Government has agreed to submit a report to Parliament concerning the development and reform of the national innovation policy.

The report is an agenda for change, describing the current and new measures for enhancing the innovation policy, since the strategy will predominantly focus on the reforms necessary for the creation and implementation of a broad-based innovation policy within a global operating environment.

The practical preparation of the strategic work was carried out by the Ministry of Employment and the Economy (until 31 December 2007, Ministry of Trade and Industry). The strategy was prepared on a transparent basis, involving the extensive consultation of specialists, stakeholders and citizens. Eleven workshops, focusing on the key challenges of innovation policy, were held in the autumn of 2007. Nearly 800 specialists gave their views in the workshops and online.

A steering group, chaired by Esko Aho, President of Sitra – The Finnish Innovation Fund, was appointed for the actual 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. The report contained herein has been drawn up on the basis of the proposal.

1.2 Definitions

Innovation refers to a utilised competence-based competitive advantage.. A competence-based competitive advantage can emerge from scientific research, technology, business models, service solutions, design, brands or methods of organising work and production. Typically, an innovation is generated by a combination of different competencies. Capitalised as innovations, competence-based competitive advantages promote the advancement of businesses, society and wellbeing.

Innovation policy refers to public measures which influence the opportunities to innovate, the effectiveness of the innovation environment, and the creation and leveraging of innovation in the economy and society. A *broad-based innovation policy* would support the reform of policy sectors (such as social affairs and health, energy, transport, the information society, education and training, and regional development) through innovation, focusing on the importance of close partnerships between policy sectors and strategically led innovation efforts in the public sphere.

Innovation system refers to a system formed by the producers and users of information and competencies, and their mutual relationships. In the future, the innovation environment will even more clearly belong to the global network of innovation hubs and centres. Innovation environments will be global, national and regional, and in order to succeed they must attract skilled workforce and form part of close collaboration with other environments.

Systemic approach refers to a comprehensive method of aligning the business and policy sectors (horizontal) and their associated development activities at different levels (vertical). The systemic approach is a key concept in implementing a broad-based innovation policy. It refers, comprehensively, to the interconnection and

mutual dependencies of various phenomena. In general, changing one process or functionality requires the corresponding development of other, related processes.

1.3 Strategic premises

Improving productivity and competitiveness and maintaining and developing the Finnish welfare state call for a state-of-the-art innovation environment, which will require, in addition to maintaining current strengths, an active and dynamic approach to reforming and diversifying innovation activities. The Finnish innovation system, businesses and other innovation stakeholders will undoubtedly face tougher international competition in the future.

Meanwhile, an ageing population and scarcer resources call for maximum leveraging of the resources invested in innovation. Innovation is not an end in itself but a means of supporting economic growth and the positive development of the national economy, of fostering sustainable socio-economic reform, and enhancing the wellbeing of citizens and the environment.

1.4 Drivers of change in the innovation environment

Both the economy and society are facing immense pressures for change. The basic precondition of a successful innovation policy is the recognition of such pressures and taking them into account. Key drivers of change include globalisation, sustainable development, new technologies and demographic changes, all of which involve both threats and major opportunities for society and the economy.

- **Globalisation.** Today, industrial manufacturing is very flexibly placed in locations offering the most favourable operating conditions. Knowledge and competencies are undergoing similar development. Operators in developing countries are striving to challenge those who are presently enjoying success throughout the world.

- ***Sustainable development.*** Increasing awareness of climate change and the related threats has created pressure to switch to ecologically sustainable production and consumption. The scarcity of energy and raw materials, and their soaring prices, are adding to this pressure.
- ***New technologies.*** Technological development continues at an accelerating pace. For instance, the fields of information and communication technology and bio- and nanotechnology are producing information and results on a continuous basis, creating huge potential for new applications and the renewal of former operations.
- ***Aging of the population.*** Finland will be one of the first countries to face reducing workforce volumes. A rapidly changing population structure is forcing Finland to devise rapid solutions in order to enhance productivity and efficiency, while creating the preconditions for new innovations.

2 The current state of innovation activity

In international studies, the Finnish innovation system ranks as one of the best in the world and is considered to function effectively. However, even the occupant of such a pioneering position requires renewal, since competition in the open global operating environment of innovation activity is intensifying. New challenges call for new solutions, which is why new operational models must be found to complement the acknowledged strengths of Finnish innovation system.

According to the Government Programme, improving the productivity and competitiveness of the national economy will only be possible if the innovation

policy can be given a broader basis and made more efficient. The Government will pay particular attention to policies concerning education, research and technology, emphasising the significance of business, design and organisational innovations alongside technical ones.

Finnish success in international comparisons evaluating competitiveness and the development of the information society has been on the decline in recent years. When the labour force begins to decrease rapidly in the near future, without extensive work-based immigration, economic growth can only rely on improving productivity of work. In addition, commitments to the fight against climate change and to increasing renewable energy may influence the economy's growth potential and competitiveness, even in the short term.

Since the above-mentioned serious challenges demand new solutions, new operational models must be found to complement the acknowledged strengths of the innovation system. Successful innovation will support market development and promote access to new innovation by people, companies and the public sector.

Skilled and capable workforce, as well as research and development, are essential in boosting innovation activities. Finland has succeeded well in international comparisons of education, research and technology, being one of the world's leading countries in terms of innovation and the quality of enterprises' operating environments. Finnish success has largely been based on a high-quality educational system, long-term investments by the private and the public sector in research and development, and well-functioning, networked institutions.

A successful science and technology policy has created the basis for many successful industries. This provides a sound platform for building the future. However, the challenges of growth and competitiveness can no longer be tackled

solely by means of a sector-based, technology-oriented strategy. Instead, a demand-driven innovation policy must be bolstered alongside a supply-driven, broad-based innovation policy.

Due to the reform of innovation activities, and their becoming broader based in an environment without borders, the intellectual property rights system requires improvement. The Government Programme states that, together with the innovation strategy, a proposal for a new national intellectual property rights strategy (IPR Strategy) will be completed by the beginning of 2009.

Preparations for the establishment of Strategic Centres of Excellence for science, technology and innovation (SHOKs) were begun in 2006, following the guidelines issued by the Science and Technology Policy Council. These Centres will strengthen key areas of research and innovation in terms of strategic competencies required by the business sector, while significantly increasing the dialogue between cutting-edge research and the testing and piloting necessary for capitalising on findings.

The implementation and financing of the Centres will be based on partnerships between businesses and the public sector, and on long-term commitments by all stakeholders. Centres in operation at the moment include Forest Cluster Ltd, Tivit Ltd (information and communication industry) and Fimecc Ltd (metal products and mechanical engineering). The development of the energy and environment centre (Cleen Ltd) and the health and wellbeing centres is underway. A centre focused on the built environment has also been proposed.

Launched at the beginning of 2007, the cluster-based Centre of Expertise Programme (OSKE) attempts to bring together scattered expertise and research resources for the creation of more influential systems, which will enable more

effective dialogue between the programmes managed by other stakeholders, such as Tekes and the Academy of Finland, and Strategic Centres of Excellence.

The significance of services to the economy, employment and wellbeing continues to increase, currently accounting for more than two thirds of gross domestic product. However, productivity of services has been increasing slowly. Innovation has been acknowledged as the best solution for developing the public sector and other service sectors. The purpose of the new, broad-based innovation strategy is to further strengthen positive trends in the development of quality and productivity in private and public services as well as in retail business.

Although Finland has succeeded in generating innovation in some sectors of industry, investment in research and development and in technology has failed to produce sufficient results, as measured by indicators such as the number of high-growth businesses, active entrepreneurship, successful venture capital investment or consumer purchasing power. In recent years, a number of measures have been implemented to strengthen cooperation between the innovation system and financiers of growth in public and private companies. The new innovation strategy has been designed to further increase growth opportunities in high-competence businesses.

Particularly important reforms concerning policies in research, innovation and institutions of higher education are currently underway. The objective of this current structural development of the public research system is to increase the strengths and standards of Finland's higher education system, create state-of-the-art research infrastructures and platforms, and enhance the training and standards of researchers.

Higher education holds the key to the public research system. The profiling and priorities of institutions of higher education will be strengthened, and the higher

education network will be enhanced in order to create more prominent institutions with higher standards. Steps are being taken to strengthen the financial and administrative autonomy of universities. The review of the Universities Act will provide universities with better opportunities to apply modern human resources policies, improve the quality and effectiveness of teaching and research, and strengthen creative and innovative research and learning environments. Universities with a higher degree of independence will be able to succeed internationally. Enhancing international activities and encouraging closer dialogue with other stakeholders in society will also help to diversify universities' finances.

Research training will be transformed in order to facilitate a more systematic approach to training in both research schools and other organisations. In addition to subject areas, expertise produced by research training will include key skills required in working life. Universities will implement a four-tier research career model, which will increase transparency and facilitate career planning. A similar task-based system in other research institutions and in the private sector, along with a broader interpretation of achieving work merits, will encourage mobility between sectors. Hence, a career in research will be based on a broader definition in the future.

The objective of the structural development of sector research is to upgrade the entire research capacity and utilise it more effectively. Sector research institutions will be transformed into international research organisations, which have a multidisciplinary focus and produce findings of greater social relevance. Research institutions will work closely and innovatively with higher education organisations and regional centres of expertise, producing know-how that will support regional, national and global decision-making, ensuring Finland's broad-based competitiveness.

The structural reform of sector research will be prepared so as to allow the Government to agree on the necessary structural reforms for research institutions by the end of 2008, as laid down in the Government Decision of 28 June 2007 on sector research.

The role of vocational training in the innovation system will be strengthened. In accordance with the vocational college strategy, measures will be taken to enhance the service capability and structures of training providers. Work-based learning will be broadened and linked more closely to training and workplace development initiatives. The objective of the above strategies is to help training providers establish training and development services, which encourage innovative production and service ideas in businesses and workplaces and create new business based on innovation. Cooperation between training providers and stakeholders in regional development and innovation activities will be reinforced.

An overall reform will be carried out in vocational adult education (AKKU), systemising the currently fragmented administration, financing, legislation and benefits. This reform will cover vocational adult education, adult education provided by institutions of higher education, employment policy adult education and personnel training. It will promote professional mobility, along with efforts to lengthen careers and match demand to supply in working life. The projects included in the overall reform will be prepared in time to allow their implementation from the beginning of 2010.

For some time, the key objective of Finland's economic and employment strategy has been to strengthen growth potential by increasing research and development efforts. The target set by the Government Programme is to increase the share of research and development to four percent of gross domestic product by 2011, of which over two thirds will constitute research and development investments by the

private sector. In line with the Government Programme, funding for public research, development and innovation will be primarily allocated to the service sector, small- and medium-sized enterprises, and nationally recognised key research fields. Uniform nationwide criteria will be applied to the funding allocation. The Government Programme also emphasises the need to allocate resources for promoting international activities and exports, while highlighting the significance of R&D and demonstration projects in renewable energy and other environmental technologies, among other areas of innovative activity.

According to a preliminary estimate by Statistics Finland, the total spending on research and development exceeded EUR 6 billion in 2007, accounting for some 3.36 percent of gross domestic product. The government's share of this total was EUR 1.7 billion, representing 4.5 percent of the total budget and just under 1 percent of gross national product. In recent years, companies' R&D spending has developed favourably in many sectors, such as the electronics, mechanical, metal and chemical industries, and the service sector. Statistics Finland's preliminary data suggests that private sector's research and product development spending in Finland totalled EUR 4.3 billion in 2007.

In order to achieve the Government Programme's target, public research and development expenditure must be increased significantly, by EUR 400–500 million, towards the end of the current term of government. Companies must also significantly increase their research and development efforts in Finland in order to achieve this target and maintain the ratio of private and public funding at its current level.

Despite the growth in R&D being carried out abroad, companies largely continue to conduct research in Finland. According to a Confederation of Finnish Industries investment survey, the share of domestic R&D spending accounted for just over half of the total business investment in research in 2008. A major share of the research

and development efforts carried out by Finnish companies abroad takes place in the EU, but activities are increasing, particularly in innovation centres outside Europe.

The question of how well the EU succeeds in its economic and innovation policy will be a decisive factor in Finland's future success, and Finland must therefore be an active participant and actor in the development and targeting of the EU's research and innovation policy. By leveraging the opportunities provided by the EU's innovation policy, we will strengthen and diversify Finnish innovation activities while promoting Europe's development into a leading knowledge-based economy.

Finnish research organisations and companies have been successful in competing for projects in the EU's research programmes, and Finland is clearly a net recipient in terms of the EU's R&D funding. The country is also actively involved in several new initiatives concerning the European research and innovation policy, in areas such as intensifying cooperation between national R&D programmes and promoting European top research (ERC, JTI, EIT).

Drawn up during Finland's term of presidency, the EU's innovation strategy has provided a significant opening, harmonising innovation policy measures within the EU and promoting their determined utilisation in achieving the Lisbon objectives.

Finland has actively sought partnerships with the world's leading centres of innovation. Bilateral cooperation with countries outside Europe will be increased, particularly with countries boasting leading technological advances and emerging economies, such as China and India. The international FinNode innovation centres, which have been set up in China, the United States, Russia and Japan, represent a new kind of partnership model. An investigation into setting up an innovation centre in India is also underway.

3 Basic choices in the development of innovation policy

3.1 Vision for innovation activity

Innovation-based development of productivity: To increase economic growth and enhance wellbeing, innovation-based, sustainable improvement of productivity is required, on an extensive basis in enterprises and other communities. This requirement will gain in importance as the work input declines and the population ages. The target status sees Finnish enterprises succeeding and growing on the international market due to their competitive strength, which will be based on expertise and the enhancement of productivity. In addition, the public sector must actively reform its service systems and operating methods, by developing innovations. If Finland is to respond to the challenges presented by a declining labour force and higher cost levels, work productivity must be increased both in businesses and the public sector.

Pioneering in innovation activity: In order to succeed, Finland must lead the way on a global scale in selected sectors of innovation activity. Finland must be able to generate globally significant added value and attract both skilful experts and investors into the country. According to its target status, Finland must meet its social challenges through a comprehensive, consistent innovation policy across administrative boundaries, paying close attention to both technological and non-technological sectors of innovation activity. An attitudinal environment motivating creativity will support the broad-based development of innovation.

3.2 Competence base

High quality teaching, research and development activities have formed the basis of Finland's success. However, the rapid exploitation of new competencies is more and more often requiring the attainment of a position as a partner in networks that create

knowledge and competence, while access to top networks is requiring the ownership of unique competencies in exchange. Access is denied to free-riders, and those left outside networks fall behind. Buyers of competence will only be able to reap the benefit of new competencies at a later stage than developers of competence.

An extensive array of one's own competencies also forms the basis of the ability to receive knowledge and competence generated elsewhere, and of recognising new opportunities. The fact that innovations often arise as new combinations of various competencies crossing disciplinary and industry boundaries only serves to emphasise the importance of an extensive competence base.

The types of knowledge and competence which are valuable to innovation are generated in many ways and by a host of factors. While the knowledge and competence exploited may arise in a scientific community, the broad-based innovation concept emphasises the significance of individuals, enterprises, public operators and user communities as producers of knowledge and competence, alongside the world of academic research. Arts and the nature also provide important sources of experiences and new ideas.

3.3 Basic strategic choices

Traditionally, Finland's competitive ability has been strong and we must continue to maintain quality education, sizeable investments by enterprises and the public sector in research & development, and well-functioning Finnish institutions. This solid competence basis, created by Finland through investing in education and research, must not only be preserved, but further reinforced. However, current strengths will not suffice in meeting future challenges.

To attain strategic goals, Finnish innovation environment must be capable of creating novelty and making choices. The following four basic choices are presented

in the strategy: innovation activity in a world without frontiers, demand and user orientation, innovative individuals and communities, and a systemic approach.



Figure 1. Basic choices and key development areas for the innovation strategy

Innovation activity in a world without borders: The success of enterprises and regions depends on their ability to position themselves in global networks and, in the role they have selected, to produce more added value than others. Only companies, regions or communities able to produce added value are partners worth taking seriously which are able to attract other operators throughout the world.

To some extent, the success of Finnish innovation policy can be quantified in terms of the quantity of investments, experts and enterprises entering Finland. Finland can only succeed in the global market for experts and investments by constructing a well-known, renowned *brand* based on strategic choices, state-of-the-art competence, and a competitive innovation environment.

- *Connecting and positioning Finland in the global knowledge and value networks requires ability to participate and influence these networks, international mobility of experts and determined development of the attractiveness of the Finnish innovation environment*

Demand and user orientation: Innovation activity no longer abides by the traditional logic of invention. Rather than searching for customers for new products and inventions, in an increasing number of cases new solutions are being sought for customers. Competitive strength is often based on the ability to realise the needs of customers, consumers and citizens before competitors do, and to offer corresponding products and services. Various forms of open and public innovation activity are gaining ground alongside traditional, closed innovation activity. Policies must create the preconditions for the emergence of open innovation environments.

In Finland, on average innovative enterprises cooperate with customers to a greater extent than in many other EU countries. Value chains are being steered from customers and consumers towards producers and developers rather than vice versa. Innovation policy must adapt to this change in innovation activity and accelerate its pace. Attention must be paid to the quality and depth of cooperation, and the creation of markets for innovative solutions must be promoted.

Traditional innovation policy has focused on the development and commercialisation of new technologies, and successes have been measured primarily by development investments and technological output. A new, broad-based innovation policy will emphasise the development of products and services meeting the needs of customers, and the strengthening of users' and developers' mutual development work. There is room for improvement in Finland, particularly as concerns the development and introduction of user-oriented service innovations.

Particular attention should be paid to enhancing the productivity of the public sector through the development of services and service capabilities.

- *Innovation steered by demand, paying attention to the needs of customers, consumers and citizens in the operations of the public and private sectors alike, requires a market with incentives and shared innovation processes between users and developers.*

Innovative individuals and communities: Innovativeness is based on the skills and creativity of individuals. Generating innovations requires a sufficient quantity of information on phenomena, customers, technologies, intellectual property rights, previous solutions and operating modes.

Innovation policy means industrial policy. In many cases, entrepreneurs are the ones who are able to combine ideas, the ability to take risks and other required skills with a clear view of customers' needs. In Finland, entrepreneurship activity has been found wanting, and its development calls for measures that also pay attention to the novel attitudes of new generations towards entrepreneurship.

Increasingly often, innovations are created at the interfaces of various competence areas. In an operating environment which is fruitful in terms of innovations, individuals with different backgrounds work on the same problems. Innovative communities can constitute close teams meeting together, or more loosely coupled communities working as a network. The success of innovative communities is based on sharing competence and knowledge, and the ability to combine various perspectives and approaches.

Innovation communities and centres are increasingly international. When knowledge and communication technology is utilised, global knowledge communities are

formed. Enterprises, too, are increasingly resorting to open communities in innovation activity.

International examples indicate that innovation activity is being centralised and is finding its way to regions and localities offering sufficient preconditions for innovation activity. Instead of national innovation systems, innovation ecosystems and innovation centres are attracting attention, being locally and regionally fixed but globally networked. They combine, in a fruitful manner, needs and ideas with the abilities required to implement the latter. The dynamics of such ecosystems are based on communities where the prevailing culture favours cooperation, knowledge, the sharing of ideas and willingness to take risks.

We must find a way to create globally networked innovation ecosystems, which can be adapted to Finnish conditions and which help Finland to capitalise on its strengths. By international standards, Finland boasts exceptionally close links between information providers and users. Overall, partnerships with other stakeholders are particularly commonplace in innovative businesses. On the other hand, we are falling below par in several areas. For example, we lack the top-class services required to commercialise ideas rapidly and create new start-ups. Venture capital investors who ensure the rapid growth of start-up firms with sufficiently large investments operate in successful ecosystems. Another group of significant operators are business angels, who place their wealth of experience and networks at entrepreneurs' disposal. In these areas, Finland is trailing behind international development.

- *Individuals and innovative communities play a key role in innovation processes. Innovation capabilities and incentives for individuals and entrepreneurs are critical success factors in the future.*

Systemic approach: In order to meet global challenges, innovation policy must be broad-based and comprehensive. Piecemeal policy measures will not suffice in ensuring a pioneering position in innovation activity, and thus growth in national productivity and competitive ability.

A systemic approach will constitute a key concept in implementing a broad-based innovation policy. Such an approach would constitute a comprehensive outlook, which would be essential for instance in solving environmental problems, enhancing the efficiency of public services, and constructing regional innovation centres.

Instead of partial solutions, the comprehensive renewal and structural development of entire systems is called for. Deeper cooperation is also required from the administration and innovation policy. A successful, broad-based innovation policy requires the renewal of all political sectors, the lowering of sector boundaries and closer cooperation. Demand on national level and the customer-oriented activities of those implementing the policy must also be reconciled. All of this requires strategic management within the public administration.

Development efforts aiming at influential reforms across a broad spectrum must be implemented on the basis of nationally – or even globally – uniform standards. Standards that facilitate the extensive utilisation of innovations can develop either from the base up, via individual development projects and their rapid spread, or traditionally from the top downwards. Both cases call for close interaction on national and local level, and a clear division of duties, whereas the validation of traditional standards requires attention to practical experience gained from trial projects in the further development of the standard.

- *The exploitation of the results of innovation activities also requires broad-based development activities enhancing structural renewal and determined management of change.*

4 The Government's development guidelines

1) Reinforcing the competence base

The attractiveness and success of Finland's innovation environment require a broad, solid competence base that reaches international top level in selected sectors. The maintenance and reinforcement of competencies form the main focus throughout the action plan: R&D projects and work-driven training and development services efficiently generate both new competence, networks disseminating competence, and the infrastructure required for constructing the competence base.

The education and research system will be developed as a whole, in order to increase competitiveness and wellbeing in Finland and to foster culture, creativity and knowledge creation. Furthermore, the Government will guarantee nationwide equal opportunities for receiving high quality education, from early learning to higher education. The Government's target is to increase general educational and skills levels in order to improve Finland's ranking among the highest in the world. Special attention is being paid to continuous efforts to raise educational standards, ensuring quality at all levels of education and training. Enhancing the quality of education and research, while improving effectiveness and efficiency, can be achieved only if the changes in the operational environment are taken into account in the development of the school network, the training provider network and the network of higher education institutions. The challenges of providing the skills required in working life, and tackling the changes in the age structure, will be resolved by

improving the adult education system and strengthening the adult education functions of higher education institutions.

Innovative activities increasingly take place in networks, where research and development are closely entwined with practical production and service functions. Consequently, innovation can reach all areas and levels of working life, while higher standards of professional skills and expertise are required in all parts of the innovation chain. Broad-based fostering of the competence base calls for strengthening vocational training provision, alongside improving higher education provision and sector research. The associated service and development initiatives must reconcile the needs of working life. The measures mentioned above will support the rapid adoption of new service and product innovations and innovative work-life initiatives.

Finland's education system will continue being developed in an integrated manner so as to provide better support for the progress and reform of a competitive, broad and diverse competence base while leveraging Finnish production capacity as much as possible. In terms of Finland's future success, international top level expertise will be maintained and developed in key sectors. Vocational training, in conjunction with the associated service and development initiatives aimed at reconciling the needs of working life, will be enhanced alongside higher education provision.

2) Broad-based innovation activity

Successful innovations are usually based on the open-minded combination of various competencies, while too narrow a concept of innovation activity results in part of innovation potential remaining untapped.

Correspondingly, Finnish innovation activity has largely been concentrated on industrial sectors and focussed too narrowly on the exploitation of scientific-technological expertise. The introduction of broad-based innovation activities in Finland is impeded by the fact that a number of low productivity branches of the industry and the public sector have not yet systematically utilised innovation activity in the development of their operations and productivity. Incentives enhancing the broad-based nature of innovation activity will assist in the harnessing of this latent potential.

Various innovation activity incentives must be targeted so that, combined, they facilitate the achievement of the highest possible long-term benefits for the national economy and society. A systematic analysis of the internationally best performing incentives for starting innovation activity (e.g. tax incentives, incentives targeted at hiring research and development personnel, or incentives for the transfer of expertise) could offer new opportunities for complementing the portfolio of measures used in Finland in the appropriate manner. However, it is important that the development of prospective new instruments be limited to options in whose case it can be forecast that they will bring added value to the totality of former incentives.

Incentives and development measures targeted at business, management, operating methods, design, creative industries and service and social innovations will be strengthened. New incentives will be created in order to launch innovation activity in enterprises in

all sectors where innovation activity might play a key role in enhancing performance and productivity.

The entire public innovation and business development service system will be upgraded so as to improve the productivity and competitiveness of the national economy, branches of industry, businesses in different sectors and regions, and the public sector.

Finland will be transformed into an experimental society, able, through its sound cooperation and innovation environment, to produce internationally competitive innovations in systemic programmes, leading to extensive reforms. The public sector will be encouraged to become an active developer of innovations, which is equally active in applying and introducing them.

The innovation-based development of productivity and wellbeing requires a competent and motivated workforce willing and able to develop further at work. Indeed, within the innovation environment, quality of working life emerges as a critical success factor, with a direct influence on the efficiency, productivity and quality of operations. Innovation activity, like other competence-based high added value tasks, is based on employees' and working communities' enthusiasm, commitment and enjoyment of work.

The perspective of working life development will be included as a coherent part of innovation policy and the system for financing and promoting innovations,.

3) Internationalisation of the innovation environment and operating in a world without borders

Development needs in promoting the international aspect of innovation are manifold. The international mobility of researchers remains limited and is even experiencing a downward trend. Research and development activity carried out by international companies is on a low level in Finland, and this country does not attract enough international innovation investments in other respects. Not enough international experts find their way to Finland, nor are we sufficiently able to exploit the diversified expertise and multiculturalism of people with foreign backgrounds who reside here, in the development of Finnish innovation environment.

There is no point in redeveloping technologies and competencies in Finland which are easily available in the outside world. It is important that companies and other organisations are quickly and easily able to acquire up-to-date information, competent resources and technology across geographical, discipline-based, technological and industrial borders.

The principles of public research, development and innovation financing will be transformed so as to meet the demands of a borderless operating environment. This means stronger incentives for international networking and risk-taking both in Finland and overseas, while ensuring that investments in innovation add value to the Finnish economy and society.

Special challenges in reinforcing participation and influence are related to e.g. research, development and innovation cooperation in the EU. While Finland is a preferred partner that participates actively in various forms of cooperation, it is not profiling itself sufficiently as an influential force or in taking the initiative. In a global operating environment, having an influence on a European scale is not

enough. Partnerships and cooperation frameworks are essential alongside leading innovation activity hubs and pioneering markets, regardless of their location. Cooperation initiatives exist alongside operators outside Europe but such operations are fragmented and on a small scale.

Proactively and in a target-oriented manner, Finland will endeavour to influence the development of the European Research and Innovation Area (ERIA), so that it is established as a European single market for research, development and innovation activity, and so that it reinforces and complements the Finnish innovation environment.

The ability of the innovation financing and service organisations to exert an influence in international innovation networks will be reinforced.

Cooperation and partnerships will be reinforced worldwide in the areas of the emerging economies and innovation most interesting to Finland, for instance through strategic partnerships, bilateral agreements on scientific and technological cooperation and the FinNode network.

As the population ages, employment and competence based immigration is becoming an increasingly important success factor for innovation activity in Finland. Finland's attractiveness as an immigration target could be improved, above all by revising personal taxation to a competitive level in comparison with competing countries. The development of the attitudinal environment within the residential and operating environment is also vital. Multiculturalism and pluralism would enhance the attractiveness of the innovation environment and the creation of innovations.

The Finnish innovation environment and working life will be developed in order to transform Finland into a recognised, attractive location for research, product development and innovation-based business, and a living environment that promotes diverse cultures and value systems.

Personal taxation will be revised to improve international competitiveness. In order to expedite competence and employment based immigration, an active immigration policy in line with international best practices will be created. The incentives for international mobility, and the related targets, of researchers and teaching staff at universities, other higher educational institutions and research institutions will continue to be strengthened.

4) Strong and networked innovation centres

Finland faces special challenges in reconciling various regional, national and international initiatives in order to create hubs of expertise. Finland has only made minor national choices of emphasis binding on various actors of the innovation environment and, for the time being, these choices have played too insignificant a role as criteria for targeting resources. Interactive innovative communities have not been exploited sufficiently, nor has Finland interacted closely enough with top-level international hubs in the EU and other parts of the world.

In Finland, research activity is diverse and, on average, of high quality, but research yields too few top results that would function as special competitive assets.

Furthermore, too few experts willing and able to establish themselves as key players in global innovation networks are emerging in strategic fields of research in Finland.

The specialisation of regions in their strengths will increase their critical mass of expertise and improve their ability to link with expertise and value networks vital to their own development. Furthermore, regionally decentralised research, development and innovation activity will become a national resource when pooled into networked innovation communities. A country of Finland's size can only host a few diversified, internationally competitive centres of innovation.

Nationally and internationally networked centres of innovation will create opportunities for companies throughout Finland to benefit from international business networks and sources of expertise.

Agile centres of innovation, both content-based and regional, will be set up in Finland. The objective of this initiative is to transform Finland into one of the world's leading countries in innovation activity in chosen areas. Innovation hubs crossing industrial sectors will be preferred partners in international networks and play a key role as the basis for Finland's international visibility, attractiveness and fruitful innovation activity.

On the basis of national strategic content choices and the local strengths of regions, a number of strong regional innovation hubs will be created with world-class operating environments.

Financing programmes intended for centres of innovation (e.g. Strategic Centres of Excellence (SHOK), Centre of Expertise Programme (OSKE), the cohesion and competitiveness programme

and EU funding instruments) and other development measures for creating attractive operational and living environments will be reconciled with each other.

As the global competitive situation and operating environment changes, national choices must undergo continuous critical assessment and updating whenever necessary. On the other hand, choices must be made with a long-term focus in order to enable enterprises and other organisations to plan innovation investments in sufficiently predictable conditions. A long-term approach is also necessary as regards the targeting of strategic research. The definition of focal points must pay attention to the overall view of the opportunities afforded by various areas, and their innovation potential.

A transparent, extensively interactive process capitalising on the results of foresight will be created for the preparation and maintenance of national focal point choices as part of the measures initiated by the new Research and Innovation Council.

5) Internationally competitive system of training and higher education

The reform of universities, polytechnics and research institutions requires modern management and administration alongside broader economic independence. Dramatically intensifying competition is forcing higher education and research units to implement reforms, since the most talented students, enterprises' research acquisitions and financing will seek the best targets in terms of their own goals, regardless of geographical boundaries. A more open approach will both constitute a necessity and generate major potential for Finland's innovation environment.

As part of the innovation system, the strategic tasks of vocational training focus on the provision of relevant and high-standard vocational skills in order to match the requirements of industry and working life in general, while ensuring the availability of labour force. In addition, the role of vocational training will gain in importance in the development of services for industries and other working life, since opportunities to enhance individual competencies, work and workplace communities should be promoted alongside developing vocational net skills and supporting innovation and development carried out in businesses and workplaces. In order to be able to support the innovation system, training providers must either be large enough, or otherwise have a robust capacity enabling them, to provide vocational training, covering all vocational training services, development measures and teaching units.

Finnish educational system will be developed so as to strengthen the general level of competence and support the development of special talents. Internationality, interactive skills, entrepreneurship, creativity and innovation will be introduced at the core of teaching. An internationally top-level development environment for learning will be created in Finland. Incentives and opportunities for proactive

individual schooling and continuous learning will be enhanced in working life. Methods of anticipating demand for labour force and training will be reviewed so as to improve opportunities to align training with the needs of businesses and individuals by using guidance and decision-making processes. An overall reform of adult education will be implemented.

Researcher training will be reviewed in order to enable career paths for researchers and guarantee a sufficient number of researchers to match the needs of the entire research and innovation system. International cooperation and mobility of researcher training will be increased.

The research capacity of universities and research institutions will be enhanced with respect to the focal points of the national innovation policy. The university reform underway will be implemented, organising research institutions and higher education establishments into larger, modern entities in terms of size, management, the ability to change, resources and administration. Closer cooperation between universities and research institutions will be enhanced. The steering and financing system of universities will be renewed in order to support training and research standards and effectiveness, and interaction between universities, trade and industry and other parts of society.

The role of vocational training in innovation systems will be strengthened by developing the service capability of training providers and the structures of provider networks in line with the vocational

college strategy, expanding work-based learning, and linking training to workplace development measures.

6) Developing the Finnish environment to support growth businesses

A comprehensive innovation and growth company policy is a central means of supporting the development and internationalisation of innovative companies. In most cases, an experienced venture capital investor, committed to the development of the enterprise by using his own capital and expertise, is best able to support a small innovative growth company. Partial public funding plays a key role in risk sharing in such a way that the ratio of expected profit and risk related to the investment becomes acceptable for a private investor. Growth can also be encouraged through changes to growth company taxation and other regulations (for instance, insolvency and bankruptcy procedures and the related legislation), with the objective of building an ecosystem which fosters growth.

In a successful innovation environment, private investors and investors with a public background work in partnership. Public operators must be able to offer growth companies comprehensive business financing, integrated service products and flexible cooperation between parties in the service chain. Basic growth enterprise services are developed through the Enterprise Finland service concept on a needs-based and nationwide approach. Top expertise should be introduced to the process of assessing the ideas produced by institutions of higher education in terms of their value to business, and to further develop such ideas in order to create growth start-ups.

Business development services and incubators will particularly target those companies which strive to generate rapid growth. The service system for growth companies will be developed as a whole, so that the roles and offerings of public operators form a clear entity.

By means of taxation, experienced capital investors and business experts will be motivated to commit themselves to the development of enterprises aiming at rapid growth and internationalisation.

Company taxation and insolvency legislation will be developed so as to encourage small innovative businesses to generate growth and take risks, and to create prospects for serial entrepreneurship.

New forms of operation will be established to encourage international venture capital and expertise to find its way to Finland.

7) Strengthening demand and user orientation

Even on an international scale, the use of competitive and market incentives as an innovation policy tool is a relatively new phenomenon. Therefore, no tried and tested complete models for implementing such incentives are easily available. This situation also offers the opportunity to develop the Finnish operating environment into a pioneering one worldwide, in terms of competitive and market incentives. Existing strong networking and innovation orientation of Finnish enterprises, funding organisations and public authorities offer an internationally attractive platform for cooperation requiring a systemic approach.

In Finland, competitive and market incentives have not been exploited systematically as part of the portfolio of methods for economic and innovation policy. Neither has innovation policy single-mindedly supported the development and renewal within the public sector.

Competition and market incentives will be exploited extensively and systematically in promoting innovation activity. The operating methods of public procurement will be developed so that they offer opportunities and provide the motivation for the performance of innovative acquisitions. In support of public sector innovation activity, clear incentives for innovation linked to the Government's performance management and a system of central government transfers to local government will be created.

Ultimately, lead markets will be created on the basis of market players' own decisions, but their hoped-for development can be promoted by methodically implementing measures in support of innovative demand. At national level, particularly interesting starting points for the preparation of lead markets exist, for instance, in the sectors highlighted by the 'Paras' project, launched in pursuit of the reform of Finland's municipal and service structure.

The majority of conditions influencing the market-driven exploitation of Finnish innovations are defined at EU level. Determined efforts are underway in Europe to establish lead markets in selected sectors. European lead markets are one way of counteracting the small size of the Finnish home market, cited as one of Finland's weaknesses in comparisons of competitive ability.

In selected areas, lead markets will be created to promote Finnish innovation activity. National measures, in compliance with the principles agreed in the EU, will be launched in order to establish lead markets in selected areas. In the spring of 2009, the Ministry of Employment and the Economy and the will draw up a framework for policy measures required to implement the demand- and user-oriented innovation policy. Based on the framework, an action plan for

demand- and user-oriented innovation policy will be drawn up under the Ministry of Employment and the Economy.

The demand- and user-oriented innovation policy will efficiently capitalise on new and diversified innovation activity models and development platforms, combining the needs of users, consumers and citizens, alongside knowledge, creativity and competence. Creators, developers and users of expertise will engage in a diverse and rich dialogue.

Stronger user and demand orientation will also encourage public sector reform, which will take account of the needs of customers, users and citizens. The objective of such development is to allow demand for and users of innovations to define the innovation policy and establish it as part of the national innovation policy entity, alongside the policy defined from the providers' viewpoint.

Even at present, public financing incentives for innovation activity are targeted at enterprises and communities that are thought to operate in the manner required in order to generate success, i.e. based on a demand and user focus. However, user orientation is becoming increasingly important in the steering of innovation activity, while the European regulatory framework, guiding the use of incentives, is becoming more permissive, which is facilitating the development of incentive systems. Current incentive systems must be evaluated and charted to ensure that, in the best possible way, they serve the development of demand and user-oriented innovation activity. New incentives accelerate changes of perspective in innovation processes, bringing individuals as end users into the core of innovation activity. Therefore, the innovation potential of citizens, which previously remained partly hidden, can now be capitalised on as the driver of development in the national economy and society.

The national supply of public expert and financing services will be updated to meet the needs of demand and user oriented innovation activity. Moreover, new operating forms and incentives will be created in support of the broad-based interaction required for genuinely demand and user-oriented innovation activity.

The expertise in intellectual property rights of an enterprise or other community, particularly as regards the protection of strategically important know-how, is one of the key success factors in business. Success in rapidly changing international innovation communities calls for a greater ability to select a suitable exploitation model and protect one's own immaterial expertise, than that currently held by SMEs.

Regulations pertaining to the protection of intellectual property rights have a major influence on how well the operating environment is able to support innovativeness. The Government's new strategy on intellectual property rights, due for completion by the beginning of 2009, will review several issues, including the national and international development needs of the system of intellectual property rights, and will present the measures that must be taken in order to enhance the level of competence within enterprises concerning these rights.

The exploitation of intangible assets will be developed, securing the incentive-based division of benefit generated by the value network between different operators and users. Practices for protecting and utilising intangible assets will be revised in order to meet the needs of diversifying innovation activity and a global operating environment. The abilities of SMEs in particular, in protecting and exploiting expertise and intangible capital, will be promoted in a manner that supports open, communal and user-oriented innovation activity.

8) Central government's corporate steering and a systemic approach

In order to be able to meet systemic challenges critical to Finland, and for Finland to develop into an experimental society, central government measures must be managed with determination and a strategic orientation, in the form of a consortium. The Government Programme must be a strategy that provides clearer guidelines for operations and development, emphasising key systemic needs for reform as regards Finland's future.

Innovations of the highest social significance involve many different actors and administrative branches. In order to achieve such innovations, a national-level definition of needs (*top down*) and actor-level customer-oriented preparation of implementation (*bottom up*) must be combined in an interactive way. Financial steering has a crucial impact on whether organisations launch innovative reforms in order to enhance their productivity and impact. Generally speaking, public sector steering and management systems do not include incentives for innovation activity that involves risks, nor for broad-based innovative cooperation.

A national cooperation process for clarifying the roles of various players in the reconciliation of evaluation, foresight and strategy work in innovation activity would generate synergy benefits for organisations involved in such activity. Moreover, a significantly more solid research-based knowledge base relating to the success factors of broad-based innovation activity is needed to serve in the background of policy decisions. Since public sector operations influence the prerequisites of innovation activity in a multitude of ways, the preparation of legislation and other key decisions must pay special attention to the analysis of these impacts.

Inadequate interaction between innovation activities and the development of the information society is an example of the lack of sufficient systemic development efforts. Controlled and efficient influencing of complex systemic phenomena within the economy and society requires the support of determined public investment in the information society, methods of anticipating market developments and innovation efforts to sustain the aforementioned approaches.

The central government's corporate steering will be renewed in order to make it a worldwide pioneer of systemic reforms. The work of the Cabinet Committee on Economic Policy will be enhanced as the forum for the state consortium's strategic management, following the guidelines issued by the advisory group appointed by Prime Minister Vanhanen. During 2008, the advisory group has been mapping out opportunities to improve decision-making processes concerning economic policies. As part of the reform of the Committee's remit, the Minister of Education must be included in the Committee.

For the support of broad-based innovation policy decision-making, an expert body, the Research and Innovation Council, comprising key actors in the sector, is necessary. This Council should manage duties related to the monitoring, assessment, targeting and reconciliation of science, technology and innovation policy, playing an advisory and preparatory role in support of the Government and its ministries. The Research and Innovation Council would replace the current Science and Technology Policy Council.

For the purpose of supporting the targeting, monitoring, assessment and reconciliation of science, technology and innovation policy, a Research and Innovation Council will be established on 1 January

2009 to replace the former Science and Technology Policy Council, the tasks and composition of which have had a narrower scope.

9) Resources for innovation activity

Investments in support of broader innovation activities are required both from the public and the private sector. In addition, reaching and maintaining international level of research and development in the global operational environment. requires determined investments by the public and private sector in knowledge creation and renewal of the innovation activity..

Although businesses and the public sector have stepped up their R&D efforts, the target of a four percent share of gross domestic product, in line with the Government Programme, has proved challenging. This can be partly explained by a higher than expected increase in gross domestic product in recent years.

Since companies have increased their R&D efforts more than the public sector, their share of total investment now accounts for 72 percent, while the share of public funding is about to plunge dangerously close to 25 percent. This situation is endangering long-term research efforts and continued research and development in risky and creative areas, particularly in new fields.

Resources for research, development and innovation will be increased in line with the Government Programme. The amount of additional funding for the remaining part of the Government term will be decided in the Government's mid-term review.

10) International review of the innovation system

An international review of the innovation system will be carried out in order to identify changes in structures and operating models and development measures, as prescribed in the innovation strategy. The strategy process, which encouraged participation and was carried out transparently, facilitated efforts to identify the necessary changes to the content of the innovation policy. However, these changes in structures and operational models can be fully introduced only after a systematic and comprehensive review of the current state and capacity of the innovation system has been carried out.

Drawing on international top expertise, the objective of the review is to provide a diverse picture of the kind of structural changes required to implement the national innovation strategy guidelines. The objective is to identify the key challenges concerning methods, organisations and resource allocation within the new, broad-based innovation policy. Conclusions concerning the development of the structure, administration and institutions of the innovation system will be drawn on the basis of the review findings and proposals.

In partnership with the Ministry of Education, the Ministry of Employment and the Economy has begun preparations for the review, to be carried out between October 2008 and August 2009. International and national experts will be invited to join the evaluation panel. In partnership with the Ministry of Education, the Ministry of Employment and the Economy will also appoint a monitoring group to follow the progress of the innovation strategy and the implementation of the results and findings from the international evaluation, in line with the innovation strategy guidelines.

Based on the national innovation strategy, an international evaluation of Finland's innovation system will be carried out in 2008–2009. The operating models and structures of the innovation system will be developed in line with the evaluation's proposals.