UNDERSTANDING INNOVATIVE SWEDEN
FROM FARMING NATION TO INNOVATION LEADER
Founded in 1919, the Royal Swedish Academy of Engineering Sciences (IVA) was the world’s first engineering academy. It has just over 900 Swedish fellows and almost 300 fellows from other countries.

IVA’s influence in the Swedish public debate is based on our ability to mobilise a unique network consisting of decision-makers and experts from business and industry, academia and the public sector.

An important vehicle to IVA’s influence is the extensive project activities that benefit society and are based on a scientific approach. Over the past few years IVA has run a number of innovation projects which have attracted a large commitment and active participation from IVA’s vast network.

The main goal for the recent project, Innovation for Growth (2009–2011), was to bring about a national innovation strategy for Sweden. The Government presented such a strategy in 2012. The focus of Innovation Powerhouse Sweden (2012–2013), was to facilitate the implementation through regional innovation strategies. In the more recently started project called Attraction for Sustainable Growth, the fundamental issue is how an innovative Sweden can attract companies, capital and talent.

This document describes the innovation policy debate and presents a number of proposals that have been put forward. The aim is to provide an overview of the innovation policy’s opportunities and limitations in the Swedish knowledge economy. It is based on reports from IVA’s recent innovation projects and provides some facts on the Swedish economy and the Swedish innovation system.

The world and Europe face great societal challenges, and innovation is an obvious route to try to find solutions to these. I am convinced that the exchange of ideas and experience across national borders on how to promote innovation is a huge opportunity to improve global innovation capabilities. In this report IVA would like to contribute to this development based on a Swedish perspective.

Björn O. Nilsson
President of the Royal Swedish Academy of Engineering Society
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Sweden
– A tradition of innovation

Sweden is one of the world’s innovation leaders. Not only is Sweden home to the largest number of multinational companies per capita, it also serves as a base for tomorrow’s emerging industries, including environmental technology, life sciences and ICT.

Sweden invests a larger percentage of its GDP in research and development than most other countries, and has the advantage of some basic preconditions for a climate in which innovation can thrive.

Apart from a very substantial nationwide investment in research and development (R&D), Sweden has a strong economic stability, a focus on critical thinking in education from an early age and a climate that is open to new and international influences. Sweden also has a tradition of encouraging curiosity, creativity and experimentation.

Sweden has a long tradition of innovation. Many of the early innovations formed the foundation for a surprisingly large number of multinational export companies and brands with their origins in Sweden. Several were founded during a period of rapid economic development in the first half of the 1900s, including Volvo, AstraZeneca, ABB, IKEA, Ericsson, Electrolux, H&M, Saab and Absolut.

The power of innovation is still strong today. Skype originated here, as did the Spotify music streaming service and one of the world’s most widely read newspapers, the free newspaper Metro.

**MULTINATIONAL COMPANIES WITH THEIR ORIGINS IN SWEDEN**
With a small population, Sweden has succeeded in making a big imprint internationally. Sweden’s population is just over 9.5 million, which is equivalent to just 0.13 percent of the total global population.
0.13 %
Sweden’s economy in the 20th and 21st centuries

During the 19th century Sweden was one of the poorest countries in Europe. Today it is one of the richest.

In this chapter you will be given an overview of the Swedish economy and its development over the past centuries.
Employment Population Ratio – EU 27, Norway and Switzerland
Percentage employed age 15–74, 2013. Source: Eurostat via Macrobonds

Swedish trading partners
Exports of goods 2013, billion SEK. Source: SCB via Macrobond
GROSS DOMESTIC PRODUCT

Sweden’s gross domestic product, GDP, amounted to SEK 3.6 billion in 2013. From the 1970s to the present day, Sweden has seen an average GDP increase of just over 2 percent annually, although the country has experienced several deep recessions during this period.

A significant break in the growth trend occurred at the beginning of the 1990s when GDP fell for three consecutive years. When the IT bubble burst at the beginning of the 2000s, the Swedish economy, like most of the developed world, was affected. The most recent break in the growth trend was in 2008 when the financial crisis was the starting shot for a new global depression. In 2009 Sweden’s GDP shrank by 5 percent, the biggest decline in Sweden’s GDP in a single year in modern times.

The financial crisis was followed by a recovery with very high growth figures in 2010. However, the Swedish economy slowed down again as the debt crisis worsened internationally. Today Sweden is one of the strongest economies in Europe.

EXPORTS AND IMPORTS

Sweden is a small and export-dependent country. Sweden exports more per capita than the USA, China, Brazil, Greece and Italy combined.

Sweden exported goods for a value of SEK 1,100 billion in 2013. Europe, particularly the EU, is the largest market for Swedish export goods. Asia is a growing export market for Swedish companies and currently surpasses North and South America combined.

Over 40 percent of Swedish goods exports consist of engineering goods. This category includes cars and other vehicles, machinery, electronics, telecom and metalwork.

Sweden’s basic industry also accounts for a significant portion of the country’s goods exports. The forest, steel & mining and chemicals industries are normally placed in this category.

Over 80 percent of Sweden’s imports come from countries in Europe. Swedish imports from China are also significant, amounting to SEK 44 billion in 2013. Imports from Asia as a whole are growing, but are still lower than exports to the region.

Major import goods include electrical and telephony products, foodstuffs and cars. Oil imports – both crude and refined oil– are also very significant. Over time, however, Sweden has become less dependent on oil, because of the use of renewable energy.

EMPLOYMENT RATE

The employment rate is the percentage of the labour force that is employed.

The employment rate in Sweden is relatively high in comparison with the average rate within EU-27. The biggest increase was when women entered the Swedish workforce in the 1970s and it has remained high ever since. But Sweden is not unique. In 2013 the employment rate for women in Iceland, Switzerland, Norway and the Netherlands was higher than in Sweden.

For most countries the total employment rate fell in 2009 as a result of the financial crisis and ensuing recession.

HOW SWEDEN BECAME RICH

At the beginning of the 1800s Sweden was one of the poorest countries in Europe. Today it is one of the richest.

The industrial revolution began in the second half of the 1800s in Sweden. Demand, particularly from the United Kingdom, for Swedish raw materials from the forest as well as iron ore and grain rose rapidly. Towards the end of the century a number of companies were formed based on various innovations and as a consequence, the amount of processed goods among Sweden’s exports increased.

The year 1870 marked the beginning of a period of relative stability and strong growth as well as a considerable dependence on exports, which has characterised Sweden’s development ever since.
Sweden experienced a rapid population increase in the second half of the 1800s. Due to the poverty of the labour force in the agricultural sector, this led to rapid urbanisation and extensive emigration, particularly to North America.

A number of political reforms were introduced at the same time. In 1842, elementary school education was introduced for all Swedish children. The composition of the Swedish parliament (Riksdag) changed, guaranteeing the longevity of a series of liberal reforms of significance for the economy. The Government was also involved in infrastructure expansion. One of the ways this took place was through foreign loans that Sweden secured to finance the expansion of the railway.

Sweden’s 20th century history was characterised by structural transformation. More and more people moved to towns and cities. A decreasing percentage of the population worked in agriculture and the number of industrial workers increased. After World War II, more and more women entered the workforce, the public sector expanded and the services sector grew, while manufacturing industry became smaller.

This structural transformation was accompanied by important political developments. The political democracy was fully developed at the beginning of the 20th century. The social democracy entered the scene for the first time in the 1930s. The trade union arm of the working class movement gained a strong position, which manifested itself in the 1938 Saltsjöbaden Agreement regulating how negotiations, conflict and agreements between trade unions and employers should be handled.

The Saltsjöbaden Agreement was an important component in “the Swedish Model” in that it created the necessary conditions for good cooperation in the labour market. Sweden was already strong in areas such as organising ability, pragmatism, cooperation, social mobility and established political rules.

Following very rapid growth in the 1950s and 1960s, Sweden was affected by a structural crisis in the 1970s. Companies in the textile and shipbuilding industries, for example, closed down or moved abroad. Engineering industry operations in mill towns with a history of many hundreds of years were discontinued.

To help individuals deal with these changes, an active labour market policy was pursued which, with the help of public investment and agreements between unions and workers, helped individuals in a number of ways to find new jobs. The policy included, for example, training to give people the skills that were in demand and grants to relocate to a different area where work was available. Sweden’s upper secondary education system was also expanded during this time. The same applied to tertiary education where a student grant system allowed young people to continue their education at universities and colleges after leaving school.

The Swedish economic crisis of the 1990s resulted in sweeping budget cuts for the Government. At the same time, many Swedish companies implemented rationalisation and efficiency measures to allow them to regain their international competitiveness.

The ambition of creating long-term, sustainable social insurance systems like pension systems is strong in Swedish politics. There is consensus that the Government should offer a large measure of basic security. An active labour market policy is being pursued, although the exact structure and scope of systems and measures in these areas is under discussion.
Sweden from an international perspective

**SWEDEN AT THE TOP OF INTERNATIONAL INDEXES**

The World Bank, the OECD, the European Commission and well-reputed institutions regularly make basic comparisons between the world’s nations to assess different aspects, such as innovation, creativity and democracy. In most of these indexes Sweden holds a leading position.

**INNOVATION**

The Global Innovation Index, Innovation Capacity Index and Innovation Union Scoreboard were all created to assess the innovation climate in a selection of the world's nations. In all of these three indexes Sweden is ranked in first or second place.

The European Commission conducts an annual survey called Innovation Union Scoreboard. It is an ambitious comparison between EU member nations and summarises their strengths and weaknesses based on 25 different indicators. The maximum score for each indicator is 1. Sweden’s index is 0.75.
Sweden is at the top of the list and is in the Innovation Leaders category alongside Denmark, Finland and Germany. But if we look beyond the EU, Sweden has a lower innovation index than Switzerland, South Korea and the USA. However, the difference is small enough for us to easily conclude that Sweden is in the same division as these countries.

Sweden is performing better than the EU average in most of the indicators, especially when it comes to research, private sector R&D investment and patents. But Sweden does not do as well in the indicators that measure exports of knowledge-intensive services and sales in relation to new innovations.

**CREATIVITY**

The Global Creativity Index is produced by the Martin Prosperity Institute. Creativity is seen as an economic driver and the report presents strong correlations between creativity and economic growth, human development and other aspects such as happiness.

The Global Creativity Index ranks 82 of the world’s nations based on the conditions that exist for creativity. Sweden is in first place among the 82 countries in the comparison.

The index ranks countries based on three categories: technology, talent and tolerance.
• **Technology** (R&D investment, number of researchers, number of patents) Sweden is in 5th place

• **Talent** (university graduates, people employed in the knowledge-intensive sector) 2nd place

• **Tolerance** (tolerance for ethical, racial and sexual minorities) 7th place

**DOING BUSINESS**

The Doing Business Index maintained by the International Finance Cooperation and the World Bank regularly ranks ease of doing business in various countries. The index compares things like ease of starting companies, registering property, getting credit, protecting investors and taxes in 189 countries.

Sweden is in 14th place in the most recent ranking from 2013. Two areas in which Sweden’s performance is weaker are taxes and ease of starting a business. Both of these areas have been important issues in the Swedish debate in recent years. Proposals have been put forward for changes to tax rates and simplified rules.

**DEMONCRACY**

The Economist’s Democracy Index regularly compares the state of democracy in 167 countries. The index measures various aspects of democracy.

• Electoral process and pluralism
• Civil liberties
• Functioning of government
• Political participation
• Political culture.

In the most recent index from 2013 Norway is ranked the world’s most democratic nation, followed by Sweden, Iceland and Denmark.

**QUALITY OF LIFE**

Both the Social Progress Index and OECD’s Better Life Index measure multiple dimensions of human wellbeing and conditions for social progress. These are important factors in an increasingly globalised world with strong urbanisation trends and competition for talent, where national borders are no longer seen as a career obstacle.
## Doing Business Index 2013

<table>
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<tr>
<th>Economy</th>
<th>Ease of Doing Business Rank</th>
<th>Starting a Business</th>
<th>Dealing with Construction Permits</th>
<th>Getting Electricity</th>
<th>Registering Property</th>
<th>Getting Credit</th>
<th>Protecting Investors</th>
<th>Paying Taxes</th>
<th>Trading Across Borders</th>
<th>Enforcing Contracts</th>
<th>Resolving Insolvency</th>
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## Democracy Index 2012
Source: The Economist Intelligence Unit, 2012

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Sweden lands among the best in these rankings as well. In the OECD Better Life Index 2013, Sweden is ranked in 2nd place among the 36 OECD nations.

The Social Progress Index ranks 132 of the world's nations. Sweden is in 6th place in the most recent index from 2014.

A GOOD FOUNDATION UPON WHICH TO BUILD

All together, the international indexes present a picture in which Sweden holds a strong position in many areas. It is a solid foundation for future growth, but the challenge is how to retain that position.

The issue of how Sweden can maintain its strong global competitiveness has been discussed increasingly recently. It has also been brought up in the innovation policy by IVA and other influential actors.
Innovation – a key factor in meeting the great societal challenges

Globalisation brings great challenges for all of the world’s nations. What is presented as challenges in different debates varies. Often global warming and other environmental challenges, energy shortages, an ageing population and health issues are examples that are mentioned. New technology, innovation and changing consumption patterns are seen as key factors in meeting the challenges.

But major global societal challenges also bring business opportunities for innovative companies. The ability of Swedish industry to exploit the opportunities offered by globalisation will therefore be of great significance for the development of resources for the Swedish welfare society.

INNOVATION SYSTEM
An innovation system consists of various components and relationships between them. The main components are organisations, i.e. structures of people and players, and institutions, i.e. rules, statutes, norms, routines and practices. The main function is to drive innovation processes forward, i.e. to develop, spread and utilise innovations.

The activities in the innovation system determine how innovations are developed, spread and utilised.

A government which, through active innovation policies, wants to strengthen innovation processes in the country base their efforts on the activities outlined in these four categories and assess which activities require public-sector involvement. The authorities and organisations that implement these policies in practice are often called the innovation support system.

In economic policy contexts, the argument for public-sector investment is often linked to the issue of so-called “market failures.”

When it comes to innovation, market failures may relate to actors in a certain market not being willing or capable of taking the financial risks associated with developing new products, or that certain products are collective in nature and therefore hard to commercialise.

In innovation policy contexts, we also talk about so-called “systemic failures,” or systemic weaknesses, which are weaknesses that in various ways limit or prevent competitive renewal, development capacity and long-term growth. In all of these areas, public-sector investment is needed to guarantee a country’s or a region’s competitive capacity and long-term growth.

INNOVATION
A broad view of innovation has been prevalent in Swedish innovation policy in recent years. The concept of innovation is explained on the basis of the OECD’s definition as follows:

“By innovation we mean knowledge that is turned into new value in the form of products, services or new organisations in both the private and public sector. That means everything from industrial robots, payment systems and energy efficiency to leadership, business models and healthcare.”
AN OVERVIEW OF THE ORGANISATIONS WITHIN THE SWEDISH INNOVATION SUPPORT SYSTEM

For a complete list of organisations and explanations of abbreviations, see Appendix on page 39.

**LEGEND**
The sizes of the boxes indicates the size of the yearly budget of the organisation.

- **Government**
  - More than half of the board members appointed by the government
- **Independent**

  Indicates that the budget is bigger than the size of the box indicates.

**EU**

- Buffer funds in the Swedish national income pension system

**Governmental research grants distributed by the county councils**

**Ministry of Enterprise, Energy and Communications**

- Ministry of Education and Research
- Ministry of Enterprise, Energy and Communications

**Ministry of Finance**

**Independent institutes**

**Private foundations & associations**

- Wallenbergstiftelsena
- Söderbergs stiftelser
- Kempestitelser
- Craafofd
- Tryggers

**Swedish Association of Local Authorities and Regions**

**Universities & University Colleges**

- The Swedish Research Council
- The Norway Fund
- Inlandsinnovation

**The Swedish Transport Administration**

**Space**

- UHR

**Swedish Energy Agency**

**Sweden’s Innovation Agency**

**Tillväxtverket**

**ALMI** (incl. ALMI Invest)

**Industrifonden**

**Inland Innovation**

**VTI**

**Fourier Transform**

**The Norwegian Fund**

**The Swedish Research Council Universities & University Colleges**

**Inland Innovation**

**Ministry of the Environment**

**Min. for Rural Affairs**

**Ministry of Defence**

**Min. for Foreign Affairs**

**SIDA**

**FORMAS**

**SLU**

**FOI, FM, FMV, FXM**

**SMHI**

**NVV**

**HVM**

**SLV**

**SI**

**BS**

**RI.SE**

**BLV**

**KKV**

**PRV**

**SSM**

**HVM**

**SLV**
The Swedish innovation support system

For many years Sweden has been one of the top investors in R&D among the world’s nations. In 2011 R&D investments amounted to around SEK 118 billion, which is equivalent to just under 3.4 percent of GDP. Private sector investment in R&D in relation to GDP was among the highest in the world, amounting to SEK 80 billion in 2011, equivalent to around two thirds of the country’s total R&D.

The research volume at Swedish universities is also among the absolute highest in the world in relation to GDP, although R&D activity at research institutes is low compared to other countries.

Public sector R&D investments through the Government and municipalities combined is just over 30 percent of all of the Sweden’s R&D investments.

**DISTRIBUTION OF THE GOVERNMENT’S INNOVATION INVESTMENTS**

Today Government resources are divided between various authorities, agencies and other organisations directly through appropriations or indirectly by the appointment of committee/board members and/or councils tasked with allocating funds. Today’s system is complex and involves many actors, which is illustrated on the left.

The map shows Sweden’s innovation-related organisations over which the Government exercises direct control through appropriations, with funds allocated according to which ministry they fall under and how large the funding is. It also shows organisations that are independent to a greater or lesser extent. The Government exercises control over these these by appointing a majority their committee/board members.

Key government agencies within the system are Sweden’s innovation agency VINNOVA and the Swedish Agency for Economic and Regional Growth (Tillväxtverket). They have been tasked by the Ministry of Enterprise, Energy and Communications to implement political proposals and reforms within their respective areas of activity. Both of these agencies play an important role in implementing various EU programmes in Sweden (Structural Funds and Horizon 2020).

VINNOVA has overall responsibility for innovation issues.

The Agency for Economic and Regional Growth works to help companies be more competitive by making it easier to do business and to make regional development environments more attractive.

The Ministry for Education and Research is responsible for allocating public funding to universities, institutes and other bodies.

Discussions are under way on ways to simplify the existing publicly funded innovation support system and render it more efficient so that the various actors can more easily invest in, develop and support prioritised areas together.
The Swedish national innovation strategy was launched in a focus document aimed at bringing about concrete political measures.

The vision for 2020: Sweden is a country characterised by innovative ideas and pioneering new ways of thinking and acting to shape our future in a globalised world. People in all parts of Sweden can and will contribute to creating value for people, the economy and the environment through new or better solutions.

The national innovation strategy outlines the focus of efforts to develop an innovation climate in the country so that Sweden can remain a world-class player with an eye to 2020. This work involves:

- Identifying and addressing areas where there are currently obstacles hindering innovation or where Sweden has weaknesses in international comparisons.
- Maintaining or further developing the areas where Sweden is strong today in comparison to other countries.
- Increasing cooperation between political spheres and between different levels and sectors of society to make public sector initiatives more efficient and have the greatest possible effect on renewal, sustainable growth and social development in Sweden.

The vision and objectives in the strategy are divided into six categories. They are the following:

1. **Innovative people**
   This category includes issues relating to undergraduate education, competence development and how attractive it is to work in the Swedish private and public sectors. This category also covers attitudes and providing the right conditions so that individuals will consider becoming entrepreneurs.

   **Objective:**
   - People have the knowledge, expertise and skills to contribute to innovation processes.
   - Individuals have the courage and desire to actively contribute to innovation processes.
   - Working in Sweden is attractive internationally in a system characterised by diversity and mobility.

2. **High quality research and higher education for innovation**
   This category consists of research policies, issues relating to higher education and the role of institutions.

   **Objective:**
   - World-class education and research that contributes to the innovation process.
   - World-class research institutes.
   - Strong research hubs that are well-positioned in global knowledge networks.

3. **Framework terms and infrastructure**
   This category contains issues that affect the corporate climate and commercial conditions, such as regulations, taxes, intellectual property and physical and digital communication.
Objective:
• Regulations, market conditions and norms that promote innovation.
• Efficient access to “competent capital” for innovation and growth capacity.
• Sustainable and digital communication.

4. Innovative companies and organisations
This category contains proposals and aspects of competitiveness, innovative capacity and social innovation within companies.

Objective:
• Companies in Sweden grow by offering innovative solutions in global markets.
• Existing and new businesses work systematically on improving their innovative capacity.
• The potential that exists in social innovation and social entrepreneurship is used to help address societal challenges.

5. Innovative public sector organisations
This category covers innovation within public administration, social services and areas such as innovation-friendly procurement.

Objective:
• Public sector organisations work systematically with innovation to increase efficiency and quality.
• Public sector organisations help to develop innovative solutions to address societal challenges.
• Efficient organisations that support innovation for the public good.

6. Innovative regions and environments
This category addresses how Sweden’s regions will take advantage of and cooperate in order to develop regional strengths.

• Sweden’s regions develop their innovative capacity based on their unique conditions.
• Regional strategies for innovation are established through joint regional leadership.

CREATING REGIONAL STRATEGIES AND PROMOTING COMMITMENT

Innovation is key to regional development work in Sweden. The structures in place for this vary. 14 of Sweden’s 21 regions have chosen to produce an innovation strategy, while six regions have opted to tackle innovation issues in their regional development strategies.

An innovation strategy is an important tool for bringing together regional resources for growth and development. It contains a summarised analysis of the current situation and strength areas. This is where the priorities for future work are defined, as well what the process will look like and which actors will be responsible for implementation.

REGIONAL STRENGTH AREAS
In their innovation strategies and development plans the regions have identified certain strength areas. These should be seen against a backdrop of the emphasis on smart specialisation, e.g. in the EU’s Horizon 2020 strategy. The main strength areas identified in the regional strategies and development plans are listed below:

1. Energy/environment
2. IT/telecom/technology
3. Tourism/experience industry
4. Manufacturing industry
5. Medicine/health/healthcare
6. Forest/wood industry
7. Built environment/infrastructure
8. Smart materials
9. Cultural/creative industries
SUCCESS FACTORS FOR REGIONAL INNOVATION EXCELLENCE

In order for the regional innovation strategies to be successful, a number of success factors have been identified in consultation with Sweden’s regions. They are the following:

<table>
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<th>Strong leadership</th>
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<tr>
<td></td>
<td>Strong regional leadership is necessary in order to develop and implement an innovation strategy. Leadership is needed to motivate and mobilise various actors in the region.</td>
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<th>Involvement of the political sphere</th>
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<td>Placing innovation high up on the regional political agenda is important to create the necessary legitimacy and to mobilise sufficient resources.</td>
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<th>National support provides legitimacy</th>
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<td></td>
<td>National initiatives, such as a national innovation strategy, can serve as inspiration and support, and create legitimacy for the regional efforts.</td>
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<th>Common vision and goals</th>
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<td></td>
<td>Visions and goals play an important role, both as inspiration and as a unifying link in strategy work.</td>
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<th>Budget for strategy work</th>
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<td>The regions need to earmark resources for strategy work, particularly in the form of work hours, in order to get the work done.</td>
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<th>Clearly-defined process</th>
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<td>A successful innovation strategy requires a process that involves many parties. The different stages should be clearly defined. Gatherings and meetings must be thoughtful and inspiring and results and follow-up must be available to all.</td>
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<th></th>
<th>Joint ownership</th>
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<td></td>
<td>Joint ownership of strategies and action plans is important to ensure the plans go from words to actions. Joint ownership can be created by having representatives from the funders, academia and industry in the region taking responsibility for the actual construction of action plans in joint work groups.</td>
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<th>Broad-based and firm regional footing</th>
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<td></td>
<td>A broad-based and firm regional footing among business leaders, civil servants, politicians and private individuals is important in order to capture different approaches and promote credibility and commitment to the strategy process.</td>
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<th>Focus on “the customers” – public and private sector</th>
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<td></td>
<td>The purpose of the strategies is to help create an efficient innovation system for both private and public sector organisations. It is therefore crucial to include the perspectives of these actors.</td>
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<th>Outside perspective</th>
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<td></td>
<td>It is important for the strategies to be based on an outside perspective, which can be obtained by, for example, inviting people to attend independent peer reviews to learn about important issues and get feedback on strategy work.</td>
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<th>Conscious communication</th>
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<td></td>
<td>It is important for the strategies to be communicated so that they reach and inspire as many people as possible. The choice of message and wording are therefore key, as well as how the strategies are communicated through different channels.</td>
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| **12.** | **Inspiring design**  
To increase interest in the strategies and make them easily accessible to a broad target group, the design and graphic expression are important factors. |   |
| **13.** | **Action plans and clearly assigned responsibility**  
A strategy should contain a firm plan of action outlining concrete activities, deadlines and who is responsible. It is important for it to be structured in a way that allows for sensitivity to changes in the external environment so that new initiatives can be identified. |   |
| **14.** | **Budget for prioritised activities**  
Many of the initiatives and activities that the innovation strategies initiate are covered by the organisations’ budgets. The strategy can in these cases make a difference by stimulating new processes, better cooperation and re-prioritising among existing activities. |   |
| **15.** | **Clarity about implementation and results**  
Implementing an innovation strategy is a long-term process. To create general confidence and sustainable commitment, it is important for it to be easy to monitor implementation. It is a matter of both outlining the process as a whole as well as clearly describing the sub-processes, results achieved and how they contribute to the whole. |   |
| **16.** | **Evaluation and revision**  
The innovation strategy should serve as inspiration, an analysis tool for strengths and weaknesses and should be a basis for setting priorities. It should therefore be clear when and how the strategy should be evaluated and revised. |   |
In this section we present proposals in a few key innovation policy areas in which IVA has identified problems or shortcomings. We have summarised a selection of IVA’s proposals and describe what the Government is doing in each area.

UNIVERSITIES

Challenge
Through education programmes, universities provide Sweden with knowledgeable and talented individuals. The universities also fill an important social function by transferring knowledge, maintaining democratic values and acting as long-term culture bearers.

The seats of learning are also obvious cooperation and collaboration partners in several stages of the innovation process. Even if research in many cases is the foundation for innovation, it is not the primary role of universities to commercialise discoveries. Instead, universities, as effective partners in the knowledge triangle – education, research and innovation – can contribute to a strong, future innovation ecosystem.

Proposals
Stimulate a fully developed knowledge triangle (cooperation between education, research and innovation.)

→ Introduce an allocation system for basic funding to increase the incentive for cooperation between the actors responsible for education, research and innovation.

→ Increase flexibility in the use of the universities’ government funding by allowing the universities to receive their whole allocation of funds as a collective resource for education, research and innovation.

Allow universities to wholly own and develop their innovation processes. A university must be allowed to profile its innovation system based on its academic profile, regional cooperation and private sector partnerships.

→ Simplify the University Ordinance and remove regulations and other obstacles so that universities can efficiently develop their own holding companies.
Promote cooperation between institutes and universities. Universities need to be able to set up internal institutes for new needs and sectors.

Allow seats of learning to compete for funding for partnerships.

Invest in challenge-driven, strategic partnership programmes between SMEs and large corporations, public-sector organisations, universities and research institutes to maximise the benefits of research studies. The programmes should complement and work with strategic research area (SRA) investments through needs-driven priorities that increase innovative capacity through the SRA initiatives.

Establish a career system for industrial post-docs within SMEs.

**Actions**

- The 2012 Research and Innovation Bill proposes a gradual increase in resources for research of SEK 4 billion a year for the years 2013–2016.
- The Government has proposed new legislation to give universities greater autonomy, including allowing them to be turned into foundations.
- In order to increase cooperation, the Research and Innovation Bill proposes changing the model for the allocation of funding to put greater emphasis on cooperation and the relevance and commercialisation of research results. The Bill also underscores the importance of strategic research and innovation areas that can help meet the great societal challenges.
- To promote commercialisation more innovation offices will be established. Twelve universities have them now. Their function is to provide support for commercialisation of research-based knowledge. Other measures to increase commercialisation and cooperation with the private sector include an initiative to make testing and demonstration facilities available and to increase funding for RISE (Research Institutes of Sweden) so that they in turn can increase their support for SMEs conducting research.

**SUPPLY OF TALENT**

**Challenge**

In the debate the quality shortfall in school education has been seen as a threat to Sweden’s future supply of talent. There is already a shortage of people with the appropriate expertise and skills in many industries and segments in the Swedish private and public sectors. From an innovation perspective, this is serious. To take advantage of, further develop and efficiently commercialise innovation, Sweden needs a workforce with the appropriate skills.

Matching in the Swedish labour market is not good enough today. In other words, there is a shortage in the workforce of people with the skills that are in demand.

Today the talents of individuals who have made a career without a formal education are not being fully exploited. The same applies to the large group of immigrants in Sweden who have many years of professional experience and academic education, but who are not finding jobs that match their qualifications.

One contributing factor for this is the problem of validating qualifications. This is a problem, for example, for industrial workers who want to or are forced to switch to a different sector due to restructuring. For most immigrants with long professional careers, the lack of effective validation can have even greater consequences.
Innovation means knowledge that is turned into new value. It is about developing projects, services and organisations in both the private and public sectors.

Our proposal is aimed at businesses that want to climb the innovation pyramid. Increased R&D collaboration with external parties or within the company itself will allow companies to strengthen their capacity for innovation.

STIMULATE RESEARCH AND DEVELOPMENT WITHIN SMEs

Challenge
Sweden is a leader internationally in total investment by companies in R&D as a percentage of GDP. Only 18 percent of this investment is, however, taking place within SMEs. A lack of time and funding are the two biggest hurdles for investment in R&D. Also, few SMEs are working closely with research institutes or universities.

There is therefore a clear need to give SMEs additional incentives to climb the innovation pyramid.

Actions
The Government has improved follow-up processes for results and performance in primary and secondary education. A series of measures have been introduced to improve quality in schools and increase knowledge.

Measures have also been implemented to improve the skills of teachers and enhance educational leadership.

The Swedish Agency for Public Management has been tasked with investigating how to establish a national system for the validation of professional expertise.

NB: The process data is from an analysis by the Dutch SMF. No equivalent analysis has been conducted in Sweden. There is, however, reason to assume that Sweden has a somewhat larger share of innovation leaders since the percentage of innovative companies is larger than in the Netherlands.
Proposals

→ Introduce an innovation cheque for companies to purchase R&D services from universities and research institutes. The cheques could be issued at at least two levels. The amounts must be sufficient to provide enough of an incentive for fruitful innovation collaboration.

At the higher level it should be matched by co-funding of 50 percent. The rules should be simple so that businesses can determine in advance if the project in question meets the criteria for the cheque. Processing should be simple and fast.

→ For the innovation cheque system to have full impact, an innovation coach system is needed. Based on the interests of the business, the coaches would serve as a bridge between the company and the academic institution conducting the R&D. In most cases innovation companies need an infusion of capital. Investors and companies can be encouraged to help increase R&D investments through tax incentives:

Private individuals receive a 30 percent tax deduction for the capital infusion for innovation companies that meet certain criteria. Companies and legal entities are entitled to a full deduction.

Companies have the ability to reduce their R&D costs directly through a tax deduction, similar to the system in place in several other OECD countries.

Actions

In 2012–14, VINNOVA has been running an innovation cheque programme for businesses. They are to be used to improve innovative capacity by purchasing services from, for example universities, institutes or other public or private sector knowledge providers. This initiative links the innovation cheque to an innovation coach who can help the company with evaluating ideas, project management and contacts with external knowledge providers.
CAPITAL PROVISION

Challenge
Government initiatives to provide venture capital to SMEs in the early stages of their development are necessary because marketing solutions rarely work in this phase. The initiatives are also necessary to help developing companies in certain parts of the economic cycle. But the Government’s initiatives are too splintered today. The Government should therefore concentrate its commitment to two areas.

Proposals
→ Provide support to a regional incubator system that is firmly established in the regional and local economy, is large enough to attract private capital, and has sound management and experienced business coaches. Investment funds could be tied to the incubators where Government involvement is according to the same principles as the venture capital funds described below.

Actions
The budget proposal for 2014 proposes establishing a new fund for the purpose of investing in new and existing private venture capital funds. The fund would be established to increase the amount of private venture capital for companies in early stages and to increase the number of private venture capital managers.

INNOVATION PROCUREMENT

Challenge
To stimulate innovation, the starting point for development projects within the public sector should, to a greater extent, be needs rather than solutions. One tool for this is innovation procurement, or pre-commercial procurement, where solutions to predefined problems are procured (see figure). The international model is Small Business Innovation Research (SBIR) procurement which is used in countries like the UK and the Netherlands and has proved to be particularly advantageous for small and medium-sized enterprises (SMEs).

Today only a small portion of the SEK 600 billion that government authorities at the national, county and municipal levels in Sweden use for procurement every year goes to innovation procurement. Sweden’s current public procurement laws and regulations are not actually an obstacle for innovation procurement. But there is limited activity despite this. More knowledge is needed and attitudes need to be changed. The public sector also needs a more clearly defined mandate to pursue innovation issues.

Proposals
→ The Government should appoint a commission for public innovation procurement with a time-limited mandate. The commission should identify measures that can be implemented immediately to support innovation procurement, follow up and evaluate measures, address issues in various areas and participate in dialogue on the application of LOU (the Public Procurement Act), LUF (the Act on procurement in the areas of water, energy, transport and postal services) and LOV (the Act on the freedom of choice system).
A number of public authorities should have a clear responsibility for innovation procurement, and this should be stated in their Appropriation Directions. The authorities will be tasked with identifying the most important needs in their area, as well which of these can be met within the framework of an innovation strategy using innovation procurement as an important tool.

A Swedish innovation procurement system should be introduced.

**Actions**

Efforts are being made to further develop innovation procurement. The proposed budget bill for 2014 increases procurement support and places it under one authority. The Swedish Competition Authority, VINNOVA and Kammarkollegiet are mandated by the Government to provide information, advice and, in VINNOVA’s case, build networks and support innovation procurement. The Swedish Transport Administration and the Swedish Energy Agency are mandated by the Government to work with innovation procurement.

The regions today are involved in a limited amount of innovation procurement activity.
TAX RULES TO STIMULATE INNOVATION

**Challenge**
The tax system is an important tool to stimulate entrepreneurship and innovation. Different countries have considerable opportunities to design their tax systems according to their own circumstances. This also applies within the EU where each member nation can largely determine both the focus and levels within their own tax systems.

At the same time, due to competition considerations, globalisation of the world economy is limiting what individual countries can do. From an innovation policy perspective, the tax system should be designed in a way that promotes risk-taking and solvency. These are both intimately linked because getting access to resources in a key phase in an enterprise’s development often requires risk-taking.

The fact that resources consist both of access to capital and time invested by key individuals should also be taken into consideration.

Some taxes that affect innovative companies are:
- capital gains tax,
- corporate tax,
- tax on long and short term shareholdings,
- tax rules for key individuals,
- taxation of intangible assets.

**Proposals**
In its two innovation projects, IVA proposed the following:

- A venture capital tax deduction to allow sizeable investments to be made.
- A venture capital account that allows private individuals to defer capital gains tax.
- A change in the regulations so that a business angel who invests and is also involved in an enterprise is not taxed at a higher rate than a passive investor.
- A change in the taxation of stock options to make it easier for company employees with key expertise to be operationally involved. Stock options make it possible to engage key individuals (including entrepreneurs) more effectively without the entrepreneur (the company founder) being deprived of the opportunity for financial gain and control over his/her company.

**Actions**
The Government has made sweeping changes to the tax code.
- The main quantitative changes are reduced corporate tax and the earned income tax deduction (jobbskatteavdrag).
- An inquiry on employee stock options has been announced.
- In 2013 a venture capital deduction for physical persons was introduced. The 2014 budget bill proposes a deduction for R&D in the form of reduced payroll tax.
OUR NEXT STEP
– FACILITATE GLOBAL MOBILITY

The ever-increasing competition for the world’s talent and investments poses a threat but also presents an opportunity for a small export-dependent country like Sweden. Our prosperity is based on offering services and products that are relevant and attractive in a global context.

Constantly improving conditions for innovation and the ability to efficiently convert knowledge into new value is crucial for Sweden’s future. But it is not enough to be an innovative country. In a world characterised by increased mobility and globalisation, it is also crucial to have strong international relations and international visibility.

What, then, does Sweden need to do to maintain and strengthen its position as an attractive innovation country in an increasingly globalised world? Which policies and measures are needed so that Sweden can be a relevant and globally attractive nation where people, businesses and investments can work and thrive? These questions are the starting point for IVA’s continued innovation work within the framework of the ongoing Attraction for Sustainable Growth project which will be concluded in 2015.
Appendix

ORGANISATIONS IN THE SWEDISH INNOVATION SUPPORT SYSTEM

BLACK: Government
- Riksdag & regering – Parliament & Government
- Utbildningsdepartementet – Ministry of Education and Research
- Näringsdepartementet – Ministry of Enterprise, Energy and Communications
- Socialdepartementet – Ministry of Health and Social Affairs
- Finansdepartementet – Ministry of Finance
- Miljödepartementet – Ministry of the Environment
- Landsbygdsdepartementet – Ministry for Rural Affairs
- Försvarsdepartementet – Ministry of Defence

LIGHT-BLUE: More than half of the board members appointed by the government
- Rymdstyrelsen – The Swedish National Space Board
- UHR, Universitets och Högskolerådet – Swedish Council for Higher Education
- Vetenskapsrådet – The Swedish Research Council
- Universitet & högskolor – Universities & University Colleges
- Energimyndigheten – Swedish Energy Agency
- VINNOVA – Sweden’s Innovation Agency
- Tillväxtverket – Swedish Agency for Economic & Regional Growth
- ALMI – State-owned company offering capital support and advise to SMEs
- Industrifonden – One of Sweden’s largest investors in growth companies
- RISE – Research Institutes of Sweden
- KKV – Swedish Competition Authority
- BLV – Bolagsverket – The Swedish Companies Registration Office
- PRV – The Swedish Patent and Registration Office
- Norrlandsfonden – The Norrland Fund
- Inlandsinnovation – a state-owned venture capital company investing in the northern half of Sweden
- Trafikverket – The Swedish Transport Administration
- Forte – Swedish Research Council for Health, Working Life and Welfare
- FHM – Folkhälsomyndigheten – The Public Health Agency of Sweden
- Bov – Boverket – The Swedish National Board of Housing, Building and Planning
- LMV – Läkemedelsverket – The Medical Products Agency
- ALF-medel – Governmental research grants distributed by the county councils
- AP-fonder – Buffer funds in the Swedish national income pension system
- Fourier Transform – a state-owned venture capital company investing in the Swedish industrial cluster
- SIDA – Swedish International Development Cooperation Agency
- Business Sweden – The Swedish Trade and Invest Council
- FORMAS – The Swedish Research Council Formas
- NVV – Swedish Environmental Protection Agency
- SMHI – Swedish Meteorological and Hydrological Institute
- SSM – Swedish Radiation Safety Authority
- SLU – Swedish University of Agricultural Sciences
- Jordbruksverket – The Swedish Board of Agriculture
• HVM – Swedish Agency for Marine and Water Management
• SLV – National Food Agency
• FOI, FM, FMV, FXM – Swedish Defense Agencies

**ORANGE: Independent**

• Oberoende institutet – Independent institutes
• EU – European Union (Structure funds and R&D-funds)
• SSF – Swedish Foundation for Strategic Research
• KKS – The Knowledge Foundation

**GREEN**

• Sveriges Kommuner och Landsting – Swedish Association of Local Authorities and Regions

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**STEERING COMMITTEES**

**INNOVATION FOR GROWTH (2009–2011)**

Marcus Wallenberg, (chairman), SEB
Kristina Alsér, Kronobergs County
Lars Backsell, Recipharm
Pontus Braunerhjelm, Swedish Entrepreneurship Forum
Charlotte Brogren, Sweden’s Innovation Agency (VINNOVA)
Johan Carlstedt (project leader), IVA
Anders Ekblom, AstraZeneca
Johan Hernmarck, Provider Ventures

Annika Lundius, The Confederation of Swedish Enterprise
Christina Lugnet, Swedish Agency for Economic and Regional Growth
Stefan Löfven, IF Metall
Björn O. Nilsson, IVA
Göran Sandberg, Knut och Alice Wallenberg Foundation (KAW)
Melker Schörling, Melker Schörling AB

**INNOVATION POWERHOUSE SWEDEN (2012–2013)**

Rune Andersson (chairman), Mellby Gård
Carl Bennet, Carl Bennet AB
Magnus Breidne, IVA
Charlotte Brogren, Sweden’s Innovation Agency (VINNOVA)
Johan Carlstedt (project leader), IVA
Eric Giertz, Royal Institute of Technology (KTH)
Peter Geisler, Arbesko AB
Håkan Gergils, Ecofin

Erik Lautmann, IVAs Business Executives Council
Christina Lugnet, Swedish Agency for Economic and Regional Growth, Jan.–Aug. 2012
Björn O. Nilsson, IVA
Gunilla Nordlöf, Swedish Agency for Economic and Regional Growth
Malin Persson, Chalmers University of Technology
Håkan Sörman, The Swedish Association of Local Authorities and Regions (SKL).
ATTRACTION FOR SUSTAINABLE GROWTH (2014–2015)

Carl Bennet (chairman), Carl Bennet AB
Tomas Billing, Nordstjernan AB
Pontus Braunerhjelm, Swedish Entrepreneurship Forum
Charlotte Brogren, Sweden’s Innovation Agency (VINNOVA)
Johan Carlstedt (project leader), IVA
Ulf Ewaldsson, LM Ericsson AB
Pam Fredman, University of Gothenburg
Carola Lemne, The Confederation of Swedish Enterprise
Martin Lorentzon, Spotify AB

Björn O. Nilsson, IVA
Gunilla Nordlöf, Swedish Agency for Economic and Regional Growth
Eva Nordmark, The Swedish Confederation for Professional Employees (TCO)
Johan Rockström, Stockholm Resilience Centre
Anders Sundström, Folksam AB
Håkan Sörman, The Swedish Association of Local Authorities and Regions (SKL)
Karl-Petter Thorwaldsson, The Swedish Trade Union Confederation (LO)
The Royal Swedish Academy of Engineering Sciences (IVA) is an independent, learned society that promotes the engineering and economic sciences and the development of industry for the benefit of Swedish society. In cooperation with the business and academic communities, the Academy initiates and proposes measures designed to strengthen Sweden’s industrial skills base and competitiveness.

For further information, please visit IVA’s website at www.iva.se.