

*Improving Innovation
is a Priority*



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Does Sweden need its RTOs?

The answer is, undoubtedly, yes. Unlike universities and colleges, whose main tasks are research, education and achieving academic merit, research and technology organisations (RTOs) cater to the needs of the business world, and society in general. RTOs aim to create commercial benefits and strengthen the competitive and innovative abilities of industry by developing innovations to an industrial level.

RTOs work at the intersection of academic research and commercial development of products, processes and services. Their specific strength is that they can focus on the later development stages that have to be performed in close collaboration with customer companies.

RTOs are also an alternative career path for university researchers and can be a pool of potential recruits for business. As such, they broaden the career opportunities for postdoctoral researchers and contribute to the flow of knowledge from academia to industry. Universities and RTOs complement each other with their different approaches to research and development (R&D) and innovation.

The current globalisation of R&D provides a strong argument for Sweden to have market-oriented research. It is also important for Sweden that companies choose to buy and conduct R&D here in the future. A competitive RTO sector that is able to cooperate with universities strengthens the foundation for corporate R&D in Sweden. Without one, there is a risk that companies will take their R&D to countries with better RTOs. The importance of this point is highlighted by the fact that 40 per cent of private R&D in Sweden is now carried out by companies with headquarters abroad.

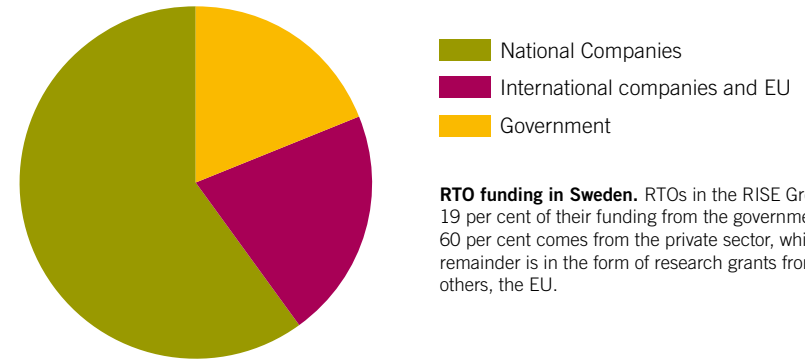
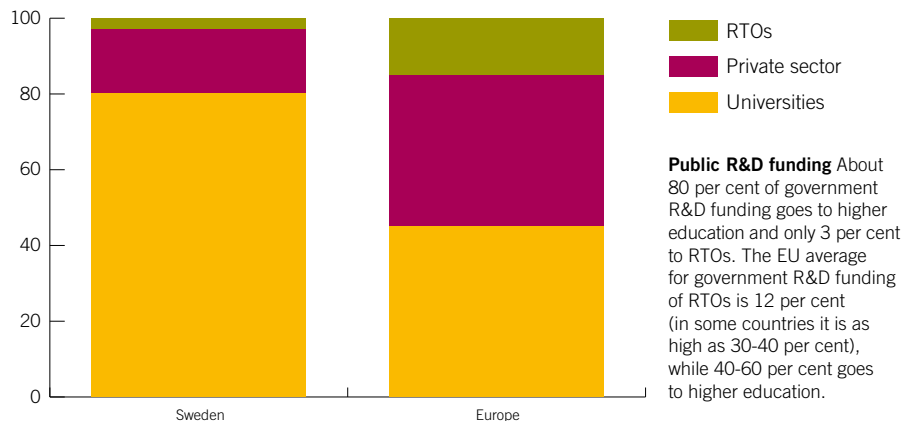
Swedish RTOs and globalised R&D

If Sweden is to continue competing in the international market, and meet the national and global challenges of the future, RTOs must broaden their activities beyond Sweden and work with those companies that are part of economic globalisation. RISE RTOs currently gain 23 per cent of their revenue from international sources.

There is a need to focus on, and specialise in, fields where Swedish R&D is considered to have particular strengths. Swedish RTOs also need to increase their presence in strategically valuable international contexts, such as the comprehensive EU R&D frame programmes. The RTO sector also must raise its level of cooperation with RTOs abroad so as to attract more international customers.

Public funding of RTOs

Sweden uses a comparatively high proportion of its GDP for R&D, nearly 4 per cent. But it has chosen to focus these government R&D investments on higher education – 80 per cent compared to 40-60 per cent in equivalent countries. At the same time, a very small amount goes to the RTOs – only 3 per cent compared to the 12 per cent EU average. As the cases on the impact of RTO R&D in this brochure show, a strengthened RTO sector would contribute to increased innovation in Sweden.



New innovation strategy required

The issue is one many nations face: how will they be able to guarantee jobs and prosperity in a globalised economy with increasing competition? For Sweden, there is a long-standing consensus on the answer: not with low wages and favourable costs. If it is to maintain its standard of living, Sweden must do it through innovation and fresh ideas.

There is broad agreement on this and is an issue the Swedish government is currently addressing both in pending research legislation and the country's innovation strategy. Sweden must develop a policy for innovation that links the efforts being undertaken in a number of political arenas:

It is not enough to have a policy to simply proactively invest in research. Such an effort can be justified and important, but research in itself only generates world-leading results, not new world-leading businesses. It is not enough to simply have a macroeconomic policy that stimulates jobs and growth. Experience from other countries has shown that it takes broader efforts to support the innovation process itself and the entrepreneurship that may follow.

And it is not enough to simply have an industrial policy that relies on world-leading Swedish companies. Recent research shows that the development of innovation in industry occurs through the interaction between large and small companies – small companies are more efficient innovators in the early stages, while the larger ones are better at up-scaling and industrialising the new ideas.

Tunnel vision prevents new ideas

Modern Swedish politics is often characterised by fragmentation, despite the fact that Swedes have a self-image that they are good at co-ordination and consolidation. Policies are, in fact, cast in isolation from each other, hampering the nation's ability to act. This very much applies to innovation policy in Sweden and so is especially harmful when innovation relies on the ability of a number of different policy sectors to easily work together. New ideas develop through new meetings. An innovation system is based on the interaction between research and enterprise, with RTOs acting as an important link between them.

Innovation is also enhanced by mobility at an individual level, when a person can easily move between the public and private sectors and transfer knowledge as they do this. The current Swedish labour market has many obstacles that discourage this kind of job mobility.

There are many players in the Swedish R&D system: universities, RTOs, RISE Holding, Vinnova, the Swedish Energy Agency, the Swedish Agency for Economic and Regional Growth, Innovationsbron, Industrifonden and Almi. Each has its part to play in bringing about innovation, but they do not work within an integrated vision or policy.

Future innovation policy?

Sweden has to define a new policy field in order to develop a coherent innovation policy with two main tasks:

1. Co-ordinate the Swedish R&D and innovation stakeholders so they are heading in the same direction. Together, they can fill the needs of large companies, sub-contractors, small and medium enterprises and new entrepreneurs – the stakeholders whose role it is to transform knowledge into attractive market offers.
2. Identify public sector obstacles to innovation. One example is the Swedish tax system. Other countries apply tax deductions for donations and investment in R&D – Sweden is one of the few that do not.





10 vital aspects on innovation today

Haydn Shaughnessy:

Rapidly changing markets in an era of globalization, force us to rethink the balance between R&D and downstream innovation. Markets, consumers and companies are beginning to function in new ways, creating new needs and wants well away from long term R&D. Companies, faced with global competition need to respond to their new, diverse global audiences and their changing needs, but responses have to be made quickly, as connected impatient people have rapidly rising expectations of companies. All this means that innovation itself now requires substantially new skills, new knowledge, new urgency and new priorities.

How do we rethink the Swedish innovation system to ensure that Swedish companies are best equipped to achieve long term sustainable growth in this new environment? Haydn Shaughnessy shows you the personal, the cultural, the corporate and the policy aspects of innovation against the backdrop of a transformational world economy

BACKGROUND

1. China since joining the World Trade Organization has risen rapidly to become the world's second largest economy but is now producing goods of high quality at low prices that present a novel challenge to Swedish and European firms.

2. Competition is putting extraordinary pressure on western companies, forcing them to seek new opportunities, and innovate new products and services, across the globe.

The new geography of competition and the rise of a mobile and connected society everywhere, means innovation is now multidimensional and Sweden must adapt in each dimension:

On a personal level:

3. People are adopting personal innovation lifestyles and adapting their non-work lives away from the recent legacy of competitive markets towards a new ethos of sharing and contribution, creating a new culture in the free market.

4. *Their engagement in personal innovation lifestyles is forcing companies to change at an unprecedented rate as employees bring new demands into the workplace and as customers diversify their needs and wants.*

On a cultural level:

5. *The personal is translated into cultural change. There is a new openness in cities, governments and companies (open data, open innovation, open government) coupled to new productivity platforms and the culture of sharing that Swedish culture could be ideally suited to exploit if Government and business can show a lead in this new business culture.*

6. *The new productivity platforms can help direct downstream innovation, i.e. away from the lab, in a consultative and participatory way creating a novel new collaborative force in the Swedish economy.*

On an enterprise level:

7. *This means companies need to master new skills, particularly in the management of widely distributed innovation systems and in measuring and interpreting the social dynamics of this new economy.*

8. *Companies are faced with greater risk factors than ever, though, brought about by global competition - they need to adapt to an economy where stability and employment will give way to a more tactical level of growth opportunity exploitable by exceptional talent in very short time-frames, which is a huge challenge for R&D culture.*

At a policy level:

9. *Policy makers need to balance the upstream and downstream investments they make, taking account of where the exceptional, yet every day, innovation is taking place and what can work for the economy short, medium and long term, tactically and strategically.*

10. *We need to understand these profound changes better, debate the new structures that are needed, find ways to manage upstream and downstream innovation and create the policies to inspire, fund and direct all innovation.*



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Tasty bread for gluten intolerant people

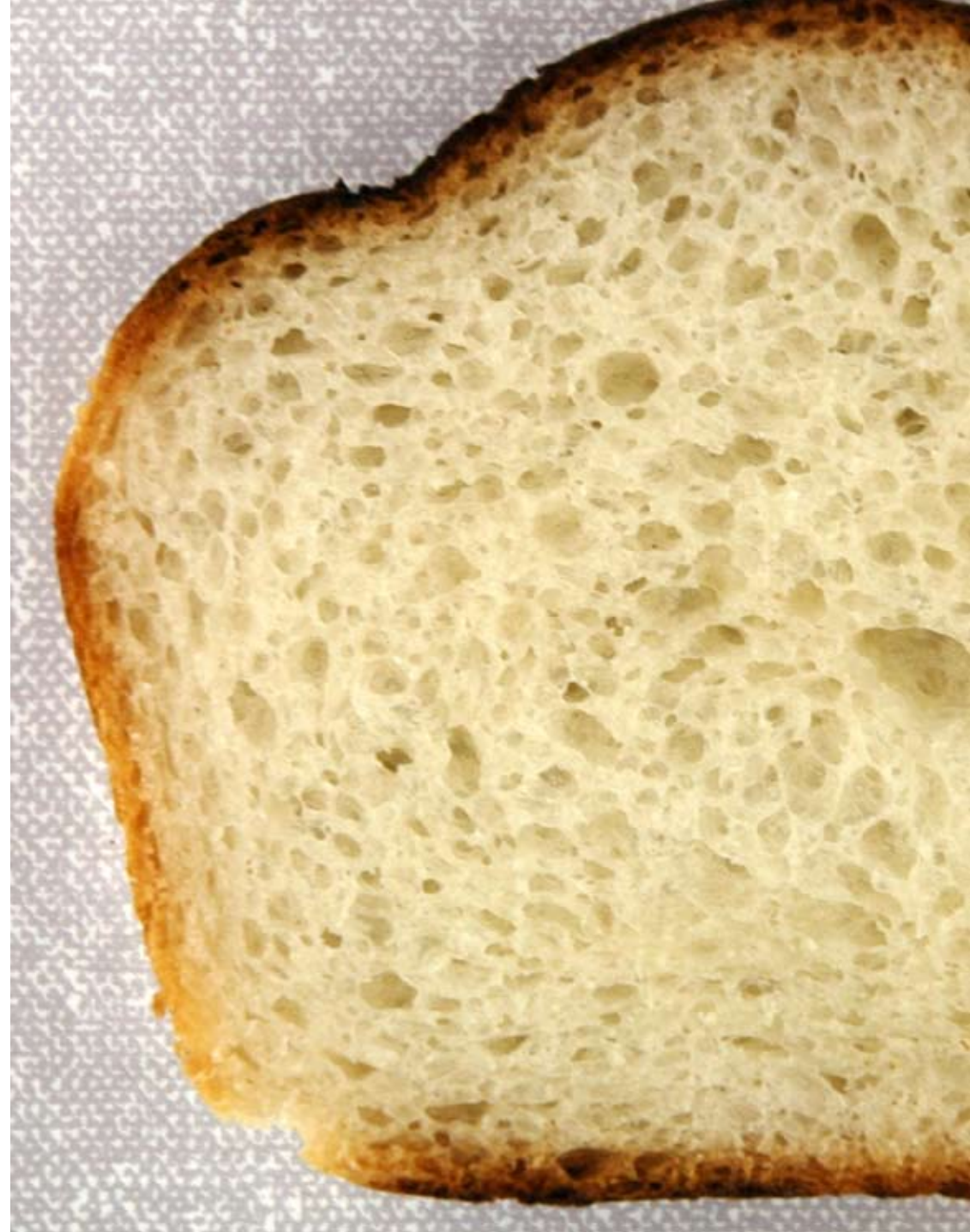
The Swedish Institute for Food and Biotechnology, SIK, has developed methods to bake tastier gluten-free bread, a product often regarded as turning dry and dull too soon after baking.

The first part of the project was to find a replacement for guar, a leguminous plant often used to make the batter-like, gluten-free dough more like ordinary bread dough. But a lot of gluten-intolerant people also are allergic to leguminous plants. It emerged that polysaccharide xanthan and polysaccharides from psyllium plants can function fully as replacements for guar.

SIK has also developed methods to include emulsifiers in gluten-free bread to make it feel soft and juicy, even after being stored for a couple of days. Including emulsifiers in this kind of bread has not been that common before. Garbo Foods, one of the companies involved in the project, immediately began using emulsifiers in its bread.

SIK research also showed that the leavening of oat bread was considerably helped by polysaccharides such as xanthan and HPMC, giving it a fluffier structure. Adding oats also gives the bread a darker shade and a more characteristic taste.

*www.sp.se
www.sik.se*



Kockums AB in Karlskrona has built a maintenance vessel entirely of carbon fibre composite. Within the scope of the LASS and LASS-C projects, SP has helped develop the fire resistance of the material.

PHOTO: KOCKUMS

Lightweight construction applications at sea

LASS, “Lightweight construction applications at sea”, began in 2005 with researchers from SP, Chalmers, KTH Royal Institute of Technology, Swerea SICOMP, DNV and SSPA. The project was designed to demonstrate the economic and ecological benefits from a weight perspective using lightweight materials (aluminium and plastic composites) for ship structures. A number of positive effects are now evident: six ships have been redrawn using light construction materials and the number of participating organisations has risen to 30.

Through cooperation with the EU’s SAFEDOR project, a fire and risk analysis was made for a new ferry with composite superstructure that shipping company Stena plans to build. Supporting documentation from a ship that was designed in LASS was used by the Swedish Coast Guard for the procurement of new patrol boats. Shipyard Kockums has started production of composite vessels and sells composite superstructures for steel ships. The world’s first two fire-rated carbon fibre catamarans were launched by Styrsöbolaget in 2010.

www.sp.se





A unique medical visualization tool

The Virtual Autopsy Table is a unique new medical visualization tool that allows people to explore the inside of a human body. With its intuitive gesture-based interface, the Virtual Autopsy Table totally changes the way users interact with volumetric medical data. Multiple users can interact collaboratively and simultaneously, working with large and complex data to gain deeper understanding and insight into the functions and processes inside the body.

The Virtual Autopsy is already utilized successfully to complement conventional autopsies. It dispenses with the need for invasive surgical procedures, allowing medical experts to see things that would be difficult to discover with traditional methods. The technique can also be applied in many other areas of health and medical practice.

The Virtual Autopsy Table is the result of successful co-operation between the RTO Interactive Institute, Norrköping Visualization Center and Center for Medical Image Science and Visualization (CMIV). In 2010, the partners developed and launched a product aimed at the clinical market together with the Swedish medical IT company Sectra.

www.swedish-ict.se

www.tii.se

Lignin, a possible raw material for carbon fibres

What if carbon fibres could be made of a renewable raw material instead of oil? What if this new raw material was available in large quantities? One research area of great industrial interest at Innventia is biorefinery, which focuses on producing maximum total value from a tree. Here, new processes for turning wood substances such as cellulose, hemicellulose and lignin into new valuable materials and products are being developed. Innventia is working on several interesting applications.

Lignin, for example, has been shown to be a possible source for carbon fibres. With such a raw material as lignin, the volume of carbon-fibre production could increase considerably. The production of carbon fibre could also lead to an increase in revenue for pulp mills in the future. The LignoBoost process, developed in co-operation between Innventia and Chalmers and today owned by Metso, forms the basis for the production of lignin that has the right quality to act as a raw material for producing carbon fibre.

www.innventia.se





Composite to metal in space environment

There is an ever-growing demand from the space industry to be able to increase the maximum payload of various systems sent into space. One way to satisfy such demands is to reduce the weight of load-bearing structures by replacing sections of the existing metal structure with a composite material. This means that certain structural elements will comprise two materials (metal and composite) combined to form a single unit.

Ruag Space AB currently manufactures an aluminium separation system for a load-bearing structure for rockets. The separation system features a clamp-band that is used to attach the satellite to the rocket during launch. As part of the KOMET project, the existing aluminium material used in the clamp-band is being replaced with a hybrid material comprising composite and aluminium, which will enable Ruag Space AB to reduce the weight of their separation system by 2 kg or more, which will in turn make it possible to increase the system payload to an approximate value of SEK 400,000.

www.swerea.se

Internet of Things to support communication in the sustainable society

Over the next ten years, the “Internet of Things” will become a reality and change our lives. Where today the internet reaches virtually anyone at anytime, anywhere, the same will become true for “anything”. The objects that inhabit our world will increasingly be connected.

Ericsson predicts there will be 50 billion new mobile connections by 2020. Through companies such as Ericsson and research from Swedish ICT, Sweden is at the forefront of this development and has a unique opportunity to take the lead. Swedish ICT has developed key technologies and a strong research base. For example, the operating system Contiki, developed by SICS, pioneered many new concepts now taken for granted in Internet Protocol-enabled, low-power smart devices. SICS, together with Ericsson, Cisco, and other major companies, co-founded the IPSO Alliance, an international driving force behind the Internet of Things.

Swedish ICT is now forming an Internet of Things Initiative to address this major challenge from multiple perspectives: technical infrastructure, applications, business models, users and society. The Internet of Things Initiative will leverage the unique expertise at the forefront of the developments in telecom, ICT, wireless embedded systems, and user-centric design. The Internet of Things is one of the key building blocks in the generic communication infrastructure needed to support smart grids, eHealth, and sustainable mobility of people and goods in a sustainable society.

www.swedish-ict.se

www.sics.se

Thimeo Voigt, leader of the Networked Embedded Systems group at SICS, demonstrates a sensor network.

PHOTO: LARS NYMAN





Renewable and biodegradable material for interior decoration

Since its launch in Milan in April 2010, the paper lamp w101, designed by the famous Swedish designers Claesson Koivisto Rune for the lighting company Wästberg, has generated a lot of media interest and earned several awards. The lamp is made of Durapulp®, a renewable material from Södra that has been developed in co-operation with Innventia. Durapulp is made from selected pulp from Södra combined with a biodegradable plastic (PLA) based on cornstarch.

The new composite material was developed as a result of Innventia's research programme. In 2007, a first demonstrator, called the Kofes, was shown at the Milan Fair to prove the usability and endless possibilities of the material without defining how the material should be used. Two years later, an up-scaled demonstrator – the children's chair Parupu, which means pulp in Japanese – was put on stage. Cellulose composites, such as Durapulp, offer new markets for the pulp and paper industry. They can be employed in a wide range of applications within the furniture, automotive, packaging and construction industries, among others. The w101 lamp is the first commercial product.

www.innventia.se

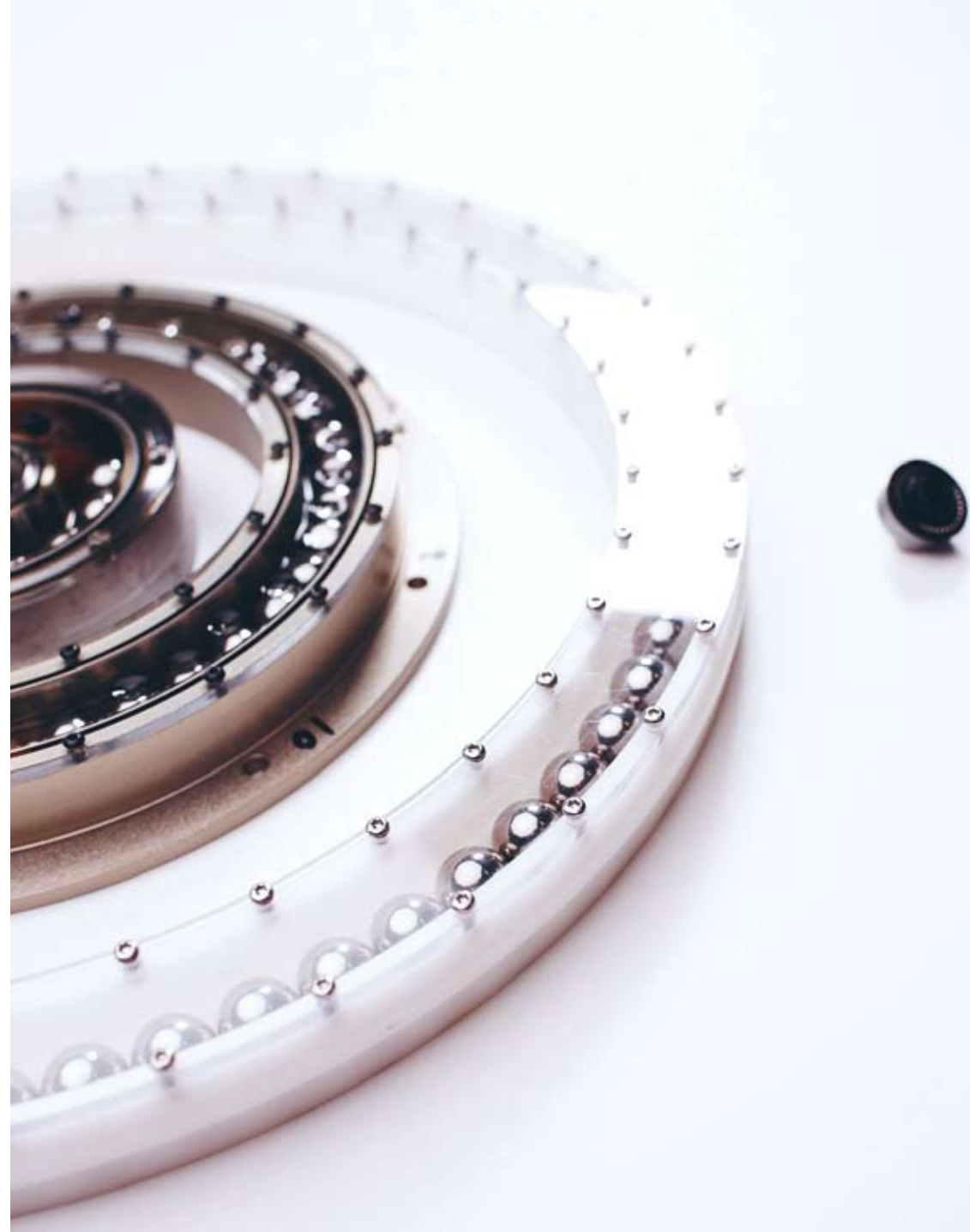
Lighter-weight washing machines with balance and optimised components

Large counterweights have to be inserted into washing machines due to imbalances that arise during spinning. These counterweights make washing machines very heavy. Installing balancing rings onto the drum of a washing machine can reduce the centrifugal forces from spinning by up to 90 per cent and vibrations can also be reduced considerably. Swerea has developed a balancing ring that can be mass produced at a reasonable cost.

This makes it possible to scale down several washing machine components, reducing the weight of a washing machine by up to 50 per cent. Lighter-weight washing machines will be less environmentally damaging to transport and open up fascinating new opportunities when it comes to interior design – such as suspending washing machines from the wall at the right working height.

In Swerea Lättvikt, Swerea has been working on optimising a cross spindle for the washing machine. Topology optimisation shows where materials are of most benefit in a component, with regard to effective loads. Based on that, a component can then be designed on the basis of optimal use of materials. The cross spindle, which was previously made of cast iron and weighed about 9 kg, can be cast in aluminium, reducing the estimated weight to just over 3 kg.

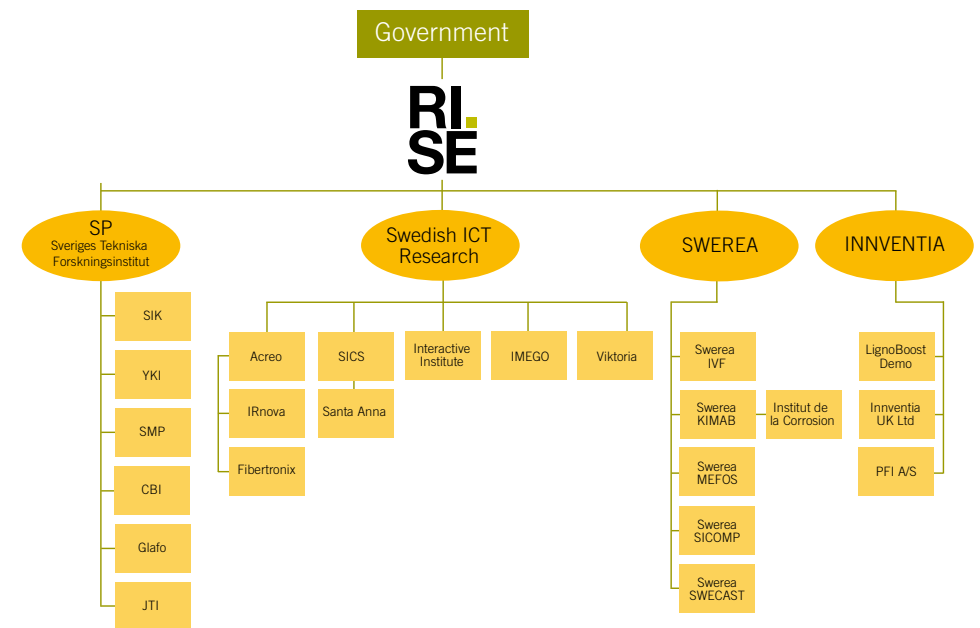
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This is RISE

- In 2010, the RISE RTOs had a total turnover of EUR 270 million and around 2100 staff
- The RISE RTOs are organised into four institute groups:
 - *SP Technical Research Institute of Sweden, with a focus on energy/-environment, built environment, life science and transportation*
 - *Swerea, with a focus on material, process, product and production technology*
 - *Swedish ICT Research, with a focus on information and communication technologies*
 - *Innventia, with a focus on forest-based biomaterials, mainly paper and packaging*
- The RISE RTOs are operated as non-profit, limited-liability companies
- The rise RTOs have 19 % government funding in the form of strategic competence funds
- The RISE RTOs provide competence and services to industry, 55-60 % of turnover from industrial projects
- The RISE RTOs have a special focus on small and medium enterprises, 36 % of industry contracts come from SMEs
- The RISE RTOs have high academic competence, with around one third of the staff holding PhDs, or equivalent, and of whom 65 are professors

- The RISE RTOs play an important role in technological infrastructure and operate around 50 test beds/demonstrators; for example, fire and climate labs, experimental pulp plant, ICT test bed for products and services, product development area, and so on.
- The RISE RTOs gain 23 % of their revenue from international sources
- The RISE RTOs are the fifth-largest recipient of funds from EU FP7
- Swerea operates a subsidiary in France (Brest and Saint-Étienne) Swedish ICT Research participates in one of the knowledge and innovation communities, KIC, of the European Institute of Technology





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