VINNOVA

VINNOVA REPORT
VR 2011:17

READY FOR AN EARLY TAKE OFF?

INTERNATIONAL EVALUATION OF THE VINNVÄXT INITIATIVES IN EARLY STAGES

FRAMTIDENS BIORAFFINADERI

PeakInnovation
TOURISM SPORTS OUTDOOR

PEA
Printed
Electronics
Arena

smart
textiles

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Title: Ready for an early Take Off? - *International evaluation of the VINNVÄXT initiatives in early stages*
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Series: VINNOVA Report VR 2011:17
ISBN: 978-91-86517-55-7
ISSN: 1650-3104
Published: December 2011
Publisher: VINNOVA - Swedish Governmental Agency for Innovation Systems/Verket för Innovationssystem
Case No: 2002-00568

VINNOVA develops Sweden´s innovation capacity for sustainable growth

VINNOVA is Sweden's innovation agency and our aim is to increase the competitiveness of Swedish researchers and companies.

Our task is to promote sustainable growth in Sweden by funding needs-driven research and the development of effective innovation systems. To this end, we have 220 million euro to invest in new and ongoing projects each year.

An important part of VINNOVA´s activities consists of increasing the cooperation between companies, universities, research institutes and other organisations in the Swedish innovation system. We do this in a number of ways, including long-term investment in strong research and innovation milieus, investment in projects to increase commercialisation of research results and by creating catalytic meeting places in the form of conferences and seminars.

VINNOVA is a Swedish government agency under the Ministry of Enterprise, Energy and Communications and the national contact agency for the EU Framework Programme for R&D. Some 200 people work at VINNOVA´s offices in Stockholm and Brussels. VINNOVA was established in January 2001.

VINNVÄXT is a programme that takes the form of a competition for regions. The aim is to promote sustainable growth by developing internationally competitive research and innovation environments in specific growth fields. The winning regions will receive funding of up to SEK 10 million per year for a period of 10 years. The objective is that the winners will become internationally competitive in their respective fields within this period. A prerequisite for the programme is the active participation of players from the private, public and research sectors and from the political sphere. VINNVÄXT also comprises a number of support activities such as seminars, training/education, the exchange of experience and the extension of knowledge/research. The programme began in 2001

The **VINNOVA Report** series includes external publications and other reports from programmes and projects that have received funding from VINNOVA.

Ready for an early Take Off?

International evaluation of the VINNVÄXT initiatives in early stages

Lisa de Propris, Alexander Eickelpasch, Ifor Ffowcs-Williams, Peter Kempinsky, et. al.

Preface

In this evaluation report The Swedish Governmental Agency for Innovation Systems (VINNOVA) presents the first evaluation of the initiatives in the third announcement of the VINNVÄXT programme. The initiatives were selected through a call for Innovation Systems in Early Stages. The aim was to find fresh initiatives with major growth potential which were not yet fully established in their regions. In 2005 the programme council and three assessment panels, plus officials and experts from VINNOVA, selected five growth initiatives (from 86 applicants) to receive SEK 2 million each for two years. In June 2008, four of these initiatives were upgraded to VINNVÄXT winners.

The objective of the VINNVÄXT programme is to promote sustainable growth based on international competitiveness in regions, by developing regional innovation system´s functionality, dynamics and efficiency to an international level. According to the evaluation strategy the initiatives are evaluated every third year. The overall objective of this first evaluation is to see if the initiatives had a good start, building the platform for future growth and international competitiveness in their respective growth area. Evaluation aspects are organizational and leadership issues as well as the outcome and impact of the initiatives in terms of knowledge development, innovation and international competitiveness.

The evaluation has been carried out through a group of international specialists from university and industry, both in cluster development and regional innovation systems and in the specific knowledge area for each initiative.

This report presents the evaluation of the following four regional initiatives appointed as winners 2008:

- The Biorefinery of the Future
- Peak Innovation
- Printed Electronics Arena; PEA
- Smart Textiles

After a short introduction to the evaluation, the following four chapters present the evaluation of the initiatives with focus on:

1 a situational analysis of achievements and challenges
2 the international positioning of the initiatives
3 the clustering process and
4 the way forward for the initiatives.

The last chapter gives a summary of the evaluation and recommendations for further development of the initiatives as well as for the VINNVÄXT programme at VINNOVA.

VINNOVA in December 2011

Charlotte Brogren
Director General

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Director
Head of Transport & Environment Division

Content

Summary

The objective of the VINNVÄXT programme is to promote sustainable growth based on international competitiveness in regions, by developing the innovation system's functionality, dynamics and efficiency in functional regions to an international level.

The initiatives evaluated are the third generation initiatives to be funded by the VINNVÄXT programme, commencing in 2008:

- **The Biorefinerary of the Future** – based on the industrial tradition in the Örnsköldsvik area the initiative will support sustainable growth through the development of biorefineries based on forest raw materials and energy crops.
- **Peak Innovation** – aims at positioning the Åre-Östersund region as an internationally leading environment for research and business development in winter sports, tourism and outdoor pursuits.
- **Printed Electronic Arena** – will create sustainable growth in the Norrköping-Linköping region commercialising and exploiting printed electronics
- **Smart Textiles** – aims to establish an internationally leading position in the design, development and production of next-generation textile products in Västra Götaland.

The initiatives were selected through a call for Innovation Systems in Early Stages, i.e. emerging Innovation Systems based on radical renewal of existing industries where the process supporting organisation, infrastructure and triple helix collaboration is not yet fully at hand.

The evaluation of the initiatives was carried out by a group of international specialists from university and industry, both in cluster development and regional innovation systems and in the specific knowledge area for each initiative.

The overall impression from the evaluation is that three out of four of the VINNVÄXT initiatives evaluated are performing well and in line with the objectives that have been set up by VINNOVA for the VINNVÄXT programme. For these three initiatives the evaluators see a good potential for further growth as the initiatives develops further. Not unsurprisingly, the initiatives are in many respects different as they build on specific conditions and challenges. They also have a different (regional) history and assets to build on.

The fourth initiative, Printed Electronics Arena, is still in a very embryonic stage with a strong research orientation but as yet weak linkages to industry and a cluster organisation that requires strengthening. The research and knowledge position of the initiative is internationally competitive but the evaluator's fears that the road for commercialisation and growth is still long and difficult for the initiative.

As part of the evaluation of the initiatives the following models were used to summarise the observations building on the criteria's and objectives for the VINNVÄXT programme as well as experiences on cluster development from Sweden and globally.1

- The innovation stretch of the initiative:
  - Knowledge base: academia
  - Knowledge base: firms, absorptive capacity
  - Commercialisation & Entrepreneurship
  - Equity finance: venture capital, angel funding
  - Cluster scale: potential regional impact
- The quality of the clustering intervention:
  - Governance
  - Strategic focus, including internationalisation
  - Process leadership
  - Connecting & catalysing; Leveraging the regional innovation actors
  - Raising the cluster's profile

The VINNVÄXT initiatives generally show a positive development regarding the aspects identified in the evaluation model. In general the initiatives shows positive development when it comes to, for example, strengthening the knowledge base, supporting commercialisation and entrepreneurship as well establishing a governance structure based on triple helix collaboration and in having an effective process leadership in place.

The challenges for the initiatives to handle in their further development regards, for example, the strategic focus and internationalisation of the cluster. This also has to do with raising the cluster's profile as well as international linkages and partnership between related cluster initiatives, universities and companies.

Based on the evaluation of the initiatives, the evaluators would like to make the following recommendations to the initiatives for further development:

- Clarify the importance and potential of the industry to the region and nationally
- Systemic thinking and developed business models needed for the sustainability of the initiative
- Internationalisation needs to be at the core of the initiative, strengthening the initiative and supporting the cluster companies in globalisation
- Strengthen the business dimension in governance board and process management
- Take the accumulated knowledge and experiences on innovation systems/clusters to a wider Swedish audience (regionally, Tillväxtverket, Reglab)

[1] The model and the concluding recommendations are based on the evaluation both of the VINNVÄXT initiatives funded from 2008 (evaluated in June 2011) and the VINNVÄXT initiatives funded from 2004 (evaluated in September 2011).

- Diversity as a driving force for growth and sustainability needs a broader perspective than just Gender

For VINNOVA the evaluators would like to make the following recommendations. An important basis for our recommendations is how VINNOVA can build on and leverage the investment made in the VINNVÄXT program.

- Inserting more competitive elements in the further implementation of the programme; rewarding the most competitive
- Supporting the initiative more proactively – by stretching the ambitions
- Use the Challenge Driven Innovation Concept to build on and link the VINNVÄXT initiatives
- The initiatives are ”mini-VINNOVA’s” and the hands on involvement of other parts of VINNOVA is a win-win
- Supporting more active learning and sharing between the initiatives
- Tightening collaboration with supporting national actors, especially for the internationalisation of the initiatives
- Establishing standardised web presence for all Swedish cluster initiatives (see for example www.kompetenznetze.de)
- Supporting the learning of regional authorities in the development of integrated regional innovation systems, drawing on VINNOVA’s comprehensive learning from different programmes, including VINNVÄXT
- Need for a more regional/client oriented work division within VINNOVA

1 Introduction

This report presents the evaluation of four VINNVÄXT initiatives:

- The Biorefinary of the Future
- Peak Innovation
- Printed Electronics Arena
- Smart Textiles

1.1 The VINNVÄXT programme

The initiatives evaluated were the third generation of initiatives to be funded by the VINNVÄXT programme which commenced in 2008, all selected to be in the early stages in the development as innovation systems.

As the original proposal stated: “The programme aims to promote sustainable regional growth by developing internationally competitive research and innovation environments in specific growth areas. This is done by funding needs-driven R&D to strengthen the cutting-edge competence of the respective environments and by means of strategic efforts for the development of innovation systems.”

The twelve initiatives that to-date have been supported through the VINNVÄXT programme have been picked through national calls and competition, with all the winners believed to have excellent growth potential. The objective is that the winners will become internationally competitive in their respective fields within 10 years. A unique aspect of VINNVÄXT is the long time horizon. VINNOVA will provide the winners with funds of up to 1.1 million euro per year for a period of 10 years.

1.2 The evaluation task

The initiatives in the VINNVÄXT programme are to be evaluated every third year in order to determine whether they are complying with the demands set by VINNOVA.

The first three year evaluation of the VINNVÄXT initiatives have both a summative and formative (learning) approach focussing both on achieved results in comparison to goals and action plan as well as strategic issues related to the further development of the initiative.

The objectives for the initiatives after three years are to demonstrate clear positive changes in innovative capabilities and international competitive-ness. The evaluation has focussed on the following questions:

1 Have the regional initiative had a good start, setting up the organization, processes and mobilizing key actors that embodies the platform for future growth and international competitiveness in their growth area?

2 How is the quality of research and commercialization strategies, activities, and to some extent, the output from those activities in an international comparison?

The evaluation should be seen as a learning process and input to the strategic development of the initiatives and the action plan for the coming three years.

1.3 The evaluation team

The evaluation was carried out by an international team consisting of experts with:

- Academic and/or business oriented profile with excellent knowledge about state of the art on innovative clusters and innovation systems
- Academic and/or business oriented profile with excellent knowledge about state of the art in the specific field for the initiative

The evaluators are presented in the matrix below. For background on each of the evaluators, see Appendix 1.

Name	**Expertise**	***Biorefinery***	***Peak Innovation***	***Printed Electronics Arena***	***Smart Textiles***
Lisa De Propris	Clusters & Innovation Systems	x	x	x	x
Alexander Eickelpasch	Clusters & Innovation Systems	x	x	x	x
Ifor Ffowcs-Williams	Clusters & Innovation Systems	x	x	x	x
Lars Gädda	Research & Technology	x			
Jack Stadler	Research & Technology	x			
Anne-Mette Hjalager	Research & Technology		x		
Mark Held	Research & Technology		x		
Susan Reuter	Research & Technology			x	
Barbara Stadlober	Research & Technology			x	
Barbara Layne	Research & Technology				x
Lutz Walter	Research & Technology				x
Peter Kempinsky	Process leader	x	x	x	x

Personnel from VINNOVA participated in the evaluations as observers: Göran Andersson (ST), Lars-Gunnar Larsson (BoF, PEA), Mats Robertsson (PEA), Peter Svensson (Peak), Marie Wall (ST) and Marit Werner (Peak).

1.4 The evaluation process

The evaluation of the four initiatives were carried out in June 2011:

- Smart Textiles – 7th to 8th June, Borås

- Printed Electronics Arena – 9th to 10th June, Norrköping
- The Biorefinery of the Future – 13th to14th June, Örnsköldsvik
- Peak of Innovation – 16th to 17th June, Östersund

The evaluation is based mainly on the three years follow up report presented by the initiatives and discussions with different stakeholders and players at meetings during the site visit. The results from the evaluation of each of the four initiatives has been presented in a report to the board and management team of each initiative

In this report a summary of the results from the evaluation of each of the four initiatives is presented together with general conclusions.

The report is presented by Lisa De Propris, Alexander Eickelpasch, Ifor Ffowcs Williams and Peter Kempinsky.

1.5 About the report

The following four chapters presents the evaluation of the initiatives with focus on:

1 a situational analysis of achievements and challenges
2 the international positioning of the initiatives
3 the clustering process and
4 the way forward for the initiatives.

The last chapter gives a summary of the evaluation and recommendations for the both the further development of the initiatives as well as the VINNVÄXT programme.

2 A situational analysis

This chapter presents an overview of the results and outcome for the four initiatives evaluated as well as the challenges they are facing in the further development of the initiative.

2.1 The Biorefinery of the Future – strong regional and national support

The vision for The Biorefinery of the Future (BoF) is to be a creative, leading initiative for the development of biorefineries based on forest raw materials and energy crops. Developing new knowledge and bio-based green products, chemicals and fuels as well as new energy solutions from industrial process streams will create sustainable growth. There is a strong tradition in the Örnsköldsvik area of forestry and the related forest products industry as well as major manufacturing and supplier companies.

2.1.1 Achievements

Triple Helix initiated and driven by strong industry involvement

The initiative is based upon a strong triple helix: Processum has 21 member companies, which are all connected in some way, mostly directly, to either the forest and/or energy sector. Many of the companies that are located in Örnsköldsvik (Ö-vik), were part of the former MoDo Group and from this common heritage they have developed an exceptional industrial complex of technically connected companies. Most of the participating companies are fairly large, with fairly strong positions in their markets and long lasting international experience. There are also several world class universities and research institutes which are an integral part of the initiative. Umea University even has part of its teaching and research staff based at Ö-vik. The municipalities not only support the initiative in terms of funding, there is also very strong political support evident by several of the counties. Representatives from municipality of Ö-vik met with the review team and were obviously strongly committed and passionate about the BoF initiative. In addition, the Kempe foundation, as an important local player in regional development, strongly supports the initiative as well.

Based on trust and long term experience in collaboration

The review team had the impression that the initiative was also very successful because of the key ingredients of trust, long experience in collaboration with each other and that the self-awareness that sum of the parts was considerably greater than just the additive effect.

The tacit knowledge was already in place, there is a strong and unique technological platform focused on biomaterial, and many of the needed facilities, personnel and experience were already in place.

The region has a long tradition in the Biorefinery area, reaching back to the vision elaborated in the 1940s, although it was not called biorefining in those days but more “speciality pulping”.

In the strategy paper dated from November 2010 the initiative has proposed a strategy for areas of expanded operation.

People strongly attached, and even attracted, to the region (the researchers, young people…)

Many of the people we met were born and brought up in the region and are obviously closely “bound” to the area. Although many of them carried out their academic training at universities in Sweden or abroad, after gaining some professional experience, they return to the region of their early life. This attractiveness is thus an asset when it comes to attracting knowledge and possible partners from outside the region.

Strong mentoring and a supportive culture

A further asset for the region is the strong supportive mind set of the people living there. One example is the Kempe foundation. There were also other examples of mutual support for each of the participating organisations, such as the membership fees differed by the size of the companies.

Already attracting national and international interest

The leading companies in the region are already players on the world market and they export most of their products aboard. The groups are of international stature because of their technological knowhow and experience in bio refinery.

The addition and integration of the universities to the Initiative

The collaboration with academia in the region is extremely important, as it is planned to build a bio refinery research community in Ö-vik and at the chemistry institution in Umeå. As mentioned earlier, there are already researchers from Umeå University (UmU) based at the biorefinery site in Ö-vik. A second success is the funding of Bio4Energy.

Cluster Initiative extended outside Örnsköldsvik – from Sundsvall to Umeå and Piteå

Although the cluster initiative started at the biorefinery site in Ö-vik, during the last three years it was extended along the coast, from Piteå in the north to Iggesund in the south. Thus it covers many complementary companies and universities in the field of biorefinery, all based in this region.

Reinventing the industry at place and pace (”time is on your side”)

The pulp and paper industry is typically thought of as being conservative and slow to change. In this respect the members of the initiative are an exception. The companies involved, the universities, and the municipality are aware of the potential for innovativeness that is connected to biorefinery.

Stubborn culture –"although we have had our ups-and downs, we will stay, and thrive, here"!

People in the region are known as being stubborn (tenacious!). This region has experienced a lot of blows of fate and people have learned to deal with it. So they know that you will only be successful when you have staying power and patience.

2.1.2 Challenges

Extending the knowledge platform to material science, chemical engineering

What are still missing are a broader scope of application areas and the addition of expertise in industrial design, organic chemistry and in material science.

Complementing the advanced pilot plant approach with modeling and simulation

Pilot plants are important for testing production processes that were developed in laboratories in a broader scale. Here, very often the method of "trial and error" is applied. This method costs a lot of money and time and should be complemented with parallel approached. Specifically more modeling and simulation expertise should be developed to both accelerate the rate of innovation and to reduce costs.

Broadening the arena for creating business ideas in the region and the creation of start-ups and supporting innovative SME's

The R&D council is an excellent way to generate and support innovation projects. The council meets the interests of the member companies. However, it may be helpful to complement this approach by broadening the arena for creating business ideas.

Extending the local portfolio of service providers

The local supply of services seems to be too small when it comes to future investments in the facilities and the pilots. Therefore the initiative should develop plans in how to extend the local portfolio of service providers.

Strengthening/linking up the innovation system, incubator facility already in place – but in a rather informal way

There are some activities on-going to support researchers to start a business and there is a long tradition in mentoring. However, this excellent tradition should be expanded and ways should be explored to see how far this could be intensified by cooperating with the existing incubators located at UmU and Mid Sweden University.

Attracting, aligning and utilizing foreign investors to the region (for example; new owners of Domsjö)

In April this year, the Indian family run consortium Aditya Birla Group acquired Domsjö Fabriker for a sum of US $ 340 million. According to the company, the region will benefit very strongly from that venture.

Proactive branding. Developing “The Biorefinery Coast” brand

Proactive branding is essential in order to enhance the awareness of the initiative in the region as well as tin Sweden and abroad. There are already a lot of activities going on. These efforts should be intensified in the future.

Web page should be improved to meet the needs of Open innovation (content and interact ability)?

One most important way to communicate the initiative to the public is through the use of the web. In the view of the review team the performance of the web site could be improved significantly. The content could be considerably enhanced and more focused on the needs of specific and general groups of users.

No formal mechanism for benchmarking – need for an international advisory board?

There is no formal benchmarking of the work or progress of the cluster against other similar clusters that are operating globally. Although it is clear that BoF is world leading, it might be helpful to have a continuous and more systematic way of benchmarking progress and achievement of articulated goals. A technical/scientific advisory board with international members could be helpful in both setting these goals and assessing progress.

2.2 Peak Innovation – strong regional TH-support

Peak Innovation (Peak) aims at positioning the Åre-Östersund region as an internationally leading environment for research and business development in winter sports, tourism and outdoor pursuits. New service systems and products will be produced through customer-driven development across industrial boundaries. Services and technologies will be developed in parallel in winter sports, tourism and outdoor pursuits. The venture is grounded in the region’s strong sectors of tourism, events and winter sports plus the two international competence centres for the tourist industry (ETOUR) and winter sports (Swedish Winter Sports Research Centre).

2.2.1 Achievements and outcomes to date

Great determination to develop the economy since mid-90s

In this connection the municipality of Östersund started in 2000 to design a development plan for the city. Based upon that idea Östersund municipality submitted in 2002 an application to the VINNVÄXT programme. This was rejected in 2003. In 2004 the municipality applied for a VINNVÄXT grant in the second call. This was also rejected on the grounds of insufficient involvement from trade and industry. Finally, with the third call the application was successful.

Broad mobilisation of regional stakeholders

The number of stakeholders participating in the initiative is impressive. It has also to be emphasised that without the competent, energetic, and enthusiastic process management in place the strong mobilisation would not have been possible.

Facilitating business opportunities

The main aim of the initiative is to facilitate business opportunities. In order to reach this aim it is not sufficient to mobilise regional stakeholders. Peak has also succeeded in changing the attitude of the participants towards commercialisation and cooperation.

Creating meeting arenas (PBS)

Peak innovation established several meeting arenas. The most important one is Peak Innovation Business & Sports AB (PSB). Also the other bodies such as the Advisory Board and the Management Groups serve as arenas. Peak is also involved in conferences such as the Scandinavian Outdoor Summit and the Åre Capital Market Days.

Support to enhance the scope of activities

Main pillars of the region are tourism and outdoor. Peak pushed the discussion in order to enhance the scope of activities, such as capturing the idea to market the region as a gastronomic place. Another idea is to integrate IT companies in Östersund, which evolved from the former Ericsson subsidiary.

Clear entrepreneurial mind set

The Jämtland region is known for its entrepreneurial thinking. The county has according to the Confederation of Swedish Enterprise the third highest level of entrepreneurship activities in Sweden. Peak can build on that and at the same time push it forward.

Strong regional support and mentoring (Öppen dörr, Almi, ...)

"Öppen dörr" is one of the areas of operation led by a project leader. Since 2008 about 250 ideas have been submitted, 100 of them were selected in order to develop the business idea further. About 20 of them have currently the potential for establishing a business. The ideas are collected from the Mid Sweden University (Miun) developers in companies, and the Peak management group.

Research & knowledge platform developed (SWSRC, ETOUR, Sportstech)

A big asset of the region and Peak is the three research facilities at MSU that are all located in Östersund. This is quite a unique combination of expertise as it provides as a test bed for the outdoor industry as well as knowledge on markets and consumer behaviour for the tourism business. The role of Peak was to initiate dialogues between the university institutes and local companies. Peak also funded some collaboration projects with the regional business. One example is "Peak experience".

Initiating cooperation with other VINNVÄXT initiatives

Cooperation is in place with Smart Textiles, Skåne Food Innovation and Uppsala Bio. For example, Peak shared a stand with Smart Textiles at the ISPO fair in 2010. Skåne Food Innovation Network visited Peak to discuss cooperation in the food sector.

The core driver for developing the regional innovation system

Peak represents the most important sectors of the regional economy and, thus, its role for the development of the innovation system is self-evident. This is also mirrored by the fact that Peak will play a major role in developing the Regional Development Strategic plan for the new Region Jämtland.

Peak Innovation well known as a brand

The strategy "House of Brands" was chosen in order to boost the brands of the companies and institutions and municipalities in Peak. Today Peak is very well known and has obtained acceptance and earned legitimacy as a place to go when it comes to business development.

2.2.2 Challenges

Trends for ski tourism not reliable (climate, market development) – balancing with summer tourism

Tourism is crucial for the economic development of the region. For several reasons it is risky to focus on winter tourism only. Summer tourism is already evolving.

"Sustainable tourism" – need to be integrated

Environmental compatibility is getting more and more important for tourists. The initiative should respond to this trend, promoting the region as a centre for sustainable tourism.

Broaden the thin base in outdoor industry to leisure industry

The economic base in the outdoor industry in the region is actually very thin. There are some internationally well-known and successful companies (Hilleberg, Klättermusen, Woolpower, etc.), but they are small, and there are only few of them.

Opening up the technological platform at Miun for leisure sports industry and outdoor companies from abroad

SWSRC and Sportstech are already well known and acknowledged in the world. Until now SWSRC is offering its facilities mostly to athletes. In the view of the review team there is unused potential. Sportstech is already cooperating with industry (e.g. Haglöfs, Primus, Halti) and they want to go that way in the future.

Focusing the activities and organisation of PI (from project archipelago to mainland focus)

Peak should also consider further strengthening the 'House of Brands'. Peak has already achieved a "unique selling point" as a hub for regional innovation, a communicator, and facilitator in the best interest of the region. A stronger branding can be seen as a win-win opportunity for all stakeholders.

Exploring the links to public health system

One overarching strategy area for 2011 to 2014 is the development of the tourist industry. Tourism in a broader sense is not only outdoor activities like skiing, fishing,

hunting, cross country biking or walking. This can capture also offers in well-being. But there seems to be more options, for example into health care. The Folkhälsoinstitutet (National Institute for Public Health), which is located in Östersund, is not mentioned in the strategic discussion of Peak.

Using a data baseline on tourism effectively to inform and frame the action plan

In order to develop a strategy for the region, consistent and up-to-date data (actual trends, by seasons, behaviour of tourists, benchmarking, market trends) is needed.

2.3 Printed Electronics Arena – still to develop as a cluster

The target for Printed Electronics Arena is to create sustainable growth in the region around Norrköping/Linköping by commercialising and exploiting printed electronics. The aim is to produce electronics in the same way as paper is now; in large volumes at low cost. The market for printed electronics lies in sectors such as the packaging and security industries in the form of displays, sensors etc.

2.3.1 Achievements

PEA-M, a backbone of a research driven initiative, with potential for product development and applications

PEA-Manufacturing (PEA-M) is a key asset of the cluster initiative. The facility serves as a test bed for converting inventions into applications. It is mainly used by the researchers at Linköping University (LiU) and by local companies. PEA-M's capacity is not as yet fully utilised.

Internationally acknowledged research standing - Unique feature: low voltage based applications

When it comes to research LiU is without any doubt an international known and acknowledged place for research on low voltage based applications and on paper substrate.

Strong efforts made to mobilize regional industry

PEA has approached over 200 companies over the last three years, which has led to learning processes on both sides. PEA has increased its profile in the region and learnt more of the needs of the companies. PEA-M is utilising regional subcontractors and thus strengthening backward linkages into the regional economy. The collaboration with "The Packaging Arena" in Karlstad may lead to more possibilities for developing applications.

Support from political and academic leaders

There is clear support by regional stakeholders. Östsam nominated PEA as one of the four focus areas of the regional development program for growth in Östergötland. PEA is also one of the five regional growth initiatives listed by the regional "Growlink" network. The municipality of Norrkoping is strongly committed to PEA. However, it

was also made clear that in a foreseeable period of time political leaders are expecting some concrete outcomes.

Integration of LiU, Acreo, PEA, and also Norrköping Science Park

With LiU and Acreo there are the two main institutions in the region that are crucial for the success of the initiative. PEA's role in this context is to sup-port the commercialisation of the outcome in research in the field of printed electronics.

Fresh integration of expertise in industrial design

The recent extension of the expertise of LiU to include industrial design is an important step in moving from components to the long-term aim to development of electronic systems.

Test bed in place – Municipality can acts as an early customer

There is a very good relationship between LiU, Acreo and the municipality of Norrköping. The municipality is aware that it can play an important role as an early customer of products generated by the regional innovation system. One good example for public procurement is a new humidity sensor.

2.3.2 Challenges

Shifting centre of gravity to user-driven innovation

PEA is currently a research driven initiative. The Board and the members of the initiative, notably LiU and Acreo, are aware of the need for stronger orientation towards commercialisation.

Flexibility to handle uncertainties over technology trends and early market opportunities

Printed electronics is an emerging technology for a broad range of applications serving a range of markets and industries. This offers a major opportunity. But, technology development and market needs are moving fast. Therefore, the speed of commercialisation has to be increased very significantly.

Moving from components to systems; Broadening out from the R&D/ technology focus

Printed electronics is a niche technology. There are a lot of components provided by printed electronics technology, which can also be done by applying other technologies. However, the main advantage of printed electronics is that applications can be produced at very low cost. In order to be sustainable this is not enough. The aim must be to move away from developing low cost single applications towards supplying users with a broader scope of applications.

Developing an international profile

Although quite well known in Sweden, PEA's international profile has yet to be established. Acreo and LiU are internationally much more visible. Internationalisation will be crucial for further developing the initiative. The industrial structure of

Norrkoping is weak when it comes to the potential for PEA-M. As there are few demanding customers within the region, there is a need to go further afield within Sweden and internationally

Reducing vulnerability through over dependence on a few key people

The research activities in the initiative are very much centred on one person at LiU. The necessary broadening of persons involved may be a challenge. One option to be explored is the spinning off of companies from the university group.

Promoting the region as a centre of excellence for printed electronics, building on Acreo and LiU's reputations

The initiative follows the strategy of "House of Brands" by promoting important partners in the initiative, in particular Acreo and LiU. However, this strategy does not seem to be appropriate to the aims of the initiative. It is much more promising to establish a brand such as "Printed Electronics". Thus, the region will benefit much more by that, last but not least also LiU and Acreo.

Continuity and Capacity needed in Process Management Team

Since its inception the process manager has changed three times. As from 1 May this year a new process manager was installed and an additional half time position was granted by the stakeholders for an assistant process manager. It is not clear how much autonomy the process leader will have. It would have been helpful if there were a schedule of responsibilities between the process leader and the Board.

2.4 Smart Textiles – strong linkages to university

Smart Textiles (ST) aims to establish an internationally leading position in the design, development and production of next-generation textile products in Västra Götaland. Different competences within a number of research areas are being joined up (for example, research into textile materials, electronics and medicine). Finished products include greenhouse fabrics, wound care products and sound-insulating textiles.

2.4.1 Achievements

Substantial local and regional Triple Helix-backing and enthusiasm

The initiative is based upon a strong triple helix-collaboration. It has to be emphasised that without the competent, energetic and enthusiastic process management in place the strong mobilisation would not have happened.

Well established world market leaders

There is a long regional tradition in trade and textile industry. This region also experienced the structural change in the textile market and nowadays there are only few companies left. However those we met were strong and internationally successful. There are also some remarkable new companies.

Impressive Open Innovation Arena (STTL, STDL, PF, CDP)

One of the assets of ST is the four environments, which establish the open innovation arena. The ST Design Lab (STDL) and the ST Technology Lab (STTL) are very much research and university driven. The other pillar of the open innovation arena captures the more business-oriented activities in ST. One part of it is the so-called Company Driven Projects.

Integrated knowledge platform/curriculum: technology, design & management

In 2001 a study on an Entrepreneur Program on textile innovation started, funded by the Knowledge Foundation. A second effort to lead students into the business world is the pre-incubator “Textil och modefabriken” which opened in 2007.

International acknowledged knowledge based initiative

During the first years a lot of effort was put into promoting the brand “ST” nationally and internationally. ST Tech Lab started with collaborations with researchers in the US and in Bangkok. There are also some scholarships assigned to visiting scientist. These examples show that a lot of international awareness has been reached in the first three years. But it is also quite clear that the international reputation of ST is mainly in the field of research, not in the field of commercialisation.

Linkages to regional research institutes/ Strong regional platform and importance

During the first three years ST has initiated the creation of several platforms for collaboration of research institutes and universities. Those arenas are oriented on the regional as well as the national level.

Inspiring experimental research

There are some remarkable arenas that give room for experimental research. Examples are the pre-incubator Textil- och modefabriken and the Market-place Boras. In 2013 Simonsland will open its doors, a large centre for textile, fashion, and culture converted from an old textile production site. ST was one of driving forces. Also the Textile Material Library has to be mentioned.

National linkages

Besides linking national partners via the creation of arenas ST started also to explore possible collaboration with other industries. Together with the VINNVÄXT initiative Biorefinery and TEKO discussions were hold aiming at exploring the potential for collaboration in the field of fibre research.

Growth area for University of Borås

University of Borås, founded in 1977, has six departments among others the Swedish School of Textiles. This is the only School in Sweden and one of a few institutions in the world that has, within its facilities, a full-scale textile-manufacturing environment. It is an important and – from the view of the university administration – growing part of the University.

Strong portfolio of financiers

Public authorities, the University of Borås and Swerea (a national research institute group) are important financiers of ST. VINNOVA's financial contribution over 2008 to 2011 has been only 18 % of the total.

2.4.2 Challenges

Spread of focus areas & human resources – lack of unique profile?

For the future ST is planning to broaden its thematic approach and to open ST for strategic areas such as healthcare and sustainable cities. There are also plans (or at least pre-studies) to push commercialisation by establishing further competence centres such as one on filters and a platform in Plasma-treatment of textiles. ST should be very careful in balancing the advantages and the risks of broadening the scope of areas against the background of limited human resources and the need of focussing.

Commercialisation and market impact

ST is quite strong in inventions and in generating prototypes. However, when it comes to commercialisation there is a noteworthy lack of expertise. One reason for this is that researchers are not automatically willing or able to become an entrepreneur. They also do not have the time to look for an investor.

ST should put very much emphasis on that topic in the future. Actually in the plan for 2011 to 2014 this issue is already addressed as a strategic field.

The profile of the textile industry yet to be fully understood

The review team had the opportunity to talk to some important textile companies in the region. However, it would have been helpful if the textile industry had been presented in more detail.

Baseline data yet to be gathered

In order to develop a strategy for the region consistent and up-to-date data is needed. The reports do not show this.

Functional organisational structure?

ST has a quite complex organisation. ST might evolve into two bodies, one body for the operational level and the other one for the strategic steering.

Need to integrate Experimental Research & Business Innovation

ST is based on the two pillars "Experimental Research" and "Business Innovation". The first one is research driven, the second one business driven. It seems that the knowledge flow from research to business and vice versa is very thin. This applies also for the relationship between the Design Lab and the Tech Lab.

No machinery industry in the region

One major disadvantage of the region is absence of manufacturing of textile machinery.

Too much inward focus at university level

ST is still very much university driven. The driving partners involved are mostly university staff. So the inward focus towards the university is not surprising. For the next phase further emphasis will need to be placed on commercialisation. This implies that more people from the business side will have to engage in ST.

3 The international position

An important objective of the VINNVÄXT programme is to support the development of internationally competitive innovation system. In this chapter we present the international experts view on the international standing of the initiatives from a knowledge/technological and industrial perspective.

3.1 Biorefinery – strong industrial and technological position

The Biorefinery of the Future (BoF) initiative in Ö-vik is well aligned with the modern, global trend towards developing a more sustainable and environmentally viable future, which is at least partially based on renewable raw materials such as wood.

The Ö-vik industrial base has a long history as it was originally established at the beginning of last century and was subsequently strengthened during the Second World War, when a biorefinery (the MoDo dissolving pulp mill) operated at the Ö-vik industrial site. The foundation for future endeavours is thus based on a strong technological heritage based on Domsjö, Sekab, Eurocon, MoRe Research, and a well established, excellent working co-ope-ration between the different actors and people in Ö-vik as well as strong support from the local community.

Compared to similar cluster activities in Finland, the member base in Processum are somewhat more limited and narrower than in for example the finish Forestcluster Ltd, which is a true public-private partnership at the national level in Finland. Forestcluster Ltd is a private company and the owners are the big industrial actors in areas of pulp and paper, equipment suppliers and chemical industry in Finland as well as including two major research institutes and eight universities.

When compared with the Finnish industrial site at Äänekoski, which was in a similar situation as Ö-vik after the Second World War, the all important factors such as pulp producers, paper and board producers, cellulose derivatives producer, pigment producer and bioenergy deliverer can be found at the Äänekoski site. The Äänekoski site is thus a good example of a more traditional biorefinery focused towards the production of more bulk pro-ducts on a large, modern industrial scale. Äänekoski is a typical Finnish forest product integrated production site.

There are also plans to develop a new demonstration unit for manufacturing biodiesel on this site. However, future oil prices and whether there will be support from the EU for this kind of industrial demonstrations will be very decisive in whether these plans will develop.

The main differences between the Ö-vik and Äänekoski clusters are the combination of “right people”, cooperative spirit and improving cooperation with Universities that is still developing in Äänekoski. The experienced people and technological biorefinery

culture in Ö-vik, and the more recent cooperation with regional Universities and close cooperation with the members of the local community are obvious in the case of the Ö-vik cluster.

The set up and operations of the evaluated Biorefinery of the Future in Ö-vik is thus really quite unique, at least from a Nordic point of view.

Other jurisdictions, such as Canada, have embarked on national strategies to "reinvent" the forest based industrial sector. The "Biopathways Initiative" which has been led by the Forest Products Association of Canada (FPAC) and funded by the federal Canadian Forest Service (CFS) has taken a regional, technology and market assessment approach to try to identify opportunities for forest based companies to diversify into non-traditional markets and technologies as either an "add on" to their current operations or in developing partnerships with complementary companies.

This open innovation approach is exemplified in the recently upgraded website (http://www.fpac.ca/bio-pathways-partnership) where potential partners are encouraged to review the stated strategies of the biopathways partnership, comment on the detailed economic and technical recommendations that have been made (for example, in British Columbia, traditional sawmilling will likely be at the core of a future biorefinery strategy while a pulp mill will be at the core in Quebec) and indicate how they could contributing to achieving the stated goals.

BoF has had enough initial success and is ambitious enough in its aspirations that they should be encouraged to "market their experience" so that the lessons that have been learned could be used to not only help other jurisdictions but facilitate the development of international partnerships to perhaps achieve a "network of clusters.

Most of the elements of a forest-based biorefinery already exist at Ö-vik but key elements still need to be developed and nurtured. BoF is a strong and impressive initiative that is well managed, has a very strong mental and technological background and shows even greater potential.

3.2 Peak Innovation – strong position in tourism, Out door needs to be developed

3.2.1 Tourism: competition getting fiercer and global

Tourism and in particular winter sports tourism is of crucial importance for Jämtland and an economic base for Peak Innovation (Peak). Compared to other tourism regions, Jämtland does not seem to be deprived of qualified staff in the tourism industry. Besides, large commercial actors – particular Skistar – have been successful in terms of identifying the resources in the region and linking it efficiently up with the markets. The scope and scale of winter sports have been decisive for the emerging research and commercial spin-offs. Peak is continuing and enhancing sports activities as test benches for the development of new products and services.

Sweden is a high wage/high cost country. Enterprises in the region's winter sports sector have been very capable of ensuring adequate productivity gains to maintain a continued competiveness. The main markets for tourism to Jämtland are Sweden and the neighbouring countries, with Norway as particularly important. The competitors are other ski destinations, particu-larly in Europe and to a growing extent also globally. To be able to compete improved air transportations infrastructures in Jämtland are crucial.

The popularity of destinations depends on more than facilities, prices and location. It is a long-term effort to raise the image of a place, requiring a good understanding of the customers' motivations and behaviour as well as their communicative power and willingness to be ambassadors for a place. There is an increasing awareness of the need for strategic communication in Peak, but steps have not yet been taken to strategize the communication effort.

Climate change as a main challenge for both winter and summer tourism will also provides opportunities. Jämtland might gain from an earlier decline in the Central European winter sport areas but this will eventually be counteracted by politically installed measures to compensate for climate change. Climate changes can transform the gap between summer and winter tourism and lead to the development of more overarching and entirely new concepts.

Challenges and opportunities also depend on changes in the consumer motivations and behaviour. Tourists now are less destination loyal and looking for new alternatives, requiring flexibility at destinations to be able to choose freely, expecting a variety of sights, activities and expectations on a destination to meet different needs, demanding high service quality (both personal and embodied) with a growing interest in health and environmental issues.

The involvement of public institutions in the development of tourism can create competitive advantages. However, destination management requires a continued refinement and innovation. Important issues for destination management efforts are transportation infrastructure and safety/security as well as the development of attractive built environments and landscape and utilizing publicly provided health and educational services for the tourism industry in the region. An advanced destination management and governance system may be an "export article" in its own right.

3.2.2 Outdoor: Yet to realise the potential for the region

The region covered by Peak figures 'Outdoor' quite prominently, and the area is home to a number of highly regarded Outdoor brands. The low population density and pristine natural environment will always be a draw to, entrepreneurial, owner run Outdoor businesses, but in addition, it serves as the backdrop to a greater potential for developing the region as an Outdoor tourist destination and a cluster of outdoor related enterprises.

Peak recognise correctly that there is a need to internationalise and promote the outdoor potential of the region, so far primarily through collaboration with the Scandinavian

Outdoor Group (SOG). Peak should continue their co-operation with the SOG, but also seek to broaden the level of input from other international sources. The development of an outdoor business cluster will also involve encouraging international brands to locate their Swedish/ Scandinavian operations in Jämtland. To achieve this Peak need to be careful that the presentation of the region is balanced and not overly biased towards domestic brands.

Walking, as an activity is by far the most commonly cited reason for visits to Sweden. This is relevant for the wider Swedish nature tourism sector and the greatest area of competition for Jämtland, Abisko. This is not necessarily insurmountable as the concept of developing the region as attractive in many respects such as retail; gastronomy, quality accommodation etc. could amount to a greater value offer. It is unlikely that Jämtland will attract the "true" wilderness seekers away from Abisko, but the wider target group is both larger and prepared to spend more.

The existence of, and close links to, the Mid Sweden University (MSU) is of great significance and potential value to Peak´s aspirations in the Outdoor area, but there is yet little evidence of this being used to support and build a broader Outdoor base. MSU´s research focus on the performance of elite winter sport athletes has according to the review team little relevance in supporting the aspirations of Peak Innovation in the area of Outdoor. We would rather suggest that the physiology knowledge base of MSU could be utilised for meaningful research on the impact of outdoor activities on population health, an area that is of huge significance to the entire European health policy sector, and that could put MSU and Jämtland in the forefront. Worth exploring is also the potential for MSU to support product development and testing for companies attracted into the area, a service that would be enhanced by the natural environment testing potential of Jämtland. Another area is the provision of education to provide companies considering relocating to the region with qualified human resources. Such actions are taken by the Outdoor Sports Valley (Annecy, France) together with Savoie University.

Having a clear understanding of the strengths and weaknesses of other Out-door clusters, combined with studying the wider industry, will provide Peak with an understanding of the sector that is needed in order to be able achieve their objectives. There are three obvious areas for them to concentrate on; Annecy in France, Kendal in the UK and Boulder, Colorado in the United States.

Annecy in France has an existing cluster of outdoor brands that includes, Salomon's HQ, Patagonia's European HQ & Millet. To further the region of Haute Savoie as a centre for the outdoor industry, the region set up an organisation called Outdoor Sports Valley (OSV) that together with the EOG, established an international conference that attracts outdoor businesses from all over Europe. The initiative is far from perfect, but has a lot of good points and there is considerable potential for Peak to benchmark.

Kendal - in the UK lies on the edge of the Lake District National Park, which attracts in excess of 13 million visitors each year and is the centre for outdoor activities in the UK.

The area has also become a major focus for outdoor retailing and serves as a base for brands such as Lowe Alpine, The North Face UK, Haglöfs UK, Merrel UK and Meindl footwear. Sales presentations within the modern outdoor industry are typically done in professionally constructed showrooms where the entire brand offering can be seen merchandised and presented in an appropriate manner. A cluster such as in Kendal provides major buyers with the opportunity to travel to one region and see a number of key brands in the same trip, and all this in an attractive setting that reinforces the core values of the brands.

Boulder in Colorado has a similar cluster of outdoor businesses and even houses the US Industry Association, the Outdoor Industry Association.

All three of these examples have commonalities such as being centres of outdoor activities, having prominent local brands as a catalyst for expansion etc., that also exist in Jämtland. They are appropriate regions to benchmark and will assist Peak in developing their strategies.

3.3 Printed Electronics Arena – international knowledge and technology position

From an international perspective Printed Electronics (PE) is a very competitive field, both on academic as well as on business level. Europe is in a strong academic and technological position, but compared to East Asia, it suffers from the weak commitment of global companies to the technology.

For this reason Europe has lost important business cases in several application areas (e.g. displays) in the past although the technology base was laid by European research activities. One strategy to keep PE business in Europe is the strengthening of regional clusters resulting both in a concentration of regional knowledge and competence and also in an increased backing by the national governments due to tapping into regional subsidy funds.

The international standing of the PEA in Norrköping was evaluated with respect to important PE clusters existing in Europe such as Dresden, Cam-bridge, Oulu, Eindhoven and Heidelberg/Darmstadt A close inspection of the table reveals several factors that contribute to the success of a cluster on academic as well as on application, product development and business level. Based on this European knowledge and industrial perspective, several lessons can be identified for the Printed Electronics Arena:

- The high academic level represented by the research at LiU (and to some extent Acreo) should be exploited more aggressively to incubate spin-offs from the university group (e.g. organic bioelectronics).
- A broadening of the technology platform (without neglecting the strengths and unique selling points of PEA) and well organized lab environment might enlarge the base of potential customers interested in test-bed services and is a prerequisite for open innovation strategies.

- More system-oriented and application-driven research and techno-logy development will result in the realization of marketable products.
- Strong regional companies (e.g. from paper industry and packaging industry) with international standing need to be brought into the initiative to strengthen both the financial basis as well as the application-driven research focus
- Establishment of a sustainable industrial network along the value chain (maybe also via “virtual clusters”) enables a long-term perspective of technology and product development for potential customers.

It is recommended to strengthen:

1 Application-orientated research,
2 Development of systems, and
3 Early co-operation with potential partners and users.

3.4 Smart Textiles – an international arena for knowledge production

3.4.1 The arena for knowledge production

Many crucial ”ingredients” in an arena for knowledge production with a clear international position are in place in Borås, building on the historic foundation of textile industry in the region and a strong regional support.

A wealth of knowledgeable, creative researchers working in the Smart Tex-tiles Design (STDL) and Smart Textiles Technical (STTL) labs are developing new initiatives and engaged in cutting edge projects. The linkage with other academic institutions and in particular, Chalmers University of Technology, contributes to a broad base of information resources. The cross-fertilization between design, science, engineering and production is a demonstrated part of these collective efforts.

The university-based Textile Research Lab is unique and ST is connected to facilities that are unmatched in other university-based textiles research areas globally. Supporting the equipment are skilled technical specialists knowledgeable in both traditional and digital approaches to textile production.

The concept of the Prototype Factory (PF) is one of collaboration, bringing together vital players in the facilitation of research projects. The expertise available through PF can provide a major competitive advantage, as part of a collective learning in the region. In conjunction with the Textile Material Library, PF is key in building partnerships and serving as a crucial workspace in the development of new textile research and production.

The ST Sample Collection collates material evidence ranging from experimental Blue Sky sampling to targeted testing for specific projects. The col-lection constitutes a valuable treasury that can be used as a central depository for documentation, a reference

library for future research and a tool for dissemination. In conjunction with the Textile Material Library, the resource provides essential support to research activity.

The developing reputation of ST is attracting new students at all levels that will give an opportunity to select top candidates. In particular, the PhD program includes dynamic, next-generation researchers who bring technical skills and creativity to the research environment. The organization of conferences such as *Ambience* and *Next Textile* bring global recognition to ST and to the city of Borås. Through these efforts, the Smart Lab has created a platform on which to exchange ideas and promote new perspectives in textile innovation, both locally and internationally.

3.4.2 Industrial and cluster comparison

The Smart Textiles cluster can be seen in line with a number of other textile cluster initiatives across Central & Western Europe, which have developed over the last 5-7 years such as InnTex in Chemnitz/Saxony (Germany), UP-Tex in Lille/Nord-Pas-de-Calais (France) and Textile Futures in Brad-ford/Yorkshire (UK).

In all these regions the textile and clothing industry, which was traditionally organised in dense industry clusters with substantial manufacturing operations along conventional textile-clothing value chains, has undergone a heavy restructuring process in the last 2-3 decades leading to a substantial downsizing of previously existing manufacturing capacities accompanied by a heavy loss of employment. The remaining companies had to find niches and higher added value strategies to maintain their competitive edge such as retail & mail order, functional and technical textiles, flexible small batch production/ mass customisation or the luxury market. What was maintained in this process was a significant skill, knowledge and technology base which formed the basis of the emergence of innovation clusters which benefit from the proximity of all necessary actors in an innovation chain – education, research and technology providers, industry and demanding customers.

In comparison to the above-mentioned peers in Germany, France or the UK, ST stands out for:

- Its excellent multidisciplinary (design technology, management) yet fully textile-focussed research and higher education infrastructure,
- A particularly strong commitment and support of public authorities at local, regional & national level, and
- A diverse, innovation-minded and internationally oriented industry structure.

Areas in which Smart Textiles should particularly seek improvements are:

- Internationalisation strategies
- Business & market drive

4 The Clustering process

The four cluster initiatives raise different issues in relation to clustering processes. In fact, we can say that:

- The Biorefinery of the Future is a **spun-off cluster** with a very strong innovation drive
- Peak Innovation exemplifies a **growing and diversifying cluster**
- Printed Electronics Arena is a case of an **research-driven embryonic initiative**
- Smart Textiles presents the opportunity for **cluster upgrading**

All of them present a form of firm clustering embedded in a wider regional innovation system. There is not a clear cut and agreed upon divide between clusters and regional innovation systems (RIS); however, clusters tend to coincide with agglomeration of firms specialised in a particular sector and the most mature ones would also present an articulated institutional frame- work. Well-established and mature clusters might therefore look like RIS if together with public and private institutions they also present innovation and technology dedicated stakeholders. In particular, there is ample evidence suggesting that the latter is more effective if it includes universities as well as other research organisation.

4.1 Biorefinery: a spun-off cluster with a very strong innovation drive

BoF is emerging as a spin-off from the wood processing industry, which is well established in the region and Ő-vik. The clustering of biorefinery activities started as a private initiative led by local business people who came together and established a consortium – Processum – to organise and coordinate the activities, resources and finance needed to enable the co-location of the main production stages for the biorefinery industry in the North East Swedish Coastal region.

The biorefinery cluster appears at the moment as an initiative driven by a membership-based organisation which is orchestrating the development of the industry by pro-actively pursuing the goal of building a critical mass of interdependent firms all connected to the tree processing value chain. The possibility of members and non-members to have joint projects financed by Processum, is inserting a welcoming element of spontaneity, which is crucial to the innovation drive of the cluster. This might however cause some problems to the membership nature of Processum.

As wood related activities are embedded in this part of Sweden, it is easy to see that the opportunities that the biorefinery concept offers already, and that will increasingly appeal to a growing number of regional, and perhaps even international, businesses.

The nature of the Biorefinery industry is such that it requires economies of scale at the different stages of the production process. This invites the value chain to be segmented and many firms to be stage-specialised in complementary activities – key prerequisite for a cluster. This suggests that a desirable way to kick off a cluster like this is indeed through a concerted action: that is what Processum did. Nevertheless after the initial kick-off, the growth of the cluster depends on a more spontaneous agglomeration of firms interested in exploring a wide range of technology and market opportunities, literally by 'filling-the-gaps'. This will take place thanks to the entrepreneurial intuition of larger and smaller firms, which want to explore whatever market opportunity, they see.

Indeed, the development of the Biorefinery cluster will depend on its ability to move from an orchestrated initiative – Processum and to some extent BoF – to a more organic, spontaneous and chaotic agglomeration of firms. In-deed new firms will contribute with new, varied, differentiated competences that will enrich and expand the knowledge base of the cluster; besides, as more than one firm tend to 'cover' one stage of production, healthy competition will emerge between firms within the cluster. The balanced mix of cooperation and competition will enable the cluster of firms to be constantly innovating as firms are constantly exposed to new ideas coming from within and out-side the cluster.

The development of a clustering of firms is framed within a triple helix model thanks to the BoF. Universities, government, local and regional institutions and businesses are all active stakeholders in Processum: businesses have initiated and drive the overall cluster, the local municipalities are fully engaged and the local universities which have committed resources to the biorefinery initiative in terms of blue-sky and needs-driven research. At the moment, the three parties of the triple helix are working together however under the lead of Processum, the growth of the cluster will on the other hand require each party to play a part depending on their remit and to have a broader view. For instance, Processum has been driving the 'research agenda". Although this might be an effective way to ensure that research is relevant to the firms who are involved in the market, it might foreclose technology- pushed driven innovations. The presence of Umeå University within the region ought to provide a more pro-active agenda in pursuing a Biorefinery research agenda that can feed into the biorefinery cluster. There are also incubation facilities – Almi – that will be crucial to enable now firm's formation and university spinoffs.

4.2 Peak Innovation: growing and diversifying cluster

The local economy of Őstersund and Åre has been revolving around winter tourism, with summer tourism emerging in particular in Krokom and Őster-sund.

The success of the winter tourism in Åre is evidenced by the fact it is one of Europe's top 10 winter destinations. This suggests that Åre is likely to pre-sent the key features of a winter tourism cluster. Indeed, tourism like many other economic activities tends to

concentrate in some places, in this case around a natural asset, the mountains. As an established cluster, the Åre winter tourism cluster is likely:

1 To have already developed the key economic activities revolving around winter sports, from the renting of equipment to hotels to tourist agencies. These businesses are not only co-located but have already developed buyer-suppliers linkages. In other words, the hospitality value chain is likely to be in place, albeit specialised on winter sports.
2 To host a pool of specialised labour.
3 To have favoured trust and socially embedded relationships.
4 To have relevant public and private institutions in place.

All the above suggests that the Åre winter tourism cluster is an excellent stepping stone to expand the local economy beyond winter tourism, to reduce the dependency of the local economy on winter tourism and to stretch business activities over the 12 months.

Cluster life cycle theories suggest that:

- Clusters are life forms and go through stages such as emergence, growth, maturity, decline or revival. These stages coincide with the number of firms growing over time as the concentration of firms reaches a critical mass that covers all the necessary competences.
- As clusters grow they go through a phase of sector specialisation followed sector diversification- so-called *cluster spawning*. Here sector diversification draws on the core specialisation of the cluster and on some inputs – exploiting economies of scope – creating however for different markets. This enables the cluster to sustain its growth and progressively expand its market opportunities.
- Clusters' survival depends on the diversity and heterogeneity of knowledge and technology.

The diversification of the Åre cluster into summer outdoors tourism and outdoors products seems to be natural developments from the winter tourism, but they have to be treated as different things.

Accelerating the growth of summer outdoor tourism is probably the most natural development for the region, since Krokoms and Őstersund already attract visitors during the summer months.

Drawing on the existing competences and skilled labour in the local hospitality industry, the summer outdoors activities can be developed by redirecting such resources into niche outdoor packages. Some of the tourism and hospitality services part of the winter sport cluster can be expanded and adapted to strengthen the summer outdoor cluster. The specialised local labour market in Åre can be expanded and adapted to cater for the summer season. Crucial for this the presence of education and training facilities to provide a constant flow of dedicated skills in the region. The summer out-door sector can also leverage the Åre brand to raise awareness to national and international tourists, slowly developing a cluster brand.

Similarly to the winter sport cluster, the further expansion of the summer outdoor cluster depends on three factors:

1 *Accessibility and visibility*. Infrastructure is crucial and this will require an integrated transport between air-trail-road. In the same way, a marketing campaign together with an effective communication strategy should make the region known to international markets.
2 *Offer of experiences and services*. Outdoors experiences are often embraced by people who like nature and animals; people who like silence, peace, landscape, slow life, but also by people who crave for adventure, active life, physical endurance and excitement. This means that 'being far away, peripheral, and sparsely populated, but with mountains, woods, lake, meadows populated by local fauna' becomes the attraction asset of your region. To attract visitors who can have all of such experiences, visitors must be presented with an offer of experiences and services. Peak innovation is already considering sustainable tourism and health tourism (probably the idea of wellbeing and fitness better reflect your vision of attracting healthy visitors to feel better and fitter, such as weight loss activity and diet packages); the list can be longer. The offer of experiences can reflect outdoors tourism niches targeted at different markets: families, young people, week-ends breaks on wellbeing and fitness, food tasting week-end breaks, 'learn to water-kite in a week-end or in a week'.... Evidence from other industries suggests that the offer of experiences and activities attracts a critical mass of visitors, if it is itself varied and abundant. Visitors are most likely not to do all the activities on offer, but the idea that the options are there and that they could do any of them one day if they want it, is a huge attraction.
3 *Quality of hospitality*. Hotels, gastronomy, shops and services provide the foundation for a welcoming and pleasant stay. This is probably where the region has already strengths it can leverage.

The other spin-off from the winter tourism targeted by Peak is to create an outdoors products and services industry.

From a cluster point of view, the outdoor industry in the region is embryonic. The development of the industry relies university-centred competences through links with *Sportech*. However, there is not yet a critical mass of out-doors businesses. For indigenous new firms to start up, *Sportech* must be able to design and implement a more effective commercialisation strategy. Also existing local outdoors firms could play a more leading role and contribute to push the development of the industry further depending in which product niche they are. The attraction of global brands to locate their Scandinavia head quarter in the region, or their distribution offices would also strengthen the visibility of the regions in this sector. This growth trajectory requires a complete different strategy from the one necessary to expand the tourism offering. The key conditions are R&D competences to create new businesses and to attract existing ones – partly already in place – and a deep understanding of the outdoor sector.

The development of the outdoor equipment cluster is somehow related to:

a The parallel acceleration of the outdoor tourism market as the growth of the outdoor tourism is likely to increase the sales of outdoors equipment and this could attract the main brands first to open shops and then to have a stronger presence in the region
b The ability of the university research to spin-off new born firms.

Overall, the ambition of Peak to see emerging a future *Scandinavia outdoor hub* will depend on the how the positive externalities that the outdoor tourism will create for the outdoor equipment industry.

Overall the region can successful sustain a growing and diversifying tourism-related cluster with one activity spawning another, whilst at the same time one activity feeding into any of the others.

4.3 Printed Electronics Arena: an research-driven embryonic initiative

Printed electronics is an emerging technology that is still at the stage where research is gathering pace within research institutions –especially universities – but for which demand is still to be created. PEA sees this emerging industry as an opportunity to revive the declining paper industry, which has been core to the local economy for a long time. The leap from paper mills to printed electronics is nevertheless quite large.

The emergence of printed electronic as a cluster is at this stage purely driven by the Cluster Initiative, in other words the industry is at an embryonic stage as an upgrading from the traditional and long established pulp and paper cluster in the region. As a winner of the national VINNVÄXT-programme, PEA has been able to create a research infrastructure that has all the ingredients necessary to activate a triple helix with a RIS framework. Indeed PEA shows evidence of being potentially an innovation powerhouse; however, its ability to generate a clustering phenomenon will depend on its success in creating regionally spin-off firms able to populate the industry value chain.

The cluster process will gather momentum as the industry is able to create serial start-ups by nursing entrepreneurial ventures in sector specific incubators and science parks, by facilitating funding opportunities for new firms with seed funding and venture capital and by linking up businesses with the local, national and international supply-chain networks.

As an embryonic cluster in an emerging industry, whose innovation is typically technology driven – rather demand-pulled – the single more important factor driving its development is going to be the rising of a demand for its product. At the same time, demand is likely to develop a need for this new technology when it will be made more aware of it and when needs for it will be created. For this, the commercialisation side of the industry needs to be strengthened. Their readiness to be first-mover in a new market is likely to pay-off.

The emergence of the printed electronic cluster resembles what might hap-pen in typical university-centred clusters for emerging sectors. There is a large literature on this suggesting that as demand takes form, the ability of research infrastructure to exploit its innovations by churning out applications, patents, and spin-offs is crucial to quickly achieve a critical mass of competences and firms. A bottleneck at the commercialisation stage might take innovations (which can be codified and travel across space) to be fully exploited elsewhere.

4.4 Smart Textiles: presents the opportunity for cluster upgrading

The Smart Textile Cluster Initiative is an opportunity for the upgrading of the local Borås textile cluster. In fact, Borås is the home of Swedish textiles. It hosts an historical textiles industry that grew since the 1800 from textile and trade to mail order in the 1950s for instance, but which went through a deep crisis in the 1970s. This means that the textile industry shapes the identity of the region and it is very much embedded in the region, with local stakeholders having it at heart. Local stakeholders confirm a strong commitment to the industry. Borås has therefore a cluster of textile firms, but also firms in sectors downstream the value chain as they utilise textiles, such as car industry, furniture, medical, fashion. This can provide the business basis for the commercialisation of ST.

All this indicates that Borås already hosts a textile cluster. The Initiative has the potential for renewing the industry, which, as elsewhere in Europe, has been threatened by South East Asia cheap imports at the bottom end of the market. The need to *smart up* the textile cluster with high tech and high value added textiles is therefore vital to guarantee the survival of the industry in the future.

Cluster upgrading includes competence upgrading within firms (upgrading involves moving from cheap to expensive items, from simple to complex products, and from small to large orders) as well as within inter-firm firm networks or clusters -moving from mass production of standardised goods to the flexible production of high value added, technology-intensive and differentiated goods.[2]

At the moment ST has had a minimal impact on the upgrading the local textile cluster; a key step would be to connect better with the local textile cluster; to facilitate start-up and spin-offs of innovative firms; and to enable the hand-over of new ideas to interested entrepreneurs would benefit from connecting with the local textile cluster.

[2] For more information, see **Lisa De Propris, Stefano Menghinello And Roger Sugden**, (2008) The internationalisation of production systems: embeddedness, openness and governance, Entrepreneurship & Regional Development, 20, 493–515; **Humphrey, John and Schmitz, Hubert**(2002) 'How does insertion in global value chains affect upgrading in industrial clusters?', Regional Studies, 36: 9, 1017 — 1027; **Gary Gereffi** (1999) International trade and industrial upgrading in the apparel commodity chain, Journal of International Economics 48 (1999) 37–70; **Gary Gereffi** (1999) A Commodity Chains Framework for Analyzing Global Industries, mimeo.

This connection with the local textile cluster can happen through many channels.

ST can put in place ways in which early adopters of the new ideas coming out of ER activities are identified and supported in commercialising the innovation: this means to support innovators to become entrepreneurs, namely *start-ups and spinoffs*.

Key factors to enabling the formation of university spin-offs are:

- Sector specific incubators providing coaching and mentoring; basic services such as lawyers, accountants and marketing professionals; match-making between buyers and customers; market research and commercial assessment intelligence.
- A synergetic collaboration with incubators that involves them from the initial stage of an innovation becoming a prototype. The incubator supports product development.

ST could consider ways to suggest the existing incubator to play a more sec-tor dedicated role by building a package that is specifically designed to attract those textile innovators who have an aspiration to become entrepreneurs. The move to Simonsland could provide such an opportunity.

The connection set up by the ST with the local agglomeration of firms should therefore aim at increasing the number of firms specialised in smart textiles. In fact, as the technology to produce high tech textiles is new to the local textile cluster, the overall cluster upgrading requires the creation of new businesses as early adopters and crucial players within the local value chain. The new firms will trigger a process of learning and upgrading that will extend to the local cluster, for instance, as they buy and sell intermediate goods that embody greater technology. This is a form of ‘learning through networking’. For such new firm formation the presence of a research capacity -often attached to university or publicly funded initiatives- is crucial.

There is a wealth of cases where university-centred research has been able to generate a critical mass of new businesses as thanks to spin-offs from research activities. The best known are Silicon Valley ICT cluster and Cambridge (UK) biotechnology. In such cases what was crucial was the creation of university-industry bridging activities and actors to that extent that the borders between the two become porous. This enables the translation of research into new businesses.

Not all innovators want to become entrepreneurs. In such cases, a strategy for knowledge or technology transfer can be considered to capitalise on the innovations coming out of the Technology Lab and the Design Lab, and to realise the market potential of such innovations. Knowledge transfer strategies would imply thinking of an IP strategy. As innovators hold the IP of their innovations, mechanism needs to be put in place to inform them of the opportunities of handing over their IP through licensing, or by creating joint ventures and alliances with possible entrepreneurs. Innovators must be involved in the process of hand-over and must engage with it in positive ways, as it enables their innovation to reach the final market.

ST might want to consider how it can shape and implement a knowledge transfer strategy that reassures innovators that they have recognition of their innovation and benefit from the hand-over, that the stakeholders involved are managing the process fairly and pro-actively, and finally that the business community is able to realise the commercial potential of the innovation with an appreciation of their risk-taking.

Another effective way to engender cluster upgrading is by 'using' local firms as a sounding board for what ideas to take further as they more than others meet market's needs. In the same way, the Initiative can more reactively consider suggestions and requests from the business community.

Currently, the regional innovation system in Borås appears to be unbalanced with a large university role, a relevant public institutions' role and a quite underdeveloped business role. In order to connect better with the local textile cluster and to the industry more nationally and internationally, it needs to develop functions that are at the end of the R&D processes, namely dissemination, diffusion, and commercialisation. A model to consider is the Service Centre one, as a sector dedicated service centre or sector dedicated one-stop-shop. This coordinates the provision of business services to firms in a specific sector in a specific locality – i.e. in a cluster. Firms rely on this cluster-based provider for a broad range of services that need to develop their business, to grow, but they cannot have in-house.

The opportunity of ST to couple its existing research capacity with a similar outfit would mean for it to capitalise on its research output by making is relevant for the local textile cluster. Firms in the latter must be given the opportunity to be adopters of new innovations, to test them in the market and feed responses back to research core.

5 The way forward for the initiatives

5.1 The Biorefinery of the Future

As BoF is more broadly aligned to developing a technology cluster, with Processum as a component within that cluster, a preferred future for the cluster could now be 'The Biorefinery Coast', i.e. 'The world's leading centre for Biorefinery technology, products and services based on wood'.

Realising such a preferred future will require a broad based strategic agenda that needs to be determined by wide consultation and involvement. The development agenda should reflect this need:

- The geographic area covered by such an initiative could extend from Sundsvall to Lulea and would require early discussions with a wide range of potential actors within this region;
- Such broad geographic clusters often have a hub, or knowledge centre, with spokes where regional activities are undertaken. Such spokes may, through differentiation, become knowledge hubs;
- The continuing need for R&D/Technology/Process development, driven strongly through the identification of user needs;
- Broadening the region's business base through SME incubation, proactive business mentoring; encouraging
- Spin-offs from existing organisations including universities; attracting talent to the region that extends the local capability; seed finance for new ventures;
- Skills development, technical and management training; university projects that enable students to engage with local firms; green chemistry at schools; school competitions and activities; entrepreneurship courses;
- Internationalisation: trade fair participation, investment attraction, research on export market development;
- Leveraging through extending collaboration with other clusters, in Sweden and internationally;
- Winning strong support from public agencies in Sweden and the EU for the cluster's development agenda; active Board engagement in broadening the cluster's resources;
- Creating an environment within the cluster that encourages periphery exploration in both technologies and market applications; learning-by-doing; failing faster and thus succeeding sooner;
- Creating an attractive physical environment, with schools and amenities that encourage mobile professionals to move to/stay within the region.

The Processum AB Organisation is well positioned to take on the enlarged role of a cluster organisation by providing high-level coordination and filling any competency gaps that are not covered by other organisations.

The management team and the Board for Processum AB are already in place. There is no need to establish a separate organisation for this purpose.

5.2 Peak Innovation

Peak has over the last three years established strong foundations, successfully opening up communications and links across the cluster. The separate corners of the local triple helix are now well connected and Peak has also included a fourth helix, which are the sport organisations and the voluntary sector.

Peak has clearly earned credibility and considerable influence. The initiative is acting well as a catalyst. There is a sound structure and management team in place with high level and very active governance. The initiative has succeeded in securing broad based funding and resources.

In moving forwards and developing its Strategic Agenda, Peak now has the opportunity to build on this strong position. In changing gear to a higher pace, Peak needs to clearly identify and then focus on its strategic priorities, those areas where the initiative can clearly make a difference. Hard data and international benchmarking is needed to clarify the current position and to establish realistic performance indicators both for the development of tourism and outdoor industry in the region.

Developing the cluster's preferred future

The current Vision 2016 is for Mid Sweden 'to be the leading European location for research and business development in tourism, sports and the outdoor industry'.

More specific visions, or preferred futures, for the key components within this cluster initiative could be that Mid Sweden is:

- Widely recognised within Sweden & Norway for its dynamic entrepreneurs, its outdoor lifestyle and family environment;
- Acknowledged in northern Europe as a premium winter/summer tourism destination; and
- Respected globally as a centre of excellence for winter sports technology and outdoor products.

Once the preferred futures have been shaped and finalized, then the key steps to move in this direction need to be established. This will require dialogue and inputs from across the cluster.

Forward priorities

The region needs to maximise the opportunities that are available beyond ski tourism, in particular through placing more emphasis on exploring and developing a summer tourism sector and the outdoor equipment capabilities. The region has an opportunity to substantively develop high value job growth in outdoor products and services. The appointment of a dedicated person to support the development of this activity should be considered with urgency.

An important aspect on Peak's agenda is the further development of university business links, drawing on the multiple disciplines that the university offers. The university now has the opportunity to further extend into the commercial domain, using its unique capabilities based on servicing the needs of Sweden's top winter sports athletes.

Peak should explore leveraging the capabilities of the local outdoor equipment firms through links and benchmarking with relevant international clusters. These could include Annecy, France; Kendal, UK; and Boulder, Colorado, USA.

Peak has become the region's high-level economic development coordinator. The organisation should continue its practical approach of working in partnership with others, filling gaps only when necessary. The application of CATs, short term for "Cluster Action Teams" ideally not led by Peak Innovation, may help in allowing the organisation to engage on a broader agenda with-out further stretching its limited resources. These CATs should self-destruct on task completion, rather than continue on in a committee format.

Regional leadership needs to allow Peak to focus on a few priority areas, rather than having the organisation distracted through a more generic and broad agenda.

5.3 Printed Electronics Arena

PEA now needs to broaden out from what is essentially an R&D/ techno-logy initiative to a cluster initiative. This implies extending the local knowledge and competency to applications knowhow, identifying early adapters, and firstly developing a broad base of local applications. It implies a culture within the cluster that is orientated towards learning-by-doing. Close collaboration with other clusters, including Packaging Arena, will provide further leverage. No cluster is a self-contained system, especially as specialisation deepens.

As the Review Team is recommending a broader role for PEA, the creation of a Leadership Group is recommended.

The Leadership Group is the cluster's governing body, the 'Board of Directors'. Collectively the Group needs to manage the process that creates a clear picture of the future, articulate how that is a better future than the present, and manage the route to get there. The Leadership Group is primarily a high level coordinating mechanism, linking the key actors within the cluster's innovation system.

The Leadership Group, and its small secretariat, should be seeking to fill gaps within the cluster's system, adding value where appropriate. It should not be competing with any existing organisations or structures, such as industry associations, public agencies or private firms. As the cluster evolves, others may fill these gaps and the cluster initiative should then adjust its own activities accordingly. Gaps during the early stages of a cluster initiative can include:

- Developing a clear profile and identity for the cluster, especially for a young, emerging cluster;

- Supporting targeted investment and migrant attraction to fill capability gaps and to broaden the local customer base;
- Sponsoring activities at local high schools that relate to the cluster's development agenda; developing school-business links;
- Organising participation at trade fairs;
- Creating a regular newsletter for the cluster initiative;
- Developing a web site with links to cluster's stakeholders;
- Generating local interest and awareness; media briefings;
- Facilitating links between local firms and graduates/trainees at local universities/technical colleges; locating summer secondments for students; developing a process for supervised undergraduates to be working within local firms.

As well as being the public face of the cluster, the Group has an important and very useful role in reaching politicians and senior government officials, and widening the cluster's influence.

The Leadership Group does not in a conventional sense set the cluster's strategy, but rather steers the process through which the strategy emerges. The strategy should evolve through a more transparent and open process. Cluster development is not a few deciding for many. A key component of the Leader-ship Group's activity then becomes securing the resources to support the cluster's development agenda.

Once momentum with the cluster initiative has been achieved, this Group should only need to meet around 4-6 times a year. All members are unpaid volunteers.

5.4 Smart Textiles

It is recommended that Smart Textiles should immediately establish a Task Force to bring forward a focused strategy to consolidate and enhance business driven innovation and product development. This Task Force should report to the current Board.

The focus of this Task Force is not about the future of Smart Textiles, but more fundamentally about developing the future of textiles in the region and upgrading the cluster's competitiveness, and then revisiting the role of the Smart Textiles initiative as a support mechanism.

It is recommended that the Task Force should report back to the Board by the end of October 2011. The review should be short and sharp.

The composition of the Task Force should cover the triple helix, and could be two company representatives (CEOs from one large company and a small one), a senior university representative and a senior participant from local government. The task force should be small.

It may be useful to invite outside facilitation for support the Task Force. At least one meeting should be held that is open to all within the region that has an interest in the future of the local textile sector.

Elements that the task Force might want to consider include:

- Identifying the subgroups within the cluster that have particular growth prospects where more focused development engagements could occur. This analysis needs to be strongly based on detailed company knowledge. Subgroups could have a market, a technology, an application or other focuses;
- How to more tightly integrate the different parts of the Open Innovation Arena;
- How to further develop the innovation supporting process, involving actors within and beyond Borås. Where are there opportunities to lever the Borås competencies through engagement with others, including other clusters within Sweden and beyond?
- Developing a broader based strategic approach that could include: Training & Education; Company financing; Project Management; Support and Review; IPR management; PR/Marketing/Branding of the cluster; Internationalisation;
- The financial allocation of resources;
- The preferred organisational structure for strategy implementation to support sustainability.

For Smart Textiles change is not a choice. Change is imperative if the region wishes to substantially benefit in terms of developing a wider range of growth businesses, and a larger number of high value jobs.

6 General conclusions

The concluding chapter summarises the evaluation of the four VINNVÄXT initiatives funded from 2008, initiatives in the early stages. The chapter contains two parts: a summary of the evaluation through a model to analyse the development of the cluster initiatives. The model is an attempt to capture key aspects of cluster development based on, among others, the criteria's and objectives for the VINNVÄXT program. The second part of the chapter presents the evaluators' recommendations for the initiatives and for VINNOVA.

In 2011 evaluations of two generations VINNVÄXT initiatives were conducted, the initiatives that were appointed in 2004 (and evaluated in September 2011), and the initiatives that were appointed in 2008 (and evaluated in June 2011).[3] The model presented below, as well as the recommendations from the evaluators, is based on both these two assessments conducted in 2011.[4]

6.1 A summary of the cluster development process

This section outlines a framework for the evaluation of cluster development and cluster initiatives that was developed by the International Review Teams for evaluation of the VINNVÄXT initiatives appointed in 2004 and 2008 respectively. Generalised reflections are also made in this section on the Team's findings.

Two comparative perspectives were taken by the International Teams on the cluster initiatives:

- The innovation stretch:
  - Knowledge base: academia
  - Knowledge base: firms, absorptive capacity
  - Commercialisation & Entrepreneurship
  - Equity finance: venture capital, angel funding
  - Cluster scale: potential regional impact
- The quality of the clustering intervention:
  - Governance
  - Strategic focus, including internationalisation
  - Process leadership
  - Connecting & catalysing; Leveraging the regional innovation actors
  - Raising the cluster's profile

[3] 2004: Fiber Optic Valley, GöteborgBIO, New Tools for Health, ProcessIT Innovations, Triple Steelix and 2008: The Biorefinerary of the Future, Peak Innovation, Printed Electronics Arena, Smart Textiles.
[4] The summary and recommendations will therefore, with minor changes, also be presented in the report of the evaluation of VINNVÄXT initiatives 2004.

6.1.1 Innovation stretch

Knowledge Base: academia

'Academia' broadly refers to publically funded knowledge providers, including local universities, R&D institutions and test bed facilities. This perspective assesses the quality of the knowledge base at publically funded institutions that is specifically relevant to the needs of the cluster's firms.

Co-specialisation (rather than duplication) needs to be in place between the separate knowledge providers, and open tacit information flows between them. Further, strong clusters have deep knowledge within their area of specialisation. This is supported by strong academic links, often on a global scale, with an academic centre earning a position as a 'global hot spot' within its competence area, attracting links with other knowledge centres, attracting students and attracting talent.

Comments:

Each of the cluster initiatives has a developed academic knowledge base; some are well recognised within Sweden, a few well recognised globally.

Some of the cluster initiatives are reactive, hesitant and unnecessarily cautious in making contact with potential external knowledge bases. There are benefits for many of the initiatives in becoming more systematically proactive in identifying global academic partners.

Knowledge Base: firms, absorptive capacity

This perspective explores the capacity of local firms to access, absorb, integrate, add value to, and commercialise locally developed technologies and processes, particularly innovations coming from publically funded research, including radical research. Such research is often science driven as it is aimed at expanding knowledge in a particular discipline. For it to be used by demand it requires an effort in identifying applications and incremental innovations that must be demand-driven. University spin-offs are one positive indication of user-driven applications in specialists and niche markets.

A further dimension is the position and role of the region in national or global value chains. In a globalised economy it is rather unusual that a single region – and the companies located there – would capture all activities of a value chain such as supply of raw material, product design, research and development, production, marketing and sales, etc. Most often, regions are elements of a national or a global value chain.

The regions that play a dominant role in a value chain and are crucial for market success, i.e. which host the most important members (companies, universities, etc.) will benefit most from the value system. Value chains are not static; they are changing according to market needs and are becoming more specialised without necessarily being dissected. Strong initiatives will play a major role in their value chain.

'Local firms' includes investment and talent that is attracted to the region because of the quality and accessibility of the local R&D and technology base.

Comments:

A few of the cluster initiatives still remain science and curiosity driven. In a number of the clusters, academic activity is strongly market/needs driven. Some of the initiatives have very fragmentary regional value chains, are not able to bridge missing members, or fall below a 'critical mass'. This calls for a strategic development focussing on the initiatives 'growing out' of the region by linking up with other cluster initiatives, companies and academia globally.

Commercialisation & Entrepreneurship

Competitiveness and economic growth through innovation is fundamental to the VINNVÄXT programme. Therefore systematic activities for and support to commercialisation and entrepreneurship is important for the cluster initiatives. This covers a wide range of activities from supporting commercialisation and entrepreneurship in the forming of spin out companies from university as well as support for commercialisation of market driven innovations in existing companies, both global and mainly regionally oriented SME's

Comments:

The VINNVÄXT initiatives have made great efforts to support commercialisation and entrepreneurship. The Initiatives have made significant investments in both processes as physical arenas (e.g. test beds, prototype factories, business labs, etc.). The challenge for the initiatives is to secure the flow of ideas that could lead to new products and services and/or new businesses. It also requires strategies how the investments made to promote the commercialization and entrepreneurship can be sustainable and managed in a more business-oriented way.

Equity finance: venture capital, angel funding

A key to the development of many clusters is the availability of equity finance for high growth ME's, in particular the wide availability of venture capital and angel funding. Coupled with the availability of this specialist finance is board / management advice and high level contacts. As these are integral ingredients in lifting a firm's capabilities, there are strong advantages if this finance is available within the cluster's functional region.

Comment:

The difficulty of accessing formal venture capital funds is widespread in Sweden. However, a possibly more important informal market is developing, with high net worth individuals willing to take equity positions, especially in local firms that are geographically close. Most of the cluster initiatives could be more active in matching high growth companies with local investors.

Cluster scale: potential economic Impact

The VINNVÄXT initiative is fundamentally and ultimately about regional economic growth: upgrading local competitiveness, improving productivity, the growth of existing firms (from SME's to multinationals), and the establishment of new firms.

This perspective is a very qualitative assessment of the possible medium to long-term impact of the initiative on job growth; export growth, and growth in the regional economy. It captures the multiplier effect of the initiative as it acts on creating/empowering/strengthening the innovation processes and the actors involved, on the local cluster and on the broader local economy.

A cluster initiative should be able to present hard data to local politicians and others, demonstrating its economic importance to the local community.

Comment:

While very few of the cluster initiatives presented hard data on their economic significance, it is clear that at this point in time some are very small contributors to their region's economy. The Initiative may still be exploring an emerging technology, or have yet to substantively engage beyond academia.

Some few initiatives, even if they succeed with long-term double-digit growth, are unlikely to have anything more than a very marginal impact on their regional economy.

6.1.2 Cluster Initiative Quality

Governance

The activities, and therefore the membership, of a Cluster Initiative's Board are one of the main determinants of success. Clear and sound leadership is an essential.

The Board may have needed to evolve as the Cluster Initiative matures. Ideally the Board, by the third year of a Cluster Initiative, should be business led, with a business culture, notwithstanding the active participation of regional government, industry association/agencies and academia. The culture of a cluster initiative needs to more closely reflect that of business rather than that of a public agency or that of academia.

Senior stakeholders who are active within the cluster are required, ideally C.E.Os. from local firms. Board members need to be able to activate a broad agenda for a cluster, rather than looking after the interests of their own organisation. Amongst the Board members there needs to be a deep understanding of the cluster's market and technologies. Board members that have the ability to use their connections to bring in additional resources to support the Cluster Initiative are particularly valuable.

Comment:

Some of the cluster initiatives are now strongly business led with active and committed local business people, together with senior stakeholders coming from the local universities and local or regional public and private institutions – reflecting the triple helix model – that are again pro-active, commit-ted and supportive. For others it still is

an important strategic task to develop from a mainly regional and public sector driven to a business led initiative.

Strategic focus, including Internationalisation

The development agenda for any cluster is broad, and may include, along-side technology/R&D such issues as training and skills development; the availability of equity finance; investment and talent attraction; export pro-motion and internationalisation; the development of the cluster's identity; school-business links and university-business links.

Any cluster initiative's decisions on strategic priorities and their implementations needs to be data driven, especially when Board members have diverse backgrounds. Information and figures on the latest trends the industry and related industries' employment, profitability, export markers and competition, consumer patterns, revenues, regulations, as well as macro trends such as climate change needs to be available. In addition, the governance of the Cluster Initiative may benefit from benchmarking exercises that highlight competitors, as well as unique competitive advantages.

The steps that need to be addressed in upgrading the cluster's competitive-ness need to be transparently identified, not a few seniors deciding for the many stakeholders.

Comment:

This perspective takes into account the understanding demonstrated by the Board and the process team of the wider agenda facing the cluster, beyond just the Cluster Initiative itself; and the availability and use of hard data in determining this agenda.

Few of the cluster initiatives came through strongly on this dimension. Very few could present hard data on the local economy, the cluster itself or major competitors. Again, very few of the cluster initiatives could clearly articulate the steps that need to be undertaken to lift the competitiveness of their cluster.

Process Leadership

A Cluster Initiative, as a deliberate intervention, requires competent, dedicated and authoritative process leadership. Process leadership needs to be able to operate at a high level, and to have the support of the cluster's governance. In its role, process leadership serves the interests of the broader set of stakeholders involved in the initiative. Process leadership will more easily achieve its task if it shows an attitude towards good communication, networking and bridge building – within and beyond the cluster. Process leadership depends on a mix of factors: some more qualitative relate to having strategic focus, empowering others, good social skills, able and pro-active connectors with a relevant business background, but also basic ones such as full time and dedicated time for the task.

Comment:

Most of the cluster initiatives have strong, dedicated and enthusiastic management teams in place. A few have over-stretched leadership, spread too thinly; others have relatively junior executives in place, who will have difficulty in making a substantive impact.

Connecting & Catalysing; Leveraging the regional innovation actors

The individual components within a high performance cluster need to be well connected, with tacit information easily moving amongst firms, and between firms and academia. By the third year a cluster initiative is expected to be well set-up, and to have set in place the key elements to deliver on its strategic targets. As it gains momentum, the initiative becomes more visible in the local economy and with more connections the innovation process will simultaneously work through two dimensions – market-driven and university/R&D push.

Emerging clusters tend to be fragmented and at times dysfunctional due to weak connections. Mature clusters might have long-established links and routines that need renewing, but are hard to change.

VINNOVA's core funding should be leading to the commitment of other financing to the cluster initiative. This is one result of Connecting & Catalysing. A second important result is changing mind sets within the cluster, including firms revisiting their own strategies as a direct result of the clustering process and collaborative engagement.

As the Cluster Initiative gathers pace, alongside the VINNOVA financial sup-port there should be evidence of funding coming from other local, regional, national or EU sources that further accelerates the development of the cluster.

The regional innovation actors that can bring additional resources to support a cluster initiative include among others:

- Almi
- Innovation Bridge
- Invest in Sweden
- Swedish Export Council
- Local municipality, regional council

Comment:

Some initiatives have been very successful in mobilizing further funding and resources, including EU sponsorships, as well as in securing the active support of very passionate, energetic, committed and high-level people.

Some of the cluster initiatives have yet to substantively change gear in terms of mobilising beyond an academic/test bed environment. Other initiatives are over dependent on VINNVÄXT and VINNOVA and could be vulnerable as Year Ten approaches.

Raising the cluster's profile

A successful cluster has a profile that attracts attention to the cluster in a number of dimensions:

- From well beyond Sweden's borders, facilitating international awareness and engagement by firms and academic institutions. The profile should be attracting customers, talent and new investment to the cluster.
- Within Sweden, the cluster's profile should attract increasing attention by national public agencies, banks and other support firms.
- Within the region, the cluster's profile should attract the attention of local triple helix leaders (politicians, academics and business) as well as school leavers and entrepreneurs seeking to start up a new business. Importantly, the profile should also capture the attention of neighbouring clusters.
- Within the cluster itself, increased visibility should also help in building the social glue…the connections…within the cluster, and have positive impact through the cluster's stakeholders being proud of being part of the local cluster 'team'.
- Building a cluster's awareness and image to the global level reached by a Silicon Valley or a Hollywood takes decades. But through coordinated PR and marketing, aligned around a core brand, significant progress can be made within the time frame of a VINNVÄXT initiative.

Comment:

Many of the cluster initiatives are still failing to reach out to a European, let alone a global audience. The names of some of the cluster initiatives remain appropriate only for a domestic audience; some of the cluster web sites are only in Swedish. While the cluster may well have firms and academic institutions that are active globally, this broad reach is not reflected in many of the cluster's PR and marketing activities.

6.2 Recommendations from the evaluators

This section presents the evaluators' recommendations to VINNOVA based on evaluations of the VINNVÄXT initiatives appointed in 2004 and 2008.

6.2.1 Recommendations to the initiatives

Clarify the importance and potential of the industry to the region and nationally

The evaluation panel received the impression that in some initiatives the process management, and even more importantly the regional stakeholders, do not know the economic significance of the cluster to the regional economy. The knowledge and understanding of how the initiative will contribute to current and the future regional development is crucial. This will also help to strengthen the awareness of the initiative even when the immediate impact to the regional economy might not be very strong. The same applies to the relevance for the Swedish economy as a whole.

We therefore think that it would be helpful if the initiatives would present a document that gives a clear picture of the importance and potential of the industry involved to the

region and to Sweden. This report should be based on quantitative figures (e.g. companies, turnover, employees as percentages, research facilities, etc.).

Systemic thinking and developed Business models needed for the sustainability of the initiative

The review shows that all the initiatives are discussing about sustainability, i.e. about the time after the end of the VINNVÄXT funding. Crucial for viability is a convincing concept to keep the current members in the initiative, to extend the participation and to acquire new funding. We think that strategic thinking should comprise a systemic approach linked to a business model. Systemic thinking implies that innovation within a company can only be reached in conjunction with other complementary expertise.

We recommend the initiatives to keep this concept in mind. It will make them more and more attractive to companies when they offer possibilities for regional and national collaborations also “off the beaten track”. Interesting and successful examples of this were presented to the evaluators in some initiatives.

Business models also mean that the members of the initiatives will have to financially contribute to the initiative. According to interviews with companies we are quite optimistic in that respect. Companies will pay when an initiative makes useful offers. We recommend to the initiatives to investigate the need of the members thoroughly.

Internationalisation needs to be at the core of the initiative

Internationalisation of the cluster initiative and the cluster companies are crucial for the sustainability of the initiative. The evaluation team likes to stress the need for the initiatives to act more strategically when it comes to the international positioning of the initiative and international partnership and collaboration.

We came to the view that international position is unclear to some of the participants and even to some members of the management and the board. It seems that the mind-set is yet to be changed into thinking in international dimensions.

Also, international benchmarking is not everywhere seen as a permanent and systematic task. This should be implemented in the everyday work of the management and taken for granted. Further recommendations are to include more internationally experienced (business) people in leading position. At least, branding and web site should be improved in some initiatives in order to be comprehensible to the international audience and to ease access for potential partners from abroad.

Strengthen the business dimension in governance board and process management

Some of the initiatives the review team saw are very much business led, and efforts for commercialisation are taking the centre stage of the process management. Other initiatives are in our view still too much focused on research.

We recommend strengthening the business dimension in the board and in the process management. Notably, the stakeholders are responsible for setting the course for future strategic orientation of the initiative.

Take the accumulated knowledge and experiences on innovation systems/clusters to a wider Swedish audience (regionally, Tillväxtverket, Reglab)

The process management teams have accumulated a lot of knowledge on how to create an initiative and how to keep it running. This cumulative and rich treasury of knowledge, the "tacit" knowledge of the people involved, stands out on a European scale.

Many the regional initiatives could now more systematically make their process knowledge more available for other initiatives in their region and in Sweden.

Diversity is more than Gender

The gender topic is addressed in most of the initiatives and is well implemented by projects that are supported by the initiative and by member companies and research institutes etc.

During the site visits it came more and more obvious that gender engagement is indeed an important topic but that it is not the only way in order to strengthen equal opportunity in business life, and to broaden the cluster's talent base. In some initiatives the question was raised in how far students and migrants from abroad – male and female – could be integrated into the initiative in a more sustainable way and thus become part of the regional labour force. This can be described to be a typical "win-win situation" for the region – as it improves the quality of the regional labour force; for the employer – as it stimulates cross-cultural behaviour and thinking; and for the individual – as it opens new opportunities. Thus, it is recommended that the initiatives should broaden out from the notion of "Gender Mainstreaming" to the notion of "Diversity Mainstreaming".

6.2.2 Recommendation to VINNOVA: Build on your Investment

The VINNVÄXT program is a long-term and extensive financial commitment from VINNOVA, and this sustained commitment is applauded by the International Team. An important basis for our recommendations is therefore how VINNOVA can built on and leverage the investment made in the VINNVÄXT program.

Inserting more competitive elements in the further implementation of the programme; rewarding the most competitive

The aims of the review team was – among others – to evaluate the progress the initiatives have made during the last three years and to assess the actual and the future potential for commercialisation.

In the course of the site visits the review team realised that some of the initiatives were more successful than others in this respect. For the years coming we recommend an increasing focus on those initiatives where the commercial potential is strong and, respectively, where the efforts of the process management for commercialisation were strong ("innovation stretch"). This could imply that the more promising initiatives will receive additional funding by VINNOVA for the next three years, possibly with some funding being moved from the less to the more promising initiatives.

Supporting the initiative more proactively – by stretching the ambitions

For some initiatives the evaluation team came to the view that the process management and/or the board did not fully appreciate that the cluster initiative was proceeding at a sub-optimal level, or if some of the stakeholders did appreciate this, they were unable to take the necessary action.

This would imply for VINNOVA to think about supporting struggling initiative more proactively, and earlier, in order to raise ambitions and performance. At times a short and sharp outside intervention is needed to generate change.

Use the Challenge Driven Innovation Concept to build on and link the VINNVÄXT Initiatives

The Challenge Driven Innovation Concept (CDI) is an innovation methodology that was developed by innovation practitioners. The idea is to enable companies to accelerate their innovation outcome by leveraging open innovation and crowdsourcing and thus tapping into external knowledge and perspectives.

The VINNVÄXT initiatives contain a rich portfolio of knowledge and experiences. This economic potential could be exploited even more effectively when VINNOVA creates a framework that encourages the initiatives, especially the process management, to pursue or to extend cross-fertilization, open innovation and crowdsourcing.

However, in order to be successful the initiatives have to be very clear about their own expertise and about the expertise of the other ones.

The initiatives are ”mini-VINNOVA’s” and the hands on involvement of other parts of VINNOVA is a win-win

On our site visits we saw that the initiatives are acting like “mini-VINNOVA’s” meaning that they are acting as the node for acquiring and distributing financial resources from other funds such as regional, national, and EU-funds, including other programmes run by VINNOVA. This shows that VINNVÄXT enables regions to attract additional funding.

Within VINNOVA, there could be tighter coordination amongst the different departments, aligned around the needs of the cluster initiatives.

Supporting more active learning and sharing between the initiatives

The initiatives are in our view eager to learn from other initiatives, from within Sweden and beyond.

Whilst there are already some workshops on the exchange of experiences, VINNOVA could support that process more actively and offer a platform for mutual learning. This could include workshops on generic issues such as process management, international benchmarking, innovation processes, venture capital, etc.

Tightening collaboration with supporting national actors, especially for the internationalisation of the initiatives

The initiatives need to place much more emphasis on internationalising their activities. However, it has to assume that they will not manage it internally. The resources of process management and the board members are limited given their task in keeping the initiative running.

We think the initiatives should be further supported by Swedish organisations such as the "Swedish Trade Council" which promotes international activities of Swedish companies. We recommend that VINNOVA could help and strive for collaboration with the trade council. In the evaluation 2008 the evaluation already recommended this.

A starting point in this respect could be to advertise regional innovation clusters on the web site of the Trade Council.

Establishing standardised web presence for all Swedish cluster Initiatives, such as Kompetenznetze.de

National and international visibility on the Internet is crucial for the awareness and the international positioning of an initiative in international competition. To maintain a customer-friendly website is definitely one of genuine tasks of the initiatives themselves.

However, branding and international visibility can be strengthened further by presenting a selection of the best initiatives on a web site that gives a standardised overview on the Swedish innovative networks. The German "kompetenznetze.de" is a good example for that approach. The platform campaigns for the "best innovation networks" in Germany. Applicants have to run through an assessment process of an independent jury.

Supporting regional authorities learning on the development of integrated regional innovation systems, based on VINNOVA's learning from different programmes, such as VINNVÄXT

In the previous section we recommended that the initiatives should exploit their knowledge and their experiences on building and running innovations systems or clusters by sharing it with other initiatives within their region. At the same time also VINNOVA itself has accumulated considerable knowledge and experience in how to support regional innovation systems, as is evidenced by requests to share experiences at international conferences and the on-going support in Africa.

Our recommendation to VINNOVA points into a similar direction. We think that the regional authorities that are considering supporting innovation initiatives in their region could be more comprehensively advised by VINNOVA, and through this VINNOVA assisting in raising Swedish competitiveness with a much wider approach.

Need for a more regional/client oriented work division

There seems to be a need for re-arranging the internal division of work at VINNOVA, specifically the allocation of the initiatives to the members of the VINNOVA team. The time may now be appropriate to have team members' specialising/focussing on different regions within Sweden.

Appendix 1. The evaluation team

The evaluation of the VINNVÄXT initiatives was carried out by an international team consisting of experts with:

- Academic and/or business oriented profile with excellent knowledge about state of the art on innovative clusters and innovation systems
- Academic and/or business oriented profile with excellent knowledge about state of the art in the specific field for the initiative

The experts on clusters and innovation systems participating in the evaluation of all four initiatives were:

- *Lisa De Propris*, Dr and senior Lecturer, Birmingham Business School, UK. Extensive research on clusters and innovation systems: small firms and clusters; competitiveness in clusters and regions; forms of clusters and governance; innovation; clusters and FDI; regional development; knowledge economy and clusters.
- *Alexander Eickelpasch*, Senior Economist, German Institute for Economic Research (DIW Berlin), Germany. Fields of expertise: Evaluation of innovation policy, regional economics and service industries. Research and consultancy mainly for public institutions in Germany and abroad.
- *Ifor Ffowcs-Williams*, globally recognised cluster expert and CEO of Cluster Navigators Ltd, New Zealand. Cluster Navigators Ltd is a niche economic development consultancy, taking a cluster approach to the nurturing and upgrading of competitiveness agendas.

The following international experts were part of the evaluation team:

Biorefinary of the Future

- *Lars Gädda*, Research Director of Forest Cluster Ltd, Helsinki, Finland. Long background in research and industry. Forestcluster Ltd was established in 2007 and participates in the renewal of the forest cluster by creating new forms of networking and by boosting top-level research and innovation.
- *Jack Saddler*, Professor and former Dean of the Faculty of Forestry University of British Columbia, Vancouver, Canada. He has been working in the biorefinery area since the late 1970’s and is the cur-rent Task Leader of the International Energy Agencies (IEA) Bio-energy Liquid Biofuels network.

Peak Innovation

- *Anne-Mette Hjalager*, Consultant, Advance/1, External associate professor, University of Southern Denmark. Hands-on experience in the fields of analysis, planning and performance of economic development in local and regional settings where tourism development has been a key issue.

- *Mark Held*, Director General EOG – European Outdoor Group and with a long back ground in the out door industry in various positions. EOG was founded in 2003 by nineteen of the world's largest Out-door companies, this group recognised the need for a cohesive, cross border approach to representation of the outdoor sector.

Printed Electronics Arena

- *Susann Reuter*, head of IDTechEx office in Germany, Diplom Ingenieur for Electronic Devices from Chemnitz University of Technologies. Worked in microelectronics and microsystem technologies prior to starting a second career in printing. Involved in development and manufacturing of printed electronics since early 2004.
- *Barbara Stadlober*, Mag.dr, Head of the division "Synthesis of Nano-structured Organic Systems " Joanneum Research, Austria. Currently her main interest is in the design, processing and integration of micro- and Nano scaled active and passive electronic devices based on organic materials ('plastic electronics').

Smart Textiles

- *Barbara Layne*, Professor, Concordia University, Montreal and Director of Studio subTela, one of the research labs in smart textiles at the Hexagram Institute. The lab is developing interactive cloth structures for artistic, performative and functional textiles.
- *Lutz Walter*, Head of the R&D, Innovation and Projects Department of Euratex, the European Apparel and Textile Confederation based in Brussels. Secretary of the Governing Council of the European Technology Platform for the Future of Textiles and Clothing since its establishment in 2004.

The evaluations were arranged and facilitated by:

- *Peter Kempinsky*, CEO and senior advisor, FBA Holding AB with long experience from working with innovative clusters and innovation systems in Sweden and internationally.

VINNOVA´s publications

December 2011

See www.VINNOVA.se for more information

VINNOVA Analysis VA 2011:

01 Smart ledning - Drivkrafter och förutsättningar för utveckling av avancerade elnät

02 Framtid med växtverk - Kan hållbara städer möta klimatutmaningarna?

03 Life science companies in Sweden - Including a comparison with Denmark

04 Sveriges deltagande i sjunde ramprogrammet för forskning och teknisk utveckling (FP7) - Lägesrapport 2007-2010, fokus SMF. *Only available as PDF. For brief version see VA 2011:05*

05 Sammanfattning Sveriges deltagande i FP7 - Lägesrapport 2007-2010 - Fokus SMF. *Brief version of VA 2011:04*

06 Effektanalys av forskningsprogram inom material från förnyelsebara råvaror

07 Effektanalys av starka forsknings- & innovationssystem. *Only available as PDF. For brief version see VA 2011:08*

08 Sammanfattning - Effektanalys av starka forsknings- & innovationssystem. *Brief version of VA 2011:07*

09 Samarbete mellan Sverige och Kina avseende vetenskaplig sampublicering - aktörer, inriktning och nätverk. *Only available as PDF*

10 När staten spelat roll - lärdomar av VINNOVAs effektstudier

VA 2010:

01 Ladda för nya marknader - Elbilens konsekvenser för elnät, elproduktionen och servicestrukturer

02 En säker väg framåt? - Framtidens utveckling av fordonssäkerhet

03 Svenska deltagandet i EU:s sjunde ramprogram för forskning och teknisk utveckling - Lägesrapport 2007 - 2009. *Only available as PDF. For brief version see VA 2010:04*

04 SAMMANFATTNING av Sveriges deltagande i FP7 - Lägesrapport 2007 - 2009. *Brief version of VA 2010:03*

05 Effektanalys av stöd till strategiska utvecklingsområden för svensk tillverkningsindusytri. *For brief version in Swedish and English see VA 2010:06 and VA 2010:07*

06 Sammanfattning - Effektanalys av stöd till strategiska utvecklingsområden för svensk tillverkningsindusytri. *Brief version of VA 2010:05, for brief version in English see VA 2010:07*

07 Summary - Impact analysis of support for strategic development areas in the Swedish manufacturing industry. *Brief version of VA 2010:05, for brief version in Swedish see VA 2010:06*

08 Setting Priorities in Public Research Financing - context and synthesis of reports from China, the EU, Japan and the US

09 Effects of VINNOVA Programmes on Small and Medium-sized Enterprises - the cases of Forska&Väx and VINN NU. *For brif version in Swedish see VA 2010:10*

10 Sammanfattning - Effekter av VINNOVA-program hos Små och Medelstora Företag. Forska&Väx och VINN NU. *Brief version of VA 2010:09*

11 Trämanufaktur i ett uthålligt samhällsbyggande - Åtgärder för ett samverkande innovationssystem. *Only available as PDF*

VINNOVA Information VI 2011:

01 Framtidens personresor - Projektkatalog

02 Miljöinnovationer - Projektkatalog

03 Innovation & Gender

04 Årsredovisning 2010

05 VINN Excellence Center - Investing in competitive research & innovation milieus

06 VINNOVA Sweden´s Innovation Agency

07 Challenge-driven Innovation - VINNOVA´s new strategy for strengthening Swedish innovation capacity. *For Swedish version see VI 2011:08*

08 Utmaningsdriven innovation - VINNOVAs strategi för att stärka svensk innovationsförmåga och skapa nya hållbara lösningar för näringsliv och offentlig verksamhet. *For English version see VI 2011:07*

09 Utmaningar för svensk innovationspolitik - Sex områden i behov av insatser

10 Projektkatalog - Innovationer för framtidens hälsa.

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12 Projektkatalog Smartare, snabbare, konvergerande lösningar - inom området IT och data/tele-kommunikation i programmet Framtidens kommunikation

VI 2010:

01 Transporter för hållbar utveckling

03 Projektkatalog 2010 - Branschforskningsprogrammet för skogs- & träindustrin

04 Årsredovisning 2009

05 Samverkan för innovation och tillväxt. *For English version see VI 2010:06*

06 Collaboration for innovation and growth. *For Swedish version see VI 2010:05*

07 Cutting Edge. *A VINNOVAMagazine in Chinese/English*

08 Vinnande tjänstearbete - Tio forsknings- & utvecklingsprojekt om ledning och organisering av tjänsteverksamhet. *Only available as PDF*

09 NO WRONG DOOR Alla ingångar leder dig rätt - Erbjudande från nationella aktörer till SMF - Små och Medelstora Företag.

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11 Omställningsförmåga & kompetensförsörjning - Projektkatalog. *Only available as PDF*

13 Mobilitet, mobil kommunikation och bredband - Projektkatalog. Branschforskningsprogram för IT & telekom

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Production: VINNOVA's Communication Division
Printed by: Arkitektkopia, Stockholm, Sweden, www.arkitektkopia.se
December 2011
Sold by: Fritzes Offentliga Publikationer, www.fritzes.se

VINNOVA develops Sweden's innovation capacity
for sustainable growth

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