



SHIFTing the Support of Entrepreneurship in Eco-Innovation

Work Package 9: Final report for the Eco-Innovaera project SHiFT

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1 Introduction

The project SHIFT – Support Systems for Sustainable Entrepreneurship and Transformation – has been carried out in the timeframe 2012-2016 within the first call of the EU research network ECO-INNOVERA,¹ which enables international collaborative projects on eco-innovation that are funded by the respective national funding organisations of the participating research institutions. The primary goals of the project were firstly to study and analyse how public, intermediary and private support systems for entrepreneurship are currently being provided by six key support actor types (universities, incubators, business development organizations, design service providers, funders and inter-agents); secondly, to explore how these support systems have to be changed in order to systematically boost the development and implementation of eco-innovation², and, thirdly, to make realistic recommendations for policy makers and important actors of the support system on how to redesign support systems to boost eco-innovation.

This final report contains key findings and results of the SHIFT project and comprises strategies and recommendations for redesigning support systems for entrepreneurship in order to boost eco-innovation. The strategies and recommendations formulated in this report are targeted at the European Commission and European policy makers (for the European level) and at specific actors of the support system on the local, regional and national level. These specific actors are those which have been focussed on and investigated in the SHIFT project: universities, incubators, business development organisations, design service providers, funders and interagents³.

The strategies and recommendations have been developed by the SHIFT project team by systematically evaluating the empirical results of Work Package (WP) 2 to 7 and by taking the theoretical and conceptual insights from WP 1 into account (Fichter et al., 2013). This report also based on the results of WP 8 of the SHIFT project (Fichter et al., 2016b). The aim of WP 8 was to a) evaluate any discrepancies between the current support systems for entrepreneurship and innovation and the requirements of adapted systems to specifically stimulate and support sustainable entrepreneurship and eco-innovation; and b) develop a holistic model and basic strategies for redesigning the support systems adapted for sustainable entrepreneurship and eco-innovation at national and EU-levels.

¹ www.eco-innova.eu

² The SHIFT consortium focussed on product innovations (goods and services) and process innovations and adopted the following definition: An *eco-innovation* is a product or process innovation that causes a *significant* decrease in environmental impact, while remaining economically feasible (i.e. financially viable) and being in harmony with social sustainability.

³ An interagent is defined as ‘an independent actor or player who has an agenda as intermediary, interceder, mediator or middle person *to bring people and other key resources together* for their self-interest and the interests of others in the innovation support system’. Cf. Kuisma and Fuad-Luke, 2015, p. 3.

2 The SHIFT project: Scope and frameworks

SHIFT investigated the following guiding research question:

In which regard and how do support systems for entrepreneurship have to be changed in order to effectively support the generation and implementation of eco-innovation?

There is no widespread, common understanding of the concept of support systems in the context of entrepreneurship and innovation. Based on the model of “innovation systems” and a range of related concepts in both innovation theory and entrepreneurship theory (Fichter et al., 2013, p. 24 f.) we thus broadly define “support systems” as follows:

A support system comprises all actors, institutional settings and resources that help entrepreneurs in innovating successfully. (Authors’ own definition)

We relate support systems to the entrepreneurial process or entrepreneurial life cycle from opportunity identification to market entry and growth and study and analyse how public, intermediary and private support systems for entrepreneurship are currently being provided and have to be redesigned to effectively support the generation and recommendations of eco-innovations (cf. Figure 1).

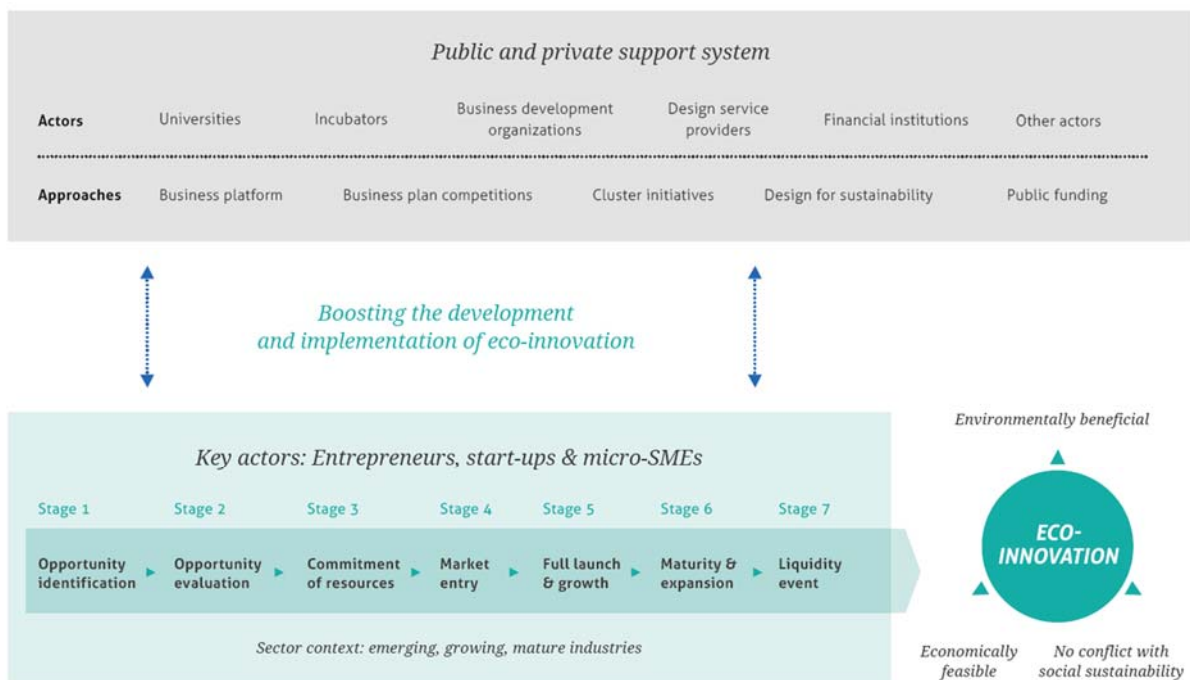


Figure 1: Actors and approaches of the support system for entrepreneurship in eco-innovation

The guiding research question contains several distinct components, which reveal the complexity of the object of research in the project. It emphasises the *need for change*, in a *systemic manner*, in a range of actors related to *entrepreneurship* and *eco-innovation*, as well as the exploration of the *kinds of changes* that are needed for an effective transformation of the support systems. The follow-

ing concepts and their description have helped to make explicit what elements the empirical investigations in SHIFT focussed on:

- *Support system* – embraces notions of hard, soft, formal and informal types of support from the key actors within various overlapping and independent support systems.
- *Key actors* – for SHIFT we selected six key support actor types: universities, incubators, business development organizations, design service providers, funders and interagents and investigated the existing support systems in Germany, Finland and Sweden and through more extensive ‘state of the art’ literature and contextual reviews.
- *Enterprise types* – depending upon the scope of the work package, focus have been given to start-ups, young Micro Small and Medium sized enterprises (MSMEs) and/or established SMEs.

Based on an overview and analysis of the state of the art in several relevant academic fields a gap concept was developed for exploring potential mismatches between the existing support system for innovation and entrepreneurship and the innovators that are intended to be supported to innovate successfully. The gap concept developed in Working Package (WP) 1 of the SHIFT project was applied in the empirical investigations of WP 2 to 7. Based on insights from WP 2 to 7 and discussions within the SHIFT team in the course of the project the following figure was developed for answering the guiding research question in which regard and how support systems for entrepreneurship have to be changed in order to effectively support the generation and implementation of eco-innovation.

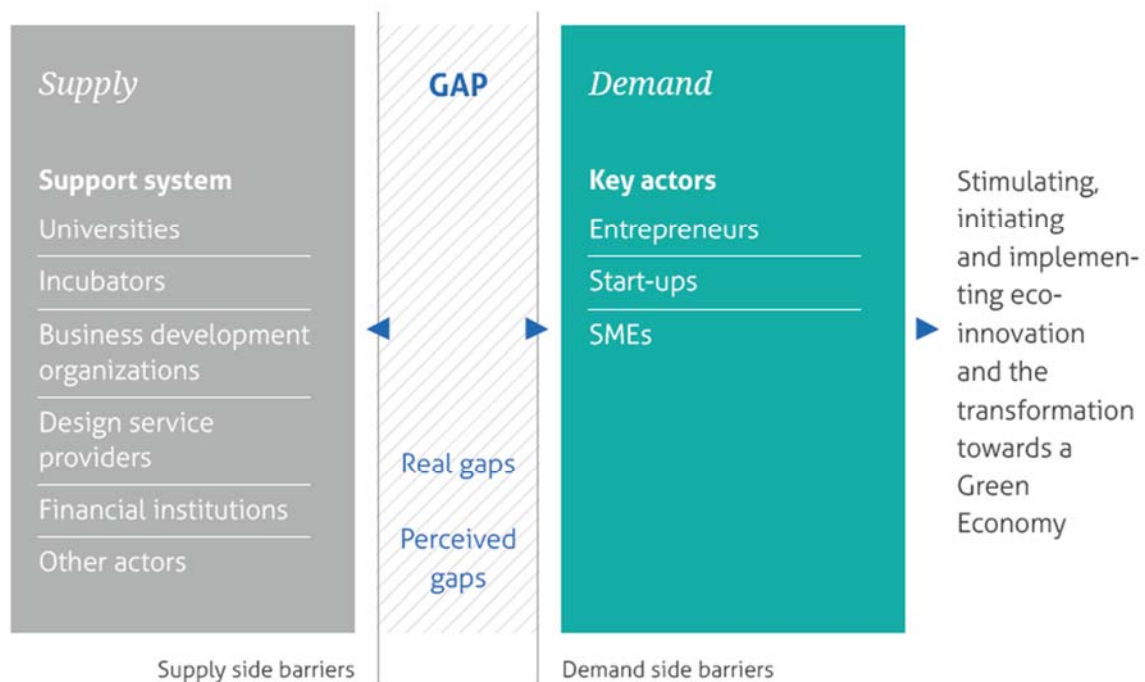


Figure 2: The SHIF T gap concept for exploring the (mis-)match between the support system and innovators

3 Results and Conclusions for Different Actors of the Support Systems

3.1 WP 2: Universities

Klaus Fichter, Irina Tiemann & Joerg Geier

Introduction

Universities play a pivotal role in promoting sustainability principles and, thus, can substantially contribute to the paradigm shift toward a more sustainable development (Disterheft, Caeiro, Azeiteiro, & Leal Filho, 2013). Universities have been charged with key roles in promoting and implementing sustainable development (UNCED, 1992). An increasing number of universities have responded to the ethical obligation to systematically integrate sustainability into their institutions (through teaching, research, operation, assessment and reporting) (Disterheft et al., 2013). Nevertheless, Lans, Blok, and Wesselink (2014) have observed a lack of interconnections between education and the research fields “entrepreneurship” and “sustainability” respectively. The integration of sustainability issues within the entrepreneurial activities and vice versa is limited to only a few cases.

In the proposal for SHIFT, universities have been identified as critical actor for the implementation of a paradigm shift in the support system for entrepreneurship and eco-innovation. The premise of WP2 is not only to explore in more detail how university entrepreneurship can serve as a mechanism to give birth to new ideas, but to use university entrepreneurship as a lever to unleash a sustainability-driven innovation revolution. Against this background the *guiding research question* for WP 2 is as follows:

In which regard and how do university support systems for entrepreneurship in Finland, Germany and Sweden have to be changed in order to effectively support the generation and implementation of eco-innovation? What can be learned from this for other countries?

Aims of WP 2

WP 2 had three *aims*:

- (1) Identification of deficits and potential of the existing university support systems with regard to support entrepreneurs in the development and implementation of eco-innovation,
- (2) Identification of good practices of university support for sustainable entrepreneurship
- (3) Make realistic recommendations for policy makers and decision makers in universities how to (re-)design the university support system to effectively support the generation and implementation of eco-innovation.

Methodology

The research *methodology* of WP 2 comprised five steps:

- (1) Developing a basic research framework (finished in Dec. 2013, working document, based on results from the following step the framework has been continuously developed since then)
- (2) State of the art: Broad review of international literature (finished in April 2014, results documented in a 85 pages report)
- (3) Analyzing existing deficits and potentials: Explorative expert interviews (12 in total, 4 in each country (FIN, D, S), finished in July 2014, result papers for each country)
- (4) Good practice research (Sept. 2014 – July 2015): Identification and analysis of 42 examples from S, SF, D, UK and USA, report with detailed results (114 pages, cf. Geier and Fichter, 2015), good practice collection with 9 cases from Europe (FIN, D, S etc.) and USA, additionally booklet (10 pages) (cf. www.shift-project.eu/publications)
- (5) In-depth case studies: Based on a multi case study design 4 case studies (2 Europe, 2 USA) (Nov. 2014 – Oct. 2015), results will be presented in journal publications.
- (6) Conclusions, transfer, paper writing (Feb. 2015 – Jan. 2016). Based on the previous steps, conclusions are drawn and recommendations for policy makers and universities are formulated. Recommendations for the redesign of the support systems will be elaborated.

Key results

Conceptual framework

While the state of the art in university entrepreneurship research offers a variety of classifications of relevant aspects and topics, none of these seem to fit exactly the purpose of a *basic framework for investigating the role of universities in supporting sustainable entrepreneurship*. Based on Xavier et al. (2012) and Rothaermel et al. (2007) we have developed a basic framework of university entrepreneurship, that subdivides the university as the unit of analysis into five key elements. In addition to *research* and *education*, which has developed historically, universities have embraced a third central function over the last few decades: to make solution- and action-orientated contributions to relevant societal challenges and problem areas. This “third role” comprises knowledge transfer, patent commercialization, joint research and implementation projects and cluster initiatives with companies and other societal actors as well as academic spin-offs and can be labelled as “*cooperation*”. This three key functions of a university are influenced and governed by its *institutional framing* (strategy, structure, culture) and is supported by various cross-cutting practical university structures and activities like research funding offices, innovation and entrepreneurship centers, start-up coaching, transfer offices etc., which we label as “*support*”. These five elements are mutually dependent on the environmental context (the national university policy, regional development strategy, innovation systems etc.) and are expected to generate benefits and positive effects for society, which can be assessed by various output indicators (like e.g. the number of academic spin-offs) and outcome indicators (like the number of jobs created in the region, reduction of greenhouse gas emissions etc.).

In regard to entrepreneurial support and the development of innovations there are numerous relations and forms of interaction between internal actors of a university and external actors. Building on the interactive school of innovation theory (Fichter et al., 2013, p. 27 f.), the theory of interaction economics (Fichter et al., 2013, p. 28) and the process model of open innovation (Fichter et al., 2013, p. 29) we use an open innovation approach to describe and analyse interaction between the university and external key actors. Since SHIFT is focussing on the role of entrepreneurs, start-ups and micro-SMEs in the innovation process, we concentrate on the interaction with these key actors. The open innovation paradigm treats R&D as an open system (Chesbrough, 2006, p. 1) and highlights the importance of shared processes, connecting outside-in and inside-out motions by working within alliances of complementary companies (Gassmann and Enkel, 2006). The open innovation paradigm has up to now put companies in the center of its conception. We put, for the first time, *universities in the center of an open innovation model* and differentiate outside-in approaches, cooperation approaches and inside-out approaches in the interaction between universities and external entrepreneurs, start-ups and SMEs.

Insights form literature review

The literature review provides three key insights:

Sustainability gap in university entrepreneurship research: Only 3 out of the 56 articles and books that we analyzed consider sustainable entrepreneurship and/or eco-innovation explicitly. There is a clear gap in university entrepreneurship research in regard to sustainability issues.

Need for interactive paradigm: Rothaermel et al. (2007, p. 740) suggest for a more comprehensive systems analysis to understand the effects of different measures on the whole system. This perspective is shared by other authors (Bradley, Hayter, & Link, 2013) who stress the fact that technology transfer and university entrepreneurship is not a linear process, but highly interactive. This supports our open innovation approach and research design, which follows an interactive paradigm and differentiates inside-out-approaches, outside-in-approaches and coupled approaches.

Relevance of university culture: The existing literature supports our assumption that university culture is an important factor in the entrepreneurship support mechanism. Strategies for integrating sustainability into the entrepreneurship support system of universities should take this into account and draw on existing conceptualizations for the cultural transformation of universities (Davies, 2001, p. 30).

Insights from expert interviews and good practice analysis

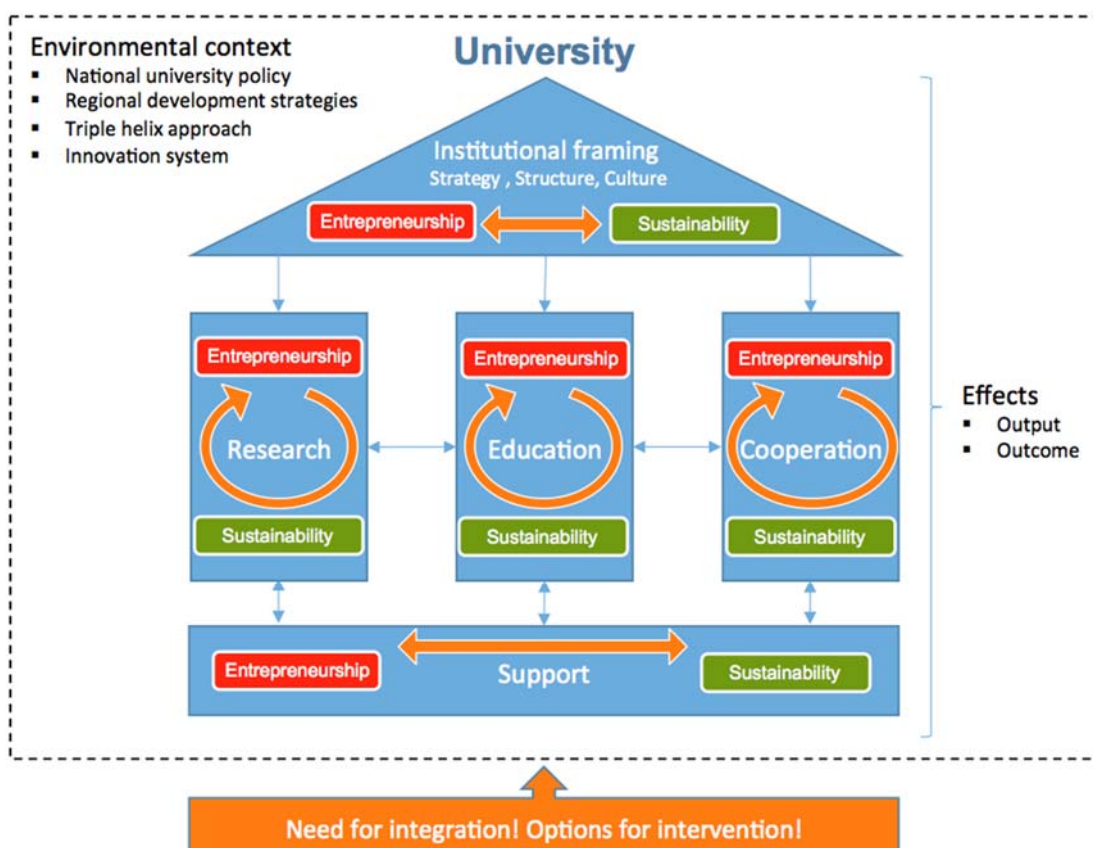
In the respective countries (Finland, Germany, Sweden) the concept of the entrepreneurial university has become very popular and has been fostered by national policy quite extensively. Also a growing number of higher education institutions are applying the concept of sustainability and follow a strategy of becoming a sustainable university. Thus, *entrepreneurial and sustainability strategies, structures and culture are emerging rapidly in these countries*, but have not yet been established on a full scale and are still restricted to a limited number of universities.

Up till now the *concept of the entrepreneurial university and the concept of the sustainable university are largely disconnected*. This is true for university policy as well as for the practical implementation in higher education institutions. Only a very limited number of universities in Finland, Germany and Sweden have implemented support activities that explicitly connect entrepreneurship and innovation support with sustainability issues and aims. In our good practice research we could identify 23 universities in these three countries that provide explicit support for sustainable entrepreneurship and eco-innovation (12 in Germany, 4 in Finland and 9 in Sweden). Compared to the total number of universities, universities of applied science and colleges (323 in Germany, 41 in Finland and 40 in Sweden) this is still a minority.

Given the fact that Finland, Germany and Sweden are leading countries in regard to high performing innovation systems and especially in regard to supporting eco-innovation (cf. Eco-Innovation observatory) it can be concluded that – on a European and international scale - *university support systems for promoting sustainable entrepreneurship and eco-innovation are still in its infancy* and can be considered to be a “*niche phenomenon*”.

Against this background it becomes clear that up till now there is *no integrated support culture at universities* that would systematically connect and integrate entrepreneurship and sustainability support. Supporting sustainable entrepreneurship and eco-innovation is not yet part of the existing support paradigm of universities. Thus, there is clear need for integration. Figure 3 displays options for intervention for developing university support systems for sustainable entrepreneurship.

Figure 3: Need for integration and options for interventions for developing university support systems for sustainable entrepreneurship



Need for redesigning support systems

What were the real and perceived gaps you found between supply in the support system you studied and the demand from the key actors, SMEs developing eco-innovation and green start-ups?

The gap analysis of the university support systems in Finland, Germany and Sweden reveals two key insights: First, there are already a few pioneering universities that provide explicit support for sustainable entrepreneurship and eco-innovation. Good practice examples can be identified in all five fields of university support (institutional framing, research, education, cooperation and support (cf. Figure 4). Second, in regard to all universities in the respective countries the supply side support for sustainable entrepreneurship is still weak, scattered and very limited. We could identify four key supply side barriers which support the assumption that there is *real support side gap*:

- Entrepreneurial and sustainability culture are emerging, but not yet established
- No integrated culture for sustainable entrepreneurship yet
- Except for a few pioneering universities (cf. above) the relevance of the start-up field “Green economy / cleantech” is not yet recognized by universities and policy makers.
- Looking at the total of all universities in the respective countries there are only very few specific teaching and support activities for sustainable entrepreneurship and eco-innovation.

Up till now there are *no systematic investigations of demand side barriers* and concrete demands of academic entrepreneurs (students, professors etc.) and regional companies in regard to sustainable entrepreneurship and eco-innovation. Given the limited resources for WP 2 we could not carry through any survey or interviews with academic entrepreneurs and companies in regard to demand side barriers. Thus there is *clear need for further research*.

While there are no investigations of demand side barriers of universities specifically there are studies which support the assumption that current demands by green entrepreneurs/start-ups are not well met by universities:

- There is a clear demand by green entrepreneurs and start-ups for recognizing greentech / sustainability as a distinct field for start-ups and innovation
- Up till now there is no or very little sustainability specific know-how and support at entrepreneurship centres and transfer offices of universities
- Presently there are no or hardly any sustainability experts and networking support for green entrepreneurs at universities to meet specific demands of green entrepreneurs

Where are the most relevant discrepancies between the current support systems for entrepreneurship and the requirements of (adapted) systems for sustainable entrepreneurship?

Summarizing the gap analysis it can be concluded that the most relevant discrepancies between the current support systems for entrepreneurship and the requirements of (adapted) systems for sustainable entrepreneurship are a research gap and a supply side gap.

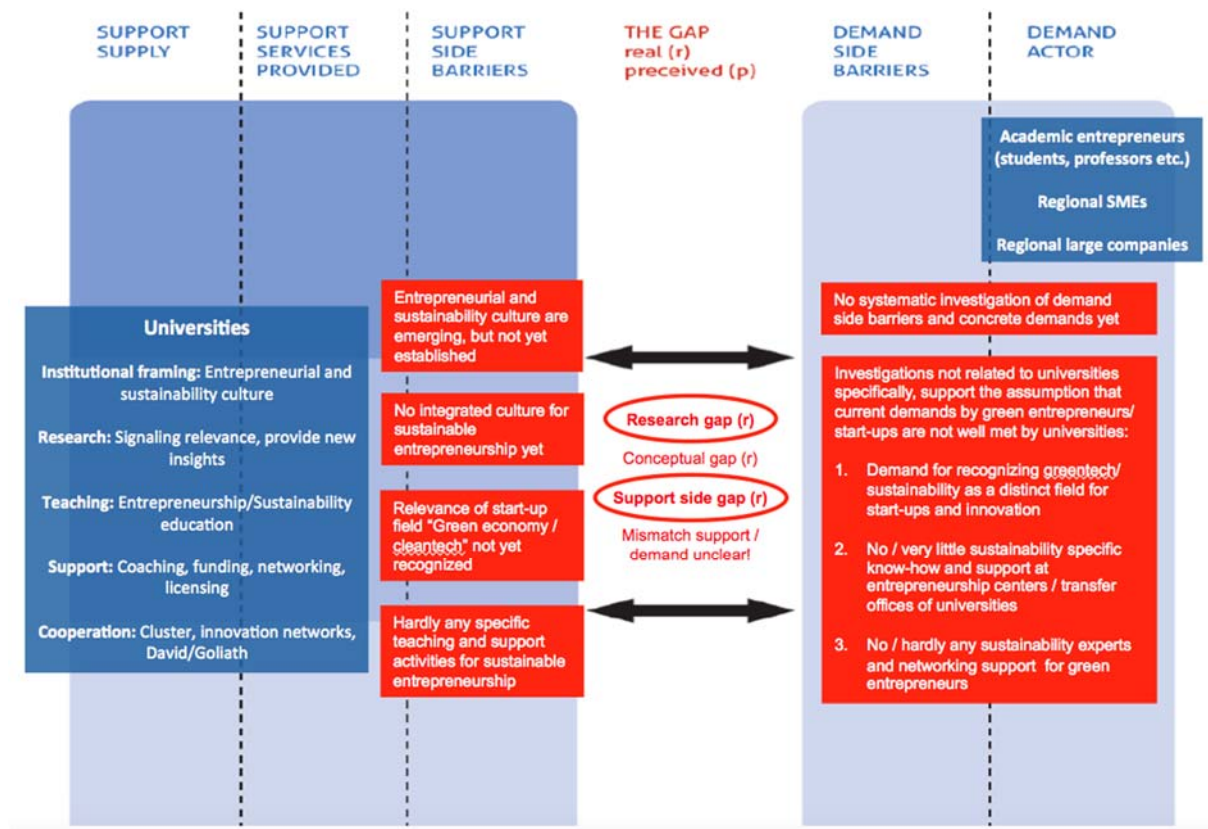


Figure 4: Results from the gap analysis of the university support system in Finland, Germany and Sweden

Is there a need for substantially redesigning the existing support system for entrepreneurship, and, if so, on what level of the support system or in what respect is it most urgent?

Yes, there is a need for a substantial redesign of the university support system! Three are elements which seem to be crucial for redesigning university support systems:

- Meet the demand for recognizing greentech/sustainability as a distinct field for start-ups and innovation
- Provide sustainability specific know-how and support at entrepreneurship centers and transfer offices of universities
- Provide access to sustainability experts and networking support for green entrepreneurs.

Conclusions and recommendations

Universities are key players in the support system for entrepreneurship and innovation. They are important with regard to entrepreneurship education, venturing schemes and venture funds as well as with regard to technology transfer and university spin-offs. Universities also have been charged with key roles in promoting and implementing sustainable development and can play a pivotal role in promoting sustainable entrepreneurship and eco-innovation.

Our research results reveal that up till now the concept of the entrepreneurial university and the concept of the sustainable university are largely disconnected. This is true for university policy as well

as for the practical implementation in higher education institutions. In our research we focussed on three European countries (Finland, Germany, Sweden). Only a very limited number of universities in Finland, Germany and Sweden have yet implemented support activities that explicitly connect entrepreneurship and innovation support with sustainability issues and aims. Given the fact that these three countries are leading in regard to high performing innovation systems and especially in regard to supporting eco-innovation it can be concluded that – on a European and international scale - university support systems for promoting sustainable entrepreneurship and eco-innovation are still in its infancy and can be considered to be a “niche phenomenon”.

Given these findings we would like to make the following general recommendations for policy makers:

- (1) **University policy:** Recognize the need for connecting the concept of the entrepreneurial university and the concept of the sustainable university! Make both concepts and their integration a evaluation criteria for universities. Develop an award for the “Sustainable entrepreneurial university”!
- (2) **Entrepreneurship policy:** Change government funding programs for start-up support at universities! Make “Sustainability” an obligatory requirement in start-up funding programs (e.g. for funding proposals, for business plans etc.), create a distinct start-up category “Green/eco-/sustainability” in statistics.
- (3) **Research policy:** Support for additional research in regard to the demand of academic entrepreneurs (students, professors etc.) for sustainability-specific entrepreneurship and eco-innovation support as well the potential mismatch between the support and the demand for sustainable entrepreneurship at universities.

The following recommendations are targeted at decision makers at universities as well as at policy makers in charge of university policy, entrepreneurship policy, innovation policy and environmental policy. The recommendations are based on our empirical research (expert interviews, good practice research, in-depth case studies) and are linked with basic strategies for redesigning support systems for eco-innovation and sustainable entrepreneurship (cf. Chapter 5).

Table 1: Recommendations and good practice examples for universities

Basic strategy	Selected recommendations for actions	Selected good practice example
1 Put eco-innovators at the centre of support efforts	Check whether a specific university has the potential to focus on sustainability and eco-innovation as a core area of its research and transfer activities. If so, this allows for addressing eco-innovators specifically and establish centers that focus on eco-innovation/greentech and for introducing chairs / tenure positions for eco-innovation / sustainable entrepreneurship. Develop a specific community of eco-innovators at and around the university.	Hamburg University of Technology (TUHH): Competency area “Green Technologies”; InnovationsCampus Green Technologies; Startup Consultant Green Technologies; Startup Prize Sustainability
2 Easy entry and sign posting for eco-innovators	Make students, post-docs, professors potentially interested in eco-innovation and green start-ups aware of existing online-platforms specifically designed for eco-innovators like www.start-green.net	The German Internet Portal for green start-ups and eco-innovators: http://www.start-green.net

3 Encourage experimentation:	The SHIFT good practice collection shows that there are already proactive approaches and that there is quite a bit of experimentation going on with sustainable entrepreneurship support at universities. Let yourself get inspired by the different approaches and select approaches that seem to fit your university.	Cf. SHIFT good practice collection of university support for sustainable entrepreneurship with nine good practice cases from Europe and U.S.A: (cf. SHIFT good practice collection)
4 Dynamic tailoring of support activities:	(1) Provide sustainability specific know-how and support at entrepreneurship centers and transfer offices of universities and connect and integrate it systematically with general start-up support activities; (2) Develop specific support activities for eco-innovators and green start-ups (3) Provide access to sustainability experts and networking support for green entrepreneurs.	(1) Technical University of Hamburg, Germany: Start-up Consultant Green Technologies and (2) Santa Clara University: GSBI Accelerator for social entrepreneurs from developing countries preparing to scale and GSBI (cf. SHIFT good practice collection).
5 Mainstreaming sustainability in the support system:	(1) University policy: Recognize the need for connecting the concept of the entrepreneurial university and the concept of the sustainable university! (2) Develop an award for the "Sustainable entrepreneurial university"! (3) Entrepreneurship policy: Change government funding programs for start-up support at universities! Make "Sustainability" an obligatory requirement in start-up funding programs (e.g. for funding proposals, for business plans etc.), (4) Make sustainability a key criterion in evaluation schemes of entrepreneurial universities (e.g. in Germany the "Gründungsradar" (Start-up radar of universities).	(1) Lappeenranta University of Technology (LUT), Finland: Strategy 2020 is based on sustainability; entrepreneurship is strongly related; (2) Leuphana University Lüneburg, Germany: Leuphana University's semester starts with a kick-off week for all first semester students. Working together as a team, they get involved in broadly conceived projects developing solutions that make our society a place worth living in. SHIFT good practice collection).
6 Specialisation:	(1) Establish sustainability and entrepreneurship as a core values and as basic principles of the university strategy; (2) integrate them in the Key Performance Indicators (KPIs) and the scorecard of the university (3) Establish centers that focus on eco-innovation/greentech; (4) Introduce chairs / tenure positions for eco-innovation / sustainable entrepreneurship. (5) Offer specialized teaching and support programs for eco-innovators and green start-ups.	(1) Chalmers University of Technology, , Sweden, is Climate-KIC's first network partner in Sweden. (2) Bren School, UC Santa Barbara: Module in "Eco-Entrepreneurship (Eco-E)". (3) University of Oldenburg, Germany: Award-winning module "Eco-Venturing" (cf. SHIFT good practice collection).
7 Assessment and monitoring of effectiveness:	Make sustainability a key criterion in evaluation schemes of entrepreneurial universities (e.g. in Germany the "Gründungsradar" (Start-up radar of universities). Include universities and university spin-offs in the Green Economy Start-up Monitor provided by the Borderstep Insitute.	No university-related good practice example of assessment and monitoring of effectiveness is known.

In our research on good practice we investigated five countries (Finland, Germany, Sweden, UK and USA). We could identify 42 good practice examples in these countries and have analysed and documented these examples (cf. Geier and Fichter, 2015). Good practice examples can be identified in all five fields of university support (institutional framing, research, education, transfer and cooperation and support). We have produced a SHIFT good practice collection of university support for sustainable entrepreneurship with nine good practice cases from Europe and U.S.A. (see SHIFT publications). Table 2 gives an overview of nine selected good practice examples.

Table 2: Good practice examples of university support for sustainable entrepreneurship and eco-innovation

	Institutional integration	Curricula/ teaching	Research	Support of concrete start-up undertakings	External co-operation
Finland					
Lappeenranta University of Technology (LUT) (http://www.lut.fi/web/en)	Key Performance Indicators (KPIs), a scorecard or other guiding principles refer to sustainability or entrepreneurship, e.g. certified ISO 14001 environmental management system; strategy 2020 is based on sustainability; entrepreneurship is strongly related; WWF Green Office label; Professorship "Environmental Economics and Management", Department of Environmental Technology	Master's programme in "Strategy, Innovation and Sustainability"; Doctoral Programme in "Environmental Technology"; Master's programme in "Energy Technology"; Courses in "Cleaner Technologies and Markets" and "Life-Cycle Costing of Investment Projects" (at LUT School of Business and Management)	Institute of Energy Technology ("LUT Energy"); Environmental Technology research areas include Lifecycle Modelling, Waste Management, Sustainable Community, Transition Management and Environment and Business	Green Campus Innovations Ltd.	Part of the International Sustainable Campus Network (ISCN) and Nordic Sustainable Campus Network (NSCN)
Germany					
Hamburg University of Technology (TUHH) (http://www.tu-hh.de/alt/tuhh/startpage.html)	Competency area "Green Technologies"; TUHH Sustainability Council; TUHH Startup Dock	Course modules: "Environmental Management and Corporate Responsibility"; "Business Model Generation & Green Technologies"; "Corporate Entrepreneurship & Green Innovation"	Research project "Academic Entrepreneurship in Synthetic Biology"	InnovationsCampus Green Technologies; Startup Consultant Green Technologies; Startup Prize Sustainability	StartersHub: Platform for Sustainable Entrepreneurship – collaboration between Hamburg-based universities and Babele.co (from April 2015)
Leuphana University of Lüneburg (http://www.leuphana.de/en/home.html)	Sustainability is one of the basic principles that guides the activities of the university; sustainable guidelines noted in university's mission statement; Centre for Sustainability Management (CSM); Chair for Sustainability Management; Junior Professorship in "Social Entrepreneurship"	MBA in "Sustainability Management" General studies are mandatory for all first semester Bachelor students, module "Science bears Responsibility" accounts for 1/3 of a semester and covers sustainability issues and illustrates ethical behaviour; master studies: "Sustainability Sciences"; PhD: "Sustainability Sciences"	Research project: "Sustainability-oriented business model assessment" EU Tempus project ConSus – Connecting Science-Society Collaborations for Sustainability Innovations I4S (Innovation for Sustainability) EU project	Professional School's Start-up Service; Innovation Incubator of Lüneburg; Innovation Network "Sustainable SMEs"	As part of the I4S (Innovation for Sustainability) research project, under the leadership of The Academy of Business in Society (EABIS), Leuphana together with seven leading universities.
University of Oldenburg (http://www.uni-oldenburg.de/en/)	"Sustainable Entrepreneurship" is a core topic of the university; Adjunct Professorship in "Innovation Management & Sustainability"; Oldenburg Centre for Sustainability Economics and Management (CENTOS)	Master cluster with 9 master programmes in sustainability, energy and environmental sciences; Master's programme "Sustainability economics and management (SEM)"; "Eco-Venturing" module: part of the University of Oldenburg's Master's course in "SEM"	CENTOS: research in areas such as innovation management, the generation of sustainability innovations, the creation of 'green' future markets, and eco-entrepreneurship	Sustainability-specific start-up support (coaching, mentoring etc.) in the fields of climate change, cleantech and energy; ideas competition for SMEs in the field of climate protection and adaptation	Collaboration with local enterprises, especially in the area of sustainable entrepreneurship; regional SME network initiative for climate protection and adaptation; partner in "StartUp4Climate", the first national initiative for a Green Economy
Sweden					
Chalmers University of Technology (http://www.entrepreneur.chalmers)	University vision "Chalmers for a sustainable future"; Chalmers Challenge Lab	All students take 7.5 credit hours' worth of classes in environment and sustainable development.; M.Sc. in "Design for Sustainable Development"; M.Sc. in "Sustainable Energy Sys-	Chalmers Initiative for Innovation and Sustainability Transitions (CIIST)	Chalmers Innovation offers to inventors and start-ups money and experience; Encubator (<i>generic offering</i>) in collab-	Core partner on Climate-KIC's master programme (first one in Sweden); as part of the Climate-KIC's Building Technologies Accelerator,

	Institutional integration	Curricula/ teaching	Research	Support of concrete start-up undertakings	External co-operation
se)		tems”; M.Sc. in “Innovative and Sustainable Energy Engineering”; M.Sc. in “Innovative and Sustainable Energy Engineering” (part of NST partnership)		oration with the Chalmers School of Entrepreneurship	Chalmer’s ‘living lab’ brings together multidisciplinary teams across Europe to address the climate impact; Nordic Five Tech (NST) partnership
United Kingdom					
University of Manchester, England (http://www.manchester.ac.uk)	Strategic plan for 2020 (puts an emphasis on social responsibility and environmental sustainability); Manchester Institute of Innovation Research; Sustainable Consumption Institute (SCI); two separate professorships on “Innovation and Sustainability” and “System Innovation and Sustainability”	B.Sc. in “Management (Innovation, Sustainability and Entrepreneurship)”; M.Sc. “Innovation Management and Entrepreneurship (IME)”; undergraduate courses on “Sustainable Development for Electrical and Electronic Engineering”, “Cases in Sustainable Development”, “Interdisciplinary Sustainable Development”	“Innovation and sustainability” (Manchester Institute of Innovation Research); “Sustainable consumption” (at the Sustainable Consumption Institute)	Manchester Enterprise Centre; “Venture Further” business start-up competition at the Manchester Enterprise Centre; The University of Manchester Innovation Centre (UMIC) (<i>generic offering</i>)	Part of the I4S (Innovation for Sustainability) project, under the leadership of The Academy of Business in Society (EABIS)
USA					
Presidio Graduate School, San Francisco, California (http://www.presidio.edu)	Presidio Graduate School focuses solely on sustainable management education; it embeds sustainability in every course	Master’s degrees in the following formats: MBA, MPA, and Dual MBA/MPA programme in “Sustainable Management”; JD/MBA with University of California Hastings College of the Law; curriculum integrates real-world sustainability projects with clients as part of an Experiential Learning programme.	Research & Case Development Program supports applied research and case study development.		Field study partnerships in sustainable energy sector; student teams partner with external organizations based on the specific needs of their partner; projects at overseas partner locations; corporation-sponsored innovation projects
Santa Clara University, Santa Clara, California (http://www.scu.edu)	Miller Center for Social Entrepreneurship: social entrepreneurship accelerator and mentorship; impact investing	Global Social Benefit Fellows programme: Frugal Innovation Lab at School of Engineering	The Willem P. Roelandts and Maria Constantino-Roelandts Grant Program	GSBI Accelerator (for social entrepreneurs preparing to scale) and GSBI Online (for social entrepreneurs validating their model) programmes	The Miller Center for Social Entrepreneurship draws on social entrepreneurs with a focus on disadvantaged communities and mentors that are part of the Silicon Valley ecosystem
UC Santa Barbara, Santa Barbara, California (http://www.ucsb.edu)	“Eco-Entrepreneurship” is a core topic at the Bren School of Environmental Science and Management; Professorship in “Corporate Environmental Management”; specialization in Corporate Environmental Management (CEM)	Master of “Environmental Science and Management” (MESM); modules in “Eco-Entrepreneurship” and “Corporate Environmental Management”; the Bren School and the Technology Management Program at the College of Engineering allow for elective courses to be taken across programmes.	The Bren School Strategic Environmental Research Initiative (SERI)	UCSB Office of Technology & Industry Alliances (TIA) Startup Support Program; UCSB New Venture Competition (<i>generic offering</i>)	Faculty Impact: Collaborative faculty policy work - consulting and advisory roles; Capstone Project/Module in “Corporate Environmental Management” or “Eco-Entrepreneurship”; Eco-Entrepreneurship Advisory Council

3.2 WP 3: Incubators

DzAMILA Bienkowska & Magnus Klofsten

Introduction

The aim of this working package entitled "The Role of Incubators in Supporting Sustainable Entrepreneurship" has been to investigate deficits and potential of the existing incubator support systems for sustainable entrepreneurship in Finland, Sweden and Germany. Incubators are governmentally supported organisations that support and develop selected new firms that have some growth potential. The overall research questions have been: 1) What entrepreneurship support do existing incubators for sustainable businesses offer? 2) What are the strengths and weaknesses of the incubators in relation to sustainable entrepreneurship? 3) What can we learn from good practices in the sustainable entrepreneurship field? As parts of this work we have done an extensive literature review on incubators, three case studies on incubators (one in each country), a case study on an entrepreneurship programmes aimed to support green business start-ups and finally a survey of all types of incubators (both conventional and sustainability-oriented) in these three countries.

The overall result show that incubators and how to promote young firms has over the past 20 years been a major research interest. However, there are few studies about green or sustainable incubators. The case studies show that incubators with sustainability focus differ in their approaches to selecting tenants. There is a risk that if they do not receive enough applications from sustainability-oriented start-ups they tend to take in all kinds of start-ups and thus broaden their mission. In an opposite situation (receiving more applications than spaces available) incubators tend to be more strict in their selection of tenants and practise sustainability criteria in line with their original mission. However, support provided by the case study incubators is similar to what a conventional incubator might provide, in particular when selection of tenants is based on the characteristics of the individual entrepreneur rather than the idea itself.

The survey has shown that a green profile seems to be important for many incubators and that there are some green tenants already within incubators in the three participating countries. Nevertheless, when selecting new tenants most incubators do not apply criteria relating to sustainability. An encouraging sign is that many incubators state that they would refuse tenants with adverse environmental impacts, implying that economic development should not be accepted when it bears an obvious high environmental cost. When it comes to provision of support to their tenants there are notable differences between the participating countries with the Swedish incubators being on average most actively engaged in their tenants and the German ones on average least actively engaged. Limited engagement offers limited opportunities to contribute to a "greening" of the incubator tenants.

In conclusion, there seems to be a lot of good intentions regarding sustainability and incubators, but the actual selection and support of tenants still seems to be less than impressive in this regard. We see a possible untapped potential here that could be addressed through e.g. specific searches for potential green tenants or tenants interested in greening of their business, combined with provision of advice and support focused on sustainability, for example environmental performance assessment or sustainable design. An example of good practice in this area that could be integrated into incubator environment is a training programme called ENP – Entrepreneurship and New Business Development Programme for the green industries. The programme gives opportunity to develop skills and

inspires the participants. Additionally, the structure and process of the programme is designed in a way that is intended to support the building of networks amongst the different participants and projects. Such programme could serve as an introduction to being integrated into an incubator.

Key results

Here follow the ten key results encompassing all data collection and the literature review from WP3 "The Role of Incubators in Supporting Sustainable Entrepreneurship":

- (1) Incubators and how to promote young firms has over the past 20 years been a major research interest. Incubators are considered as important regional actors that contribute to growth and development of new firms. However, there are **few studies about green or sustainable incubators**.
- (2) Incubators with a sustainability focus differ in their approaches to **selecting tenants**. Based on our case studies, if the incubators not receive enough applications from sustainability-oriented start-ups they tend to include all kinds of start-ups. In an opposite situation (receiving more applications than spaces available) incubators tend to be more strict in their selection of tenants and practise sustainability criteria in line with their mission.
- (3) Support provided by the case study (sustainability-oriented) incubators is similar to what a conventional incubator might provide, in particular when selection of tenants is based on the characteristics of the individual entrepreneur rather than the idea itself. The networks and competence available within these sustainability-oriented incubators mean that in case tenants require **specific support** related to sustainability ideas, this competence is available either in-house or through the networks of the incubator such as universities, technology clusters, investors and sponsors.
- (4) A **green profile** seems to be important for many incubators as shown in our survey. There are some green tenants already within incubators in the three participating countries: Finland, Germany and Sweden.
- (5) The survey shows that most incubators do not apply **criteria relating to sustainability** when they are selecting new tenants. This could be due to the characteristics of applicants, i.e. that it is difficult to get tenants when strictly applying such criteria as our case study interviews suggest. Possibly it is also related to the fact that regional or national economic development is the most important aim for overwhelming majority of incubators, taking precedence over sustainability concerns.
- (6) Nevertheless, many incubators in the survey state that they would **refuse tenants** with adverse environmental impacts, implying that economic development should not be accepted when it bears an obvious high environmental cost.
- (7) A majority of the Swedish incubators in the survey state that they provide some kind of active **encouragement for "greening"** of the tenants businesses, however only about half of them include specific sustainability or environmental expertise in their business development processes. A considerably smaller share of incubators in Finland (approximately one fourth) and

an even smaller share of the German incubators (approximately one sixth) actively encourage greening.

- (8) Overall, the incubator support system is characterised by **good intentions regarding sustainability**, but the actual selection and support of tenants still seems to be less than impressive in this regard.
- (9) Concerning incubators and sustainability, **more could be done** to realise their potential for contribution to the transformation, e.g. specific searches for potential green tenants or tenants interested in greening of their business, combined with provision of advice and support focused on sustainability, for example environmental performance assessment or sustainable design.
- (10) We suggest that some kind of **training programme** could serve as an introduction to being integrated into an incubator. An example of good practice in this area is the Entrepreneurship and New Business Development Programme for the green industries (ENP). This gives opportunity to develop skills and inspires the participants. Furthermore, a programme is a meeting arena that can facilitate networking and learning between people who are in similar working situation.

Need for redesigning the support system

What were the real and perceived gaps you found between supply in the support system you studied and the demand from the key actors, SMEs developing eco-innovation and green start-ups?

- On average - incubators would like to be more green than they currently are; meaning that having a green profile is considered important by the incubators, but actual fulfilment of a green profile is more difficult to implement
- Some incubators face difficulties in recruiting sustainability-oriented firms to their programmes, which might lead to a drift away from their original missions
- Incubators depend on a rich local environment consisting of or attracting talented entrepreneurs, new ideas, and a relevant knowledge base – since without quality inflow it is difficult to create quality outflow

Where are the most relevant discrepancies between the current support systems for entrepreneurship and the requirements of (adapted) systems for sustainable entrepreneurship?

- Incubators could play a larger role in an adapted system, for example engaging in “greening coaching” that could be relevant for a bigger target group of firms
- Incubators on average need to sharpen their skills with regard to recognizing if expert “green knowledge” is needed by an associated firm and being aware of what such expert knowledge could contribute with
- Indicators need to be developed that can steer incubators towards fulfilling their sustainability-related missions; currently such indicators are underdeveloped in most incubators which means that sustainability goals are less prioritized

Is there a need for substantially redesigning the existing support system for entrepreneurship, and, if so, on what level of the support system or in what respect is it most urgent?

- There is a large potential to develop the existing system through integrating green knowledge in established institutions such as incubators
- A challenge is to truly integrate sustainability-related issues into traditional business development processes. It is important that these types of issues are implemented into the entire support system and not being seen as an “add-on” but an integral part of conventional business development.

Are there best practice cases you would recommend to look at?

- Green Garage case (see below)
- Entrepreneurship and New Business Development Programme for the green industries (ENP) (see WP3-report)

Good practice example – Green Garage Berlin

“Green garage (GG) is an incubator located in Berlin that was started in spring 2013 in order to exclusively target climate innovations and since then has supported 42 start-ups. The mission of the incubator is to support climate entrepreneurs with relevant climate-related ideas from idea stage to investment stage transforming their ideas into a business with commercially viable products and services including associated potential customers and investors within 12-18 months. GG is part of a European private-public innovation partnership called climate KIC that runs and manages Green Garage.

GG has rigorous criteria in choosing their tenants. GG considers enterprise being sustainability oriented if it works toward reduction of carbon and the climate impacts. It is obligatory that the idea of the entrepreneur has a clear connection to either reducing the rate of climate change or adapting to it to get admitted to GG. Since a lot of start-ups and applications with new sustainability oriented ideas are coming to GG in order to get a chance to get accepted to accelerator programme start-ups should go through two stages application. They should both apply through a written application and also a presentation to a jury both from climate KIC members and external experts like investors, entrepreneurs, and academics working with entrepreneurship.

Green Garage has a selection criterion, which is common with many conventional incubators, which focuses on the team behind the idea, the scalability of the business model and the competitive advantage and /or innovativeness. However, the most important and the common core review criteria for evaluating accelerator proposals/pitches is the climate impact that differentiates GG from other incubators. Since an essential part of the portfolio of Green Garage is about climate change mitigation and adaptation, the evaluation of the ideas of potential tenants in this regard is important.

Start-ups go through an 18 months programme with three stages. In the first stage the focus is on developing an appropriate business model, and learning business fundamentals. Stage two focuses in validation and verification of the business model, and stage three is finding investment or capital and protecting the idea. During all three stages the start-up gets a funding through scholarship from the accelerator and they have access to business coaches, training, workshops, seminars and master

classes. They can even participate in European wide competition for climate KIC start-ups. Entrepreneurs have to pitch each stage to get to the other one, and not all teams go through the whole programme. There is also an Alumni phase afterward where start-ups have the possibility to stay in the loop, keep in touch with GG, get invited to workshops and connect to other partners but without any funding.”

Conclusions and recommendations

Incubators are today an established part of innovation support systems in many countries. They have in most cases a regional scope and are often co-financed by policy actors at various levels (EU, national and regional). They are governed through policies, mission statements and indicators that are used for evaluation, which serve as a basis for getting access to financing. Incubators can be general and have a broad scope with regard to which industries they support, but some incubators can have a more specific focus, e.g. ICT industry, cleantech or life science.

In this study of incubators in Germany, Finland and Sweden we have found that on average incubators show a lot of interest in acting as catalysts for sustainable development. That could mean both supporting already sustainability-oriented firms, and also developing conventional firms in a more sustainable direction. Some incubators with a strategy of recruiting only sustainability-oriented firms face difficulties in finding enough firms in their surroundings so that these could carry their operations. Peripheral areas with low density of firms seem to have more difficulties with recruitment than big city locations (e.g. Berlin where the Green Garage incubator is situated). Recruitment is also potentially dependent on many other factors, such as the newness of the incubator (where a newly started incubator could attract a pent-up demand from firms), timing in general (e.g. societal trends, media attention), how well known the incubator is, and availability of additional funding.

An interesting complement to the traditional incubator that was described in section three is an entrepreneurship training programme. The programme admits sustainability-oriented entrepreneurs and firms that are offered business expertise in combination with coaching, mentoring and networking. Such a programme could serve as a recruitment & selection tool for incubator managers, an introduction to entering an incubator, or even as an alternative to being located in an incubator, for example in peripheral areas where recruitment could be a challenge for an incubator but interest in sustainable business is still present. Participating in an entrepreneurship programme as a preparatory step for an entrepreneur before approaching an incubator would mean that the limited time spent in an incubator could be used in a more efficient way. Furthermore, such programme could also be integrated with other incubator activities and supplement these when developing the businesses.

Based on this study we would like to make **three general recommendations** for support systems:

Firstly, incubators should strive to adapt their recruitment strategies to the local and regional conditions and facilitate sharing of relevant experiences and learning between recruited firms even if they are active in different industries. Entrepreneurs’ interest in sustainability could be evaluated during recruitment process and taken into account besides the business idea/type of industry itself.

Secondly, we suggest that some kind of structured and time-limited development programme should be offered to all incubator firms. During such programme incubator firms should be put in touch with

experienced role models, coaches and mentors – both from sustainability-oriented firms and from conventional firms that have developed in terms of sustainability.

Thirdly, we recommend incorporating more competence on sustainable business development in all types of incubators. Since sustainability is relevant in almost any industry nowadays this should in some way or form be a natural part of business development, especially in the early phase of a new venture when routines and formalities are still not set.

Recommendations

Given the findings above, what are your **practical recommendations for policy makers**, and support actors for improving the support of (1) green start-ups/SMEs (the eco-enterprises) and for (2) greening start-ups/SMEs (enterprises wishing to green their operations)?

Incubators should strive to adapt their recruitment strategies to the local and regional conditions. Collaborations with other actors in the support system (e.g. cluster initiatives) could be used to enlarge the recruitment base in less dense/more remote regions. Virtual incubators could be a helpful solution for reaching a critical mass of participating firms.

Some kind of structured and time-limited development programme should be offered to all incubator firms. During such programme incubator firms should be put in touch with experienced role models, coaches and mentors – both from sustainability-oriented firms and from conventional firms that have developed in terms of sustainability.

We recommend incorporating more competence on sustainable business development in all types of incubators. Since sustainability is relevant in almost any industry nowadays this should in some way or form be a natural part of business development, especially in the early phase of a new venture when routines and formalities are still not set. Relevant indicators that are used to follow up sustainability-related goals should accompany such development.

The recommendations in Table 3 are directed towards incubators (both public and private) that have interest in working more directly with sustainability-related businesses. Some of the recommendations also address the regional and national policy levels where overall policies for innovation and incubation systems are shaped.

Table 3: Recommendations and good practice examples for incubators

Basic strategy	Selected recommendations for actions	Selected good practice example
1 Put eco-innovators at the centre of support efforts	Incubators can reach out to eco-innovators and adapt their selection criteria to accommodate sustainability-related goals	Green Garage, Berlin (one of a few specialized incubators for climate entrepreneurs)
2 Easy entry and sign posting for eco-innovators	Support should be accessible but should in return demand engagement and devoting of time for participation from the entrepreneurs. There could be more focus on entrepreneurial intentions of individuals rather than on “greatness” of the ideas when selecting incubator tenants. Creating pre-incubation activities reaching potential tenants – this can facilitate access to the incubator for new ventures	LADEC in Finland uses the Protomo method for team-based business development where the support organisation helps a new venture form a team of entrepreneurs with complementary competencies.
3 Encourage experimentation	A training programme for green start-ups can be offered to interested entrepreneurs (even those that are not tenants in an incubator) – such program could be seen as a pre-step to becoming a tenant within an incubator and allows for development of novel ideas and entrepreneurs. Openness towards participation in activities that promote entrepreneurial mind-sets, idea development, facilitate networking and trust-building	The Green Entrepreneurship Training Programme (ENP) in Sweden aimed towards stimulating entrepreneurship within green industries
4 Dynamic tailoring of support activities	Coaching, mentoring and workshops can be tailored to suit current demand from start-ups and incubator tenants. Creating a network of senior entrepreneurs and experts is vital in order to be able to connect new ventures with the right competencies – here it might be fruitful to use alumni tenants.	The Green Entrepreneurship Training Programme in Sweden involves flexible models of coaching and support
5 Mainstreaming sustainability in the support system	Incubators could integrate sustainability-related expertise and support for greening of conventional ventures into their processes, e.g. services within sustainable design, or environmental performance assessment. Putting sustainability in the spotlight through e.g. highlighting successful tenants and exploring possibilities for integrating sustainability into the regular business support processes.	Our studies have not clearly indicated availability of a good practice example
6 Specialisation	More specialised incubators with clear sustainability strategies could be established in places/regions where there is a long-term supply of potential tenants. Incubators should take into account the characteristics of the surrounding catchment-area of potential tenants when shaping their specialisation strategy in order to ensure a steady inflow of new ventures.	Green Garage, Berlin (one of a few specialized incubators for climate entrepreneurs)
7 Assessment and monitoring of effectiveness	Some interesting indicators could be e.g. (a) demand for becoming a tenant in an incubator; (b) how many ventures that complete an incubator process (i.e. the ventures find it worthwhile to proceed with their development regardless of viability of initial idea); (c) integration of incubator activities within the larger support system (e.g. through collaboration, co-financing, networking activities). Every incubator needs to continuously adapt to local/regional conditions and develop ways to reach out to and support the entrepreneurs in its surroundings. Flexibility in policy and management is therefore important.	This aspect has not been directly studied in the WP, however to our knowledge VINNOVA in Sweden (and previously ALMI) have an elaborate evaluation/monitoring system used for evaluating and decisions regarding future financing.

3.3 WP 4: Business Development Organisations

Olof Hjelm & Wisdom Kanda

Introduction

Experience from supporting small enterprises environmentally driven business development demonstrates the importance of a Triple Helix approach that involves different Business Development Organisations (BDO; Hjelm, 2011) and cluster initiatives (as defined by Ketels and Memedovic, 2008 p. 348). A small company cannot have all competences needed for eco-innovation and sustainable entrepreneurship and is therefore dependent on different actors in the innovation system for support. Using the Triple Helix model the innovation system is described to consist of three different types of actors; industry-academia-supportive organisations (see Etzkowitz and Leydesdorff, 2000). Business development organisations and cluster initiatives are mainly belonging to the supportive organisations.

This WP aims at *identifying relevant business support organisations and examines their potential* in supporting eco-innovation and sustainable entrepreneurship, identification of best practices and conclusions for a paradigm shift of the support system. This work package focuses only on public-owned business development organizations and cluster initiatives due to their key role in sustainability related activities and also the practicality of studying them compared to the numerous number of private intermediaries (see Kivimaa, 2014).

The findings reported are based on case studies on the support activities of business development organisations including cluster initiatives in Region Skåne, Sweden and North Rhine Westphalia, Germany. Data collection and analysis was based on an approach inspired by technological innovations systems literature (e.g. Bergek et al., 2008).

Key results

Below follows a presentation of the main findings from WP4. First we describe different support functions identified, followed by examples of current good practice and discrepancies between current support activities and a well-functioning support for eco-innovation and sustainable entrepreneurship based on our case studies.

Functions of BDOs and CIs for eco-innovation

Since, the analytical approach guiding this work package departs from the technological innovation systems literature, which stresses on the importance of innovation system functions as a basis for understanding the dynamics of the system of supporting the development, diffusion and use of innovations, it will be prudent to synthesize first the support functions of BDOs and CIs for eco-innovations and sustainable entrepreneurship. To relate to the existing literature on innovation intermediaries and innovation system functions, we have labelled the support activities of the studied BDOs and CIs with existing functions in the literature (cf Bergek et al., 2008; Howells, 2006; Kivimaa, 2014; Lopez-Vega and Vanhaverbeke, 2009). This list of support functions (see Table 4) is by no means exhaustive and we intend to further develop them into more detail or abstraction in our scientific publications planned for this work package. It should also be observed that though the sup-

port functions are listed individually, in reality they may interact with each other weakly or strongly in a planned or unplanned fashion and sometimes even have conflict and tensions with each other.

Table 4: Support functions of BDOs and CIs for eco-innovation and sustainable entrepreneurship

Support Function	Activity	Example BDO and CI providing function
1. Forecasting and road mapping	Generating a list of potential eco-innovations to develop. Stimulating eco-innovation projects.	Greentech Cluster, NRW Malmö Cleantech City, Skåne
2. Resource mobilization	Provision of financial assistance, linkages to financiers, assistance with financing implementation projects.	ALMI Skåne, Local BDOs in Essen and Duisburg; Efficiency Agency
3. Networking and partnerships	Breakfast meetings, social gatherings around a specific theme. Conferences, seminars, collaboration projects between companies and other actors.	Sustainable Business Hub; Malmö Cleantech City; ALMI Skåne; Greentech Cluster, NRW; Energy efficiency agency; Efficiency Agency; Local BDOs in Essen and Duisburg
4. Commercialization	Assistance with sales and marketing; export promotion activities.	Sustainable Business Hub; Malmö Cleantech City; ALMI Skåne; Local BDOs in Essen and Duisburg
5. Assessment and evaluation	Provision of test beds and measurement of the environmental performance of new products and/or services.	Malmö Cleantech City
6. Technical consulting	Energy and material efficiency consulting and project implementation	Energy and Efficiency Agency, NRW
7. Knowledge/Information gathering, processing, generating and spreading	Seminars, workshops, meetings around specific topics, newsletters	Sustainable Business Hub; Malmö Cleantech City; ALMI Skåne; Greentech Cluster, NRW; Energy efficiency agency; Efficiency Agency; Local BDOs in Essen and Duisburg
8. Sector branding and legitimization	Seminars, workshops, meetings around specific topics, newsletters	Sustainable Business Hub; Malmö Cleantech City; Greentech Cluster, NRW;
9. Prototyping and piloting	Field testing and measurement	Malmö Cleantech City; ALMI Skåne; Greentech Cluster, NRW

Good practices with current support activities

Despite a number of challenges with the support activities of BDOs and CIs, there are potential “good” functioning practices from BDOs and CIs in North Rhine Westphalia, Germany and Region Skåne, Sweden bearing in mind these countries have been consistently ranked among the top ten in eco-innovations worldwide (WWF, 2012, 2014).

A mix of general and tailored functions

A mix of different types of BDOs and CIs providing different support functions to firms – “hard” support (e.g. technical support on energy and material efficiency, financing) and “soft” support such as networking, social meetings both on a general level and sometimes tailored for sustainable entrepreneurship in certain instances. This is based on the understanding that entrepreneurs developing eco-innovations face both general and specific challenges and it could thus be fruitful to combine different support approaches for firms – i.e. hard-soft; general -tailored. For example, the energy-efficiency type of support is of importance for climate protection and cost efficiency in firms, while business-related support, is relevant for market success and competitiveness of firms as well as of regions.

Proactive support

A well-functioning BDO and CI should be engaged with proactive support in scanning and foresighting relevant eco-innovations to entrepreneurs and firms. Proactive support approaches is expected to trigger eco-innovation activity particularly in firms with low absorptive capacity and also when radical innovations outside current economic and institutional settings are of interest which typically face systemic barriers.

Interaction between different BDOs and CIs

Active interaction between various types of BDOs and CIs to promote learning and competence sharing is relevant in a sector with a proliferation of support actors in many regions. It was observed that local BDOs did not always have in-house competence in supporting eco-innovation activities but rather had a strong relation with a large number of firms and thus active interactions with other support actors are relevant.

Support for different kinds of eco-innovations and entrepreneurs

Support for different kinds of eco-innovations and entrepreneurs e.g. product and process innovations and entrepreneurs – incumbents, new entrants; David’s and Goliaths (see Hockerts and Wüstenhagen, 2010) is expected from a well-functioning system. The literature already pointed out that there is a distinction between product and process eco-innovations regarding the barriers to their development and diffusion and thus tailored intermediation activities targeted at these types of eco-innovation could be considered a “good” practise. For example in North Rhine Westphalia, energy and resource efficiency as well as product development are targets for BDOs and CI activities.

Need for redesigning the support system

Discrepancies of current support activities

To identify discrepancies between the current support activities of BDOs including CIs and a well-functioning system, an analysis of both the supply and demand sides of the support system would be appropriate. In this work package, we had to rely on secondary data to access the demand side and thus our discussions on current challenges could more relate to the supply side. Furthermore, a discussion about discrepancies with the current intermediation support activities should be approached

carefully since public support for eco-innovation and sustainable entrepreneurship is supposed to complement market initiatives and thus should not be expected to fulfil every function. Overall such challenges and system weaknesses should not be treated as particularly catastrophic since the formative phase of an innovation system is particularly characterized by high uncertainty in terms of technologies and markets together with experimentation and variety creation (Bergek et al., 2008). Key supply side barriers in this work package are discussed below as summarized in Figure 5.

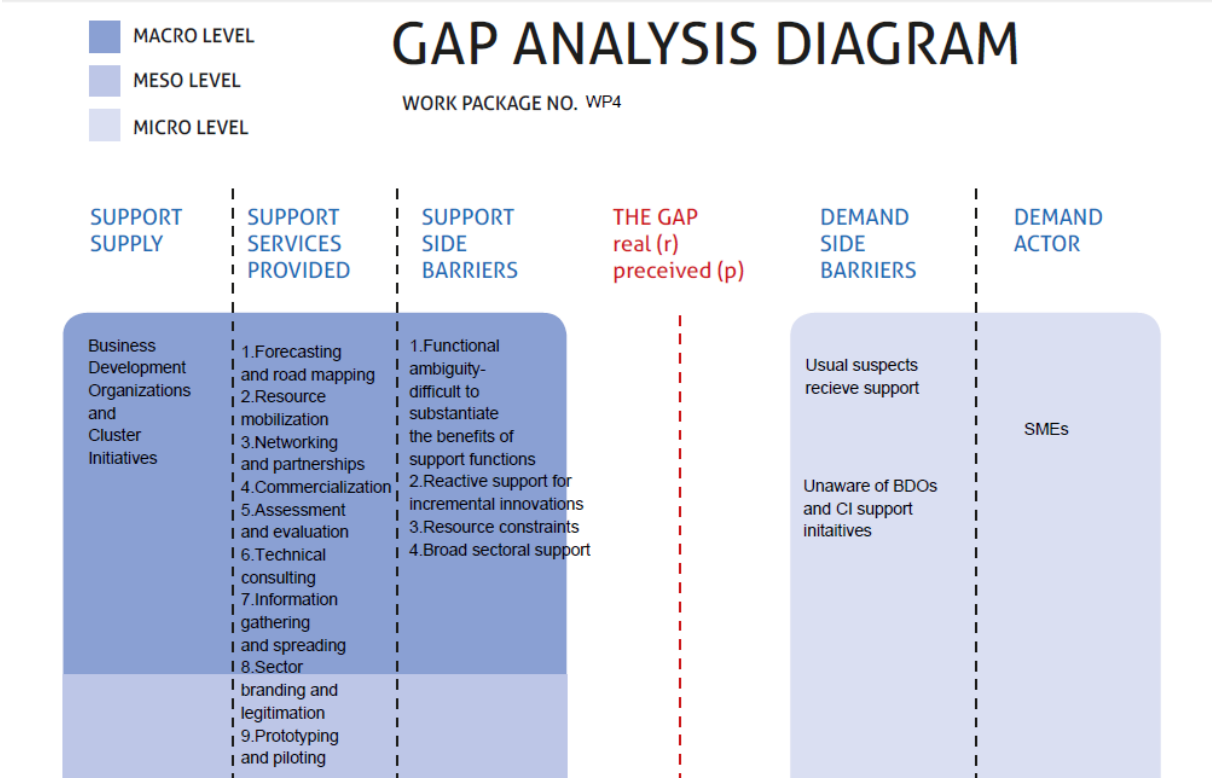


Figure 5: Gap model for WP4, regional level business development organizations and cluster initiatives. Note: this corresponds to the meso-level, with SMEs in the micro-level.

Functional ambiguity

Though, most SMEs appreciate the support they receive from BDOs and CIs, it is often difficult to establish a concrete relation between the support they receive and eco-innovation outcomes and/or business development. This challenge is particularly pronounced for general focused actors such as local BDOs in Essen and Duisburg, and ALMI (regional BDO in Region Skåne), since their support is largely general business development. Assessing the impact of their activities is difficult given their sometimes indirect impact on the businesses value chain and this challenge goes a long way to affect their access to financial resources, the long term existence of their support activities as their clients and/or financiers find it difficult to grasp the nature and value of their support activities. However, when support activities involve consulting support for energy and material efficiency, the outcomes can be easily followed up in terms of financial, energy and material savings in the firm as a result of the technical support from the BDO.

Resource constraints

Another challenge with the current support activities of the studied BDOs and CIs relates to their resource constraints in term of e.g. personnel, financing, and knowledge. This challenge influences the quality of their support activities. For example the mandate given most of the studied BDOs and CIs and also the financial resources and knowledge competence available at their disposal influences how general or specific their support functions could be. For example, the activities of cluster initiatives are often mandated towards an entire cluster and not for individual companies' needs or characteristics partly because of resource limitations as indicated by Sustainable Business Hub, Greentech Cluster, Malmö Cleantech.

One-size fits all approach

Many local BDOs (e.g. ALMI Skåne, Essen, Duisburg) do not consider eco-innovation and sustainable entrepreneurship as different from "ordinary" innovation and entrepreneurship. And cluster initiatives (Sustainable Business Hub, Malmö Cleantech City, Greentech Cluster) which focus on the environmental technology sector use similar support activities as local BDOs – cf: intermediaries in "ordinary" innovation (cf. Howells, 2006). Even though this generalization approach to support activities can be linked to the resource constraints (e.g. finance, knowledge, personnel) on the side of BDOs and CIs and their complementarity role to private intermediaries, it has potential implications on the support outcomes. For example (Klewitz and Hansen, 2013), in their study of eco-innovation intermediation activities for SMEs in the manufacturing sector established the need for some differentiation in the support provided. This varied along the lines that, some SMEs require continuous handholding during their pursuit of sustainability while others deal with this types of issues once they receive initial help. Understanding from the studied intermediaries however indicates a largely general sector focus approach to support and also loosely held activities such as networks and social meetings which can also be as a result of their resource constraints and mandate to complement the market.

Reactive support

The current support approach offered by many of the BDOs (ALMI, local BDOs in Essen and Duisburg, Sustainable Business Hub) is very reactive to the needs of companies. And from experience, company needs often fall within the current economic and institutional settings. For example when electricity and material costs get high, companies contact the energy and material agency for support. With, this reactive approach, radical innovations which go beyond current economic and institutional boundaries might be difficult to generate. A proactive approach is recognized as an essential push factor to trigger eco-innovations with low absorptive capacity (Klewitz and Hansen, 2013).

Redesigning support systems

To suggest how the support system could be redesigned to better support eco-innovation and sustainable entrepreneurship requires an overview of the entire support system including its various actors. Relevant input questions from this work package include:

- What can be done to trigger radical eco-innovations and sustainable entrepreneurship? And which support actors have the capacity to do so?

- What support functions should be expected from BDOs and CIs in eco-innovation cf. they are supposed to complement market initiatives.
- At which levels can support be differentiated e.g. Greening vs. Green firms, different types of entrepreneurs (motivation, absorptive capacity), different types of eco-innovations.

Conclusions and recommendations

In this study we have identified a portfolio of intermediary functions in eco-innovation and sustainable entrepreneurship as: (i) forecasting and road mapping (ii) resource mobilization (iii) networking and partnerships (iv) commercialisation (v) technology assessment and evaluation (vi) technical consulting (vii) information scanning and distribution (viii) sector branding and legitimation (ix) prototyping and piloting. These support functions often take a “one-size-fits-all” approach with few tailored functions for eco-innovations and sustainable entrepreneurship. This can be explained by the complementarity role of public intermediaries to private intermediaries and also the resource limitations of such public intermediaries. Potential good practices point to a mix between general and tailored functions together with collaborative learning between various types of intermediaries – i.e. established and new entrants. To stimulate radical eco-innovations and sustainable entrepreneurship, a proactive approach to intermediation is suggested.

The results of our analysis indicate that the functions of the innovation intermediaries are particularly relevant for the overall goals of the innovation system as compared to the structure since the functions have a direct relation to the development, diffusion and use of eco-innovations. In this regard, a missing function should be of more concern than a missing actor and the overall system outcome can be achieved with different support structures. In addition, identifying system weaknesses and recommendations for policy should be approached with caution since certain phases of the innovation system such as the formative phase are characterized by experimentation, variety and creativity with associated weaknesses. Particular challenges with functional assessment relate to establishing a causal relation between the support function and eco-innovation especially in general intermediation support activities e.g. coaching, networking as compared to technical support on energy and material efficiency.

The recommendations described in this sub-section are targeted at business development organizations including cluster initiatives. To relate to the scientific literature contributively and for learning purposes, these actors i.e. – business development organizations and cluster initiatives are often referred to as intermediaries in the work package. We refer to intermediaries as organization or entities that assist firms in the eco-innovation process by providing external impulse, motivation, advice and other specific support functions often by acting as an agent or broker between two or more parties. These actors have been studied by adapting an analytical framework from the technological innovation systems literature which emphasises on the functions of innovation systems compared to their structure. Our recommendations are based on good practices and also gaps identified with current support practices. These recommendations should be interpreted contextually and also with caution for at least three reasons. First, the countries studied, Germany and Sweden are at the forefront of eco-innovation even though improvements options can be identified in the support activities their eco-innovation support system seems progressive (or at least generating eco-innovations). Furthermore, specific support for eco-innovation is in its early phase characterised by experimentation,

variety creation and duplication of efforts which explains some of the gaps identified. More so, the studied actors are public-owned/financed and are intended to complement market initiatives where there are failures and also contribute to an innovation support system and thus should not be expected to fulfil every particular need or role. With this being said, here come specific recommendations for business development organizations including cluster initiatives targeted at their support functions.

Table 5: Recommendations and good practice examples for business development organizations

Basic strategy	Selected recommendations for actions	Selected good practice example
1 Put eco-innovators at the centre of support efforts	Intermediaries have to identify and support the needs of a broader base of eco-innovators than the “usual suspects”.	The studied business development organizations target a broad base of firms and have largely satisfied clients (cf. client satisfaction analysis by Sustainable Business Hub, Malmö Cleantech City, Skåne; The Energy Agency and The Efficiency Agency, North Rhine Westphalia-see WP4 report).
2 Easy entry and sign posting for eco-innovators	There should be no “wrong door” for eco-innovators into the support system. The intermediaries should direct eco-innovators to better suited support if necessary.	
3 Encourage experimentation	The support system should accommodate experimentation and variety creation both in structure and functions to escape stagnation and lock-in. Intermediaries should not operate as “silos” but there should be interaction between established and new entrants, formalised and informal actors using creative approaches.	Support platforms such as test beds, pilot projects (Malmö Cleantech City, Skåne) and the innovation radar (Greentech Cluster, NRW) encourage experimentation both with eco-innovation and the support approach.
4 Dynamic tailoring of support activities:	Intermediary support should identify and strive to support different types of eco-innovators and eco-innovations using different approaches such as eco-innovation-specific support and general framework support for innovation.	The Greentech Cluster, NRW uses the innovation radar program to scan, forecast and roadmap eco-innovations for relevant actors to develop while The Energy Agency and Efficiency Agency uses technical consulting to support eco-innovation in industrial processes.
5 Mainstreaming sustainability in the support system	There should be bi-directional interactive learning between established intermediaries and new entrants. Learning should focus on incorporating eco-innovation support into established intermediaries and also developing new entrants into self-reliant, long existing support actors.	The general focused business development organizations often incorporate eco-innovation specific support provided by new entrants such as the Efficiency Agency and Energy Agency, NRW and Sustainable Business Hub and Malmö Cleantech City in Skåne.
6 Specialisation	The support activities of general focused intermediaries should be complemented with specific eco-innovation support from new entrants.	Specialised support targeted at eco-innovations or the environmental technology sector is found in the studied regions. An example is the specialized business plan competition for “Climate, environment, energy and resource efficiency” in North-Rhine Westphalia, Germany, connected to the Greentech cluster.
7 Assessment and monitoring of effectiveness:	Intermediaries should assess their clients’ satisfaction as a basis for communicating the value addition from their support activities to their key stakeholders.	Both direct- e.g. quantification of money, energy and material saved (Sustainable Business Hub, Malmö Cleantech City) and indirect-e.g. number of firms and new projects supported (The Energy and Efficiency Agency) assessments are used by the studied business development organizations to communicate their value addition to their funders/owners.

3.4 WP 5: Design Service Providers

Alastair Fuad-Luke, Anja-Lisa Hirscher & Malin Bäckman

Introduction

When we ‘designed’ our research synopsis for this work package in November 2013, we initially saw our key aims as:

...identifying Design Services provided to sustainable start-ups and eco- micro-enterprises, with a special reference to services supporting eco-innovation, and to show how these services are integrated into support systems and to show the impacts they lever, while ‘revealing’ their potential for more positive impacts on eco-innovation support.

However, the range of Design Service Providers (DSPs), including actors, organisations and other ‘design service’ capabilities is, as reported in WP1 (cf. Table 4, pp. 90-91) diverse, so we focused on designers, design agencies and specialist research units. For the purposes of our investigation we defined ‘design services’ as the following activities:

Communication design, concept design, design management, design research, ecodesign/sustainable design, spatial design, graphic design/visual identity/identity design/brand design, interface design, (new) product development, product/industrial design, service design, strategic design, user-centered design/usability, web design and other services (see Section 1.1.1., 5-6 in WP5 SHIFT report).

Furthermore, the early literature search for WP1 (pp. 65-74, 87-91) indicated that eco-innovation for Micro Small and Medium sized enterprises (MSMEs) requires support interwoven from three elements, design, entrepreneurship and marketing (Figure 6):

- Design for Sustainability (DfS), eco-design support for more eco-efficient products, Product Service Systems (PSS) or services
- Entrepreneurship support
- Eco- or green marketing support, often including branding and design communications

Design operates on three levels - design as content or detail, design as operation or management and design as vision or strategy and leadership.

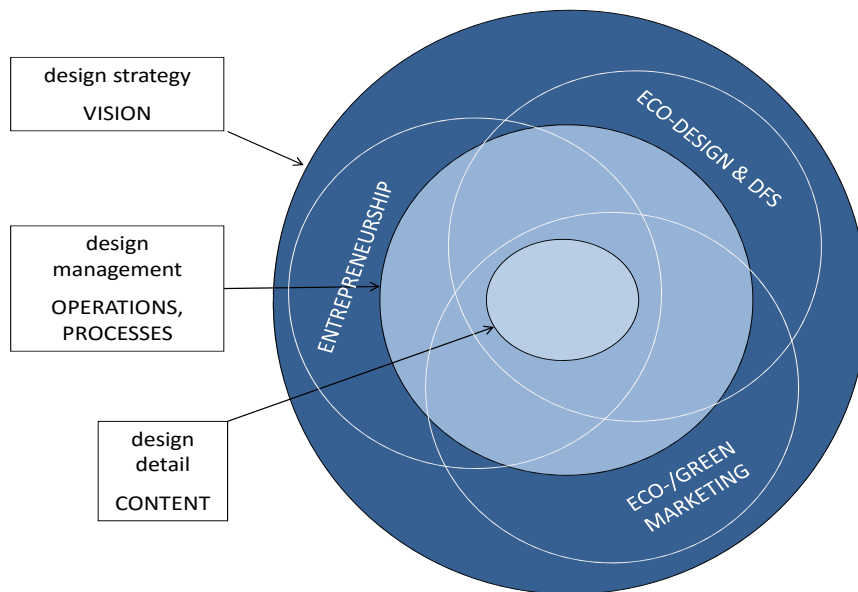


Figure 6: Integrated Design Service Provision for eco-innovation support at design content, operations and vision levels (Source: Alastair Fuad-Luke, in response to WP1, May 2013).

Unit of analysis

The necessity of framing from a Multi-Level Perspective (MLP)

As the field of design today permeates all facets of contemporary life, the value of a MLP is clear as it allows the actors, stakeholders and beneficiaries of design to be seen in a systemic context and helps us understand how macro and meso-level decisions affect the micro-level activities.

Macro level actors and context

Given the scope of the SHIFT project and recent advancements in EU design policy since 2007, we focused our studies on Europe and in particular, the EU. This is also where we find the best concentration of literature. Macro level actors in this context include the European Commission, the Directorate General for Enterprise and Industry (now DG GROW), the Directorate General for the Environment, pan-European project consortia under the auspices of the European Design Innovation Initiative, EDII (such as The SEE Platform, DeEP and DfE), the European Network of Ecodesign Centres (ENEC) and the Bureau of European Design Associations (BEDA), the latter being a key initiator in the process of catalysing EU design policy development from 2007 onwards.

Meso level actors and context

The meso level is defined within each EU member state by diverse organisations representing government and the public sector (national design centres, regional initiatives), the design industry, designers and design agencies (professional design organisations representing the sub-fields of design) and education (universities and their research centres).

Micro level actors and context

The context for the micro level is Micro Small and Medium sized enterprises (MSMEs) and SMEs in general and, more specifically, eco-MSMEs/eco-startups, DSPs and their interaction.

Initial guiding research questions

Our initial guiding research questions were:

- What are the best practices and deficiencies?
- How can the design service provision be improved to enhance the eco-innovation support system?
- A more macro level system question was:
- Policies have driven the support systems involved in eco-innovation, but there is little focus on DSPs – why is this?

As our literature review and early research activities evolved, we developed more specific research questions for different actors in different parts of the support system, enabling us to develop a more holistic view.

Methodology

Our strategy for the empirical work

- (1) A literature review that evolved over the lifetime of the project.
- (2) Interviews of experts across all system levels in the field of green design in the UK.
- (3) Initial demand and supply surveys of MSMEs and DSPs in Finland to understand how the innovation support system is experienced by MSMEs and how DSPs and MSMEs relate to each other.
- (4) Follow up surveys in Finland, Germany and Sweden with targeted eco-SMEs and eco-start-ups to explore the commonalities and differences between the needs of ‘enterprises’, ‘greening enterprises’ and ‘eco-enterprises’ in relation to design services.
- (5) Survey of existing design support systems in the EU in 2014 to explore if and how these supported eco-SMEs and eco-start-ups.
- (6) Design Acupuncture, a game that brings together MSMEs and DSPs as a response to our literature review and survey work.

For a more thorough description of our empirical work, please see WP5 section 1.5 Strategy for empirical work, pp. 74.

Key results

What were the real and perceived gaps between supply in the support system and the demand from the key actors, SMEs developing eco-innovation and green start-ups? There are some real, and profound, gaps between the supply of design support for eco-innovation and demand by MSMEs, start-ups, eco-MSMEs and eco-start-ups which can be summarised as:

Macro level

- Current policy initiatives for design & innovation at EU level lack a consistent message on eco-innovation and the green economy.

- MSMEs and start-ups do not feel they are the real target of policy initiatives.
- Meso level
- Design support for MSMEs and start-ups in the EU is negligible (estimated at less than 0.02% of SMEs) and for eco-MSMEs and eco-start-ups almost non-existent.
- Most national design centres/organisations do not promote ecodesign or eco-innovation or the green economy.

Micro level

- Very few DSPs have ecodesign &/or eco-innovation skills – this is an issue for design education and reflects lack of belief in the green economy
- DSPs and MSMEs/start-ups face similar issues in both being small enterprises.
- Both (ordinary) MSMEs and eco-MSMEs seem to have similar design needs and face similar challenges when collaborating with DSPs.
- Both (ordinary) MSMEs and eco-MSMEs see benefits in design, but they need better ways of meeting and communicating with DSPs and understanding how design can really benefit and add value to their business and why they should prioritise it over other support services.

Where are the most relevant discrepancies between the current support systems for entrepreneurship and the requirements of (adapted) systems for sustainable entrepreneurship? (If you wish, you may differentiate between "greening enterprises" and "green enterprises". Please specify what results of your literature analysis and/or evidence in your empirical work support your conclusions.)

Need for redesigning the support system

Discrepancies in the existing design support systems for entrepreneurship

Policy – in current design and innovation policy neither ‘MSMEs’ or ‘eco-innovation’ or the ‘green economy’ are central to achieving the current aims of these policies. This is an omission. ‘Design’ including ‘ecodesign/sustainable design’ is also not named specifically in most Horizon 2020, Innovation Union, COSME and other relevant EU/EC initiatives and bids.

Design support programmes – currently there is patchy provision across the EU with only 12 active programmes (in 2014) and their reach is very limited to SMEs, MSMEs and even less to eco-MSMEs and eco-start-ups. Most national design centres or national professional design organisations do not forefront ecodesign/sustainable design services nor support, or promote, the development of their industry towards the green economy. There are hardly any national directories in EU member states listing designers with ecodesign and/or experience of working with (eco-)MSMEs, so it is difficult for prospective MSMEs to find the right DSP. In addition, the design industry does a very poor job of communicating how different design services can add value and/or show a Return-on-Investment (ROI) and/or give short-term and long-term benefits. This further makes it challenging for (eco-)MSMEs to prioritise design over other support services. The supply-side (DSPs) and demand-side (MSMEs) rarely meet nor are they linked with marketing and/or entrepreneurial support.

Supply-side micro level – Designers and design agencies see a potential market for more ecodesign services and working with MSMEs, but they actually lack the skills or capacity to provide these services. There's an urgent need to do an up to date 'state of the art study' on ecodesign capacity in Europe in DSPs (designers, design agencies, specialist research units) as the last one was done in 2000 (Tukker et al., 2000) and ecodesign is a core eco-innovation practice (Klewitz and Hansen, 2014). While excellent work has been done by specialist research centres supporting ecodesign in up to 10 EU countries, the design support is largely provided through research projects. The time frames and eligibility can restrict participation of MSMEs and long term funding is not guaranteed for these centres. So, it is essential for the wider design industry to get serious about developing its expertise to support the green economy and SMEs already active in this economy.

Demand-side micro level – There is a lack of knowledge in how and which design services actually meet the needs of MSMEs and when in the innovation cycle. MSMEs need to network with different promoter types (see SHIFT WP7), as well as DSPs, in order to update on trends, find quick solutions to pressing problems, understand their technological and organisational limits and requirements and so on. MSMEs needs, and design needs are dynamic. Eco-innovation is about upstream processes, so there is a need to raise awareness in MSMEs so they can engage in longer-term planning for their own organisational change.

It is essential to find ways of providing funding to both supply and demand actors at the micro level, with more funding for sustainability orientated enterprises (SOEs) and eco-enterprises i.e. those already committed to the green economy.

Is there a need for substantially redesigning the existing support system for entrepreneurship, and, if so, on what level of the support system or in what respect is it most urgent?

Requirements of (adapted) systems for sustainable entrepreneurship

The SEE Platform project, part of the European Design Innovation Initiative (EDII) proposed an 'EU Design Innovation Ecosystem' (Whicher et al., 2015) which enables the actors, organisations and capacities within each to be more easily visible. But it is a 'top-down' view of the existing system and doesn't directly assist SMEs in understanding how design support adds value to their enterprise. In contrast, LADEC, Lahti Regional Development Oy, in the City of Lahti, Finland developed a more local/regional design ecosystem where the beneficiaries and key support providers were placed in the centre of the ecosystem and more permanent design support infrastructure around it (LADEC, 2012; Fuad-Luke et al., 2015). This ecosystem allows the beneficiaries and key support actors to bring in appropriate resources when required for a specific beneficiary and project. This seems to offer a proactive, flexible and softer system that could encourage innovation. Any 'adapted system' for sustainable entrepreneurship should be driven by a sensitive mixture of bottom-up demand and top-down inspiration and planning. Such a system could respond to short, medium and long-term trends and cycles.

Conclusions and recommendations

Given the findings above, what are your practical recommendations for policy makers, and support actors for improving the support of (1) green start-ups/SMEs (the eco-enterprises) and for (2) greening start-ups/SMEs (enterprises wishing to green their operations)?

Improving support for green start-ups/MSMEs (the eco-enterprises)

Place the eco-entrepreneurs/eco-preneurs at the centre of a design support system and build the system according to their needs. Aim for a pan-European ‘green economy and eco-accelerator’ design ecosystem where design support is critically mixed with other key support activities, but make sure that the ecosystem model is adaptable to local/regional circumstances. A schematic of this innovation support system re-design is given in Figure 7.

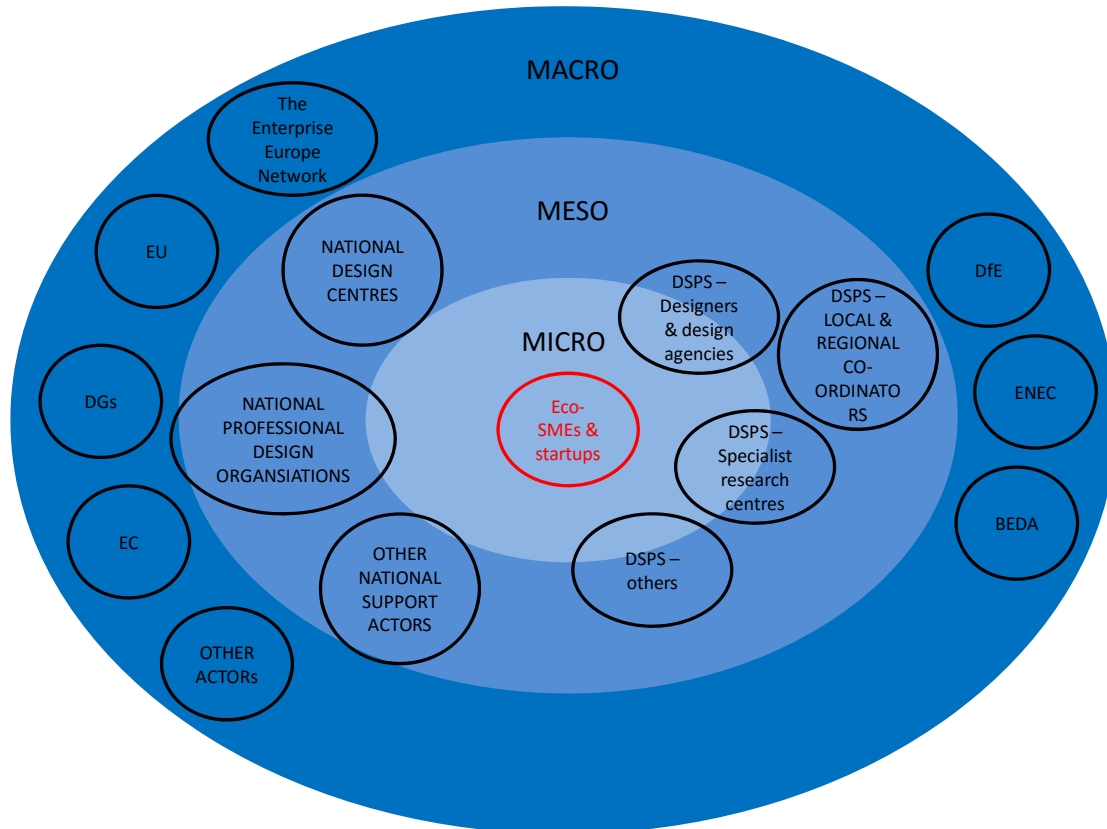


Figure 7: Developing a paradigm shift in support systems: A green economy and eco-accelerator design ecosystem for the EU. (Source: NODUS, Aalto ARTS for SHIFT, September 2015).

Priority should be given to helping those MSMEs and start-ups that are ‘eco-enterprises’ i.e. the existing ‘visionary and green champions’ in order to inspire others to join the green economy. The development of this ecosystem should be co-ordinated by DfE, BEDA, ENEC and other relevant meso-level organisations liaising with the Enterprise Europe Network and their extensive 600 partner network in 50 countries. Also, consideration should be given to better co-ordination with existing Knowledge Innovation Communities in the EU that have a focus on the green/circular economies e.g. Climate KIC, KIC InnoEnergy and so on. Better co-ordination of these overlapping interests gives an opportunity to blend design, entrepreneurship, marketing and financial support services with access to appropriate networks.

Prioritise financial and other support mechanism to the eco-enterprises as they are the vanguard of the green economy. Policy makers and their meso level delivery organisations should also prioritise

the green economy in their activities and look for synergies with organisations involved in The Green Action Plan (European Commission, 2014).

Improving support for greening start-ups/MSMEs ('greening enterprises' wishing to green their operations)?

Developing an EU 'eco-accelerator design ecosystem', as suggested above, could encourage 'greening enterprises' to move beyond target driven resource efficiency to develop concepts, prototype and take products to market for an expanding and visionary green economy.

Are there best practice cases you would recommend to look at?

The national design centres and/or national design organisations of Austria, Belgium, Denmark, Germany, the Netherlands, Spain, Sweden and the UK show an above average awareness of ecodesign, sustainable design and/or its relevance to innovation. Involvement of meso-level organisations from these countries to develop a pan-European 'ecodesign ecosystem' seems appropriate (see above sections).

However, it is at the local and regional level in Europe where we see the genuine examples of best practice in how design can support eco-innovation. Of particular merit are the locations supported by ENEC – Flanders, Belgium; North-Rhine Westfalia, Germany; Ilobe Basque, Spain; Pôle Eco-conception Rhône Alps, France; and the EcoDesign Centre, Wales, UK and long-term contributors such as the Centre for Sustainable Design, Surrey, UK. The key feature appears to be support for ecodesign and eco-innovation at the local or regional political level of governance. This is the case for LADEC's Cleantech Co-design Center which has received consistent support from the City of Lahti and the Päijät Häme region in south-central Finland. In fact Finland's Ministry of Employment and Economy emphasised in the latest Finnish design policy document that *'Linking design competence together with the green economy demands the pooling of investments in expertise. This has been achieved for example with the CleanDesign concept in Lahti'* (Ministry of Employment & Economy, 2013). The development of this centre has run in parallel with the development of a co-design culture to increase creative collaboration between the commercial, public, social and informal sectors (Fuad-Luke et al. 2015).

Specific recommendations for EU and for Finland

Recommendations for the EU

Recommendation 1: 'Design' including 'ecodesign/sustainable design' should be embedded in all new Horizon 2020, Innovation Union, Competitiveness of Enterprises and Small and Medium-sized Enterprises (COSME) and other relevant EU/EC initiatives and bids to ensure its integration into an emergent European innovation culture.

Recommendation 2: The Directorate General for Internal Market, Industry, Entrepreneurship and SMEs (DG GROW) should collaborate with existing EDII projects, such as DfE, and EU member states' national design centres to discuss how better design support to SMEs, and in particular eco-startups and eco-MSMEs can be levered at the micro level. Perhaps this could be co-ordinated through the European Resource Efficiency Excellence Centre and/or the European Enterprise Network. The dis-

discussion should gather around the policies developed in the Green Action Plan 2014 (European Commission, 2014). In particular discussion should focus on the possibility of creating a 'one-stop shop' where eco-innovation services are 'visible' and where design services sit alongside business and other support services.

Recommendation 3: DGs Environment; and Internal Market, Industry, Entrepreneurship and SMEs (DG GROW) should liaise with the European design industry, possibly through the existing DfE project in co-operation with the Bureau of European Design Associations (BEDA), to bring together all national design centres and professional trade organisations to discuss the creation of a European directory of designers and design agencies. This directory would define different design services (including ecodesign, sustainable design) and how they add value to enterprises.

Recommendation 4: Reports on Return-on-Investment (ROI) from design services show clear benefits to SMEs (Design Council, 2012; Pitkänen, 2012), but a universal agreement and measurement of how different design services add-value to an SMEs activities is absent. Organisations such as the national design centres of EU member states and BEDA are best placed to collate and collect this data. This will generate more confidence in SMEs making investment in design over other support services if they better understand that the ROI adds value to tangible *and* intangible assets.

Recommendation 5: There is an urgent need to do an up-to-date 'state of the art study' on ecodesign capacity in Europe in DSPs (designers, design agencies, specialist research units). Perhaps this can be co-ordinated by the European Network of Ecodesign Centres (ENEC) and be dovetailed with Recommendation 3 above.

Recommendation 6: Develop an audit tool which would help MSMEs determine their immediate and longer-term specific needs and whether it is 'design support' or some other kind of support needed. This should be co-ordinated with activities under Recommendation 2.

Recommendation 7: Design support programmes need to facilitate the meeting and networking of MSMEs and DSPs and try to combine marketing and/or entrepreneurial support. For example, develop matchmaking events where MSMEs and DSPs have to create a joint proposal to obtain micro-funding for the application of design to a specific innovation life cycle phase in the development of an eco-product or eco-service. Perhaps these can be co-ordinated by the Enterprise Europe Network (ENN) or linked to specific KICs named above.

Recommendations for Finland

Recommendation 1. As the Clean Design Center, Lahti is already recognised by the Finnish government as a centre of excellence and best practice, it makes sense to amplify this situation by further promoting this as a national centre for 'design and the green economy' for MSMEs *and* DSPs.

Recommendation 2. The Clean Design Center, Lahti should join the European Network of Ecodesign Centres (ENEC) to benefit from their knowledge and network with other centres of excellence in other EU member states.

Recommendation 3. LADEC, Lahti Regional Development, has developed their own 'design ecosystem' and is experienced in developing platforms for projects, for example, the CoDeCo project where co-design teams were formed around real projects with local companies while simultaneously raising the expertise of designers in Lahti to facilitate using co-design (Fuad-Luke et al., 2015). The continued

development of Lahti as a 'Co-design Bay', a national centre of activity for co-design projects for multi-stakeholders, also provides a strong opportunity for eco-MSMEs and eco-startups to expand their networks, especially in the early lifecycle stages of innovation. The eco-preneurs, should be placed at the centre of the 'design ecosystem' and seen as the key beneficiaries of the services, knowledge and other facilities which can be provided by the platform.

Recommendation 4. Access to design support services should be prioritised to eco-enterprises (green, visionary champions), who are highly motivated to innovate in the green economy. Greening enterprises, are also important but represent a more incremental approach to eco-efficiency within their existing business models.

Recommendation 5. A state of the art national survey should be initiated to determine the current expertise in DSPs for eco-design/sustainable design and their competences to work with SMEs and if there is a need to initiate training and coaching programmes.

Recommendation 6. Develop an audit tool which would help MSMEs determine their immediate and longer-term specific needs and whether it is 'design support' or some other kind of support needed. This audit tool should be made available via Centres for Economic Development, Transport and the Environment where design services should be made available with general business or technology advice and advice on market entry/new market initiatives.

Recommendation 7. Develop the Design Acupuncture game for MSMEs and DSPs by bringing together demand-side (Suomen Yrittäjät, Confederation of Finnish Industries) and supply-side actors (Ornamo, Design Forum Finland and other actors in the Finnish Design Centre network outlined in the Finland Design Programme 2013) with key funding agencies' programmes, such as Tekes Green Growth, with a view to developing regular matchmaking events for MSMEs and DSPs. These events can be used to help them develop joint proposals where they receive micro-funding for mutually beneficial projects such as prototyping, new product development, taking products to market and so on.

3.5 WP 6: Private Financial Institutions and Public Funding Programmes

Linda Bergset

Introduction

In order to develop their business and survive the first crucial years in which income is low or non-existent, entrepreneurs – sustainable or otherwise – are dependent on internal and/or external financial infusions (Carter & Van Auken, 1990). While there is evidence of an increasing number of financial institutions that combine a clear focus on Cleantech, the environment or sustainability with early stage finance, these are still rather few and far between (Bocken, 2015; Randjelovic, O'Rourke, & Orsato, 2003). Few sustainable entrepreneurs in green start-ups do nonetheless limit their search for finance to such sustainability-oriented investors. The question therefore arises: How well do they, with their particular characteristics, fare when seeking to finance their company at early stages?

Work Package 6 (WP6) in SHIFT aims at identifying financial instruments, investor types and public funding programmes used by sustainable start-ups (up to the age of 8 years) providing environmentally friendly products and services. Further, it assesses real and perceived gaps in the access to finance and funding at the early stages of these companies. While the overall project also focuses on later stages of company development in MSMEs, this work package focuses specifically on start-ups as the financial challenges of MSMEs that develop eco-innovation differ from that of new and young companies and as MSME-specific challenges have been explored thoroughly elsewhere (European Commission, DG Environment, 2011) earlier. The guiding questions to be answered in the empirical work in WP6 are thus the following:

- How and to what extent are the specific financial needs of different types of sustainable entrepreneurs in green start-ups at different phases met by private financial institutions and public funding programmes?
- Where do real and perceived gaps and barriers exist (both on demand- and supply-sides)?

Due to the little empirical work done on entrepreneurial finance in sustainable, green start-ups that provide environmentally friendly products or services (cf. literature review in WP6 report), it was deemed necessary to do both qualitative and quantitative research in the project. The research methodology of WP6 included the following steps:

- (1) Literature review and overview of the state of the art.
- (2) Explorative, qualitative and semi-structured interviews with 24 start-ups in Finland, Germany and Sweden (8 in each country) were done in advance of the survey, in order to generate background information, issue insight in the three-country context and knowledge of the language used by the entrepreneurs in start-ups for the survey.
- (3) A survey of different start-ups' use of financial instruments, investors and funding programmes with 273 participants in total.
- (4) An assessment of each individual survey participant's product/service portfolio was carried out parallel to the survey, based on the EGSS classification developed by Eurostat.
- (5) A workshop with investors and public funders.

Key results

Usage of Financial Instruments and Public Funding Programmes

Results from the interviews

One of the most striking results from the 24 interviews carried out in the three countries, was the diversity of financial sources used in the early phases of company development (i.e. pre-seed and seed stages) compared to that of the start-up stage and the expansion stage. While this result might be due to the interview limitation of only including companies up to 8 years of age (most of whom in this case had not reached the expansion stage (Kollmann, 2005)), it might also be an indication of a higher level of “creativity” in financial sourcing in early company stages. Manifestations of this creativity include the foundation of a cooperative for investment purposes and the use of paid parental leave for the start-up development. The prevalent use of the founders’ own funds is observed in personal loans, the use of exit money from earlier companies of the entrepreneurs, working without salary and the cross-subsidisation of the company by working other jobs parallel to the start-up activities.

Some of the main findings in usage of financial sources in the three countries were:

- A majority uses public funding earmarked for innovation and business development.
- The most prevalent private source of funding is business angels.
- The use of bank loans were not too common: Only three out of 24 companies had been able to access debt funding by the help of guarantees issued by public funding institutions or due to long-term personal contact with the bank in question as well as due to contacts arising from a business plan competition.
- The use of public-private partnerships (PPP) was mentioned frequently; it was however also often mentioned to fall through due to a lack of private commitment (no private matching found in time).
- The availability of sustainability-oriented investment or impact investment for start-ups seems to be rather limited still (only small sums on an individual basis and in total the volumes estimated to be rather small). A few companies (3 German and 1 Swedish) mentioned having received money from “sustainability-oriented” investors (from a business angel with renewable energy experience, a venture capital provider with a strict Cleantech portfolio and two family offices).

Results from the survey

The survey, certainly due to both its larger participant size and random sample, yielded rather different results with regard to the types of investment instruments and financial sources used in the companies. Also, compared to the interviews carried out, where most companies were in the seed and start-up phases, the majority (77.8%) of the survey participants identified themselves as already being in the expansion phase. In the survey, due to the broad sample selection, the results from the green start-up participants could be compared to that of a control group of non-green start-ups.

Similarly to the results from the interviews, a strong spread in types of financial instruments used can be observed in the survey. Although there are some substantial differences, most green start-ups get their private financial resources from the same five sources: secured loans (46.3%), overdraft credit

(50.9%), family and friends (33.3%), supplier credit (31.4%) and “other” (excluding VC, Business Angels, IPOs/share issue) private equity (15.4%). In the non-green control group, these are also the largest sources. There are, however, some differences worth noting upon: Green start-ups significantly more often use *IPOs and share issues* as a money source. They also significantly more often use *private incubators* as a money source. In terms of bootstrapping, 50.9% of green start-ups use overdraft credit compared to only 33.3% of the non-green companies and 31.4% of green start-ups use supplier credit compared to only 18.7% of the non-green start-ups. An aggregated analysis of debt and equity instruments showed no significant differences in usage, even if the green start-ups to larger extent (64.8%) use debt instruments than non-green start-ups (55%) do. Compared to the results in the interviews, many green start-ups in the survey have used bank loans, which might be related to the fact that a majority of the green survey participants had reached the expansion phase, which few of the interviewees had.

On the public side, there is slightly more diversity in the use intensity of the main funding sources between non-green and green start-ups. Here, the five most used sources of green start-ups are: public loans (25.9%), credit guarantees (24.1%), employment grant for staff (22.6%), employment office funding (20.8%) and business development funding (18.5%). Non-green start-ups, on the other hand, use start-up stipends for founders more frequently and less often seek business development funding. Indeed, green start-ups significantly more often use business development funding and credit guarantees. In terms of the funding levels approached, green start-ups use regional public funding significantly more often than non-green start-ups. An aggregated analysis of public funding programmes revealed no significant differences in usage, even though the green start-ups to larger extent (67.3%) use public funding than non-green start-ups (52.8%) do.

In the survey, the start-ups were asked which primary types of sources they used at what stage (company-internal funds, company external funds and the founders’ own funds). In terms of usage of the founders’ own funds, 43.5% of green start-ups use these financial means in the expansion stage compared to 25.1% of non-green start-ups, which is statistically significantly more often. At the seed and start-up stages there are no significant differences between the two groups.

Challenges in Financial Access

Results from the interviews

There was a broad variety of challenges in access to finance that were mentioned by the green start-ups in the interviews. Many of them are such that also other start-ups without environmentally friendly products or services have also been observed in the literature to experience. The ones that were mentioned by most start-ups include: long / complex application processes for public funding (29%), difficult access to public money due to (private) matching need (25%) and companies having a longer time-horizon than investors (25%).

The interviewer did not specifically divide types of challenges into general and sustainability-related ones in the interviews, but still some issues mentioned were quite clearly sustainability-related aspects. These included for instance hindering / uncertain regulation (e.g. related to renewable energy policy) and the importance to companies of investors having similar moral values. Some companies seemed to be more affected by such sustainability-related challenges, but on the whole as many as 10 of 24 companies (42%) were affected by at least one challenge related to the sustainability of

their company or product/service. A main concern amongst the entrepreneurs, which was formulated in a range of ways, was the lacking investor knowledge about and understanding of sustainability-related issues that in the case of green start-ups might have an impact on product development, market issues or the business model. The entrepreneurs maintained that investors did not understand the type of business they were doing, their choice of legal form, that investors' lack of knowledge arises due to inexistent or few established benchmarks for sustainable services and that investors were sceptical that customers will pay for "green solutions". One interviewee whose company struggled with their choice of a particularly sustainable legal form of company (a mutual insurance company, which is owned fully by its policyholders) as investors had no understanding for it, later admitted that they had had to change their legal form to the more standard German AG in order to get investors on board. It is furthermore possible that reasons listed as "general" reasons (i.e. reasons relevant for all start-ups) might be to a larger or lesser extent sustainability-related (e.g. a long time-horizon could arise due to the development of a radical sustainable innovation).

Results from the survey

Whereas in the interviews only the barriers or challenges that the interviewees mentioned themselves could be analysed, in the survey different characteristics could be analysed in combination with the participants' indications of difficulties or rejection from investors or funders. Hypotheses on challenges (which were operationalised using "difficulties" and "rejection" as specific survey items) and their potential connection to specific company and entrepreneurial characteristics such as level of technology ("R&D intensity"), eco-innovativeness ("product/service novelty" and "potential to change the market") and business background as well as a range of specifically sustainability-related characteristics were thus developed and tested.

The main findings with regard to difficulties in financial access and rejection from investors/funders are briefly explored here:

- Overall challenges (Hypothesis 1): Green start-ups overall were found neither to have more difficulties in accessing finance nor to be rejected more often than their control group "non-green" start-ups.
- National differences: At the national levels there are some differences: In Sweden and Germany, green start-ups surprisingly seem to struggle *less* than non-green start-ups; while in Finland it is as theorised green start-ups that experience more difficulties and rejection across the board (the differences at the national level are not statistically significant, however).
- Expansion stage: There is one especially noteworthy result when looking at specific stages: at the expansion stage, 42.9% of the green start-ups indicated they experience "very big difficulties", while only 29.7% of the non-green start-ups said the same.
- Technology level (Hypothesis 2): The green start-ups *significantly* more (42.3%) often carry out their own research and development (R&D) than the non-green start-ups in the sample (28.1%). While both in the green and the non-green group, the survey participants more often experienced difficulty in accessing finance at at least one stage if they were carrying out their own R&D, the difference was bigger in size and statistical strength for the green start-ups.
- Innovativeness (Hypothesis 3): The green start-ups in the survey indicated more often that the novelty level of their products/services is high (53% vs. 39.5%) and that the products/services

have a large potential to change the market (57.7% vs. 43.1%) compared to the non-green start-ups. For the item “product/service novelty”, there were *significant* differences between the companies with a high level vs. those with a low degree of novelty in terms of difficulties in financial access. This result was found for both green (at the expansion stage) and non-green companies (several stages). The difference established was however larger and statistically stronger for the green start-ups. Interestingly, while there were *significant* differences between the companies with high and low values for the item “potential to change the market” in terms of difficulties in financial access for green start-ups at the expansion stage, no such finding could be established for the non-green control group.

- Business background (Hypothesis 4): For the item “business education”, there is *statistically significant* support at the expansion stage. Here, fewer green start-ups that have founding members with a business education experience “moderate to very high difficulties” (38.5%) than those green start-ups that have no founder members with a business education (80%). As a comparison, no significant differences were found for the control group of non-green start-ups.
- Alternative investment sources (Hypothesis 5): Founders’ own funds: Interestingly, while green start-ups use the founder’s own funds more often, it is only for non-green start-ups that difficulties in financial access correlate significantly with the use of such funds. As explored above, green start-ups also significantly more often use bootstrapping instruments such as overdraft credit and supplier credit compared to non-green start-ups.
- For the sustainability-related characteristics (e.g. use of environmental labels and certification, reluctance to grow, local/regional orientation and use of collective action), there were not many significant results linked to challenges in financial access. This, however, does not rule out that there might be a joint effect (i.e. on an overall sustainability “dimension” and not on the specific items), which warrants further research in this area.
- The six most mentioned reasons for rejection among the green start-ups that had been rejected were: “risk considered too high” (19%), “collateral lacking” (18.8%), “sustainability unfamiliarity of investor/funder” (17%), profit prospect low/uncertain (15.2%), funding criteria of investor/funder (15%) and “sector unfamiliarity of investor/funder” (13.2%).

Need for redesigning support systems

What were the real and perceived gaps between supply in the support system and the demand from the key actors, SMEs developing eco-innovation and green start-ups?

The general results on difficulties and rejection comparing green start-ups as an overall group with non-green start-ups as a control group make it clear that green start-ups also are a composite group of different types of start-ups that need more detailed analysis. That said, the gaps found in the empirical research done in WP6 of SHIFT to a large extent correspond to gaps observed in the literature on entrepreneurial finance in eco-innovative start-ups (Bocken, 2015; Ghosh & Nanda, 2010; Randjelovic et al., 2003; Wüstenhagen & Teppo, 2004) – see separate report on WP6 for more details. While not all green start-ups in the survey are highly innovative companies, they were significantly more often innovative than their non-green counterparts in the control group. This suggests

that the findings on challenges in financial access linked to innovation and high levels of technology are particularly relevant to green start-ups.

Particularly the expansion phase stands out in the survey results as one in which challenges arise particularly for green start-ups: here many more green start-ups – 42.9% – indicate that they experience “very big difficulties” in access to finance, while only 29.7% of the non-green start-ups do. The expansion phase also stands out in much of the further analysis carried out.

The result that green start-ups significantly more often use their founders’ own funds in the expansion phase (and that this is not significantly linked to rejection or difficulties at this stage) as well as bootstrapping instruments generally, suggests that some green start-ups might be wary of external “interference” from investors that often require decision-making powers in return for investment at this stage.

While almost half of all companies in the interviews mentioned investment barriers related to the sustainability of their company and many the incomprehension of investors for such aspects, 17% of all rejected green companies in the survey mention that a reason for the rejection was that the investor/funder was unable to evaluate the market potential of their sustainability-related product/service or business model. This suggests that many investors and public funders are still not able to assess the relevance of sustainability-related issues in the market context and that there is a gap in knowledge as well as a lack of money. For green start-ups involved in radical innovation this difficulty of convincing investors/funders may be exacerbated due to the inclusion of further aspects for which no market benchmarks exist.

By presenting the supply-side, investors and intermediaries in a workshop with the results of the demand-side results from the interviews and surveys, it was possible to some extent to distinguish whether the gaps observed were rather perceived or real. The need to further categorise types of green start-ups, which was mentioned several times in the workshop, was also made apparent by the results of the survey. While there was some disagreement with regard to specific challenges for green start-ups, Martin Bolits’ presentation about difficulties for innovative and expansion phase funding correspond to findings of the survey. The finding in the survey that green start-ups’ teams often lack a business background was acknowledged and verified by the participants of the workshop. In this context, the need to make green start-ups “investment ready” was maintained. Similarly, there was an acknowledgement of investors’ lack of information and knowledge about green business models. It was argued that more information should be made available in order to enable better investor assessment in this area. However, there was a level of disagreement regarding the existence of investors who might be willing to forego some profits in order to achieve a societal impact. One intermediary also mentioned the different “languages” spoken by investors and start-ups and the challenge in overcoming this linguistic gap. Finally, the need for optimised and adapted matching seemed to be a consensus in the group.

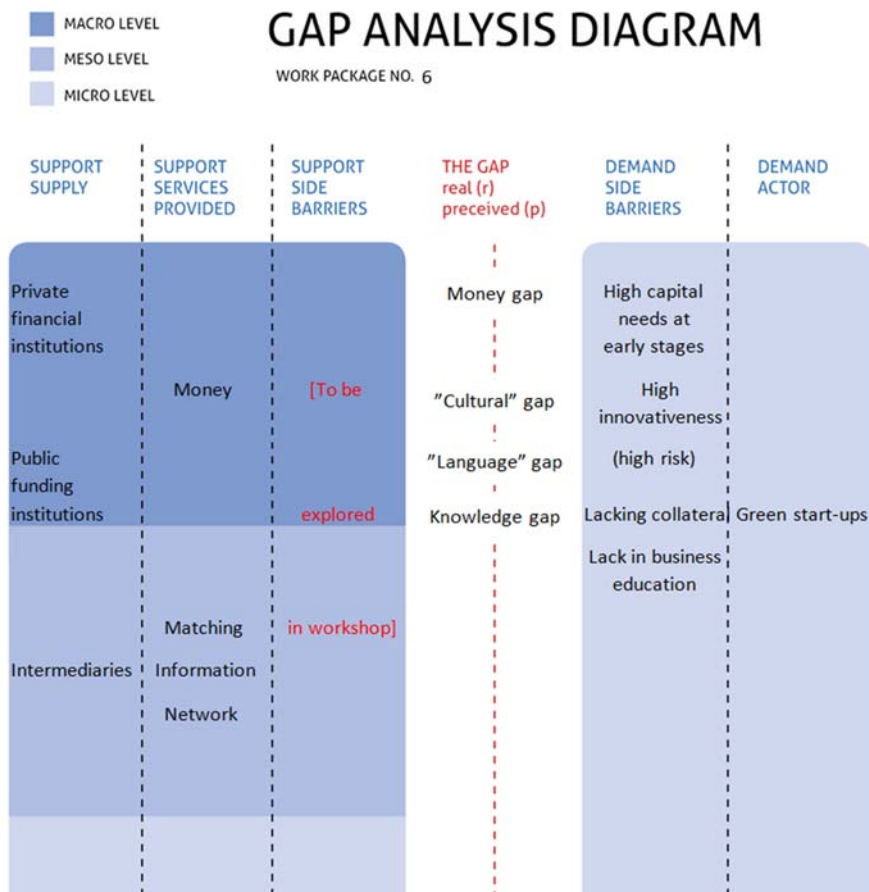


Figure 8: Results from the gap analysis of financial access for green start-ups (WP6)

Where are the most relevant discrepancies between the current support systems for entrepreneurship and the requirements of (adapted) systems for sustainable entrepreneurship?

In addition to the existence of possible gaps in finance and funding, there is also a broadness in usage of financial mechanisms and sources (especially “alternative” ones), which suggests that where there is a gap, clever and resourceful green start-ups also find a way to circumvent such challenges, at least to some extent. This is an indication that green start-ups and their sustainable entrepreneurs are well equipped to take advantage of the support systems for entrepreneurship as they exist currently. The survey, furthermore, showed a high level of usage of credit guarantees and loans: this might indicate a stronger orientation of European start-ups toward the banking system than in the land of entrepreneurial finance – the US – where venture capital and private equity in various forms are more widespread in the early phases of company development.

Green start-ups are also creative enough to take additional advantage of those public funding programmes where they might have particular needs: for instance business development funding due to a lack of business qualification or credit guarantees due to a lack of sufficient collateral for loans.

There might, nonetheless, be certain characteristics in at least a certain proportion of green start-ups that require especial attention: Both investors and funders still seem to some extent unable to assess the products/services, business models, strategies and rationales of sustainable entrepreneurs in green start-ups when sustainability-related aspects become central to them.

Is there a need for substantially redesigning the existing support system for entrepreneurship, and, if so, on what level of the support system or in what respect is it most urgent?

Considering the results and the existing discrepancies between the current systems and adapted, more “optimal” support systems for sustainable entrepreneurship in the context of private finance and public funding, the answer is a qualified “not necessarily”. It might suffice to strengthen those parts of the systems that are most relevant to green start-ups as well as make some further “non-substantial” changes:

- Public funding programmes: For green start-ups especially regional funding programmes are of central importance. The specific types of mechanisms they use significantly more often include credit guarantees and business development funding. Green start-ups could be targeted particularly with these programmes.
- Banking system: Banks are, at least in the context of lending, rather conservative when it comes to risk. Considering the reliance of green start-ups on banks in the European context, there might be a need to strengthen the banks’ ability to assess eco-innovative business models.
- As the literature review makes clear (Ghosh & Nanda, 2010; Wüstenhagen & Teppo, 2004), there might be a need for substantial sums of money at the early stages of some green start-ups, which individual investors or even individual venture capital funds may not be able to offer. In these situations, syndication across large investors or several funds may be needed.
- For smaller sums of money, it might be helpful for green start-ups, at least in some cases, to not have to bootstrap or use their founders’ own funds. In order to steer more funds in the direction of green start-ups, one option is to increase interest for entrepreneurial finance among sustainability-oriented investors (e.g. high net worth individuals and institutional investors such as pension funds or insurance companies); another option is to increase interest for sustainability-oriented investments among early phase investors (conventional VC firms or business angels).
- As “alternative” sources of finance seem to be particularly important to a range of green start-ups, crowdfunding might be an option that may become increasingly important. It mobilises money, which otherwise would not be invested in start-ups and it “democratizes access to capital markets” (Rubinton, 2011, 12) making it particularly sustainability-compatible.
- There are some changes that might be less trivial: In order to overcome the information and possible culture and knowledge gaps between sustainability-oriented green start-ups and early-stage private investors there might be a need for information dissemination, education (on both sides), intermediaries that facilitate between supply and demand as well as adapted matching formats for this specific type of green start-ups.

Conclusions and recommendations

It cannot be said that green start-ups as an overall category generally struggle more with access to finance than non-green start-ups. This kind of distinction is too coarse to capture any of the specifics of green start-up finance. The empirical analysis, however, pinpointed certain types of green start-ups and stages that were of particular relevance. One stage of company development that seems to be quite challenging on an overall basis is the expansion phase, which was observed at many levels of the analysis. Furthermore, the survey found that green start-ups are on average more technology-

based and innovative than non-green start-ups and that these green start-ups experience particular difficulties when seeking to finance themselves. There is also evidence to suggest that (at least some) green start-ups struggle with particular challenges linked to the sustainability of their companies.

Given the findings above, the following practical recommendations for policy makers, and support actors for improving the support of green start-ups can be made:

Recommendations for financial institutions:

- Investors and financial institutions might wish to provide training and information to their employees on how to adequately assess “green” business models, products and services. A way of mainstreaming this strategy is to develop clear and simple evaluation criteria and key performance indicators for sustainable start-ups. They might also draw on external expertise to cover any knowledge gaps they might have in this area. Especially banks should consider this an area in need of improvement, as the reliance of green start-ups on banks in the European context can be observed to be high.

Recommendations for policy and public funding institutions:

- Public funding institutions could strengthen sustainability know-how in their employees, especially on the regional level where many green start-ups apply for support. Here it would be helpful to develop clear and simple evaluation criteria and key performance indicators for sustainable, green start-ups.
- There is evidence that particular challenges in financial access arises for high-tech, innovative green start-ups and especially at the expansion phase. This suggests a particular area of concern for policy and could be an area where public funding programmes could be used to target green start-ups where it matters most.
- Radical innovation with high capital demands and regulatory barriers might benefit from the development of innovation parks with infrastructure for testing and experimentation as well as regulatory exemptions and special provisions at the early stages.
- The finding that green start-ups significantly more often use their founders’ own funds in the expansion phase (and that this is not significantly linked to rejection or difficulties at this stage) as well as bootstrapping instruments (supplier credit and overdraft credit) generally, suggests that some green start-ups might be wary of external “interference” from investors that often require decision-making powers in return for investment. This also suggests that public funding programmes are needed at the expansion phase where higher capital demands arise and the use of bootstrapping is likely to be inefficient due to its related potentially high capital costs.
- Public-private partnership (PPP) funding seems to be quite common in all three countries. It, however, also often falls through due to only public and no private commitment (i.e. no private matching found in time). Here, it might be sensible to reduce bureaucratic requirements to a necessary minimum and to provide support to start-ups in finding suitable investors.
- It may be a question of public interest and prioritisation to further support green start-ups in their search for money. In order to steer more funds in the direction of green start-ups, one option is to increase interest for entrepreneurial finance among sustainability-oriented investors (e.g. high net worth individuals and institutional investors such as pension funds or insurance

companies), while another option would be to increase interest for sustainability-oriented investments among early phase investors (conventional VC firms or business angels). Here, potential incentives could be provided in tax alleviations or guarantee instruments by introducing appropriate policies. This public support should, however, be linked to clear criteria for what constitutes as “green start-up investment”.

- As “alternative” sources of finance seem to be particularly important to a range of green start-ups, crowdfunding might be an option that may become increasingly important. It mobilises money, which otherwise would not be invested in start-ups and it “democratizes access to capital markets” (Rubinton, 2011, 12) making it particularly sustainability-compatible. Here, it is imperative that financial policies support and do not hinder such small-scale investments – something which needs explicit examination.
- Public policy should stimulate quantitative, macro-level research on the supply-side with regard to numbers on specifically focussed financial institutions, institutions with sustainable mainstreaming approaches, size of investments and types of investments.
- At the European level, the European Commission should support a European-level network of “sustainable early-stage investors”. As sustainability-oriented and Cleantech-oriented investors invest relatively low sums of risk capital in early-stage companies, these should be brought together at the European level in order to leverage their impact. This process would increase visibility of best practice for other investors as well as create a clear access point for sustainable and green start-ups. While project-based initiatives exist both at the EU level (e.g. INNEON and national level (GreenUpInvest), a more permanent structure would be beneficial.

While the survey and interviews did not explicitly ask the start-ups about the role of intermediaries for accessing financial resources, the above discussion make it clear that their role might be quite central to overcoming a range of challenges found. There is potential for increased intermediary activity in the following areas:

- Founder teams in green start-ups that lack business education and training are more likely to struggle in their search for finance. Intermediaries could help green start-ups by ensuring they include all relevant expertise in the founder team, e.g. by recruiting additional founders or employees. Intermediaries could also provide the needed business training, which would ease the start-up’ relations and negotiations with investors.
- Intermediaries could develop approaches to mobilise a) sustainability-oriented investors for involvement in early-stage companies and b) early-stage investors for involvement in green start-ups.
- There seems to be a need for adapted matching between green start-ups and suitable investors in those cases where there are sustainability-related reasons for challenges. Intermediaries could provide such improved matching between demand and supply by taking specific characteristics of green start-ups and their business models into consideration.
- In those situations where substantial sums of money are required at early stages of company development, intermediaries may act as multipliers by organising syndication across large investors or several funds. Not only can larger sums be achieved in this manner, risk can also be spread and portfolio effects attained for the investors involved. One way of organising such syn-

dication is by developing networks, such as are seen primarily in the US in this area (e.g. Investors' Circle, Nexus or CREO)

3.6 WP 7: Interagents & Unusual Collaboration

Mika Kuisma & Alastair Fuad-Luke

Introduction

The primary aim of the study in WP7 was identifying what kind of ‘unusual collaborating support actors’ exist, especially actors supporting eco-innovation in start-ups and SMEs which are to some extent different from those identified and focused in other WPs (2-6). This part of the study was largely covered by a literature review. Early on in the study we developed a working definition of the term ‘interagent’ and a preliminary perspective on unusual collaboration. The interagent can play a key role in organising collaboration that brings key resources together to promote increase in eco-innovation. For the purposes of contextualising this report for the reader we define the interagent and ask ‘what makes collaboration ‘unusual’’:

*An interagent is an independent actor or player who has an agenda as intermediary, interceder, mediator or middle person to **bring people and other key resources together** for their self-interest and the interests of others in the innovation support system*

Here is a summary of our understandings about ‘unusual collaboration’ from our literature review and our empirical and qualitative research work. First, they have innovative, different organizational design for bringing people and other resources together to support eco-oriented innovation and start-ups. Their services are to a certain extent different from existing (mainstream) support system or they build up to some extent tailored combination of services. They also have a more informal institutional setting in the eco-innovation support infrastructure compared to the more established (mainstream) services. The support provided is more of a proactive nature. The collaboration approach also includes a multi-actor support as well as multi-level perspective. An explicit aim of the services is also to make changes on system (macro / policy) level to promote transformation in the society as well as support new business models based on the principles of sustainable development. They offer easily accessible, and highly relevant support to SMEs. These characteristics are summarized in Table 6.

Table 6: The nature of unusual collaboration.

Origins of support service Features of unusual collaboration supporting eco-innovation

Organizational design	<i>Innovative / different organizational design of bringing people and other resources together</i>
Service offering	<i>Building up a different and more tailored combination of services compared to the mainstream support system</i>
Institutional setting	<i>Having a more informal setting in the eco-innovation support service infrastructure</i>
Standardization of aims	<i>Less standardised and more case specific than in the mainstream support services</i>

<i>Proactivity of services</i>	<i>Support offered by interagents / unusual collaboration is more of a proactive nature</i>
<i>Scope of perspectives</i>	<i>Multi-actor support as well as multi-level perspective</i>
<i>Focus in relation to sustainability</i>	<i>Focusing especially in supporting sustainable innovation and/or entrepreneurship</i>
<i>Aims in relation to system level changes</i>	<i>Aiming at system (macro / policy) level changes to promote transformation (as well as support the new business models) is explicit</i>
<i>Relevance to start-ups and micro-SMEs</i>	<i>Offering accessible, relevant, understandable and useful support to 'like-minded' SMEs (sector, needs, vision)</i>

Secondary aims of the study in WP7 included showing how these actors' services are or are not integrated into existing support systems and assessing their potential for more positive impacts on eco-innovation support, and ultimately sustainable transformation in the society.

By analysing the contents and implementation of specific unusual collaboration in cases in Finland, the study strived to show how these unusual collaboration services add value to eco-innovative start-ups and Micro Small and Medium sized enterprises (MSMEs), and how these services are related to overlapping concepts that promote entrepreneurship, such as cluster initiative, innovation community and business accelerator. The study aimed to assess the potential and constraints that such unusual collaboration approaches have in terms of positive impacts to serve the sustainable transformation in the society.

Unit of analysis

Existing empirical research on the collaboration of businesses generally and in the area of sustainable innovation presents several theoretical perspectives and typologies. Based on the findings from the various perspectives in the literature study as well as our early empirical observations from this field during the start phase of the project, we developed the framework of analysis for the study.

Our framework of analysis was initially based upon five perspectives:

- (1) Which **area of services** does interagency offer support / create value? (cf. Velamuri et al., 2011).
- (2) Which **level of business activity** does the support focus on?
- (3) In which **collaborative contexts** does interagency offer support / create value? (cf. Celik et. al., 2014).
- (4) What kind of **exchanges** are present (transferred) in the collaboration? (cf. Fichter, 2012).
- (5) On which level of society does the collaboration take place and have impacts? (**multi-level perspective**) (Geels, 2011; Kemp et al., 2007).

The analytical framework used in the case studies was developed further from the basic conceptual frameworks behind the study by adding the innovation (or entrepreneurial) life-cycle stages in the

chart. This allowed the research team to make conclusions that reflect also the interagency and collaboration in proportion to life-cycle stages in a start-up or young SME. Figure 9.

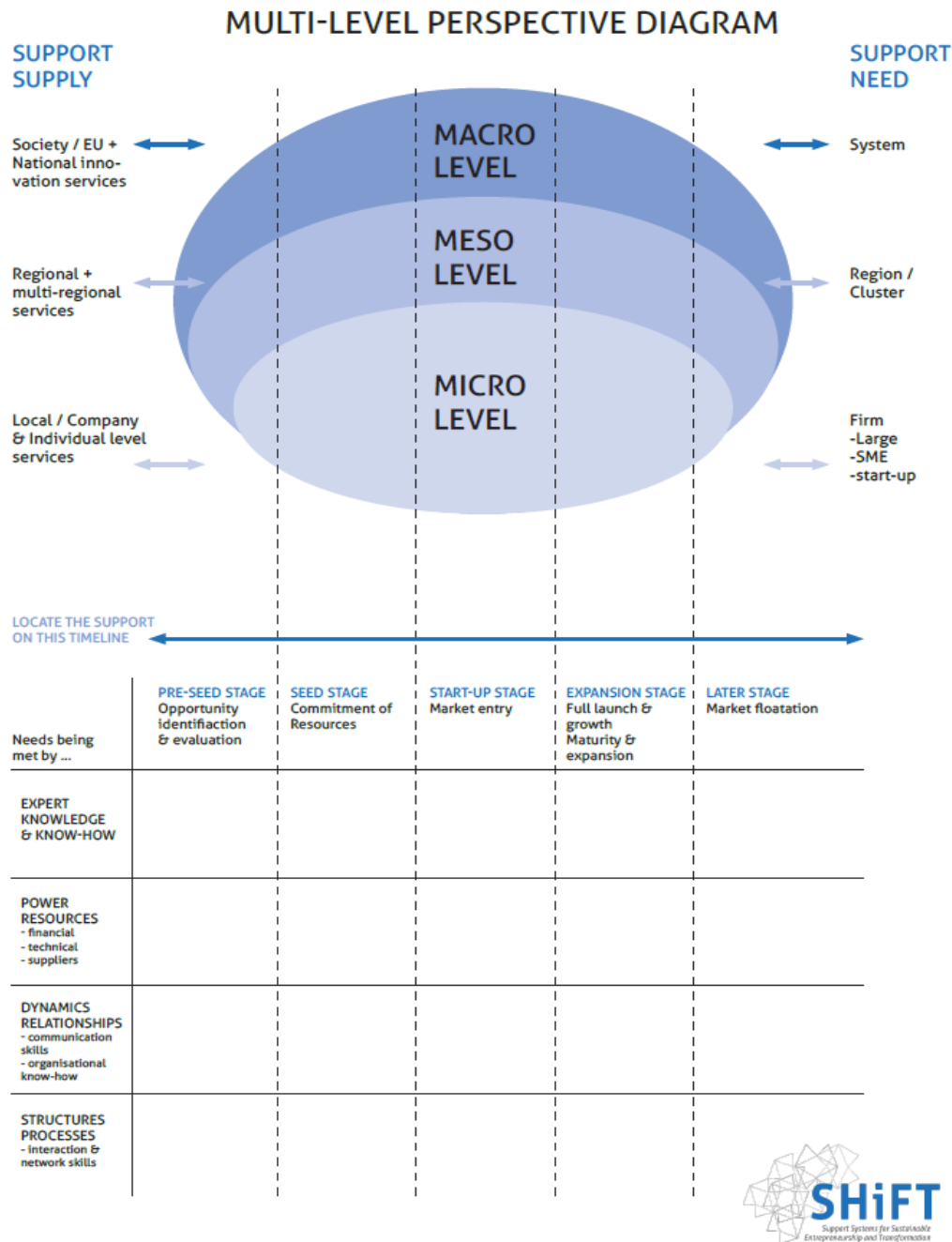


Figure 9: The framework used in WP7 case analysis.

Guiding research questions

We formulated the research questions as follows:

RQ1 - What emergent and innovative types of bringing people and other resources together to support eco-oriented innovation and start-ups exist in the current support system (in addition to those of actors in focus in WPs 2-6)?

RQ2 - What kind of added value do these support services create (and how) compared to the ‘main-

stream' support system and what challenges are involved (in terms of technological and behavioural change)?

RQ3 - How should the eco-innovation support infrastructure / policies be developed to better serve the transformation of society (technological and behavioural perspectives)?

Methodology

The first phase of the research strategy of the study is based on a detailed 'state of the art' literature review focusing on collaboration for SME support and eco-innovation and inter-organizational collaboration to support innovative start-up business. For the second phase we adopted a qualitative method (i.e. limited number of cases) and focused on specific interviewees and case studies in Finland, because of NODUS, Aalto ARTS research group's sphere of knowledge and expertise. We decided not to initiate quantitative surveys due to the novelty of the phenomenon, and the challenges in identifying interagents and/or getting others to identify themselves as interagents. At this stage, it is important to describe and to understand the nature of interagency and unusual collaboration, and qualitative case method served these purposes. It would also be difficult to design justified survey questionnaires before first understanding the background of unusual collaboration and potential challenges related to it. It is also unclear whether e.g. entrepreneurs would understand the conceptual framework of the study and potential survey questions derived from it. We did, however, test the conceptual and analytical framework of the study (Figure 9) with some of our Finnish industrial SME partners in two specific events in Helsinki in 2014. After some minor elaborations to the framework after feedback from these partners we applied the framework during the expert interviews related to cases in 2015.

Case study selection focused on mobility, housing as well as private consumption in general because these can be considered the hot spots to enable innovations and behavior change, i.e. transform everyday lifestyles and decrease environmental footprints (ANPED 2013). Two of the cases focus to a large extent on energy (The Local Energy Association/FInsolar) and mobility cleantech business (Peloton Club – Demos Helsinki), whereas one case aims at supporting more sustainable business models in a specific consumer goods sector, namely fashion (TELAKKA®). Individual interagents were identified for each case study and were each interviewed, using a semi-structured interview technique, for 1.5 hours.

Key results

The findings from the literature study give an overview as regards **collaboration** of small businesses and (often bigger) interagent organisations, especially in terms of support for start-ups in the field of **sustainable innovation**. The perspectives on collaboration and interagency are many, with the majority of studies focusing on collaboration motives, types, outcomes and other conventional aspects of collaborating. As regards this study for WP7 we believe the more relevant literature is gathered under promoter power & role, intermediary level (business vs. system), intermediary role & function and innovation network category (Figure 10).

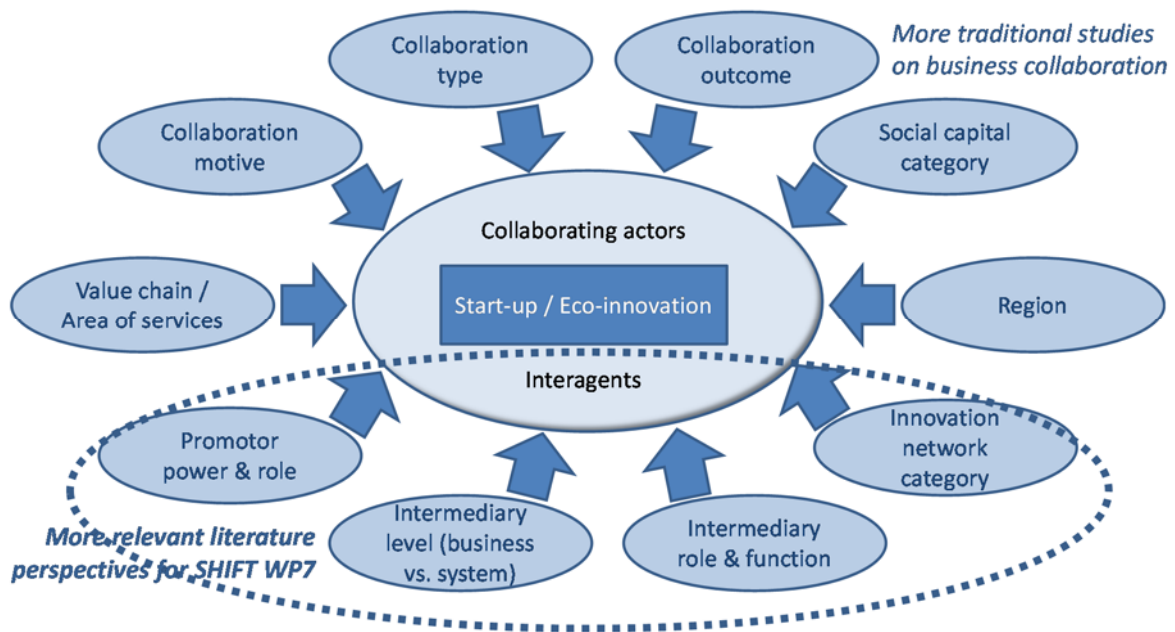


Figure 10: The various perspectives on corporate collaboration and interagents.

In a comprehensive analysis of the literature sources we created an emerging typology of interagents and unusual collaborators, identifying 47 different types including individuals, organizations and other actors (Table 7, Appendix 1). We also identified five different categories of ‘exchange’ made by these types: Specialized knowledge – financial, technical, other; Resources – financial, technical, supplies, other; Relationships – networking skills, interaction; Processes – admin, decision-making in hierarchies; and other exchanges. Specialised knowledge and Resources were the most popular categories of exchange.

Table 7: A classification of potential interagent and collaborator actors according to their organizational background (see also Table 4 in Chapter 2.7 in WP7 report for authors and more details).

Background	Actor type			
	<i>Individuals</i>	<i>Organisations</i>	<i>Individuals or organizations</i>	<i>(More complex) Multi-actor structure</i>
Term mentioned in the literature on collaboration and innovation support	Business contact CSR champion Entrepreneur Expert Founder / CEO Friend	Boundary organization Business Development Organization Incumbent ('Goliath') Innovation consultancy Intermediary firm Knowledge intermediary Not-for-profit organization Private organization Public organization	Bonding interagent Bricoleur Bridging interagent Broker Consultant 'David' (small firm) Ecopreneur (Innovation) intermediary Intermediary (agency) Intermediary level	Family Industrial cluster Innovation community Network Peer group Social innovation network Systemic intermediary Third parties

		<i>Regional institution</i> <i>Superstructure organization</i>	<i>body</i> <i>Knowledge broker</i> <i>Network facilitator</i> <i>Regulatory inter-agent</i> <i>Researcher</i> <i>Resource interagent</i> <i>Systemic intermediary</i> <i>Technology broker</i> <i>Venture capitalist</i>	
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Analysis of three Finnish case studies revealed that the added value of unusual collaboration when compared to most of the more conventional support services has been their ability to combine or recombine existing support mechanisms and other exchanges into an industry-specific, tailored combination of resources and collaborative contexts to help brands, start-ups and SMEs to grow and even internationalize. Even if the support focus has been on micro level, where also the support needs come from, unusual collaboration seems to be able to promote interaction and information flow between different system levels. For example, bottom-up lobbying of changes in the regulation and society that would improve the business environment in favor of sustainable start-ups and SMEs has been part of the collaboration in practice (see Figure 11).

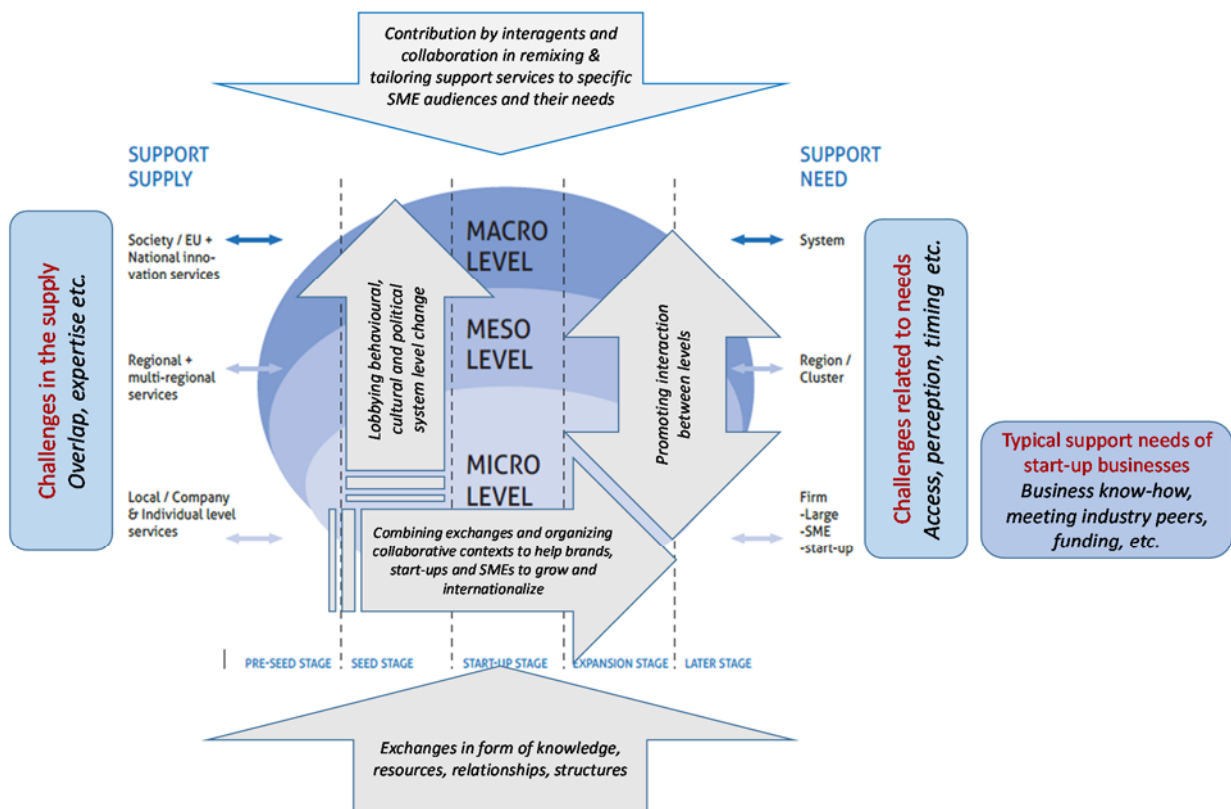


Figure 11: The value adding contributions of interagents and unusual collaboration in filling the gap between start-up support supply and support needs.

However, we should keep in mind that this visualization as well as our findings reflect especially the Finnish experience in a small country with obviously easier access to meso- and macro-level organizations. Developing similar networks and exchange flows might prove more demanding for the interagents in larger populations and economies.

As regards the impact of unusual collaboration, the assessment of real (mid and long-term) impacts of support through collaboration in the case organizations is not possible, due to the short history of collaboration cases. The cases have shown success in bringing entrepreneurs and innovators with rather similar sector background together, and accelerated business development through diverse combined mechanisms of support brought more conveniently available to participants. Due to the project-based nature of the support, however, a long-term continuous positive impact might prove challenging, especially if the financial footing is not broadened.

Our considerations of the challenges and threats based on the observations by the interagents in collaboration showed that factors probably hindering the success of support activities at least in the long run are related to funding, people, time and value creation. The financial footing is narrow and based primarily on public innovation funding. In order to attract more funding, the collaborations should be able to show benefits, added value to both customers (support receivers) and investors. Despite these rather serious challenges related to collaboration, our cases have shown several promising aspects.

Considerations of the potential strengths and opportunities available in the collaboration, as well as the potential weaknesses and threats are summarized in Table 8 below.

Table 8: Considerations of favorable and challenging aspects as regards interagents and unusual collaboration.

	<i>Favorable aspects</i>	<i>Challenging aspects</i>
<i>Internal</i>	<p><i>Strengths</i></p> <p><i>Accelerating business development through hybrid support mechanisms</i></p> <p><i>Bringing a diverse set of support services conveniently available to participants</i></p> <p><i>Bringing like-minded people with similar industrial background together</i></p> <p><i>Focusing on businesses on rather similar life-cycle stage</i></p> <p><i>Informal, innovative and spontaneous nature of collaboration</i></p> <p><i>Positive team spirit</i></p> <p><i>Shared vision of a more sustainable future</i></p> <p><i>The expertise and visions of the interagent</i></p>	<p><i>Weaknesses</i></p> <p><i>Ability to show impacts of collaboration</i></p> <p><i>Dependence on the contribution and interest of the interagent (and key persons)</i></p> <p><i>Strong dependence on public funding</i></p> <p><i>(Often) temporary project-based nature of collaboration</i></p> <p><i>Systematic impact assessment missing</i></p>
	<i>Opportunities</i>	<i>Threats</i>

External	<p><i>Emerging favorable gradual change on macro level (behavioral, cultural, social change)</i></p> <p><i>Interest by political decision makers</i></p> <p><i>Internationalization and scaling up of the collaboration concept</i></p>	<p><i>Financing collaboration in the long run (availability of public funding)</i></p> <p><i>Withdrawal and availability of key contributors</i></p>
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At least in the innovation and entrepreneurship support context of Finland, the pivotal role of public innovation funding agencies (The Finnish Innovation Fund Sitra and the Finnish Funding Agency for Innovation Tekes) and government (e.g. Ministry of the Environment in Finland) during the start and early years of unusual collaboration should not be ignored. Private venture capital and informal seed funding (e.g. crowdfunding) might also prove important for the start of collaboration. In addition to motivated and visionary interagents, securing sufficient initial funding and other practical support to the collaboration might be essential for the later success of the collaboration – and support as well. Consequently, it is necessary to consider, how the motivated and visionary interagents themselves could be better supported, so that they can improve their support and increase added-value inputs.

Need for redesigning support systems

The real and perceived gaps found between supply in the support system we studied and the demand from the key actors, SMEs developing eco-innovation and green start-ups

Our observations are based upon our extensive literature review and the three Finnish case studies, but we believe that some of the recommendations have more general application to eco-innovation support systems within and across EU member states.

Unusual collaboration is typically started with long term system change in mind, also trying to fill some of the obvious gaps in the existing support system by working intensively and collaborating at the micro level. The potential gaps (that seem to exist and could become even larger in the future) especially related to interagents and unusual collaboration, but probably also to other forms of support, include, e.g.

- Receiving relevant support may heavily depend on good luck and coincidence (mismatch between the timing from supply and demand side)
- Peer-level and other support by like-minded people is often difficult to find, and networking is challenging to organize for various reasons
- It is really challenging to bring about system level change (as already stated in the literature study for WP1 of this project, paradigm shifts will take time) in cooperation with financially weak startup players in a non-permanent organization based upon short-term collaborative projects

The most relevant discrepancies between the current support systems for entrepreneurship and the requirements of (adapted) systems for sustainable entrepreneurship

The supply and demand sides of the support do not generally understand each other's perspectives (in practice, as some of our expert interviewees put it, they often do not seem to speak the same

language). Two of the highly relevant discrepancies in the system are linked to business assessment methods and specific expertise available in the support system.

In terms of evaluation of the businesses looking for support there seems to be too narrow selection of indicators to evaluate the potential opportunities and risks of the ventures in typical public entrepreneurship support services. Also sustainability ('how to change the world') aspects should be involved, in addition to conventional financial indicators. Mainstream business indicators may be suitable for 'greening enterprises', but insufficient especially in the analysis of 'eco-enterprises'. Thus, business start-ups and existing SMEs looking for support should be assessed on their sustainability futuring capability, and sustainability assessment could also affect the businesses' eligibility for innovation support funding.

As for sector specific and sustainability related expertise provided by the support system, it seems that the support services currently available are often too generic (mainstream), i.e. they lack business sector and/or sustainability expertise. At least in Finland, despite of all well-intentioned reforms of the public support system, it still appears to be designed more for the needs and perspectives of larger firms than startups and MSMEs. Both sector specific and sustainability type of expertise are essential for the support of both greening and eco-startups and SMEs. The support service should be able to see and develop the business potential and understand the real needs of an 'eco-SME' and small business in general.

Need for substantially redesigning the existing support system for entrepreneurship

The challenges that call for redesigning the support system are related to the coordination of decisions and support activities on and between all levels. The experience and views by the Finnish industrial partners of the project as well as findings from the case studies reveal that:

- Sometimes decisions on macro level water down the business development and support efforts on micro level – thus, more systematic views are necessary when preparing decisions (e.g. regulation)
- There seems to be much overlap: reinventing the wheel by local, regional, national, and sector-specific support actors is rather common and several parallel and even competing public support activities and initiatives are available
- Lack of coordination and unity in the support system mean difficulties for startups and SMEs to perceive the support system and benefit from the service supply
- Systematic evaluation of the quality and effectiveness (impact) and benchmark of the support services is generally not available.

The most urgent redesign needs on macro level include the introduction of a more holistic (sustainability oriented) analysis on the impacts of decisions. On micro level, the support supply should be made more easily perceivable and understandable for start-ups and SMEs. On all levels, sustainability should be emphasized in addition to more conventional views of economic development.

Conclusions and recommendations

The practical recommendations for policy makers, and support actors for improving the support start-ups and SMEs are related to improving the assessment methodology of businesses, accessibility of services, coordination of political decisions and support services, quality control and impact assessment of support services, and also improving policy support for collaboration networks. We need innovation at ALL levels in the support system – micro, meso and macro. Actors need to spend time in different levels of the support system to understand how to vertically and horizontally integrate a more effective system.

As regards the assessment methodology of start-ups and business ideas

- The eligibility of businesses should be based on sustainability future proofing (including environmental and social factors in addition to economic performance indicators).

As for the accessibility of services

- The support system should be adjusted to be more easily perceived, understood, accessed and utilized by startups and SMEs. This could start with the mapping of regional and national support systems and frequent updates of them.

When improving the coordination of macro level political decisions and support services on all levels

- Policy makers could break old social and organizational ‘silos’ while creating new collaborative contexts for design and innovation
- The collaborative support services should be complimentary and not competing with each other
- Influential actors like EU and national ministries (and other relevant macro level national actors) should be able show more action to tackle sustainability constraints in support services and business as well.

In terms of quality control and impact assessment of the (publicly funded) support services, it seems that the support actors and organizations are currently not easily assessed for the quality of support and the value they add to start-ups and SMEs. The real value and impact of the different collaborative innovation networks is how their primary functions cross-over or hybridise. To evaluate quality and success of support,

- For example current support systems might be uniformly evaluated and reviewed looking at promoter roles, and even ranked, but we should avoid implementing a certification system (in addition to all those others that already exist)
- More benchmark indicators and a more comprehensive selection of indicators should be made available.

Improving the policy support for the collaboration networks between eco-innovative firms and other actors is important. In our cases, the most frequently rising need in terms of unusual collaboration seems to be meeting peers in the same industry. Encouraging P2P inter-exchange of resources, e.g. P2P platform, network, events etc. is recommended. In addition, e.g. innovation policies should try to leverage cooperation and competition between Davids and Goliaths, SMEs and incumbents (cf. Hockerts and Wüstenhagen, 2010). This would promote the diffusion of sustainable innovations in the society. It might also be useful if key support actors/organisations had to define their vision and

how it is underpinned by policies and also how they demonstrate 'effective practice' i.e. evidence on how the support meets real needs of start-ups/SMEs and how it works. It seems that current 'expert' databases in support system providers need updating as the abilities of these experts to 'talk the language of SMEs' and have field experience with SMEs.

- Possibly making funding available for facilitators, platform creators and so on would help create new networks for the exchange of resources.

All in all, we need

- Better understanding of the relevance and opportunities linked to sustainable entrepreneurship, and more elaborated tools to evaluate the business potential and risks, as well as better coordination of the support at national levels and
- Systemic (holistic) analysis of the societal impacts of the macro level decisions and much better coordination of regulation and innovation and entrepreneurship support at EU-level
- 'Systemic intermediaries' or 'experts' who are able to see the whole support system(s) as well as motivated and visionary interagents (or intermediary organisations in general) who are able and willing to support the establishment of new actor-networks to bring about desired changes towards sustainability in sociotechnical systems (cf. Backhaus, 2010). However, the work needs better policy support to promote the creation of these networks between eco-innovative firms and other actors (cf. Triguero et al., 2013; Van Lente et al., 2003). As Kivimaa (2014) concluded, the intermediaries can make an important contribution to sustainability transitions by initiating and managing new policy or market processes and by acting as impartial contact point or voice for new networks of actors.
- Further research to increase our understanding and to back up the support system development.

It remains to be considered, whether there are best practice cases we would recommend to look at. We can say that in Finland, The Local Energy Association/Finsolar <http://www.lahienergia.org/in-english/about-finnish-clean-energy-association/>, TELAKKA® <http://telakka.com/> and Peloton Club (Demos Helsinki) <http://www.pelotonclub.me/> all place the eco-entrepreneurs near the centre of their sustainable entrepreneurship activities and demonstrate ways of improving eco-innovation support practice. In Germany, "The Changer", located in Berlin. Cf. <http://thechanger.org>, is another example.

4 Is there are need for a paradigm change in support systems?

A paradigm is typically defined as a set of assumptions, concepts, values, and practices that constitutes a way of viewing reality for the community that shares them. Paradigm shift in turn is often defined as a fundamental change in an individual's thinking or a society's view of how things work in the world. Applying Kuhn's concept of the evolution of a paradigm to the guiding research question of SHIFT and pulling together insights from empirical investigations allows for describing several phases of a paradigm change in support systems for innovation and entrepreneurship (cf. Table 9.)

Table 9: Paradigm change in support systems for innovation and entrepreneurship

Phase	Key assumptions and values	Practices
Phase 1: Pre-paradigm phase	Innovation happens based on single entrepreneurial activity, no need is seen for specifically supporting innovation by public authorities or private actors	Innovation and entrepreneurship is being implemented without specific public or private support activities
Phase 2: Dominant paradigm evolves	Innovation is considered to be a key driver for the wealth of nations, public support is considered to be important to boost innovation	Innovation and entrepreneurship support systems evolve with a clear focus on generating economic benefits
Phase 3: Exploring alternative ideas	Sustainability is considered to be important; innovation and entrepreneurship are considered key forces in solving societal problems /challenges	Practices are being explored for generating and boosting eco-innovation, potential mismatch between support systems and innovators is identified, redesign of support systems
Phase 4: Paradigm shift - Replacement of old paradigm	There is consensus that eco-innovation and sustainable entrepreneurship are key forces for securing and increasing the well-being of mankind	Innovation and entrepreneurship support systems are designed to generate multi-purpose benefits (economically, ecologically, socially).

Recent studies as well as findings in SHIFT make clear that all three countries that we have investigated (Finland, Germany and Sweden) have very sophisticated support systems for innovation and entrepreneurship. These support systems have largely been developed during the past two to three decades. Our results also point out that in all three countries sustainability is considered to be important by the respective governments and that there is a growing consensus in the population and business that society should promote and facilitate more sustainable production and consumption patterns should be designed to be sustainable. Findings also illustrate that most actors of the support system for innovation and entrepreneurship are interested in sustainability issues (for various reasons) and that good practice examples of support for eco-innovation and sustainable entrepreneurship already exist. But the results of our investigations also make clear these activities are for the most part still an exception and a niche phenomenon. In general it can be stated that sustainability is hardly implemented in the support system for innovation and entrepreneurship and is not yet established as a standard in business development processes and the respective support activities. Most

parts of the innovation and entrepreneurship support systems still have a clear focus on generating economic benefits and are not yet intended and designed to generate multi-purpose benefits (economically, ecologically, socially). Against this background it can be concluded that Finland, Germany and Sweden are still in Phase 3 of the evolution of paradigms and that a mainstreaming of integrating sustainability systematically and holistically in the support system for innovation and entrepreneurship has not yet occurred in practice.

5 Strategies for redesigning support systems to boost eco-innovation

Even countries like Finland, Germany and Sweden who are leaders in eco-innovation support, still are in Phase 3 of the evolution of paradigm change (cf. last Section). No mainstreaming of integrating sustainability systematically and holistically in the support system for innovation and entrepreneurship has yet occurred in practice. Based on this central result of the SHIFT project and the detailed findings from our empirical investigations, seven basic strategies can be developed for the redesign of support systems to effectively support eco-innovation:

- (1) *Put eco-innovators at the centre of support efforts*: Select specifically eco-innovators for support activities and/or design support activities that fit the specific needs of eco-innovators.
- (2) *Easy entry and sign posting for eco-innovators*: Create easily accessible entry points to the support system for eco-innovators and provide clear guidance to available support offerings.
- (3) *Encourage experimentation*: Specific support for eco-innovators is emerging, but is a fairly new phenomenon. Pilot exercises and good practice examples are already available, but experience with support systems specifically designed to stimulate and help eco-innovators is still limited. Well-established “standards” or dominant designs do not exist yet. Therefore experimentation with innovative support activities and designs should be encouraged.
- (4) *Dynamic tailoring of support activities*: Eco-innovators are not a homogeneous group, but comprise different types of entrepreneurs who act in very different sectors, markets and regulatory and societal environments. Therefore support activities for eco-innovators have to be tailored dynamically to the specific needs of specific groups and contexts.
- (5) *Mainstreaming sustainability in the support system*: Sustainability aspects are not just an issue for the specific group of sustainable entrepreneurs that are highly mission-driven or active in specific green markets. Sustainability nowadays is relevant for all entrepreneurs no matter in which field of technology, sector or market they are active or intend to be active. Therefore sustainability has to be integrated broadly in the support system. It helps all entrepreneurs to embrace additional opportunities and advantages from taking sustainability into account and in avoiding risks and failure from not considering success relevant aspects of sustainability.
- (6) *Specialisation*: Mainstreaming sustainability should be combined or supplemented by support activities that are specifically targeted at and designed for sustainable entrepreneurs and eco-innovators. To fit the specific needs of eco-innovators and to establish entrepreneurial communities and eco-systems requires specialisation in the support system.
- (7) *Assessment and monitoring of effectiveness*: Support activities are not an end in itself, but should contribute to specific goals. Up till now support systems for innovation and entrepreneurship have been focussing on economic goals. With regard to sustainability it requires a paradigm change. Support systems should be designed to generate multi-purpose benefits (economically, ecologically, socially). This requires assessment and monitoring tools that help to benchmark existing support systems, measure impacts and outcomes of support activities and provide data and information for policy makers and decision makers of support systems.

For implementing these seven basic strategies we have elaborated recommendations for European policy as well as for different actors of the support system. These will be presented in the following Chapters.

6 Conclusions and recommendations for National and European Support Systems

6.1 Conclusions for the European Union

Based on findings, recommendations for action and good practice examples from SHIFT recommendations for European policy for redesigning the support system for innovation and entrepreneurship can be developed. The recommendations are targeted at European policy makers and address specifically the Directorate-General for Internal Market, Industry, Entrepreneurship and SMEs (DG GROW), DG Environment and the DG for Research and Innovation (DG RTD) of the European Commission.

Table 10: Basic strategies, key messages and recommendations for DG GROW, DG Environment and DG RTD

Basic strategy for redesigning support systems	Key messages with regard to the strategy	Specific recommendations for actions for DG GROW, DG Environment and DG RTD
<p>1 Put eco-innovators at the centre of support efforts</p>	<p>Develop a mixture of support functions to prioritise eco-innovators and green start-ups over ordinary enterprises.</p> <p>Pick promising eco-innovators i.e. the eco-enterprises and green start-ups showing sustainable entrepreneurship potential and/or positive early results and have or are interested in embedding sustainability future-proofing.</p>	<p>The European Commission should create a project or programme to develop the criteria and the methodology to identify and pick promising green start-ups and young eco-enterprises on the basis of their ‘sustainability future proofing’ potential. If green start-ups and eco-SMEs pass the sustainability future proofing test they should be ‘fast-tracked’ through the support system.</p> <p>DG GROW and DG Environment should facilitate a project to bring together the best European eco-design/sustainable design centres of expertise/excellence and the more sustainability aware design centre representatives from EU member states to develop a ‘design ecosystem’, a template that can be used across Europe, where the eco-innovators’ are integrated as the primary beneficiaries of the support system and specific and generic support services are built around them. LADEC/the city of Lahti’s design ecosystem in Finland or Climate KIC’s Green Garage in Berlin and its climate innovation ecosystem would be a starting point of discussion.</p>
<p>2 Easy entry and sign posting for eco-innovators</p>	<p>Create a ‘one-stop shop’ which eco-innovators feel is orientated towards them and their needs. This might include e.g. offering micro-funding for specific activities.</p>	<p>The European Commission should support the development of European as well as national (language specific) “One-stop shops” for green start-ups and young eco-enterprises. This could comprise e.g. Internet portals like the first national platform for green start-ups in Germany (www.start-green.net) or e.g. business plan competitions specifically focussed on eco-innovation and the Green Economy.</p> <p>DG GROW and DG Environment should co-ordinate with each other and bring together organisations central to the creation of a European Directory of Design Services. In this Directory SMEs can easily assess what kind of design service is offered and how it adds value.</p>
<p>3 Encourage experimentation</p>	<p>Create and stimulate fresh ways of exchanging knowledge, of networking or getting access to resources, people and systems.</p> <p>Bringing different actors together in new ways e.g. matchmaking events between SMEs, design service providers, finance service providers, incubators or university entre-</p>	<p>The European Commission should initiate a funding programme for developing and evaluating innovative support activities for eco-innovators and green start-ups. Benefits, costs, impacts and transferability of pioneering support activities should be evaluated systematically and best practice should be identified.</p> <p>DG GROW and DG Environment should consider providing funding for a Programme to encourage eco-SMEs and design service providers (DSPs) to submit applications <i>together</i> for micro-funding for joint SME-DSP eco-innovation proposals.</p> <p>National and EU prizes for best eco-innovation solutions and for green and sustainable entrepreneurship should be stimulated and supported by the European Commission. Examples for already existing prizes are the European Sustainable Entrepreneurship Award or the national StartGreen Award in Germany.</p>

	preneurship centres.	
4 Dynamic tailoring of support activities	<p>Develop an audit tool to help start-ups and SMEs identify their current and latent dynamic needs. Experts look at start-ups and SMEs needs and give their opinions as to which support services might best meet each SME's needs e.g. coaching etc.</p> <p>Funding is provided for audit and for 'tailored services'.</p>	<p>DG GROW and DG Environment should consider providing funding for a specific project for developing an audit tool for eco-SMEs and eco-start-ups so they can articulate their immediate and longer-term needs. The 'Design Acupuncture' game (see WP5 SHIFT report) could be further developed to 'locate' the best design services to meet those needs. The game can also be prototyped for other services e.g. financial services.</p> <p>Incubators supported from the EU level should be encouraged to implement sustainability strategies while taking into account the characteristics of the new ventures in its surroundings. The aim should be to create a variety of business development activities such as e.g. coaching, mentoring, or networking that is tailored to the local/regional needs and conditions and builds on regional strengths.</p>
5 Main-streaming sustainability in the support system	<p>Make sure that environmental and sustainability issues are systematically integrated in guidelines and templates for business plans and business model canvas</p> <p>Integrate sustainability and entrepreneurship criteria in the support actor organisation through Key Performance Indicators (KPIs).</p>	<p>The European Commission should support the development, dissemination and replication of methodologies, guidelines, tools and templates for mainstreaming environmental and sustainability issues (challenges, opportunities, added value, risks etc.) into business planning and business modelling. This can build on existing approaches like the Sustainable Business Planer from Austria, the Handbook for Business Planning of the Berlin Brandenburg Business Plan Competition or the Sustainable Business Canvas.</p> <p>The European Commission should initiate a project or funding programme for the development of metrics and key performance indicators (KPIs) for assessing the integration of sustainability and entrepreneurship criteria in support organizations like incubators etc.</p> <p>DG GROW and DG Environment should focus on policy 'language' and appoint an officer to ensure that all future EC APs and calls under the Horizon 2020, Innovation Union, COSME, and other relevant initiatives, embed the words 'design', 'ecodesign' and 'sustainable design'.</p>
6 Specialisation	<p>Create a platform or portal for green start-ups providing information, resources and networking specifically targeted at green businesses and sustainable entrepreneurs</p> <p>Support hybridisation of eco-innovation support services.</p>	<p>The European Commission should support European as well as national (language specific) platforms and Internet portals specifically targeted at green start-ups and young eco-enterprises. (see also Strategy 2).</p> <p>It should also support a European-level network of "sustainable early-stage investors". As sustainability-oriented and Cleantech-oriented investors invest relatively low sums of risk capital in early-stage companies, these should be brought together in order to leverage their impact. While project-based initiatives exist both at the EU level (e.g. INNEON and national level (GreenUpInvest), a more permanent structure would be beneficial.</p> <p>Intermediaries (see WP4 SHIFT report) and interagents (see WP7 SHIFT report) offer an interesting and potentially impactful way of hybridising and tailoring support to SMEs for particular eco-innovation sectors. DG GROW should liaise with DG Environment to determine which sectors in the Circular economy might benefit most from hybridisation of eco-innovation support services.</p>
7 Assessment and monitoring of effectiveness	<p>Benchmark the existing support system showing how it integrates sustainability and supports eco-preneurs/eco-innovators.</p> <p>Measure impacts of services on SMEs and the consequent impacts SMEs have on EU/EC sustainability targets.</p> <p>Assess the support system from three perspectives – the supply actor, the start-up/SME demand-side actor and an independent assessor.</p>	<p>The European Commission should support the development and establishment of national and European wide monitoring systems for sustainable entrepreneurship and eco-innovation. A project should be funded that explores how the existing Eco-innovation Observatory can be supplemented with specific indicators and metrics on green start-ups. Existing experiences from the existing Green Economy Start-up Monitor should be used.</p> <p>DG Environment should liaise with DG GROW to fund a project to create a new set of benchmarks for the primary functions of eco-innovation support systems in the EU, bringing data from the Eco-Innovation Observatory initiative 2011-2014 and setting new benchmarks which explicitly explain how specific support services add value to the eco-SMEs and eco-start-ups.</p> <p>We suggest the following indicators when evaluating support of incubators: (a) demand for becoming a tenant in an incubator; (b) how many ventures that complete an incubator process (i.e. the ventures find it worthwhile to proceed with their development regardless of viability of initial idea); (c) integration of incubator activities within the larger support system (e.g. through co-financing, networking activities). Such indicators show how well the incubators are anchored in their local/regional environment.</p>

6.2 Conclusions for Finland

Alastair Fuad-Luke and Mika Kuisma

Setting the scene

A common perspective adopted by the Finnish partner (Aalto ARTS, Aalto University) in its two work packages for the SHIFT project (WP5 Design Service Providers, and, WP7 Interagents and unusual collaboration) was to stand in the shoes of the (eco-)SMEs and (eco-)start-ups to view the (eco-) innovation support system in Finland from their perspective. Understanding the real needs of the SMEs and start-ups, while also considering the national, regional and local support actors operating across a multi-level perspective, is essential. Collaboration with eco-Micro-SMEs, from a diverse sectors, throughout the project revealed that very few sought assistance from key actors identified in the institutionalised, formal Finnish eco-orientated innovation support system (Table 11, see below) instead relying on support from a range of informal and other formal actors. A typical viewpoint is expressed, from an eco-fashion company called First Crush, who participated with 16 eco-SMEs in a SHIFT workshop run by NODUS, Aalto ARTS on 06 March 2013 in Helsinki (Figure 12). The importance of customers as key support actors was stressed by many MSMEs. These eco-enterprises also identified independent actors in their sectors who they felt provided essential support. Insights from this and other workshops led to the development of the concept of the 'interagent' (see full WP7 report).

Finland

MSMEs view of eco-innovation support systems

Mari Himmanen, First Crush – an eco-fashion agency

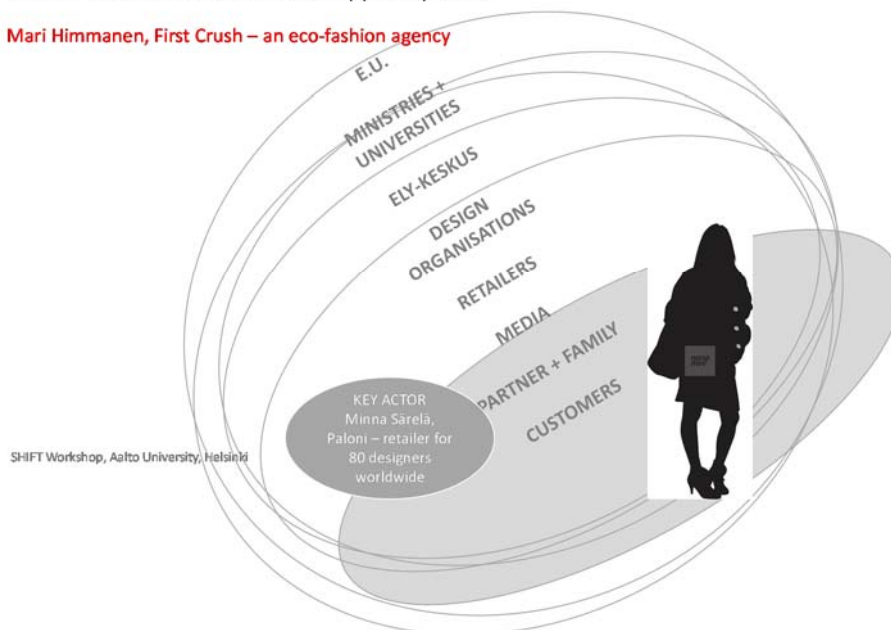


Figure 12: Visualization of a specific support system of an individual SME. Key support actors include family, customers and an interagent. The institutionalized support system is not located in the core.

Overview of the Finnish (eco-)innovation support system

The ‘bottom-up’ view of the eco-innovation support system, from the Finnish eco-(M)SMEs in the SHIFT project, is a salient counter-point to the formal view of the eco-innovation support systems in the EU monitored by the Eco-Innovation Observatory from 2011 onwards. The official ‘top-down’ view is that Finland, alongside Sweden, is consistently at the top of the ranking for supporting eco-innovation (EIO 2013, Figure 13). This is achieved through a fast growing Cleantech sector (energy efficiency, renewable energy, waste management and recycling, clean process, consulting and advisory services) and a government spending on R&D early stage investments 80-200% higher than the EU average (Eljas-Taal et al./EIO 2013, 7, 9). However, as the Eco-Innovation Observatory notes, one of the key barriers to eco-innovation in Finland is that different strategies, plans and programmes are being administered by different ministries and agencies (Eljas-Taal et al./EIO, 2013, p. 10).

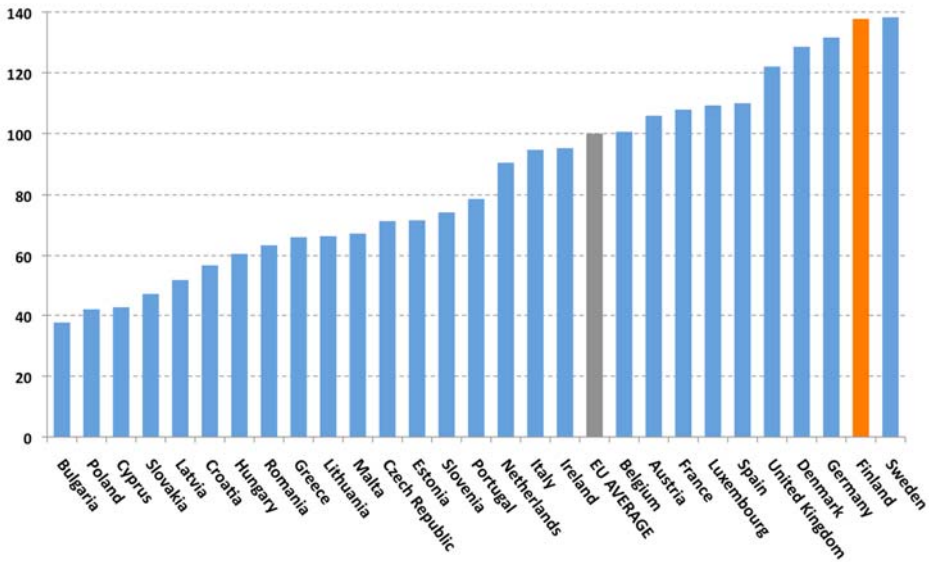
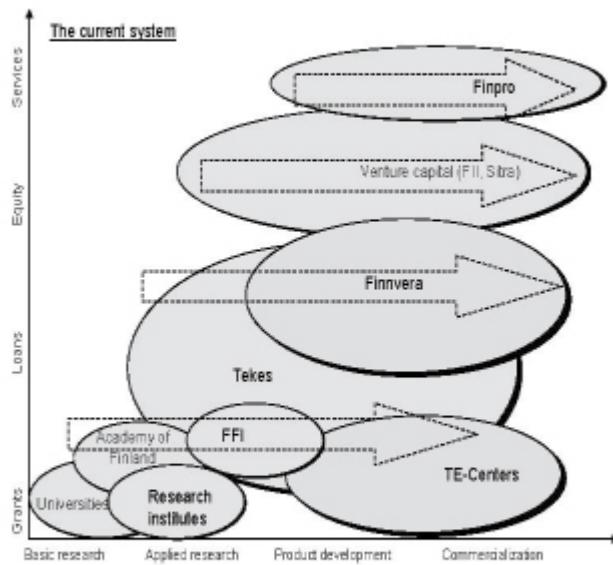


Figure 13: Finland is joint equal leader with Sweden in the 2013 Eco-Innovation Observatory ranking of EU member states for eco-innovation support (Source: Eljas-Taal et al./EIO, 2013).

Since the early 2000s, Finland has a well structured innovation support system (Georghiu et al., 2003, Figure 14) with key government-funded actors remaining significant providers in a stable configuration for well over a decade.

Figure 1: The Finnish innovation support system



Source: Georghiu et al. (2003).

Figure 14: The Finnish Innovation Support system in 2003. (Source: Georghiu et al., 2003).

However, there has been a re-structuring in recent years, driven by an evaluation of the Finnish national innovation system where it was noted that ‘green innovation seems to be less integrated into the Finnish mainstream innovation policy discussions’ (Veugelers et al., 2009, p. 5). This triggered a range of new policy initiatives encouraging more cleantech solutions through public sector procurement, the bio-economy and material efficiency plus Tekes’ own Green Growth programme, 2011-2015 (Eljas-Taal et al./EIO, 2013, p. 11). Final reports from the Green Growth programme are yet to be published but efforts were focused on four cross-cutting themes:

- Energy & materials efficiency
- Bioeconomy & biomaterials
- Recycling, recovery of raw materials and waste processes
- Business models, service concepts and comprehensive solutions

Tekes is a key primary actor in encouraging eco-innovation, especially in the early phases of R&D for new products, Product Service Systems (PSS) and services and remains central to the Finnish government’s structural organisation of public-sector actors (Figure 14). However, there are other public and private sector actors which constitute the wider eco-innovation support system (Table 11).

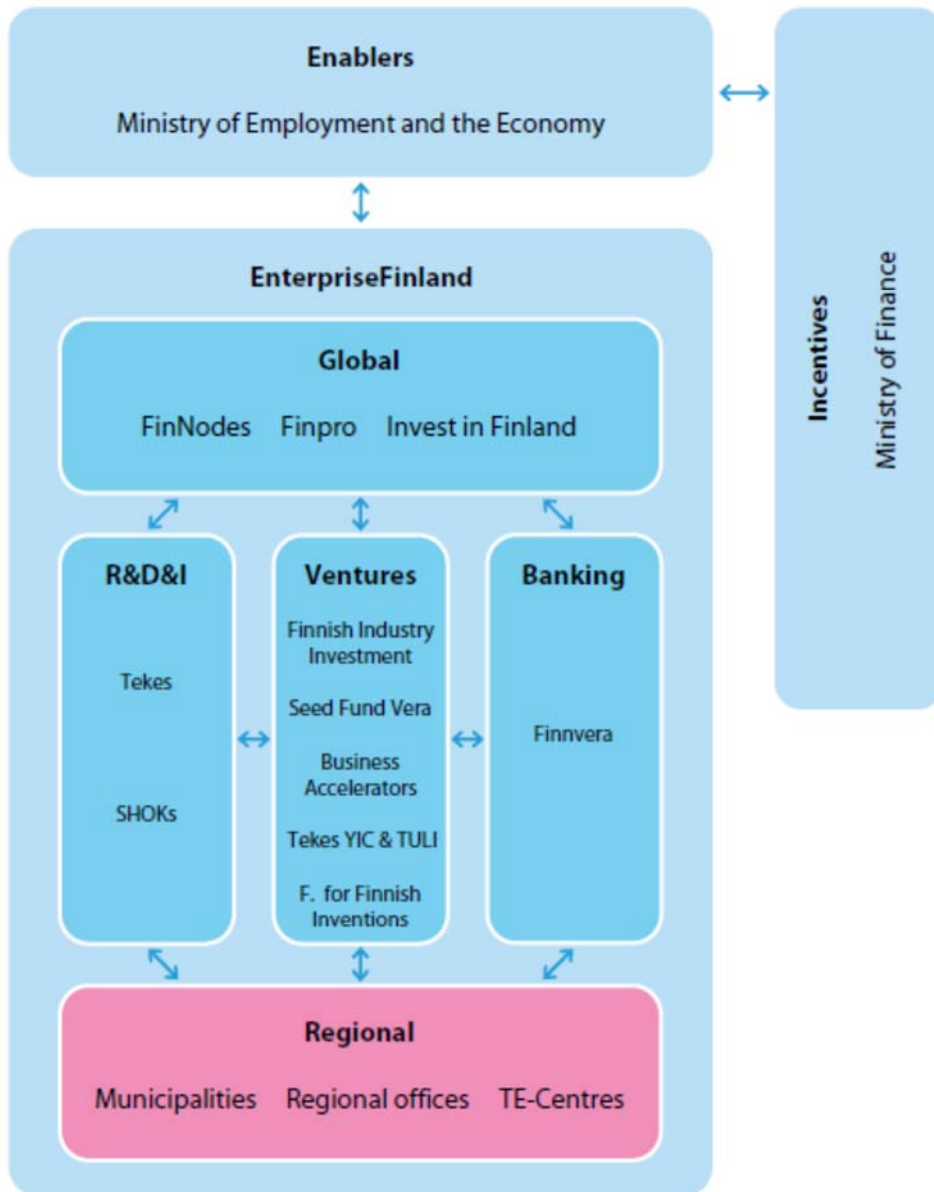


Figure 15: An outline of a streamline public enterprise support system. (Source: Veugelers et al., 2009, p. 65).

Table 11: Key actors in the eco-innovation support system in Finland. (Source: Kuisma, 2014. Eco-Innovation Support System: Basic classification of actors, hot spots and potential interviewees in Finland. 21 November 2014, NODUS, SHIFT, internal report).

Sector	Category	Organisation	Notes
Publically funded national services	National development	Tekes	Green Growth Programme 2011-2015
		Sitra	Energy Programme
		Finpro	Cleantech Finland
		Min. of Employment & Economy	Ecolabel Finland (Motiva Services)
	Sector research institutes & authorities	National Consumer Research Centre	
		MTT Agrifood Research Finland	
		Finnish Forest Research Institute	
		VTT, Technical Research Centre Finland	
		National Institute for Health & Welfare	
	Publically funded regional services	Regional services of government	Centres for Economic Development, Transport & Environment (ELY-KESKUS)
Other regional development clusters			LADEC Oy (comprising Lahti Regional Development Company (LAKES) & Lahti Science & Business Park
Other regional initiatives		Forum Virium, Helsinki	
Investors & Finance	Venture capital	CleanTech Invest Oy	
Professional & Trade Organisations	Design orientation	Design Forum Finland Ornamo – Association of Finnish Designers	
	Eco-orientation	Cleantech Finland GreenNet Finland Cleantech Cluster	
Entrepreneurship Associations & Chambers of Commerce	Associations of Entrepreneurs	Suomen Ekoyrittäjät – Association of Finnish ecoentrepreneurs	
Consultants/private development services	LCA & other environmental consultancies	Ecobio VTT	
	Thinktanks	Peloton/Demos Helsinki	
	Events	Kierrätystehdus – Recycling Factory	

The challenge for any Finnish eco- (M)SME, eco-preneur or eco-enterprise is to navigate through the complexity of support system options. While this is, perhaps, more straightforward if you are a clean-tech-orientated enterprise, or focused strictly on resource efficiency, it becomes progressively more difficult if your eco-focus is outside these categorisations.

Building on existing good practice

There is ample good practice to build upon, including at a national level Tekes' Green Growth Programme, the Cleantech Finland cluster and the Sitra Energy Programme, however, accessibility to these initiatives for smaller companies (Micro & Small SMEs - MSMEs), individual ecopreneurs and eco-startups remains difficult unless there is a more regional or local focus. In this sense LADEC's Cleantech Co-design centre and their initiatives such as Cleantech Venture Day, facilitate platforms, networking and other support activities that are more readily accessible to the smaller companies. Moreover, LADEC's ability to build platforms for focused activities ensures delivery of a more tailored support system. The applicability of a 'LADEC type approach' should be explored for other regions in Finland at the same time as asking 'How can other actors be encouraged to contribute to this type of local/regional eco-innovation support system?'.

Recommendations for hybridising support for an adaptable eco-innovation system

A consistent feature of Lahti's design ecosystem (see WP5, pp. 40-42) and the modus operandi of the interagent case studies in Finland (see WP7, pp. 48-81) is that the eco-SMEs/eco-preneurs/eco-enterprises are placed in the centre of the support system as key beneficiaries of the support activities. For a support system to declare itself successful, the beneficiaries have to *actually* benefit from the support activities. Tying all the detailed recommendations of WP5 and WP7 together, it seems there are some low-hanging fruit for some short-term gains. Our key recommendations are made directly to Tekes, as this public sector organisation plays such a pivotal role in eco-innovation in Finland:

- (1) Tekes should look at the detailed Recommendations made in WP5 and WP7 for the European Commission DGs, EU member states and for Finland, in order to determine the relevance of these recommendations to improving the eco-innovation support system.
- (2) Tekes should initiate a series of quarterly annual events for eco-SMEs focused around key themes: Access to research support; access to finance support; access to design support; and access to customers and markets. Tekes should invite key support actors, including those from Table 1 above to co-organise and co-develop each event. For example, the design service providers (DSPs) in Oranamo, Design Forum Finland and LADEC Cleantech Co-design Centre would be ideal collaborative partners to organise the 'design support' event. For a design support event Tekes should consider using or adapting the open source Design Acupuncture game developed in WP5 (pp. 119-125).
- (3) Macro-level: Tekes should develop a means to systematically benchmark the eco-innovation support services and their effectiveness in relation to a set of 'sustainability future proofing' criteria for the eco-SMEs. Eco-SMEs meeting these criteria should be fast-tracked through the support system, co-ordinated by the Meso-level support organisations.

- (4) Meso-level: Tekes should develop, in consultation with the interagent case study organisations (Finsolar/Local Energy Association, Peloton Club/Demos Helsinki and TELAKKA®) and the Design Service Providers (DSPs) (named in 2. above) a series of workshops to bring different actors together in order to improve the accessibility and effectiveness of the eco-innovation support system. This might involve creation of a multi-level perspective online platform or other ICT prototype, which can inform everyone from policy makers (macro level) to individual ecopreneurs (micro level) about support options.
- (5) Micro-level: Tekes should build on its findings from the Green Growth programme and initiate a research project to ascertain the exact composition of 'eco-sector' SMEs⁴, their diversity, their specific support needs in relation to the innovation cycle to obtain new baseline data to inform the development of adaptable eco- innovation support services.
- (6) All levels: Tekes should promote the idea of interagent activities to encourage cross-over and hybridisation of ideas and support activities between the macro, meso and micro levels of the support system.

⁴ Today this might include SMEs which consider themselves part of the bio-economy, eco-economy, circular economy and, even, the sharing economy.

6.3 Conclusions for Germany

Klaus Fichter and Linda Bergset

The federal political system in Germany, with its municipalities, districts, city states and federal states that complement each other in political implementation activity, leads to complex structures of support for business development. Accordingly, the German support systems for entrepreneurship and innovation are comprehensive at all geographical and political levels of activity (cf. Figure 16). There are nonetheless gaps in these systems and structures, especially when analysing it within the context of sustainable entrepreneurship. The focus of the SHIFT investigation in Germany was primarily on start-ups and early-stage entrepreneurship. The findings and recommendations here thus do not necessarily apply to general SME and eco-innovation support.

Parallel to the project period of SHIFT, the German SHIFT partner participated in a national research project on green start-ups in Germany. The support actors investigated in this project – StartUp4Climate – included entrepreneurship funding programmes at the national level, regional business development organisations, cluster strategies, start-up competitions, start-up awards, incubators, start-up support at higher education institutions, private actors of entrepreneurial finance and internet platforms and websites. The findings of this project are therefore particularly relevant to this section looking specifically at Germany, as its research scope to a substantial extent overlaps with the research carried out in the SHIFT project. The strategies and recommendations developed for Germany within SHIFT thus also draws on the findings within StartUp4Climate as documented in two publications (Borderstep Institut, 2014; Fichter et al., 2014).

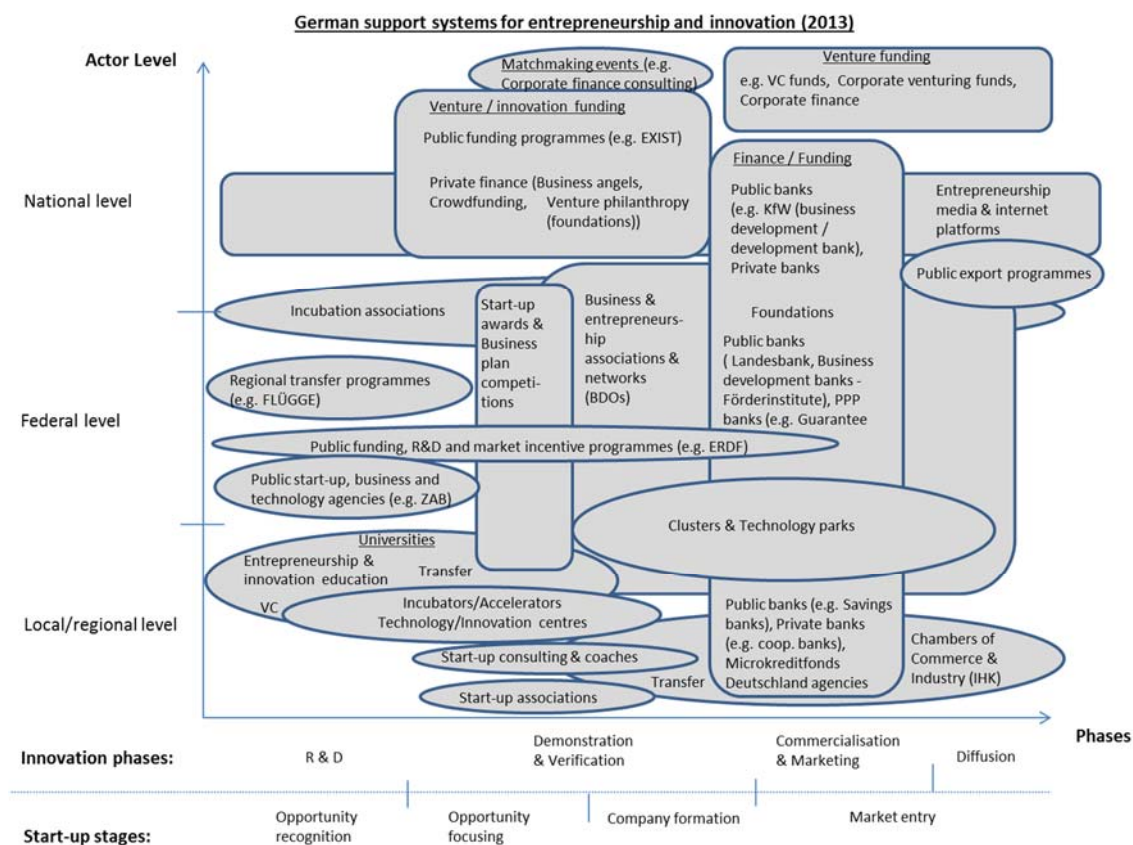


Figure 16: Overview of the German support systems for entrepreneurship and innovation (source: WP1)

Table 12 lists concrete recommendations and good practice examples specifically for Germany for the seven strategies for redesigning support systems developed within the SHIFT project.

Table 12: Recommendations and good practice examples for Germany

Basic strategy for redesigning support systems	Recommendations for actions	Good practice examples
<p>1 Put eco-innovators at the centre of support efforts: Select specifically eco-innovators for support activities and/or design support activities that fit the specific needs of eco-innovators.</p>	<p>(1) Develop a specific community of eco-innovators at and around the support actor in question;</p> <p>(2) Establish and take account of the specific needs of green start-ups;</p> <p>(3) Adapt investor/start-up matching formats to the specific needs of green start-ups.</p> <p>(4) Convey the potential fields of activity and economic significance of the Green Economy;</p>	<p>(1) Hamburg University of Technology (TUHH): Competency area “Green Technologies”; InnovationsCampus Green Technologies; Startup Consultant Green Technologies; Startup Prize Sustainability;</p> <p>(2) Green Garage, Berlin: one of a few specialised incubators for climate entrepreneurs;</p> <p>(3) Specifically adapted matching format: Ecosummit.</p> <p>(4) Specialised start-up awards like the StartGreen Award</p>
<p>2 Easy entry and sign posting for eco-innovators: Create easily accessible entry points to the support system for eco-innovators and provide clear guidance to available support offerings</p>	<p>(1) Make students, professors, incubees, start-ups and intermediaries potentially interested in eco-innovation and green start-ups aware of existing online-platforms specifically designed for eco-innovators;</p> <p>(2) Create a culture within the support systems of directing entrepreneurs towards other actors of support if these are better suited to the entrepreneur’s needs.</p>	<p>(1) StartGreen - the German internet portal for green start-ups and eco-innovators: http://www.start-green.net</p>
<p>3 Encourage experimentation: Specific support for eco-innovators is emerging, but is a fairly new phenomenon. Pilot exercises and good practice examples are already available, but experience with support systems specifically designed to stimulate and help eco-innovators is still limited. Well-established “standards” or dominant designs do not exist yet. Therefore experimentation with innovative support activities and designs should be encouraged.</p>	<p>(1) Target start-ups and young companies for participation in Green Economy related clusters;</p> <p>(2) Prioritise eco-innovators (the existing visionary & green champions) by placing them in the centre of a pan-European ‘green economy and eco-accelerator’ ecosystem (perhaps by linking up existing Climate KIC, KIC InnoEnergy, and forthcoming KICs, like Food4future in 2016).</p> <p>(3) Develop networks for interested investors in order to increase visibility of such investors to green start-ups and enable syndication;</p> <p>(4) Identify and make interagents and examples of unusual collaboration visible in order to stimulate further such activity.</p>	<p>(1) The Green Technology Cluster, North Rhine Westphalia, uses an “innovation radar” (scanning, forecasting, road mapping relevant eco-innovations and providing a platform for relevant actors to develop it further);</p> <p>(2) KICs in Germany: KIC InnoEnergy Germany and Climate-KIC Germany;</p> <p>(3) Green Start-up Investment Alliance, a Germany project-based investor network;</p> <p>(4) The Changer, Berlin, is one example of such interagents.</p>
<p>4 Dynamic tailoring of support activities: Eco-innovators are not a homogeneous group, but comprise different types of entrepreneurs who act in very different sectors, markets and regulatory and societal environments. Therefore support activities for eco-innovators have to be tai-</p>	<p>(1) Provide sustainability specific know-how and support and connect and integrate it systematically with general start-up support activities;</p> <p>(2) Develop specific support activities for eco-innovators and green start-ups;</p> <p>(3) Provide access to sustainability experts</p>	<p>(1) KIC InnoEnergy Germany provides an entrepreneurial eco-system that systematically involves sustainability specific know-how and support for start-ups and eco-innovators.</p> <p>(2) WISTA Accelerator A2 in Berlin offers specific support e.g. for energy start-ups and provides an extensive</p>

<p>lored dynamically to the specific needs of specific groups and contexts.</p>	<p>and networking support for green entrepreneurs (e.g. alumni tenants in the case of incubators).</p>	<p>network including incumbents form the energy sector</p>
<p>5 Mainstreaming sustainability in the support system: Sustainability aspects and requirements are not just an issue for the specific group of sustainable entrepreneurs that are highly mission-driven or active in specific green markets. Sustainability nowadays is relevant for all entrepreneurs no matter in which field of technology, sector or market they are active or intend to be active. Therefore sustainability has to be integrated broadly in the support system. It helps all entrepreneurs to embrace additional opportunities and advantages from taking sustainability into account and in avoiding risks and failure from not considering success relevant aspects of sustainability.</p>	<p>(1) Integrate sustainability issues and criteria in business plan or business model canvas templates in institutions such as the Federal Ministry for Economic Affairs and Energy (BMWi), the public bank KfW, the Chambers of Industry and Commerce (IHK);</p> <p>(2) Use sustainability criteria in evaluating start-ups' business plans or business models for entry into the specific support system;</p> <p>(3) Develop a sustainable entrepreneurial culture, for instance by popularising green champions (successful green start-ups) and green role models;</p> <p>(4) Define Green Economy as a specific, individual entrepreneurship domain within public funding programmes at the state and national levels;</p> <p>(5) Consider using bonus criteria for "sustainability future proofed" start-ups in entrepreneurship funding programmes at all political levels (i.e. prioritising the most advanced start-ups).</p>	<p>(1) The Berlin-Brandenburg Business Plan Competition for People Starting up in Business (BPW) has systematically integrated sustainability related question in its handbook for start-up teams and entrepreneurs</p> <p>(2) The Sustainable Business Canvas is a holistic concept for developing business models and integrates sustainability issues and questions systematically. It provides a workshop format and an online tool.</p> <p>(3) Leuphana University Lüneburg, Germany: Leuphana University's semester starts with a kick-off week for all first semester students. Working together as a team, they get involved in broadly conceived projects developing solutions that make our society a place worth living in.</p>
<p>6 Specialisation: Mainstreaming sustainability should be combined or supplemented by support activities that are specifically targeted at and designed for sustainable entrepreneurs and eco-innovators. To fit the specific needs of eco-innovators and to establish entrepreneurial communities and eco-systems requires specialisation in the support system.</p>	<p>(1) Evaluate the possibility of establishing specific start-up funding programmes for the Green Economy at the federal and national levels;</p> <p>(2) Partial or full specialisation of incubators on the Green Economy and its fields of activity;</p> <p>(3) Set up specialised sustainable / green entrepreneurship professorships and offer related curricula for students at higher education institutions.</p>	<p>(1) University of Oldenburg, Germany: Master's programme in "Sustainability Economics and Management" which includes the award-winning module Eco-Venturing with students developing sustainability-orientated business concepts in co-operation with business partners aiming at the promotion of tangible green business start-ups;</p> <p>(2) KUER - specialised business plan competition for "Climate, environment, energy and resource efficiency" in North-Rhine Westphalia, Germany, connected to the environmental technology cluster;</p> <p>(3) KfW Programme for financing social enterprises (KfW-Programm zur Finanzierung von Sozialunternehmen): specifically adapted public-private partnership funding programme.</p>
<p>7 Assessment and monitoring of effectiveness: Support activities are not an end in itself, but should contribute to specific goals. Up till now support systems for innovation and entrepreneurship have been focussing exclusively on economic goals. With regard to sustainability it requires a paradigm change. Support systems should be designed to generate multi-purpose benefits (economically,</p>	<p>(1) The assessment and monitoring tools should be more harmonised, reflecting and emphasising systematically the green attributes of new businesses and their long term sustainability impacts, in addition to mainstream conventional business assessment features;</p> <p>(2) Make sustainability a key criterion in evaluation schemes of entrepreneurial universities, in Germany the "Gründungsradar" (Start-up radar of universities);</p> <p>(3) Stimulate quantitative, macro-level</p>	<p>(1) Green Economy Startup Monitor</p>

<p>ecologically, socially). This requires assessment and monitoring tools that help to benchmark existing support systems, measure impacts and outcomes of support activities and provide data and information for policy makers and decision makers of the support system.</p>	<p>research on the supply-side with regard to numbers on specifically focussed financial institutions, institutions with mainstreaming approaches, size of investments and types of investments by integrating such numbers in existing monitoring (e.g. KfW Start-up Monitor; Green Economy Startup Monitor) or new monitoring instruments;</p> <p>(4) Assess clients' satisfaction as a basis for communicating the value-added of support activities to key stakeholders.</p>	
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6.4 Conclusions for Sweden

Olof Hjelm, Magnus Klofsten, Dzamila Bienkowska & Wisdom Kanda

Interplay between national and regional level in Sweden

In the Swedish system the governmental Ministries create policies on a high level, e.g. at the Ministry of Enterprise and Innovation that is responsible for the business sector, housing and transport, ICT, regional growth and rural policy or the Ministry of the Environment and Energy that deals with environmental, energy and climate policies. The ministerial policies are implemented through various agencies and organizations such as VINNOVA (Sweden's innovation agency) or ALMI (regional development funds). These actors in turn work with regions, other organizations, and individuals – either through own regional offices (as in ALMI's case) or through e.g. supporting development projects located in regional and local contexts (as in VINNOVA's case). Supported activities can be e.g. specific development projects such as the electric crane truck developed by Volvo Technology in collaboration with suppliers and a user organization (a contract carrier) in a VINNOVA-financed project; business advisory services such as those provided by ALMI directly to private firms; or more broad platform-building initiatives such as Malmö city project to establish a formal partnership for long-term innovation and development through a pooling of resources on the basis of a sustainable transformation of the existing building stock.

Strengths

- Willingness on the national level to put in resources into sustainability-related initiatives in a wide array of areas, e.g. energy efficiency, urban development and construction, fossil-fuel free systems
- Tradition of applying new technologies and science for the betterment of the society, with policy and private firms co-operating
- A majority of individuals are interested in sustainability and have motivation to personally engage in initiatives such as recycling, energy efficiency, finding alternatives to car transportation

Weaknesses

- Policy sometimes has short attention span, and needs to incorporate a lot of varying interests on political level
- Regional level actors have already established structures and processes that they strive to uphold and preserve – this can sometimes lead to new initiatives being channelled through traditional organizations, although this might not be optimal
- Learning at the ground level is occurring but the experiences can sometimes be disregarded, which can lead to making same mistakes again and/or creation of redundancy through the replication of already existing initiatives that are working good enough

Opportunities

- Sweden has a good reputation for sustainability and responsible economic development
- Building further on traditional Swedish industries and areas of strength, such as transportation

Threats

- There is a potential risk of short-sightedness in policy support, where new trends emerge and can draw resources out of already existing useful and well-functioning initiatives
- Existing initiatives/projects could be negatively affected by a lack of patience from the financing bodies (both private and public) that can decide to close down projects prematurely

Description of functions in the Swedish support system

A systems approach to analysing the dynamics of innovation and sustainability transitions has gained widespread support among researchers and policy analysts (Bergek et al., 2008; Coenen and Díaz López, 2010). In this regard, a promising approach is the functions of innovation systems as a basis for analysing the emergence, diffusion and use of innovations. Depending on which literature one relates to – innovation systems (see Bergek et al., 2008), innovation intermediaries (see Howells, 2006), there can be several functions of support actors some of which overlap and contradict each other. We adopted this function of innovation systems approach to map out on a general level the functions of the public support systems for eco-innovation and sustainable entrepreneurship in Sweden.

Key actors in the Swedish support system are shown in Figure 17, while the key functions are depicted in Figure 18 based on the main activities of the key actors. The illustration in Figure 17 depicts in a simplified manner key public actors providing direct and indirect support to the Swedish cleantech sector. The upper part of the illustration shows actors supporting different segments within the cleantech sector and also their involvement in the different phases in the development of cleantech companies. The lower part of the illustration shows other actors financed by authorities from which companies can also receive support.

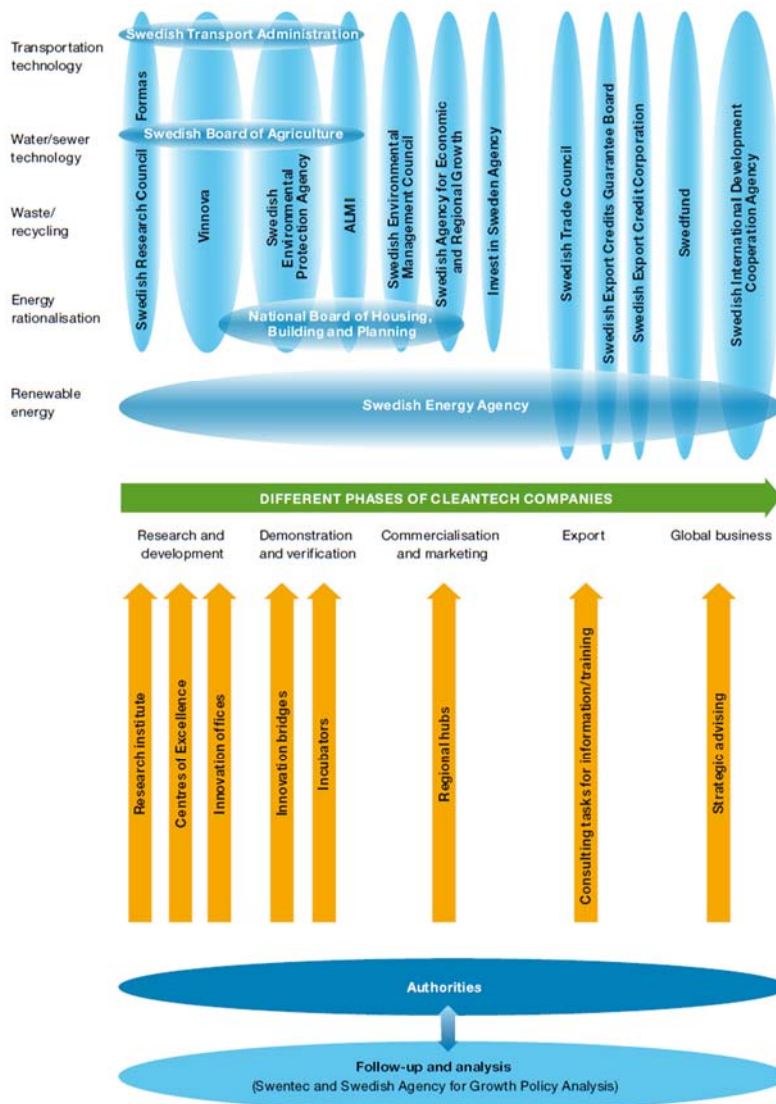


Figure 17: Actors in the Swedish support system. Source: (Swentec, 2008).

To make the role of the support actors depicted in Figure 17 above more tangible, we will briefly outline the various relevant support functions elaborated in (Bergek et al., 2008) and (Howells, 2006) from which we develop a functions map for the support actors in Figure 18.

(1) Knowledge development and diffusion

This function captures the breadth and depth of current knowledge base around a particular technology and how that changes over time including how it is combined and diffused in the system. Different types of knowledge are identified as scientific, technological, market and from different sources such as research and development, learning from new entrants and imitation.

(2) Forecasting and roadmapping

With this support, intermediaries suggest develop foresights and roadmaps on relevant eco-innovations to develop based on information such as the market potential, availability of resources such as financing, project and research partners and provide entrepreneurs with such insights.

(3) Testing and validating

Here intermediation activities emphasize on assessment of technologies and evaluating particularly their environmental performance for example in terms of energy, material and financial savings often on test beds and under laboratory conditions.

(4) Entrepreneurial experimentation

This support function entails creating platforms for entrepreneurs to experiment with and further develop their technologies, its applications and markets. Thus experimentation encourages social learning between different types of entrepreneurs – new entrants vs. incumbents, different types of technologies and sectors.

(5) Legitimacy and sector branding

Legitimacy deals with social acceptance and compliance with relevant institutions. The function covers the acceptance the support actors offer to certain entrepreneurs and technology types as eco-innovations and sustainable entrepreneurship. This could be through their membership, accreditation and other means of affiliation to the support actors. Legitimacy and the branding are important for resources to be mobilized, for demand to form and actors to gain political strength.

(6) Information processing and distribution

Intermediaries at this level of support assist in combing and distributing information relevant for eco-innovation and sustainable entrepreneurship from two or more parties using newsletters, magazines, seminars and social meetings.

(7) Resource mobilization

This support function deals with how the intermediaries assist firms with mobilizing different resources needs for eco-innovation and sustainable entrepreneurship. Such resources include technical competence/human capital, financial capital. This function can be provided by the intermediary itself or by linking firms to other organizations specialized in providing the particular resource.

(8) Market formation and commercialization

This level of intermediation aims at supporting entrepreneurs to exploit their innovations by identifying potential markets and consequent strategies for serving those markets both local and international.

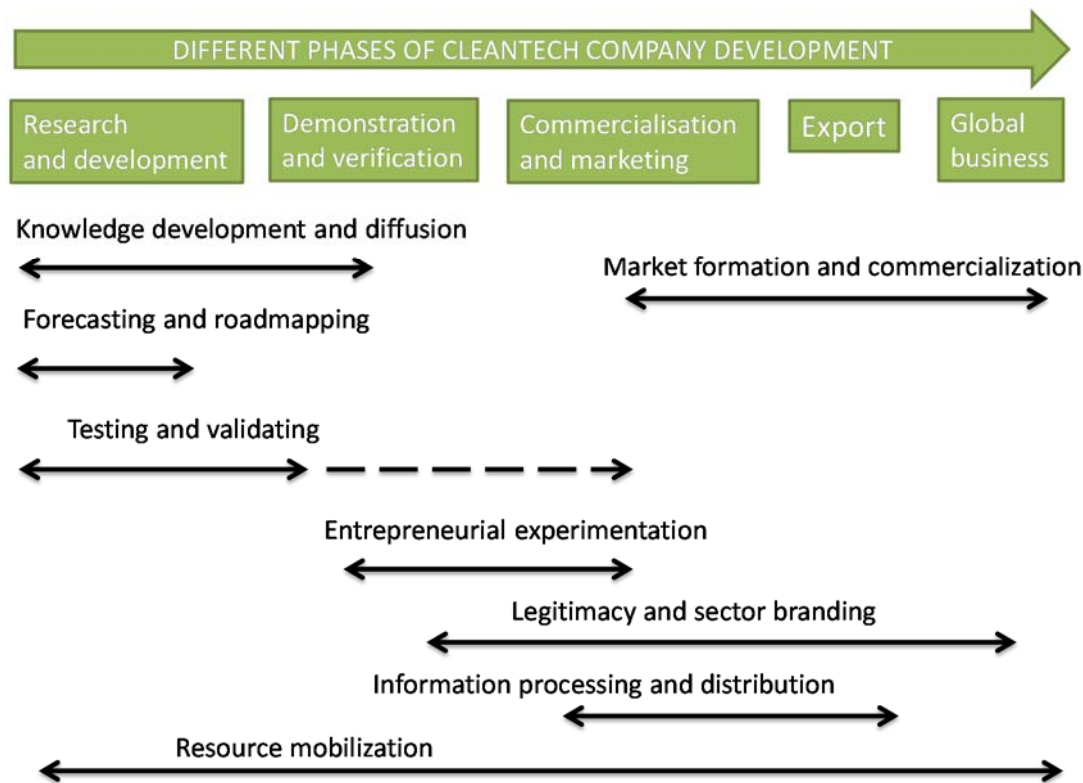


Figure 18: Functions of support actors for eco-innovation and sustainable entrepreneurship in Sweden.
 Source: Author's elaboration based on (Bergek et al., 2008; Howells, 2006; Swentec, 2008)

Major implications from the above mapping point to a focus on functions of public support organizations as compared to the structure of the public support when it comes to the development and diffusion of eco-innovations and sustainable entrepreneurship. In this regard, certain actors could be missing in a support system to no detriment but essential support functions cannot be substituted and support functions have a more direct and immediate impact on the development, diffusion and use of eco-innovations.

Possible gaps in the support system – tentative discussion

- Firms/SMEs are interested in individual advice and support solutions that fit their real current needs while the support system need to function efficiently and therefore offers more group-wise solutions/services
- Sustainability transition requires major/radical changes while the support system is set up to handle small/incremental changes
- New and different business ideas have always been and are still difficult for supporting actors (such as e.g. financing bodies) to judge and assess therefore making it difficult to use rational measurements/criteria/indicators

- Sustainability has positive connotations and is used on policy and strategic level, but implementation can be hindered by inadequate competence and understanding at senior management levels.

Good practice – Skåne region

Acknowledging the interplay between national policy, regional coordination and local activities with eco-entrepreneurs and firms we want to acknowledge the region of Skåne as a good example of how a support system could be shaped. Even if not perfect, parts of their system can serve as inspiration to other European regions wanting to develop the functions and structure of their support system for eco-innovation. Our interviews and surveys show that there is still a need for better cooperation between general support organisations such as incubators and general business development organisations, and the more sector specific cluster initiatives. Irrespective of this we want to highlight the following.

Region Skåne is like any European region dependent on and influenced by European and national policy. The policy support from Swedish government to foster eco-entrepreneurship can be judged as strong and most Swedish regions have high ambitions in supporting environmental or sustainable technologies and eco-entrepreneurship. Based on our own experience of working in the region of Östergötland and a general insight in several Swedish regions, together with a pre-study performed in the Kalmar region (Brambila and Palmén, 2014); Region Skåne stands out as one of the leading regions in this respect. The region is also hosting several successful or promising environmental technology companies and driven eco-entrepreneurs constituting a good ground for fruitful business support and development.

We have found a diversity of support organisations in the region and broad coverage of support functions. This is further described in chapter X of this report and in “the WP4 report”. Examples of support functions covered are: i) Forecasting and road mapping; ii) Resource mobilization; iii) Networking and partnerships; iv) Commercialization; v) Assessment and evaluation and finally vi) Technical consulting. This support is delivered by a number of complementary and overlapping organisations such as the cluster initiatives Sustainable Business Hub and Malmö Cleantech City and more general support organisations such as ALMI Skåne and different business incubators. All these general support organisations express an interest and ambition to support environmental technology companies and eco-entrepreneurs even if they do not have so much of own competence or experience in the area. All together the support system in the region of Skåne has the potential to offer broad support to the individual firm or eco-entrepreneur. A good knowledge among the support organisations regarding their different skills and what they can offer eco-entrepreneurs would be beneficial for channelling the right support at the right time.

General conclusions

In the SHIFT project we have observed that the Swedish support system is characterized by a multitude of sustainability-related initiatives on various levels, with a varying degree of sustainability focus, and underpinned by good intentions present in both the civil society, private firms and on the governmental level. There is a mix of both older and newer initiatives and industries/areas where

Sweden traditionally has been dominant – e.g. energy, mining, forestry, construction, waste treatment, transport and construction vehicles, as well as general urban development.

We have also observed that there is a mix of working towards sustainable development through established long-term institutions (such as ALMI or Universities) and also through short-term projects and temporary organisations (such as Integrated Transport Research Lab that will explore the transport solutions of the future).

We would like to describe the current situation in the Swedish support system for sustainable entrepreneurship and transformation as going through an experimental phase of system evolution. We argue that it could be viewed as a positive feature and we recommend keeping the support system flexible and varied and allowing for pluralistic solutions. It is important to leave room for unusual actors and unexpected solutions since the transformation towards sustainability is itself in an early stage of its development process.

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Appendix 1: An emerging typology of interagents, unusual collaborators and their exchanges.

The ‘state of the art’ literature review on collaboration and intermediation brings up a long list of names of actors that could potentially be considered interagents or constituents of unusual collaboration. In the table below we have picked up the terms and concepts that were used in the literature. Naturally, some of them are overlapping or sometimes almost synonyms for each other. In addition, we have reviewed each potential interagent or collaboration concept based on actor type, i.e. whether it can be considered an individual, an organization or a combination of these. Interagency and collaboration always involve bringing people and other resources together, and thus it is relevant to consider what kind of exchange is taking place in each case: is it about the exchange of knowledge, resources, relationships, processes or something else (cf. Fichter, 2012). In terms of support supply and needs, the exchanges reflect mostly the supply side.

Table 13: An emerging typology of interagents, unusual collaborators and their exchanges

“√” indicates the primary focus of exchanges available to start-ups and (M)SMEs).

Reference in WP7 literature review (page numbers refer to this report)	Potential type of Interagent (I) or Unusual collaborator (C) mentioned in literature -the primary means of support (not mentioned in all types)	Type of actor: Individual (I) Type of actor: Organisation (O)	EXCHANGE made by Interagent or Unusual collaborator				
			Specialized knowledge – financial, technical, other	Resources – financial, technical, supplies, other	Relationships – networking skills, interaction	Processes – admin, decision-making in hierarchies	Other
Several (p.12)	Network	Ot	√	√	√		√
Dubini & Aldrich (p.12)	Entrepreneur	I	√	√	√		
Several (p.13)	Peer group	Ot	√	√	√	(√)	
Several (p.13)	Expert	I	√				
Several (p.13)	Service provider	I/O					√
Several (p.13)	Producer/supplier	I/O		√			
Birley (p.13)	Family	I/Ot		√	√		√
Birley (p.13)	Friend	I					√
Birley (p.13)	Business contact	I	√	√	√	√	√
Kolk et al (p.13)	Public organisation	O	√	√		√	
Kolk et al (p.13)	Private organisation	O	√	√			
Kolk et al (p.13)	Not-for-profit organisation	O	√	√	√		
Several (pp. 13-14)	Incumbent, ‘Goliath’ – large firm	O	√	√			
Several (pp. 13-14)	‘David’ – small firm	I/O	√	√			
Battaglia et al (pp. 15-16)	Industrial cluster	Ot	√	√	√		

Jenkins (p.16)	CSR champion	I	✓				
Jenkins (p.16)	CEO / Founder of sustainability rooted SME	I	✓				
Palmén & Åslund (p.16)	BDO	O	✓	✓	✓	✓	
Halila & Rundqvist (p.17)	Technology expert	I	✓	✓			
Halila & Rundqvist (p.17)	Venture capitalist	I/O	✓	✓			
Triguero et al (p. 17)	Researcher	I/O	✓				
McEwen (p.17)	Eco-preneur	i/O	✓	✓	✓		
Klewitz et al (p.17)	Innovation intermediary	I/O	✓	✓	✓	✓	✓
Yarahmadi & Hig- gins (p.17)	Regulatory interagent	I/O				✓	
Yarahmadi & Hig- gins (p.17)	Resource interagent	I/O		✓			
Celik et al (p.17)	(Social) innovation network	Ot			✓		✓
Fichter (p.21), Lynn et al (p.24)	Innovation community	Ot	✓	✓	✓		✓
Van Lente et al (p.21)	Systemic intermediary	I/O/Ot	✓	✓	✓	✓	✓
Backhaus (pp. 21- 22)	Network facilitator / host	I/Ot			✓		
Watkins & Horley (p.23); Seaton & Cordey-Hayes; Callon; Shohert & Prevezer (p.24) Braun (p.23) Van der Meulen & Rip (p.25) Howells (p.22, 25) see Howells (2006a)	Intermediaries intermediary agencies intermediary level bodies innovation intermediaries	I/O	✓ technology transfer & exploitation, re- search, research policy	✓ service firms as intermediaries in innova- tion system	✓ science networks & local collectives	✓ orientate science system to socio- economic objectives	
Mantel & Rosegger (p.24)	Third parties	I/O/Ot				✓	
Aldrich & von Gli- now (p.24)	Broker - diffusers in social systems	I/O/Ot			✓		✓
Bessant & Rush (p.24)	Consultant as bridge builder -innovation processes	I/O					✓
Stankiewicz (p.24)	Intermediary firm -adapt solutions in market to users	O					✓
Turpin et al (p.24)	Bricoleur -application of new technologies outside original field	I/O	✓				

<i>Lynn et al (p.24)</i>	<i>Superstructure organisation -flow of information to substructure firms</i>	<i>0</i>	<i>√</i>				
<i>Hargadon & Sutton (pp.24-25); Wolpert (p.23)</i>	<i>Knowledge/information broker -combine existing knowledge, information & technologies in new ways</i>	<i>I/O</i>	<i>√</i>				
<i>Provan & Human (p.25)</i>	<i>Technology broker/brokering -new products by making connections between existing solutions, sectors or technologies (knowledge) new products by making connections between existing solutions, sectors or technologies (resources)</i>	<i>I/O</i>	<i>√</i>	<i>√</i>			
<i>McEvily & Zaheer (p.25)</i>	<i>Regional institution -provide 'surrogate ties' for organisations lacking bridging ties</i>	<i>0</i>			<i>√</i>		
<i>Guston (p.25), Cash (p.25)</i>	<i>Boundary organisation -technology transfer (knowledge) -co-production of technologies (resources)</i>	<i>0</i>	<i>√</i>	<i>√</i>			
<i>Millard & Choi (p.25)</i>	<i>Knowledge intermediary -measurement of intangible value of knowledge received</i>	<i>0</i>	<i>√</i>				
<i>Pilorget (p.23)</i>	<i>Innovation consultancy (firm) offering services</i>	<i>0</i>	<i>√</i>	<i>√</i>			
<i>De Carolis & Saparito (p.26)</i>	<i>Bonding interagent</i>	<i>I/O</i>			<i>√</i>		<i>√</i>
<i>Maak (p.27)</i>	<i>Bridging interagent</i>	<i>I/O</i>	<i>√</i>	<i>√</i>			<i>√</i>
<i>Total number observed</i>			<i>29</i>	<i>24</i>	<i>17</i>	<i>8</i>	<i>14</i>

In terms of actor type, some of the potential interagents or unusual collaborators mentioned in this table are clearly individuals. These include Business contact, CSR champion, Entrepreneur, Expert (and technology expert), Founder (or CEO) of sustainability rooted SME, and Friend. On the other hand, actor types that are obviously organizations are many: Boundary organization, Business development organization, Incumbent ('Goliath'), Innovation consultancy, Intermediary firm, Knowledge intermediary, Not-for-profit organization, Private organization, Public organization, Regional institution, and Superstructure organization.

In addition, there is a considerable amount of actor types with interagent or collaborator potential that might be considered individuals, but organizations as well. These include Bonding interagent, Bricoleur, Bridging interagent, Broker, Consultant as bridge builder, 'David' (small firm), Eco-preneur, Innovation intermediary, Intermediary, Intermediary agency, Intermediary level body, Knowledge broker, Network facilitator, Regulatory interagent, Researcher, Resource interagent, Systemic intermediary, Technology broker, and Venture capitalist. Some of the actor types can be considered to be based on a more complex structure consisting of individuals and organizations. These include Family,

Industrial cluster, Innovation community, Network, Peer group, Social innovation network, Systemic intermediary, and Third parties.

As regards the potential exchange made by such an interagent or unusual collaborator to support (eco)-innovation and start-ups, it seems that knowledge (e.g. technology transfer) is most often in the core of exchange, especially in relation to the intermediation process in innovation (cf. Howells 2006a). Also the exchange of resources (financial, technological, supplier, etc.) other than knowledge is quite frequently involved, but the knowledge exchange related to collaboration is clearly most important. It looks like the exchange related to relationships and processes have been less frequently present in collaboration in practice.

Multi-level perspective (including micro, meso and macro levels) might bring in an interesting addition to the analysis. Howell's (2006a) analysis of different innovation intermediaries that has been in the core of this literature review seems to focus on business (micro) level. Previous research also opened some perspectives on macro level, e.g. 'systemic intermediaries' that emerge in long-term transitions (Van Lente et al., 2003).

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Good practice collection University support for sustainable entrepreneurship

Fichter, K., Geier, J., Tiemann, I. (2016). Good practice collection – University support for sustainable entrepreneurship. Berlin, Helsinki, Linköping: SHIFT. Available at <http://www.borderstep.de/wp-content/uploads/2013/02/SHIFT-WP-1-final-report-October-2013-public-version.pdf>

Good Practice: Presidio Graduate School San Francisco, California, USA. Available at <http://www.borderstep.de/wp-content/uploads/2013/02/SHIFT-WP-1-final-report-October-2013-public-version.pdf>

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Practical Material For Support System Actors

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