

REAL CHANGE - PHASE II – Final Report - 2011-01-31

Background

Real Change is an international program with the aim of developing theory, methodology and practice for strategic sustainable development through interdisciplinary and intersectoral cooperation between researchers in academia and business- and public sector leaders. The program builds on a unique and several decades-long international academic and practical development work with its origin in Sweden. The overall goal is to contribute to real change of society towards sustainability.

Real Change consists of a core program – CORE (see Strategic Objectives below) and thematic programs connected to CORE. Integral parts of CORE include assisting with coordination, start-up and certain guidance to the thematic programs (Strategic Objective 4) but these are programs principally funded separately. In order to show how such a connection may look like there was included as part of the assignment from the funders, the consolidation of a good example of a thematic program, SPIRIT (see below), for the guidance of future thematic programs. As a metaphor to describe this structure we use a flower, where CORE is the centre of the flower and the thematic programs are the "petals".

Real Change CORE has been granted funding by the Swedish Energy Agency, the Swedish Research Council for Environment, Agricultural Sciences and Spatial Planning (Formas), the Swedish Environmental Protection Agency (EPA), the Swedish Agency for Economic and Regional Growth (Tillväxtverket) and the Swedish Governmental Agency for Innovation Systems (VINNOVA) and also by the initiators Blekinge Institute of Technology (BTH), Lund University (LU) and The Natural Step (TNS). The horizon is ten years and the above funders have supported the program with 9 MSEK for the first three years (Phase II). The initiators committed to contribute with 7.8 MSEK during the same period. The EPA, VINNOVA and the initiators also funded and co-produced the program in a preparatory pre-study (Phase I).

Added to the basic CORE and SPIRIT funding is other considerable funding both nationally and internationally for other SPIRIT activities and other thematic programs which are connected to CORE.

Report Structure

This report is structured according to the strategic plan of the program (Real Change Strategic Plan – 2008-06-17). Four strategic objectives with pertaining targets and deliverables have been specified in this plan. The strategic plan also specifies a number of indicators which are intended to reflect the activities in Real Change as a whole and its direct and indirect external influence.

The report first presents a follow-up in relation to targets and deliverables for each of the four strategic objectives separately. Management- and administration activities are also

briefly commented. Next there is a follow-up in relation to the mentioned indicators for the program as a whole. The report is concluded by a financial follow-up for the PHASE II period (2008 – 2010) and a summarizing comment.

Follow-up in Relation to Strategic Objectives

See Real Change Strategic Plan – 2008-06-17 for targets and deliverables.

Strategic objective 1

Scientific scrutiny and development of basic principles for sustainability and basic guidelines for strategic sustainable development.

The work is initially focused on development of principles for social sustainability and is conducted through a sub-project entitled "Elaboration of Sustainability Principles" (to some extent other sub-projects also contribute to this objective). We have had ten workshops with the entire project group (2008-02-04, 2008-06-16—17, 2008-09-18, 2008-10-30—31, 2009-01-15, 2009-03-06, 2009-05-15, 2009-11-26—27, 2010-01-28—29 and 2010-11-24—25) and in between these a great number of contacts by telephone and e-mail and also meetings with parts of the project group.

Examples of external researchers with connection to social sustainability with whom we have established a learning dialogue within this sub-project are Bo Rothstein and his research group (Quality of Governance, Gothenburg University) and Ethan Schutz and Leif Cervin (The Human Element).

We have fulfilled most of the targets and deliverables. We have produced a detailed project plan (Deliverable 1.1; Enclosure 1.1) and we have made an individual study plan for the PhD student Merlina Missimer (Deliverable 1.2; Enclosure 1.2).

We have explored social aspects under different levels of our FSSD¹ and have in that way begun to develop a theoretical basis for the future work. We have also created a comprehensive report on the state-of-the-art based on our literature review (Deliverable 1.3; Enclosure 1.3). Through a combination of the above we have identified where our research focus should be placed and we are in full progress of carrying out this work. Several steps forward have been taken and at present we are writing a number of articles where new hypotheses that we have developed regarding principles for social sustainability will be presented and exposed to peer review.

We have performed a group session on social sustainability with the funding agencies 2009-03-06 (Deliverable 1.4; Enclosure 1.4). We have presented a candidate set of social SPs² and related work to Professor Bo Rothstein and his group at Gothenburg University in a workshop 2009-06-09 and we have received very positive response and valuable feedback from this group of leading social scientists. We have also prepared and sent a written draft for a common working paper about social sustainability to both Professor

¹ Framework for Strategic Sustainable Development.

² Sustainability Principles.

Rothstein and Ethan Schutz and we have received very positive response and valuable feedback also on this. Building on this we co-created a second workshop (2010-01-28—29) at Gothenburg University with Professor Rothstein and his group. We had two days of very stimulating and truly interdisciplinary work. Our approach and research plans in this sub-project were thoroughly scrutinized. We have also taken part in a one day workshop (2010-05-14) together with the international Human Element group outside of Amsterdam. The purpose was to explore the relationship between the Human Element's approach and social sustainability more in detail, and to outline projects for a continuation of the cooperation between the two groups. Overall the social scientists from these two groups have applauded our approach and research plans, we have received more good advice and comments regarding existing publications and manuscripts, we made progress in understanding social sustainability that could not have been reached without this cooperation and our groups decided to continue to cooperate with more workshops, joint publications, etc. We decided that our next common workshop will have group modeling as a focus.

We had a workshop with a number of companies (Max, Scandic, Sleep Well and The Human Element) 2010-12-15 to prepare coming work. Among other things a group modeling session is planned for March 2011 (the corresponding group modeling report will therefore obviously not be ready to be enclosed with this final report).

We have continued our involvement in the development and launch of ISO26000 – the new guidance standard for social responsibility.

We have produced a conference paper (Deliverable 1.5; Enclosure 1.5) on some constraints for human civilization that was presented as a keynote at the Goldschmidt conference 2009 in Davos, Switzerland, and published in the Geoscientist. We have produced a journal paper (Deliverable 1.6; Enclosure 1.6.) that identifies weaknesses in our current definition of social sustainability and outlines the work for developing a more elaborate definition. This paper is published in the Journal of Cleaner Production.

We have also, together with Stockholm University, performed group modeling with respect to environmental targets in the Swedish mountain areas and the governance and maintenance of this resource, and we plan to make use of this experience when scrutinizing and developing further our suggested new set of social SPs (Deliverable 1.7; Enclosure 1.7). The perspective in this study was backcasting from clear, comprehensive and principled goals that would suffice from a full sustainability perspective. An overall conclusion is that all stakeholders agree that inter-disciplinary and cross-sector research is called for and that it must involve the local communities as well as the Swedish EPA and other relevant agencies, and that it must also highlight the social dimension of sustainability.

We have produced a paper on how ecological and social sustainability aspects are interrelated, exemplified in relation to society's use of Phosphor. This is currently in review for journal publication and replaces the conference paper planned (Deliverable 1.8; Enclosure 1.8). We have produced a paper presenting an attempt on an elaborated

definition of social sustainability, which is currently being submitted for journal publication (Deliverable 1.9; Enclosure 1.9). We have also produced a revised textbook on the FSSD (Deliverable 1.11; Enclosure 1.11).

The licentiate thesis of Merlina Missimer (Deliverable 1.10) is not ready. This is because of a later start of her PhD studies than originally planned. The preparatory work that needed to be done before taking on a PhD student took more time than expected and also to find the ‘right’ person for this challenging PhD work. However, once started the PhD work is running according to schedule and we expect her to finish her licentiate thesis during 2011.

Strategic objective 2

Scientific scrutiny and development of stakeholder inclusive methods and tools for modeling, simulation, visualization, assessment and monitoring of strategic sustainable development.

The work is initially focused on development of support for modeling and simulation of economic and socio-ecological implications of alternative decisions at value-chain cooperation around product-service systems (PSS) and is conducted through a sub-project entitled ”Decision Support for Sustainable Value-chains” (to some extent other sub-projects also contribute to this objective). We have had ten workshops with the entire project group (2008-02-04, 2008-05-16, 2008-06-16—17, 2008-10-30—31, 2009-01-16, 2009-03-20, 2009-08-20, 2009-11-26—27, 2010-01-28—29 and 2010-10-20) and in between these a large number of contacts by telephone and e-mail and also meetings with parts of the project group.

We have fulfilled most of the targets and deliverables. We have produced a detailed project plan (Deliverable 2.1; Enclosure 2.1). We have prepared two individual study plans for the PhD students Pia Lindahl and Anthony Thompson (Deliverable 2.2; Enclosure 2.2.1 and Enclosure 2.2.2).

Sophie Hallstedt has successfully presented and defended her doctor’s thesis (Deliverable 2.3; Enclosure 2.3). It has its bridgeheads in the CORE- and SPIRIT programs and is an example of how these are bridged together. The basic concepts for strategic sustainable development (CORE) have been integrated with methodology for product development and have been used to inform the development of new methods and tools for sustainable product development (SPIRIT). This has, on its part, generated ideas back to CORE about how the basic concepts can and should be developed further, which, among other things, constitute a basis for the research questions in this and the other sub-projects. It has also led to a process which we believe to be generally applicable for how the degree of maturity of an organization can be assessed from the point of view of strategic sustainability (CORE). The work with the thesis has taken place in close cooperation with the industry. Nineteen organizations have been directly involved in different projects during the course of the work, of which most have been small and medium-sized enterprises (SMEs). More enterprises are of course affected indirectly. General knowledge construction has in that way also led to (and keeps leading to) real change in

the direction of sustainability. The grading committee and the opponent praised the thesis for its high scientific quality and called it, among other things, the first one of its kind – with respect to product development with a full sustainability perspective.

We have presented a paper at the conference Sustainable Innovation 2008 (Deliverable 2.4; Enclosure 2.4) on cooperation in value-chains for sustainability and competitiveness. We have also produced a comprehensive report on the state-of-the-art based on our literature review (Deliverable 2.5; Enclosure 2.5).

We have had a number of individual sessions with our company partners and performed surveys of the current processes and toolboxes for product-service system innovation at several Volvo companies. Building on this we have performed workshops and interviews at more of our partner companies and we are currently analyzing and compiling the observations made and data collected. A preliminary report has been put together in the form of a conference paper (Deliverable 2.6; Enclosure 2.6).

We have presented a paper at the International Conference on Engineering Design at Stanford 2009 (Deliverable 2.7; Enclosure 2.7) and we have produced a journal paper that is published in the Journal of Cleaner Production (Deliverable 2.8.1; Enclosure 2.8.1), both concerning integration of strategic sustainability considerations in decision systems. We have also produced a whole Special Issue for the journal Progress in Industrial Ecology entitled Strategic Sustainable Development and Real Change, including eight papers centred around our framework for strategic sustainable development (Deliverable 2.8.2).

Henrik Ny has successfully presented and defended his doctor's thesis (Deliverable 2.9; Enclosure 2.9). It is focused on "bridging tools" which in a simple, clear and easily applicable manner will bridge over the gap between, on the one hand, the strategic level in the companies and the overall basic methodology (FSSD) and, on the other hand, the operational level in the companies and specialized analysis tools (such as LCA, investment calculation, etc.). This work also links to further development of earlier methods and tools, as our method for sustainable product development (MSPD), templates for sustainable product development (TSPD) and business planning tools, which are developed further and tested together with both SMEs and large enterprises. We now have the ambition to bring together the FSSD, the MSPD, the TSPD, business planning tools and our new "bridging tools" in a computer portal that links to and guides the usage of more detailed tools and data, and that also offers more efficient interdisciplinary assistance from experts from the universities as well as from enterprises.

We have presented a paper on integration of sustainability aspects in product development processes at a conference in Milan, Italy (Deliverable 2.11, Enclosure 2.11).

We have produced a conference paper on sustainability-driven innovation through product-service systems for the International Conference on Industrial Product Service Systems in Braunschweig, Germany. This replaces the journal paper planned on the same topic (Deliverable 2.12; Enclosure 2.12).

Anthony Thompson has successfully presented and defended his licentiate thesis (Deliverable 2.13; Enclosure 2.13). It builds on three knowledge domains; sustainability, innovation and product-service systems. The thesis points to the possibilities to merge these to support sustainability-driven innovation through product-service systems. The studies have been performed with seven companies. The thesis and the public defence have received very good judgements from representatives of both academia and business. One professor said that it was the best licentiate presentation and defence he had ever seen.

The licentiate thesis of Pia Lindahl is not ready. This is because she has had part time parental leave. We expect her to finish her licentiate thesis during the spring semester of 2011.

We have several components of a prototype of a computerized decision system equipped with support for simulation of risks and opportunities in value-chain cooperation around product-service systems development and interfaces toward specific methods and tools for life-cycle assessment, technical assessment, investment calculus, etc. (Deliverable 2.14). However, we are not ready to deliver those put together as a prototype of a computerized decision system.

We have, together with one of our partner companies, Auralight International, presented a conference paper at the International Conference on Industrial Product Service Systems in Linköping, Sweden (Deliverable 2.15, Enclosure 2.15) on a new promising way to sell long-life light-tubes as a product-service system offer.

We have produced a textbook on systems thinking (Deliverable 2.16; Enclosure 2.16)³. Since we enclose the final version we do not enclose the preliminary version (Deliverable 2.10)

The following enterprises have taken part in this work:

Enterprise	Type	Activity/Products	Contact
Aura Light International	SME	Long-life lighting	Mikael Severinsson
Dynapac Compaction	Large	Compaction machines	Pontus Jonsson
eco2win	SME	Environmental consultant (LCA expertise)	Raul Carlsson
Enell Sust. Business	SME	Environmental consultant (environmental management, function sales)	Magnus Enell
Roxtec International	SME	Sealing components	Åse Johansson
Stena Metall	Large	Metal recycling	Peter Domini
Sv. Avfallsrådgivning	SME	Waste counseling (materials flow optimization)	Peter Johansson
Volvo Aero	Large	Aircraft engine components	Ola Isaksson
Volvo 3P	Large	PD support within the Volvo group	Ann-Charlotte Stridbeck

³ Background work related to this book has been done also in sub-project 1.

The enterprises have taken part in conferences, seminars, workshops, field surveys and by gradually testing methods and tools and giving feedback, by providing viewpoints on publications and sometimes by performing as co-authors in publications, by arranging study visits for researchers and the other enterprises, by letting researchers participate in the daily work at the enterprises in order to make action research and co-production possible, etc.

We have also taken part in a workshop with the Swedish national Product-Service System network on 2009-10-14—15 and started working more also with that network.

Strategic objective 3

Scientific scrutiny and development of methods and tools for learning and communication for strategic sustainable development and organizational change.

The work is initially focused on development of support for the production of criteria and processes for product labelling and procurement based on a full strategic sustainability perspective and is conducted through a sub-project entitled "Sustainability-based Product Labeling and Procurement" (to some extent other sub-projects also contribute to this objective). We have had eleven workshops with the entire project group (2008-02-04, 2008-06-09, 2008-06-16—17, 2008-10-30—31, 2009-01-16, 2009-04-04, 2009-04-15, 2009-11-18, 2009-11-26—27, 2010-04-27 and 2010-10-14) and in between these a large number of contacts by telephone and e-mail and also meetings with parts of the project group.

We have fulfilled most of the planned targets and deliverables. We have produced a detailed project plan (Deliverable 3.1; Enclosure 3.1). We have prepared an individual study plan for the PhD student Cecilia Bratt (Deliverable 3.2; Enclosure 3.2).

We have taken part in a conference on sustainable procurement where one of our partners, Cascades Djupafors, was awarded the prize as "Green Supplier 2008" from another of our partners, the Swedish Environmental Management Council.

We have produced a comprehensive report on the state-of-the-art based on our literature review (Deliverable 3.3; Enclosure 3.3). We find that there is very good support in literature and among the actors of the area for the relevance in the research questions that we have identified and the objective we have put up for the project. That the work is carried out within the framework of Real Change means unique possibilities to provide what is demanded – a full sustainability perspective and the strategic dimension.

We have presented our work in a seminar "The value-chain of food from cradle to table" 2009-04-29 in which important Swedish actors in this value chain participated.

During three workshops (2009-04-04, 2009-11-18 and 2010-04-27), we shared with the project partners our findings regarding challenges and opportunities for integrating a strategic sustainability perspective in the criteria development process for labeling and

procurement. The partner group contributed with experiences and different views and gave very valuable feedback during these sessions. The outcome of these workshops is captured very well in the academic papers and the case study report mentioned below. A separate session report would be redundant and Deliverable 3.4 is therefore omitted as a separate entity.

We have also run a workshop at BTH with Professor Allan Astrup Jensen from UNEP on February 18, 2010. This workshop was mainly arranged to support the work of this sub-project but it also included elements relevant for sub-projects 1 and 2, which also participated.

We have performed two case studies at the Swedish Environmental Council, SEMCO (Miljöstyrningsrådet), and we are currently analyzing the criteria development process under study. The researchers have followed these processes through action research and taken part in the working and decision meetings. The two cases are about fuels for transportation and indoor lighting, respectively. For these case studies we have produced a report (Deliverable 3.5; Enclosure 3.5). We have also expanded the work with case studies at some of our industry partners: Tetra Pak, Cascades and Auralight International.

We have presented the project at one national conference "Forskningens dag" arranged by Landstinget Blekinge on October 22, 2009 and at the International Conference on Engineering Design at Stanford University in USA (Deliverable 3.6; Enclosure 3.6). The work in this sub-project has also contributed to the conference paper (Deliverable 2.7) reported under sub-project 2. Also in a public seminar about "Labeling for climate change" (2010-04-28), in Ronneby, Sweden, results from the project were presented.

We have written a paper about performed sustainability assessments of some existing eco-labelling schemas and how a strategic sustainability perspective can be integrated into these schemas. This paper is in the process of being published in the Journal of Cleaner Production (Deliverable 3.7; Enclosure 3.7).

We have two more papers in the publication process. One about a new approach to self-assessment of organizations' maturity regarding sustainability thinking in product development and procurement that has been submitted to the International Conference on Engineering Design at the Technical University of Denmark 2011 (Deliverable 3.8; Enclosure 3.8) and one about performed sustainability assessments of some existing green public procurement schemas and how a strategic sustainability perspective can be integrated into these schemas. The latter is currently being submitted for journal publication (Deliverable 3.9; Enclosure 3.9).

The licentiate thesis of Cecilia Bratt (Deliverable 3.10) is not ready. This is because she has had part time parental leave. We expect her to finish her licentiate thesis during the spring semester of 2011.

We have started to develop a proposal for a new process for product labelling and procurement. These ideas will initially be presented in a conference paper and an abstract

has been submitted to the Life Cycle Management conference in Berlin, Germany (Deliverable 3.11; Enclosure 3.11).

We have produced a project plan for an additional project (Deliverable 3.12; Enclosure 3.12).

The following enterprises/organizations have taken part in this work:

Enterprises	Type	Activity/Products	Contact
Aura Light International	SME	Long-life lighting	Mikael Severinsson
Cascades Djupafors	SME	Packaging carton	Eva Berg
Hammarplast	SME	Consumer products	Olle Mattsson
County Council of Blekinge	-	Medical service	Annika Christensson
Scandic Hotels	Large	Hotel activities	Inger Mattsson
Ecolabeling Sweden	SME	The Nordic Ecolabel	Ragnar Unge
Swedish Environmental Management Council	SME	Environmentally driven procurement	Sven-Olof Ryding
Tetra Pak International	Large	Packaging solutions and machines	David Cockburn
WSP Environmental	Large	Environmental consultant (procurement expertise)	Agneta Persson

These enterprises/organizations take part in conferences, seminars, workshops, field surveys and by gradually testing methods and tools and giving feedback, by providing viewpoints on publications and sometimes by performing as co-authors in publications, by arranging study visits for researchers and the other partners, by letting researchers participate in the daily work of the enterprises in order to make action research and co-production possible, etc.

Strategic objective 4

Petal coordination, communication and resource amplification to support development of thematic programs, cross-fertilization of discoveries and understanding between thematic programs and scale up of the whole program.

The work was initially focused on the launching of Real Change, communication of the aim and overall purpose of the program, consolidation of cooperation between the CORE- and SPIRIT programs, mapping of and introductory dialogue of cooperation with the other thematic programs and projects and the making of long-term plans for communication and scale-up. The work is carried out through a sub-project entitled "Petal Coordination, Communication and Amplification" (to some extent other sub-projects also contribute to this objective). We have had ten workshops/meetings with the entire project group (2008-02-04, 2008-03-13, 2008-06-16—17, 2008-10-30—31, 2009-01-16, 2009-03-05, 2009-05-14, 2009-11-26—27, 2010-02-04 and 2010-11-25) and in between these a large number of contacts by telephone and e-mail and also meetings with parts of the project group.

We have fulfilled most of the targets and deliverables. We have launched Real Change in cooperation with, among others, the King Carl XVI Gustaf of Sweden and the external funders' director-generals 2008-05-09 (see photographs below) and at that time we also carried out an international summit with more than a hundred persons from different enterprises, municipalities, regions, authorities, universities and other interested parties. Totally about 80 organizations took part in the summit (of which about ten were SMEs).



Seated from the left: Frank Fiskers (CEO, Scandic), HRH Carl XVI Gustaf with specially designed "sustainable" shoe in Swedish colors from Nike, Ursula Hass (Vice-Chancellor, BTH), Karl-Henrik Robèrt (Professor, BTH/DNS). Photo: Turbin AB.



From the left: Karl-Henrik Robèrt (Professor, BTH/DNS), Göran Broman (Professor, BTH), Per Eriksson (DG, VINNOVA), Rolf Annerberg (DG, Formas), Lars-Erik Liljelund (DG, the Swedish Environmental Protection Agency), Harald Sverdrup (Professor, LU), Sune Halvarsson (DG, Nutek), Tomas Kåberger (DG, the Swedish Energy Agency); Watering the Real Change flower. Photo: Turbin AB.

For this summit we produced and presented posters that describe the various programs and projects within Real Change in a compact way and these posters are compiled in the Summit Proceedings (Deliverable 4.1; see example in Enclosures 4.1). This information is accessible via our homepage for Real Change (www.realchange.nu). We have, in relation to this, also put out a number of press releases, taken part in a major story in the Swedish magazine *Veckans Affärer*, appeared on the radio, etc. (Deliverable 4.2; see example in Enclosure 4.2.1). We have also produced some "position papers" (Deliverable 4.2; see example in Enclosure 4.2.2).

We have given several presentations for researchers, companies, authorities and other decision-makers, e.g., with invited keynote speeches at: the Swedish National Energy Convention, Stockholm, March 2008; the National Academy of Sciences, Washington DC, USA, April 2008; the Ministry of Enterprise, Energy and Communications, workshop for the boards of directors of state-owned enterprises, Stockholm, May 2008; the Swedish magazine *Affärsvärlden's* symposium on sustainable product development, Stockholm, September 2008; Sustainable Industry Economic Forum, Portland, USA, October 2008; ProViking Research School, May 2009; and others (Deliverable 4.3; see example in Enclosure 4.3).

We have secured funding for a sister project to sub-project 3 and also for a project for the development of a new emission-free technology for separation and refining of special metals within the thematic area METAL (Deliverable 4.4; see example in Enclosure 4.4).

We have developed a communication plan (Deliverable 4.5; Enclosure 4.5). Discussions with the current funders on how to bring about a long-term resource base for Real Change have been intensified. We have also received support from Ashoka to further develop a strategy and amplification plan in line with the plans discussed with current funders 2010-02-04. This is now happening within the Ashoka Globalizer project where 20 social entrepreneurs have been selected to help them scale-up important innovations with a potential global impact. Professor Robert has been selected as one these 20 social entrepreneurs. This plan will be finalized in April 2011.

We have taken part in the BTH working team for the development of a program declaration with respect to a so-called KK-environment (Deliverable 4.6; Enclosure 4.6). Sixteen institutes of higher education submitted such a policy statement to the Knowledge Foundation. BTH was one of the three granted. The BTH Knowledge Environment brings together the profile areas of Systems Engineering, Innovation and Sustainability with the purpose of supporting sustainable growth. The SPIRIT program within Real Change corresponds very well to this. Professor Broman has been appointed Program Director of this university wide Knowledge Environment named ProVision.

We have secured two new funding contracts during 2009. One is the EU project CONVERGE (Deliverable 4.7; Enclosure 4.7.1), which aims at testing whether the concepts of “contraction and convergence” used in the climate change context (the idea of emissions rights allowing for the economic solution of emissions trading) can be applied to the full global sustainability agenda. With nine collaborating institutions in five countries, the project is an interdisciplinary endeavour where universities and non-governmental organizations use a systems analysis approach combined with action research to gather a rich web case studies. The overall goal is to explore how we can rethink globalization. A second is a pilot project (Deliverable 4.7; Enclosure 4.7.2) in cooperation with the ENERGY petal, focusing on how district heating could be analyzed, optimized and communicated in an attractive way as regards being a viable platform in a backcasting plan towards sustainable cities.

We have produced a refined web page (Deliverable 4.8; www.realchange.nu)

We have filed three funding applications to strengthen research activities between CORE and various petals. One is an application to the Knowledge Foundation entitled Decision Support for Sustainable Value-chains, which is supposed to allow an expansion of sub-project 2 further into the SPIRIT Petal (Deliverable 4.9; Enclosure 4.9.1). This application has been approved. A second is entitled Decision Support for Sustainable Energy Systems and it is a cooperation between CORE and the ENERGY petals (Deliverable 4.9; Enclosure 4.9.2). This application has been very positively responded to by the Energy Agency throughout. However, due to a lack of officials, reorganizations and restructuring of programs and budgets a decision on the application was repeatedly

postponed for more than a year and unfortunately it was not approved in the end, as we understand it partly due to the new organisation and new budget restrictions. A third is an application to VINNOVA which was supposed to strengthen the junction between CORE and SPIRIT petals, also involving three other partner universities working with Product-Service Systems, namely KTH, Linköping University and Luleå University of Technology (Deliverable 4.9; Enclosure 4.9.3). Unfortunately this was not approved.

For resource reasons, we decided to not repeat the Sustainability Leadership Challenge each year (Deliverable 4.10 and 4.11). However, we plan to run a seminar together with Stockholm Environment Institute during 2011 as a part of our intensified cooperation with this institute and we have continued to produce press releases, e.g., regarding BTH being ranked number one in Sweden and number three in Europe as regards Engineering Education for Sustainable Development (Enclosure 4.10) and position papers, e.g., in *Miljöaktuellt* and in *Dagens Industri*. We have also made several presentations to influential decision makers, e.g., at the World Trade Centre Seminar in conjunction with the COP 15 Climate Conference (Enclosures 4.11). We have presented the Real Change program to a number of new partners in USA and Canada. This has given rise to a lot of media attention and professor Robèrt has appeared in many television and radio interviews in conjunction with these presentations.

We have not secured a full profile grant for SPIRIT (Deliverable 4.12) but we have secured two project grants for the SPIRIT sister projects of CORE sub-project 2 and 3 as described above, which corresponds to approximately half a profile grant on an early basis.

We have not yet secured long term funding for CORE (Deliverable 4.13) but several leads are currently being followed up on.

Further examples of activities that promote the development of "petals", general communication, usability of our basic methodology and upgearing are:

- We have had meetings with representatives of the Energy Systems Group at Linköping University (LiU) about Real Change and a seminar about the framework for strategic sustainable development. This group is since 2008 affiliated to Real Change as an ENERGY-petal. The purpose is to combine our basic methodology for strategic sustainable development with this group's simulation tools for national and European energy systems and study how a full sustainability perspective would possibly change boundary conditions, results and conclusions of energy systems simulations.
- We have run a seminar for the VINNOVA staff on "Sustainable Value-chain Management".
- We have run a seminar on strategic planning for sustainability for the Swedish Energy Agency.
- We have formed part of the jury of the WWF's competition in climate entrepreneurship and of the seminar in which the winning companies were presented and also in a subsequent workshop on funding in early innovation

phases. Twelve SMEs were elected winners and the competence and network of the Real Change program was offered as a resource for these companies.

- We have had meetings with the management for Sweden Cleantech Incubators (SCTI) and companies which form part of SCTI. This is an incubator which uses the basic methodology of the Real Change program to assess and coach companies in their early innovation phases. Some twenty SMEs have been accepted into the incubator, several with a focus on energy efficiency, energy transformation and renewable fuel. The competence and network of the Real Change program have been placed at the disposal of these companies as a resource. One of the companies, Ocean Harvesting Technologies, has already initiated a cooperation project within the SPIRIT program. The company has developed a new concept for wave power which will now be validated and optimized by researchers at BTH. SCTI is now expanded nationally into Cleantech Inn Sweden.
- We have had meetings with the management of Sustainable Business Hub Scandinavia (SBHS) and have offered the competence and network of the Real Change program as a resource for its member companies. SBHS is a network for sustainable business development which helps companies with activities in the area of the environment and energy to increase their competitiveness and develop their business in Sweden and on the export market. The network has about one hundred members, of which many are SMEs.
- We have carried out workshops with representatives of Radboud University in Nijmegen, The Netherlands, and discussed the development of the thematic program "Water Management" with these representatives. This group has now, among other things, written a paper about the CORE methodology and how it is used to structure cross-sector cooperation around the Rhine river delta in The Netherlands (Enclosure 4.A). We are now applying for joint funding from Stitching DOEN to design and realize a climate proof fluvial landscape through a co-creation process with stakeholders in Waal Weelde. Cooperation between the Water Management petal and the Rainforest Ecosystem petal has also started, facilitated by a thesis project co-supervised by several Real Change participants. The thesis group studied the Purus river basin in Brazil, using the Real Change framework for strategic sustainable development and related knowledge and experience from similar work on the Rein river delta (Enclosure 4.B).
- We have had meetings with representatives of the Federal University of Amazonas and the Brazilian National Institute for Space Research concerning cooperation within Real Change. BTH has received a planning grant from the Linnaeus-Palme program which makes possible further visits and discussions about cooperation within the thematic program "Earth and Ecosystem Science". We have co-created a course and a workshop and have run these at the University of Amazonas this summer (Enclosure 4.C). We have explored how new processes and products based on regional resources in the Manaus area could become a good example and alternative to today's slashing, burning and logging in parts of Amazonas. The idea is to also use the World Soccer Cup 2014 as a show case to draw attention to this.
- We have given an invited keynote and panel discussion at a public seminar within the framework of the Karlskrona Dialogues. The theme was ICT & Sustainability. Others taking part in the panel were, among others, representatives of Indian

universities, an incubator for small enterprises in India, Ericsson and the local SME Wireless. The Indian universities declared a strong interest in cooperation with BTH and Real Change and wish to have written strategic agreements about such cooperation.

- We have run three workshops on Real Change in Madison, Wisconsin – one for the mayor and civil servants in the eco-municipalities of Wisconsin, one for the capital’s mayor and sustainability team and one for the general public arranged by the University of Wisconsin. The Mayor of Madison has clarified that the basic methodology of the Real Change program has been instrumental to the city’s successes in respect to sustainable development and that the city intends to carry on its commitment by means of this methodology and is pleased with, and will be following up on, its ongoing refinement.
- We have together with representatives of the Royal Institute of Technology (KTH) by order of VINNOVA prepared an idea memorandum on the transportation solutions of the future.
- We have, by order of the BTH Vice-Chancellor, contributed to the basis for the decision for how BTH, as part of the idea that one should “live as you teach” (walk the talk) and to set a good example as the main node of Real Change, as soon as possible could attain climate neutral activities. A decision in this matter was made by the BTH Board of Directors on August 29 and signifies that BTH as of September 2008 is climate neutral (see www.bth.se).
- We have, together with representatives from London Business School, validated Probe for Sustainable Business, a new benchmarking tool suitable for SMEs.
- We have had two workshops together with representatives from the Funders of the Real Change Core Programme, March 6 and May 15 2009, to further discuss our current research projects and explore new collaborative research projects involving all funding organisations.
- We have, together with representatives from the Business School in Gothenburg (Business & Design Lab) handed in an application to VINNOVA called LIVING 2020. It is a research project that will combine methods for strategic sustainable development and service innovation through design (design thinking and service design) to develop new home services for tenants that will improve everyday life and simultaneously help people contribute to sustainable development.
- BTH has signed a Letter of Intent with the World Trade Centers Association (WTCA). This outlines the start of a new collaborative relationship where BTH will participate in the WTCA’s Go Green team. Together, the parties will develop a platform where BTH can share and present news, solutions, seminars, best practice and education to the WTCA organization, members and others. The WTCA services more than 750 000 international trading corporations. This offers a great opportunity to showcase results from the Real Change Program. “BTH is now well-known for their research and education related to sustainability. We are excited to work with them on this Go Green initiative”, says Anders Berner, Coordinator of WTCA Northern Europe.
- We have initiated cooperation with a research group at the Technical University of Denmark, Department of Management Engineering, Section of Engineering Design & Product Development, which is led by Prof. Tim McAloone. The group is

entitled the *Sustainable Innovations Group*. We have had common workshops both in Sweden and Denmark.

- We have re-initiated and expanded our cooperation with researchers from Chalmers University of Technology: Gunilla Clancy, Morgan Frörlind, Magdalena Svanström, Chemical Environmental Science, working in a 5-year VINNOVA-project; Emma Rex: manager at the Competence Center in Environmental Assessment of Product and Material Systems; Ulrika Lundqvist: head of the Department of Physical Resource Theory who is working on criteria for sustainable investments; Vendela Santén, from Logistics and Transportation and Ulrika Palme, from Environmental System Analysis.
- We have had several discussions with Maynooth University in Dublin. After a visit at BTH 2010-05-21 they have decided to engage in Real Change. We have moved on with practical arrangements and we visited Maynooth University and some of their business partners 2010-11-02—04. Radboud University in Nijmegen follows a similar track. These universities will probably engage directly in the CORE program and in this way give Real Change CORE a broader and more international and stable base.
- Professor Robèrt made a TEDx presentation 2010-06-15. He outlined the history and logics of the Real Change FSSD and invited more people to the program. TEDx is a US concept, inviting lecturers with important topics for the general public to give short presentations, around 20 minutes. The lecturers are encouraged to package their respective messages as professionally and easy to understand and engaging as possible. The presentations are visited by a selected audience and are also published on YouTube. The quality of these lecturers has been such that the brand TEDx has been growing to reach worldwide recognition.
- We have had several meetings with the Stockholm Environment Institute/Resilience Center during 2010. The two groups have concluded that we have several goals and competencies in common, at the same time as we have several interesting complementary competencies and backgrounds. The two groups have decided on a deeper cooperation.

We have carried out a mapping of the thematic programs and projects that up to now have joined Real Change. The areas, the extent, etc., for the programs/projects in questions are displayed on the Real Change web page. A set of status slides is also provided in Enclosure 4.D.

Management and administration

BTH is the program owner and is responsible for management and administration. Tied to the program there is also a steering group with representatives of the organizations and funders taking part in the program. The work was initially focused on finalising the strategic plan for PHASE II (three-years). This has, for example, included the prioritizing and organizing of activities for the strategic objectives, allocating human and economic resources, completing partnership agreements and transaction agreements, establishing routines for economic transactions and reporting, identifying indicators, etc. We have had

eleven steering group meetings (2008-02-04, 2008-03-13, 2008-06-17, 2008-10-31, 2008-12-12, 2009-01-16, 2009-05-14, 2009-11-27, 2010-02-04, 2010-03-18 and 2010-11-25) and between these a large number of contacts by telephone and e-mail. The Program Director (and sometimes others from the steering group) has taken part in six meetings with the funding consortium (2008-03-14, 2008-05-23, 2008-06-09, 2008-11-20, 2009-03-06 and 2010-02-04) and has before and at these meetings provided supplementary material in the form of detailed project plans, partnership agreements, written answers to specific questions, etc., and he has also made oral clarifications. The Program Director has also had several additional contacts with separate representatives of the funding consortium.

Follow-up in relation to indicators for the program as a whole

Annotation 1. Numerical information concerning the indicators should be seen as approximate. In some parts we completely abstain from mentioning numerical values.

Annotation 2. As a purely numerical follow-up does not reflect the various characters that the different entities may have within one indicator, a supplementary character description is, in some case (as an example), also provided.

Participation Indicators

- *Number of SMEs, large companies and other organizations, respectively, participating in the Real Change program and total number of employees and total turnover of these organizations.*

Ten SMEs, seven large companies and one county council have participated in direct project cooperation within CORE (see Tables above). At least some ten other organizations have participated in project planning. Another ten or so companies have taken part in projects in connected thematic programs (petals). The total number of employees and the total turnover of these organizations have not been mapped because of administrative resource constraints. Some ten universities participate through running thematic programs within Real Change. On their part these universities have connections to further cooperation partners. This network has not been fully mapped because of administrative resource constraints.

- *Number of organizations and number of people participating in seminars, gatherings, and other events.*

Totally about one hundred organizations and several hundred persons have taken part in such arrangements. As an example, it could be mentioned that 82 organizations (of which about ten were SMEs) and 125 persons took part at the launching of Real Change on May 9 2008.

- *Number of organizations financially supporting the Real Change program and their total support.*

The mapping of this is incomplete because of administrative resource constraints. The programs, which have up to now been mapped, together turn over about 66 MSEK/year, uncounted the contributions in kind from partners and uncounted related education programs.

Real Change Indicators

- *Number and character of business strategy and policy changes influenced by the Real Change program.*

This has not been systematically monitored and analyzed because of administrative resource constraints. However, as an example it could be mentioned that Rohm & Haas and Chemson have adopted ambitious goals at the highest level of management as a direct result of their work with the basic methodology of the Real Change program and our advisors. Dow has now acquired Rohm&Haas and takes up the high-level sustainability work by drawing knowledge from the Real Change program through the previous work with Rohm&Haas and through a new cooperation agreement with The Natural Step. This bears a great potential for influencing their business strategy and policies and for transforming the whole chemical industry towards sustainability. Dow delivers a broad range of products and services to customers in approximately 160 countries and had in 2008 annual sales of \$57.4 billion and employed approximately 46,000 people worldwide, with 150 manufacturing sites in 35 countries. Strategic sustainability decisions in such a company are, of course, utterly important and potent support for sustainable development.

Another example is Nike's sustainable product innovation work. Analysis of Nike's current situation was conducted using a Strategic Life Cycle Assessment tool based on knowledge developed in the Real Change program. An outcome was a new corporate vision and direction for product sustainability – the Nike North Star.

- *Number and character of concrete actions in business and society influenced by the Real Change program.*

This has not been systematically monitored and analyzed because of administrative resource constraints. However, as an example it could be mentioned that Rohm & Haas has introduced Advapak™ NEO products, a new range of highperforming, organic based and heavy metal-free technology stabilizers. The SLCA tool developed by Real Change and our advisors were used to evaluate the product resulting in important improvements in product development. This product has helped the company increase the usage of renewable raw materials and reduce energy consumption and emissions by simplifying the manufacturing process and enabling easier recycling. And Advapak™ NEO is just one outcome of Rohm & Haas' engagement in a PVC value chain collaboration in Europe striving to develop sustainable PVC solutions.

Another example is that Real Change methodology was applied to refine the measurement tools at Nike. This has in turn helped Nike publicly release its tools to the industry – a move that will speed up progress toward sustainability.

- *Economic implications in business and society of the above changes and actions.*

This has not been systematically monitored and analyzed because of administrative resource constraints. See the above bullets.

Dissemination Indicators

- *Number and character of publications, learning tools, presentations and media interactions co-produced with people from business and society.*

Two doctor's thesis and one licentiate thesis (with three more coming 2011), some twenty conference and journal papers, about fifteen posters, some twenty master's theses, a distance course for the chemical industry and a course and a workshop for university-, business- and municipal leaders and staff in Brazil; all of it based on the basic methodology of the Real Change program. At least about fifteen presentations and a handful of appearances in media (see above).

- *Number and character of case reports of concrete actions in business and society.*

This has not been systematically monitored and analyzed because of administrative resource constraints. However, as an example a case study report has recently been written about the development of stabilisers in PVC (M. Schiller, B. Pelzl, P. Dolan, A. Hofer, W. Messner; "How Can I Go On - Towards a Sustainable PVC Stabiliser?" PVC '08, Brighton, U.K., 2008). It is an example of how the basic methodology of the Real Change program is used in practice. This has been made possible through our work with Hydro Polymers, a company which has understood the necessity of engaging its entire value chain in order to take full responsibility for its products. This has, among other things, led to Chemson, a company which develops stabilisers, beginning its sustainability work according to the same model as Hydro Polymers (see under Real Change Indicators above).

- *Number and character of facilitated workshops with problem owners and stakeholders.*

A handful. As an example, it could be mentioned that representatives from the chemical industry have worked with creating suggestions for cooperation projects for developing solutions to the challenges that today's PVC production faces.

Economic follow-up

The expenditure of the means from the funding consortium for PHASE II (2008-2010) is 9000 kSEK. Matching funding from the initiating organizations (BTH, LU, TNS) is 8354 kSEK, being clearly above the committed 7800 kSEK/year. A specification of the accounting is provided in Enclosure 5.

Summarizing Comment

All in all we have performed well in relation to the purpose of the program and planned deliverables. Only few deliverables are missed or only partly fulfilled and on the other hand we have over-performed in relation to some of the other planned deliverables.

Karlskrona 2011-01-31,

Göran Broman,
Program Director.