



2014

Lessons from the field: A first evaluation of working with the elaborated social dimension of the Framework for Strategic Sustainable Development

Missimer, Merlina and Robèrt, Karl-Henrik and Broman, Göran

Suggested citation:

Missimer, Merlina and Robèrt, Karl-Henrik and Broman, Göran (2014) Lessons from the field: A first evaluation of working with the elaborated social dimension of the Framework for Strategic Sustainable Development. In: Proceedings of RSD3, Third Symposium of Relating Systems Thinking to Design, 15-17 Oct 2014, Oslo, Norway. Available at <http://openresearch.ocadu.ca/id/eprint/2094/>

Lessons from the field:

A first evaluation of working with the elaborated social dimension of the Framework for Strategic Sustainable Development

Merlina Missimer¹, Karl-Henrik Robèrt, Göran Broman

Blekinge Institute of Technology

Abstract

Arguably, sustainability is the most complex challenge humanity has faced to date. Not only are the impacts of our behavior resulting in more and more severe repercussions, but we are also realizing that the causes of unsustainability are deeply embedded in the design of many of the systems we rely on. This means, of course, also, that solutions to the problem cannot be one-off ideas, but that strategic and systematic transformation of many of our systems is needed. Because of the necessity of the re-design of our economic and other man-made systems, it has been suggested that sustainability science should be considered a “science of design” (Miller 2011). Perhaps it can be considered one of the most “wicked” cases of design, as it needs to aim both for significant impact and a participatory approach to solve the challenge.

One framework that approaches the sustainability challenge from a design angle is the Framework for Strategic Sustainable Development (FSSD). Specifically, it is based on the idea of strategically and step-wise designing sustainability out of the systems we currently rely on. The FSSD is a trans-disciplinary framework built on insights from systems thinking and has been continuously developed for the last two decades. Its core is built on backcasting from principles of re-design for sustainability, which allows for wide-spread agreement on what sustainability means and allows for creativity within these constraints, so that each group or organization can create their own path towards sustainability within these constraints. The FSSD has been used in organizations all over the world to create real transformation towards sustainability.

A particular recent development focus has been the social dimension of sustainability. Following the idea of sustainability as a design science, the development was based on a design research methodology (e.g Blessing and Chakrabarti 2009), which included a suggested new ‘prototype’ for

¹ Corresponding Author: Merlina.Missimer@bth.se

the approach to social sustainability within the FSSD. Based on a systems approach to the social system, five new principles of social sustainability have been proposed (Missimer 2013, Missimer *et al.* 2013a, 2013b). This paper aims to contribute to the evaluation stage of the prototype and presents preliminary results of an evaluation based on field-work with the new social sustainability principles. Overall, a clearer definition of social sustainability is not just for theoretical purposes, but because without a clear theoretical concept, it is hard to strategically work towards social sustainability in practice.

The data for evaluation comes from workshops that were run with sustainability professionals (also called practitioners) who use the FSSD in their work. In three workshops, the authors, as well as groups of sustainability professionals, used the new social sustainability principles to assess projects on their contribution to social sustainability. The workshops were followed by reflections by and interviews with the professionals assessing the usability of the new principles.

Preliminary results indicate that it is indeed possible to use the newly proposed social sustainability principles in the manner intended and that the approach yields results that are valuable to the professional and the potential clients of these professionals. Integration with existing tools commonly used by the practitioners was possible, although further refinement of the designed tool prototypes will be needed.

Practitioners reflected that the earlier approach to social sustainability lacked in clarity and the ability to structure other tools and concepts in the field. They reported that most practitioners designed their own way of working with social sustainability, which lead to confusion and undermined a common approach. They appreciated the more thorough and scientific approach to the social aspects presented in the new approach, which allowed for a common language and a more thorough assessment of contributions to un-sustainability. The practitioners also reported new insights regarding the use and connection to other tools and concepts in the field of social sustainability.

However, challenges were expressed as regards the somewhat more difficult nature of the science behind the new approach and how this impacted the ease of working with the framework for practitioners. The paper ends with some reflections by the authors. In further research this preliminary evaluation will be expanded and built upon to facilitate continuous improvement and applicability of the FSSD.

Keywords: Strategic Sustainable Development, Social Sustainability, Systems Thinking, Action Research

Introduction

The Sustainability challenge

The impacts of our unsustainable behavior have by now been extensively documented (e.g Steffen et al. 2004, Millenium Ecosystem Assessment 2005, Stern 2007, Intergovernmental Panel on Climate Change 2007, Rockström et al. 2009). The 2012 Living Planet Report details that humanity is currently using 50 per cent more resources than the earth can provide on a yearly basis and that by 2030 even two planets would not be enough for human consumption levels (World Wildlife Fund 2012).

A wicked challenge

The sustainability challenge is a complex challenge, as issues and causes are interrelated in a myriad of ways and include many uncertainties (Hartman et al 2009, Kahane 2010). It is therefore also often considered a '*wicked problem*' - a problem that is complex, where uncertainty is high, where there is debate over values and where solutions are not obvious (Rittel and Webber 1973, Funtowicz and Ravetz 1993).

In essence, sustainability is potentially the most wicked challenge humanity has ever faced as impacts are occurring on an unprecedented scale and our own continuation as a species depends on it (Scharmer and Kaufer 2013)

Systems Change is needed

It has also become more and more clear, that all the individual issues amount to systematic degradation of our biosphere and are not just one off issues that can be tackled individually (Rockström et al. 2009, World Wildlife Fund 2010). The underlying problem seems to be that many of our human social systems are built on fundamentally unsustainable tenants and that therefore entire systems change is required to move towards sustainability (Senge 2006, Mirchandani 2010, Draper 2013). In essence, we need to find ways to strategically and systematically transform many of our man-made systems.

Sustainability – A Science of Design

Because of the necessity of the re-design of our economic and other man-made systems, it has been suggested that sustainability science should be considered a "science of design" (Miller 2011). Following Simon (1996, 111), Miller (2011) describes the process of design as the choosing of a

“course of action aimed at changing existing situations into preferred ones”. It focuses on how things should be, rather than on how things are (Miller 2011, 101).

Therefore, sustainability might be one of the most “wicked” cases of design (Moote, 2013), as it needs to aim both for significant impact and a participatory approach to solve the challenge.

Framework for Strategic Sustainable Development

One framework that approaches the sustainability challenge from a design angle is the Framework for Strategic Sustainable Development (FSSD). Specifically, it is based on the idea of strategically and step-wise designing un-sustainability out of the systems we currently rely on by giving guidance on moving any region, organization, project or planning endeavor towards social and ecological sustainability in an economically viable way.

The framework was designed in order to create a unifying structure for sustainability and is therefore a trans-disciplinary framework built on insights from systems thinking and has been under continuous development over a 20-year consensus and peer-review process including theoretical exploration, followed by refinement and testing in iterative learning loops between scientists and practitioners from business and government (see, e.g., Robèrt 2000; Broman et al. 2000; Robèrt et al. 2002; Ny et al. 2006). The FSSD has been applied by a variety of business leaders (Electrolux 1994, Robèrt 1997, Anderson 1998, Natrass 1999, Broman et al. 2000, Leadbitter 2002, Matsushita 2002, Natrass and Altomare 2002) and policy makers (Gordon 2003, Cook 2004, Strauss-Kahn 2004, James and Lahti 2004).

A 5-level model

At the foundation of the FSSD lies the following 5-level model (see figure 1):

Systems Level
Success Level
Strategic Guidelines Level
Actions Level
Tools Level

The system level describes the overall major functioning of the system, in this case the social system of the human society within the biosphere. The current threats and degradation of this system is the rationale for the levels that follow.

The success level specifies the definition of the objective, in this case, sustainability. In the case of the FSSD, sustainability is defined using sustainability principles. The next level requires this key second level.

Figure 1: The 5-level model that the FSSD is based on.

The strategic guidelines level specifies the guidelines for how to approach the objective strategically. This implies a step-by-step approach toward the objective in an economically viable way.

The step-wise transition is guided by “backcasting” thinking, i.e., thinking back from a vision fulfilling the objective to the current situation – backcasting – to identify possible transition paths. A unique feature of the FSSD is that the backcasting does not only, or necessarily, occur from a simplified image of a desirable future (as in “scenario-planning), but from basic principles designed as boundary conditions for re-design, which allows for creativity within these constraints, so that each group or organization can create their own path towards sustainability within these constraints.

The actions level comprises everything done in concrete terms, e.g., in chess, the actual moves. Strategic guidelines at level 3 are applied to inspire, inform, and scrutinize every action or investment that is put into a strategic plan.

The tools level includes concepts, methods, and tools that are often required for decision support, monitoring, and disclosures of the *actions* to ensure they are chosen in line with the *strategic guidelines* to arrive stepwise at the *success* in the *system*. Examples in sustainable development are modeling, management systems, indicators, life cycle assessments, etc.

Objective as a functional system boundary

The five-level structure of the FSSD evolved to avoid confusion by keeping a strict, logical separation between levels, especially between the system as such and the objective in the system. The objective can then serve as the functional system boundaries that guide the further research of the system. What aspects of the system (level 1) are essential to reach the objective (level 2)? Once the objective is clearly defined, it is possible to look for strategic guidelines (level 3) by which actions (level 4) can be organized in a step-wise strategic plan, and relevant concepts, methods and tools for decision-making and monitoring of the planned transition route can be chosen or developed (level 5).

Overriding mechanisms of destruction

As mentioned above, a unique aspect of the FSSD is that any definition of success is required to be within basic sustainability principles. As sustainability has only become relevant as a consequence of humanity’s systematic contributions to un-sustainability, the principles for ecological sustainability were derived by asking the following question: by what overriding mechanisms, upstream at the level of first approximation in chains of causality, do human activities set off the myriad of downstream impacts that will destroy the ecological system? A myriad of downstream impacts were clustered in a few upstream first-order mechanisms. Thereafter, a “not” was inserted for each mechanism to form first-order sustainability principles, designed as exclusion criteria for redesign.

Sustainability Principles

In order for sustainability principles (level 2) to work for backcasting (level 3) they should be science-based, necessary (but not more, to allow for 'out-of-the-box' creativity) and sufficient (to not forget essential elements of sustainability), general enough (to be applicable to all activities relevant to sustainability), concrete enough (to inspire action and provide direction) and distinct i.e. mutually exclusive (to allow structured analyzes and monitoring) (Ny et al. 2006). The principled definition of sustainability used within the next section.

In a sustainable society,	
nature is not subject to systematically increasing...	people are not subject to systematic barriers to...
ESP 1. ...concentrations of substances extracted from the Earth's crust, ESP 2. ...concentrations of substances produced by society, ESP 3. ...degradation by physical means	SSP 1. ... integrity SSP 2. ... impartiality SSP 3. ... influence SSP 4. ... competence SSP 5. ... meaning

Figure 2: The 8 Sustainability Principles

Social Sustainability within the FSSD

In recent work on the framework (Missimer et al., 2010; 2013a, 2013b; Missimer, 2013) the social dimension, a hitherto relatively neglected dimension of the framework, has been explored into the five above-mentioned social principles. The aim was to make it as operational as the first three, ecological, sustainability principles.

Based on transdisciplinary literature studies, as well as conceptual modeling sessions, essential elements of the social system were identified. These essential aspects were found to be *trust*, *common meaning*, *diversity*, *capacity for learning* and *capacity for self-organization* (Missimer et al., 2013a). These essential elements were then used to derive a first hypothesis of social sustainability principles from. The 5 principles are described as follows:

In a socially sustainable society, people are not subject to systematic barriers to:

... *integrity*

This means that people are not systematically exposed to direct harm; physically, mentally or emotionally

... impartiality

This means that people are not systematically exposed to impartial and unequal treatment. It is about acknowledging that all people have the same rights and are of equal worth.

... influence

This means that people are not systematically hindered from participating in shaping the social systems they are part of

... competence

This means that people are not systematically hindered from developing competence, learning and developing individually and together.

... meaning

This means that people are not systematically hindered from different forms of meaning-making at the individual and collective level.

Aim of Paper

This paper presents a first set of results from practical field-work with the new social sustainability principles presented above. The aim was to evaluate the usefulness of the new proposed principles. Overall, a clearer definition of social sustainability is not just for theoretical purposes, but because without a clear theoretical concept, it is hard to strategically work towards social sustainability in practice.

Research Design and Method

Following the idea of sustainability as a design science, the development was based on a design research methodology (e.g Blessing and Chakrabarti 2009), which usually includes the studying of a problem and its context, the suggestion of a solution prototype to the problem and a testing rigorous evaluation of the solution prototype in the context. The suggested 'prototype' for the new approach to social sustainability within the FSSD has been described above. This paper presents a first set of results in the evaluation stage.

At the onset of the research project, it was decided that success criteria for the prototype would relate to two things: the level of scientific rigor of the new approach and the viability of use of the new approach by practitioners. This paper focuses on the second of these success criteria.

The data for evaluation comes from workshops that were run with sustainability professionals (also called practitioners) who use the FSSD in their work. In three workshops in three different countries, the authors together with groups of sustainability professionals, used the new social sustainability principles to assess projects on their contribution to social sustainability.

The workshops usually started out with one of the authors presenting the new work and answering any lingering questions. The workshop participants would then apply the principles in a case study format to various scenarios, e.g. the lifecycle of a cup of coffee, community work or another relevant case study. The workshops were followed by reflections by and interviews with the professionals assessing the usability of the new principles. In the following section we will present a vignette of each workshop, followed by summarized results and the discussion.

Results

Group 1

This group was comprised of 8 individuals, ranging from having worked with the FSSD for just a few months to over a decade of experience.

The most experienced person (Participant 1), who has also followed the development of the social sustainability closely, reported having used the new SSPs in explorative ways with clients already. Participant 1 felt that the new principles were intuitive to people, i.e. that people could grasp their meaning even if they could not remember them verbatim. That being said, Participant 1, acknowledged that this was “new land” and that there was still an unease when working with these new concepts. Participant 1 was the only participant who had been exposed to the new SSPs before and had tried them out. All other participants had heard of them, but came to the workshop to gain a deeper understanding.

The rest of the participants echoed the unease. However, they also acknowledged that they didn't feel particularly strong on this social aspect of sustainability in general. Yet, the new approach did not give them the ease they were looking for. They still considered it complex.

While they felt that the principles were useful as a discussion point – to think critically about social sustainability issues, their main questions or concerns related to the logic or the flow of how the principles were derived from the system's understanding. They deemed this to be the most important part, as they felt they were able to relay a concise, compelling and scientifically accurate description of the system and the principles on the ecological side. They did not yet feel that this was the case on the social side. They discussed the need to create “our own words and our own explanations” to be able to convey their logic to clients and to essentially own the story themselves.

Finally, the term 'integrity' as used in the social sustainability principles was still a challenge to many as they intuitively associated it with a moral stance of integrity rather than no harm, which led to confusion when working with the SSPs.

Group 2

3 individuals were involved in workshop 2. One of them had 2 years, another 4 years and the third had 10 years of experience working with the FSSD.

After 1.5 days of workshop each participant seemed to have a very different response. Participant 1 on this group felt that the science behind the new social sustainability principle was solid and that this perspective had been missing before. They acknowledged that the new approach was more difficult than the old approach, but that also the way of thinking that was associated with the FSSD was not very common in general and therefore more difficult for many people. They felt, however, unsure about how to use the new SSPs in practice (despite practice exercises throughout the workshop).

Participant 2 seemed to have the opposite reaction. They felt the new SSPs were usable in practice, also with various tools that are commonly used within the FSSD. They, however, felt that the science and logic was not clear and that the new science behind the principles left a lot of questions. Similar to group 1, this participant felt that a clearer narrative was very important, but missing so far.

Participant 3 felt that the new approach was a valuable addition to the framework and that social sustainability was now much better addressed. However, they had many questions related to the implementability. They voiced concerns about the complexity of the approach for users, especially those not familiar with the general approach of the FSSD and therefore were not convinced that this new approach would replace the old one, despite them feeling that it was an improved approach. Finally, this participant had questions around wording, specifically regarding the word integrity, but also others. This participant also mentioned that the new approach did not provide quite the clarity they had hoped for.

Group 3

Group 3 was comprised of 8 practitioners, with a similar range of years of experience as group 1. The most experienced practitioners had over a decade of experience; the newest person about 6 months. The average was around 7 years.

Similar to group 1, one of the senior practitioners had already starting the new SSPs in their work. They mentioned that overall the approach was very useful and that people within the community of practitioners had been waiting for this "forever". They also reported that they felt that the earlier approach was "just stabbing in the dark" as the approach did not provide any concrete guidance. They did acknowledge, that of course at this point there were more questions than answers with the

new approach, but that this was the work to be done now, to figure out how to work with this new approach. They did also mention that some of the language around integrity and impartiality was tricky.

One person in the group felt that during the exercises the new SSPs did not necessarily bring up the most material issues. One other person described the exact opposite, feeling that they did lend themselves to exactly that.

Another senior practitioner considered the new SSPs very useful and stated that it was a question “of how they would work with them, not if”. They felt that they could clearly see the pattern of the principles in many of their projects.

Two practitioners discussed that the former human needs approach really set off light-bulbs with people and questioned whether this would be the case with the new approach. They felt that this new approach was more complex and also didn't feel like the new logic was completely clear and solidified yet.

Overall, the sentiment was that a lot more practice would be needed with the new approach for the practitioners to feel comfortable and, similar to the other groups, that a clearer narrative was needed to work with clients.

Summary of Results and Discussion

The preliminary results indicate that it is indeed possible to use the newly proposed social sustainability principles in the manner intended. All groups successfully used the new approach in the exercises they were given. Some participants even went as far as starting to think about integration of the SSPs with the existing tools they commonly use; they seemed to think that the integration was possible, although, of course, further refinement of the designed tool prototypes will be needed.

The patterns emerged from the three separate groups were, that

- the language of the SSPs was still tricky to most of the practitioners
- the approach was still complex and a clearer narrative was needed
- some practitioners were more able to accept the novelty, complexity and the work-in-progress state of the SSPs and reacted with less unease than others. In general, the more experienced practitioners felt less unease.

Some pattern also emerged, that were essentially the opposite of each other

- Some felt that the SSPs did not necessarily bring up the most material issues; other felt like they did exactly that
- Some felt that the science was solid, but were unsure about how to use the new SSPs in practice (despite practice exercises throughout the workshop). Others felt unsure about the science, but felt that the SSPs were usable in practice

- As a result of all of the above some felt that the new approach was a valuable addition and that social sustainability was now much better addressed. Others were not convinced that this new approach would replace the old one due to its complexity.

Reflections from the authors

Not surprisingly, one could observe a difference between practitioners using the new SSPs and how they felt about doing so. Despite the fact that they all used the SSPs successfully in an exercise, many still felt very uneasy even after the exercise.

A pattern that seemed to emerge was that the reactions to the new SSPs often seemed highly dependent on a person's willingness or ability to engage with uncertainty and risk. It seems in every group there are always some people who are (naturally) more entrepreneurial, willing to take risk and try something new and do not feel that their professionalism is threatened by 'not knowing' or 'trying something that might fail'. Understandably, the practitioners want to feel knowledgeable, competent and confident when engaging with their clients. And there is a certain kind of irony that we as practitioners "teach" others about planning in complex systems and that this comes with uncertainty and risk, while at the same time feeling such a level of unease with it ourselves.

One, of course, has to also acknowledge that change and learning is a process and that initial reactions to a proposed change are not always indicative of the long-term success of the change initiative. In relation to the FSSD, the ecological side has already undergone a +20 year development and will continue to do so and it is to be expected that the social side will do so as well and that acceptance of changes will take a long time.

Finally, an interesting take away has also been that the usefulness and use of the prototype is not about only the prototype itself, but to a large extent about the support the practitioners receive with the implementation. The implementation support is really what will determine the success of the new approach. A variety of tools and mechanisms will be needed, which opens up an interesting next phase for this research project overall.

References:

- Anderson, R. C. 1998. *Mid course correction - toward a sustainable enterprise: The Interface model*. Atlanta, USA: The Peregrinzilla Press.
- Blessing, L. & A. Chakrabarti, 2009. *DRM, a Design Research Methodology*. London: Springer Verlag.
- Broman, G., Holmberg, J. & Robèrt, K.-H. 2000. Simplicity Without Reduction: Thinking Upstream Towards the Sustainable Society. *Interfaces*. 30(3), pp.13-25.
- Cook, D. 2004. *The natural step towards a sustainable society*. Green Books Ltd, Dartington, UK.
- Draper, S. 2013. Creating the Big Shift: System Innovation for Sustainability. In Forum for the Future. pp. 2-48.
- Electrolux. 1994. *Electrolux Annual Report*. Electrolux, Stockholm, Sweden.
- Funtowicz, S. O. & Ravetz, J.R. 1993. Science for the post-normal age. *Futures*. 25(7):739–55.
- Gordon, S. 2003. *The Natural Step and Whistler's journey towards sustainability*. Paper presented at the Sustainable Mountain Communities Conference in Banff, Alberta.
- Hartman, C.L., P.S. Hofman and E.R. Stafford. 1999. Partnerships: A Path to Sustainability. *Business Strategy and the Environment*: 8(5): 255-266.
- Intergovernmental Panel on Climate Change. 2007. *Climate Change 2007: Synthesis Report*. Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Geneva, Switzerland.
- James S. & Lahti T. 2004. *The Natural Step for communities: how cities and towns can change to sustainable practices*. Gabriola Island, British Columbia, Canada: New Society Publishers.
- Kahane, A. 2010. *Power and love: A theory and practice of social change*. Berrett-Koehler Publishers.
- Leadbitter, J. 2002. PVC and sustainability. *Progress in Polymer Science*. 27(10), pp.2197-2226.
- Matsushita. 2002. *Environmental sustainability report 2002*. Matsushita Electric Industrial Co., Ltd. Osaka, Japan
- Mirchandani, Dilip. 2010. EAM White Paper Series: sustainability and innovation for systemic change." *Organization Management Journal* 7.4: 243-245.
- Millenium Ecosystem Assessment. 2005. *Living beyond our means. Natural assets and human well-being*. Statement from the board. Sarukhán, J. & Whyte, A. (eds.)
- Miller, T. R., 2011. *Constructing Sustainability: A Study of Emerging Scientific Research Trajectories*.(PhD). Arizona State University. Available at http://repository.asu.edu/attachments/56608/content/Miller_asu_0010E_10655.pdf (Accessed January 25th, 2013)
- Missimer, M. 2013. *The social dimension of strategic sustainable development*. Licentiate Dissertation, Blekinge Institute of Technology.

- Missimer, M., Robèrt K – H., Broman G. & Sverdrup, H. 2010. Exploring the possibility of a systematic and generic approach to social sustainability. *Journal of Cleaner Production*. 18(10-11), pp.1107-1112.
- Missimer, M., Robèrt K – H., & G. Broman, 2013a. A Strategic Approach to Social Sustainability - Part 1: Exploring the Social System. *Manuscript submitted for publication*.
- Missimer, M., Robèrt K – H., & G. Broman, 2013b. A Strategic Approach to Social Sustainability - Part 2: A Principle-based Definition. *Manuscript submitted for publication*.
- Natrass, B. & Altomare, M. 2002. *Dancing with the tiger*. Gabriola Island, British Columbia, Canada: New Society Publishers.
- Natrass, B. 1999. *The Natural Step: corporate learning and innovation for sustainability*. Doctoral Thesis. The California Institute of Integral Studies, San Francisco, California, USA.
- Ny H., MacDonald J.P., Broman G., Yamamoto R. & Robèrt K-H. 2006. Sustainability constraints as system boundaries: an approach to making life-cycle management strategic. *Journal of Industrial Ecology*. 10(1-2), pp.61-77.
- Rittel, H.W.J. & Webber, M.M. 1973. Dilemmas in a general theory of planning. *Policy Sciences*. 4:155-169.
- Robèrt, K.-H. 1997. *ICA/Electrolux - A case report from 1992*. 40th CIES Annual Executive Congress, Boston, MA.
- Robèrt, K.-H. 2000. Tools and concepts for sustainable development, how do they relate to a general framework for sustainable development, and to each other? *Journal of Cleaner Production*. 8(3), pp.243-254.
- Robèrt, K.-H., Schmidt-Bleek, B., Aloisi de Larderel, J., Basile, G., Jansen, J.L., Kuehr, R., Price Thomas, P., Suzuki, M., Hawken, P. & Wackernagel, M. 2002. Strategic sustainable development selection, design and synergies of applied tools. *Journal of Cleaner Production*. 10, pp.197-214.
- Rockström, J., Steffen, W., Noone, K., Persson, Å., Chapin, F., Lambin, E., Lenton, T., Scheffer, M., Folke, C. & Schellnhuber, H. 2009. A safe operating space for humanity. *Nature*. 461, pp.472-475.
- Scharmer, Otto, and Katrin Kaufer. 2013. *Leading from the emerging future from ego-system to eco-system economies*. San Francisco: Berrett-Koehler Publishers, Inc.,
- Senge, P. 2006. Systems Citizenship: The leadership mandate for this millenium. *Leader to Leader* 41: 21-26
- Simon, H. A. 1996. *The sciences of the artificial*. 3rd edition. Cambridge, MA: MIT Press.
- Steffen, W., Sanderson, A., Jäger, J., Tyson, P. D., Moore Iii, B., Matson, P. A., Richardson, K., Oldfield, F., Schellnhuber, H.- J., Turner Ii, B. L. & Wasson, R. J. 2004. *Global Change and the Earth System: A planet under Pressure*. New York: Springer Verlag.
- Stern, N. 2007. *The economics of climate change : the Stern review*. Cambridge: Cambridge University Press.
- Strauss-Kahn, D. 2004. Building a Political Europe. 50 Proposals for Tomorrow's Europe. *Brussels: European Commission*.
- World Wildlife Fund International. 2010. Living Planet Report 2010: Biodiversity, biocapacity and

development. WWF International

World Wildlife Fund International. 2012. *Living Planet Report 2012: Biodiversity, Biocapacity and Better Choices*. Gland (Switzerland)