

**Panel: Breaking Down Silos in Universities: Imaginative Interdisciplinary Approaches to Sustainable Development Research, Education, and Practice**

**New approaches to implement Sustainability Science – a Case of University of Helsinki**

**Korhonen-Kurki, Kaisa; Pietikäinen, Janna; Soini, Katriina, Schönach Paula and Kuitto, Virpi**

Kaisa Korhonen- Kurki, adjunct professor, research coordinator,  
University of Helsinki (corresponding author)

[kaisa.korhonen@helsinki.fi](mailto:kaisa.korhonen@helsinki.fi)

Yliopistonkatu 3, Helsus Hub  
University of Helsinki, 00014  
Finland

Janna Pietikäinen, vice-dean, university lecturer  
University of Helsinki

Katriina Soini, Adjunct professor, senior researcher  
Natural Resource Institute Luke

Paula Schönach, adjunct professor, research coordinator,  
University of Helsinki

Virpi Kuitto, environmental specialist  
University of Helsinki

*The paper is based on the already published papers by the authors, such as Soini et al 2018 and the documents written during the HELSUS planning process*

**1. Introduction**

Universities are experiencing a growing trend to redefine their strategies and organisations along the lines of sustainability (Beynaghi et al., 2016; Ferrer-Balas et al., 2010). Sustainability has been seen not only as a component of education, research and innovation, but also as a social learning process within and beyond academia (Barth and Michelsen, 2013; Ferrer-Balas et al., 2009). As an indication of the increased focus on sustainability, hundreds of universities have joined the Sustainable Development Solutions Network supported by the United Nations (UN), or other networks related to sustainability (e.g. the International Sustainable Campus Network (ISCN), the Association for the Advancement of Sustainability in Higher Education (AASHE) in the USA, the Environmental Association for Universities and Colleges (EAUC) in the UK). Additionally, a number of university-based centres or institutes focusing on sustainability have been

established. In a worldwide survey addressed to universities, Lozano et al. (2015) have found that sustainability centres are one of the key activities in the sustainability transitions of universities.

The evolution of university-based sustainability centres can be seen as part of a broader process of integrating sustainability into universities' research and curricula. Beynaghi et al. (2016) have shown that sustainable development in the 1980s promoted an initial "acknowledgement" response in certain institutes, particularly in the visions of frontrunner institutions. Focus was placed on engineering and physical sciences, and on efforts to address environmental issues through technological development. During the second phase, in the 1990s, sustainable development entered the curricula and university activities more broadly through public commitment to sustainability policies (see also Lozano et al., 2015). In the third phase, since 2000 onwards, sustainable development has been integrated more deeply into the structures and missions of universities. Technology transfer, entrepreneurialism, societal interventions and the co-creation of tools and experiments to drive societal transformations towards sustainability have become more and more significant areas of activity in universities (Trencher et al., 2013). These new roles adopted by universities have been called the sustainability transition or transformation of universities (Baker-Shelley et al., 2017), the third revolution of universities (Dedeurwaerdere, 2013), or, when contributing to societal change, the "fourth mission" of universities (Trencher et al., 2013).

As part of this latest trend, certain universities have aligned their activities with the principles of sustainability science (e.g. Barth and Michelsen, 2013; Wiek et al., 2012). Sustainability science, as an emerging discipline and field of research aims not only to increase understanding of the complex social-ecological systems (Kates et al., 2001), but also to link this knowledge to action (Miller, 2014). This means crossing disciplinary and sectoral boundaries: conducting research not only for society, but also with society by involving non-academic stakeholders in the research process, and fostering transformative learning and social change (Spangenberg, 2011).

The evolution of sustainability research and education can be seen as a response to the "sustainability call" expressed by international conventions related to sustainability and the environment, most recently by the UN Sustainable Development Goals and the Paris Climate Agreement in 2015. Yet, despite mutual benefits for both universities and society, and many successful examples, studies also document various internal and external challenges and constraints when organising multi-, and in particular, inter- or transdisciplinary sustainability research and education (see e.g. Beynaghi et al., 2016; Dedeurwaerdere, 2013; Trencher et al., 2014a,b).

We summarise these challenges as scientific, organisational, supportive, conceptual, and ideological. First, sustainability research and education are distinct from the dominating monodisciplinary research and education, requiring a paradigm shift towards systems thinking and interdisciplinary collaboration. Second, academic research, education and the administration have been strongly disciplinary-based. New types of organisational

structure, culture and communication practices are required to cross disciplinary boundaries and to increase the feasibility of research collaboration with non-academic partners. Third, current rewarding and funding systems within the academia do not necessarily support inter- or transdisciplinary sustainability research and education. Finally, the conceptual vagueness of sustainability along with varying and conflicting aims and goals related to it, may cause problems in inter- and transdisciplinary collaboration and communication.

A number of studies have explored sustainability transitions (e.g. Ferrer-Balas et al., 2008; Ferrer-Balas et al., 2009; Stephen and Graham, 2010) within universities. The earlier study by the authors (Soini et al., 2018) analysed 44 university-based sustainability centres and provided insights on what kinds of organisations these centres are and how their research programmes and activities respond to sustainability challenges, and finally, proposed a typology of the centres.

In this paper, we will demonstrate that the sustainability transition in the University of Helsinki was made possible by several internal and external factors and processes related to evolution of sustainability science, research profiling and educational reforms. These on-going and partly overlapping processes created windows of opportunities that enabled the the beginning of the transition that is based on the emergent sustainability science. We will show that all these processes are interconnected and conclude that both, the positive push of external funding and strong internal support for transition, contributed to cross-disciplinary sustainability transition in the university.

## **2. Transition to sustainability**

Sustainability centres have presumably developed various types of organisational structures along with scientific approaches to meet sustainability challenges. We follow the socio-technological transition framework (Geels, 2002; Geels and Schot, 2007), where socio-technical transitions are understood as long-term and fundamental transformation processes through which established socio-technical systems shift to more sustainable modes (Geels, 2002)

Applied in the university context by Stephen and Graham (2010), we suggest that sustainability centres could be considered “niches” within universities when trying to create scientific and organisational conditions for inter- and transdisciplinary sustainability research and education. Niches are usually developed by small networks of dedicated actors and built up by an internal momentum through learning, performance improvements and support from powerful groups. Experiments (novelties) are carried out and developed at the niche level by small networks of dedicated actors. Such experiments aim to create something new and concrete that is restricted in terms of time, space, scope and actors but that has the potential of having wider societal relevance through various up-scaling mechanisms (Bulkeley and Broto 2012). Experimentation is triggered by an intentional destabilisation of existing institutions and routines in that actors are seeking to explore novel possibilities and outcomes of informed deliberation.

Local niches can serve as protective spaces for new solutions to evolve: The evolution of niches is influenced by the socio-technical landscape, the wider socio-political context from market to national and international policy, and from demography to technology. Destabilization of the regime due to, for example, pressure in the landscape (in the case of universities new societal requests for science or funding availability) may create windows of opportunity for niche innovations. Careful analysis of practical examples and experiments offers a good basis to design and adapt policy frameworks on the basis of barriers and opportunities recognized.

Theory of multilevel socio-technical transitions has been successfully applied to many cases but it has also received some critiques regarding delineation, possibilities of cross fertilization between regimes and characteristics of niches to serve as a platform for continuous development of the novel technology, not only for emergence of novelties (Genus and Coles 2008).

Berkhout et al (2004) have criticized the transition theory for the emphasis on bottom-up approach at the cost of top-down activities: While experiments and niches are of high importance in the process of transition, there is no less urgency in transitioning of the whole system. It must be noted that not all emerging experiments are viable or prove to be sustainable. However, they indicate changes at niche level. Therefore, careful analysis of practical examples and experiments offers a good basis to design and adapt policy frameworks on the basis of barriers and opportunities recognised.

### **3. Emergence of sustainability science in the University of Helsinki**

#### **3.1 Formation of sustainability science institute<sup>1</sup>**

In the following analysis, we aim to identify the factors that both enabled and on the other hand, factors that hindered the emergence of sustainability science institute in the University of Helsinki.

##### ***3.1.1. Internal push: active grassroots actors and networks***

At the University of Helsinki a great volume of research which is linked to the sustainability research is conducted. A part of this research has been carried out within established interdisciplinary networks and centres. The Helsinki University Environmental Research Unit (HERU) was established in 2002 as an initiative of the active rector of the time, who was committed to the idea that the university should mobilise its expertise in providing solutions to pressing environmental concerns. HERU changed its name to HERC - Helsinki University Center for Environmental Research, and was active in initiating

---

<sup>1</sup> The process has been closely followed by authors and the material of this paper is based on documents written by the authors as well as already published paper by the authors Soini et al 2018.

interdisciplinary environmental research within six faculties until 2008. Eventually also the multidisciplinary environmental teaching was merged with it, and together they formed the Helsinki University Centre for Environment, HENVI. HENVI was responsible for carrying out and coordinating environmental research and teaching. All faculties of the University of Helsinki were participating in the activities of HENVI. The aim of HENVI was to strengthen and enhance interdisciplinary research and teaching, and to raise public awareness of important environmental issues. HENVI was successful in creating networks among the researchers with different disciplinary backgrounds. The experience gained in HENVI on the challenges and opportunities of interdisciplinary collaboration was extremely important for the development of the Institute of Sustainability Science.

The University has hosted also several thematic networks around its environmental research. The University of Helsinki Global South Network (HUGS) concentrates on research and teaching on the Global South. Interdisciplinary urban research and teaching are compiled under the Urban Academy and the Helsinki Metropolitan Region Urban Research Program. The activities related to urban issues builds on the collaboration within the Urban Academy, a joint platform of the University of Helsinki, Aalto University, another university in the capital region in Finland and with an emphasis on amongst others planning, architecture and design, and the city of Helsinki.

Besides of these formal interdisciplinary networks also several informal networks among researchers were established, such as those around environmental archeology, sustainability and business etc. Furthermore, the active role of few individual researchers within these networks in creating spaces for interdisciplinary collaboration was crucial in enabling the later reforms.

### ***3.1.2.External push: policy and funding for the research profiling***

Besides of internal activism within in the university, the reforms in Finnish science and research policy created an window of opportunity for new openings within the universities.

The Finnish university sector went through a large reform in 2010 (Academy of Finland 2018), including a revision of the funding models in higher education. Following this, university funding consisted of the basic, core funding, and as a novelty, an incorporation of strategy-based funding in the model. In itself, the new funding model does not provide very strong incentive to making strategic profiling choices. However, in 2012 the Ministry of Education, Science and Culture, and the Ministry of Employment and the Economy, drafted a research and innovation policy action programme, which stated that “given the current state of central government finances in Finland, the state of business and industry today, the need to promote cooperation and the rapid changes unfolding in the research and innovation field, strong support is needed for more effective university profiles” (Academy of Finland 2018). As a consequence, the Finnish Government agreed on the crucial strategic decision which resulted in the creation of a new, targeted funding instrument in order to strengthen Finnish universities’ research profiles.

In the Finnish Government's public finances plan for the years 2015–2018, a total of 50 million euros of central government finances earmarked to universities was reserved to be allocated through the Academy of Finland over the time period 2015-2019. These funds will be used in their entirety to strengthen the research profiles of universities (Academy of Finland 2018).

This funding scheme forced universities to strengthen their research profiles and identify the research areas in which they want to focus and profile themselves. As the largest and oldest University in the country, the University of Helsinki has a unique position in Finland. It includes almost all research fields except of technology and business. Defining of the future focus areas, and on the other hand deciding on areas that need to be deselected in order to provide resources for the prioritized ones, was a hard exercise for the old, multidisciplinary university. Profiling areas can be: existing high-quality areas, emerging areas with potential to reach the top level or new areas with high potential” (Academy of Finland, 2018).

University of Helsinki made a strategic decision that together with its already established strong research fields, such as health, atmospheric, and data sciences, sustainability science as a new emergent area with high potential, was included among the profiling areas. This decision, as well as the successful funding application for the profiling funding of the Academy of Finland that was made as a joint effort of six faculties, formed the financial and organisational basis for the sustainability science institute. The funding allowed establishing among others positions for altogether ten new tenure track professors. Taking into consideration the size of the country, and its academia, this is a remarkable number of new research positions. After the four years period of boosting funding by the Academy of Finland, these professor positions will be funded by the participating faculties. This means that they need to redirect existing resources to these newly established positions, and thus the participation in the sustainability science initiative necessarily is also an important strategic decision done by the individual faculties.

### ***3.1.3 External push: Timing - Sustainability a real world problem***

One of the important factors that enabled the deans of the faculties to do the crucial strategic decision to focus on sustainability science, was the obvious urgency of sustainability (or the lack of it) as a real world challenge, to which the university needs to respond. University had defined sustainability as one of the grand challenges of our era and stated that in its strategy. Furthermore, Sustainable Development Goals (SDGs) were announced few years ago and it became clear that also countries like Finland need to respond them.

### ***3.1.4 Hindering: resistance by traditional disciplines and university internal faculty structure***

Despite the various enabling factors that pushed the establishment of the new

sustainability science centre, the initial stages of the founding of the centre were not painless. Sustainability science was not viewed as *science* as such, but rather as activity of social interaction since it includes the strong transdisciplinary knowledge co-production approach. Furthermore, the transformation as an aim and approach for was considered too radical and political. This can be called as ideological resistance. Furthermore, reciprocal prejudices about the essence of sustainability science were evident among representatives of different scientific traditions: some social scientists considered sustainability science as purely natural and environmental question, while some natural scientists claimed that it is social science and void of strict scientific methods. However, to a large degree these views can be considered as reactions to the risks perceived in connection to the profiling activities and the anticipated result of ultimately eliminating some of the existing chairs.

The earlier experiences from HENVI activities also showed that not all scientists are comfortable with inter- and transdisciplinary activities - this is something to be accepted, as disciplinary approaches provide a firm basis for multi-, inter-, and transdisciplinarity.

In addition to ideological and epistemological differences, emotional resistance, the university's structure of Faculties proved to be difficult for the organization of an interdisciplinary cross-faculty centre. The University of Helsinki has a very strong vertical structure – a rectorate and Faculties organized according to disciplines, with the only addition of some separate units which are responsible for the technical activity or rather specific research areas (such as e.g. biotechnology). However, those units have a very minor role in teaching activities. Therefore, a new structure of “joint action unit” between the faculties was created. The benefit of this kind of unit is, that it engages the faculties to activities of sustainability science institute, being a formal part of them.

### **3.2 Formation of the “*HELSUS research approach*”**

As a result of the processes described earlier, sustainability science, as a new discipline and a transdisciplinary approach is being increasingly foundational in the practices of research and education. In the field of research, the Helsinki Institute of Sustainability Science, HELSUS that was officially established in the beginning of the year 2018, is the first sustainability science centre in the country.

During the drafting of the profiling application, it was decided that the research conducted within by HELSUS would focus on sustainability transformations. Sustainability transformations are understood as fundamental changes in the societies and thus paving way to sustainable well-being of humans and nature. Truly sustainable transformations can only be developed if both ecological and human perspectives are taken into considerations and fitted together. Such transformation requires maintaining and increasing adaptive capacity in the changing environmental and social conditions. It also acknowledges the role of technological and social innovations, while striving for

fundamental change in the existing structures, practices, norms, and values. Sustainability transformation is a joint effort and a continuous learning process between public, private and civil society.

Achieving transformation calls for new approaches and methodologies. The scientific basis for the research and education is derived from sustainability science, which has become a mainstream approach in sustainability research and policy. Sustainability science acknowledges the fundamental interactions between nature and society, aims at guiding these interactions to sustainable trajectories and promotes social learning necessary to navigate the ways to sustainability (Kates et al 2001). The potential of sustainability science in understanding and managing complex problems is essentially based on inter- and transdisciplinary approaches, which integrate not only the knowledge across the disciplines but also that of other experts, practitioners and citizens beyond academia.

Following the principles of sustainability science, the research at HELSUS is composed of three main interrelated dimensions, which integrate epistemologically different disciplines from natural sciences to social sciences and humanities as well as practical knowledge. The research exploits both qualitative and quantitative methodologies, and the knowledge is co-produced in different contexts and scales. These research dimensions serve as organizing principles for the scientific research of the centre, which is operationalized through research programmes and projects.

*Dimension 1: Understanding - What is?* The first research dimension aims at increasing analytical knowledge of complex social-ecological-cultural processes and dynamics at all/various scales in order to valorize what are the lock-ins and opportunities for transformations by focusing on e.g. following questions:

- How have coupled social-ecological-cultural system dynamics evolved in the past, how are they currently functioning and might further develop?
- What are the acceleration and tipping points for sustainability transformations?
- How to measure sustainability transformations?

*Dimension 2: Exploring/learning – What can be done?* The second research dimension aims at answering the question: how to enable and guide transformations that ensure ecological integrity and social justice? Consequently, this dimension explores the conditions, processes and limits of transformation at individual, communal and society, policy/institutional and ecological levels. Focus lies especially on

- practices
- ecological thresholds, tipping points and limits
- changes in values and human agency (behavior, attitudes, worldviews)
- guiding mechanisms (policy, regulation, governance, education)
- learning (organizational, social and institutional) and communication

- ethical conditions

*Dimension 3: Co-producing/designing - How to do it?* The third research dimension aims at answering the question:

- what are the case specific pathways and solutions to sustainability transformations related to real-world and context/place-specific problems and experiments?

It bases and underlines the analytical understanding from which the applied/practical dimension is drawn. It utilizes transdisciplinary co-production methodologies and involves the practitioners in the research from joint problem definition to dissemination. This kind of research leads to practical solution(s) or alternative pathways and socially robust knowledge, but it also increases scientific understanding of the phenomena in question. The research acknowledges high reflexivity regarding the aims and the results, as well as different roles of the researchers.

Within HELSUS, research is organized within five core thematic research areas, which are summarized in Table 1. However, these themes must not be seen neither exclusive nor static.

Table 1. Research themes of HELSUS

Theme	Research focus in HELSUS
CONSUMPTION AND PRODUCTION	<p>Sustainable bio-production and sustainable use of natural resources are in a key role in achieving sustainability transformations. How should we reorganize the production and consumption within the planetary boundaries, while guaranteeing the sufficient and equitable level of well-being? How to cover the needs of growing population using natural resources such as water, fish, land and biomass more efficiently? How to develop sustainable products and services to fulfill the needs of the present and future generations?</p> <p>Both consumption and production require radical changes. Technological innovations are not alone sufficient for the required transition. Therefore other approaches, such as grassroots innovations, social movements and sustainable design need to be analyzed and promoted. These require structural changes in economic and political systems and also novel governance arrangements to push these changes.</p> <p>Helsinki Institute of Sustainability Science will approach production and consumption from a systemic perspective addressing the dynamics related to ecological, economic, social, political and cultural aspects. Our approaches include a wide</p>

	range of participatory and interdisciplinary methods.
ARCTIC- GLOBAL SOUTH	<p>Majority of the people in our planet live in the “Global South”, where most of the world’s natural resources are located, and where poverty and many other social problems are most severe. It is clear that global sustainability challenges cannot be solved without enhancing the transformation pathways in Global South. These pathways are obviously linked with the development trajectories in the rest of the world.</p> <p>Novel pathways may be co-designed through innovative interaction and ways of co-learning. The Arctic – Global South setting provides a unique platform for learning about the conditions, limits and pathways for sustainability in different contexts. Despite the differences in the socio-economic and political systems, Global South and Arctic also share multiple problems such as fragile environments and social marginality. Linking research on Nordic welfare state with post-colonial situations in the global South, for instance, may provide innovative opportunities to investigate sustainability transformations in relation to wellbeing, justice and rights. Arctic environments are utmost fragile and will be the most heavily affected by the climate change, but are also facing increasing pressures to find new transportation and energy options</p>
URBAN	<p>Urbanized areas cover only a fraction of the Earth’s surface but their vast human populations determine the future of our societies. Cities constitute places of social conflicts and segregation, as well as environmental and health problems. At the same time, however, cities are centres of culture, creativity, and innovation that bring together diverse human populations and foster the exchange of ideas, thus playing a key role in transformations.</p> <p>The future of our urban societies rests on how we meet a new fundamental challenge. This is pivotal especially in urban development: the tension between ecological imperatives on the one hand and economic competitiveness on the other. In present-day urban development, this challenge should be met in a way that produces favourable results also from the perspective of people living in the urban environments.</p> <p>Research on ecological sustainability, physical environment, economic success and competitiveness, liveability, social needs and well-being, based on a specific cases, will produce integrated</p>

	solutions functional in design and planning.
THEORY AND METHODOLOGY	Inter- and transdisciplinary approach is built in to sustainability science research. Therefore the research theme for Theory and Methodology is cross-cutting. Sustainability science strives to aid the societal change through transformative knowledge. We consider strong theory and methodology development in inter- and transdisciplinary research as the core of the Institute.

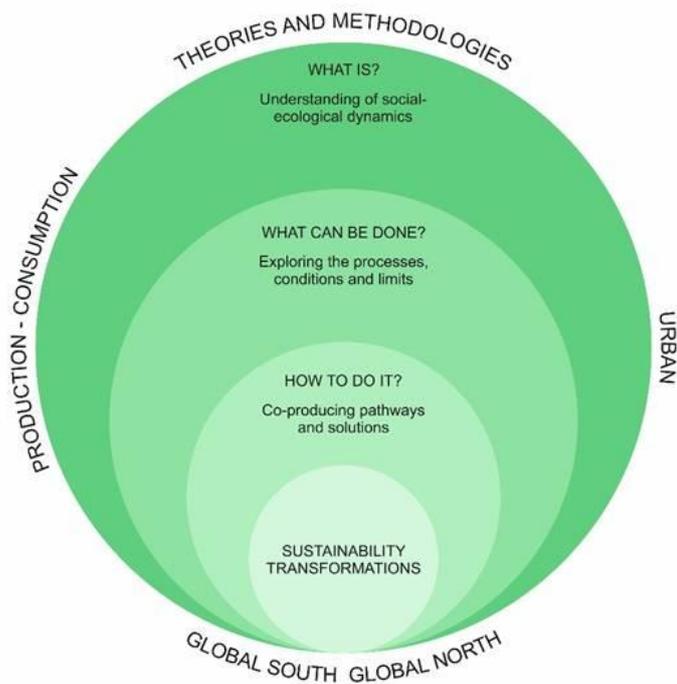


Figure 1. Research dimensions and themes of HELSUS

In order to enhance the societal impact of the HELSUS research structured policy dialogues were initiated with the Prime Minister's office, including regular monthly sessions that feed directly to Finland's process of implementation of Sustainable Development Goals. HELSUS Policy Dialogues 2018 focus on indicators to measure the SDGs and consider the Finnish progress in regard to the goals set, as well as analysing

the reasons for Finland's performance (or non-performance). The aim is to create the interdisciplinary forum for dialogic discussion acknowledging the latest scientific findings. Additionally, a short summary of the discussion will be produced to contribute to the indicator development and to be part of the material provided to Finnish government.

In addition to policy dialogues, various other activities for societal engagement are organised such as workshops, networking events, science days, seminars etc, and plans for innovation platform and business collaboration have been developed.

### **3.3 Developments in educational arena**

The UH has launched a development process of educational organization, which aimed at restructuring all the education and creating broader Bachelor's and Master's degree programs. Sustainability science is embedded in the education provided at UH in several disciplines and campuses. The MSc program in Environmental Change and Global Sustainability (ECGS) together with MSc program in Urban Studies and Planning are the main MSc programs for sustainability issues, however, also other MScs and MSocScis will provide education with a sustainability perspective. ECGS was initiated in Sept 2017, and already next year it was the most popular program in the international application round.

ECGS aims to educate broadly thinking interdisciplinary experts who can solve socio-ecological sustainability problems in collaboration with social actors by applying scientific methods within a particular specialization of sustainability science. ECGS fulfils this aim with a joint interdisciplinary core and two specializations. The Interdisciplinary Core module focuses on the methodologies of sustainability science and science-society interaction. The Environmental Change specialization educates experts with an orientation in natural sciences who understand the functioning of terrestrial and aquatic ecosystems, including human-induced changes in them, and can mitigate and manage the changes. The Global Sustainability specialization educates experts with an orientation in social sciences and humanities who understand the socio-cultural underpinnings of global sustainability challenges and can develop solutions that take into consideration social and environmental justice. ECGS is a joint programme of the Faculty of Biological and environmental sciences, Faculty of Agriculture and Forestry and Faculty of Social Sciences.

Master's Programme in Urban Studies and Planning produces experts with different profiles, and different specific competences, in ecological and technical systems, human and social sciences, and design and planning – all of these in a way to enable the discussion across the borders of disciplines and professional boundaries producing integrated interpretations and solutions. The programme offers modules that transcend the borders of scientific expertise and knowledge on the one hand and design and planning on the other. This is of decisive importance in relation to urban studies and planning: knowledge and understanding on the practices and ways of thinking in design and planning enable the practitioners of urban studies to pose and answer their research

questions in ways that are of significance from a planning perspective, and vica versa. The Master's Programme of Urban Studies and Planning is a joint programme of the University of Helsinki (Faculty of Biological and Environmental Sciences, Faculty of Science, Faculty of Social Sciences, Faculty of Arts) and Aalto University Schools of Engineering and Arts.

Doctoral training and education in sustainability science is fundamental part of the center. Several doctoral programs (Interdisciplinary Environmental Sciences DENVI, Social Sciences, Sustainable use of renewable resources AGFOREE, and Political, Economic and Regional Change) are closely connected to the center in their aspect of sustainability research.

### **3.4. University campus as urban sustainability living lab**

Universities committed to sustainability are also active in introducing sustainability standards in their campus operations. As universities are commonly located in larger cities and thus have a major role in the urban surroundings, the sustainability operations have an effect on the behavior of not only students and staff but also citizens, city planning and urban governance.[JSE1]

UH has already implemented various sustainability measures which can be further developed. These include producing renewable energy e.g. solar power plant at Viikki campus and wood chip power plant at Lammi biological station, reducing energy and water consumption in buildings e.g. energy-efficient solutions and technical systems, developing sustainable construction projects e.g. LEED certified Kaisa House (gold level), implementing Green Office environmental program at Viikki campus and launching a program to advance healthy and sustainable forms for commuting. The solar power project was driven by the need to produce renewable energy at the energy intensive life science campus. On a clear summer day the solar panels meet up to 20 % (900 kW) of electricity demand. Annually the solar energy production is expected to represent 5-6 % of the overall consumption at Viikki campus.

In addition, UH has a fair trade certification and it has been committed in considering the aspects of fair trade in its operations. The excellent cooperation of the facility management and sustainability science research and education enables using the campus as a living lab for testing sustainability innovations, both social and technical and using the campus as a learning platform for students.

## **4. Conclusions**

Sustainability transition is a complex process including various actors and interests. When reflecting the process of establishing the sustainability science centre in the University of Helsinki to transition theory (Geels and Shot 2007) - it can be, indeed, concluded that small niche innovations at the grassroot level - the networks and science activism pushed for the regime level changes. However, the financial incentives initiated in the regime level,

enabled the niche level innovations to grow, and provided a window of opportunity for the initiation of structural changes.

Based on the experience of establishing an institute of sustainability science in the University of Helsinki, we conclude that both, the positive push of external funding and strong internal support for transition, contributed to cross-disciplinary sustainability transition in the university, which has an established tradition of rigid faculty lines. This transition resulted in a structure that enables university to take an active role in solving the sustainability problems and implement the Sustainable Development Goals (SGDs) together with the society.

## 5. References

Academy of Finland. 2018. *Competitive funding to strengthen university research profiles* <https://www.aka.fi/en/research-and-science-policy/university-profiling/> accessed 26.6.2018

Baker-Shelley, A. Zeijl-Rozema, P. Martens 2017. "A conceptual synthesis of organisational transformation: how to diagnose, and navigate, pathways for sustainability at universities?" *J. Clean. Prod.*, 145, . 262-276.

Barth, B and Michelsen, G. 2013. " Learning for change: an educational contribution to sustainability science Sustain". *Sci.*, 8, 103-119.

Berkhout, F., Smith, A. and Stirling, A. 2004. Socio-technological regimes and transition contexts. In *System Innovation and the Transition to Sustainability: Theory, Evidence and Policy*; Elzen, B., Geels, F.W., Green, K., Eds.; Edward Elgar: Cheltenham, UK, pp. 48–75.

Beynaghi, G., Trencher, F. Moztarzadeh, M. Mozafari, R. Maknoon, W. Leal Filho. 2016 "Future sustainability scenarios for universities: moving beyond the United Nations decade of education for sustainable development" *J. Clean. Prod.*, 112. 1464-1474.

Bulkeley, H. and Castán Broto, V. 2012. Government by experiment? Global cities and the governing of climate change. *Trans. Inst. Br. Geogr.*, 38, 361–375

Dedeurwaerdere, T. 2013. "Transdisciplinary sustainability science at higher education institutions: science policy tools for incremental institutional change" *Sustainability*, 5, 3783-3801.

Ferrer-Balas, D., J. Adachi, S. . 2008. An international comparative analysis of sustainability transformation across seven universities *Int. J. Sustain. High. Educ.*, 9 (3), 295-316.

Ferrer-Balas,D., H. Buckland, M. de Mingo 2009. Explorations on the University's role in society for sustainable development through a systems transition approach. Case-Study

of the Technical University of Catalonia (UPC) *J. Clean. Prod.*, 17 1075-1085.

Geels, F.W. 2002. "Technological transitions as evolutionary reconfiguration processes: a multi-level perspective and a case-study". *Res. Policy*, 31, 1257-1274.

Geels, F.W. and J. Schot 2007. Typology of sociotechnical transition pathways *Res. Policy*, 36, 399-417.

Genus, A. and Coles, A. 2008. Rethinking the multi-level perspective of technological transitions. *Res. Policy*, 37, 1436–1445.

Lozano, R., K. Ceulemans, M. Alonso-Almeida, D. Huisingh, F.J. Lozano, T. Waas, W. Lambrechts, R. Lukman, J. Hüge. 2015. " A review of commitment and implementation of sustainable development in higher education: results from a worldwide survey" *J. Clean. Prod.*, 108, 1-18.

Kates, et al. 2001. Sustainability science *Science*, 292 (5517), 641-642.

Miller, T.R. 2014. *Reconstructing Sustainability Science. Knowledge and Action for a Sustainable Future. Science in Society Series Earthscan, Routledge*

Soini, K., Jurgilevich, A., Pietikäinen, J. and Korhonen-Kurki, K. 2018. " Universities responding to the call for sustainability: A typology of sustainability centres". *Journal of Cleaner Production* 170C: 1423-1432.

Spangenberg. 2011. "Sustainability science: a review, an analysis and some empirical lessons" *Environ. Conserv.*, 38 (3) pp. 275-287

Stephen, C., A.C. Graham. 2010. "Toward an empirical research agenda for sustainability in higher education: exploring the transition management framework" *J. Clean. Prod.*, 18, 611-618

Trencher, M. Yarime, K.B. McCormick, C.N.H. Doll, S.B. Kraines. 2013. Beyond the third mission: exploring the emerging university function of co-creation for sustainability *Sci. Publ. Pol*, 1-29

Wiek, A., F. Farioli, K. Fukushi, M. Yarime 2012." Sustainability science: bridging the gap between science and society" *Sustain. Sci.*, 7 (Supplement 1), 1-4.