



Annual report – 2007

SUSTAINABLE INNOVATIVE MATERIALS IN HIGH TECH APPLICATIONS (SuMac)
A Multidisciplinary Approach to Engineering Technology and Chemistry of Environmental Sound
Products and Productions

University of Lapland

Resources:

Professor Minna Uotila
Researcher Piia Rytilahti
Researcher Miia Mattila

Rytilahti's dissertation is progressing well and is concerning ecoluxury design and its value creation from the discipline of sociology of design. She has worked as a junior researcher in the Emergence of Luxury –research project funded by the Academy of Finland (2004–2007).

Progress of the project:

The ongoing SuMac –research project began in 2007 and will continue to the end of 2007 in the Sustainable Products and Production –research programme. The goal of the project is to establish a conceptual framework offered by the theoretical bases of the design research, ergonomics and material technology for sustainable goods and services relative to their environmental impacts. In our understanding, the environmentally sound products and design are a mixture of the sustainable aspects as well as the pleasurable – even luxurious - properties of products. With this approach it is possible to design and produce ethically high-oriented products and create successful brands that carry the idea of environmentally and ethically sound design. The long-term success of sustainable business success is based on the emerging green industrial revolution which takes into account both old and new ethics of consumption. The project is producing knowledge on clean production, research models, design tools and strategies.

During the first year the Sumac -research project has challenged the traditional sustainable products and production by defining modern principles of environmental sound design. Merging the traditional target groups of sustainability and the new diverse segments of end-users has directed the qualitative end-user data gathering. By the end of the year 2007 the user-data (Table 1.) consists of self assembled videos taped by the outdoor sports groups (total 14 informants in three groups) and self-reflective group interviews conducted with these groups. User-data gathering is still going on due to the seasonality of these outdoor sports activities. User-data is also gathered among another form of user-communities, namely in the Finnish Martha association (total 15 informants in three groups). The Martha organization is a Finnish home economics organization, which was founded in 1899 to promote the quality and standard of life in the home. Spring 2008 is scenario and concept work based on user-data analyses. Scenarios and concepts for eco-innovation are executed in workshops for students working on their master's thesis.

Table 1. User-data gathering and processing 2007-2008.

<i>Cultures of action:</i>	<i>Self assembled videos by the groups of informants</i>	<i>Place and duration of the self-reflective group interviews:</i>	<i>n</i>	<i>Date of the interview:</i>
<i>Ski-trekking Group I</i>	40 min	Rovaniemi	6	11.5.2007 transcribed
<i>Ski-trekking Group II</i>		Spring 2008		
<i>Snowboarding Group I</i>		Spring 2008	6	
<i>Snowboarding/ telemark Group II</i>		Spring 2008		
<i>Kite surfing Group I</i>		Rovaniemi 2008	4	
<i>Canoeing Group I</i>	2h	Rovaniemi	4	24.10.2007 transcribed
<i>Canoeing Group II</i>		Spring 2008		
<i>Downhill riding Group I</i>	50 min	Rovaniemi	4	8.11.2007 transcribed
<i>Downhill riding Group II</i>		Rovaniemi 2008		
<i>Marthas I</i>		Rovaniemi	5	10.12.2007
<i>Marthas II</i>		Rovaniemi	5	12.12.2007
<i>Marthas III</i>		Rovaniemi	5	17.12.2007
		N	39 ^{*)}	

39^{*)} done in 6 groups, to be done: 20-30 persons in 6-9 groups

Publications:

1. Articles in refereed international scientific edited volumes and in refereed international scientific conference proceedings

Rytilahti Pii; Uotila, Minna & Narbrough, Maxim (2007): Understanding the Essence of Environmentally Sound Products: Some Insights into Ecoluxury Design. In the web proceedings of Nordic Design Research: www.nordes.org . ISSN: 1604-9705. Nordic Design Research Conference, 27-30 May 2007. Konstfack, University College of Art, Craft and Design, Stockholm, Sweden.

Uotila, Minna (2007): Clean and Luxurious as the Object of Design and Consumption. An abstract accepted for an oral presentation in International Design Conference Cumulus Kyoto 2008, March 28-31, 2008, Kyoto, Japan.

2. *Other scientific publications, such as articles in non-refereed scientific journals and conference proceedings, and publications in university and department series.*

Rytilahti, Piia & Narbrough, Maxim. (2007): Some Insights to Sustainable Design and Innovation in the Arctic region. Proceedings of the Knowledge and Power in the Arctic Conference, 16–18 April 2007, University of Lapland and its Arctic Centre, Rovaniemi, Finland. (in print.)

Tampere University of Technology

Resources:

Docent Eija Nieminen

Researcher Päivi Talvenmaa.

Progress of the project:

- Literature reviewing and data collection of new and innovative materials
- Outlining possibilities to integrate new solutions in textiles and apparel (context LAY & UKU)
 - o 1. special focus: materials and technologies for cooling and heating like phase change materials, shape memory polymers, conductive materials and aerogels
 - o 2. special focus : materials and technologies for shock protection like auxetic materials and state change materials
- Outlining sustainable product chains/global supply chains and LCA (cleaner production, dematerialization, robust design, recycling, product to services, safer processes)

(Doctoral thesis specifying : defined study for innovative materials and technologies reviewed as a part of sustainable product development)

Publications:

Talvenmaa P., Meinander H., “Possibilities of Inorganic Phase Change Materials to Regulate Body Temperatures in Hot and Cold Environment”, Intelligent Textiles & Mass Customisation Conference ITMC-2007, 15-17th November , Casablanca, Morocco, Proceedings pp. 331-340.

1. Participation in RITE-group Conference (Reducing the Impact of Textiles on the Environment) the 10th October 2007, London, UK

- Delegates of authorities, textile industry and global apparel brands and retailers presented their views on the sustainable and ethical sourcing of textiles and apparel

2. Participation in ITMC-Conference 15-17.11.2007, Casablanca, Morocco

University of Kuopio

Resources:

Professor Veikko Louhevaara

Researcher Lintu Niina, (1.1.-31.7.2007)

Researcher Jukka Kähkönen (1.10.-31.12.2007).

Ass. Researcher Susanna Kähkönen (1.10.-31.12.2007).

Progress of the project:

The primary purpose of the current research is to increase the understanding of interactions between design and production, environment, and participation and empowerment of workers in industrial production and service processes, and their roles for supporting sustainable production and product both at the strategic and operational level. The UKU develops high-tech tools and good practices and concepts for promoting sustainable production and products in terms of ergonomics, health and wellbeing. In the production this means clean work environments, and meaningful work processes with acceptable physiological, psychological and social work loads. During the first year of SUMAC the UKU has analyzed the strategic and operational concepts involved in the promotion of wellbeing in the Itella group of enterprises, and considered the implementation and feasibility of high-tech tools based on the long-term recordings of bio-signals such heart rate, heart rate variability and electromyography for occupational settings. In addition, the theoretical framework based on the systematic literature review is under work for connecting the concepts of sustainable development and occupational wellbeing as they have same outcome variables like the quality of life. It seems that learning and competence are indispensable prerequisites of sustainable development which needs - as far as possible - the prediction and control of future changes and challenges.

Impacts:

The collaboration including meetings and interviews with the Itella group and the Finnish Institute of Occupational Health has been very active.

Development with respect to the project plan:

The cooperation within the university consortium (Tampere University of Technology, University of Kuopio and University of Lapland) required more effort than expected due to long distances. At the UKU, the development of the theoretical framework for combining sustainable development and occupational wellbeing is a challenging tasks requiring multidisciplinary systematic literature review. The first year aims have been achieved although some problems occurred related to the recruitment of personnel.

Publications:

Louhevaara V, Kähkönen J, Hokkanen T. Load and risk profile for analyzing developing physical work. Proceedings of the 8th Pan-Pacific Conference on Occupational Ergonomics (PPCOE 2007), October 17-19 2007, Bangkok, Thailand. CD rom.