大会议程

The Conference Program

中国，北京 2011年10月27——29日
October 27-29, 2011, Beijing, China

目录/ CONTENTS：

会议宗旨：

世界在发展中巨变！处于工业文明与生态文明的十字路口，人类应该走向何处？

今天，环境问题已不再局限于某一地区而成为一个跨国家、跨界域、跨文化的人类共同面临的问题。在中国的哲学中，“道”意味着“道路”“途径”“方法”“原则”以及“伦理”等。老子云，“人法地，地法天，天法道，道法自然”。保护人类赖以生存的自然环境，才是人类永续发展的最根本保障。

进入千禧之年的兴奋还未完全退去，21世纪的第一个十年却已悄然过去，我们惊讶地发现，全球化的脚步正在以加速度向前发展！而不断加深的环境危机也引发了人们对于人类自身发展方式的哲学思考：人类必须立即停止目前的短视行为，走可持续发展之路！

亡羊补牢，为时未晚！

艺术设计作为人类文明发展的一种体现，作为社会、经济、文化进一步发展的有力推动因素也面临着全球化带来的机遇和挑战。

全球化可能会使文化趋同，特色消失，但全球化也使原本处于完全不同文化背景下的国家和人们之间的交流更为方便，也使发展中国家和发达国家之间的协作更加可能。中国清华大学美术学院——一个发展中的中国的顶级大学的艺术设计学院，一个在中国传统文化之根上孕育而出的现代设计和设计研究人才的培育基地，与芬兰阿尔托大学（原赫尔辛基艺术与设计大学）——一个以设计强国的西方发达国家顶级大学中的艺术与设计学院，一个作为北欧设计人才培养旗舰的艺术与设计学院，经过多年的前期合作，将在21世纪第二个十年的第一个年头展开一次实质性的合作，于2011年10月27日——10月29日在清华大学美术学院共同主办“全球化背景下可持续艺术设计战略”国际研讨会，为探讨可持续设计新思路搭建一个观点交锋、新知发散、经验共享的思想交流平台，探索一条艺术设计的“持续之道”。

东西方文明智慧必将在这里激情碰撞并融合！

Introduction：

This conference explores the possibilities of design in developing sustainable solutions for the future of mankind.

In Chinese philosophy, the “Tao” means “path”, “way”, “method”, “principle”, “truth”, “ethics”. Lao-Tse, the ancient Chinese philosopher and the founder of Taoism said, “Man follows Earth. Earth follows Heaven. Heaven follows Tao. Tao follows Nature”. The protection of natural environment is the first and most fundamental guarantee for sustainable development of human beings.

The constantly accelerating globalization with its rapidly growing flow of artefacts and consumption is a burden not only to the natural environment but to civilizations, communities and individuals. The deepening ecological crisis is a call also for design: in which ways can it help in solving problems of sustainability in the prevailing context of globalization?

Design as a reflection of the development of human civilization and as a powerful catalyst to social, economic and cultural developments, is also confronted with the opportunities and challenges brought by these current megatrends.

Now, continuing their previous collaboration, Academy of Arts and Design of Tsinghua University—the academy belonging to one of the top universities in developing China and an institution of up-to-date design education also rooted in traditional Chinese culture, will launch this event together with School of Art and Design of Aalto University (formerly University of Art and Design Helsinki)—a school of international standing from the developed western countries. They will jointly hold “an International Conference on Sustainable Design Strategies in a Globalization Context” during October 27-29, 2011. The conference will provide a platform for ideas clashing and converging, spread of knowledge and experience sharing and help to seek the "Tao of sustainability" in design.

总议程 / Overall Program:

第一天日程（2011 年 10 月 27 日）/1st Day Overall Program (October 27，2011)

<table>
<tr><th>时间/Times</th><th colspan="3">内容/Content</th><th>地点/Place</th></tr>
<tr><td>09:30-12:00</td><td colspan="3">DESIS 论坛–北京/ DESIS Forum–Beijing，主持人：艾佐·曼梓尼/ Chair: Ezio Manzini
DESIS 论坛是一个汇聚不同国家、地区参与者的开放式研讨会。论坛将以简短讲演与小型展览会的形式展示正在进行或近期完成的有关“社会创新与可持续设计”的相关案例。
The DESIS Forum is on open space where several on-going or recently completed projects on design for social innovation are showcased by means of short speeches and a small exhibition.</td><td>B406</td></tr>
<tr><td>10:00-13:30</td><td colspan="3">注册/ Registration
咖啡、自助午餐/Welcome coffee and buffet luncheon (12:00-13:00)</td><td>A 区大厅
A- lobby</td></tr>
<tr><td>13:30-14:00</td><td colspan="3">开幕式（“持续之道”国际会议与 2011 清华大学美术学院学术活动月）/Opening Ceremony of the conference and the academic month of the Academy of Arts & Design, Tsinghua University 2011</td><td>A301</td></tr>
<tr><td></td><td colspan="3">主持人：周浩明 教授 / Chair: Prof. Zhou Haoming</td><td></td></tr>
<tr><td>14:00-14:45</td><td colspan="3">主旨讲演 1/Keynote Speech 1 —— Q&A (40+5 min)
郑曙旸（中国）/Zheng Shuyang (China):
可持续设计教育的中国战略 / Chinese Strategy on the Education of Design for Sustainability</td><td>A301</td></tr>
<tr><td>14:45-15:30</td><td colspan="3">主旨讲演 2/Keynote Speech 2 —— Q&A (40+5 min)
拜卡·高勒文玛（芬兰）/Pekka Korvenmaa (Finland):
从边缘到中心——可持续性与设计-演进的途径/ From the Margin to the Center：Sustainability and Design - the Path of Evolution</td><td>A301</td></tr>
<tr><td>15:30-16:00</td><td colspan="3">咖啡时间/Coffee Break</td><td></td></tr>
<tr><td rowspan="2">16:00-18:15</td><td colspan="3">分论坛 A、分论坛 B：每位 12+3 分钟；同时举办建筑环境可持续设计工作坊（由芬兰驻华大使馆、芬兰国家技术创新局主持）
Parallel Session A, B: (12+3 min) and Sustainable Design of Building Environment workshop（Hosted by Embassy of Finland in Beijing and Tekes, the Finnish Funding Agency for Technology and Innovation）</td><td rowspan="2">分论坛 A
Session_ A
A301

分论坛 B
Session_ B
B406

工作坊
Workshop
B212</td></tr>
<tr><td>分论坛 A /Session_ A
可持续设计教育/Pedagogy in SD Education
主持人/chair：董伟 教授/ Prof. Wei Dong</td><td>分论坛 B /Session_ B
艺术设计的发展方向与对策+可持续设计方法论/ Direction and Strategy of Design + Methodology of SD
主持人/chair：娄永琪 教授/ Prof. Lou Yongqi</td><td>工作坊/ workshop
建筑环境可持续设计工作坊/Sustainable Design of Building Environment workshop
主持人/chair：凯瑞 参赞/ Kari Hiltunen，Counselor</td></tr>
</table>

18:30-21:00	**欢迎晚宴/Welcome Dinner**	玉树园 餐厅 Yushuyuan Restaurant

第二天日程（2011 年 10 月 28 日）/2nd Day Overall Program (October 28，2011)

<table>
<tr><th>时间/Times</th><th colspan="2">内容/Content</th><th>地点/Place</th></tr>
<tr><td></td><td colspan="2">主持人：拜卡•高勒文玛 教授 / Chair: Prof. Pekka Korvenmaa</td><td></td></tr>
<tr><td>09:00-09:45</td><td colspan="2">主旨讲演 3/Keynote Speech 3 —— Q&A (40+5 min)
周浩明（中国）/Zhou Haoming (China):
可持续室内环境的有机整体性 / Organic Unity, the Character of Sustainable Interior Environment</td><td>A301</td></tr>
<tr><td>09:45-10:30</td><td colspan="2">主旨讲演 4/Keynote Speech 4 —— Q&A (40+5 min)
艾佐•曼梓尼（意大利）/Ezio Manzini (Italy):
开放式设计项目的实验室：设计学院——推动（可持续）变革的动因 / Design Labs for an Open Design Program: Design Schools as agents of (Sustainable) Change</td><td>A301</td></tr>
<tr><td>10:30-11:00</td><td colspan="2">咖啡时间/ Coffee Break</td><td></td></tr>
<tr><td>11:00-11:45</td><td colspan="2">主旨讲演 5/Keynote Speech 5 —— Q&A (40+5 min)
多勒卡·盖诺宁（芬兰）/Turkka Keinonen (Finland):
以用户为中心和可持续性 / User Centeredness and Sustainability</td><td>A301</td></tr>
<tr><td>12:00-13:00</td><td colspan="2">自助午餐/ Buffet Luncheon</td><td>A 区大厅
A- lobby</td></tr>
<tr><td rowspan="2">13:30-15:45</td><td colspan="2">分论坛 C、分论坛 D：每位 12+3 分钟/ Parallel Session C, D: (12+3 min)</td><td rowspan="2">分论坛 C
Session_ C
A301

分论坛 D
Session_ D
B406</td></tr>
<tr><td>分论坛 C / Session_ C
社会创新与可持续设计+服务设计/ Social Innovation and SD + Service Design
主持人/chair: 刘新 副教授/ Associate Prof. Liu Xin</td><td>分论坛 D / Session_ D
商业与可持续设计+可持续设计方法论/ Business and Design for Sustainability + Methodology of SD
主持人/chair: 付志勇 副教授/ Associate Prof. Fu Zhiyong</td></tr>
<tr><td>15:45-16:00</td><td colspan="2">咖啡时间/ Coffee Break</td><td></td></tr>
<tr><td rowspan="2">16:00-18:15</td><td colspan="2">分论坛 E、分论坛 F：每位 12+3 分钟/ Parallel Session E, F: (12+3 min)</td><td rowspan="2">分论坛 E
Session_ E
A301

分论坛 F
Session_ F
B406</td></tr>
<tr><td>分论坛 E / Session_ E
文化与可持续设计/ Culture and Sustainable Design
主持人/chair: 万书元 教授/ Prof. Wan Shuyuan</td><td>分论坛 F / Session_ F
可持续人居环境与产品设计/ Design for Sustainable Environment and Product
主持人/chair: 邱灿红 教授/ Prof. Qiu Canhong</td></tr>
<tr><td>18:30-20:30</td><td colspan="2">晚宴/ Dinner</td><td>玉树园</td></tr>
</table>

		Yushuyuan Restaurant

第三天日程（2011 年 10 月 29 日）/3rd Day Overall Program (October 29，2011)

时间/Times	内容/Content	地点/Place
	主持人：刘新 副教授 / Chair: Associate Prof. Liu Xin	
09:00-09:45	**主旨讲演 6/Keynote Speech 6 —— Q&A (40+5 min)** **难波和彦（日本）/Kazuhiko NAMBA (Japan):** “建筑的四层构成”——可持续建筑设计的基础理论/ The Four Layers of Architecture as a Basic Theory of Sustainable Design	A301
09:45-10:30	**主旨讲演 7/Keynote Speech 7 —— Q&A (40+5 min)** **佩妮•邦达（美国）/Penny Bonda (USA):** 营造健康建筑室内的方法与实践 / Healthy Building Interiors: Methods and Practices	A301
10:30-11:00	**咖啡时间/ Coffee Break**	
11:00-11:45	**主旨讲演 8/Keynote Speech 8 —— Q&A (40+5 min)** **卡罗·维佐里（意大利）/ Carlo Vezzoli (Italy):** 可持续性系统设计——研究领域的新前沿 / System Design for Sustainability: the New Research Frontiers	A301
11:45-11:55	**启动“中国可持续设计学习网”/ Launch of LeNS-China** **刘新（中国）/ Liu Xin (China):** 一个分享式的可持续设计学习网络服务平台 / A shared learning web platform of design for sustainability	A301
12:00-13:00	**自助午餐/ Buffet Luncheon**	A 区大厅 A- lobby
13:30-17:00	**组委会组织参观 798 艺术区/ Visit to 798 Art Area or Some Other Cultural Places**	

分论坛议程/ Parallel Session Program

第一天分论坛日程（2011 年 10 月 27 日）/ 1st Day Detailed Parallel Session Program (October 27，2011)

	分论坛 A /Session_ A （A301） 可持续设计教育 / Pedagogy in SD Education 主持人/chair: 董伟 教授/ Prof. Wei Dong	**分论坛 B /Session_ B （B406）** 艺术设计的发展方向与对策+可持续设计方法论 / Direction and Strategy of Design+Methodology of SD 主持人/chair: 娄永琪 教授/ Prof. Lou Yongqi
16:00-18:15		
16:00-16:15	黄海燕（中国） 可持续设计教育的知识整合与设计创新 Huang Haiyan (China) *Knowledge Integration and Design Innovation of Sustainable Design Education*	柳冠中（中国） 适可而止地“栖息” Liu Guanzhong (China) *The Moderate Inhabitation*
16:15-16:30	乌沙•纳什木汗、多莉•库马尔（印度） 时尚产业和可持续发展策略——探寻设计过程新方式 Usha Narasimhan, Dolly Kumar (India) *Fashion and Sustainable Strategies: In Search of a Fresh approach to the Design Process*	肯•纳姆卡（丹麦） 开创独特的设计之路——道家文化指导下的场地设计 Ken Namkha (Denmark) *Making Way for Particularity: Field Design in a Daoist Perspective*
16:30-16:45	冯晋、吕江（美国） 室内设计课程的可持续设计教学 Jin Feng, Jiang Lu (USA) *Teaching Sustainable Design in Interior Design Curriculum*	万书元（中国） 当下中国可持续设计的困境及出路 Wan Shuyuan (China) *The Dilemma and Outlet of Sustainable Design in Contemporary China*
16:45-17:00	蒂姆•夏普、萨利•斯图尔特（英国） 缩小可持续设计教学和研究之间的差距——基于麦金托什建筑学院的经验 Tim Sharpe, Sally Stewart (U.K.) *Closing the Gap between Teaching and Research in Sustainable Design: Experiences at the Mackintosh School of Architecture*	卡梅拉•库茨泽拉（加拿大） 设计思维和预防原则——可持续设计理论模式的开发 Carmela Cucuzzella (Canada) *Design Thinking and the Precautionary Principle: Development of a Theoretical Model for Design for Sustainability*
17:00-17:15	刘新、刘吉昆（中国） 机会与挑战——产品服务系统设计的概念与实践 Liu Xin, Liu Jikun (China) *Possible Opportunity: the concept and practice of product service system design*	曹天慧（中国） 绿色设计将走向何处？ Cao Tianhui (China) *What the Green Design Going To Be?*
17:15-17:30	赛利尔•维因、西因（英国） 程序和询问——新型技术在探寻可持续设计方面的应用 Cyril Wing Yin, Shing (U.K.) *Procedures and Enquires: The Use of Emegering Technology in Searching for Sustainable Design*	海因涅•西因、保罗•约翰逊、卢克•哈默（英国） 人力驱动产品的设计方法，倡导可持续能源消费 Daniel Shin, Paul Johnson, Luke Harme (U.K.) *Methods for Designing Human-powered Products, Educational Intervention towards Sustainable Energy Consumption*
17:30-17:45	卡洛斯·菲奥伦蒂诺（加拿大） 2011 年可持续性设计教学：前瞻性课程的初步成果 Carlos Fiorentino（Canada） *Teaching Design for Sustainability*	安婭娟、李闽川（中国） 让室内设计更长寿——初探我国建筑装饰装修工程“短命”现象 An Huajuan, Li Minchuan (China) *Let Interior Design be more*

	in 2011: First Results from a Prospective Curriculum	*Longevous: Study on the "Short Life" Phenomenon of Building Decoration in China*
17:45-18:00		爱德华•何塞•贡萨尔维斯、安娜•马加瑞达•戈梅斯·费雷尔、亨利•克里斯蒂亚安斯（葡萄牙、荷兰） 光——可持续发展的世界的一部分 Eduardo José Gonçalves, Ana Margarida Gomes Ferreira , Henri Christiaans (Portugal、Dutch) *Light as Part of a More Sustainable World*
18:00-18:15		孙琳、孙元良 通过在行动中反思来制定可持续设计决策 Lin Sun, Yuanliang, Sun (USA) *Sustainable Design Decisions Through Reflection-in-action*

第二天分论坛日程（2011 年 10 月 28 日）/ 2nd Day Detailed Parallel Session Programme (October 28，2011)

	分论坛 C / Session_ C （A301） 社会创新与可持续设计+服务设计/ Social Innovation and SD + Service Design 主持人/chair: 刘新 副教授/ Associate Prof. Liu Xin	**分论坛 D / Session_ D （B406）** 商业与可持续设计+可持续设计方法论/ Business and Design for Sustainability + Methodology of SD 主持人/chair: 付志勇 副教授/ Associate Prof. Fu Zhiyong
13:30-15:45		
13:30-13:45	巩淼森、钟芳、张桢、裴雪（中国） 可持续服务设计初探：一个中国的教学案例 Miaosen Gong, Fang Zhong, Zhen Zhang, Xue Pei(China) *Emerging Experience on Service Design for Sustainability: A Didactical Case in China*	塔图•马迪拉（芬兰） 消费社会中的可持续性——寻找适宜设计策略以减少消费 Tatu Marttila (Finland) *Sustainability in a Consumer Society: Identifying Suitable Design Strategies to Support Less Consumption*
13:45-14:00	王国胜、刘峰（中国） 校园公共信息服务平台——清华美院服务设计案例与教学研究 Wang Guosheng，Liu Feng (China) *Information Service on Campus: An Educational Case of Service Design in Tsinghua University*	吉米•卡欧、马里亚诺•拉米雷斯、史蒂夫•沃德（澳大利亚） 长期的产品依恋感——优化用户与产品关系的可持续设计方法 Kimmi Ko, Mariano Ramirez, Steve Ward (Australia) *Long-team Product Attachment: A Sustainable Design Approach for Optimising the Relationship between Users and Products*
14:00-14:15	阿方索•鲁兹•拉罗、阿尔弗雷多•里韦罗、庞培约•雷纳、丹妮拉•桑托斯、奥罗拉•巴罗索（西班牙） 变废为宝——利用刺毛狼尾草制作包装用纸及纸箱 Alfonso Ruiz Rallo, Alfredo Rivero, Pompeyo Reina, Daniela Santos, Aurora Barroso (Spain) *Revaluation of Pennisetum Setaceum Waste Transforming It into Paper and Cardboard to Manufacture Packaging*	玛丽亚达•格拉萨•古德斯、安娜•罗萨（葡萄牙） 可持续性是建立时尚品牌差异化战略的关键 Maria da Graça Guedes, Ana Roncha (Portugal) *Sustainability as a Key Asset in Establishing Differentiation Strategies for Fashion Brands*
14:15-14:30	钟芳（意大利） 中国创新食品网络建设中的信托服务设计 Fang Zhong (Italy) *Service Design for Trust Building in Innovative Food Networks in China*	艾里夫·库茨卡瑞克、阿尔佩·厄尔（土耳其） 具有设计意识的中小型企业为实现可持续性目标所进行的自下而上的转变 :考察获得伊斯坦布尔行业商会嘉奖的企业 Elif Küçüksayraç， Alpay Er (Turkey) *The Bottom-up Transition to Sustainable Production in Design-conscious SMEs: Observations from Companies Awarded by the Istanbul Chamber of Industry*
14:30-14:45	李笑寒（中国） 设计品的生长与再生——从可持续性设计角度探讨设计品的恢复性价值 Li Xiaohan (China) *Growth and Regeneration of Design Products:Investigate the Recovery Value of Design from the*	高寓鹏、巩淼森（中国） 论可持续设计与新型商业模式的融合与发展 Gao Yupeng, Gong Miaosen (China) *The Combination and Development of New Business Models and Design for Sustainability*

	Perspective of Sustainable Design	
14:45-15:00	A.爱迪尔•贾茨鲁索（新西兰） 产品开发层面的系统可持续创新——一个概念性框架 A. Idil Gaziulusoy (New Zealand) *System Innovation for Sustainability at Product Development Level: A Conceptual Framework*	纪毅（澳大利亚） 以人为本的交互设计的可持续性设计框架研究 Yi Ji (Australia) *Research on Sustainable Design Framework for Human-centered Interaction Design*
15:00-15:15	王刚（中国） 生物科学视角下的类生命体生态设计 Wang Gang (China) *Biological Design of Quasi-living Structure Under the Perspective of Bioscience*	唐瑭、特蕾西•巴穆拉（英国） 将设计行为干预模式应用于可持续行为设计中 T. Tang, Tracy Bhamra (U.K.) *Applying a Design Behaviour Intervention Model to Design for Sustainable Behaviour*
15:15-15:30	王国胜、陈茜、于丹丹、饶永刚（中国） 中国医院实现公平沟通促进医院和患者之间的关系 Wang Guosheng, Chen qian, Yu dandan, Rao yonggang (China) *Equitable Communicating in Chinese Hospitals Enhancing the relationship between Hospital and patients*	朱希•希尔图宁（芬兰） 可持续视角——Kone 公司设计小组的生态设计原则 Jussi Hiltunen (Finland) *Perspectives on sustainability: Eco-design Principles for the Kone Design Team*
15:30-15:45	张桢（中国） 物联网技术下的公共的产品和服务 Zhang Zhen (China) *Public Products and Services in The Context of Internet of Things*	陈漪、罗伯特·克拉克（英国） 山寨产品和可持续设计 Yi Chen, Robert Clarke (U.K.) *Shanzhai Products and Sustainable Design*

第二天分论坛日程（2011 年 10 月 28 日）/ 2nd Day Detailed Parallel Session Program (October 28，2011)

16:00-18:15	**分论坛 E / Session_ E （A301）** 文化与可持续设计/ Culture and Sustainable Design 主持人/chair: 万书元 教授/ Prof. Wan Shuyuan	**分论坛 F / Session_ F （B406）** 可持续人居环境与产品设计/ Design for Sustainable Environment and Product 主持人/chair: 邱灿红 教授/ Prof. Qiu Canhong
16:00-16:15	董伟（美国） 从西方绿色设计与东方风水文化中的跨文化比较——寻求可持续设计之新途径 Wei Dong (USA) *Cross-cultural Comparison of Western Green Design and Eastern Geomantic Culture: Seeking New Ways of Sustainable Design*	蔡琴、 郑曙旸（中国） 城市化进程中的城市边缘区可持续环境景观设计 Cai Qin, Zheng Shuyang (China) *The Sustainable Landscape Design of Urban Fringe in the Process of Urbanization*
16:15-16:30	马尼沙•辛格女士（印度） 特殊工艺品与可持续性 Ms. Manisha Singh (India) *Special Craft and Sustainability*	邵丹（中国） 可持续人居环境中的室内陈设设计初探 Shao Dan (China) *A Research of Interior Furnishings Design in Sustainable Human Environment*
16:30-16:45	景楠（中国） 可持续设计的传统渊源及其行为链的转化模式 Jing Nan (China) *Traditional Sources of Design for Sustainable into Behavior-Chain Patterns*	李昕阳、 袁逸倩（中国） 建构具有“归属感”的现代社区交往环境 Li Xinyang, Yuan Yiqian (China) *Creation of Modern Residence Community Environment to Promote the Sense of Belonging*
16:45-17:00	黄艳（中国） 复杂有序的层级系统——城市景观的文化生态构成 Huang Yan (China) *Complex and Orderly Layered System : Cultural and Ecological Composition of Urban Landscape*	马库 伯格曼（瑞典） 有机棉面料研发与可持续发展的服装设计研究 Marcus Bergman (Sweden)， *Research on Ecocotton and fashion Design of sustainability* .
17:00-17:15	史蒂夫•德•雷伊、安德鲁•维塞尔（新西兰） 跨学科合作的作用——通过可持续的产品创新来促进城市生态多样化 Stephen D. Reay, Andrew Withell (New Zealand) *The Role of Interdisciplinary Collaboration for Sustainable Product Innovation to Support Urban Biodiversity*	常乐、 吴智慧、 马俊颖（中国） 基于可持续发展的家具制造业的低碳设计 Chang Le, Wu Zhihui, Ma Junying (China) *Low Carbon Design in Furniture Industry Based on Sustainable Development*
17:15-17:30	邹峻、T.L. 里奇、劳畅（美国） 从可持续发展视角看路易斯安那克里奥尔与湖南庭院式乡土建筑之间的联系 Jun Zou, T.L. Ritchie and Chang (USA) *Linkages between Louisiana Creole and Hunan Courtyard Vernaculars – A Perspective from Sustainability*	冷涛（中国） 浴室节水装置创新设计 Leng Tao (China) *The Innovation Design on Saving Water Equipment in Bathroom*
17:30-17:45	孔令旗（英国） 文化多样性和可持续设计：评估影响空间导向系统的“地方——全球”文化因素 Lingqi Kong (U.K.) *Cultural Diversity and Sustainable Design:*	王蕾（芬兰）、于历战（中国） 居住的再思考——以建筑现象学视角再认识人与环境的关系 Wang Lei (Finland)，Yu Lizhan（China） *Rethinking Dwelling An*

	An Evaluation of Local-global Cultural Factors in Wayfinding Design	*Architectural Phenomenology review for person-environment relation*
17:45-18:00	张毅，张书鸿（中国） 传承与应用——论湘西传统土家民居建筑文化对当代可持续设计的启示 Zhang Yi, Zhang Shuhong (China) *Inheritance and Application: The Inspiration of Traditional Tujia Residential Buildings in Western Hunan to Contemporary Sustainable Design*	朱婕（中国） 从 40 个厨房中看橱柜设计的本土化和可持续化 Zhu Jie (China) *Study on the Localization and Sustainability in the Design of Kitchen Cabernets with 40 Kitchens in China as Example*
18:00-18:15	梁斌、周越、张博（中国） 解析可持续性设计先驱——阿尔瓦•阿尔托 Liang Bin, Zhou Yue, Zhang Bo (China) *Interpretation the Pioneer of Sustainable Design: Alvar Aalto*	范伟（中国） 旧瓶新装——谈物质空间形态设计的可持续性 Fan Wei (China) *Old Bottles of New Content: Sustainability of Physical Space Form Design*

展览内容/ Poster Exhibition

展览时间: 2011 年 10 月 27-29 日/ Exhibition Time: October 27-29，2011

内容/ content	地点/ Place
● **大会论文张贴/ The Conference Paper Poster** 根据作者要求以及大会评审，遴选出 13 篇高质量的学术论文进行张贴。 13 papers were selected to be posters by the conference organizing committee	A 区大厅 A- lobby
● **LeNS 可持续设计国际学生大赛/ LeNS Exhibition** 展出的可持续系统设计概念均选自 2010 年 LeNS 学生设计竞赛中的优胜者作品和最具发展前景的概念。作为 LeNS 项目的重要组成部分，本次学生设计竞赛的目的是促进可持续设计在各国设计院校中的发展与传播。 The sustainable system concepts presented here are the winners and promising concepts of the LeNS Student Design Competition 2010. The student competition and Award is promoted and organized as part of the LeNS project, which aims at the development and diffusion of design for sustainability in design institutions.	A 区大厅 A- lobby
● **DESIS 社会创新与可持续设计专题展/ DESIS Exhibition** DESIS 论坛是一个汇聚不同国家、地区参与者的开放式研讨会。论坛将以简短讲演与小型展览会的形式展示正在进行或近期完成的有关“社会创新与可持续设计”的相关案例。 The forum is on open space where several on-going or recently completed projects on design for social innovation are showcased by means of short speeches and a small exhibition.	A 区大厅 A- lobby

工作坊/Workshop

主办：芬兰驻华大使馆、芬兰国家技术创新局/ Hosted by Embassy of Finland in Beijing and Tekes, the Finnish Funding Agency for Technology and Innovation

时间：2011 年 10 月 27 日 16:00-18:15/Time：October 27, 2011, 16:00-18:15

内容/ content	地点/ Place
● **建筑环境可持续设计工作坊** 芬兰国家技术创新局下设有“可持续社区技术”计划，旨在鼓励与设计、建造和维护可持续与高能效区域和建筑相关的技术，特别是提高建筑和社区的能效以及推广可再生能源的应用。自数年前开始支持芬兰企业在中国推广生态城概念，希望藉此将芬兰的可持续技术引进到中国来。在数年的实践中，芬兰相关企业和中国的合作伙伴共同经历了成长，也面临许多未知的挑战，其中突出一点体现在具有超前意识的可持续技术与现存规划标准、建筑标准之间的冲突。 故此，芬兰驻华大使馆、芬兰国家技术创新局特举办“建筑环境可持续设计工作坊”，希望藉此机会汇集国家创新机构（芬兰国家技术创新局）、建筑行业企业（芬兰公司）、研究机构（芬兰大学）人员与中国专家进行研讨。芬兰代表团一行有 15 名团员，来自以上不同的机构。 工作坊分为两个部分：第一部分——拟邀请 3 位专家做简短报告（15 分钟），涉及领域包括 1）可持续规划&设计行业标准制定方面的专家；2）建筑可持续规划设计专家；3）在中国运营的芬兰公司的建筑行业咨询师。他们会介绍在各自领域的实践。第二部分——分组讨论，就以下三个议题：1）经济可持续性；2）社会可持续性；3）环境可持续性 进行讨论，重点在于建筑环境可持续设计在实施过程中遇到的挑战与应对办法。 **Sustainable Design of Building Environment workshop** Tekes, the Finnish Funding Agency for Technology and Innovation, is the main public funding organisation for research, development and innovation in Finland. Tekes promotes a broad-based view on innovation: besides funding technological breakthroughs, Tekes emphasises the significance of service-related, design, business, and social innovations. In China, one important task for Tekes is to help Finnish companies to promote the best Finnish knowhow of sustainable technologies, and to find business opportunity. With the support from the Embassy of Finland and the Academy of Arts and Design of Tsinghua University, on the occasion of the visit of a Finnish delegation led by Tekes, we organize the Sustainable Design of Building Environment workshop. It is a good opportunity for Chinese players in the area of sustainable design to meet their Finnish counterparts coming from innovation organizations, companies and research institutions. The workshop consists of two parts. Part I, the keynote speech from Chinese experts, areas include: 1) Sustainable planning & design standard; 2) Challenge in sustainable design of buildings; 3) Finnish company’ s practice in China. Part II, the group discussion, three themes cover: 1) Social sustainability; 2) Economic sustainability; 3) Environmental sustainability. The focal topic is the challenges in turning sustainable design into reality.	B212

讲演者名录/ List of Oral Presenters

讲演者 Presenter	单位 Institution	主题 Subject	分论坛 Session
A. Idil Gaziulusoy A.爱迪尔·贾茨鲁索	Auckland University of Technology, Auckland, New Zealand 新西兰 奥克兰理工大学 产品设计系	System Innovation for Sustainability at Product Development Level: A Conceptual Framework 产品开发层面的系统可持续创新：一个概念性框架	C
Alfonso Ruiz Rallo, Alfredo Rivero, Pompeyo Reina, Daniela Santos, Aurora Barroso 阿方索·鲁兹·拉罗、阿尔弗雷多·里韦罗、庞培约·雷纳、丹妮拉·桑托斯、奥罗拉·巴罗索	Faculty of Fine Arts, La Laguna University, Spain 西班牙 拉古纳大学美术学院	Revaluation of Pennisetum Setaceum Waste Transforming It into Paper and Cardboard to Manufacture Packaging 变废为宝——利用刺毛狼尾草制作包装用纸及纸箱	C
An Huajuan, Li Minchuan 安婳娟、李闽川	School of Architecture, Southeast University, Nanjing 210096, China 东南大学建筑学院	Let Interior Design be more Longevous: Study on the "Short Life" Phenomenon of Building Decoration in China 让室内设计更长寿——初探我国建筑装饰装修工程“短命”现象	B
Cai Qin, Zheng Shuyang 蔡琴、郑曙旸	Academy of Arts and Design, Tsinghua University; Art and Science Research Center, Tsinghua University, China 清华大学美术学院 清华大学艺术与科学研究中心	The Sustainable Landscape Design of Urban Fringe in the Process of Urbanization 城市化进程中的城市边缘区可持续环境景观设计	F
Cao Tianhui 曹天慧	Academy of Arts and Design, Tsinghua University, China 清华大学美术学院	绿色设计将走向何处？ What the Green Design Going To Be?	B
Carlo Vezzoli 卡罗·维佐里	Politecnico di Milano, INDACO dept. Italy 意大利 米兰理工大学 设计系	System Design for Sustainability The New Research Frontiers 可持续性系统设计研究领域的新前沿	Keynote Speech 主旨演讲
Carlos Fiorentino 卡洛斯·菲奥伦蒂诺	University of Alberta, Canada 加拿大 阿尔伯塔大学	Teaching Design for Sustainability in 2011: First Results from a Prospective Curriculum 2011年可持续性设计教学：前瞻性课程的初步成果	A
Carmela Cucuzzella	Concordia University, Dept of Design and	Design Thinking and the Precautionary Principle:	B

卡梅拉·库茨泽拉	Computation Arts L.E.A.P (Laboratoire d'étude de l'architecture potentielle) de l'Université de Montréal 加拿大 康哥迪亚大学 设计与计算艺术系	Development of a Theoretical Model for Design for Sustainability 设计思维和预防原则：可持续设计理论模式的开发	
Chang Le (1), Wu Zhihui (2), Ma Junying (2) 常乐(1)、吴智慧(2)、马俊颖 (2)	(1) Beijing Forestry University, China (2)Nanjing Forestry University, China (1) 北京林业大学 (2) 南京林业大学	Low Carbon Design in Furniture Industry Based on Sustainable Development 基于可持续发展的家具制造业的低碳设计	F
Cyril Wing Yin, Shing 赛利尔·维因，西因	Chelsea College of Arts and Design, University of Arts London, UK 英国 伦敦艺术大学切尔西艺术与设计学院	Procedures and Enquires: The Use of Emegering Technology in Searching for Sustainable Design 程序和询问：新型技术在探寻可持续设计方面的应用	A
Daniel Shin, Paul Johnson, Dr. Luke Harmer 海因涅·西因、保罗·约翰逊、卢克·哈默博士	Nottingham Trent University, UK 英国 诺丁汉特伦特大学	Methods for Designing Human-powered Products, Educational Intervention towards Sustainable Energy Consumption 人力驱动产品的设计方法，倡导可持续能源消费	B
Eduardo José Gonçalves (1) , Ana Margarida Gomes Ferreira (1), Henri Christiaans (2) 爱德华·何塞·贡萨尔维斯(1)，安娜·马加瑞达·戈梅斯·费雷尔(1)， 亨利·克里斯蒂亚安斯(2)	(1) UNIDCOM/IADE – IDIMCOM, Lisbon, (2) TU Delft, School of Industrial Design Engineering, The Netherlands (1) 葡萄牙 里斯本 UNIDCOM/IADE–IDIMCOM (2) 荷兰 代尔伏特 工业设计工程学院	Light as Part of a More Sustainable World 光——可持续发展的世界的一部分	B
Elif Küçüksayraç，Alpay Er 艾里夫·库茨卡瑞克、阿尔佩·厄尔	Istanbul Technical University, Turkey 土耳其伊斯坦布尔技术大学	The Bottom-up Transition to Sustainable Production in Design-conscious SMEs: Observations from Companies Awarded by the Istanbul Chamber of Industry 具有设计意识的中小型企业为实现可持续性目标所进行的自下而上的转变： 考察获得伊斯坦布尔行业商会嘉奖的企业	D
Ezio Manzini 艾佐·曼梓尼	DIS Politecnico di Milano - DESIS Network, Italy	Design Labs for an Open Design Program Design Schools as Agents of (Sustainable) Change	Keynote Speech

	意大利 米兰理工大学可持续设计与系统创新研究所 – 社会创新与可持续设计联盟	一个开放式设计计划的设计实验室 设计学院——推动（可持续发展）变革的动因	主旨演讲
Fan Wei 范伟	Fine Arts Academy of Hunan Normal University 湖南师范大学美术学院	Old Bottles of New Content: Sustainability of Physical Space Form Design 旧瓶新装——谈物质空间形态设计的可持续性	F
Fang Zhong 钟芳	Politecnico di Milano, Department of INDACO, Italy 意大利 米兰理工大学 工业设计 艺术与交流部	Service Design for Trust Building in Innovative Food Networks in China 中国创新食品网络建设中的信托服务设计	C
Gao Yupeng, Gong Miaosen 高寓鹏、巩淼森	School of Design, Jiangnan University, China 江南大学设计学院	The Combination and Development of New Business Models and Design for Sustainability 论可持续设计与新型商业模式的融合与发展	D
Huang Haiyan 黄海燕	Sven Travis, Parsons The New School For Design, US School of Arts and Design, Xi’ an University of Technology, China 西安理工大学艺术与设计学院	Knowledge Integration and Design Innovation of Sustainable Design Education 可持续设计教育的知识整合与设计创新	A
Huang Yan 黄艳	Academy of Arts & Design, Tsinghua University, China 清华大学美术学院	Complex and Orderly Layered System —— Cultural and Ecological Composition of Urban Landscape 复杂有序的层级系统——城市景观的文化生态构成	E
Jin Feng(1), Jiang Lu(2) 冯晋(1)、吕江(2)	(1) Interior Architecture, School of Architecture and Design Lawrence Technological University, USA (2) Interior Design, College of Technology Eastern Michigan University, USA (1) 美国 罗伦斯科技大学 建筑设计学院 (2) 美国 东密歇根大学 技术学院	Teaching Sustainable Design in Interior Design Curriculum 室内设计课程的可持续设计教学	A
Jing Nan 景楠	Design school, Jiangnan University,Wuxi, Jiangsu, China 江南大学设计学院	Traditional Sources of Design for Sustainable into Behavior-Chain Patterns 可持续设计的传统渊源及其行为链的转化模式	E
Jun Zou(1), T.L. Ritchie (1) and Chang Lao(2) 邹峻 (1) 、T.L. 里奇(1)、劳畅	(1) Department of Interior Design, Louisiana State University. (2) Dian Shi Architects Associates.	Linkages between Louisiana Creole and Hunan Courtyard Vernaculars – A Perspective from Sustainability 从可持续发展视角	E

(2)	(1) 美国 路易斯安那州立大学 (2) 巅石建筑设计事物所	看路易斯安那克里奥尔与湖南庭院式乡土建筑之间的联系	
Jussi Hiltunen 朱希·希尔图宁	Aimo Design, Finland 芬兰 Aimo 设计	Perspectives on sustainability Eco-design Principles for the Kone Design Team 可持续视角 Kone公司设计小组的生态设计原则	D
Kazuhiko NAMBA 难波和彦	The University of Tokyo, Japan 日本东京大学	The Four Layers of Architecture as a Basic Theory of Sustainable Design “建筑的四层构成”——可持续建筑设计的基础理论	Keynote Speech 主旨演讲
Ken Namkha 肯·纳姆卡	The Royal Danish Academy of Fine Arts, School of Architecture, Denmark 丹麦皇家艺术学院建筑学院	Making Way for Particularity: Field Design in a Daoist Perspective 开创独特的设计之路： 道家文化指导下的场地设计	B
Kimmi Ko, Mariano Ramirez, Steve Ward 吉米·卡欧、马里亚诺·拉米雷斯、史蒂夫·沃德	University of New South Wales, Australia 澳大利亚 新南威尔士大学	Long-team Product Attachment: A Sustainable Design Approach for Optimising the Relationship between Users and Products 长期的产品依恋感：优化用户与产品关系的可持续设计方法	D
Leng Tao 冷涛	China Guanghua Foundation 中国光华科技基金会	The Innovation Design on Saving Water Equipment in Bathroom 浴室节水装置创新设计	F
Li Xiaohan 李笑寒	Beijing Institute of Technology, China 北京理工大学	Growth and Regeneration of Design Products - Investigate the Recovery Value of Design from the Perspective of Sustainable Design 设计品的生长与再生——从可持续性设计角度探讨设计品的恢复性价值	C
Li Xinyang, Yuan Yiqian 李昕阳、袁逸倩	School of Architecture, Tianjin University, China 天津大学建筑学院	Creation of Modern Residence Community Environment to Promote the Sense of Belonging 建构具有“归属感”的现代社区交往环境	F
Liang Bin, Zhou Yue, Zhang Bo 梁斌、周越、张博	Beijing Forestry University, China 北京林业大学	Interpretation the Pioneer of Sustainable Design——Alvar Aalto 解析可持续性设计先驱——阿尔瓦·阿尔托	E
Lingqi Kong 孔令旗	Loughborough University, School of the Arts, UK	Cultural Diversity and Sustainable Design: An Evaluation of Local-global Cultural Factors in Wayfinding Design	E

	英国 拉夫堡大学艺术学院	文化多样性和可持续设计： 评估影响空间导向系统的“地方——全球”文化因素	
Lin Sun(1), Yuanliang, Sun(2) 孙琳(1)、孙元良(2)	(1) Clark Atlanta University, USA (2) Western Michigan University, USA (1) 美国克拉克亚特兰大大学 (2)美国西密歇根大学	Sustainable Design Decisions Through Reflection-in-action 通过在行动中反思来制定可持续设计决策	B
Liu Guanzhong 柳冠中	Academy of Art & Design, Tsinghua University, China 清华大学美术学院	The Moderate Inhabitation 适可而止地“栖息”	B
Liu Xin, Liu Jikun 刘新、刘吉昆	Academy of Arts & Design, Tsinghua University； Art & Science Research Centre, Tsinghua University, China 清华大学美术学院、清华大学艺术与科学研究中心	Possible Opportunity: the concept and practice of product service system design 机会与挑战——产品服务系统设计的概念与实践	A
Manisha Singh 马尼沙·辛格	National Institute of Fashion Technology, Hauz Khas, Delhi 印度 新德里 国家时尚技术学院	Special Craft and Sustainability 特殊工艺品与可持续性	E
Marcus Bergman 马库·伯格曼	Ecocotten company, Sweden 瑞典 艾克有机棉公司	Research on Ecocotton and fashion Design of sustainability 有机棉面料研发与可持续发展的服装设计研究	F
Maria da Graça Guedes, Ana Roncha 玛丽亚达·格拉萨·古德斯、安娜·罗萨	Universidade do Minho, Portugal 葡萄牙 米尼奥大学	Sustainability as a Key Asset in Establishing Differentiation Strategies for Fashion Brands 可持续性是建立时尚品牌差异化战略的关键	D
Miaosen Gong(1), Fang Zhong(2), Zhen Zhang(1), Xue Pei(1) 巩淼森，钟芳，张桢，裴雪	(1) Jiangnan University-School of Design, China (2) Politecnico di Milano-Indaco department, Italy (1)江南大学设计学院 (2)意大利 米兰理工大学	Emerging Experience on Service Design for Sustainability: A Didactical Case in China 可持续服务设计初探：一个中国的教学案例	C
Pekka Korvenmaa	School of Art and Design, Aalto University，	From the Margin to the Center: Sustainability and Design	Keynote

拜卡·高勒文玛	Finland 芬兰阿尔托大学艺术与设计学院	- the Path of Evolution 从边缘到中心——可持续性与设计-演进的途径	Speech 主旨演讲
Penny Bonda 佩妮·邦达	FASID, LEED AP ID+C ,Ecoimpact Consulting, USA 美国室内设计协会会员、美国绿色建筑认证委员会会员 美国“生态影响力”顾问事务所	Healthy Building Interiors: Methods and Practices 营造健康建筑室内的方法与实践	Keynote Speech 主旨演讲
Shao Dan 邵丹	School of Art & Design, Dalian Polytechnic University, China 大连工业大学艺术设计学院	A Research of Interior Furnishings Design in Sustainable Human Environment 可持续人居环境中的室内陈设设计初探	F
Stephen D. Reay, Andrew Withell 史蒂夫·德·雷伊、安德鲁·维塞尔	Product + Design, School of Art + Design, Auckland University of Technology, New Zealand 新西兰 奥克兰理工大学 艺术与设计学院 产品和设计	The Role of Interdisciplinary Collaboration for Sustainable Product Innovation to Support Urban Biodiversity 跨学科合作的作用 ——通过可持续的产品创新来促进城市生态多样化	E
T. Tang, T. A. Bhamra 唐瑭、特蕾西·巴穆拉	Loughborough Design School, Loughborough University, UK 英国 拉夫堡大学 拉夫堡设计学院	Applying a Design Behaviour Intervention Model to Design for Sustainable Behaviour 将设计行为干预模式应用于可持续行为设计中	D
Tatu Marttila 塔图·马迪拉	School of Art and Design, Aalto University, Finland 芬兰阿尔托大学艺术与设计学院	Sustainability in a Consumer Society: Identifying Suitable Design Strategies to Support Less Consumption 消费社会中的可持续性：寻找适宜设计策略以减少消费	D
Tim Sharpe, Sally Stewart 蒂姆·夏普、萨利·斯图尔特	Mackintosh Environmental Architecture Research Unit, Mackintosh School of Architecture, UK 英国 格拉斯哥 麦金托什建筑学院 麦金托什环境建筑研究部	Closing the Gap between Teaching and Research in Sustainable Design – Experiences at the Mackintosh School of Architecture 缩小可持续设计教学和研究之间的差距 ——基于麦金托什建筑学院的经验	A
Turkka Keinonen 多勒卡·凯诺宁	School of Art and Design, Aalto University，Finland 芬兰阿尔托大学艺术与设计学院	User Centeredness and Sustainability 以用户为中心和可持续性	Keynote Speech 主旨演讲
Usha Narasimhan, Dolly Kumar 乌沙·纳什木汗、多莉·库马尔	National Institute of Fashion Technology, New Delhi, India 印度新德里 国家时尚技术学院	Fashion and Sustainable Strategies – In Search of a Fresh approach to the Design Process 时尚产业和可持续发展策略——探寻设计过程新方式	A

Wan Shuyuan 万书元	The Institute of Aesthetics and Arts Criticism, Tongji University, China 同济大学美学与艺术批评研究所	The Dilemma and Outlet of Sustainable Design in Contemporary China 当下中国可持续设计的困境及出路	B
Wang Gang 王刚	Design school, Jiangnan University,Wuxi, Jiangsu, China 江南大学设计学院	Biological Design of Quasi-living Structure Under the Perspective of Bioscience 生物科学视角下的类生命体生态设计	C
Wang Guosheng, Chen qian, Yu dandan, Rao yonggang 王国胜、陈茜、于丹丹、饶永刚	The Research Institute of Sustainable Design, Art & Science Research Center, Tsinghua University, China 清华大学艺术与科学研究中心可持续设计研究所	Equitable Communicating in Chinese Hospitals Enhancing the relationship between Hospital and patients 中国医院实现公平沟通 促进医院和患者之间的关系	C
Wang Guosheng，Liu Feng 王国胜、刘峰	Academy of Arts and Design, Tsinghua University； Art & Science Research Centre, Tsinghua University, China 清华大学美术学院、清华大学艺术与科学研究中心	Information Service on Campus - An Educational Case of Service Design in Tsinghua University 校园公共信息服务平台——清华美院服务设计案例与教学研究	C
Wang Lei（1）, Yu Lizhan（2） 王蕾（1）、于历战（2）	（1）School of Art and Design, Aalto University， Finland （2）Academy of Arts and Design, Tsinghua University， China （1）芬兰阿尔托大学艺术与设计学院 （2）清华大学美术学院	Rethinking Dwelling An Architectural Phenomenology review for person-environment relation 居住的再思考——以建筑现象学视角再认识人与环境的关系	F
Wei Dong 董伟	Department of Design Studies ,University of Wisconsin-Madison, USA 美国威斯康辛大学设计系	Cross-cultural Comparison of Western Green Design and Eastern Geomantic Culture - Seeking New Ways of Sustainable Design 从西方绿色设计与东方风水文化中的跨文化比较 寻求可持续设计之新途径	E
Yi Chen, Robert Clarke 陈漪、罗伯特·克拉克	School of Art, Design and Architecture, University of Huddersfield, UK 英国 哈德斯菲尔德大学 艺术、设计与建筑学院	Shanzhai Products and Sustainable Design 山寨产品和可持续设计	D
Yi Ji 纪毅	Creative & Cognition Studios, University of Technology, Sydney, Australia 澳大利亚 悉尼科技大学 创意与认知工作室	Research on Sustainable Design Framework for Human-centered Interaction Design 以人为本的交互设计的可持续性设计框架研究	D

Zhang Zhen 张桢	School of Design, Jiangnan University, China 江南大学设计学院	*Public Products and Services in The Context of Internet of Things* 物联网技术下的公共的产品和服务	C
Zhang Yi 张毅	Northeastern University 东北大学	Inheritance and Application: The Inspiration of Traditional Tujia Residential Buildings in Western Hunan to Contemporary Sustainable Design 传承与应用——论湘西传统土家民居建筑文化对当代可持续设计的启示	E
Zheng Shuyang 郑曙旸	Academy of Arts and Design, Tsinghua University； Art & Science Research Centre, Tsinghua University, China 清华大学美术学院、清华大学艺术与科学研究中心	Chinese Strategy on the Education of Design for Sustainability 可持续设计教育的中国战略	Keynote Speech 主旨演讲
Zhou Haoming 周浩明	Academy of Arts and Design, Tsinghua University； Art & Science Research Centre, Tsinghua University, China 清华大学美术学院、清华大学艺术与科学研究中心	Organic Unity， the Character of Sustainable Interior Environment 可持续室内环境的有机整体性	Keynote Speech 主旨演讲
Zhu Jie 朱婕	Beijing Forestry University, China 北京林业大学	Study on the Localization and Sustainability in the Design of Kitchen Cabernets with 40 Kitchens in China as Example 从40个厨房中看橱柜设计的本土化和可持续化	F

查看更多信息和资料请登陆“中国可持续设计学习网”/ for more information refer to: http://www.lens-china.org （即将上线/To be online soon）

SYSTEM INNOVATION FOR SUSTAINABILITY AT PRODUCT DEVELOPMENT LEVEL: A CONCEPTUAL FRAMEWORK

A. Idil Gaziulusoy
Department of Product Design
Auckland University of Technology
Auckland, New Zealand
idil.gaziulusoy@aut.ac.nz
+64 9 9219999 ext. 6628

Abstract

It is now commonly accepted that, in order to achieve sustainability, the socio-technical systems which fulfil social functions such as housing, food, mobility need to be transformed. This transformation is known as system innovation and requires multi-scale and systemic approaches to innovation. The literature on system innovation has provided explanations regarding how companies and product development activities fit into the big and long-term picture of system innovation only to a certain extent and this area remains largely neglected in the literature. In order to address this gap, this paper presents a conceptual framework explaining how innovation efforts at the micro-level (i.e. product/service development) can systemically be aligned with those efforts at the macro-level (i.e. socio-technical systems). The framework is prescriptive and states that companies are part of society and thus, their strategic goals should not be contradictory to visions of society and these goals should be aligned with the goals of the society envisioned to achieve sustainability. This requires companies to acknowledge the long-term visions of the society during their strategy development to guide their decisions on product development.

Keywords: system innovation, sustainability, product development, product design

1. INTRODUCTION

Sustainability is a system property and not a property of system elements (Clayton and Radcliffe, 1996). As the discourse on sustainability matured over the past twenty years, our understanding of the concept has evolved from being an idealized, generalized and static property of individual (system) elements to contextual and dynamic properties of systems themselves (Faber, Jorna, & Van Engelen, 2005). This dynamic conceptualization of sustainability assumes both internal and external changes will occur over time and space, thus, posits sustainability as a ‘moving target’ (Hjorth & Bagheri, 2006, p. 76). Internal and external forces influencing change over the environment, society and economy continuously alter the conditions of sustainability. Since sustainability is a moving target, it needs to be planned through process-based, multi-scale and

systemic approaches, which are guided by targets/visions, instead of traditional goal-based optimization approaches (Bagheri & Hjorth, 2007).

Since sustainability is a dynamic system property, products, services, technologies and organizations cannot be regarded as sustainable on their own right but they may be elements of sustainable socio-technical systems. The requirement for dematerialization of production and consumption and the needed decreases in greenhouse gas emissions are not likely to happen through the current technological path (Rennings, 2000; Jansen, 2003; Ryan, 2008a). It is now commonly accepted that, in order to achieve sustainability, there is a requirement for transformation of socio-technical systems. Therefore, since solely product-centered design and development approaches generally result in incremental improvements (see Brezet, 1997 for a typology of product development approaches compared to their sustainability gains) and a need for adopting a systemic approach, the discourse on innovation for sustainability has shifted from company-level processes to wider and linked processes at the socio-technical system level within which needs for housing, mobility, food, communications, etc. are satisfied (Smith, Stirling & Berkhout, 2005).

The needed transformations at socio-technical level covers institutional, social/cultural, organizational as well as technological change (Loorbach, 2010); that is, they need to take place at societal level. The process of societal transformation which needs to take place to achieve sustainability is defined as the transition to sustainable socio-technical systems or system innovation for sustainability.

Companies are important actors in this transformation and will have important roles in developing the technologies of the new system (Charter et al., 2008). Even though theory around system innovation is now very elaborate, it provided explanations regarding how companies and product development activities fit into the big and long-term picture of system innovation only to a certain extent. Recent contributions articulated different perspectives on system innovation including business perspective, design perspective and consumer perspective through cases, examples, and some models (e.g. Tukker, et al., 2008; Van Bakel et al., 2007). However, there is a lack of theory on how micro and meso-level changes (organizational and technological changes in companies) can and should be aligned with the macro-level (institutional and social/cultural changes in the wider society) changes.

In order to address this gap, this paper proposes a conceptual framework explaining how wider-scale systemic changes can be addressed at company and product development level. The conceptual framework is developed by integrating insights from sustainability science, complex adaptive systems theory and the newly emerging system innovation theory. The next section

presents a summary of these insights upon which the conceptual framework is established. Third section presents the conceptual framework. The implications of the framework for policy makers, companies, educators and professionals working in the product development area are discussed in the final section.

2. THEORETICAL UNDERPINNINGS

2.1. Complexity and Co-evolution

Socio-technical systems are complex (adaptive) systems. The major characteristics of complex systems are identified as unpredictable behaviour, large number of components with many interactions among them, decentralised decision-making and limited or no decomposability (Casti, 1986). A complex system has intricate sets of non-linear feed-back loops so that it can only be partially analysed at a time. Socio-technical systems show emergent properties. In emerging complex systems there is continuous novelty and these systems cannot be fully explained mechanistically or functionally since some of their elements possess individuality, intention, purpose, foresight and values (Funtowicz & Ravetz, 1994). Complex systems cannot be fragmented without losing their identities and purposefulness (Hjorth & Bagheri, 2006; Linstone, 1999) state that. In addition to irreducibility and emergent behaviour, the other characteristics of complex systems are self-organisation, continuous change, sensitivity to initial conditions, learning, irreducible uncertainty, and contextuality (Cilliers, 1998; Gallopín, Funtowicz, O'Connor & Ravetz, 2001; Manson, 2001; Cooke-Davies, Cicmil, Crawford & Richardson, 2007). Complex systems in general are hierarchic or have multiple-levels and each element is a subsystem and each system is part of a bigger system (Casti, 1986; Gallopín et al. 2001; Holling, 2001; Gallopín, 2004). Hierarchical structures have adaptive significance (Simon, 1974). This adaptive significance is not due to a top-down authoritative control but rather due to the formation of semi-autonomous levels which interact with each other and pass on material and/or information to the higher and slower levels (Holling, 2001). For an effective analysis of a complex system, the analyst needs to oversee the (sub)system being analysed from a vantage point. This vantage point should be at a higher or preferably meta-level to identify a context specific perspective while still acknowledging the interconnections between the (subsystem) being analysed and the rest (Espinosa, Harnden & Walker, 2008). It is not possible to study complex systems meaningfully by breaking them into their components. At times when there is a need to define system boundaries, this should be done acknowledging how the part under study relates to the rest of the system.

The distinguishing feature of complex adaptive systems is that ‘they interact with their environment and change in response to a change (Clayton & Radcliffe, 1996, p.23)’. They are resilient; therefore, they ‘can tolerate certain levels of stress or degradation (p. 31)’. As a result,

sustainability of a CAS can be achieved if the adaptive capacity of it is not destroyed. The subsystems of a system should be adaptable to changes which occur both in the other subsystems, and as a result, in the entire system. The subsystems must co-evolve to render sustainability possible. Co-evolution refers to the mutual change of all system components. During this mutual change, one component may or may not dictate a change over other(s).

2.2. Operational Time-Frame

Even though the length of time frame to be used when planning for sustainability is still being debated, the concept intrinsically requires a long-term future orientation. Long term is not a static, predetermined time span to be applied to the whole of the meta-system. Rather, it is determined in line with the nominal temporal (and also spatial) scales of the system component whose sustainability is of concern (Costanza & Patten, 1995). For cities, for example, the nominal life span can be accepted to be 1000 years or more. However, for a human being, the nominal life span, and hence the 'long term' in which sustainability is monitored and assessed will be around 70 years.

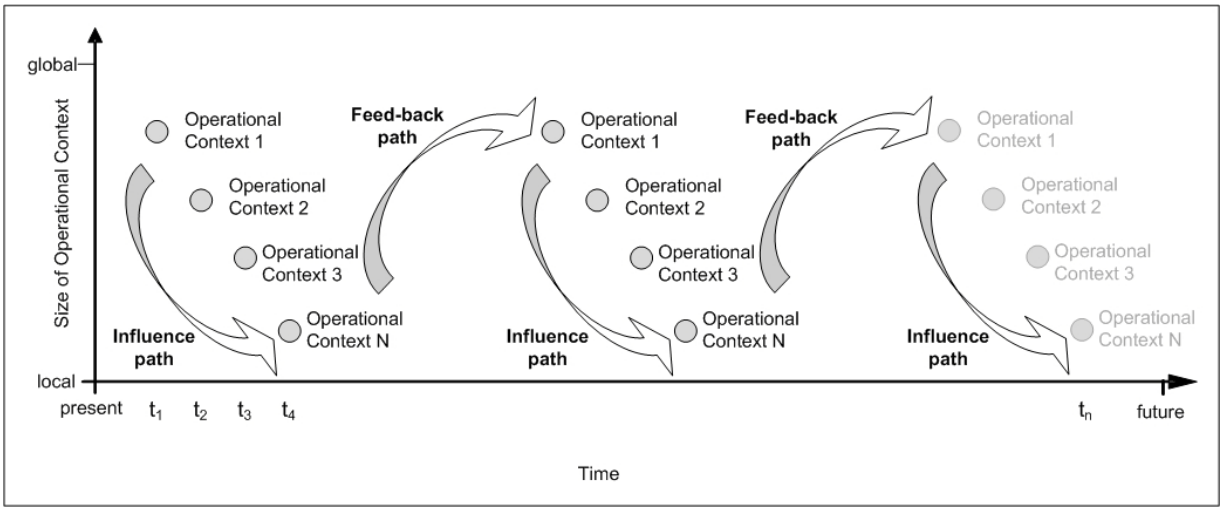

Figure 1: Temporal and spatial scale versus size of the operational context (adapted from Gaziulusoy & Boyle, 2008)

When sustainability of a complex system is of concern, from smaller (smallest) to broader (broadest), there is a continuum of hierarchically interdependent operational contexts to which the concept of sustainability can be applied (Figure 1). According to the operational context, the length of 'long term' should change; as the operational context widens, the length of planning should extend in order to cover subsumed operational contexts and to connect them both spatially and temporally (Gaziulusoy & Boyle, 2008). Nevertheless, this is not a one-way linear relationship. While planning at higher-order operational contexts requires longer and wider scales to cover lower-order contexts, lower-order contexts are externally bound by this larger scale no matter what their internal scale is (Holling, 2001). As an illustrative example, climate and vegetation can be considered. Climatic cycles are much longer than vegetation cycles.

Successive generations of the same type of vegetation are dependent on annual rainfall and temperature. In accordance with the resilience of vegetation, variations in rainfall or temperature between years are tolerable to some extent. But as climatic change affects the rainfall or temperature over the long term, first, some characteristics of the vegetation and then the type of vegetation will need to change. This also applies to human-nature interactions, as the previous example could easily be adapted, for example, to agriculture-climate or technology-resource cases. Therefore, lower-order operational contexts should be aware of issues and scales of higher-order operational contexts, first, to guarantee their success and, second, to guarantee sustainability of higher-order contexts.

2.3. Co-evolving Contexts of Change in Socio-technical Systems

For a better understanding of influencing system innovation for sustainability at product development level, there is indeed a need for analysing the dynamics of co-evolutionary influence patterns relevant to product development within the socio-technical system. In general, society and technology shape each other on an ongoing and bilateral basis (Geels, 2005a, 2005b); i.e. they co-evolve. Institutional and social/cultural changes generally take place before and, consequently, influence organisational and technological changes (Freeman, 1992). In general, institutional and social/cultural changes are more fundamental and powerful than organisational and technological changes. For example, science and research policy determines the direction of investment and thus influences technological change along that direction. Similarly, international laws and agreements determine the characteristics of international trade unions. Societal norms and values determine, to a large extent, how social organisation is structured.

Figure 2 shows some of the different elements of socio-technical system influencing technological change on a co-evolutionary basis. These elements are grouped under four types of socio-technical system component: institutional, social/cultural, organisational and technological. For example, user/consumer is a small-scale, social/cultural-type element while infrastructure is a large-scale, technological-type element. The circular arrows in the figure indicate that the change is continuous and dynamic, and, every element influences each other.

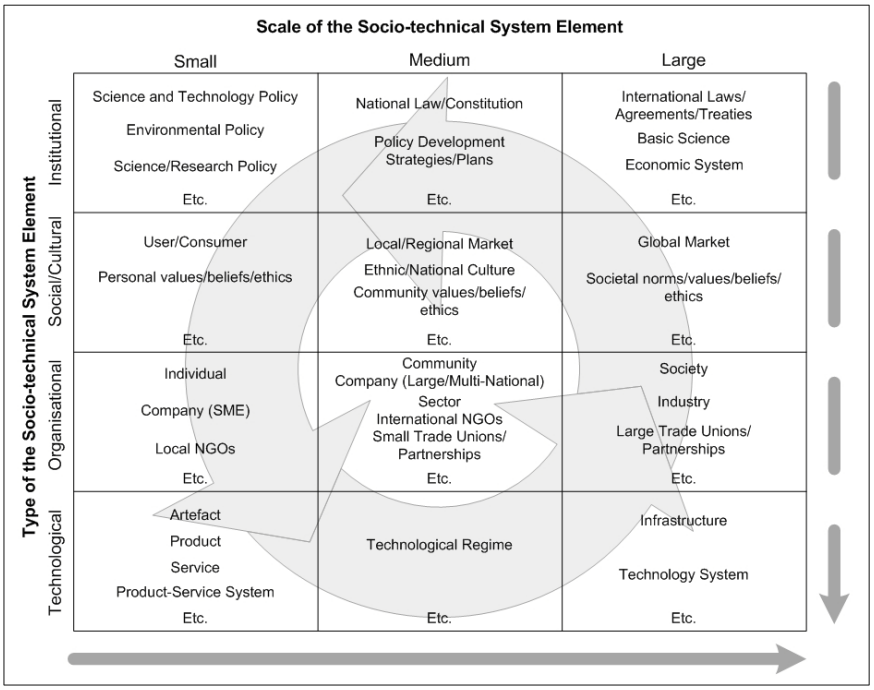

Figure 2. Co-evolutionary dynamics within the socio-technical system

Despite the hardship associated with analysing the dynamics between different types of the socio-technical system components, there are easily observable patterns between different scales of them. Complexity increases as the scale becomes larger. Consequently, as the scale gets larger, managing change becomes harder and the pace of change gets slower. Also, smaller scales of one type of socio-technical system component are hierarchically dependent on larger scales of the same type. For example, products are determined by the relevant technological regimes and the technological regimes are determined by the technology system. Similarly, change in the large scale of a particular type of socio-technical system component is likely to require change in smaller scales of the same type. Nevertheless, smaller scale socio-technical system components may or may not induce/influence change in the larger scales of the same component.

2.4. Product Development Perspective: Levels of Innovation for Sustainability

Brezet (1997) defined four levels of innovation for sustainability (Figure 3). The first level is product improvement. Product improvements are focused on reducing environmental impacts for existing products. The second level is product redesign. In product redesign, product concept remains almost intact but either the product or its components are further developed or replaced. The first and second levels are where most of the efforts are focused at the moment, driven mainly by the regulatory push/push mechanisms. These first two levels have a product focus and are performed within the realm of established technologies and social uptake of established technologies. The third level is function innovation. At this level, the innovation is not limited to

existing product concepts but related to how the function is achieved. This level generally constitutes a transition between product focus and system focus. The fourth and final level of innovation defined by Brezet (1997) is system innovation. At this level, the whole technology system is replaced by a new system.

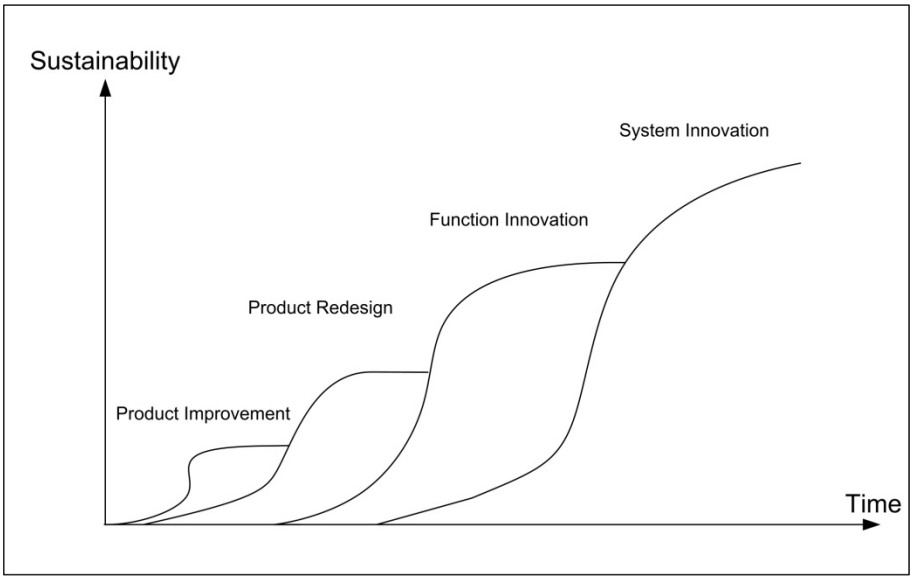

Figure 3. Levels of innovation for sustainability (based on Brezet (1997))

3. The Conceptual framework

3.1. Combining Levels of Innovation, Co-evolutionary Dynamics and Time-frame

One particular challenge in linking activities of product development teams to system level innovation becomes evident when the socio-technical contexts of change required to be intervened at each level of innovation are considered (Figure 4). Towards the upper levels of innovation for sustainability, the complexity of the problem increases because the context of change required widens. At the first two levels, a company is a sufficient entity for analysis and action. However, towards upper levels the change requires the collaboration of many stakeholders, some of which are not recognised as stakeholders currently. For the system level innovation to take place there is a need for change at institutional level, i.e. at the very fundamentals of society including norms, values, socio-cultural practices, and the underlying assumptions of the economic system, as well as organisational and technological change. As a result, in planning for system innovation for sustainability, companies and product development teams face a challenge which is not comparable in scale to any previous challenges the industry has faced. On the one hand and in the short term, companies have to design/redesign products to meet immediate business priorities like decreasing the cost and time-to-market while assuring quality, market appeal, competitiveness, and compliance to ever-toughening legislation and standards. On the other hand, in addition to these generic and short-term business goals, they

should develop new technologies in the medium and long term which will overcome the burden put by the prevailing production-consumption patterns on the environment and society.

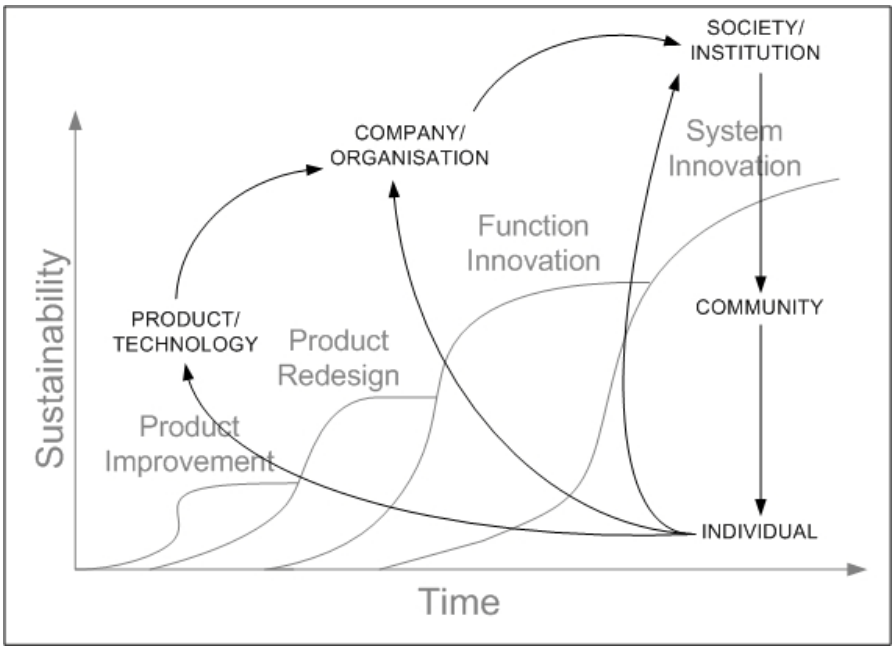

Figure 4. The contexts of change in relation to levels of innovation for sustainability

Another challenge in linking activities of product development teams to system innovation is related to the associated time frames. System innovation requires long-term planning (i.e. 50 years or more) due to the complexity embedded both in natural and social systems and the dynamic nature of sustainability requirements. The time frames required for system innovation are far beyond the ones usually used by companies for planning (Jansen, 2003). Nevertheless, system innovation assumes that structural changes will take place in the socio-technical system including the major assumptions of the current economic system and the role and responsibilities of businesses within society. Therefore, there is a need to mediate the time-frames required for system innovation with those used by companies and product development teams.

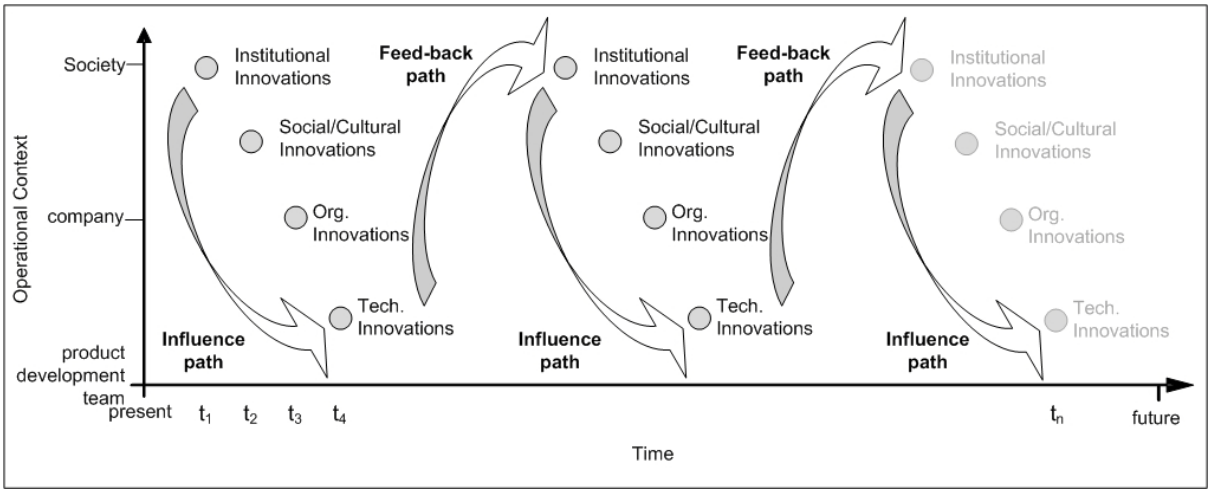

Figure 5. Temporal and spatial positioning of relevant types of innovation

Referring back to the discussion about the operational time frames, as the operational context widens, the length of planning should extend in order to cover subsumed operational contexts and to connect them both spatially and temporally. In Section 2.3, it was stated that social and institutional innovations will influence organizational and technological innovations and then will be influenced by new organizational structures and technologies in a recurring manner. Therefore, based on a systemic hierarchy, society is the widest operational context relevant to system level innovation followed by the company and the product development team. Figure 5 temporally and spatially positions types of innovation relevant for different operational contexts and relevant types of innovation based on the operational time frame model (Figure 1). According to this positioning, institutional and social/cultural innovations should be subjected to the longest planning period followed by organizational and technological innovations. There will be feedback paths established from smaller-scale, shorter-term innovations informing both each other and innovations taking place at longer time spans and in wider operational contexts as the implementation progresses.

Figure 6 combines the levels of innovation (Figure 3) and the different scales of socio-technical system components (Figure 2) in order to link system innovation to the activities of product development teams in a meaningful way. Since innovation is systemic and product development is indeed a component of another system, the activities taking place at the product development level has to be considered in the context of the company. Therefore, the product development function needs to be systemically positioned in the company, and the company needs to be systemically positioned in the society. In order to achieve this, the time frames applicable to the three operational contexts (i.e. society, company and product development) and the mechanisms of aligning the activities of product development to the transformation which needs to take place in the wider society to achieve sustainability needs to be clarified.

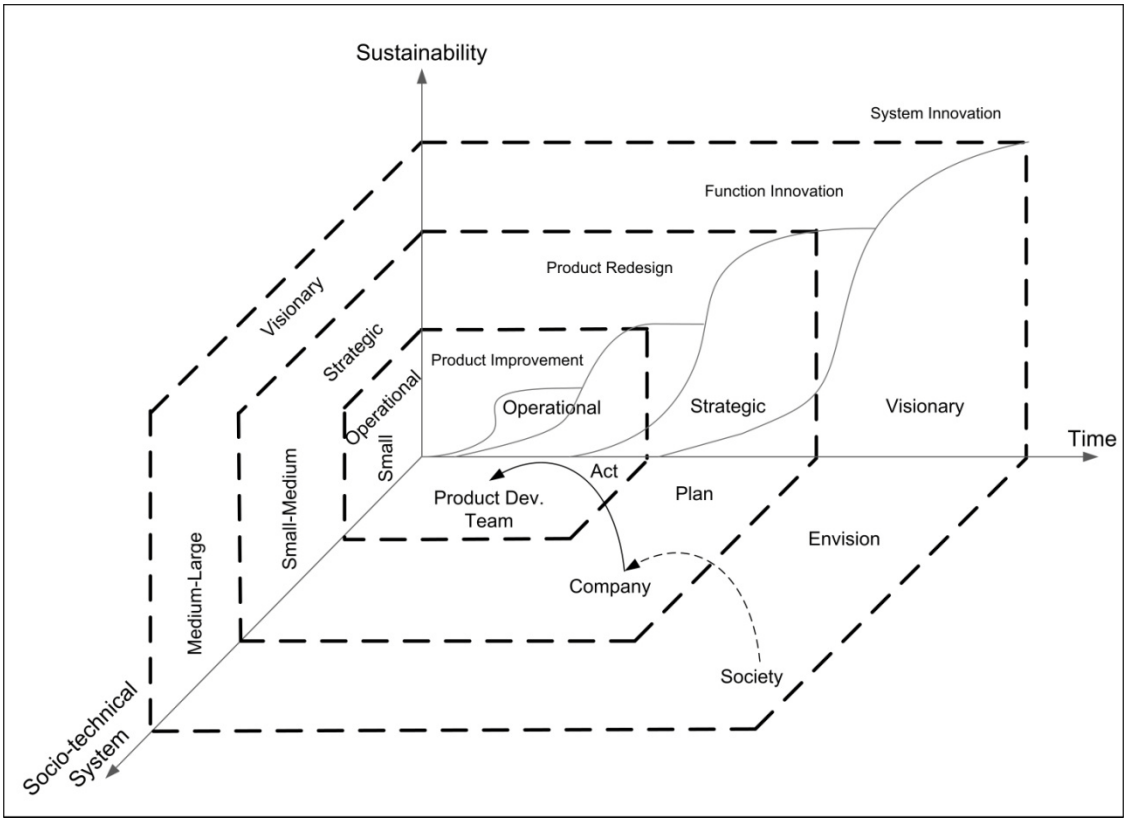

Figure 6. A model to link product development function to system level innovation

As shown in Figure 6, the planning periods applicable to the levels of innovation can be defined as operational in the short term, strategic in the medium term and visionary in the long term. The short term used here covers ten years which is the longest business planning period for most companies. It is acknowledged that there are indeed shorter periods that businesses need to make decisions and take action within, such as daily, monthly or annual periods. In addition, product development cycles are getting shorter as the global competition increases and lean product development practices become more widespread. Nevertheless, it is empirically proven that as the complexity and innovative content of products increases the development cycle becomes longer (Griffin, 1997a, 1997b). In cases of radical innovation, the technological and market uncertainties require longer learning periods, and therefore, more time needs to be invested (Herrmann, Gassmann & Eisert, 2007). Case studies (e.g. Lynn et al., 1996; Veryzer Jr., 1998; Abetti, 2000) have shown that for radical innovations, time-to-market cycles as long as and sometimes longer than ten years is common.

The strategic period should shape the operational period through the setting of goals at the organisational (company) level. Individual companies have very limited ability to influence change at the larger components of the socio-technical system, i.e. institutional, social/cultural, especially in the short-term. Nevertheless, it should be emphasised once again that companies are part of society and thus, even though they fall into small/medium scale within the socio-

technical system, their strategic goals should not be contradictory to visions of society. On the contrary, their strategic goals should be aligned with the meta-goals desired at societal level to achieve sustainability. In order to achieve this alignment the planning periods applicable to companies (operational and strategic) need to be linked to the long-term planning period; theoretically, at the end of the long-term planning period the whole socio-technical system should have been transformed. Therefore, companies should acknowledge the long-term visions of the society during their strategy development which then will guide the product development decisions.

3.2. Social Function Fulfilment, System Innovation and Product Development

Socio-technical systems are defined by the social function fulfilled by them (Geels, 2004); such as housing, mobility and energy. In planning for system innovation for sustainability, focusing on social function fulfilment broadens the thinking which was previously limited to material and technical aspects of cultural, behavioural and organisational domains of innovation, and therefore, provides more leverage points to influence the system change (Ryan, 2008b).

From the perspective of product development, innovating to find alternative ways of fulfilling a social function is not a novel concept. Indeed, this is one of the main strategies applied by product designers/developers in new product/service development. However, social function fulfilment, as currently understood from the perspective of product design/development, corresponds to the third level of innovation for sustainability (see Section 2.4). Therefore, it does not consider social/cultural and institutional innovations which are essential to achieve innovation at system level as leverage points to focus on in product development.

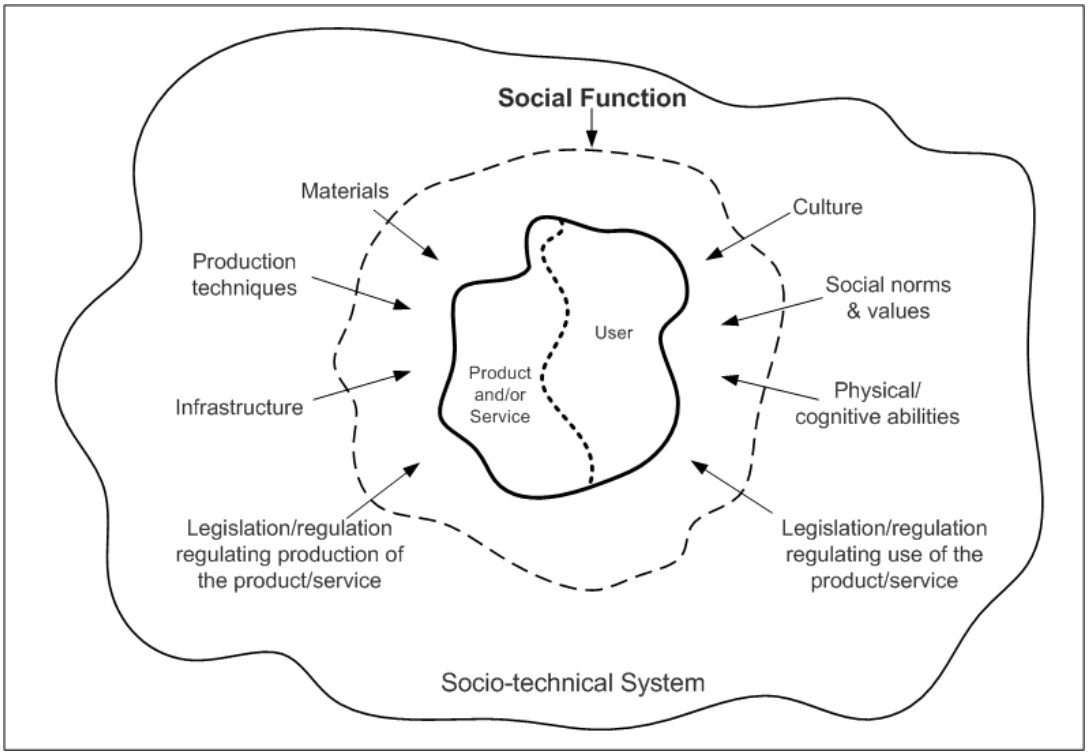

Figure 7. A model for social function fulfilment at product development level

Figure 7 is a model to describe social function fulfilment from the perspective of product development with a systemic understanding. The model conceptualises social function fulfilment in the wider context of the socio-technical system. As stated before, a socio-technical system has institutional, social/cultural, organisational and technological components. Social function cannot solely be described technologically but needs to be referenced to the other components of the socio-technical system as well. Fulfilling a social function requires consideration of several - institutional, social/cultural, organisational as well as technological- variables simultaneously. These variables include materials, production techniques, infrastructure, culture, social norms/values, cognitive/physical abilities of the user and legislation/regulation which govern the production and use of a product/service. These variables all together determine the conditions and limits of fulfilling that social function within the socio-technical system of concern. In this systemic approach to conceptualising social function fulfilment, these variables are co-dependent. Each of them is subject to change during the systemic transformation towards sustainability. Therefore, they need to be acknowledged individually yet considered simultaneously in system innovation as complementary to each other. It should be noted that the size of the physical variables (materials, infrastructure) may vary independently of the social function since a function can be met in multiple ways some of which may be more material intensive than the others.

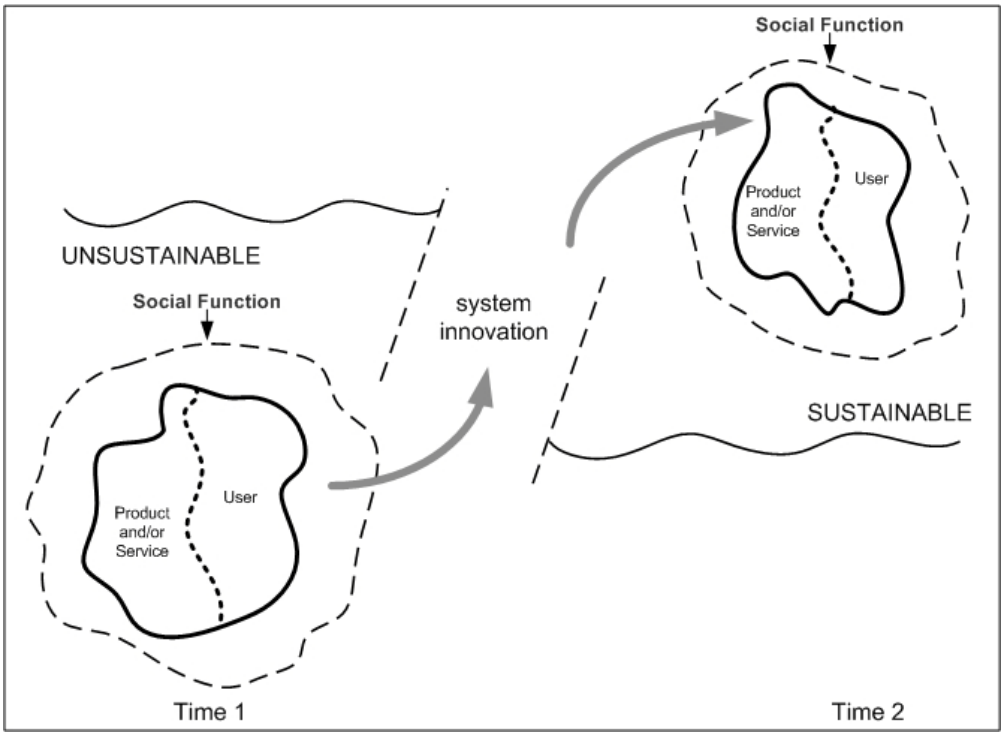

Figure 8. System innovation model from the perspective of product development

System innovation should enable fulfilment of the same social function in the future through a combination of innovations in institutional, social/cultural, organisational as well as technological contexts of the socio-technical system. From the perspective of product development this means adopting a proactive and systemic approach in design and development of the products/services by taking both physical and non-physical variables, which can be influenced at the product development phase, into consideration. Figure 8 provides a model to explain system innovation from the perspective of product development. According to this model, if in developing alternatives to fulfil a particular social function, the physical (e.g. materials, infrastructure, and production techniques) and non-physical (e.g. regulations, social norms and values, cognitive abilities of the user(s)) variables are considered and leveraged simultaneously, system level innovation can be influenced through activities and decisions at the product development level. If institutional, social/cultural, organisational and technological determinants of a social function are considered simultaneously, neither the capacity and characteristics of present technologies nor the expectations of present market and user becomes a focal point around which innovation will shape. Instead, the focal point becomes the social function to be fulfilled. This way, possible combinations of physical and non-physical variables together enabling that function to be fulfilled can be conceived. As a result, product development can have a proactive role to play in much wider and longer-term changes which need to happen at institutional and social/cultural levels.

4. CLOSURE

Sustainability is a system property and multi-scale and systemic approaches. These approaches should be guided by targets/visions, instead of traditional goal-based optimization approaches. Since sustainability is a dynamic system property, the discourse on innovation for sustainability is shifting from focusing on individual products, services and technologies to entire socio technical systems which fulfil certain social functions such as housing, mobility, food etc. At an organisational level, this shift implies a shift from company-level processes to wider and linked processes at the socio-technical system level. The theory around system innovation has provided explanations regarding how companies and product development activities fit into the broader picture of system innovation only to a certain extent and the topic is highly neglected in the literature.

In order to address this issue, this paper presented a conceptual framework explaining how innovation efforts at the micro-level (i.e. product/service development) can systemically be aligned with those efforts at the macro-level (i.e. socio-technical systems). The conceptual framework is developed through integrating insights from sustainability science, complex adaptive systems theory and system innovation theory. The conceptual framework contributes to the main body of system innovation theory by building on it to specifically address product development level in system innovation for sustainability. The framework is prescriptive and states that companies are part of society and thus, their strategic goals should not be contradictory to visions of society and these goals should be aligned with the goals of the society envisioned to achieve sustainability. This requires companies to acknowledge the long-term visions of the society during their strategy development to guide their decisions on product development.

Acknowledgements

New Zealand Foundation for Research and Technology is gratefully acknowledged for funding this research.

References

Abetti, P. A. (2000). Critical Success Factors for Radical Technological Innovation: A Five Case Study. *Creativity & Innovation Management, 9*(4), 208.

Bagheri, A., & Hjorth, P. (2007). Planning for sustainable development: A paradigm shift towards a process-based approach. *Sustainable Development, 15*(2), 83-96.

Brezet, H. (1997). Dynamics in ecodesign practice. *Industry and Environment, 20*(1-2), 21-24.

Casti, J. L. (1986). On system complexity: identification, measurement and management. In J. L. Casti & A. Karlquist (Eds.), *Complexity, Language and Life: Mathematical Approaches* (pp. 146-173). Berlin: Springer-Verlag.

Charter, M., Gray, C., Clark, T., & Woolman, T. (2008). Review: The Role of Business in Realising Sustainable Consumption and Production. In A. Tukker, M. Charter, C. Vezzoli, E. Stø, & M. M. Andersen (Eds.), *System Innovation for Sustainability 1: Perspectives on Radical Changes to Sustainable Consumption and Production* (pp. 46-69). Sheffield, UK: Greenleaf.

Cilliers, P. (1998). *Complexity and postmodernism: understanding complex systems*. London; New York: Routledge.

Clayton, A. M. H., & Radcliffe, N. J. (1996). *Sustainability: a systems approach*. London: Earthscan.

Cooke-Davies, T., Cicmil, S., Crawford, L., & Richardson, K. (2007). We're not in Kansas Anymore, Toto: Mapping the Strange Landscape of Complexity Theory, and Its Relationship to Project Management. *Project Management Journal, 38*(2), 50-61.

Costanza, R., & Patten, B. C. (1995). Defining and predicting sustainability. *Ecological Economics, 15*(3), 193-196.

Espinosa, A., Harnden, R., & Walker, J. (2008). A complexity approach to sustainability - Stafford Beer revisited. *European Journal of Operational Research, 187*(2), 636-651.

Faber, N., Jorna, R., & Van Engelen, J. (2005). The sustainability of "sustainability" - A study into the conceptual foundations of the notion of "sustainability". *Journal of Environmental Assessment Policy and Management, 7*(1), 1-33.

Freeman, C. (1992). *The economics of hope: essays on technical change, economic growth, and the environment*. London; New York: Pinter Publishers.

Funtowicz, S., & Ravetz, J. R. (1994). Emergent complex systems. *Futures, 26*(6), 568-582.

Gallopín, G. (2004). *Sustainable Development: Epistemological Challenges to Science and Technology*. Paper presented at the Workshop on Sustainable Development: Epistemological Challenges to Science and Technology.

Gallopín, G. C., Funtowicz, S., O'Connor, M., & Ravetz, J. (2001). Science for the twenty-first century: From social contract to the scientific core. *International Social Science Journal, 53*(168), 219-229.

Gaziulusoy, A. I., & Boyle, C. (2008). Addressing the Problems of Linking Present and Future and Measuring Sustainability in Developing Sustainable Technologies: A Proposal for a Risk-Based Double-Flow Scenario Methodology. In I. Horváth & Z. Rusák (Chair), Symposium conducted at the meeting of the 7th International Symposium on Tools and Methods of Competitive Engineering, April 21–25, Izmir, Turkey.

Geels, F. W. (2005a). *Technological transitions and system innovations: a co-evolutionary and socio-technical analysis*. Cheltenham, UK ; Northampton, Mass.: Edward Elgar Pub.

Geels, F. W. (2005b). Processes and patterns in transitions and system innovations: Refining the co-evolutionary multi-level perspective. *Technological Forecasting and Social Change, 72*(6 SPEC. ISS.), 681-696.

Geels, F. W. (2004). From sectoral systems of innovation to socio-technical systems: Insights about dynamics and change from sociology and institutional theory. *Research Policy, 33*(6-7), 897-920.

Griffin, A. (1997a). Modeling and measuring product development cycle time across industries. *Journal of Engineering and Technology Management - JET-M, 14*(1), 1-24.

Griffin, A. (1997b). The Effect of Project and Process Characteristics on Product Development Cycle Time. *Journal of Marketing Research, 34*(1), 24-35.

Herrmann, A., Gassmann, O., & Eisert, U. (2007). An empirical study of the antecedents for radical product innovations and capabilities for transformation. *Journal of Engineering and Technology Management, 24*(1-2), 92-120.

Hjorth, P., & Bagheri, A. (2006). Navigating towards sustainable development: A system dynamics approach. *Futures, 38*(1), 74-92.

Holling, C. S. (2001). Understanding the complexity of economic, ecological, and social systems. *Ecosystems, 4*(5), 390-405.

Jansen, L. (2003). The challenge of sustainable development. *Journal of Cleaner Production, 11*(3), 231-245.

Linstone, H. A. (1999). *Decision Making for Technology Executives : Using Multiple Perspectives to Improved Performance*. Norwood, Mass.: Artech House.

Loorbach, D. (2010). Transition management for sustainable development: A prescriptive, complexity-based governance framework. *Governance, 23*(1), 161-183.

Lynn, G. S., Morone, J. G., & Paulson, A. S. (1996). Marketing and Discontinuous Innovation: The Probe and Learn Process. *California Management Review, 38*(3), 8-37.

Manson, S. M. (2001). Simplifying complexity: A review of complexity theory. *Geoforum, 32*(3), 405-414.

Rennings, K. (2000). Redefining innovation -- eco-innovation research and the contribution from ecological economics. *Ecological Economics, 32*(2), 319-332.

Ryan, C. (2008a). *The Melbourne 2032 Project: Design visions as a mechanism for (sustainable) paradigm change.* Paper presented at the Changing the Change: Design Visions and Proposals Conference, 10-12 July 2008, Turin, Italy.

Ryan, C. (2008b). Eco-Innovative Cities Australia: A pilot project for the ecodesign of services in eight local councils. In A. Tukker, M. Charter, C. Vezzoli, E. Stø & M. M. Andersen (Eds.), *System Innovation for Sustainability 1: Perspectives on Radical Changes to Sustainable Consumption and Production* (pp. 197-213). Sheffield, UK: Greenleaf.

Simon, H. A. (1974). The organization of complex systems. In Pattee, H. H. (Ed.), *Hierarchy theory: the challenge of complex systems*. New York: Braziller. p. 3-27.

Smith, A., Stirling, A., & Berkhout, F. (2005). The governance of sustainable socio-technical transitions. *Research Policy, 34*(10), 1491-1510.

Tukker, A., Charter, M., Vezzoli, C., Stø, E., & Andersen, M. M. (Eds.). (2008). *System Innovation for Sustainability 1: Perspectives on Radical Changes to Sustainable Consumption and Production*. Sheffield, UK: Greenleaf.

Van Bakel, J., Loorbach, D., Whiteman, G., & Rotmans, J. (2007). *Business Strategies for Transitions Towards Sustainable Systems* Rotterdam: Erasmus Research Institute of Management.

Veryzer Jr, R. W. (1998). Discontinuous Innovation and the New Product Development Process. *Journal of Product Innovation Management, 15*(4), 304-321.