PLAN DEVELOP DESIGN:

Making smart cities and architecture

Book of Abstracts

The 9th Annual Symposium of Architectural Research

Oulu School of Architecture, University of Oulu
November 29th - December 2nd 2017
Oulu, Finland

Eds. Sari Hirvonen-Kantola, Essi Oikarinen & Hanna Kosunen

The 9th Annual Symposium of Architectural Research 2017

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CONTENTS

MISSION

The world is urbanizing and digitalizing, and there is a major trend where cities, communities and buildings are being developed as smart environments. This raises a variety of new questions for planners, designers and developers.

As planning and design are future oriented, in The 9th Annual Symposium of Architectural Research 2017, we will examine, in what ways architectural design, and urban planning and design contribute to, critique and address the smart city phenomenon, practices and projects. What kind of integrative processes and methods could be used to connect development actions in smart cities, communities, environments, architecture and construction? How can multidisciplinarity benefit research, design and planning?

We have welcomed researchers and practitioners in architecture, urban design and planning, as well as any other field affiliated to planning, development and design of smart cities to present their work in the Symposium. These other fields could include, for instance, computer science, information processing science, economics, futures research, lighting design and research, industrial engineering and management, innovation studies, education, health studies, social sciences such as geography, cultural anthropology, interaction and communication studies. We called for theoretical, conceptual, empirical, practical, critical, historical, pedagogical, or artistic contributions.

The main mission of the symposium is to gather together experts around the world to provide contributions for the research and development of smart cities and architecture.

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PROGRAM

VENUE UNIVERSITY OF OULU,
TELLUS INNOVATION ARENA

Wednesday, November 29th

10:00	PhD workshop, Dr. Aulikki Herneoja (Frost Club)
12:30	Lunches are available at the campus restaurants
13:30	PhD workshop continues
19:00	Get-together (Architecture Guild House, address: Pursitie 8)

Thursday, November 30th

9:00	Registration and coffee	
10:00	Vice Rector for Education, professor Helka-Liisa Hentilä, **Welcoming words** (Stage) Dr. Sari Hirvonen-Kantola, **Introduction to the symposium**	
10:15	Account manager Mika Rantakokko, **Digital transition action plan for Europe** (Stage)	
10:30	**Keynote lecture:** Professor Christian Nielsen, **Business models in the smart city context** (Stage)	
11:30	**Session 1: Business models in the built environment (Stage)** Chairs: Christian Nielsen, Petri Ahokangas, Sari Hirvonen-Kantola Hanna Kosunen & Irina Atkova: **Operational models for urban infill planning: Case Turku, Finland** Irina Atkova & Sari Hirvonen-Kantola: **Business models for urban planning agencies** Mia Pujol: **New port of Barcelona: Productive Green**	**Session 2: Emerging urban form (Aspire)** Chair: Ari Hynynen Tommy K. Lindgren: **The material city: potential for urban development in mapping material processes, erosion and obsolescence in Helsinki** Ari Hynynen & Jari Kolehmainen: **Smart principles for knowledge-based urban development: Case Finnish railway station areas**
12:30	Lunches are available at the campus restaurants	
13:30	**Keynote lecture:** Project coordinator, Associate professor Miguel Á. García-Fuentes, **Smart transformation of urban areas through integrated actions in energy, mobility and ICTs** (Stage)	

PROGRAM

14:30	**Session 1: Business models in the built environment continues (Stage)** Sanna Peltoniemi & Harry Edelman: **Learning from applying urban informatics in design studio course** Mika Ruusunen: **Smart cities with smart energy**	**Session 2: Emerging urban form continues (Aspire)** Frederik Marc Eric Vandyck & Inge Bertels: **Urban industrial land and the production of space: A typomorphological analysis of urban productive spaces in the Jette-Koekelberg area in Brussels capital region** Minna Chudoba: **Building high? The tall building question in Finnish cities** Gerd Bloxham Zettersten: **Ambitions for Kiruna 2.0**	**Session 3: Experience and participation (Frost Club)** Chair: Anna Luusua, Ira Verma: **Resilient housing and care services for aging municipalities** Martino De Rossi: **The antique and contemporary character of domus: Places for living** Jenni Merinen: **Personalized spaces to allow more independent life for visually impaired people**
15:30	Coffee		
16:00	**Session 1: Business models in the built environment continues (Stage)** Peter Hemmersam, Einar Sneve Martinussen, Jonny Aspen & Jørn G. S. Knutsen: **Unfolding cases of the urban digital** Helena Teräväinen: **Reflections on different time levels in the urban space, three city experiences** Riikka Kuittinen, Eevamaria Juuti, Matti Lakkala & Janne Pihlajaniemi: **Individuality included: Towards mass customization in Finnish log house architecture**	**Session 2: Emerging urban form continues (Aspire)** Juho Rajaniemi, Teemu Jama & Panu Lehtovuori: **What do we need zoning for? Changes in legitimizing the Finnish zoning system** Mia Pujol: **Place-making through mental maps** Ranja Hautamäki: **National urban park: A model for a sustainable city or a legislative cage for development?**	**Session 3: Experience and participation continues (Frost Club)** Mari Oline Giske Stendebakken & Nils O. E. Olsson: **Costs are not the decisive factor: A property development assessment of the possible rehabilitation of a cultural heritage site** Sanna Lehtinen: **Aesthetic perspectives to creating urban smart sustainability** Pia Fricker: **Computational Landscapes: "Immersive Experience through the Exploration of Mixed Reality"** Vesa Vihanninjoki: **Smartness experienced? The sustainability of embedding novel technologies in everyday urban life** Tiina Hotakainen & Essi Oikarinen: **Everybody loves balloons! Potential of art projects as a tool for culture-led urban regeneration**
18:45	Transport to the conference dinner (from Lapland Hotel Oulu, address: Kirkkokatu 36)		
19:00	Conference dinner (Nallikari Restaurant, address: Nallikarinranta 15) and sauna option		
21.30 23.00	Transport back to the conference hotels (from Nallikari Restaurant)		

Friday, December 1st

9:30	Registration and coffee	
10:00	**Keynote lecture:** Interaction designer Rune Nielsen, **Yes, I am talking to you, you and you... Media Architecture as a platform for urban interaction** (Stage)	
11:00	**Session 4: Smart lighting (Stage)** Chairs: Henrika Pihlajaniemi, Eveliina Juntunen Eveliina Juntunen, Henrika Pihlajaniemi, Esa-Matti Sarjanoja, Anna Luusua & Juho Eskeli: **SenCity - Piloting intelligent lighting as a service platform for innovative cities** Henrika Pihlajaniemi, Anna Luusua and Eveliina Juntunen: **Evaluating users' experiences of adaptive lighting while walking and driving - Reflection on methods** Kjell Yngve Petersen: **Ambient adaptive lighting** Roope Siiroinen & Heikki Lamula: **Smart technology, stupid solutions** Marcos Katz & Jari Laru: **Smart lighting and visible light communications: a happy marriage**	**Special event, free of charge: ICT infrastructure for smart living. IoT and digital transformation (Aspire)** Chair: Vadim Kramar, Pekka Jokitalo Helmi Ben Hmida, IoT and Digital Transformation expert, Fraunhofer IGD, Germany: **IoT enabled smart city: Requirement and challenges**
12:30	Lunches are available at the campus restaurants	
13:30	**Keynote lecture:** Architect SAFA Anssi Lassila, **Works** (Stage)	

14:30	**Session 4: Smart lighting continues (Stage)** Piia Markkanen, Henrika Pihlajaniemi & Aulikki Herneoja: **Adaptive lighting interventions in knowledge work environments** Sanae Chraibi, Charlotte Rosenkotter, Patrick Creemers, Evert van Loenen & Alexander Rosemann: **Granular dimming of lighting in offices: User experience and acceptance** Måns Paul, Henri Juslen, Matti Vesterinen, Jukka Ahola, Lars Hellström: **Wireless self learning lighting control**	**Session 5: Smart building design and construction (Aspire)** Chair: Janne Pihlajaniemi Juho Yliniemi & Mirja Illikainen: **Geopolymers – an environmentally friendly building material** Janne Pihlajaniemi: **Modern log city research project** Anna Luusua, Matti Lakkala & Janne Pihlajaniemi: **Perceptions of log and log buildings among Finnish architectural and building industry professionals**
15:30	Coffee	
16:00	**Session 4: Smart lighting continues (Stage)** Sara Leino: **Smart lighting solution in architecture of hospital campus** Esben Oxholm, Ellen Kathrine Hansen & Stine Maria Louring Nielsen: **Light and media-projections in patient rooms. A preliminary case study** Henrika Pihlajaniemi: **WellLIT - Intelligent lighting and well-being in Northern learning environments** Sarunas Noskaitis, Lucrezia Seghi & Spyridon Spanos: **The Northern and Southern lighting cultures**	**Session 5: Smart building design and construction continues (Aspire)** Matti Lakkala, Janne Pihlajaniemi, Eevamaria Juuti & Riikka Kuittinen: **Industrially produced log: Essential architectonic features in the scope of contemporary architecture**
17:00	Closing words and sparkling wine (Stage)	
19:00	Evening program: **Walk at the Lumo Light Festival**, meeting in front of the market hall, Kauppatori (www.ouka.fi/valoaoulu)	


PRATICALINFO

VENUE

TELLUS INNOVATION ARENA
University of Oulu, Linnanmaa campus
Address: Erkki Koiso-Kanttilan katu 1, 90014 Oulu
www.oulu.fi/tellusarena/

The conference venue is Tellus Innovation Arena, an inspiring open space in the heart of University of Oulu Linnanmaa campus. University entrance closest to Tellus is the door R, where conference guests can follow guides leading to the venue. Please, see also the attached map for how to locate Tellus in the Linnanmaa campus.

PUBLIC TRANSPORT CONNECTIONS

The easiest way to get to the Linnanmaa campus is by bus. You can take buses number 1, 2, 3 and 8 from the city center to Linnanmaa. The journey takes around 15–20 minutes. Convenient bus stops downtown are Toripakka P, Kaupungintalo and Pokkitörmä. We recommend that you exit the bus at the bus stop Yliopisto P when heading to the university. The buses to the city center leave from the bus stop Yliopisto E.

Buses 8 and 9 travel from the Oulu airport to the city center. This journey takes around 30 minutes. The bus number 8 travels all the way from the airport to the Linnanmaa campus (via the city center), so this is a good option for the guests planning to arrive at the conference straight from the airport. Also the conference hotels are located along these bus routes. For Lapland Hotel Oulu, get off the bus at the Kaupungintalo bus stop, and for Forenom Aparthotel Oulu, choose the Toripakka P bus stop.

Bus ticket price from the Oulu airport to the city center or Linnanmaa campus is 5,80 euros. From the city center to Linnanmaa, ticket price is 3,30 euros. Tickets can be bought from the bus driver, but buses accept only cash for the payment.

The Oulu Public Transport Authority website:
http://www.oulunjoukkoliikenne.fi/english

TAXI SERVICE IN OULU

Taxi service OTAXI
+358 600 30081
http://otaxi.fi/wpress/english/

REGISTRATION AND HELP DESK

Registration to the conference at the help desk, located near the main doors to Tellus Innovation Arena. Email atut.oulu@gmail.com

TELLUS COMMUNITY MANAGERS:
Niina Marostenmäki +358 504129659
Sergei Kopytin +358 503078183

WI-FI

An open wireless network, panOULU, is available at Linnanmaa campus, in the city centre, libraries, city offices, and Oulu Airport. All Oulu residents and visitors can use the panOULU network free of charge.

Eduroam is available at Linnanmaa campus. The Eduroam network offers Internet access to visitors from organizations belonging to Eduroam. They can log in to the wireless networks of other eduroam member organizations using their home organization user accounts.

GET-TOGETHER AT THE ARCHITECTURE GUILD HOUSE

On Wednesday, November 29th, you are invited to an informal get-together to the Architecture Guild House, located at the edge of the city center (Address: Pursitie 8, 90100 Oulu, http://oulunarkkitehtikilta.net/kiltatalo/).

LUNCH ARRANGEMENTS

Please notice that the lunches are at the conference guests own expense. Reasonable-priced lunches (6,90-10,30 euros) are available in the Juvenes campus restaurants.

A lunch cabinet for the ATUT2017 participants is booked at the Foobar restaurant – welcome!

TRANSPORT TO CONFERENCE DINNER IN NALLIKARI RESTAURANT

On Thursday, November 30th, the conference dinner will take place in Nallikari Restaurant (Address: Nallikarinranta 15, 90510 Oulu, www.ravintolanallikari.fi/). Transport to the conference dinner will leave at 18:45 from the city center, in front of the Lapland Hotel Oulu (Address: Kirkkokatu 36, 90100 Oulu).

Nallikari Restaurant is located by the sea, and it may be cold out there – wear warm gloves and beanie when outdoor. The weather forecast can be found here: http://en.ilmatieteenlaitos.fi/weather/oulu

The transportation back to the city center leaves from the Nallikari Restaurant at 21:30 and 23:00.

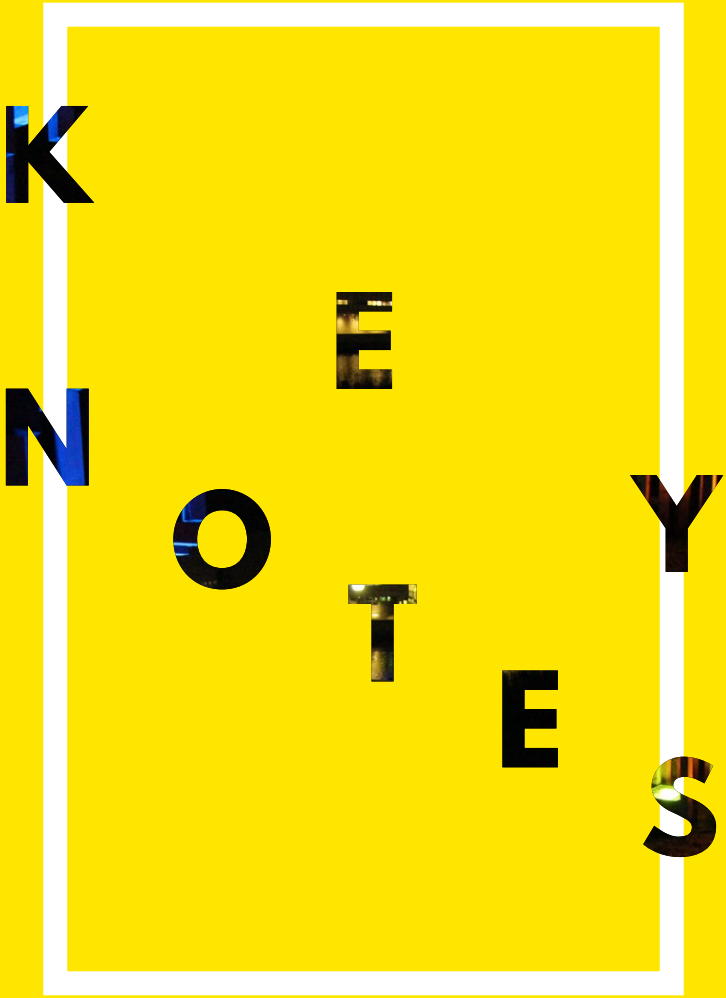
SAUNA OPTION AT NALLIKARI RESTAURANT

We would like to honour our guests by offering them a chance to get acquainted with Finnish nature, sauna and sauna culture at the Nallikari Restaurant. It is estimated that there are at least 1.7 million saunas in Finland today. Compared to the population of 5,5 million it is a world record, but it only reflects the essential role of the sauna in the Finnish way of life. Going to the sauna and hot tub here at the Nallikari Restaurant is of course optional, and those who wish can go to the sauna wearing a swimsuit or towel. There are separate saunas reserved for men and women. Our guests do not have worry about bringing towels, shampoo or soap, they are provided. This does not include swimwear, however.

WALK AT THE LUMO LIGHT FESTIVAL

The walk at the nighttime Oulu and Lumo Light festival (https://www.ouka.fi/oulu/lumo/in-english) on Friday, December 1st, will start from the city center market place, in front of the market hall (Kauppatori, 90100 Oulu) at 19:00. The duration of the walk is about one hour.

Lumo Light Festival Oulu is celebrated for the fifth time in 2017. The theme of the festival this year is "Encounters". Visitors will come across astonishing encounters in familiar environments, in virtual worlds, or with characters from the past painted with lights. Festival lightens up the darkest days of the year and creates stunning views, strange appearances and performances that will enable us to see our environment with new eyes.


KEY
NOTES

Christian NIELSEN

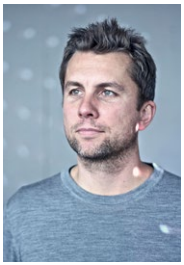
Christian Nielsen, PhD, is Professor at Aalborg University in Denmark and director of research at Business Model Design Center (BMDC). Since the establishment of this highly multidisciplinary research centre in 2011, over 300 companies ranging from local start-ups and SMEs to multinationals with a global presence have seen the value of collaborating with BMDC. This is evidence of the cutting-edge research being produced at BMDC under Christian Nielsen's leadership, which highlights multidisciplinary contributions that break away from traditional academic silos. The contributions of the rigorous scholarly research have led to published works in leading international scholarly journals. This reflects the broad international research network of Christian which spans Europe, the US, Australia and Asia.

Miguel Á. GARCÍA-FUENTES

B.Arch. (2010) and MSc Arch. (2012), both from the University of Valladolid (Spain), where he participated as Construction Manager in the self-sufficient Urcomante Solar House project presented by the University of Valladolid to the Solar Decathlon Europe 2010 competition. Currently, and since 2012, he is working as European Project Coordinator at the Energy Division of CARTIF Technology Centre, and since 2016, as Associate Professor at the University of Valladolid.

His research and teaching fields are in the framework of Smart Cities and Nearly Zero Energy Cities, focusing on energy performance improvement in new buildings and building/district renovation, Building Energy Performance Simulation (BEPS) tools and Building Information Modelling (BIM), addressing the gap of data interoperability. He participated in the coordination teams of the EU-FP7 funded BaaS (Building as a Service Ecosystem, www.baas-project.eu) and R2CITIES (Renovation of Residential Urban Spaces: towards nearly zero energy CITIES, www.r2cities.eu) projects. Currently he coordinates REMOURBAN (Regeneration Model for accelerating the smart urban transformation, www.remourban.eu), and OptEEmAL (Optimised Energy Efficient Design Platform for Refurbishment at District Level, www.opteemal-project.eu) EU-H2020 funded projects.

Miguel Á. García-Fuentes was appointed a Visitor Researcher Fellowship at the School of Architecture, Design and Built Environment at the Nottingham Trent University (2015), and has contributed to various congresses of national and international relevance related to sustainability and energy efficiency in buildings and cities. He is also member of the Technical Committee for the Spanish Congresses on Nearly Zero Energy Buildings, and has participated as Advisory Member of the FP7 project OPTIMUS (Optimising energy use in cities through Smart Decision support systems).



Rune NIELSEN

Rune Nielsen is co-founder and partner of the design practice Kollision. He is an architect and holds a PhD, but refers to himself as an Interaction Designer. He is specialized in interactive exhibitions and media architecture projects that take the form of engaging and experience-oriented large-scale installations. Rune has more than ten years' experience in designing and leading projects in the field of dynamic lighting design and urban communication, among them the media facade of the Danish pavilion at EXPO 2010 in Shanghai, and the facade of the headquarters of The Confederation of Danish Industry in Copenhagen (2013). A very recent project involves two parallel media facades integrated into the Salling department stores in Aarhus and Aalborg in Denmark (2017).

Rune frequently gives talks about his activities with the Kollision team as well as about the research projects he has been involved in. He has served as an external examiner at a number of universities and at architecture and design schools, and has been a member of The Danish Art Community since 2006.

Anssi LASSILA

Anssi Lassila is the founder and principal of OOPEAA Office for Peripheral Architecture. His international breakthrough was the Kärsämäki Shingle Church in 2004 after which he quickly gained a distinctive position among young Finnish architects. His architecture displays an interest in combining a sculptural form with traditional materials and innovative techniques. Lassila has extensive experience in working with wood in architecture. In his approach he emphasizes the potential embedded in exploring new methods and techniques as a means of developing new solutions in building.

OOPEAA works on a wide range of projects on varying scales from churches and daycare centers to housing and town planning as well as extensions to historically valuable landmarks. The office was originally founded in 2001 and it is based in Seinäjoki and Helsinki, Finland, and it currently employs a staff of 15. OOPEAA has been honored with significant awards both in Finland and abroad,including the Finlandia Prize for Architecture in 2015, the Wood Architecture Award in 2015, the Canadian Wood Design and Building Award 2016, and the American Architecture Prize 2016 in two categories. The work of the office has also been selected for the shortlist in the Mies van der Rohe European Prize for Architecture in 2005, 2011 and 2017.

SPECIAL EVENT SPEAKER

Helmi BEN HMIDA

Dr. Helmi Ben Hmida is an IoT expert & Digital Transformation expert. He is a senior researcher and project manager in the Smart Living competence center in the Fraunhofer Institute Germany and member of several European consortium and alliances in relation with the Internet of Things, especially the European Alliance of IoT Innovation (AIOTI), the European Innovation Partnership on Active and Healthy Ageing (EIPAHA) and the European innovation partnership on smart cities and communities (EIP-SCC).

He has obtained his master from Rennes University-France in the field of artificial intelligence in 2009. Till end 2012, he has successfully achieved his PhD in cooperation between the Mainz university in Germany and the Burgundy university in France. Since then, he works for Fraunhofer institute as the largest applied research institute in Europe.

Digital Transformation & Internet of things (IoT) are his main field of expertise. From a policy perspective, he has contributed to the creation of several roadmaps and studies to empower the use of ICT technologies in daily life and quantify the expected impact from social and economic perspectives. From a technological perspective, he has also lead several European and German projects for the innovation and the digitalization of different sectors touching the society, especially Smart Building, Smart City, Mobility, Assisted systems, and Energy economy. His contributions have led to the innovation & the deployment of several smart technologies for more than 6000 users in 9 European countries.


ABSTRACTS

Digital transition action plan for Europe

Mika Rantakokko
BusinessOulu, EU Urban agenda Digital transition partnership

EU Urban agenda Digital transition partnership focuses on vertical themes: Future Health and social care services, eGovernment, Urban Planning and Future learning & skills development, and 5G / other KETs. The horizontal enabler themes are cross-cutting the verticals: 5G technology, Data & Standardization and Business Models. The objective is to provide better public services to urban citizens, new innovations and create business opportunities for European cities.

It is essential that the digital transition in Europe will be based on sound prerequisites that put the interest of the citizen first. Whether it is about creating safeguards for privacy, offering transparent alternatives for the dominant US-based platforms (like Facebook, Uber, AirBnB etc), avoiding vendor lock-in and loss of control of data, etc, it is vital that the European Union, in a joint effort supported by this Urban Agenda partnership on Digital Transition, creates European alternatives that take account of those concerns.

Digitalization is the game changer for almost everything. It is essential to take into account the impact and its possibilities to the future urban planning, Digitalisation - urban planning combination forms also an interesting topic for future architectural research.

digitalisation, urban planning

SESSION 1: BUSINESS MODELS IN THE BUILT ENVIRONMENT

Chairs: Professor CHRISTIAN NIELSEN, Aalborg University, Business Model Design Center

Adjunct professor PETRI AHOKANGAS, University of Oulu, Oulu Business School, Martti Ahtisaari Institute

Dr. SARI HIRVONEN-KANTOLA, University of Oulu, Oulu School of Architecture

Built environment provides a context for researching innovative opportunity and advantage exploration and exploitation behaviors through business models. For instance, any attempt to understand integrative and proactive urban planning and design, and building design as interactive processes, requires them to be related to the prerequisites, opportunities and advantages of the smart city. In the same vein, it is important to consider the background and experience of the participants in the planning, design, and development practices of the city. These processes of exploration and exploitation, in the business models in the built environment, should be studied in more detail.

We invited researchers to contribute to the advancement of the business model research by submitting papers that address the recent developments and findings of the theme in the urban context. Both conceptual and case study approaches were welcomed.

In the context of the built environment, the research questions could cover topics such as:

- *Ecosystem and network- based business models*
- *Innovation ecosystem orchestration for new business models*
- *Public-private-partnerships in new business models*
- *ICT middleware as an enabler of new business models, for example IoT*
- *Design thinking in business model innovation*
- *Business model configurations as a basis for analyzing performance*
- *Sustainable business model development in the built environment*
- *Circular and sharing economy configurations affecting business models*

FULL PAPER PRESENTATION

Operational models for urban infill planning: case Turku, Finland

Hanna Kosunen* and Irina Atkova**
** University of Oulu, Oulu School of Architecture*
*** University of Oulu, Oulu Business School*

In Finland, urban infill planning in old high rise housing estates is understood as a physical urban regeneration approach with wider targets on creating positive economic, ecological and social development. However, the preconditions for urban infill implementation may vary: some areas are more attractive than others for urban infill projects. Urban regeneration practices targeted to high rise housing estates have to be selected in terms of considering both the desired future development of the area and the resources available in the current state of affairs. Also in theoretical discussion on strategic spatial planning the need to identify strategic priorities and consider the relevant actors and resources available is pointed out.

In management science, business model approach provides a way to understand how to bridge the level of strategic planning with the practical level of actions. In this research, different operational models for housing area regeneration are depicted using an action research based framework where business model creation and transformation are approached and understood as practices of visioning, strategizing, performing and assessing. The empirical material consist of case studies of urban infill planning in the City of Turku.

As a result, operational models used in planning of urban infill in different contexts are depicted and discussed. The findings indicate that lacking practices of visioning, strategizing or performing may constrain the transformation or creation of operational models for urban regeneration. As the practical implication, presenting urban infill planning through the business model framework provides a new insight for urban planning practitioners on their work and may help to overcome these constraints. The research contributes also to the theoretical discussion on the selective and adaptive features of strategic spatial planning by utilizing business models as a theoretical approach, as well as to the discussion on the poorly explored field of Public Business Models.

urban infill, urban regeneration, strategic spatial planning, public business model, operational model, practices

ABSTRACT PRESENTATION

Business models for urban planning agencies

Irina Atkova* and Sari Hirvonen-Kantola**
** University of Oulu, Oulu Business School*
*** University of Oulu, Oulu School of Architecture*

Cities are set in response for the economic growth in Europe, and competitive cities have been discussed (Bramezza 1996). In Finland, this approach has been highlighted in two steps: in the early 90?s, when the municipalities were made responsible for their own income, and now that their responsibility to produce and arrange social and health services is handed over to the regional level. It implies that in the future, there will be municipalities focusing on vitality and competiveness of the cities. Traditionally, land use has been a central asset in the Finnish municipalities? business policy (see Jileta 2016). To build a sustainable competitive advantage, a closer interaction between public organization sectors is called for (Ba?lija 2014). Thus, the purpose of this study is to analyze how city organizations may align purpose driven strategic planning, urban design and place management to build competitive advantage for the cities.

To understand how competitive advantage is created, business model approach is used. First, it bridges the level of strategic planning with the practical level of actions. And second, it allows explaining the process of creating competitive advantage.

Business model concept is frequently approached as value creation and value capture logic (Teece 2010, Zott & Amit 2010). From the action perspective, business model revolves around action aimed at value creation and value capture. By creating and capturing value in a unique way through the efficient use of rare resources, business model enables attaining competitive advantage. In turn, opportunity exploration and exploitation elucidate the processes value creation and value capture. Thus, it can be argued that the concepts of opportunity, competitive advantage and business model are linked via value creation and capture processes (Ahokangas & Myllykoski 2014).

The context of spatial planning, which applies to any spatial intervention, suggests that the actors jointly and simultaneously not only co-create and co-capture value, but also co-create and co-capture opportunities. In the spatial planning context, there are activities taking place at several substance fields, e.g. business, culture, social and ecological development. Therefore, business models for urban planning agencies need to deal with several motives simultaneously. Here, when the objective is vitality and competitiveness of the city, spatial planning is a context worth examining on the business model level. In this paper, the activities of three Finnish urban planning agencies are depicted utilizing business model approach, from the action perspective. A theory guided analysis was conducted with the business model wheel (Ahokangas et al. 2014).

Our study reveals that while none of the urban planning agencies had a business model of its own, the key activities in the business models were a combination of diverse public bodies? practices, contributing to the implementation of the local business policy. We conclude that in the context of spatial planning, a business model for a city could consist of a set of operational models, each with a different market orientation: exploiting the existing market, modifying the market, or creating new markets.

The theoretical contribution of this research is two-fold. First, it utilizes a business model concept in a novel context, thereby expanding the business model discussion. And it contributes to the discussion on urban management by utilizing business models as a new theoretical approach. In comparison to the sector and quantitative ideas of New Public Management (see Dunleavy et al. 2006), this kind of new business model approach highlights the holistic and integrative notion of entrepreneurialism in the urban planning agencies.

ABSTRACT PRESENTATION

New port of Barcelona: Productive Green

Mia Pujol
Barcelona School of Architecture / Oulu School of Architecture, University of Oulu

Location: Barcelona, Spain
Year: Master's Course, Year Four, Spring 2017
Type: Academic, Individual Project
Project Duration: 10 weeks
Coordinator: Prof. Alvaro Cuellar
Course: Urban Planning 3

Abstract: The proposal to redevelop the Port of Barcelona is built upon the following three objectives:

- to create a productive green environment;
- to develop a sustainable approach to current transport connectivity issues; and
- to provide a flexible, multi-functional working/living environment.

Based on the above-mentioned design objectives, the resulting masterplan comprises 44 hectares divided into three distinctive landscape areas:

- cultural heritage;
- forest; and
- agriculture.

The aim of this exercise is to weave the spaces together in a transformative landscape scheme which unfolds against a backdrop of outdated infrastructure, derelict industrial buildings and the Montjuic Natural Mountain park.

Supportive material for the presentation:
1/10000 Analysis of Barcelona Seafront
1/5000 Urban Context Diagrams
1/2000 Masterplan of Project Area
1/1000 Area Cross-Sections and Façades
1/500 Drawings of a Typical Housing Block
Photographs of Models

Academic, Masters, Urban, Barcelona, Redevelopment, Environment, Landscape, Transport, Masterplan, Heritage, Forest, Agriculture, Infrastructure, Industrial, Park

FULL PAPER PRESENTATION

Learning from applying urban informatics in design studio course

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***** Tampere University of Technology, School of Architecture and Department of Civil Engineering***

This paper investigates the characteristics of multidisciplinary design teamwork in the context of an experimental design studio course. The course combined the disciplines of architecture, civil engineering and signal processing. During the course, the members of the design teams applied the Urban Informatics approach as a method in order to understand the different factors of urban space in-depth.

Semi-structured interviews with four voluntary case study teams and field observations were used to collect the research material. The characteristics of multidisciplinary design teamwork are investigated by looking first into the influence of multidisciplinarity on the work of design teams, and secondly, challenges and opportunities emerging during the design process. The findings of this study indicate that multidisciplinary teamwork influenced the work of the design teams following areas: working methods, planning of work tasks, communication, understanding the expertise, critical thinking skills and empathy and teamwork skills. The findings of this study can be applied, for example, in architectural pedagogy. In the future, the architectural pedagogy should emphasize teamwork skills in order to educate professionals who are able to use collaborative methods and digital tools. Such novel approaches can advance the conventional practice and pedagogy of urban

analysis through automated and self-learning digital analysis of the urban environment. Thus, the actual design process can benefit from the new data and understanding about the urban data leading to better decision-making, and further, delivering to more socially sustainable design solutions.

collaborative design, multidisciplinary teamwork, design team, urban design

ABSTRACT PRESENTATION

Smart cities with smart energy

Mika Ruusunen
University of Oulu, Control Engineering

Smart cities require and produce energy in many ways. The consumption and production of energy needs to be optimized simultaneously in order to maximise energy efficiency and self-sustainability of every component of this kind of cities. The driving forces are quality of living, environmental issues, and economy. Smart energy in the form of data analytics and IoT applied to energy services may provide a tool aiming towards these targets. In order to succeed, the infrastructure of such a smart city, especially its buildings, needs to be designed to communicate and co-operate with a smart energy system. In this professional presentation, properties of a smart energy concept are discussed in the context of smart cities. Especially, requirement for a building to be part of the energy system are outlined. Finally, some case studies are presented to show the transformation of current building automation towards future smart energy solutions.

energy, automation, data analysis, buildings

ABSTRACT PRESENTATION

Unfolding cases of the urban digital

Peter Hemmersam, Einar Sneve Martinussen, Jonny Aspen and Jørn G. S. Knutsen
The Oslo School of Architecture and Design

The paper provides a critical perspective on prevailing smart city discourses by addressing exactly how digital services are 'urban'. In order to do this, it maps a broad array of digital services that address, are designed in, and for, a specific urban context. This mapping provides an overview of actors, trends and tendencies and provides perspectives on current digital 'solutions' for the city. By conducting a broad survey of urban digital services, and critically evaluating the 'urban'

component and frames they build on and enact, we aim to provide better points of reference to what 'smart city' discourses might evolve towards. Thus, providing important insight into various transition pathways within the evolving discourse on 'the smart city', we contribute to creating platforms for urban politics and critique for the intersecting urbanism and digital design field.

digital services, urbanism, design, smart city

ABSTRACT PRESENTATION

Reflections on different time levels in the urban space, three city experiences

Helena Teräväinen
Aalto University, School of Arts, Design and Architecture, Department of Architecture

According the American urban historian M. Christian Boyer the cities are theaters of the memory. The identity of the place and the collective memory take root deep in the townscape and its buildings and streets, in the names, and of course in collections and monuments which are exactly erected to keep safe the memories. However, sometimes the memory seems to get lost.

This presentation is discussing three cities, Athens, Budapest and Warsaw, and their ways to handle the collective memory in different cases. They all have a long and colorful history including many crisis and wars with destruction, and also numerous museums and monuments reflecting with memories and the urban space.

Athens, known as the birthplace of the western culture, has its heart on Acropolis, which has been there 3000 years. Acropolis is untouchable, UNESCO listed 1987, and continually under renovations. New museum by architect Bernard Tschumi is located in the vicinity, actually partly on the archeological excavations, and was opened in 2009.

Budapest (Urban Landscape UNESCO listed 1987, 2002) starts his history in Gellert Hill ca. 2000 years ago, even though the official city was established as late as in 1873 by the cities of Buda, Pest and Obuda. Before the WW I Budapest was living gracious times, but was suffering a lot in the WW II and also afterwards, in the communist era and the uprising 1956. In this city, the historical names of the streets and places have been changing, and some of the monuments have been relocated. The city itself, its urban space has kept his ancient shape on the banks of Danube.

Warsaw with its 1000 years' history has the hardest destiny among my examples: in the II World War, at least 85 % of the town was destroyed, including Old town totally, and about 800 000 people were killed, half of them Jews. (Before the war 30 % of the 1,25 Million

inhabitants in the capital city were Jewish origin.) The national identity of the Old town was seen so important, that it was rebuilt after the war, and 1980 it was put onto World Heritage list. But the destiny of Jews in Poland was obviously not very easy to represent: it took almost seven decades before Polin, the museum of the Jewish history in Poland could take place in the former Ghetto area. Architects Lahdelma and Mahlamäki designed the building, which was opened 2013 and is affording impressive spatial experiences to visitors.

This presentation aims to clarify the value of the collective memory and how the authenticity and integrity possibly are perceived in the urban space. To answer I'm using my observations and experiences, and analyzing old pictures as well as the photos taken by myself.

To build up the future we could start learning from the past which is embedded in places around us. After all, according Alan Penn smart citizens are the most needed necessity for the smart cities.

memory, urban space, experience, authenticity, integrity

FULL PAPER PRESENTATION

Individuality included: Towards mass customization in Finnish log house architecture

Riikka Kuittinen, Eevamaria Juuti, Matti Lakkala and Janne Pihlajaniemi
University of Oulu, Oulu School of Architecture

Only a few percent of new detached houses in Finland are designed by architects. Most people planning to build a house use only free design services included in the price of house delivery. This means for example that a building engineer designs the house based on some standard model, which he changes according to discussions between sales person and customer. This often results in seemingly generic houses that do not capture most value of the plot.

Log houses make no exception in the Finnish market, even if they are a somewhat luxury product abroad. Why do not people in Finland use architects for designing their log houses? Is it because of the price of the design work? How does the log manufacturer's system of configuring houses work without architects? Are log house companies satisfied with the current system? Could mass customization strategies be suitable for developing design and production processes of log houses?

Mass customization in housing is a process optimization strategy which aims at providing individuality for the price of mass production. When developing and designing mass custom housing there are many aspects to consider. Customer interface, manufacturing systems and supply chain management must all be taken into account.

This paper presents results of studying the need and supply of individuality of log houses, and house configuration processes that let users participate configuring their new log homes in Finland. The study was carried out via consumer study and interviews of log house industry's managing directors and sales personnel. All of these companies are building non-speculative individually-commissioned houses, building houses to meet customers' individual orders rather than for stock.

Based on our consumer study, there is a great demand for individual houses. Only 8,8% of the consumers would choose a standard house model. However only 10% of respondents would prefer a unique house designed by an architect, while 68.9% would prefer a modified standard model. Most important reason for not using architect is the price of the design work. This results in contradiction, since consumers want an individual house, but are not ready to pay for designing.

Surprisingly, all interviewed managing directors of log house companies said they produce only individual houses. Customers always want some modifications even in the standard models, and that results in designing each house anew. This has a negative effect on the profits of the companies, since design work is included in the price of the house delivery. What customers might not realize is that when design work is done at the risk of house builders or even sales people, it is done with as little effort and cost as possible.

Since the existing design process of log houses produces often seemingly generic but always laboriously planned houses, there could be need for improvement. Log house companies expressed interest in finding solutions that would combine benefits in terms of design resources, productions costs and architectural quality. Developing aspects of mass customization could combine affordability with individuality and thus broaden the group of potential log home buyers. Also some affordable solutions for developing architectural quality with architectural professionals should be suggested.

mass customization, log house, affordability, individuality, architecture

SESSION 2: EMERGING URBAN FORM

Chair: Professor ARI HYNYNEN, Tampere University of Technology

Research on urban form has a long tradition. The morphological method has been used for conceiving changes in physical urban structures as well as explaining their societal and cultural background. The modernist revolution evoked new building types and spatial transformations, giving birth to typomorphological approach in urban research. Later on, the need for understanding interaction between social life and physical space brought about studies on spatial syntaxes. Then, the growth of cities, enabled by advanced transport and communication technologies, highlighted the network theory and related topomorphological research. So, what's next, as our cities are turning smart?

Urban transformation is an ever continuing process. Although we could picture limits for quantitative urban growth, qualitative changes progress limitlessly, for sure. What are these changes now and in the future? How are they manifested in urban form? What are the drivers behind the transformation? What kinds of methods do we need for analyzing them? Should we expand our morphological toolbox? Do we need new urban design and planning principles?

We encouraged to tackle this theme from fresh and diverse standpoints. Theoretical and more practical approaches were equally welcomed, as well as spatial and temporal explorations through different urban scales and eras.

FULL PAPER PRESENTATION

Material city: potential for urban development in mapping material processes, erosion and obsolescence in Helsinki

Tommy K. Lindgren
Department of Architecture, Aalto University School of Arts, Finland

Urban development hinges on the availability of free space. The planned growth of Helsinki as reflected in the City Plan of 2016 relies on identifying areas for infill in the urban fabric. In built-up areas there is a tendency to let the processes of urban change take place instead of top-down planning. This change is therefore not managed, but piecemeal, resulting in a patchwork of 'stamp' plans directed by narrow private economic considerations.

The life-span of buildings varies according to their material composition – also the type of a building and its spatial configuration affect its vitality. These attributes and conditions play a part in how long a building can endure before confronting the need for radical changes, and can be aggregated from open-source data and modeled using historical referents as benchmarks. This information forms a layer of probabilities in the city, revealing dormant locations facing imminent change.

By mapping the information of the material conditions on the topography of the city, we can identify potentials for development. Identifying these latent sites in the city and engaging proprietors and landowners would give new tools for the City to affect the change and renewal associated with turnover of the building stock.

Urban metabolism, Helsinki, Urban design, planning

FULL PAPER PRESENTATION

Smart principles for knowledge-based urban development: case Finnish railway station areas

Ari Hynynen* and Jari Kolehmainen**
** Tampere University of Technology, School of Architecture, Seinäjoki Urban Laboratory*
*** University of Tampere, School of Management, Research Group for Urban and Regional Development Studies (Sente)*

Cities undergo continuous transformation processes, which at different times have unique characteristic manifestations. The changes in many Finnish cities currently focus on the vicinity of railway station areas due to changes in regional structures and rail transport, as well as the densification of city centres. The enthusiasm to this kind of development is also increased by the special features of railway station areas, which seem to provide opportunities for a new kind of local economic and innovation policies. Railway station areas are also favourable locations for the application of various smart city technologies and services. In this article, we analyse the development of Finnish railway station areas as part of a wider continuum of urban development where both economic and innovation policies, and urban planning unify. Case studies confirm our outlook of knowledge-based urban development transitioning to a new phase, which provides the prerequisites for interesting connections between railway station areas, the concept of a smart city and open innovation. One of the aims of our article is to bring together various themes that are brought up in smart city discussions and urban planning by introducing new kinds of spatial planning principles, which can be placed in three categories: 1) smart profiling, 2) smart design and 3) smart innovation.

FULL PAPER PRESENTATION

Urban Industrial Land and the Production of Space: A typomorphological analysis of urban productive spaces in the Jette-Koekelberg area in Brussels Capital Region

Frederik Marc Eric Vandyck and Inge Bertels
Architectural Engineering, Vrije Universiteit Brussel, Belgium

The proposed paper aspires to provide a typo-morphological analysis of industrial activity in the urban fabric of a productive hotspot of the Brussels Capital Region. The research fits within a larger PhD-track on the sustainable retrofit of productive activities in this region.

Due to zoning policies and increasing real estate pressure on urban land, a major part of the space-extensive productive activities has disappeared from Brussels' urban areas,

taking jobs and artisanal knowledge towards monotonous enclaves in the outskirts. Whereas European cities were rich of productive activities, they now mostly host consumption. This is problematic. Urbanists, architects and policy makers plea for the inversion of this process by reintegrating industrious enterprises in the urban fabric.

This planning enthusiasm, however, is confronted with a lacking support base among the public and therefore now chosen as subject to research. In order to overcome the gap between romanticized theory and practice, the proposed research aspires to bring architectural knowledge to the ongoing planning debate by using Caniggia's typomorphological system as the methodology for architectural and urban research. The analysis of existing co-existence in space of industrial and residential activities will benefit the overall comprehension of their temporal and spatial dimension. Through the mapping and hotspot clustering of productive activities in Brussels, the Koekelberg-Jette area has revealed a large concentration of such activities in a residential urban fabric and will therefore be analyzed as a case-study.

Concretely, the proposed paper aspires to obtain insights by the typo-morphological setup of existing productive activities in residential areas. The goal is to establish logical classes and systemically build a matrix of productive types.

ABSTRACT PRESENTATION

Building high? The tall building question in Finnish cities

Minna Chudoba
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The largest Finnish cities are currently densifying their city centers, to accommodate the growing population in a sustainable way. Densification has lead to the question of vertical construction and the role of tall buildings in the townscape. Several studies have been commissioned in the past few years, to study the local implications of vertical construction. Helsinki got its report ?Korkea rakentaminen Helsingissä? (Building high in Helsinki) in 2011, and a year later a similar study was published in Tampere: ?Korkean rakentamisen selvitys Tampereen keskusta-alueella? (A study on building high in the Tampere centre area). Several other Finnish cities (Kuopio, Espoo, Oulu and Turku) have also commissioned corresponding reports.

These reports note the historical background of tall buildings, referring to the skyscraper discussion of the 1920s. The current discussion is thus connected to a longer, ongoing national story. At the same time it is separated from it by a future orientation and a visionary outlook that has links to current global trends. The reports? suggestions for future vertical growth of Finnish cities is studied in varying scales in this presentation, from the controlling view of the whole city and the human

scale of the street. In the studies, the skyline effect and landmark qualities of tall buildings seem to dominate, bringing the question visibility in the townscape to the fore. The human scale and everyday experiences on the street level have received less attention. The studies do, however, bring up the importance of this question, for example, by subtly referring to the need for placemaking.

This presentation examines the studies on high construction in Finnish cities, published between 2011 and 2016, compares their viewpoints and relates them to a larger discussion on tall buildings, both diachronically and synchronically.

Tall buildings, high construction, human scale, densification

ABSTRACT PRESENTATION

Ambitions for Kiruna 2.0

Gerd Bloxham Zettersten
(retired, but affiliated to) Chalmers University of Technology, School of Architecture, Gothenburg, Sweden

The presentation will concern the city transformation of Kiruna, the mining town in northern, arctic Sweden, that is being partially moved to a new urban center development 3 km to the east. The urban plan was originally based on a winning competition project which was considerably reworked already from the outset of the project stage to fit in with requirements of what has been thought of as social sustainability, responding to the wishes of the public expressed in municipal inquiries in a far-ranging direct contact process accompanying the competitions for both city hall and urban plan. Already in the competition project urban plan this led to the inclusion of a single public meeting place, a polygonal ?square? [torg] with the city hall placed on it, surrounded by buildings for all central public functions--an outdoors public space, granted the arctic conditions, here being defined as a place where people can meet without it costing them any money. In the reworking of the winning urban project, the results of the direct contact process led to its reformulation as a green finger urban plan shooting into the surrounding nature making for easy access. This plan is also traversed along a diagonal by a long and narrow city park.

Here, then, the pronounced ambitions for a model smart city – Kiruna 2.0 – are based on high profile sustainability strategies. One such strategy has been the claim that the moving and tearing apart of technical systems boundaries, to be rejoined in new connections and across new boundaries, is a way forward to the creation of a smart city. A central tenet is that all supply systems interact, here specifically meaning electricity, district heating, water, sewage waste and most importantly, the buildings. In the larger picture of infrastructure and resource management, what stands out as significant are energy strategies and new energy systems that include the use of residual heat and natural light,

as well as new approaches to the organization of traffic and public transport, and waste regarded as materials for new usage. Obviously, within the overall effort of achieving an interaction between systems and approaches, many differing considerations are involved. In their ambition to create what may be understood as a 'smart city', Kiruna municipal Technical Department is intent on unlocking the potential that the city transformation offers, and in practice doing it through extensive testing.

The presentation will be based on interviews with key actors within the process and information materials supplied in this connection.

smart city, sustainability strategies, interaction between systems, social sustainability

ABSTRACT PRESENTATION

What do we need the zoning for? Changes in legitimizing the Finnish zoning system

Juho Rajaniemi*, Teemu Jama and Panu Lehtovuori***
** Tampere University of Technology*
*** WSP Finland Ltd*

The foundation for the Finnish zoning system was formed during the 1920s by enacting the Town Planning Act (1931). The very essence of the act was in engendering a planning system where one place can get only one function. Of course, this reflects the demand of the industrializing society for separating housing and polluting factories. The act was also legitimized by the need to organize use and ownership rights in growing urban areas for common good. Promoting zoning of private land, the law was supposed to support urban growth. Simultaneously, the state administration's age-old right for making town planning decisions was removed.

Zoning in Finland has been a municipal monopoly ever since. The Building Act (1958) aimed to restrain the so-called unplanned settlement outside of the town plan areas. By creating a three-level zoning system (regional plan – general plan – town plan), which is still in use, the act reveals the post-war urge for hierarchical administrative structures, an idealistic construction supported by strategic war theories.

With the adoption of the Land-Use and Building Act (1999), municipalities were no longer obliged to submit their general and town plans to state administration's control and approval. Instead, the act emphasized a more open and interactive zoning process; a kind of civic surveillance was meant to partly substitute the governmental control. This resonated with the optimistic and liberal tendencies of the era. The recent amendments for the Land-Use and Building Act have continued the long trend of reinforcing the local decision-making by the cost of the governmental bodies. The legitimation for the amendments was mainly based on the belief of a better effectivity.

Lately, many experts and politicians, the Finnish Minister of the Environment as one of them, have called for drafting a new law. Their arguments have built upon, among other things, climate change, the Finnish regional reform and digitalization including a new 3D-cadastral system. In our paper, we will discuss both historically and comparatively the basic question of what for we need zoning in the first place. For chasing the growth of the cities? For maintaining the value of the properties? For rationalizing the planning decisions? For controlling the townscape? Whatever the answer, the new law will require a new legitimation, a fresh reasoning for the urban planning. A broad professional debate is welcome in order to warrant a strong theoretical basis.

zoning, urban planning, Land-Use and Building Act

ABSTRACT PRESENTATION

Place-making through mental maps

Mia Pujol
University of Oulu, Oulu School of Architecture

Mental maps depict places and construct meanings embedded in the existing social and cultural settings. Hence, the social and emotional meanings evoked by the elements of the urban environment are at least as important, often more so, as the structural and the physical aspects of the urban environment itself. This presentation reviews the concept of place in establishing a design technique in light of the sense of place and behavioural geography (mental map) principles. The technique advocates the importance of place-based observation and its implication on the continuity of place meaning in regenerating Barcelona's seafront.

Place making, mental map, urban regeneration

FULL PAPER PRESENTATION

National urban park: a model for a sustainable city or a legislative cage for development?

Ranja Hautamäki
Aalto University, School of Arts, Design and Architecture, Department of Architecture

This paper addresses the concept of the national urban park (NUP) (kansallinen kaupunkipuisto) as a planning tool for rapidly growing cities. The focus is on the establishment process of a NUP in Tampere and Helsinki, where it has generated strong views both in favour and against. The study reveals these

conflicting arguments and examines the related objectives, values and stakeholders. The empirical basis of the study is a qualitative content analysis on the NUP planning and decision-making documents.

The paper demonstrates that the NUP can be seen either as a model for sustainable urban planning or as a legislative cage for development. On the one hand the NUP is regarded as restricting development, emphasizing static preservation, bringing no real added value, transferring municipal decision-making to the Ministry and engaging primarily environmental and heritage stakeholders. On the other hand, it is considered to be a long-term tool of urban planning, safeguarding values, contributing to tourism and engaging a broad range of actors. The research shows that the NUP process reveals the current tensions between nature and city, continuity and change, in rapidly growing cities. The paper also discusses how to use the NUP process to promote sustainable urban planning.

national urban park, establishment process, Tampere, Helsinki, urban planning

SESSION 3: EXPERIENCE AND PARTICIPATION

Chair: DR. ANNA LUUSUA, University of Oulu, Oulu School of Architecture

How will smart development change the experience of the built environment?

How will smart changes affect issues of participation, democracy, agency and access in the design, planning and development of the built environment?

FULL PAPER PRESENTATION

Resilient housing and care services for aging municipalities

Ira Verma
Sotera Institute, Department of Architecture, Aalto University

The ongoing Social welfare and health care reform in Finland has an impact on the services of the municipalities. The housing services for elderly will remain in the charge of local authorities. In the future, more people at old age are living in their own homes assisted by peers or by home care staff. The architects need to anticipate this development in the housing design and in the urban planning.

Researchers form Aalto University together with municipal and health care actors are collaborating in a Government Key project in a research and development project that aims on efficient and operational service structure through complementing the urban structure. The aim of the project is to provide a resilient local service structure for the aging municipalities taking account the existing resources.

As result of the study, cross sectoral collaboration within municipal actors and shared use of resources and spaces with public, private and non-profit organizations will enhance resilient and sustainable economy in the municipalities. The results of this local project will be disseminated for further use in other municipalities. The project is carried out in collaboration with the Ministry of the social affairs and health together with Ministry of the environment.

aging in place, small municipalities, services

ABSTRACT PRESENTATION

The antique and contemporary character of domus: Places for living

Martino De Rossi
University of Oulu

In order to develop a contemporary way of designing human scale homes in an urban context, like the growing cities of Finland, we should have a look into the past of the Western houses. In the Roman world, as we can see from the cities of Herculaneum and Pompeii, the house was the center and the focal point of the whole city life. For its various levels of privacy, the composition and disposition of the rooms, and the extremely close connection to the city, this research aims to find out if the Roman domus - a place for domestic, business and religious life - could be a model for how we should design homes today.

Is there a relationship between contemporary homes and their urban context or are they detached from it? Do we have enough privacy in our homes? Are the spaces big/small enough to satisfy the inhabitants' needs? In which way physical and psychological sphere are connected? By answering to these questions, the research project strive to focus on the composition of the house itself, on its proportions and on its relations to the city. A thorough knowledge of the Roman house will provide information for the search of a new design, for the architecture of a contemporary domus: a house that fulfills the developing needs of people in the contemporary society, taking into account the human needs, rather than maximizing the profit, as the real reason for building new houses for living.

city context life, co-living, urban atrium, human scale houses, proportions

ABSTRACT PRESENTATION

Personalized spaces to allow more independent life for visually impaired people

Jenni Merinen
Aalto University

Here I am proposing a short presentation to raise awareness of visually impaired people in public spaces. I wish to encourage designers, engineers and specialists of low vision to inspire and come up with ideas how smart environments could help visually impaired people to operate more safely and easily in them.

Currently visually impaired people need to rely mainly on assistants or other people in order to be able to operate in public spaces, such as railway stations, hospitals, schools, bus stops and department stores. Is there a need to reassess the building regulations and even laws concerning visually impaired people? We have already set various rules concerning people with reduced mobility, that have made their life much easier and safer. And above all, to enable more independent life for them. Could there be ways of using smart environments indoors and outdoors in order to allow more independent operating in public spaces for visually impaired too?

Some of the possible means could include a combination of traditional braille signs and technological inventions, auditive guiding or personal wearable equipment. When evaluating all the possible options of using smart environments to help the public life of visually impaired, one must keep in mind the various types of low vision; very few do not see anything, most see shapes, sense the change of lightning etc. This is why it is important to pay attention to colors, contrasts and lightning in collaboration with other possibly adjustable details.

Something to consider is not only the everyday use of the space, but a possible emergency situation. Since in these situations, where majority of the people are running or even screaming, it is almost impossible for a visually impaired person to ask for guidance or help.

Concerning all above, I would like to propose new means of guidance using the innovations of smart environments. Using sensors to recognize a visually impaired person in the space via their bracelet or similar, public spaces could be personalized to ease the life of visually impaired.
1. Adding contrast colored lighting or sounds around exist
2. Sending auditive guidance or other information to the bracelets
3. Adding contrast colors or lights to walls, bus stops or other spaces to offer guidance

visually impaired, smart environment, personalized space

FULL PAPER PRESENTATION

Costs are not the decisive factor: A property development assessment of the possible rehabilitation of a cultural heritage site

Mari Oline Giske Stendebakken* and Nils O. E. Olsson**
** Department of Architecture and Planning, NTNU*
*** Department of Mechanical and Industrial Engineering, NTNU*

In the choice between the rehabilitation of a cultural heritage site and a new build, recent history in Norway shows that the new build is often chosen, with reference to cost efficiency.

This paper compare the approaches to a cultural heritage site, from a property development and a cultural heritage point of view, to test this judgment. These two professional fields continuously overlap and need to cooperate. Thus, a closer look at their similarities and differences should provide valuable new insights.

The paper applies a case-study method to a larger country estate building at a NATO air base in need of office space. The building has legal protection on national level. Costs are calculated for three scenarios for new offices: rehabilitation the protected building, new build and renting. All alternatives include the law-enforced maintenance of the protected building, as the same public body carries out both tasks.

Out of the three alternatives, new-build and renting was the most expensive over a thirty-year time span. Rehabilitation was the most economical alternative. These findings indicate that owners of protected buildings should investigate possibilities to activate such buildings, not only due to their cultural heritage values, but also due to their economic potential.

cultural heritage, management, property development, project evaluation, early phase, architecture

ABSTRACT PRESENTATION

Aesthetic perspectives to creating urban smart sustainability

Sanna Lehtinen *University of Helsinki*

According to the new inter- and transdisciplinary research orientation titled sustainability science, accelerating sustainability transformation is a necessary move also within urban development. The human elements that are present, born, and cultivated as a result of the process of creating better everyday environments still require more work in order to be understood in a more thorough way. Experiential and aesthetic sustainability, for example, need to be better defined so that we can fully vision how sustainable urban development is possible.

This paper has philosophical environmental aesthetics as its starting point, but it lends ideas from social philosophy and environmental ethics in order to build a cohesive picture of the human experiential sphere in urban environments. This is done in order to gain a new understanding of how urban environments could be developed with aesthetic sustainability and an interpretation of a future perspective in mind.

Experientially, human beings form a relation to the future through the material objects in their surroundings. Buildings are more difficult to treat as this kind of relational objects, because of

the ubiquity of built objects in our societies and the everyday familiarity that veils many of their functions. Treating buildings as relational and future-oriented objects will open up a specific perspective to understanding futurity and the relation between current and future generations of human beings that use same constructed spaces. Experiencing and appreciating built space thus takes place in a continuum where many of the everyday ways of using spaces are also inherited and deeply intertwined with the ideas about usability of other generations.

It seems often, that there exist only the opposite poles of either modesty or arrogance in acknowledging the limits of our power to know what might be beneficial for others, whether our direct contemporaries or future generations of humans and non-humans. Instead of these polarizations the decisions about the future could be approached as negotiations with what we can know, combined with a strategical understanding of the risks related to the necessary element of uncertainty.

urban aesthetics, environmental aesthetics, intergenerational ethics, sustainability

ABSTRACT PRESENTATION

Computational Landscapes: "Immersive Experience through the Exploration of Mixed Reality"

Pia Fricker
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Federal Institute of Technology, ETH Zurich, Switzerland

So far data integration into large-scale landscape architecture is limited mainly to GIS (geographic information system) analysis for planning and evaluation or pure data visualization. Within the international discourse on the theme 'Big Data - Data Overload' the main goal of the paper is to present a strategy for visionary application fields of human interaction with large-scale environmental data flow in the realm of Virtual Reality. The multidisciplinary research project aims at developing an innovative platform in VR to enable the designer as well as the future users of a landscape architecture project to actively understand and interact with the hidden layers (data-sets) of the place. Perception, imagination and engagement with abstract data will open up new possibilities to reveal unexpected relevance of data-sets in relation to design.

This cutting-edge spatial perception space aims to open up new ways of simulation and participatory processes in environmental design and urban development in order to shape the future and give sustainable answers for the societal and environmental challenges. The novelty in the research project lies in the direct involvement of the humans into the design process to empower them to play an active role in the process and to enhance their future wellbeing. So far we are missing tools to overlay high-detailed real-time data of a site (pointcloud) with 3D

models of a future design and their site-specific data-sets in combination with user-centered interaction. These tools are urgently needed to integrate the increasingly complex settings of future tasks in order to achieve a meaningful distillation and interaction with data.

We are currently at a crossroads where conventional approaches to landscape architecture and urban challenges do not serve justice to the increasing complexity of environmental, social and political issues, which require solutions that are both visionary and sustainable. Climate change, global developments such as urban sprawl and the rapid growth of cities require strategies that integrate geographical, ecological, sociological and infrastructural datasets into planning. Landscape architecture is challenged to combine heterogeneous fields of action that are both physical and philosophical, scientific and poetic, and bring together past, present and future potentials into a single meaningful whole. This situation has lead to develop a framework and tools to recall the potentials of landscape architecture with a special focus on computational design methodologies within the realm of VR.

Landscape architecture has to be strengthened as an integrative discipline deeply rooted in shaping and preserving nature to the design of sustainable environments with a site-specific character by integrating future-oriented technology. In the era of 'data-overload' special attention must be given towards how data is handled and how specific information is chosen to move from mere 'data mapping' and 'datascapes' to the development of coherent and fully functional data-driven design tools. These tools are tested and applied within the experimental design studio: Entering Mixed Reality at Aalto University, Finland. The overall goal of the pilot prototype studio is to investigate the potential of the integration of new technology to achieve a new reading of the BIG DATA topic.

virtual reality, simulations, parametric design, participatory design, datascapes, data mapping, big data

ABSTRACT PRESENTATION

Smartness experienced? The sustainability of embedding novel technologies in everyday urban life

Vesa Vihanninjoki
Discipline of Aesthetics, University of Helsinki

The world's and humanity's future is urban, one might say. Thus enhancing the sustainability of urban life-forms and developing more sustainable ways of urbanism are of crucial importance from the global point of view. The actions, however, are usually more local, focusing either on national or municipality-level phenomena by formulating and implementing various directive or regulatory policies. Smart cities and developing the smartness of urban environments by introducing novel technological solutions can be seen as a major contribution to such 'sustainability project'.

Urban sustainability is yet an all-encompassing issue, covering economic and ecological, as well as social and cultural dimensions. Nevertheless, especially in Finland, certain technologically-oriented view on sustainability seems to have a rather dominant or even hegemonic status regarding the sustainability discourse. For example, when the Finnish Ministry of Environment published Finland's new action plan for sustainable urban development in July 2017, ten out of thirteen pointed priorities had to do with the infrastructure or building-related technological solutions, whereas the cultural side of urban sustainability was practically lacking altogether. In comparison, the New Urban Agenda, released by United Nations in October 2016, specifically envisages cities that (among other things), are participatory, promote civic engagement, engender a sense of belonging and ownership among all their inhabitants, [and] enhance social and intergenerational interactions, cultural expressions and political participation [?] in peaceful and pluralistic societies.

Though it is clear that the context and the 'target group' of the UN's agenda are rather different compared to those of Finnish national programmes, one is still tempted to ask whether some of the issues named in the agenda are at times taken for 'too granted' in western welfare states like Finland. For example, related to the smart cities theme, it might be appropriate to critically evaluate how the ever increasing technicality and smartness of urban environments affects the 'sense of belonging and ownership' among all urbanites – not merely among the technologically-oriented pioneers. The critical question hence concerns the urban experience and its quality: how is it possible to embed novel technologies in everyday urban life, so that its most basic structure would remain undisrupted, that is, so that the inherent experiential familiarity and certain smoothness based on socio-culturally conditioned habitual conventions would not suffer unnecessarily. After all, it is the 'smartness experienced' that defines our relationship to the urban environment, and our engagement to enhancing its sustainability also in the future.

urban experience, urbanism, sustainability, equality

ABSTRACT PRESENTATION

Everybody loves balloons! Potential of art projects as a tool for culture-led urban regeneration

Tiina Hotakainen*, & Essi Oikarinen***
** University of Oulu (Finland), Oulu School of Architecture*
*** Vienna University of Technology (Austria), Faculty of Architecture and Planning*

In planning practice and research, art projects and their potential for culture-led regeneration have been generally underestimated. Often seen as trivial experiments without any considerable value to strategic urban development, art projects in public space are merely a superficial decoration, although we argue that they could contribute much more to place-making. Embedded

in a contextual framework, we suggest developing them into tools of urban regeneration research and practice. We propose an inclusion of a temporal perspective in our tool.

We explored connecting the rhythmical layers from daily, momentary and cyclic uses to a long term, linear strategic urban regeneration through a pilot project based on action research methodology. The project was implemented as a summer course at the Oulu School of Architecture, University of Oulu, Finland, using action oriented pedagogy. After a preliminary analysis of the case area Myllytulli, a central public space Åström park was chosen as a research site. Architecture students collected data from the case area through on-site surveying, recordings and pictures during a 12-hour period in June 2017. The spatio-temporal analysis of the place was transformed into an art installation, which was displayed in the annual event 'Oulu night of the Arts' in Mid-August 2017. Visitors could experience the installation in Åström Park.

Through visualizing and displaying the located data on the exact place where it was collected to the public, the art installation gave insights on connecting temporal layers of urban experience and development. Practical implementation was close to community art practice. The art installation enabled public discourse on the current usage and future possibilities of public space, which brings up a possibility of handling controversial topics in urban development through the framework of art – as has been done in the art world for decades. This opens new potential for bringing development processes closer to public, as well as developing integrative methods for planning and design practice, where data on urban environment, its dissemination and feedback from the public are brought together. In general, the project opens a discussion on the opportunities offered by cultural and art-led practices in urban development context.

action research, culture-led regeneration, public space, place-making, space-time design

SESSION 4: SMART LIGHTING

Chairs: DR. HENRIKA PIHLAJANIEMI, researcher, responsible leader of the SenCity project, University of Oulu, Oulu School of Architecture

DR. EVELIINA JUNTUNEN, Senior researcher, project coordinator of the SenCity project, VTT Technical Research Centre of Finland Ltd

Lighting – an essential element of architectural and urban environments – is turning to smart as intelligent controlling, sensing technologies, and IoT solutions are spreading gradually to our everyday environments. Smart lighting as a concept can be seen to possess great potential concerning sustainability and energy-efficiency, functionality, well-being, and multifaceted experiential value. As technology and solutions are developing with intense pace, there is a growing need for research about design factors, methods for implementations and the results of pilot projects. Topical research perspectives include, for example, users' experiences, technological solutions, impact to environments and communities, as well as innovative future visions.

We invited researchers to contribute to the advancement of the Smart Lighting research by submitting papers that address the recent developments and findings of the theme. The research questions could cover topics such as:

- *The role of lighting in smart city and smart architecture contexts*
- *Smart design for smart lighting*
- *Users' experiences of smart lighting*
- *Well-being and added value*
- *Smart lighting and services*
- *Smart lighting technologies and solutions*
- *Sustainability*
- *Smart daylighting*
- *Critical perspectives and theoretical insights*

ABSTRACT PRESENTATION

SenCity - Piloting intelligent lighting as a service platform for innovative cities

Eveliina Juntunen*, Henrika Pihlajaniemi, Esa-Matti Sarjanoja*, Anna Luusua** and Juho Eskeli***

**VTT Technical Research Centre of Finland*

*** University of Oulu, Oulu School of Architecture*

'SenCity – Intelligent lighting as service platform for innovative cities' is a national research and development project between Finnish cities, companies and research partners. Projects aims at employing lighting infrastructure as a service platform for smart lighting solutions and innovative, user-oriented services in urban environments. The project develops intelligent LED lighting pilots in participating cities, to which companies involved develop solutions to better respond to the cities' needs. The research partners integrate the project together through the design of pilot contents and realization, user experience evaluation and technical development and testing.

The project pilots smart lighting solutions in six Finnish cities in different kinds of urban environments. The research focus is dual: to study user needs and experiences of smart solutions, and to develop and test technology needed for such solution in harsh northern outdoor conditions. Together, separate pilots in different cities around Finland create a living lab ecosystem for developing and testing innovative solutions.

Lighting infrastructure is centrally located in city, close to people and activities. It provides excellent opportunity to collect and deliver information and services beyond lighting. In the pilots, the target is to employ lighting infrastructure as a service platform - an Internet of Things backbone - in the intelligent city. Each pilot has a focus in a different theme or application context like interactive and communicative lighting and digital services in the city; traffic safety in residential area; smart lighting and services for kids and young people; smart technology in a road environment; and collecting and exploiting data for city centre needs. The pilots vary in complexity level concerning both design and research targets. In the presentation, pilots are introduced discussing the most interesting demonstrations and conclusions achieved. The user needs and experiences, technological aspects as well as experiences of collaboration in SenCity network are approached.

intelligent lighting, smart city, pilot, user-oriented

ABSTRACT PRESENTATION

Evaluating users' experiences of adaptive lighting while walking and driving – Reflection on methods

Henrika Pihlajaniemi*, Anna Luusua* and Eveliina Juntunen**
University of Oulu, Oulu School of Architecture
****VTT Technical Research Centre of Finland***

New lighting control and sensor technologies are gradually changing the paradigm of outdoor lighting in our everyday environments from static to adaptive and intelligent. Even though the technology is already available for such solutions, the implementations are still rather rare and recent and there is a lack of knowledge on user's experiences to support design processes. Thus, in our research, development and piloting projects, we have aimed to increase understanding of user's multifaceted experience of adaptive lighting and of the methods for evaluating it real-world contexts.

The presentation explores our methodological findings through presentation of three evaluation case studies carried out in different types of routes in three cities in Finland, as part of two research projects. Generally, in our research we have aimed through piloting and evaluating adaptive lighting in real-world contexts to increase understanding of the users' experiences of such environments and specifically of lighting behaviour which adapts to the presence and/or movement of a user in a route. In the presentation, we introduce three pilot case studies and present the objectives, contexts, adaptive lighting solution, and methods that are used in evaluation of users' experiences. The contexts of the case studies were a park route in a city centre, a light traffic route in a housing area, and a collector road within a housing area.

The evaluation methods, which were tailored to each pilot context, include questionnaires, in-situ interviews and the experience gauging walking interview method, which means in situ participant observations coupled with a semi-structured walking interview. The presentation reflects on the evaluation processes and methodologies, through viewpoints of context, researchers' and participants' roles, emic and epic experiences, sharing of information, and characteristics of knowledge.

adaptive lighting, presence based lighting, smart lighting, experience evaluation, method

FULL PAPER PRESENTATION

Ambient adaptive lighting

Kjell Yngve Petersen
IT University of Copenhagen

The concept of adaptive lighting suggests architectural lighting designs that adjust and react to the living practices of inhabitants and variations in the environmental

conditions. Current developments in lighting technologies, such as LED light sources and IoT infrastructures, open for new opportunities with adaptive lighting, possibly operating as an IoT service rather than build into building management systems.

Adaptive entanglement through dynamics of ambience: The dynamic flux in lighting changes the experiential presence and brings focus on change and variation rather than states, levels and structures. The suggestion is to enable adaptive entanglement through an expanded field of dynamic flux in the artificial lighting, and couple between the daylighting and the artificial lighting through an integration of ambient contexts.

Experiential Prototypes: The project develops experiential prototypes, with which the dynamic design parameters of adaptive lighting can be investigated, analysed and tested. The stagings are full-scale architectural scenographies, which situate investigations into how the experience parameters of fluctuating artificial lighting, integrated with daylight flux in an architectural space, are experienced to influence the experience of architectural space, social situations and everyday activities.

adaptive lighting, ambient light, experience, performance, perception

ABSTRACT PRESENTATION

Smart technology, stupid solutions

Roope Siiroinen and Heikki Lamula *Valoa Design Oy*

Intelligent technology enables lighting control and automation that works with different indicators. Intelligent technology enables aesthetic choices in relation to space, architecture and human behavior more widely. In the areas of architecture and infrastructure planning, development has been rapid and raises more questions than answers. There are no complete answers for design concepts or lighting styles that fit and utilize intelligent technology. First starting point is that intelligent lighting is a broad and abstract concept whose content we may not yet fully understand. One starting point for applying intelligent technology is aesthetic and visual; How light can be shaped to take into account the whole of the space, the environment and the human being's world. The second starting point is functional; How the basic needs of mobility and vision can be facilitated by lighting. The third starting point is the lighting style; Whether the whole point of lighting thinking should be based on intelligent technology rather than being applied to solutions that have been used before it has been possible to use intelligent technology.

lighting design, intelligent lighting, lighting styles

ABSTRACT PRESENTATION

Smart lighting and visible light communications: A happy marriage

Marcos Katz* and Jari Laru**
** Centre for Wireless Communications, University of Oulu*
*** Learning and Educational Technologies, University of Oulu*

In this presentation, we discuss the idea of combining two novel technologies exploiting light, namely smart lighting with visible light communications (VLC). Visible light communications allow transmitting and receiving wirelessly data using light. LED (light emitting diodes) sources are used for that purpose. The same light sources are typically used in smart lighting applications due to their flexibility, controllability and high energy efficiency, among others. In this presentation, we discuss how these two technologies can be combined to create an environment that provides wireless connectivity as well as the means to inform and orchestrate intuitively practical situations, both exploiting the same lighting infrastructure. The school of the future is identified as a very attractive scenario where the proposed concept can be used.

smart lighting, visible light communications

ABSTRACT PRESENTATION

Adaptive lighting interventions in knowledge work environments

Piia Markkanen, Henrika Pihlajaniemi and Aulikki Herneoja
Oulu School of Architecture, University of Oulu

Up-to-date adaptive lighting solutions enable various lighting control practices, such as programmed lighting, user-controlled lighting and sensor mediated lighting control. In combination, these control practices can be used to design intelligent and adaptive lighting systems that support the user-needs on different levels, such as their circadian rhythm, organizational routines and individual task-related needs. Current lighting solutions enable dynamic changes of illuminance level, color temperature of white light and color of light. Previous research has linked lighting appraisals and user-control of environment to workplace satisfaction. Therefore, understanding the role and emerging possibilities of adaptive lighting in knowledge work environments are presently important areas of lighting research.

In our research project InnoStava (www.innostava.fi), we study innovation supporting knowledge work environments, and their features, such as lighting, in local startup companies in Northern Finland. In this

presentation, we discuss and reflect the design of two real world pilot interventions, where the use of adaptive lighting was tested. We use research-by-design methods in both case studies and collect user-experience data to evaluate the pilots. Lighting setup was different in case studies due to organizational differences. The tested lighting scenes entailed different static and dynamic scenes with, for example, circadian mimicking or temporary dynamic changes in illuminance levels and color temperature.

adaptive lighting, knowledge work environment, research-by-design

FULL PAPER PRESENTATION

Granular dimming of lighting in offices: User experience and acceptance

Sanae Chraibi*,, Charlotte Rosenkotter**, Patrick Creemers**, Evert van Loenen**,*** and Alexander Rosemann****

** Philips Lighting, Eindhoven, The Netherlands*
*** Eindhoven University of Technology, Eindhoven, The Netherlands*
**** Royal Philips, Eindhoven, The Netherlands*

Sensor triggered control strategies can limit the energy usage of lighting by considering the presence of users in the office, and dimming lighting down when it is not needed. In multi-user offices, the application of occupancy-based dimming on room level limits the energy saving potential. However, zone or desk level dimming may affect the comfort of co-workers by its dynamics.

This paper reports the assessment of occupancy-based dimming in a mock-up office with 17 subjects. Subjects consisted of co-workers, experiencing changes triggered by others. While the participants performed an office-based task, the luminaire above an actors' desk was dimmed from delivering an average horizontal illuminance of around 550 to 350 lx, and vice versa, using different fading times. The participants evaluated the dimming conditions regarding their noticeability and acceptability.

The study showed that the percentage of participants that notice a light change increases with a shorter fading time. Dimming with a fading time of at least 2 s was experienced as acceptable by more than 70% of the participants. The results of this experiment provide insights to design a system behaviour that does not compromise user experience while addressing energy efficient use of electric lighting.

lighting control, occupancy, fading time, open-plan office

ABSTRACT PRESENTATION

Wireless self learning lighting control

Måns Paul, Henri Juslen, Matti Vesterinen, Jukka Ahola and Lars Hellström
Helvar Oy

Like in the other industries, wireless solutions are emerging also in the lighting industry. The benefits of wireless come in all stages of a lighting project. It makes designing easier, installation simpler and configuration faster. Wireless lighting solutions are as well easy to integrate with other building automation.

A wireless luminaire-based continuously-learning lighting control solution has several benefits over the traditional way to control lighting with controllers, such as panels or sensors, that are wired to the control gear of the light source. Specifically in lighting renovation projects it might be problematic to assemble additional control wiring into old buildings. Wireless luminaire-based lighting control solutions do not require any additional wiring and can be taken in use without programming or configuration due to the employed artificial intelligence. The solution deploys a wireless technology of Bluetooth Low Energy Mesh, which is a self-healing network topology.

Wirelessly networked luminaires learn the movement patterns in the area they are installed and use those patterns to adjust the luminaire operations in order to maximize the energy saving and optimize the lighting conditions for the end users. The solution is continuously learning, updating and fine-tuning the lighting conditions accordingly. The lighting can therefore automatically re-adjust itself to layout changes in the office.

Cloud based solutions make it possible to analyze and make decisions based on the information collected from luminaires. The sensors placed in each luminaire generate massive amounts of data about how a building is used. The movement data and heat maps can be used to generate valuable information about room occupancy, indoor navigation and asset tracking. The wireless network in the luminaires as well enable an interface to other networks of the building automation, such as HVAC or elevator control.

wireless, self learning, bluetooth mesh, automation, ActiveAhead

ABSTRACT PRESENTATION

Smart lighting solution in architecture of hospital campus

Sara Leino *Granlund Oy*

I would like to introduce three lighting project of productive production from wellbeing, visual and artistic viewpoints. In perspective of hospital building's view from inside to outside, in time of darkness, offer the special value for the patient?s and staff. There is three main project as guidelines in lesson: New Children Hospital, Tampere TAYS Building and Area lighting and Pitkäniemi Hospital (material possible to get later). All of them are in different period of construction stage.

New Children Hospital façade is such a piece of Art in architecture. With various play of lighting movements changes the feeling of building. Sensitive and musical façade of spectrum welcomes patients and parents in emotional, visual and intelligent level. Facade changes the rhythm and speed of light in time of day and season. In the time of darkness it is as an interface both inside of building as from the outside view.

There is inside each patient room special health Kehrä-luminaire which can be control by in tablets. Patient can paint with luminaire on her own, with favorite music, fairy taleing stories during difficult nursing operation. Those movement of hues can be seen to the outside as part of intelligent building as 'life', in colors. In addition there is theme of lighting scenes describing Nature as seaside, morning hues, light in forest, rainbow etc. Lighting designer has design the luminaire exactly for use by patients (Leino design).

Upper patient's floors has an individual meaning of architectural contest and sensitive movements of reflection of effect lighting paints ceilings in corridor's . It can be seen from the street level as visual unbroken vibration of storyboard. On the terrace of fourth floor are lying in a big 'moon stones'-luminaires of intelligence wireless controlling and detective sensor system (Leino design). Those are telling the solid story in urban scene during the dark period and night. The whole building is telling the visual story during long dark periods both inside and outside of building. It is a visual smart lighting.

TAYS Hospital area get a smart façade lighting in part of the main buildings. Children hospital building has an interesting mode of curve shape. It has made by different blue-green hue of mosaic on a large scale which is going to be illuminate by hues of controlling light. Idea is to get façade shine in real color of surface in an ultimately deep method. The smart technology enables a modern visualization in architectural contest. Main entrance of Campus are getting in hues of daylight illumination by led-luminaire for the transparency graphite surfaces, it works as part of smart guiding system and create a positive feelings for the customers, in a dark hours.

All of Lighting technologies, luminaires and controlling systems are based on sustainability, energy efficiency and well maintenance.

smart lighting, well-being, art

FULL PAPER PRESENTATION

Light and media-projections in patient rooms. A preliminary case study

Esben Oxholm, Ellen Kathrine Hansen and Stine Maria Louring Nielsen
Aalborg University Copenhagen

New media and lighting technology and new ways to connect and control it has potentials to improve the environment in hospitals with the goal of increasing patient satisfaction. How should such system be designed to do so and how can it be tested? In this paper it is investigated how a specific case, an interactive lighting and media system installed in a patient room, can be improved to support a greater experience of patient satisfaction and to investigate how the patient satisfaction can be measured. Through questionnaires given to the new parents staying in an interactive patient room and a standard patient room, the experience of staying in each and the patient satisfaction has been assessed. The results imply several areas where the interactive media system can be improved to provide higher patient satisfaction: The control of the lighting needs to be less complicated, the different lighting settings needs to be better tailored to the actual needs, noise from the projector and light coming from the iPad needs to be reduced, and for critical situations, the medical equipment needs be an exact copy of what the caregivers are used to. The results showed no difference in the overall patient satisfaction.

ABSTRACT PRESENTATION

WelLIT – Intelligent lighting and well-being in Northern learning environments

Henrika Pihlajaniemi
Oulu School of Architecture, University of Oulu

The presentation describes the aims and content of a research project WelLIT and presents one of its case study implementation projects in detail. The objective of the research is to study in which ways intelligent and adaptive lighting can be designed for learning environments in order to support well-being. This objective includes generating of new knowledge of the design process of such environments, applying participatory methods, as well as widening the understanding of the influence of intelligent and adaptive lighting on both pupils' and teachers' well-being in school environments. The objective is through the qualitative evaluation of the case studies, to generate knowledge of users' experiences of intelligent and adaptive lighting in the context of learning environments and, more specifically, in open learning environments. Methodological basis of this research is in the traditions of research-by-design and qualitative research. Additionally, this research can be defined as transdisciplinary research, which concerns fields of architectural research, lighting research, ethnography, HCI and learning sciences.

Case Rantajousti Elementary School in Tyrnävä: Multi-use hall with tunable white lighting and communicative light art

In my consulting office, I have designed an intelligent tunable white lighting and communicative light art for a multi-use hall space of Rantajousti Elementary School, Tyrnävä. In the low part of the hall, the colour temperature of the general ceiling lighting can be controlled flexibly from 3000 K to 5000 K and the light intensity levels can be controlled, as well. In the high part of the hall, a light art piece 'Cloud' consisting of suspended tunable white luminaires (range 3000 – 6000 K) and low-resolution fabric screens, which can present dynamic low-resolution figurative content, is situated. The space receives only a small amount of natural light and is thus highly dependent on artificial light also during the day. The building was finished and taken into use in August 2017. In the case study, the objective is to design and test different ways to use biodynamic lighting which can contain artistic and communicative elements. The first, implemented lighting control solution applies a biodynamic strategy where changes in illuminance levels and in correlated colour temperature imitate the changes of daylight during the day. The artistic content of the screens supports this rhythm with dynamically altering photographic sceneries of clouds and sky during different parts of the day. In the course of the study, different control strategies of lighting and content options for the suspended screens will be designed in a participatory design process with pupils and teachers and the experiences of the users will be evaluated.

intelligent lighting, well-being, learning environment, human centric lighting, biodynamic lighting, participatory design

FULL PAPER PRESENTATION

The Northern and Southern lighting cultures

Sarunas Noskaitis, Lucrezia Seghi and Spyridon Spanos
Aalborg University Copenhagen

In order to create awareness of different qualities of light in indoor living spaces, two different lighting cultures are investigated, a Northern and a Southern European. These investigations are used to design lighting scenarios based on the end user's preferences. The aim is to illustrate the relation between natural and artificial light, how natural light affects the use of artificial light in indoor living spaces based on geographical position and social/cultural habits of different countries, and thereby communicate to the user how different lighting scenarios can improve the use of the space. The findings from this specific project are meant to support the development of scenarios for future lighting fixtures and control systems.

lighting cultures, North and South Europe, user centered design, lighting design scenarios, indoor living space

SESSION 5: SMART BUILDING DESIGN AND CONSTRUCTION

Chair: Professor JANNE PIHLAJANIEMI, responsible leader of the Modern Log City -project, University of Oulu, Oulu School of Architecture

Design and construction of buildings are developing towards more intelligent solutions and practices. The use of different design tools and methods, more advanced systems to connect design and building phases, novel construction methods, as well as innovative use of building materials can be recognized as examples of this progress. This has produced an obvious need for research about design factors, methods for construction as well as the implemented results of these. A special interest in this track is an innovative use of massive wood as a design or building material, but the research related to all other building materials was also welcomed.

We invited researchers to contribute to the advancement of the Smart Building Design and Construction research by submitting papers that address the recent developments and findings of the theme. The research questions could cover topics such as:

- *The role of architect in novel design processes*
- *The development of design and construction tools*
- *The development of building materials and construction methods*
- *Designers', constructors' and end-users' experiences*
- *Well-being and added value*
- *Critical perspectives and theoretical insights*

ABSTRACT PRESENTATION

Geopolymers – an environmentally friendly building material

Juho Yliniemi and Mirja Illikainen
Fibre and Particle Engineering Research Unit, University of Oulu

A new building material, which will stand the test of time. And the best part? It can be made out of ash.

The material is called geopolymer. It can be described as a concrete and ceramic-type material, consisting of a polymer network of silicon and aluminium.

The earliest buildings that have been proven to be made of geopolymers were made in the ancient Rome which demonstrates the excellent durability of this material. Recent investigations of ancient Roman marine structures have shown that one component of their concrete mixture was ash. Modern day examples of geopolymer structures can be found from Ukraine, Finland and Australia. In the 1950s in Ukraine several buildings were made from slag - a side stream from steel industry. In Finland, Bob Talling is a pioneer in the field of geopolymer research and has made geopolymer roof tiles for his own house in the 1980s. The most recent example can be found from Australia where the Global Change Institute building was constructed from coal ash and slag-based geopolymer.

Nevertheless, geopolymers have only been studied systematically in the 21st century. The main reason for the recent interest in geopolymers arises from their high compressive strength, high temperature resistance and an ability to immobilize heavy metals. Especially the environmental hazards in mining and energy production increase the urgent need for a material that can encapsulate harmful components.

Most buildings are made of ordinary cement. Despite being an excellent binding material, it has its drawbacks. Cement is produced from limestone by combusting it at 1400 °C. This combustion process produces a huge amount of emissions. To be exact, it produces one ton of carbon dioxide emissions per one ton of cement. Since cement production is a massive business, the mining activity costs and the energy costs are massive as well.

This is where geopolymers can make a big difference. By replacing cement with geopolymers, we could decrease carbon dioxide emissions by 80% and decrease manufacturing costs by 70%. This is due to the fact that geopolymers can be manufactured from industrial waste, such as ash from the energy producing sector, slags from the metallurgical industry and tailings from mines.

Geopolymers are made by mixing waste material with an alkaline solution. The alkaline solution will dissolve silicon and aluminium from the waste which will then start to harden. You can use the same mixing methods with both cement and geopolymers. After the mixture has been cast it will continue to harden for decades. In addition to the decreased environmental impact, geopolymer materials can be developed to have lightweight and ductile-properties which can yield to many interesting options for architecture design. There are several on-going geopolymer research projects at the University of Oulu. Their subjects are Finnish waste from mines, the steel industry and the energy sector. By using local waste materials we can help the industrial sector decrease environmental risks and costs related to landfilling.

building material, geopolymer, environment, industrial side stream

ABSTRACT PRESENTATION

Modern log city research project

Janne Pihlajaniemi
Oulu School of Architecture, University of Oulu

Modern Log City project (2016–2018) is a research-project focusing on novel log architecture that is suitable for urban environments, application of mass customization in the design of log buildings and life-cycle economics of log buildings. The research perspective includes both small-scale log buildings from holiday homes to detached houses and large-scale log buildings from apartment buildings to public buildings.

The project includes a preliminary research phase, where challenges and opportunities related to the increase of market share of log construction are specified. The target groups of the preliminary research are consumers, owners, authorities supervising construction and representatives of building industry.

The preliminary research phase is followed by the design research phase, where log architecture suitable for urban environments is studied by preparing architectural designs for both small and large-scale building projects and by reflecting them. In the evaluation phase, feedback about the architectural designs of the design research phase is collected from the target groups of the preliminary research phase. In addition, the life-cycle economics of the plans is studied.

As a result of the project, concrete architectural plans for log buildings are developed, as well as new knowledge of the challenges and opportunities of the increase of market share of log construction is generated. In addition, the project will include seminars and presentations of the realized pilot projects.

The presentation shortly summarizes the results of the preliminary research phase as well as introduces guidelines of the ongoing design research phase.

building design, wood architecture, design for industry, sustainability

FULL PAPER PRESENTATION

Perceptions of log and log buildings among Finnish architectural and building industry professionals

Anna Luusua, Matti Lakkala and Janne Pihlajaniemi
University of Oulu, Oulu School of Architecture

Log as building material is undergoing rapid technological changes due to the introduction of industrially developed lamella log. This new material expands the technological repertoire that is

available to architects when designing with log. Furthermore, various societal trends relating to ecology, occupant health, and contemporary architectural expression are potentially altering the status and desirability of log as a building material. Thus, from the point of view of architectural research, the log as a building material should be re-investigated. In this paper, our aim is to scrutinise log and log construction through exploring how log is currently perceived as a material among Finnish building professionals. For this purpose, we analyse interviews conducted with 15 professionals in Finland. To gain these research materials, we utilised a method where a traditional semi-structured interview is combined with an in-situ interview in a pavilion construct built by our research team. We complement these materials with brief reviews into wood research and the history of log construction in Finland.

log, timber, wood, log construction, building professionals, perceptions, semi-structured interviews, architect, architecture students, log industry

FULL PAPER PRESENTATION

Industrially produced log: Essential architectonic features in the scope of contemporary architecture

Matti Lakkala, Janne Pihlajaniemi, Eevamaria Juuti and Riikka Kuittinen
University of Oulu, Oulu School of Architecture

Timber log is an ancient building material that is again current because of its structural simplicity and ecological aspects. Log as a product has become a long way in terms of technical quality and production techniques since ancient times. Log architecture is lot less developed and is based mainly on mediocre examples of log manufacturers model catalogues. There is a growing demand on using log in public buildings and in urban areas. This leads to a need for development of log architecture made of industrial logs. In order to scrutinize novel architectural solutions for contemporary log architecture, this article clarifies through literature review what kind of building material contemporary industrial log actually is in the scope of contemporary architecture, and it is also investigated how log is used by renowned architects in contemporary architecture through analyzing five exemplary buildings. Based on in-depth architectural analysis of these buildings, architectonic themes emerge that are essential to contemporary log architecture. These include overall structural configuration of log building; using tradition as an inspiration for novel solutions and versatility of log. In this study it is concluded that there is a lot of unused potential in architectural expression of log buildings made out of industrial logs.

log, log architecture, industrial log, wood architecture, contemporary log architecture

SPECIAL EVENT: ICT INFRASTRUCTURE FOR SMART LIVING. IOT AND DIGITAL TRANSFORMATION

Chair: VADIM KRAMAR, Researcher, OuluUniversity of Applied Sciences, Finland

PEKKA JOKITALO, Super IoT Alliance Leader, VTT Technical Research Centre of Finland Ltd, Verkotan Ltd, Finland

Smart Living is a concept of building people-oriented lifestyles supported by a smart environment that consists of smart spaces – interoperable, and possibly nested or intersected. Smart City, Smart Home, Smart University, Smart Factory, Smart Hospital, Smart Community, and many others are examples of smart spaces.

Development of solutions within the Smart Living concept assumes involvement of a diversity of technology enablers (such as printed electronics, wireless communications, energy harvesters, etc.) in a great number of application areas (such as government, health, education, culture, art, commerce, etc.) and a variety of business domains (construction, energy, service, health, banking, industrial, transportation, etc.).

We invited people from business and research circles to discuss a use of IoT technologies in the development of smart spaces and cities:

- *What are the gups and challenges of the current Smart City IoT solutions?*
- *What are the business interests of IoT companies with respect to smart city domain?*
- *How may Super IoT Alliance help to satisfy the business interests?*

SPECIAL EVENT SPEAKER'S PRESENTATION

IoT enabled smart city: Requirement and challenges

Helmi Ben Hmida
IoT and Digital Transformation expert, Fraunhofer IGD, Germany

IoT enabled smart city is emerging as a key component to enable the vision of smart cities. Recently, it has been highlighted through different studies that "the success of the smart city depends on interoperability, achieved through standards and layered architectures". My talk will highlight the today status of IoT Enabled Smart city and the estimated benefit of the integration of Horizontal platforms for Cross-Domain Use Cases and data sharing objectives.

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