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Accelerate SSL Innovation for Europe

Deliverable

D2.7 Workshop on the progress of green business development in sustainable cities

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Summary

There is need to develop networks for sharing explicit knowledge about the opportunities and hurdles for the new lighting. As a starting point ten SSL-erate city workshops have been conducted in 2015. It has created both networks and an understanding regarding the new light solutions both by discussing and setting roadmaps (like in Eindhoven), and also by showing some examples at those workshops. It has also helped to clarify how SSL-erate can promote a move towards focusing on creating better human light environments, better schools, better workplaces etc.

During the workshops it has been clear that we need more intelligent lighting systems that provide **the right light at the right place at the right time**, which besides being a light adapted to the locality/activity also enables energy savings. Cooperation among various actors is a fruitful way to be able to achieve this. It is often suitable to aim for a Triple Helix participation[1] in SSL-erate workshops, where all the different actors share views about the potential of more advanced light solutions. In several workshops there have been discussions that have led to useful insights. Some have been between different actors within the same subject area and/or region and some between different stakeholders and in some cases a Triple Helix approach. New networks have been one of the outcomes and a wider understanding of the technical potential as well as what wishes/demands the users have regarding the new lighting solutions. The dialogue topics have included what type of light (intensity, color temperature, algorithm, etc.) could be used and how a smart user interface could be developed to control even a very sophisticated system in an easy user-friendly way.

One showstopper is the established building norms and old standards. The workshops showed that these vary a lot between cities and countries. Another common issue is that there all kinds of hindrances, different in all the participating cities, that have to be overcome in order to enable the implementation of the SSL and HCL-approach in a broader context. To overcome these hindrances several parallel activities are needed, where the different workshops play an important role. To be able to change norms, standards, framing, etc., the key is to generate knowledge/insights among the actors. It is important to start the process and test and demonstrate new possible solutions. The workshops are a very useful format for doing this. Where different actors meet, possible solutions are shown/demonstrated and benefits are made more apparent. With the knowledge/experience and visions spread among these actors the road to change these norms/standards, etc., has taken a start towards future light solutions.

The different workshops have also been useful in activation of sustainability interests as motives and tools for accelerated deployment of SSL. A sign for this is in the feedback from the participants and the new networks/dialogues. The workshops have also served in generating sustainability-oriented interests, knowledge and control measures to promote investments in high quality SSL solutions.

In the first project year workshops were held to inquire about SSL needs and experiences through dialogues with local stakeholders in the hosting cities. In the second project year the SSL-erate city partners' workshops on deployment of SSL for sustainable city development, reached out to cities in their region. According to the workshop evaluations, the city partners' activities contributed to a number of seven cities moving towards investing in SSL and 19 cities and 12 other actors becoming interested in SSL applications.

[1] Participation of representatives of academia, industry and public sector.

1 Background

SSL-erate aims to involve Green Business and Open Innovation actors in the promotion of Intelligent, Adaptive and Integrated SSL solutions, i.e. moving SSL further ahead in order to realize the ambitions of the green paper 'Lighting the Future' and the report 'Lighting the Cities'.

The strategy is to use dialogues with at first the city partners and then their local networks to create awareness and to address opportunities and obstacles for public use of SSL solutions and development of green business. Commitment among new broader groups of actors is aimed for that can support SSL investments by means of Green Business development ambitions. The cluster partners are involved in this process by performing their SSL business development experiments.

During 2014, the WP2 partners organized 13 in-take workshops in 10 cities to understand their interest in and problems with SSL application as well as local green business policies. The main ambition was to understand the SSL-related demand, societal needs and development hurdles (Reported in D2.3). Those experiences were used in the development of the green business maps. To make sure that we fulfil the aim of engaging at least 20 cities in contact making and to promote that at least 15 cities will move to investing in green SSL solutions, the SSL-erate cities started to organize the here reported 2015 workshops.

Green Business Development
The WP2 title is "Deployment of SSL: from energy saving to acceleration of 'green' business development". The reason for the selection of the term "green business development" was that it is a broad concept that has a positive connotation related to sustainable societal development, renewal and creation of green jobs. WP2 aims to accelerate the investments in SSL for sustainable societal development. The ambition is to continue to use the energy saving ambition as a driver for renewal. However, the primary focus for SSL-erate is to promote innovation to make the new system solutions and lighting better and more functional for humans. This means that the social dimension of the sustainable development ambitions is central, e.g. to improve the lighting for schools and elderly. The primary concern is to create more meaningful innovation and more meaningful jobs.

2 Introduction

The 2014 workshops focused on the city-internal build-up of understanding about the green business opportunities and the project-internal build-up of real life understanding of the cities lighting development situation in relation to their societal and green development goals. The 2015 workshops have aimed for outreach to build commitment among broader regional groups of actors that can support SSL investments.
In all workshops user representatives participated and in most workshops – to some extent and in various ways – representatives of several cities, companies and clusters and other business actors in open innovation oriented dialogues (triple helix approach in some cases). In three workshops the Eindhoven road map was presented.

Several different actors from the building sector have been actively participating in the different workshops. Their participation have given the workshops credibility and created a starting point for different interactions between several different kind of actors (triple helix approach). There have been statements like ”before the workshop I was thinking of investment in light as an energy saving investment, but after learning more about how light affect us I now consider the other aspects to be very important and will take that into consideration as well”. The dialogue between the users and representative from different parts of the building sector during and after the workshops was very fruitful. Here it became clear that there is a genuine interest from the users in new lighting solutions and many ideas what could be done were discussed. As one system developer said after the workshop “It was very interesting to meet the end users and hear their input and what they are looking for. This will be a good guideline in the future development of our systems for controlling the light systems”.

The objectives of the Cities workshops were both on a practical and a theoretical level. In general it was to create understanding and interest in using SSL/LED solutions in various applications, both indoors and outdoors. During several workshops there were also practical examples shown and demonstrated. The focus this year (2015) was on creation of more advanced demand for green SSL business and solutions (see D2.5). The overall goal is to mobilize more cities and building sector actors, resulting in better and more adapted lighting solutions to both the localities and the activities within and making the benefits from new lighting solutions visible.

During 2015, there were workshops carried out in nine cities, see Table 2-1 below. There have been several different focuses covering different areas/aspects associated with new lighting solutions. These workshops has been appreciated by the participants and served as kick-off in many discussions/co-operations between different actors, and in some cases it has even served as a starting point for a triple–Helix approach. Participants often expressed interest to be involved if there will be more of these events coming up.

Table 2-1: SSL-erate WP2 regional workshops in 2015

City workshops to broaden the interest in SSL				
City	**Theme**	**Date**	**Goal**	**Venue/ Partners**
Lund	Lund start-up event for the International Year of Light	February 4-5	Regional Mobilisation	LU; Malmö, TNO
Bucharest	City LED Forum	April 24	LUCI meeting & regional cities	LUCI; Aalto, WP3
London	Lighting for People – Lighting workshop	July 17	City Mobilization	UCL & Future Cities Catapult
Malmö	"The search for the best light"	October 21	School Lighting Demonstrations	Malmö, LU
Stavanger	"Workshop on smart outdoor lighting"	October 21	Outdoors Lighting	Stavanger + Lyskultur, Lyse & Region Rogaland
Hamburg	Potential of LED-Lighting – Knowledge and Experiences	November 11	Eco-friendly & Feel good	HAW University + Regional partners
Vilnius	Human centric lighting - from lab to everyday day life	November 11	Smart Lighting Benefits	Vilnius University + Regional cities
Lund	The Future of Lights – Innovations for the future sustainable cities	December 1	Create understanding about light. Create networks between different actors including the users.	LU, FuturebyLund, Region Skåne
Bassano	Human Centric Lighting: The influence of light on humans	December 3	Interior Lighting	Bassano del Grappa + Luce in Veneto

3 Marketing of the cities workshops

The invitations for the workshops were distributed as broad as possible and in different ways. The invitation lists were adapted to the theme of the workshop and the message that it wanted to convey and what actors it was aiming at to reach. The most successful way the invitations were made was by personal invitation by phone and by email of persons and organizations that had interest in the subject area the workshop addressed. Invitations were also made via trade journals/ magazines, through social media and advertisement on Internet and posters.

Often homepages of different clusters were used with members from, for example, municipalities, light designers, consultants, suppliers, etc. Announcements in magazines were made, such as in the Cities & Lighting magazine for the Bucharest workshop. The personal invitations were made by using contact details in different existing networks and newly created networks.
The invitation lists were adapted to the themes at each workshop, to the groups of actors that should attend and the areas the workshop would be beneficial for and have an impact. Examples of these networks were municipalities, public road associations, consultants, energy suppliers, installers, software/system developers, etc.

The details on the invitations are to be found in the short descriptions of the different workshops and in the appendices where details of each workshop are collected.

4 Recommendations for 2016 planning

There is a growing positive interest to install intelligent human centric lighting, triggered by its potential of more comfort, helping people to feel or function better. However, one serious and frequently heard comment is that the actual willingness to invest in the added advantages is very limited when it comes to procurement. This is a kind of principal agent problem (compare landlord tenant problem) that has been found to be serious at an overarching level.
The input from the cities and their activities shows that more users and societal stakeholders are becoming aware of Intelligent Human Centric lighting and want to make more forward-thinking use of its new potential for Sustainable Societal Development. However, the procurement budgets, the specifications and routines normally used are delimited to conventional lighting solutions. This means that so far it is difficult to get acceptance for the investment funding that is needed for a more advanced Green Business development. This is due to the fact that with SSL it is more beneficial when it is used as an integral part of an adapted system and not only as separate parts, where sub optimization could be the result. In order to compete within today's framing, the price has to be the same or lower, which is contra productive in relation to the ambition to develop new solutions based on other values than evaluated today.

Therefore, it is important to make demonstrations, experimental installations and business experiments that demonstrate the diversity of the new opportunities and visualize the human value of various new lighting opportunities. Tests in different kinds of localities will provide an initial insight from the user perspective concerning the hindrances and possibilities associated with the various SSL solutions. Supporting broader networking and positive storytelling are also vital. It is important to show that knowledgeable customers are making active investments in more advanced utilization of the new lighting opportunities and that they can verify that the benefits are achieved.

Unfortunately it is also obvious that there are also unsuitable products on the market and that it is difficult to select products and make system installations that demonstrate new functionalities in a problem-free manner. This is due to the fact that there is very limited experience using building systems like these. Additionally, it is difficult to know what to ask for if you don't know what products there are on the market and what criteria should be used for evaluation. To overcome these hurdles, it is important to support competence-enhancing networking. Such networks can have its starting point in workshops and seminars. One important activity is to promote and exchange experiences of demonstrations in which different solutions are shown and evaluated. This will make it easier to understand what to look for and to get a suitable solution for each application.

5 City Workshop, Lund, Sweden, 4-5th February 2015

Lund start-up event for the International Year of Light

On February 4-5, 2015 Lund University and Future by Lund held four different workshops on lighting for the future. The overall objective was to build regional interest in the potential of SSL. The ambition encompassed building up of regional interest in innovative lighting investments.

The agenda included:

- Master students dialogue on social innovation in the lighting sector.
- Multidisciplinary light research seminars.
- Presentations on Indoor Lighting for Health and Well-being.
- Regional cities strategic dialogues for lighting innovation.

Marketing of the event:

The primary target group was regional decision makers and academia. The invitation was distributed to a broad set of lighting related people in cities, via members of Lund University's multidisciplinary lighting network and the Swedish Centre for Energy Efficient Lighting.

Summary of the 4 workshops (further information on the following pages):

1. Dialogue on Social Innovation in the Lighting Sector, introduced by Dr. Joseph Niemela, Secretary for the International Year of Light and including an open dialogue with master students at the International Institute for Industrial Environmental Economics at Lund University (IIIEE). See Table A1-2 in Appendix A1.
2. The Multidisciplinary Light Research Seminar included short introductory presentations and an open dialogue among the mixed group of seminar participants. See Table A1-3 in Appendix A1.
3. The most public session included presentations of The International Year of Light; Today's potential to create Human-Centric Lighting (HCL), Lighting Design as a change driver, Smart sensors and lighting systems and The Swedish Indoor Lighting Initiative. See Table A1-4 in Appendix A1.
4. The cities' dialogue focused on development of a common manifest (see Table A1-8 in Appendix A1) with a brief roadmap how to accelerate the deployment of Intelligent Human Centric Lighting. See Table A1-5 in Appendix A1.

Assessment of resulting effects:

The following points summarize some things occurring 10 months after the workshops and that have been influenced by the workshops:

- IIIEE master students are planning for human centric SSL in some of the IIIEE facilities.
- Malmö, Lund, Helsingborg, Kristianstad and Landskrona, and Region Skåne are involved in a regional dialogue on how to accelerate uptake of the new lighting technology.
- Malmö City has made an experimental installation of Human Centric School Lighting. One part is that this system includes an automatic light (lux and CCT) variation.
- The regional government for Region Skåne has taken a decision to invest in innovative development and utilization of Human Centric Lighting indoors.

Notes from the workshops, February 5th, 2015

Multidisciplinary Light Research Seminar 9:15 – 12:00
The workshop aim: To learn from each other
Participants: Companies, facilitators/consultants, researchers, Niemela

Malmö presented their interest in indoor school lighting. Olle Strandberg suggested that we should focus on the indirect results of lighting e.g. better school results and fewer injuries in elderly care. Viktoria Olsson is aiming to make the building managers interested in indoor lighting. Lindström, IIIEE suggested to focus on how the public sector can facilitate development towards sustainable solutions. Pia Kinhult suggested that the neutron research and the new large facilities that are being built in Lund should to be connected with the efforts to create more advanced lighting, for the future. Researchers in spectroscopy and medicine discussed advanced analyzing opportunities.

Lennart Svensson, Photonic Sweden suggested that it is vital to engage young people, entrepreneurs, etc. in order to raise interest and awareness in photonics. We should start from kids and high school, to build broad awareness. Lennart also presented funding opportunities.

LED ENGIN presented their multi-color and multi-die LED lights engines with white light. There is a need for new measurement possibilities to compare artificial with natural light.

Region Skåne is interested in linking researchers to internal experts working with smart health, smart material and smart city. Their main interested is light within schools and elderly care. One main ambition is to create a test bed for lights in different applications.

It is important to explain the differences and effects of different light. Digital photography could be a tool. Storytelling, networking and communication are vital. Social media and creative people are a source to inspire citizens. “There is strong correlation between headache and effect of light.” Many sick leaves could be related to bad lighting, since people use extra muscles to tighten their eyes and more muscles on their back to concentrate.
Hillevi Hemphälä suggested that we should use demonstrations, e.g. in shops and by YouTube, to build awareness. “To show that better light and its health benefits will contribute to energy efficiency and sustainability.” But there is a lack of measurement methods and education. We need to improve the methods for evaluation of visual environments.

Public presentations 13:00-15:00
Indoor Lighting for Health and Wellbeing a key aspect of The International Year of Light, IYL 2015,

1) Light for Sustainable Development, Nils Erkamp, TNO, SSL-erate

Light influences our psychological mood. The question has been: How to mimic sunlight, but this is not anymore the solution. We have a 24 hours economic wheel and we need to vary the light to make the right light during the day and also during the night.

The market is sending different messages, in a confusing way. As a customer it is difficult to know different kinds of light effects that result in wellbeing. Sustainability and Green business development should be in focus. In healthcare, to improve the lighting means that patients can leave earlier, consequently saving resources.

Where, along the value chain, will the main value be created in the future? The value for the lighting industry is also a value for sustainable societal development.

The are several actors that can gain from the transformation of the lighting sector:

- Installation
- Education
- Lighting design

2) Lighting design as the change driver. Kai Piippo, ÅF Lighting.

The meaning of lighting has changed. Almost 20 years ago the meaning of light within the buildings was only to avoid darkness. Now, there are many different meanings behind the light design indoor and outdoor. It can be based on the movement, feeling or purpose, etc.

Light was about creating freedom to people. About 10 years ago lighting became 'bad'. We need to make it good again. Light can be a medical instrument. Be part of the healing process. Lighting design can be an integral part of the architecture. For most people light is just a luminaire. Now we can do everything with light. What are we going to do with this opportunity?

3) International year of light (IYL), Joe Niemela, UNESCO

- The United Nations IYL resolution shows that the politicians are interested.
- The aim is to promote light technology to improve the quality of life in the world.
- The focusing on lighting is also a way to promote public appreciation of science.
- UN also wants to reduce the light pollution and energy waste.

UN focuses on development of public interest. Smart lighting can both highlight culture and reduce light pollution. Young people at the center: student networks as an enthusiastic volunteer base to interact with the public. Linkages with industry are important.

The international cooperation around the big Synchrotron-Light facilities can contribute too, because of the collaboration between countries that do not talk otherwise. United Nations declared the year the IYL. This opens doors into talking to policy people. UN uses the word "light" and not photonics, as people normally cannot relate to that term.

4) Cities as change agents for SSL and Smart Systems, Ingemar Johansson, Gothenburg

During 2015 Gothenburg is head of LUCI, an association of 70 cities. LUCI is promoting progress and exchange of experiences. The LUCI charter is aiming for:

- Sustainable cities
- Sustainable light
- Smart cities

Gothenburg wants to integrate art and lighting, such as the city of Lyon does with its lighting festival. The city of Gothenburg has a lighting program; they will not make any installations that are not LED. Gothenburg has the strategy of asking companies to provide the city with light and inform the municipality on how to make use the new technology. This is a way to work more collaboratively with the industry. Instead of commanding industry what to do and how to do it, being open is a better approach.

5) The new age of smart sensors and lighting systems, Tord Wingren

Digitization builds on extended ecosystems: many companies from different sectors are playing some role in the Internet of things area. Internet of things (IoT): connecting products to WEB is missing a standard.

What are the challenges in the ICT controlling of SSL? The digitalization of light gives a lot of opportunities for smart systems. The Internet of things is a game changer in this respect. Many companies do not know what they are going to be in the future. I consider that the time is now to write standards otherwise we will have small islands of implementation. It needs to be an open system where the companies compete only on products and that is open to connectivity.

6) The Swedish Indoor Lighting Initiative, Reine Karlsson, LU Open, SSL-erate

This initiative has a background in the multidisciplinary lighting research dialogue in Lund, which was intensified in 2010. The societal value potential and thereby also the business development potential for Sweden is documented in the Swedish Innovation Agenda for the lighting of the future. We are now working on broader and more advanced clarifications in the EU project, SSL-erate.

Indoor lighting is the main application field for Human Centric Lighting (HCL). The ambition with the Swedish Indoor Lighting Initiative is that Skåne shall take a leading role in innovative demonstrations, first focusing on schools, elderly and health care facilities.

Panel discussion

One main comment was that lighting is a very male business: There is a need to engage more women in lighting. One reason is that this is more about people than about technology. One challenge is that the researchers can't make easy experiments. The progress is likely to evolve through collaboration in the ecosystem of stakeholders.

The established lighting norms and recommendations are blocking us from progressing. Some of the standards have way too much light in them. Most standards are made for the old lighting technology. SSL is a game changer. We should look at the standards again based on the new technologies. Standards should make the systems “seamless” and behave similarly. Light is important, when the visual environment is good the productivity is higher. We need to focus on the new opportunities and hurdles. There is a need for budgets that are for the digital age and not for the analog age.

How to create awareness and education on dynamic light? We need to educate our students to have critical thinking. In design there is never a completely right or wrong answer.

City dialogue: 15:00-17:00
Regional innovation for smart indoor lighting systems

Malmö is interested in development of lighting as a part of smart buildings. The main volume of working and living environment is in old buildings. The school environments are important.

Helsingborg: I can see that there are exciting possibilities with new light. I think it's very interesting for us. We are interested to make an experimental installation in nursing homes.

Ängelholm wants to modernize itself as a health city.

The regional utility E.ON is aiming to work with light as a service.

Region Skåne: It is time to open up our public facilities for tests of new lighting.
Peter Kisch, Lund: We can provide test environments, but we need help on how to involve companies.
Björn Lagnevik, RS: It is important to find a model to include smaller players and entrepreneurs.
Peter Kisch: There is a need for competence development for service managers, on the future light.
We must educate our clients. We must find smart ways to make innovation procurement.

Patrik Rydén: We just have to decide now at doing something concrete, as a regional venture.
Kristianstad: How can we be a better client/customer?
Peter: We should try to specify customer function rather than the product.
CGM: We work with critical systems. It is crucial to know what we want.

Olle Strandberg, Malmö: It is crucial to include control systems and ICT in an integrated way.

Henrik Joinville: I want to know who's ready to test and put in time and money.
Tord Wingren: It is possible to build a test environment with ICT technology now.
Hillevi Hemphälä: We can create a VINNOVA application.
E.ON: We do not need VINNOVA. We can work with Malmö and Lund on a test case.
Peter Kisch, Lund: I think we can join forces and put together the resources that are needed to this. Do you agree?
The response from the participants was very positive.
Patrik Rydén suggested that there is a need for a project leader with industrial background and marketing skills.

Most of the dialogue focused on indoor lighting. E.ON commented that outdoor lighting could also benefit from smart lighting.

6 City Workshop, Bucharest, Romania, 24th April 2015

LUCI organized the "**City LED Forum**" peer-to-peer workshop on instigation of and on behalf of the SSL-erate project on the 24 April (2015) during the "City under Microscope in Bucharest". Approximately 50 key regional sustainability actors and regional and European municipal decision makers attended the workshop. This included lighting managers, technicians and other city representatives and stakeholders from 20 cities around Europe.

The City LED Forum consisted of a plenary session with presentations by SSL-erate partner Aalto University (Finland) on LED lighting technology – issues and perspectives for cities, along with an award-winning experience from the City of Malaga (Spain) in installing LED street lighting in the city center. This was followed by peer-to-peer world café type discussions on six different tables with each a different LED-related topic listed in Table 6.1. Six city lighting experts presented first briefly the topic and solutions from their city, and answered the questions of their colleagues from other municipalities about their topic. A selection of the presented material is to be found in Table A2-2 in Appendix A2.

Table 6.1: Summary of topics/issues addressed in the city-to-city discussions

The topics and questions discussed/ City lighting expert	**Issues addressed**
Procurement and the tendering process *Thomas Maare, City of Copenhagen*	*- Which type of tender process?* *- What are advantages in involving private and public partners?* *- What are the challenges, if you do so?* *- How do you increase the level of technical and legal matters?*
DC-grids as enabler for energy-saving, sustainable and smart cities *Arthur Noordhoek, City of Eindhoven*	*- What is the added value of DC-grids?* *- Which opportunities do you see for DC?* *- Which challenges do you see for DC?* *- What role has the city council to fulfill?*
Choosing the right luminaire *Annukka Larsen, City of Jyväskylä*	*- Which parameters for choosing luminaire?* *- How to survive light calculation phase?* *- How to compare without standard information?* *- How to calculate the return of investment?* *- What do the citizens expect from lighting?*
Control systems and presence detection *Frédéric Durand, City of Lyon*	*- How to detect pedestrians and/or cars?* *- How to communicate from supervisor to led?* *- How can level changes be accepted?*
LED lighting and social acceptance *Jorge Muñoz Estrada, City of Malaga*	*- Do citizens care about lighting?* *- Is social acceptance of led important?* *- Who is in charge?* *- How to promote social acceptance?* *- What if they don´t want led lighting?*
Financing solutions for LED lighting projects	*- Which are the barriers for financing public lighting projects in Bucharest?* *-How to apply a mix of funding?* *- How is EBRD funding used?*

Cosmin Gheorghiu, City of Bucharest	*- Funding in Bucharest: rehabilitation vs modernization?* *- How to fund international cooperation?*

Outcome:
Shortly after the event, the City of Bucharest asked its public lighting system operator to develop a smart city strategy and pilot projects. The city of Bucharest has subsequently been involved in several other events within the smart cities topic, in which it has endorsed efficient public lighting. It also aims to educate future professionals in the field of public lighting, and is looking at setting-up "working clusters/laboratory" in the region. Another Romanian town has also expressed an interest in implementing a lighting project within the smart city concept.

Workshop marketing:
As this workshop was organized within the framework of the LUCI City under the Microscope event, the marketing of this event was also done in this context. Marketing documents included printed invitations, 'save-the-date' flyers, email invitations and calls for participation to the event, articles on the LUCI website, in e-newsletter and in the Cities & Lighting magazine. A list of invitations is to be found in Table A2-1 in Appendix A2.

Link to event program:
http://www.luciassociation.org/wp-content/uploads/2015/04/Programme-Bucharest-BD.pdf

7 City Workshop, London, UK, 17th July 2015

Date Friday 17th July 2015
Time 09.30 – 15.00
Venue: Future Cities Catapult
One Sekforde Street
London, EC1R 0HD

There were representatives from a wide variety of backgrounds sharing experiences and ideas of specifying lighting, and the barriers and challenges to change. The event constituted of two parts, some introductions and after that parallel workshops. The program for the workshop is to be found in Table A3-2 in Appendix A3. The introduction part did consist of the following:

Introduction to the Future Cities Catapult,
Dan Hill, Chief Design Officer, Future Cities Catapult

Introduction to the SSL-erate project
Pieter Bolt, Coordinator of the SSL-erate project

Health Benefits of Solid State Lighting/LED
Katharina Wulff, University of Oxford

Smart Street Lighting: Experience from the Coventry City Street Lighting PFI
Councilor Rachel Lancaster, Cabinet Member for Public Services, Coventry City Council

The workshop was on the ways lighting systems are specified, together with incentives and barriers to change. It was divided into five different themes/ questions:

- *How does lighting currently get specified?*
- *Where and who do people look to for new ideas?*
- *What are main barriers to change?*
- *What are main incentives to change?*
- *What could be done to make transitions to change easier?*

Q1 - How does lighting currently get specified?

Pieter Bolt's summary of discussion.

The discussions generally focused first on standards used for the design and specification of lighting systems, then broadened to how the demands were generated and the financing of the lighting systems.

The following scheme of how lighting systems are (or could be) realized was drawn:

client / legislation	→	*expert / consultant*	→	*installer / contractor*
↓		↓		↓
defines boundaries/ limitations products		*selects products that fit within boundaries + own design criteria*		*installs specified products*

What lighting is asked for and by whom:

- There is apparently no legal obligation to provide street lighting, but cities should provide safety; and once street lighting is installed, it should be maintained.
- Street lighting increased enormously after the introduction of cars; earlier driver was safety in public spaces, which is gaining importance again. Utilization of space can be (also) controlled by lighting: a new way to apply lighting.
- Should there be / is there a legal / mandatory requirement for lighting levels in certain areas? In effect, cities move to making lighting plans (including standards and preferably part of a city master plan) for e.g. commercial, office and residential areas. Danger is that (once made) plans are used which have become outdated due to rapid technical and societal changes.
- Business models for street lighting: lighting (columns) may become a source of income: through letting of space / facilities for WIFI, sensors, sensor services (contracts for space).
- Control Management Systems and integration in infrastructure plans could become important aspects of street lighting.

How and by whom is lighting specified:

- Lighting is traditionally specified by engineers, lighting and/or transport departments. Often in isolation, unless demands from elsewhere require to work differently and when a new situation occurs.
- Lighting is still mostly specified without much engagement of the public and without talking to other (city) departments.
- The benefits of street lighting are not financed by those who may gain from better lighting, through more safety (police and health authorities) and lower (city) energy bills.
- The upfront costs of lighting systems should be offset against energy savings and lower whole life costs. This balance may change when LED lighting is used. But in high end applications, the costs of light engines may not be the determining factor.
- The financing of lighting (e.g. privately and/or publicly) is seen as a political issue outside the (city) lighting department.
- When lighting (installation, operation, maintenance) is arranged through and specified (and lighting products selected) by a third (non-city) party, for example in Public Private Partnerships (PPP) and Private Finance Initiatives (PFI), the owner of the application (client) may use e.g. CO_2 emission reduction as extra specification (within green procurement schemes) to narrow down the choices. Or use specifications with emphasis on quality.
- Procurement of lighting is becoming need driven and output specifications based: defined is (in city lighting plans) what it should look like and how it performs (using key performance indicators and score cards) rather than what it is.

Standards and codes mentioned (besides BS)

- CIBSCE (Chartered Institution of Building Services Engineers, www.cibse.org, lighting codes): provides minimum light level for certain situations, types of light and lumen needed.
- IET (www.theiet.org, the institute of engineering and technology): issued code of practice for LED exterior lighting.
- In any case, it is important to understand the application concerned and its needs. City standards (from city lighting plans) are becoming more relevant.
- Also mentioned for use in specification process: DECC (Department of Energy and Climate Change) business case tool and HEA (higher education academy problem-based learning) 'tool kit'.

Q2 - Where and who do people look to for new ideas?

There were clearly two strands to this question. Firstly there was the issue of problem definition. Here people cited a variety of drivers from saving money to doing things better. However there are

occasions where the process is reversed and suppliers are asked what can they do? The use of pre-commercial procurement processes was also mentioned.

Finding out how to achieve their goals is the second and more major strand of what was discussed. Suppliers and contractors were a common source of information, however, there was a certain amount of distrust of the information that came through this route and some people had trusted partners and with other companies they would need supporting evidence such as an installation somewhere else. DOLL in Denmark was mentioned together with Glasgow future cities demonstrator.

There were a lot of other places where people went for information including conferences, innovation parks, professional bodies and trade press/journals. Names in this area included:

- Lux Magazine
- The Institute of Lighting Professionals (ILP) and other professionals associations
- Smart Lighting conference (in Berlin)

The suppliers and technology developers took their lead from meeting customer needs (current or potential) and then doing their own research or borrowing ideas from other areas. One final remark with regard to local authorities and that was that the process for getting funding is slow.

Q3 - What are main barriers to change?

Below are the notes/ minutes from the workshop “What are main barriers to change?”:

- Tendency of the media to focus on the negatives or one off failures in projects making them less politically palatable.
- Cost of finance remains an issue with risk priced into loans – GIB, Salix etc. goes some way to help bring this cost down. Projects still require a large capital outlay upfront which can be hard to raise for many sponsors in the public sector – models do exist but they are not well known to all.
- Poor knowledge of existing assets and system performance to create business case.
- Lack of communication between departments in councils and other beneficiaries of interventions – makes it even harder to capture value and develop projects.
- Increasingly complicated projects incorporating ICT become hard to explain to the public and those outside the project.
- No upside for public sector to take risks – easier in the private sector to fail – less incentive.
- Lack of whole life cycle cost model and method to assess and monetize benefits.
- Lack of historic data to validate the opportunity, e.g. establish a baseline – installing IoT starts to capture this information.
- Lack of information required to make decisions – requires commissioning studies and surveys to establish business cases – can become very expensive looking across an entire system.
- Value accruing across council departments and other bodies and companies – becomes too complex to capture.
- Security risks around holding large amounts of personal and other data.
- Reluctance to invest – waiting for next generation of products and for prices to fall.
- Risks with smart technologies are too high for most investors - £10m IUK fund will help.
- It is not just the public sector who can be risk averse – many supply chain companies are reluctant to change their products and business models – however this is case dependent.
- Following the financial crisis entering into long term contracts has become less attractive as revenues and grants have become less predictable.
- Concern that expensive investments in ICT may not be used to their full potential.

- Concerns about obsolescence and future proofing being ineffective.
- Costs falling quickly in some markets - e.g. LED – when is a good time to move?
- Lack of communication about successful projects to potential sponsors.
- Cultural mind-set and leadership in an authority –willingness to take risks.
- Negative perceptions about technology tend to stick – even if the negative effects have now been reduced over time – e.g. diesel cars are still perceived as dirty and noisy – when in fact this is no longer the case.
- Revenue streams may be unstable or hard to predict.
- First mover advantage vs. disadvantage.
- Lack of understanding about risks and how to mitigate them contractually and make projects more attractive.
- Expectation of future enhancements once in place.
- LED's technology is still evolving with new products coming into the market that broaden the applications - when is a good time to move?

Q4 - What are main incentives to change?

Question 4: What are main incentives to change?
Katharina Wulff's summary of discussion.

I grouped the discussion into four areas:
- *The business point of view*
- *The council's point of view*
- *The public's point of view*
- *Improved technology benefitting all above*

From the business point of view:
- Enhanced Capital Allowance (ECA) scheme promotes investigation in energy saving equipment (specific Governmental criteria: up to 100% of the investment to be written off against taxable profit in the year the investment is made).
- Carbon savings (Personal and Legislation's environmental concerns).
- Using innovation to create a difference – adding to a 'brand'.

From the council's point of view:
- Lowering costs by reducing cost of failings.
- Saving money by saving energy – e.g. promoting energy performance contracts between cities, lighting operators and energy providers.
- Added values from Lighting:
- Greater integration: Flexible technology can be combined with monitoring sensors (LED +
- CCTV + Motion tracking), then integration of data – improves public services and makes
- analyst's life more rewarding.
- 'People Power' – bridging the gap, raising awareness - get the citizens involved to drive the change.
- Learning from best practice – adoption of new technology.

From the public's point of view:
- Improved quality of public lighting – colorful to white, dimming adaptable.
- Less light pollution.
- Improving well-being: fewer sick leaves - better health service.

Improved technology benefitting all above:
Systems' flexibility: cheap & durable, smaller fixtures - adding capability: dimming/changing color temperature/new colored light:

- *Museums/Archives*: specific benefit in that it is less damaging to paintings, other old
- material – prevents fading
- *Optimizing system to other benefits:* - Deliver Light fit for purpose: more choice, now use it
- for new public services & new business, for example:
  - *For residents in care homes/institutions/hospitals:* quality dynamic lighting
  - *For consumer behavior:* better quality lighting encourages more purchases, attracts
  - night-time life and tourism.

Q5 - What could be done to make transitions to change easier?

Andy Davies summary of the discussion.

The discussions were grouped into the following interconnected areas:

- *Users and behaviors*
- *Technical compatibility*
- *Skills, knowledge and capability*
- *Finance*
- *Politics of institutional change and overall coordination*

These areas are interrelated in the process of managing the transition. The transition should be managed in incremental stages; step by step. It should be led by city authorities. Need for clear communications of the result of each step to provide better 'buy in'.

Users and behaviors

- Speed of adoption is vital; but early adoption can be a problem (analogy to Betamax and VHS competing systems).
- Encourage local communities to participate in consultation exercise; this takes time and effort; needs to emphasize the benefits beyond 'technical pitch' and the direct effects of lighting (e.g. aesthetics, safety).
- Sell the idea of gradual transitions by stealth.
- Change must be gradual to convince users of the benefits, whilst recognizing that the majority of the public won't be interested.
- Use learning gained from experiments to market the benefits; e.g. lighting of cyclists in Eindhoven – learned that lighting the moving cyclist was not enough; had to light up the road ahead.
- Changing behaviors takes time; e.g. in the past we are worried when areas are dark at night; with sensors this will show that these areas are safe (when it is dark no one is present).

Technical compatibility

- Existing vs new lighting systems; technical problems associated with backwards compatibility and lock-in to inferior solutions; can be a problem when contracts extend over such long periods.
- Pilots and case studies to prove technology.
- Flexibility to avoid lock-in; promote open source systems; step-by-step using flexible designs and open standards; acknowledge that situations not anticipated at the outset will change and don't get too fixed on the initial solution; consider if you need 'active lighting'.
- Understand the maturity of the technology to identify if it's the right time to change; need ready-made solutions at the basic level.

- Lack of standards; industry groups need to create new generation of standards.
- Need to encourage the whole supply chain to promote solutions.
- Focus on demonstrators to explore options and then exploit them by encouraging the adoption by other cities.
- Design technical solutions centered on user needs and new forms of behaviors.

Skills, knowledge and capability

- Invest in skills and capability to understand complexity.
- Importance of training, education and networking to encourage the whole supply chain to adopt advanced systems; SMEs, suppliers and users.
- Need to recognize key role in the wider ecosystem: universities (research), politicians (legislation), engineers (knowledge), designers (for use) and clients (educated clients that can specify their requirements and needs).
- Identify and support champions across the industry; promote learning and sharing knowledge across the supply chain.
- International network to share previous lessons, experiences and approaches.
- Need hard data to understand what works and what doesn't.

Money

- Need to encourage new sources of finance (e.g. PFI, Green Investment Bank).
- Recognize that funding is needed over longer periods (e.g. government loans) for LED.
- Need financial incentives for transitioning; funding for trials and demonstration projects.
- Develop case studies to help city authorities identify the technical and financial risks.

Politics of institutional change and overall coordination

- Difficult to change bureaucratic organizations; it's like a tanker trying to change direction.
- City authorities need to make a firm commitment to change, but early adoption can be a problem; this is helped by the competition generated by first movers that show the way (competition like this is good).
- Overall coordination is helped by Lighting for People and Humble Lamppost (led by Graham Coatley).
- Multi sector approaches to maximize collective and individual value – led by city and municipal councils.
- Change should be led by city authorities but large firms are shaping outcomes by offering fully integrated solutions (e.g. Philips and Google's NEST system).
- Big part of change is to know how to get the information out there (educating could start with children in schools).

Marketing of the event

The event was widely publicized and marketed, through the following main routes:

- Direct emails to relevant people known by people at UCL.
- Marketing via UCL's Bartlett Faculty events website.
- Marketing by the Future Cities Catapult to all on their contacts lists.
- Via the two major societies for lighting professionals – The Society for Light and Lighting, The Institution of Lighting Professionals.
- Via Lux Magazine's contacts database.

In Table A4-3 in Appendix A4 is a list of signatures from the attending persons together with the invitation of the event in Table A4-1.

8 City Workshop, Malmö, Sweden, 21st October 2015

Workshop in Malmö – An aim to start a user driven innovation process

Name of the work shop: ***The search for the best light***
Date: Wednesday the 21th of October 2015

Objectives for the work shop:
With the help of a real case, lighting in a classroom (see Table A5-5 in Appendix A5):

- To map out the market of lighting in the Region of Skåne with the perspective of managing the steering of the light.
- Investigate the best technique/s to manage the steering of lighting in a classroom, to create the best indoor environment to support learning.
- Promote human centric lighting (HCL) to the companies/suppliers in Skåne and introduce the idea that the new knowledge means that there now is a need for user adapted dynamic automatic variation of the light.

Target group/ Marketing of the event
The target group was companies within the area of lighting and systems of steering the light. The agenda for the workshop can be found in table A4-4 in Appendix A4. The city of Malmö has worked with lighting for a while, and has created a good network. Within this network a representation for the target group was found. Present at the workshop were representatives of the whole lighting range, from of pure lighting companies, companies involved in the control system to installers. The invitation is listed in Table A4-1 (English) and Table A4-2 (Swedish) in Appendix A4. There is also a separate invitation for the participating companies in Table A4-3 (Swedish).

A list of invitations (both persons and participating companies) is shown in Table A5-6 in Appendix A4, together with a list of the participants in Table A4-7.

Summary of the work shop:
Malmö city arranged a workshop where 11 persons from five companies/consortia representing entrepreneurial SMEs, established lighting companies, control system companies and installation companies presented their suggestions how to get started with dynamic Human Centric Lighting (HCL). The invitation to the potential suppliers included a specific light variation case for a class-room, for which the suppliers were asked to present solutions, see the attachment for case description in Table A4-5 in Appendix A4. A six-person panel from the city of Malmö, Region Skåne and the University of Lund, asked questions and assessed the companies' suggestions. These are also presented in Table A4-6 in Appendix A4.

The presentations by and dialogues with the companies that are interested to supply integrated system solutions for indoor HCL indicate that:

- It is still difficult to procure open integrated system solutions that can vary the light in a free way. It is even difficult to procure a system solution for a demo installation.
- -Some entrepreneurial SME's stress that is important to be able to include feedback from various sensors and data processing.
- The market interest in SSL to save energy is very limited. It is the advantages of better light that attract interest. Considering the driving mechanisms for energy savings we noted that:
  - Europe is mainly promoting energy savings to reduce cost.
  - Some countries (e.g. rich Arabic) have mandatory rules for energy certifications and the green branding is truly important.
  - US is using both mechanisms.
- The initiative to focus on an explicit light variation recipe was considered to be good as a tool to get started. There was no serious questioning of the suggested "recipe", but it was mentioned that nobody knows which optimum recipe we ought to use when and where.
- One established lighting company tried to market their luminaires rather than taking a serious look at the case that Malmö had suggested.
- A facility management company suggested that the lighting control ought to be integrated in their control system. The panel found it difficult to assess the advantages and the possible long-term risk that such solutions might become complicated and costly.
- Considering spectral distributions, it was noted that energy saving windows modifies the spectrum of the "daylight" that enter the room, quite significantly. Todays advanced LED luminaires may provide a more "natural" light.

The conclusions of the presentations and dialogues with the interested suppliers:

- To procure applications of open integrated system solutions that can freely vary the light is still difficult.
- The entrepreneurial SMEs are experts within their field, to create a solution of the best lighting, SMEs from different areas of expertise needs to collaborate.
- All of the SMEs thought the case was very innovative and proclaimed that not many municipalities have this kind of knowledge and demands at present time.
- Many of the SMEs have the knowledge of theory to create a good solution for the case, but no one has actually created a solution, a real test bed.
- The market interest in SSL to save energy is very limited. It is the advantages of better light that attract interest.
- The case focused on a specific light variation schedule, which the suppliers considered to be good as a tool to get started. None of the suppliers questioned the suggested schedule. None of the SMEs mentioned an alternative for the best schedule to be used in a classroom.

9 City Workshop, Stavanger, Norway, 21st October 2015

Report from SSL Workshop in Stavanger 21.10.15

Goal for the workshop
The main goal for the workshop was to create demand for LED and smart solutions for outdoor lighting.

Background
For outdoor lighting, it is important to increase use of LED technology. Maybe because of low energy prices in Norway, there still is a way to go before LED is the preferred solution. Stavanger is going to change 8000 mercury lamps to LED. They are trying to create interest in more advanced outdoor lighting and they want to improve their knowledge about what to procure.

-The outdoor lighting systems need to be smarter, including possible sensors, but there is a need for information about the technology.
-Norwegian electricity is very cheap, but there are maintenance savings.
-Cities want a platform that can accommodate integration of smart technology, at a reasonable cost.

Program for the workshop
The program for the workshop was developed together with Lyse Elnett AS and Lyskultur/ Rogaland. It was decided to have some presentations first and then give the participants the opportunity to discuss the topics in a round table session. The main topics can be found in the attached program in Table A5-1 in Appendix A5.

Marketing of the event
The invitations were distributed as broad as possible and in different ways like this:

- Published at the homepage of “Bad, park og idrett”, a cluster with members from Norwegian municipalities working with, parks, squares, walkways, sport areas.
- Published at the homepage of “Lyskultur”, a cluster with members from municipalities, consultants, light designers, suppliers.
- Announcement in the Magazin Lyskultur, together with an article about the SSL-erate project, se attachment in appendix A5.
- Presentation of the program at 2 events arranged by “Lyskultur”.
- Invitation by mail to the network of road administrators in the 20 biggest cities in Norway.
- Invitation by mail to the network of people working with light in the Norwegian Public Road.
- Invitation by mail to the Hub for business development in Rogaland
- Invitation by mail to the Triangulum network
- Invitation by mail to different cities
- Invitation by mail to consultants
- Invitation by mail to energy suppliers
- Invitation by mail to hardware suppliers

Participants

The workshop attracted 55 participants, see the attached participants list (in Table A5-2 in Appendix A5), where they are grouped into different categories. All together there were participants from 10 different cities, and a list with signatures of attending persons is to be found in Table A5-3 in Appendix A5.

The workshop - outcome

- The presentations highlighted the benefits when using LED lighting and the opportunities this will bring for the future concerning energy savings, smart solutions for outdoor lighting and on the way towards Smart City solutions.
- The discussions in the roundtable session gave the participants the possibility to ask questions and discuss the different topics with the expert and the other participants. The conclusion heard was that this workshop opened the eyes for SSL as the future solution for lighting, also in combination with new services.
- The Norwegian Public Road Department made it clear that SSL was the only light source for the future and they will continue to evaluate SSL applications.
- There were also cities concluding that they would focus on SSL:
  - Stavanger is planning to implement a smart steering system for new lights on a walkway, a solution that also enables new services.
  - Sandnes is implementing smart lighting system in the main pedestrian street in the city center and will combine this with new services.
  - Steinkjer is a frontrunner in Norway among cities using LED as street lighting and combine LED with smart steering system.

10 City Workshop, Hamburg, Germany, 11th November 2015

Potentiale der LED-Beleuchtung – Expertenstimmen und Anwendererfahrungen
Potential of LED-Lighting – Knowledge and Experiences

Review of the SSL-erate workshop in Hamburg 11. November 2015

On 11th November 2015 HAW Hamburg organized the workshop "Potential of LED-Lighting – Knowledge and Experiences". Light planners, architects, company representatives, members of the City of Hamburg and the Chamber of Crafts as well as professors and students from HAW Hamburg participated at the workshop. The invitation and agenda (in German) is to be found in Table A6-1 in Appendix A7.

Summary of the workshop
The workshop was structured into presentations and discussions. During the first part of the day experts presented current research results in HCL and LED indoor and outdoor lighting alternating with field reports about LED lighting. The second half of the day was split into two parts. Starting with two presentations on how to assess the LED for official bidding and tendering, afterwards a forum for discussion on different topics related to LED technology took place. The forum was aiming at getting an overview about people´s interest in LED and HCL and where they see challenges for broad LED application. Please find the translated agenda and the questions discussed in table A6-2 in Appendix A6.

By demonstrating the possibilities of LEDs to students and in this sense the potential new generation of light planners and/or architects the workshop served as a sustainable tool for accelerated deployment of LEDs. As the event brought together people from university as well as city representatives and company members it is possible that they will apply as a consortium for new EU projects for high quality SSL solutions. The participants had the opportunity to listen to current research on SSL as well as to do active networking during the coffee breaks.

The event aimed for sustainable approaches in cities when it comes to tendering comprehensive lighting concepts. The corresponding presentation gave some good remarks on how to assess not only the price but also the quality, lifetime and lifecycle of a product.

People from seven different cities attended the workshop and used the opportunity for establishing new contacts as well as exchanging knowledge and experiences - facilitated by the set-up of the discussion forum. The participants came from Hamburg and surrounding cities (Bargstedt, Tosted, Neumünster, Nordersted, Varel and Sehlen). The invitation was sent to people in 50 cities all over Germany. The event was visited by more than 60 persons. Please find the list of participants (German only) in Table A6-4 in Appendix A6, and some pictures from the event in Table A6-3.

Objective:
The whole day event was meant to spread expert knowledge on LED lighting (indoor and outdoor) and at the same time let practitioners report on their experiences with LED. The participants shared a lot of experiences from both sides of the technology.

Indoor lighting:
The expert for lighting of HAW Hamburg, Prof. Dr. Roland Greule, opened the day with an inspiring presentation on the possibilities for indoor lighting and the effect of light on the human body (HCL).
Andreas Wiedemann is the headmaster of an elementary school in Hamburg. First he told the audience about the principle of good learning and that there is not only lighting but also the quality of school seats and learning equipment that contributes to a better learning atmosphere. Than he showed a movie on how the class rooms were renovated and some pupils told us why they like the new class rooms. One very impressive remark has been that at some point the pupils started to ask for the right light. For example when they shall read something they ask the teacher to turn on the light for better concentration. The control board for the light is placed at the teacher's desk.

Outdoor lighting:
A light planner from Philips, Miroslav Batarilo, showed the potential of LED lighting outdoor in connection with energy efficiency and light quality. It is possible to gain a higher lighting quality by a better illumination of streets, sidewalks and public places. At the same time it is possible to reduce the costs by intelligent lighting control, e.g. reduce the light intensity if there is no need.

The experiences with outdoor lighting in Norden-Norddeich (a city at the north coast of Germany) show that residents feel more comfortable with LED lighting. The light intensity is dimmed down slowly once the pedestrian has passed by and they feel safer than before. Lights are dimmed and brightened again by sensor controls.

On the contrary the residents of a street in Hamburg feel more comfortable with the usual light than with LED. That is caused by the more concentrated light of LED with less stray light. They found out that for feeling comfortable and safe at night the most important factor is to see the face of the person who is coming towards us. Therefore, even though the LED light was brighter the residents voted against this technology for this particular street.

Evaluation of LED:
From the Association for Electrical Engineering, two very interesting presentations taught the participants on assessment systems for the application of LEDs and what aspects should be considered to compare manufacturers' information. The outcome was that, for an evaluation of different offers you should always consider the whole life cycle costs instead of just the kind of technology. Energy consumption and the quality of the product should also be considered wisely. Therefore, an assessment tool is provided by the Association for Electrical Engineering. They also provide a guideline on how to compare different manufacturers' information in a proper way. The participants were all very interested in the topic and stayed until the end of the event. Please have a look at the presentations on this link (German only): http://www.haw-hamburg.de/ftz-als/veranstaltungen/led-workshop.html

Marketing of the event
To promote the event we used our broad e-mail list that has been used for the previous workshop already. We invited all staff and students from HAW Hamburg. Additionally we sent a press release to several journalists, published an article on www.channel-e.de/nachrichten/article/workshop-zur-led-beleuchtung-am-11-november-in-hamburg.html and stated the news on our HAW Facebook account (5195 likes) and on the news section at our HAW homepage. The invitation/ agenda (in German) is to be found in Table A7-1 in Appendix A7, and a translated version of the agenda (in English) in Table A7-2.

11 City Workshop, Vilnius, Lithuania, 11th November 2015

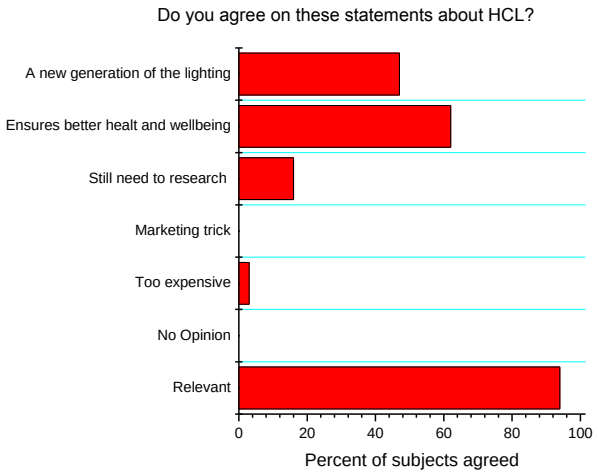
Vilnius Outreach Meeting
Date: 11th November 2015, 13 pm
Heading: **"Human centric lighting - from lab to everyday day life".**

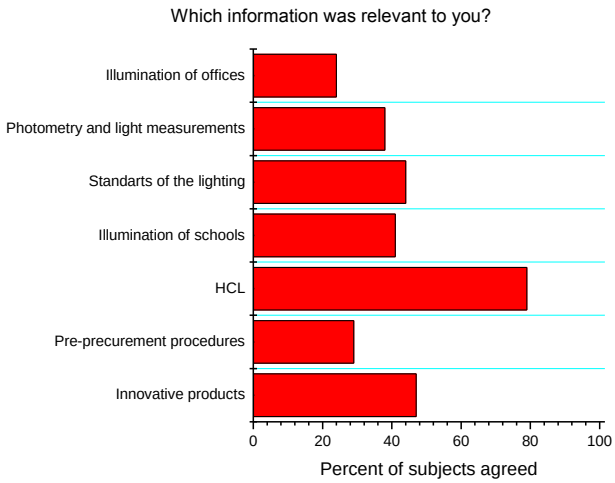
More than 300 people were invited selected from various sources and databases (see "Marketing of the Vilnius outreach meeting" below). 67 persons registered online. 70 people participated, and 14 arrived without online registration. An attendance list (including signatures of the participants) can be found in Table A7-2 in Appendix A7.

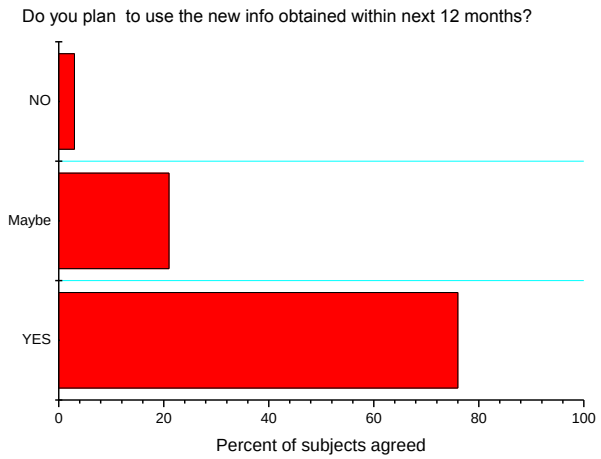
Most of the participants (see Table A7-3 in Appendix A8) were from the private sector; architects, lighting designers and, lighting industry representatives. People from academia covering different areas of interest like physics, biotech, psychology, and chemistry were also attending. From public sector only 4 persons from Vilnius Street Lighting Company and 2 persons from Central Project Management Agency were participating. This agency is an important player, since EU structural funds for street and building renovation comes through them. They are responsible for approval of the investment plans of the municipalities for the entire country. Participants from the state energy companies LESTO and Lietuvos Energija is a good sign, since these companies are really powerful (financially and politically) at the national level and are ready to invest in new technologies. Conversations with those companies about HCL and outdoor lighting are continuing.

The meeting constituted of two parts. One part consisted of presentations according to the agenda (see Table A7-1 in Appendix A7), and second part was a demonstration of HCL and/or smart lighting products/prototypes designed in Lithuania. Glamox and Cree international brands also had their products shown.

An anonymous survey questionnaire was spread among participants to fill in and return at the end of the meeting. About a half of the total number of participants (34) returned the questionnaire and the results are shown below.







The survey showed that the audience was motivated and professional. The importance of HCL was clearly understood. Since a majority of the participants were from industry (private sector) we can expect some promotion from the industry concerning HCL and smart SSL.

Unfortunately the cities other than Vilnius were not reached at this time. They decided to ignore the invitations probably due to the several reasons:

- Municipalities are in very bad financial situation and HCL is too far away. It is common to switch off each second lamp on streets and also to completely switch of the lighting late night.
- The lack of competence in municipality boards.

On the other hand, private companies from other cities like Kaunas and Šiauliai participated and likely will operate within their cities.

Marketing of the Vilnius outreach meeting

In conclusion more than 300 persons had read the invitation info and ~70 decided to participate.

- Invitation text distributed in No. 1 Lithuanian news portal delfi.lt
- http://www.delfi.lt/mokslas/technologijos/i-zmogu-orientuotas-apsvietimas-mokslininku-rinkodarinis-triukas-ar-ateities-perspektyva.d?id=69421146
- Also replicated in Vilnius University news and events section, other news portals like technologijos.lt, social network Facebook.
- The event invitation/agenda website was created on our Laboratory portal where meeting material is available for download. http://www.lrg.projektas.vu.lt/renginiai/?lang=LT
- Invitations by e-mail were sent to those associations or unions having numbers of members relevant to the lighting topic:
  - Lithuanian association of the municipalities (60 members)
  - Lithuanian union of the architects (>1000 members)
  - Lithuanian Business Confederation (>100 members)
  - Lithuanian Employer Confederation (>100 members)
- Personal invitations to the relevant persons from the Ministry of Science and Education, Ministry of Environment, Central projects Managements Agency, Vilnius municipality etc. (~20 persons).
- Customer and partner databases of our partners (UAB Gaudre and UAB Korgas) (>100 contacts).
- Our lighting laboratory partner database (~30 contacts).

12 City Workshop, Lund, Sweden, 1st December 2015

Report from SSL Workshop in Lund, Sweden, 1st December 2015
Venue: Ideon Alfa, Scheelevägen 15, Lund
Room Square, 13:00-14:30

The Future of Lights – Innovations for the future sustainable cities

Goal for the workshop

This workshop was a conjunction workshop between SSL-erate, Region Skåne and FutureByLund (http://futurebylund.se/en). Future by Lund was hosting a whole day event called "The future starts now" (http://futurebylund.se/the-future-starts-now-2/program) where this workshop was one of three parallel sessions.

The invitation is to be found in Table A8-1 in Appendix A8. The invited representatives from different stakeholders were to elaborate on issues how to form the future light, with inspiration from both the research area and input from end users and by showing a demo-fixture. These stakeholders consisted of representatives from municipalities, end users, light manufacturers, system/software developers, installers, researchers, light designers. This workshop provided the participants with an understanding of the wishes/demands from different stakeholders and to within the forum investigate possible solutions and how to proceed in achieving the future light in a near future. The main goal for the workshop was to create understanding of the importance of the light and create demand for LED and smart solutions for indoor lighting.

Program for the workshop

The program for the workshop was developed together with SSL-erate, Future-by-Lund, Region Skåne and Inside light. The workshop was held in Swedish/English and consisted of these parts:

- *Why is light important to us?* Dr. Klas Sjöberg, Malmö Hospital
- *A successful example with new light. Senior citizens home "Mårtenslund"* – Thorbjörn Laike, Professor, Environmental psychology, LTH, Lund University
- Innovative ideas about the future lighting from user perspectives:
  - Catrina Liljegren, Teacher at Polhem School (high school) in Lund
  - Jennifer Tollman and Beatrice Ch'ng Sin Yi, master students at IIIEE, environmental Institute, Lund University
- A demonstration.
- A panel discussion, with the theme *"The Enlighted human",* with the presenters in the panel

Invitation
The invitations were distributed as broad as possible and in different ways like this:

- Published online on the homepage of “Future by Lund”, “Ideon innovation”, etc.
- Invitation distributed in electronic newsletters from “Future by Lund”, “Ideon innovation”.
- Via the networks of the Interreg project Lighting Metropolis, and the regional lighting professionals network Sydljus, etc.
- Personal invitations were sent to different stakeholders in the region:
  - Municipalities (Malmö, Lund, etc.)
  - Region Skåne (Hospitals, etc.)
  - End users (patients, students / parents, etc.)
  - Light Manufacturers
  - System builders/ software developers
  - Installers
  - Procurement
  - Researchers
  - Lighting Designers/ Architects

Participants
The workshop attracted 32 participants; see the attached participants list where they are grouped into different categories. Both the invitations list (Table A9-3) and the attendance list (with signatures; Ttable A9-4) are to be found in Appendix A9.

The workshop - outcome
The first presentation highlighted the different effects of various kinds of light, and the potential of the evolving LED-based lighting for smart solutions for indoor lighting, health benefits, and energy savings etc. on the way towards Smart City solutions. The second one presented an environmental psychology study of and installation with light variation in comparison to traditional static lighting. The innovative teacher and master students presented stimulating ideas. A selected part of the presentation material can be found in Table A8-2 in Appendix A8. The panel discussion gave the participants the possibility to ask questions and discuss the different topics with the experts and the other participants. The conclusion was that this workshop opened the eyes for the potential of LED-based systems as an enabler of more advanced lighting, also in combination with new services.

One topic that was discussed was flickering. The concern about flicker includes the risk of negative health effects and also that a flickering light could cause damage to the credibility of LED as technology for the future. Avoiding flickering is important when the new lighting solutions are introduced and effort spent on this issue is time well spent.

Another topic that was discussed was the health benefits from using new type of lights and systems with lights/interfaces, where it can be controlled in a way that is adapted to the individual/human. These effects from switching to more advanced lighting can be seen in many different ways that also can be combined. From the examples in the presentations, the light had an important effect that led people to feel better and sleep better. This was measured by the number of awakenings per night, which went down and thereby also the amount of fall incidents were reduced. Fall incidents that cause injuries are very costly and also painful for the individual. The savings that can be made from using these light systems are therefore substantial.

An interesting aspect that was brought up as an example was that light can be used both to obtain stimulating/awakening effect and also to get a better sleep. The master students at IIIEE (environmental institute) were given a task to look at potential improvements at their localities regarding the light. Two examples were presented at the workshop and they were a design of study room with light with an algorithm to create awakening. Also a nap room was presented where a light algorithm was presented that was developed for shorter naps, power naps.

Also the high school teacher (Polhem School, Lund) presented interesting aspects of the future light that were of interest from a user perspective. From being informed/ inspired what the new light solutions can provide they showed interest in the new opportunities. They want to host 2 different demos based on these solutions next year and evaluate these. One of the test will be in one classroom where it is the same pupils the whole time and this will be compared to a room beside (where it is also just one class of pupils in the whole time) where the lighting is remaining. The other demo will be in a classroom where several different classes with different students are held. Here the evaluation will be made based on the experience of the specific room. In both cases the pupils have already started the ideation phase, by as a part of their design course design, design possible light solutions for these rooms. These ideas will serve as a base for the selection and developing of the lighting system/ solution.

The participants showed interest in several ways. During the panel discussion it was mentioned that their thoughts about the perception of light and the effects from it was changed and that there are several interesting aspects to implement in different areas. Also a great interest was shown after the workshop, where a majority of the participants stayed on to continue the discussion regarding the future light and created several different networks. The demand for more workshops like this was expressed afterwards, since it was considered to be an interesting and important topic.

The workshop – outcome for the future

A common feedback after the workshop was “this was very interesting, keep me posted if there are more of these events coming up”. Also there were several suggestions from the participants on future themes for workshops and seminars. This shows that the workshop was appreciated by the participants and it has been useful and provided insights for the future light.

Several different actors met for the first time and follow-up meetings were arranged. A general interest to develop something in common was established. In some cases a triple helix approach was a natural approach and resulted from the presentations by the end users and the informal discussions afterwards with the other stakeholders.

A formal network was created where the participants and the invited persons/ organizations will be invited to future events like workshops/seminars, including a.o. different demonstrations. Additionally, a newsletter will be regularly created and sent out within this network.

13 City Workshop, Bassano, Italy, 3rd December 2015

LOCAL WORKSHOP "HUMAN CENTRIC LIGHTING – THE INFLUENCE OF LIGHT ON HUMANS"

Workshop report

Bassano's one day workshop took place on 3rd of December 2015, at the Auditorium of the High school "J. da Ponte". The agenda/ program for the event is available in Table A10-1 in Appendix A10. The event was opened by two municipal Councilors – *Mr. Oscar Mazzocchin, responsible for policies for childhood, young generations, sports* and, *Mr. Giovanni Cunico, responsible for innovation, economic activities and European planning* - who introduced the SSL-erate project and its objectives. The workshop focused on Human Centric Lighting (HCL) and its influence on people, in particular in such sensitive environments as schools.
The workshop was addressed to different types of stakeholders:

1. **Students and teachers**, from 5 schools in Bassano (2 high schools, 2 technical and 1 vocational schools):
    a. ITIS "Enrico Fermi" - Industrial Technical Institute of upper secondary education in the field of mechanical engineering, electrical engineering, automation and computer science.
    b. ITET "L. Einaudi" – State Technical Institute for economy and technology.
    c. ENAIP – Vocational Training Institute in the field of mechanics and motor mechanic, electronics, tourism, wellness, cultural heritage restoration, informatics etc.
    d. Liceo "J. Da Ponte". Science High School.
    e. Liceo Brocchi – High School.
2. **Councilors and municipal officers**
3. **Professionals as architects, engineers and lighting designers**
4. **Lighting cluster Luce in Veneto and its companies**
5. **AIDI Italian Illumination Association – section of Triveneto area**

The main objective of the workshop was to improve the knowledge on "light" perception and its innovative SSL applications and the Human Centric dimension among targeted stakeholders. The importance of the "right light in right place" and HCL approaches as crucial elements for human health, well-being, work and study performance, in particular in sensitive indoor ambits as schools, and their role as drivers for energy saving and innovation in development in the area, was explained to the public by invited keynote speakers and experts.

During the morning **plenary session**, the workshop discussions were aligned with the themes pursued by the International Year of Light 2015 - "Science of Light"; "Technology of Light"; "Light in Nature"; "Light and Culture" – and following topics were discussed and analyzed:

- Light and architectural space – with focus on the use of natural and artificial light in buildings (presented by Arch. Lucia Bucchi, President of the INBAR National Institute of Bio-Architecture, section of Vicenza);
- Link between Light and color – explained by Arch. Marina Vio, expert lighting designer and former Director of the Lighting Design Master of the IUAV University of Venice;
- Application of light in culture – presented by Arch. Francesca Cremasco, Director of the Italian Illumination Association Aidi Triveneto – the cultural and social aspects of lighting are particularly new topics generally not treated very often and thus usually not considered by

people, that's why this intervention was very important and also captured the public's attention;
- Science Technology and Innovation - The use of LEDs – introduced by Eng. Alberto Sozza, Vice President of the Consortium "Luce in Veneto";
- Light and creativity – the experience of sharing innovation – interactive discussion lead by Sergio Macchioni (Hikari srl company involved in business experiment with Bassano), Roberto Corradini and Giorgio Butturini (lighting designers) and Eng. Francesco Suppi (theatrical lighting technician) who share with the public some innovative and creative solutions in using SSL/LED lighting.

In the afternoon the workshop became a **laboratory** where students had the opportunity to understand better many applications of LED innovative technologies. These labs started cooperative paths between students, teachers and the involved lighting companies and experts, aimed at practical application of the knowledge gained during the workshop through development of small projects, different for each school and linked to one of the light applications explored in the morning.
The schools' projects and initiatives will be presented on February, 19th 2016, during the Italian Energy Saving day called "*I will use less light (M'illumino di meno)*" – the symbolic initiative aimed at raising awareness on energy saving, and represents the most important communication campaign on energy saving in Italy. The philosophy of "M'illumino di meno" is to convince more people to limit the energy consumption, making the largest energy savings that are available in a short time, and this has created interests in several blogs and social networks. There are also other initiatives connected with this day. This gives a maximum visibility in media and the largest participation by common people regarding the Energy Saving Day i.e., the 19th of February 2016: at that occasion, everybody is asked for reducing to a minimum of their own private energy uses during the show time. The most incredible effect is assured by the symbolic turning off of the most important monuments and the most important city plazas, united in a sort of "energy silence".

The **potential impact** of the workshop is notable mostly thanks to the very positive commitment expressed by all involved schools, and in particular by their students that come from different educational paths (technical, vocational and high schools) and represent transversal approach towards lighting themes that can potentially intercept the entire territory. Students might act also as bridge between their parents and school and municipality, to further trigger the discussion on HCL lighting and intelligent SSL lighting in the territory.
The workshop was a success, not only because it had a wide participation (more than 120 participants) but mostly because it has launched an interactive and iterative multi-actors dialogue that involves all target stakeholders – both solution and knowledge providers as companies and lighting experts, and potential customers as municipality (owner of school buildings), teachers and students. A list with the signatures from the attending persons is to be found in Table A10-2 in Appendix A10.

Marketing of the event
The municipality did not prepare specific invitations because the workshop was organized in close cooperation with the addressed stakeholders, and defined during the preliminary meetings held on 19.10 and 30.10. There were no invitations made or any specific marketing activities. The schools have been contacted directly by the municipality and thanks to the longstanding cooperation with the INBAR and LiV we were able to commit also lighting experts.

The workshop was promoted through a series of press releases published on the Municipal website, Facebook and some online platforms and e-magazines/press.

The invited persons below is a list of persons actively involved in the organization of the workshop:
Municipality of Bassano del Grappa:

1. Mr. Oscar Mazzocchin – Councillor
2. Mr. Giovanni Cunico – Councillor
3. Mrs. Linda Munari – Councillor
4. Arch. Roberta Michelon – Urban planning Dpt
5. Dr. Paolo Montagna – Urban planning Dpt
6. Renzo Cortese – Urban planning

Schools representatives and selected school classes:

7. Prof. Stefano Longo (ENAIP Veneto – Bassano d.G.) + school class: 2° commercial specialization
8. Prof. Eugenio Caravenghi (I.T.E.T. Einaudi) + school class: geometer specialization
9. Prof. Angileri Nicola Luca (I.T.E.T. Einaudi)
10. Prof. Fabio Pilati (Liceo da Ponte) + school class: 4° ASA
11. Prof. Carla Rutter (Liceo da Ponte)
12. Prof. Maurizio Bonato (ITIS Fermi) + school class: electronics and electrotechnics
13. Liceo Brocchi

INBAR:

14. Arch. Lucia Bucchi (INBAR)
15. Arch. Gaia Bollini (INBAR);
16. Arch. Luisa Zanchetta (INBAR);

Cluster Luce in Veneto and lighting companies/experts:

17. Eng. Alberto Sozza (LiV)
18. HIKARI srl (Sergio Macchioni)
19. Roberto Corradini (Lighting designer)
20. Giorgio Butturini (Lighting designer)
21. Francesco Suppi (Lighting art theater technician)

Others:

21. Arch. Francesca Cremasco (“AIDI Triveneto”)
22. Prof. Arch. Marina Vio (Studio Associato Vio)

Upcoming local actions

1st semester of 2016 - Municipality of Bassano is planning to organize **a capacity building course on lighting design and light application** (for indoor and outdoor), **addressed to professionals** of building sector as architects, engineers, technicians, geometers etc.

The very draft idea is to organize a course of min. 16 hours (split in 2 or 3 one/half-day workshops), in strict cooperation with the INBAR National Institute of Bio-Architecture, section of Vicenza and Politecnico di Milano.

To ensure wide interest and participation, the Municipality will try to obtain patronage of several professional associations and orders and professional credits for the SSL-erate course.

14 Assessment of the resulting advancement

To assess the resulting effect of the SSL-erate activities so far, eight interviews have been held with SSL-erate city people, in December. The primary aim was to evaluate the progress in the SSL-erate key performance indicators to broaden the interest in deployment of more advanced high-quality SSL by more cities and other actors. The notes below exemplify how the cities' workshops and other SSL-erate activities have created broader local and regional engagement. One important aspect has been to build awareness and to spread the understanding of the health and wellbeing effect of light. The potential of smart lighting system developments for sustainable societal development and green business development has been also addressed. The regional networks have initiated a dialogue on possibilities of SSL solutions and the hurdles for accelerated deployment.
Notes from the interviews and dialogues 2015 Dec 10-11, and summary of the results in Table 15-1 and Table 15-2 can be found below.

Stavanger, Ingjerd Bratterud
The feedback is that the workshop has created a lot of attention on the potential of LED for smart outdoor lighting. Representatives from municipalities say that they have understood that LED lighting now is the most useful lighting technology. This is important because so far there is limited interest in LED for outdoor lighting in most Norwegian municipalities. The energy saving has not been a driver since the cost for electricity in Norway is relatively low. There are few investment programs. The smart system technology is not considered to be ready for application. It is important to demonstrate the usefulness of the new potential of SSL.
Stavanger is aiming for User Driven Innovation (utilizing their customer role) with the electric utility Lyse as a coordinating development and installation actor for 8 regional municipalities. In this setting each municipality is planned to have the control of their own lighting. The ICT network with Lyse can be used for exchange of experiences. Within the street lighting innovation activities only LED lighting should be considered.
Stavanger is aiming to become a leading smart city. They are aiming for a new workshop in April 2016, possibly together with the public traffic stakeholders Statens vegvesen (www.vegvesen.no) and Vegdirektoratet.

Hamburg University of Applied Sciences, Maria Kowald
The Hamburg workshop included a dialogue on LED street lighting on what is better and worse for various suppliers. According to Hamburg city LED lighting is not always an improvement. In some LED applications (with direct lighting) it is difficult to see the faces of people, which causes a feeling of uncertainty. A wish was to have a more controllable solution that offers wider and more different colour temperatures in the lighting.
The dialogue on school lighting highlighted that better lighting can promote better learning and circadian entrainment, and that the HCL approach was preferable. Hamburg has got positive feedback on the workshop, enabling to meet each other and to share experiences.
There is a rebound effect; the energy saving is limited because there is a tendency to install more lighting. Some cities saved so much energy that more money could be invested in new lighting in the city. Hamburg (and others in Germany) has quite a bit of discussion about light pollution.

University College London, Tim Broyd
The London workshop highlighted barriers and incentives to change. It is a rather complicated picture. The controllability and lifetime cost are the most appreciated benefits. The railroad stations are changing to LED. However, there is not much national roll out of LED for street lighting (Coventry has LED street lights). Cities normally have little authority over the buildings hired for their activities.

There are increasing cutbacks on subsidies to energy saving projects like renewable energy solutions (busy fighting the deficit). State funded innovation might also be reduced with about 50%. The only real goal seems to be cost savings and thereby also to some extent the controllability of the lampposts. Lampposts with their own IP-addresses could be controlled either individually or as a group to reduce energy and maintenance cost. There is low awareness about possible health benefits.

Eindhoven, Arthur Noordhoek

Innovation is important for Eindhoven and they are working a lot with innovation "Roadmaps". The Lighting Roadmap was the first one and Eindhoven now has eight different roadmaps for various aspects of city development, including education and mobility. However, procurement is a hindrance for implementation of the roadmaps. The cities in The Netherlands need some help/guidance on making specifications for the innovation-oriented procurement. For demonstrations you can partly go around these procurement processes, so it is possible to demonstrate new possibilities. Furthermore, Arthur indicates that LED technology is different from earlier lighting technologies and that it is important to take a grip on the present shortcomings, otherwise it will be difficult to build real interest in the possible additional values. Eindhoven's approach is that the big cities have to take the lead role, therefore they are working on this together with London, Amsterdam and Rotterdam. These large cities will be front-runners and positive regional examples for smaller cities. Eindhoven also has the end users participating, making it a Quadruple Helix.

Arthur has presented the Eindhoven Lighting Roadmap a number of times and it is catching a lot of interest. He also participates in national work on specifications for luminaries. The question is raised if more light is needed to enable facial recognition. Eindhoven wants more cities to implement LED lighting, but most cities put it on hold. They are expecting LED to become cheaper and think that new additional functions will come for free in the new types of LED fixtures. Creating willingness to pay for the more advanced functionalities and added benefits is required.

Netherlands holds the EU Presidency in the first half of 2016 and the alderman of Eindhoven responsible for lighting intends to brand Eindhoven as the innovative city of light. Eindhoven is planning a major event during the NL presidency. (The meeting planned for November this year was postponed to next year, and is planned to take place during the presidency period.)

Vilnius University, Pranciškus Vitta

The Lithuanian city governments are not interested in indoor lighting or HCL. They are very occupied with financial problems and they are only interested in cost savings and energy savings for outdoor lighting. The national government does not care about indoor lighting. Also it is hard to get them thinking of added value. Furthermore, the old "hygiene standards" still state that the lighting shall be fluorescent or incandescent. The local suppliers hardly understand HCL and there is no internal market for this. It is not just the public sector that has financial constraints also private companies have lack of funding.

Still Vilnius University has been able to create interest in installation of Human Centric Lighting in a private school. This is quite an extraordinary opportunity considering the present economic situation in Lithuania. The experimental Human Centric school lighting is interesting in relation to the advanced colour related research in Vilnius and the university also has research in cognition, psychology and on sleep disorders.

There are plans for another HCL demo after Christmas in another private school. The aim is to install HCL in several different rooms at the school.

Basssano del Grappa, Marta Krakowiak

Bassano del Grappa had 120 participants in their workshop December 3. Representatives from three private and two public schools, both high schools and vocational schools, and two municipal Councilors participated. Also 3 companies from the neighborhood were involved. The presentations

and the participation in the laboratory activities with the effects of different kinds of light and also with robotics triggered interest. The diversity is considered to be good. The workshop included appreciated dialogues among students from different disciplines and from different schools. This will be further advanced by broader public activities February 19, 2016 with the theme “I will light less and better” (translated from Italian), which is a part of a national campaign for sustainability. Engaging students in innovative lighting projects will be on the agenda.
Bassano has created interest in updating the lighting knowledge of building sector professionals, e.g.: architects, entrepreneurs, technicians and civil servants. In collaboration with Polytechnic Milano and University of Venice, a three-days “course” with credits for accreditation is being drafted for at least 15 lighting professionals. The course will start in the beginning of next year (Feb-April).
It has been both good and easy to work with different schools. There now is significant interest in Human Centric School Lighting in the Bassano region. Hospitals were harder to reach, partly due to substantial regulatory hurdles.
Practice is that the city of Bassano does not invest in new lights (outdoor) until the existing one breaks.

LUCI, Nikita Junagade
The feedback from Bucharest peer-to-peer workshop, organized on behalf of SSL-erate, as part of a LUCI city-under microscope event, was very positive. For spring 2016 the arrangement of a similar course/ workshop in the LUCI cities Dubrovnik and Budapest is planned.
The new “intelligent lighting” is different from the earlier lighting. Adequate handling of this issue requires the various actors to get out of their “silos” and to collaborate. The LUCI events (in general) often include demonstrations and activities like living labs. The real lighting needs are the starting point for programming of the LUCI city events. Next new lighting opportunities are presented in a realistic way. The language barriers prove to be a tough challenge however.
LUCI is an outdoor lighting organization, exclusively. Their main members are the municipalities and associated members like manufactures, light designers and some light festivals.

Malmö, Olle Strandberg
Comments on the outcome and the learnings/experiences from the SSL-erate process from the workshop and the work with the brochure:

- To make things happen on the market, for the solutions that are being demonstrated, there is a need for additional information:
- Consumers need guidance on what is good and bad lighting.
- The specifications of SSL needs to be standardized in order to make buying as easy was with the 40 W and 60 W bulbs.
- There is a need for more research on flicker and possible consequences.
- We need attractive, easy-to use (self-evident) solutions, e.g. a new wake up light.

When this has been accomplished the market needs to be influenced by:

- Informing about HCL, clarifying how humans are influenced by good dynamic light, in comparison to bad static light.
- Establishing businesses that really can deliver and actually deliver the new functionalities (and not only say that they can and then continue to sell their old solutions).
- Branding campaigns like “There is something new with our light”
- Pushing early adapters to take the step and try the new light.
- Storytelling about all good examples.

If this is done in the right way, in the right order; Olle is confident that the willingness to pay will evolve, both in municipalities and companies. The pressure to take action will increase because it is about our children, our elderly, etc. – so the question will be why we not already have changed

rather than if we can afford it. Therefore, the procurement considerations will change. Seeing is believing, but we need to be prepared to show what has become possible.

Summary of the WP2 achievements so far

Table 15-1 and Table 15-2 indicate the broadening of the interest in SSL resulting from SSL-erate activities. This is based on the effects of the workshops organized by the cities and other WP2 actors. The Tables summarize the outcome of the thirteen 2014 workshops and the workshops in the nine cities held during 2015. The information is based on the workshop reports of each city and the interviews with the city representatives during December 2015.

Some short explanatory remarks regarding the information in the Tables 15-1 and 15-2:

- The outcome of the workshops held in Lund is presented together with that of the Malmö workshop, as Malmö and Lund are neighboring cities.
- The workshop in Malmö was based on a case where invited companies were to show possible solutions for a specified classroom.
- Stavanger is aiming for User Driven Innovation (in their customer role) with the electric utility Lyse as a coordinating development and installation actor for eight regional municipalities. In this setting each municipality has control of their own lighting, using networks with Lyse as a platform for exchange of experiences. For instance there is a decision that it should only be LED in the street lighting.
- For London the main aim for the workshop was to highlight barriers and incentives for change and not to reach to as many cities as possible.
- The Lithuanian city governments are not interested in SSL indoor lighting or HCL. They are very occupied with financial problems and therefore only interested in cost savings and energy savings for outdoor lighting. Furthermore, the old “hygiene standards” still state that lighting shall be fluorescent or incandescent. The suppliers hardly understand HCL and there is no internal market for this. Not only the public sector feels the financial constraints but also the private companies. Still Vilnius University has been able to create interest in installation of Human Centric Lighting in a private school. This is a quite extraordinary opportunity considering the present economic situation in Lithuania.
- In Vilnius, there are plans to demonstrate HCL in several classrooms of another private school after Christmas, delivered by Glamox. In this way private schools could show the effect of HCL and possible solutions to realize these.
- Bassano Del Grappa had 120 participants (including students) from three private and two public schools, both (technical) high schools and vocational schools, and including two municipal Councilors, in their workshop December 3rd. Also 3 companies and 5 cities from their region were involved.
- Bassano has created interest in updating the lighting knowledge among building sector professionals by hosting a course (divided into three different days) in the beginning of next year.
- LUCI is to arrange a similar course/workshop in the LUCI cities Dubrovnik and Budapest in spring 2016 as held in Bucharest.
- The LUCI events often include demonstrations and activities like living labs. The real lighting needs are the starting point for the LUCI city events. Next new lighting opportunities are presented in a realistic way.
- LUCI focuses on outdoor lighting, exclusively. Their main members are municipalities and associated members like manufactures, light designers and some light festivals.

Table 15-1: Summary of the outcome of the workshops and ambition for 2016

	2015				Ambition for 2016			
	Moving to invest		New actors		Moving to invest		New actors	
	Road map	Cities	Cities	Other	Focus area	Cities	Cities	Other
Stavanger		2	**7**	3	Outdoor	7	7	
Bassano		1	5	4	Schools, building	3	7	
Malmö		2	4	3	Schools	4	6	
Vilnius		1	2	1		1	2	
UC London				1			2	
Hamburg	Streets				Streets	2		
LUCI		Bucharest	1		Streets	4		
Sum		**7**	**19**	**12**		**15+**	**24**	
KPI						*15*	*20*	

Table 15-1 summarizes how many cities are moving towards investing and how many cities and other actors got interested in SSL, helped by the activities of the SSL-erate cities in their region. Table 15-2 shows the interest of the newly engaged actors which stands out: networking, value enhancing innovation and demonstrations of SSL.
Human Centric school lighting has become a more common and more explicit interest. In four of the regions, driven by two cities and two universities in close collaboration with their municipalities, Human Centric school lighting is a driver.
SSL-erate is also advancing the interest in LED for outdoor lighting in synergy with the Smart City development, using the lighting system as an infrastructure.
All the actors participating in the workshops are stressing that networking is crucial. There is a much need for open dialogue on new SSL opportunities and hurdles.

Table 15-2: Summary of the activities in and fields of SSL applications

City/actor	Road map	Net-work	New actors		Outdoors		Indoors	
			Cities	Others	Focus	Demo	Focus	Demo
Stavanger		Yes	7	3	Smart city	Planning	-	-
Bassano		Yes	5	4	Smart city	Yes (LiV)	HCL School	-
Malmö		Yes	4	3	-	-	HCL School	Classroom
Vilnius		Yes	2	1	Smart city	Tuneable	HCL	HCL School
UC London		Yes	-	1	-	-	-	-
Hamburg	Street	Yes	-	Yes	Street	-	Schools	-
LUCI		Yes	1	Yes	-	-	-	-

Concluding notes
The Eindhoven approach, with some large cities taking visible leading roles in stimulating others to get started and by sharing information, is interesting. The project aims to start similar processes in which the SSL-erate cities take analogous leading roles for innovative deployment of smart solutions, HCL and advanced SSL. A starting point towards this is indicated by the fact that 95% of the cities today is already using LED to some extent.
It seems crucial to take seriously that LED lighting is different from the earlier lighting technologies and that it is important to get grip on the shortcomings that we still see for numerous products on

the market. Lighting needs to be seen as part of a system creating a solution, adapted for each locality, type of activity and the local circumstances.
Furthermore the Malmö experiences, based on their interviews of potential suppliers and their own installation of Human Centric School lighting, have shown that it is difficult to find system suppliers that have the combined knowledge needed for innovative dialogue, installation and commissioning of Intelligent Human Centric Lighting (HCL). The lesson learned from this are that informed decisions are very important but at the same time hard to make. Workshops, demos etc., where feedback from the different actors including end users is apparent, could be of help in that decision-making process. The Malmö experience seems to be coherent with that of other cities. This implies that the SSL-erate open networking and distribution of objective distribution of information is vital.

One thing we note is that we now have three partners (Bassano del Grappa, Vilnius and Malmö) that are active in Human Centric school lighting.
Bassano del Grappa had 120 participants from five local schools in their workshop December 3. The presentations and the participation in the laboratory activities with the effects of different kinds of light was a good trigger of interest. This will be further advanced by broader public activities February 19, 2016.
Vilnius is planning for installation of Human Centric Lighting in two private schools, a quite extraordinary achievement considering the present economic situation in Lithuania. The Human Centric School Lighting is interesting in relation to the research in Vilnius.
Malmö is working with user driven innovation for Human Centric Lighting with a focus on the own development and installation of Human Centric School Lighting in a classroom.

Appendix – City workshops conducted in 2015

Appendix A1, Lund, Sweden, 5th February 2015

Appendix A2, Bucharest, Romania, 24th April 2015

Appendix A3, London, UK, 17th July 2015

Appendix A4, Malmö, Sweden, 21st October 2015

Appendix A5, Stavanger, Norway, 21st October 2015

Appendix A6, Hamburg, Germany, 11th November 2015

Appendix A7, Vilnius, Lithuania, 11th November 2015

Appendix A8, Lund, Sweden, 1st December 2015

Appendix A9, Bassano, Italy, 3rd December

Appendix A1, Lund, Sweden, 4-5th February 2015

Table A1-1: List of invited persons

Company/ Organisation	Name	Email address
AAXSUS AB Skarpskyttevägen 3 SE-226 42 LUND	Alexander Weiland Utveckling & försäljning	alexander.weiland@aaxsus.se
White Arkitekter	Alexandra Hagen, Arkitekt	alexandra.hagen@white.se
Hammarby Sjöstad	Allan Larsson	
LU, Biologi	Allan Rasmusson	
LU	Anders Axelsson	anders.axelsson@chemeng.lth.se
Wihlborgs	Anders Grönvall	anders.gronvall@wihlborgs.se
JOIN Business & Technology	Anders Hedberg	anders.hedberg@join.se
Thorn Lighting	Anders Kristensson	Anders.Kristensson@thornlighting.com
f.d. KTH Belysningslära	Anders Liljefors	anders@andersliljefors.com
EON AB	Anders Olsson	
EON	Anders Strange	anders.strange@eon.se
Sweco Systems AB	Anders Walter	
Energimyndigheten Swedish Energy Agency	Anita Aspegren	anita.aspegren@energimyndigheten.se
Medicon Village	Anna Gisselsson	Anna.Gisselsson@luopen.lu.se
MAH	Anna Holmberg	
Energimyndigheten	Anna Johansson	anna.johansson@energimyndigheten.se
LU Open, Inside Light	Anna Ntinidou	anna.ntinidou@luopen.lu.se
Svedala Kommun (Mumindalens förskola)	Anna Rosdah	Anna.Rosdahl@svedala.se
SP	Anne Andersson	anne.andersson@sp.se
GU	Ann-Marie Pendrill	Ann-Marie.Pendrill@physics.gu.se
Cp Norway	Arne Grøsdal	arne.gronsdal@cp-norway.no
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LED Engin Europe Große Kirchstrasse 71A 51373 Leverkusen Germany	Wojtek Cieplik Regional Sales Manager EMEA	wcieplik@LedEngin.com
KTH	Zary Segall	segall@kth.se
LU Bygg	Åsa Bergenudd, byggnadschef	asa.bergenudd@bygg.lu.se
White arkitekter AB	Åsa Haremst	
Acreo		
Alfa Exx		
Arbetsmiljöverket		
ATC Indu		
Co-design		
Digital Context		
Fox Design		
Glo AB		
Göteborgs stad		
Heliospectra		
IQ Samhällsbyggnad		
J M Bygg		
Johnson Lighting Technology		

Company/ Organisation	Name	Email address
LIGHTAB		
Ljusrum AB		
NCC		
Optoga		
Prismalence		
Ramboll Lighting		
Skånes Universitetssjukhus		
Sundsvall		
Swedephonic		
Swedish ICT		
TCO Development		
Wennerström Ljuskontroll		
VISITA - Svensk Besöksnäring		
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KTH	Rodrigo Eduardo Muro Avendano	rema@kth.se
KTH	Isabel Dominguez	isabeld@kth.se
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	Joe Niemela	niemela@ictp.it

Table A1-2: Invitation to the dialogue workshop on social innovation in the light sector

Dialogue Workshop on Social Innovation in the Light Sector

Wednesday 4 February 2015 16:00-17:30 in the Aula at the International Institute for Industrial Environmental Economics at Lund University (IIIEE)

The IIIEE is situated in the centre of Lund next to Kulturen – address: Tegnérsplatsen 4.

The workshop will provide an opportunity for interested to discuss how Social Innovation could play a role for dissemination smart and appropriate light solutions considering the opportunities provided by new technologies – LED light, photovoltaics, etc. The workshop is organized in connection to activities organized by the new initiative Inside Light and various light researchers at Lund University. Special guest at these events will be Professor Joseph Niemela, Secretary for the International Year of Light which was opened by UNESCO in Paris on 19 January this year. Professor Niemela has a keen interest in Social Innovation in Africa and the possibilities to supply affordable and appropriate light solutions for these countries.

The workshop is organized by IIIEE together Inside Light as an activity in the EU-funded project SSL-erate.

Welcome!

The following explanation of Social Innovation is given by the EU: Social innovation can be defined as the development and implementation of new ideas (products, services and models) to meet social needs and create new social relationships or collaborations. It represents new responses to pressing social demands, which affect the process of social interactions. It is aimed at improving human well-being. Social innovations are innovations that are social in both their ends and their means. They are innovations that are not only good for society but also enhance individuals' capacity to act.

PARTNERS:

Table A1-3: Agenda/ Invitation list for the 5th February between 09:15-12:00

MULTIDISCIPLINARY LIGHT RESEARCH SEMINAR

Time: Thursday 5th of February 2015, 09.15-12.00 and lunch
Venue: LU Open Innovation Center, Scheelevägen 15A, Alfa 2, Lund
"Open-up" conference room at Black Pearl

Light related research and the combined potential of ICT and LED is a game changer enabling dynamic human-centric lighting and societal sustainable development advantages. To enhance the ability to support the utilization of these opportunities; SSL-erate and Lund University organize a multi-disciplinary dialogue to facilitate an out-of-the-box interaction between various knowledge leaders.

This group has one starting point in the ongoing Multidisciplinary Light Research Dialogue that was initiated by the Pufendorf Institute, Lund University in 2010. This round-table dialogue also invites a number of key knowledge and development actors from international light organization, regional organizations and companies. The subject list is only included to describe the breadth of represented subject areas.

PARTNERS:

Invited participants:

Name	Organization	Possible subject contribution
Joe Niemela	IYL 2015	UNESCO's interest in better school lighting
Ingemar Johansson	LUCI	Smart Lighting Systems for Smart Cities
Lennart BM Svensson	PhotonicSweden	The European Investments in Photonics
Nils Erkamp	TNO, SSL-erate	Deployment of Human-Centric Lighting
Kai Piippo	ÅF Lighting	Lighting Design for Human Enjoyment
Jeton Partini	CGM	Control rooms dynamic lighting for 24/7
Tord Wingren	Telecom business	Smart Sensors, ICT systems and Lighting
Wojtek Cieplik	LED Engin	Dynamic Lighting Product Development
Alexander Weiland	Aaxsus	Dynamic Lighting Product Development
Thomas Lanz	ELEKTROLANZ AB	Installation of smart LED Lighting
Isabel Dominguez	KTH Lighting Lab	The KTH Lighting Design Master projects
Sheila Galt	Chalmers	Building lighting interest among pupils
Monica Almqvist	Vattenhallen	Science Centers for creation of awareness
Anders Strange	EON	Science Centers for creation of awareness
Ann-Marie Pendrill	IYL2015 Sweden	Light is a broad scientific and technical subject
Dan Hessman	Solid State Physics	LED and Nano-threads
Mikkel Brydegaard Sørensen	Laser Physics	Multi-band illumination for improved contrast and specificity
Jessika Luth Richter	IIIEE	Recycling as driver for systemic renewal
Reine Karlsson	SSL-erate, LU Open	The lighting sector in the Digital Age
Bengt Järrehult	Innovation	Innovate or Die
Jesper Arfvidsson	Building Research	Building sector, Lighting and control systems
Thomas Lindhqvist	IIIEE	Societal Control measures as drivers for change
Marie Löwegren	Entrepreneurship	The entrepreneur as a change agent
Håkan Lagerquist	Business Research	Open Innovation for Smart SSL
Klas Sjöberg	Medicine	Medical considerations for light

Dan E Nilsson	Vision Science	Vision and measurement of light distributions
Thorbjörn Laike	CEEBEL	Environmental Psychology for Healthy Homes
Hillevi Hemphälä	Ergonomics	Ergonomic effects of bad and good lighting
Helene Vogelmann	LU Open	Societal Entrepreneurship
Patrik Ryden	LU Open	Innovative development of Smart cities
Peter Kisch	Future by Lund	Lund Municipality Innovation for SSL
Peter K Andersson	Malmö City	Dynamic Lighting for Schools and Elderly
Pia Kinhult	ESS	Dynamic Lighting to make Lund attractive
Björn Lagnevik	Region Skåne	Investment for Regional Development

Table A1-4: Invitation/ Agenda for the 5th February between 13:00-15:00

SEMINAR & PANEL DISCUSSION

INDOOR LIGHTING FOR HEALTH AND WELLBEING

A KEY ASPECT OF

THE INTERNATIONAL YEAR OF LIGHT, IYL 2015

Time: Thursday 5th of February 2015, 13:00-15:00

Venue: Ideon Agora, Scheelevägen 15, 223 70 Lund. "Square" conference room

Organiser: LU Open Innovation Center

Registration: Please register here! Participation is free-of–charge.

2015 has been proclaimed the International Year of Light and Light-based Technologies (IYL 2015), by the United Nations. Dr. Joseph Niemela, Secretary for the UNESCO IYL2015 initiative will discuss the opportunities arising at a global level. Ingemar Johansson Head of Street Lighting, Göteborg, the President of LUCI, Lighting Urban Community International will present.

The character of lighting plays a vital role in our daily lives and light is a key aspect in multidisciplinary collaboration with a great potential for innovation and "green jobs" creation. Today it is possible to create dynamic human-centric lighting systems, with significantly better functionality, health and wellbeing characteristics in comparison with traditional lighting. The combination of LED, sensors, ICT hard- and software and a variety of user interfaces enable significantly better user values and societal sustainable development advantages, by dynamically providing the right light, in the right place, at the right time.

This event presents the human functionality, health and wellbeing value of better indoor lighting. Next to the conference room, companies like LED Engin, Aaxsus and Join will demonstrate leading LED products and technology.

United Nations Educational, Scientific and Cultural Organization · International Year of Light 2015 · LUND UNIVERSITY · LUCI ASSOCIATION · lightingforpeople

PROGRAMME

FEB 5TH	SPEAKER	PRESENTATION
13.00	Nils Erkamp, *Business Line Manager Lighting TNO, SSL-erate*	Today's potential to create Human-Centric Lighting Systems
13.10	Kai Piippo, *Chief designer ÅF Lighting* The Swedish Lighting price 2012	Lighting Design as a change driver
13.25	Joseph Nimela, Prof. Applied Physics, IYL2015 *Secretariat at UNESCO-ICTP*	The International Year of Light
13.45	Ingemar Johansson, LUCI, *Head of Street Lighting, City of Gothenburg*	Cities as change agents for SSL and Smart Systems
13.55	Tord Wingren, *Co-initiator of Bluetooth and Ericsson Mobile Platforms, Co-founder of Nanoradio (WiFi&BT). Co-founder and Chairman of BrainLit*	The new age of Smart sensors and lighting systems
14:05	Reine Karlsson, *Prof EcoDesign Lund University*, SSL-erate	The Swedish Indoor Lighting Initiative
14.15	Panel discussion moderated by Torbjörn Laike, *Professor in environmental Psychology, Lund University*	
15:00	Coffee and mingle	

PARTNERS:

Table A1-5: Invitation/ Agenda for the 5th February between 15:00-17:00

SYDSVERIGES SATSNINGAR PÅ SMARTA LJUSSYSTEM INOMHUS

Plats: Ideon Agora, Scheelevägen 15, 223 70 Lund, "Forum" konferensrum
Tid: 15.00 - 17.00
Organisatör: LU Open Innovation Center

Dagens LED, sensorer, IKT hård- och mjukvara och användargränssnitt ger helt nya möjligheter att skapa dynamiska ljuslösningar för att förbättra hälsa och välbefinnande. Lunds Universitet har en stark roll i det europeiska samarbetet för att öka nyttan av denna potential. Sydsverige har starka resurser inom IKT, Malmö och Lund arbetar redan för bättre skolljus och Inside Light arbetar på att starta upp fler intresseväckande demonstrationer med dynamiska ljuslösningar.

Välkommen till en öppen dialog om hur Sydsveriges städer kan ta nytta av denna gyllene möjlighet.

PARTNERS:

PROGRAM

15.00	Kaffe	
15.30	Reine Karlsson, InsideLight	Det möjliga användar- och samhällsvärdet av att satsa på Smarta System, Gröna Jobb och Hållbar utveckling, genom att investera i att ta bättre nytta av framtidens belysning.
15.50	Björn Lagnevik, Region Skåne	Presentation av Sydsveriges möjligheter att ta nytta av Dagens Gyllene Möjligheter, genom att • Städerna tar en ledande roll i att satsa på innovativ utveckling för att öka nyttan av den nya ljustekniken för utveckling av mänsklig bättre skolmiljöer, • I samspel med regional affärsutveckling för hållbar samhällsutveckling, • Genom ett stort antal mer meningsfulla gröna jobb.
16.00	Moderator Thorbjörn Laike	Rundabords-samtal om hur svenska aktörer tillsammans kan ta framtidsinriktad nytta av att satsa på inomhusbelysning genom konkreta demonstrationer.
17.00	Mingel	

Table A1-6: Opportunities with indoor lighting, A Swedish perspective

Table A1-7: Mapping of an approach towards the future lighting

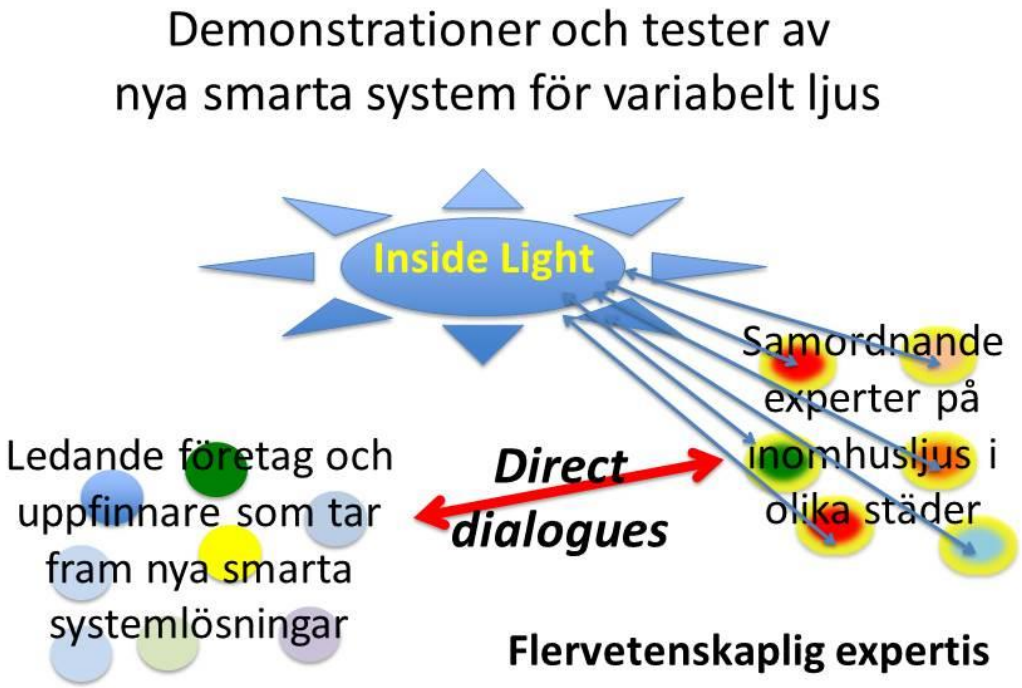


Table A1-8: The manifest from the workshops (In Swedish)

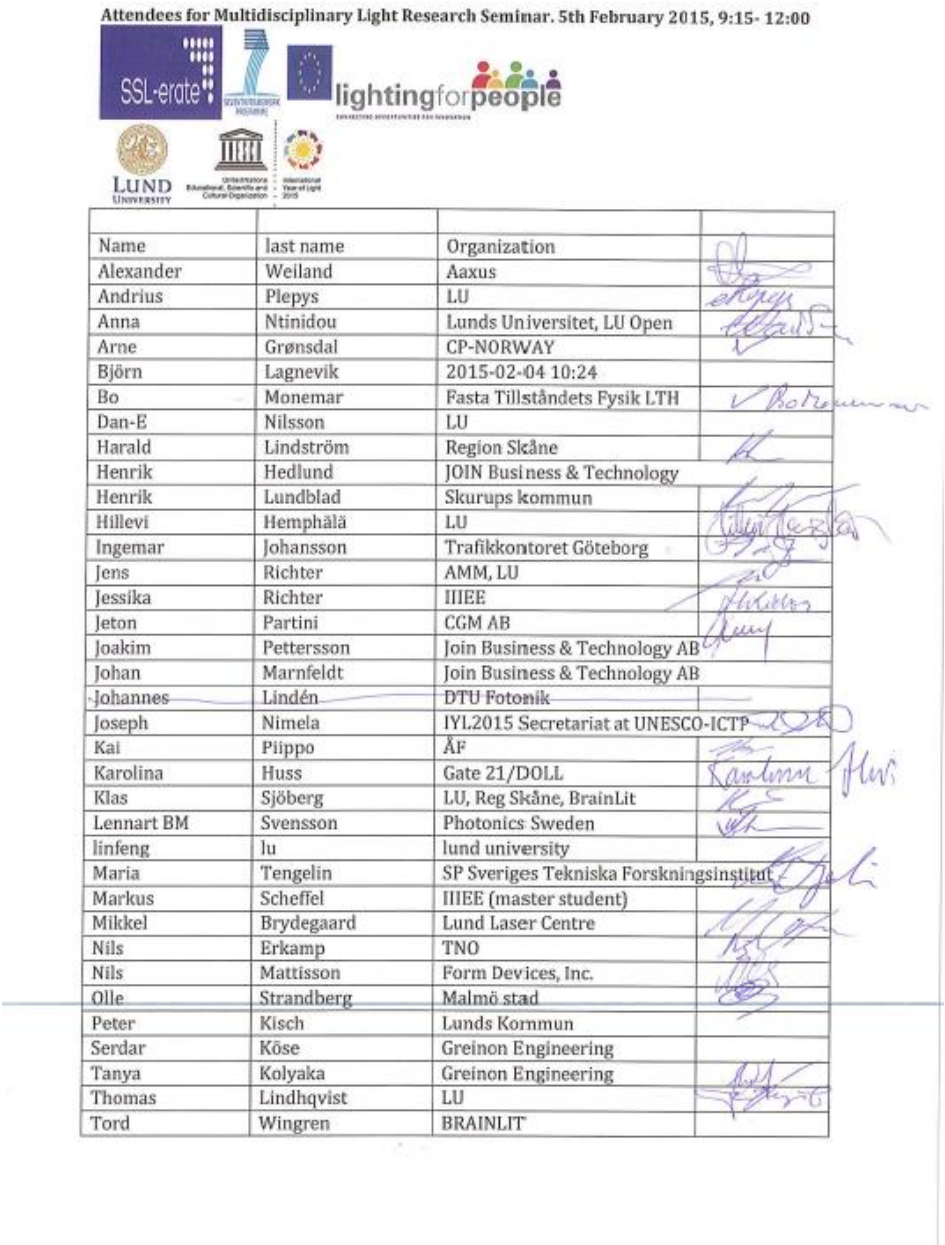
Dagens LED, sensorer, IKT hård- och mjukvara och användargränssnitt ger helt nya möjligheter att skapa dynamiskt ljus som förbättrar belysningens funktion och även förbättrar användarnas hälsa och välbefinnande. Lunds Universitet har stark flervetenskaplig ljuskunskap och en stark roll i det europeiska samarbetet för att öka nyttan av dynamiska ljuslösningar. Sydsverige har starka resurser inom IKT. Malmö och Lund arbetar redan för bättre skolljus. Det finns också en grund i att Sverige har stark tradition inom arbetsmiljö och att många svenskar är bra på systemtänkande, både tekniskt och affärsmässigt. Inom Europa växer det nu fram en ny samsyn kring att ljusets variation är mycket viktigare för hälsa och välbefinnande än de flesta inser. Genom att satsa på innovativ utveckling, för att förbättra livs- och arbetsmiljöer, skapas många gröna jobb och en grogrund för innovativ affärsutveckling.

Vårt mål är att starta en lärprocess som förbättrar deltagarnas och Sydsveriges förmåga att snabbare ta mer värdeskapande nytta av den nya ljusteknikens potential. En sida av den nya handlingsfriheten är att den nya tekniken ger möjligheter att göra fastigheter och verksamheter mer attraktiva, genom att investera i nya mer spännande ljuslösningar. En annan viktig anledning att förbättra kunskapen om olika former av belysning är att det finns många olika produkter med olika egenskaper och varierande kvalitet på marknaden.

Detta Manifest bekräftar att alla parter med start under internationella ljusåret 2015 kommer att satsa på mer intresseväckande ljusdemonstrationer. Avsikten är att visa att Skåne satsar på dynamisk inomhusbelysning som ger mänskliga värden som signifikant överträffar den traditionella belysningen. Lärandet från denna process organiseras som ett Living Lab; Inside Light, som också samordnar sökandet efter resurser och urvalen av nya allt mer spännande demonstrationer.

För att så snart det är lämpligt kunna börja ta nytta av de nya möjligheterna i större skala söker vi installationsformer som gör att de nya möjligheterna även kan nyttiggöras i existerande fastigheter. Städerna samordnar dessa aktiviteter med en sådan utveckling av sina belysningsspecifikationer, inköpsrutiner och arbetsformer för installation och uppföljning att det öppnar upp för storskaligt nyttiggörande av nya systemlösningar för mänskligt bättre ljus.

Table A1-9: Signed attendance sheets



Attendees for Multidisciplinary Light Research Seminar. 5th February 2015, 9:15- 12:00

Name	last name	Organization	
Alexander	Weiland	Aaxus	
Andrius	Plepys	LU	
Anna	Ntinidou	Lunds Universitet, LU Open	
Arne	Grønsdal	CP-NORWAY	
Björn	Lagnevik	2015-02-04 10:24	
Bo	Monemar	Fasta Tillståndets Fysik LTH	
Dan-E	Nilsson	LU	
Harald	Lindström	Region Skåne	
Henrik	Hedlund	JOIN Business & Technology	
Henrik	Lundblad	Skurups kommun	
Hillevi	Hemphälä	LU	
Ingemar	Johansson	Trafikkontoret Göteborg	
Jens	Richter	AMM, LU	
Jessika	Richter	IIIEE	
Jeton	Partini	CGM AB	
Joakim	Pettersson	Join Business & Technology AB	
Johan	Marnfeldt	Join Business & Technology AB	
Johannes	Lindén	DTU Fotonik	
Joseph	Nimela	IYL2015 Secretariat at UNESCO-ICTP	
Kai	Piippo	ÅF	
Karolina	Huss	Gate 21/DOLL	
Klas	Sjöberg	LU, Reg Skåne, BrainLit	
Lennart BM	Svensson	Photonics Sweden	
linfeng	lu	lund university	
Maria	Tengelin	SP Sveriges Tekniska Forskningsinstitut	
Markus	Scheffel	IIIEE (master student)	
Mikkel	Brydegaard	Lund Laser Centre	
Nils	Erkamp	TNO	
Nils	Mattisson	Form Devices, Inc.	
Olle	Strandberg	Malmö stad	
Peter	Kisch	Lunds Kommun	
Serdar	Köse	Greinon Engineering	
Tanya	Kolyaka	Greinon Engineering	
Thomas	Lindhqvist	LU	
Tord	Wingren	BRAINLIT	

Attendees for Multidisciplinary Light Research Seminar. 5th February 2015, 9:15- 12:00

Name	last name	Organization	
Alexander	Weiland	Aaxus	
Andrius	Plepys	LU	
Anna	Ntinidou	Lunds Universitet, LU Open	
Arne	Grønsdal	CP-NORWAY	
Björn	Lagnevik	2015-02-04 10:24	
Bo	Monemar	Fasta Tillståndets Fysik LTH	
Dan-E	Nilsson	LU	
Harald	Lindström	Region Skåne	
Henrik	Hedlund	JOIN Business & Technology	
Henrik	Lundblad	Skurups kommun	
Hillevi	Hemphälä	LU	
Ingemar	Johansson	Trafikkontoret Göteborg	
Jens	Richter	AMM, LU	
Jessika	Richter	IIIEE	
Jeton	Partini	CGM AB	
Joakim	Pettersson	Join Business & Technology AB	
Johan	Marnfeldt	Join Business & Technology AB	
Johannes	Lindén	DTU Fotonik	
Joseph	Nimela	IYL2015 Secretariat at UNESCO-ICTP	
Kai	Piippo	ÅF	
Karolina	Huss	Gate 21/DOLL	
Klas	Sjöberg	LU, Reg Skåne, BrainLit	
Lennart BM	Svensson	Photonics Sweden	
linfeng	lu	lund university	
Maria	Tengelin	SP Sveriges Tekniska Forskningsinstitut	
Markus	Scheffel	IIIEE (master student)	
Mikkel	Brydegaard	Lund Laser Centre	
Nils	Erkamp	TNO	
Nils	Mattisson	Form Devices, Inc.	
Olle	Strandberg	Malmö stad	
Peter	Kisch	Lunds Kommun	
Serdar	Köse	Greinon Engineering	
Tanya	Kolyaka	Greinon Engineering	
Thomas	Lindhqvist	LU	
Tord	Wingren	BRAINLIT	

Attendees for Indoor Lighting for Health and Wellbeing a key aspect of The International Year of Light & Sydsveriges satsningar på smarta ljussystem inomhus
5th February 2015, 13:15- 17:00

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Attendees for Indoor Lighting for Health and Wellbeing a key aspect of The International Year of Light & Sydsveriges satsningar på smarta ljussystem inomhus
5th February 2015, 13:15- 17:00

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Nils	Mattisson	nils@formdevices.com	

Attendees for Indoor Lighting for Health and Wellbeing a key aspect of The International Year of Light & Sydsveriges satsningar på smarta ljussystem inomhus
5th February 2015, 13:15- 17:00

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Attendees for Indoor Lighting for Health and Wellbeing a key aspect of The International Year of Light & Sydsveriges satsningar på smarta ljussystem inomhus
5th February 2015, 13:15- 17:00

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Paul	Wennerberg	paul.wennerberg@chattaque.se	
Mats	Wilander	mats.wilander@auralight.com	
Tord	Wingren	tord.wingren@telia.com	
Tord	Wingren	tord.wingren@telia.com	
Huajun	Yu	huajun.yu@mespom.eu	
Freddie	Nilsson	freddie.nilsson@[illegible].se	
. Alexander	Hallgren	aw@ideoninnovation.se	
. MARKUS	SCHEFFEL	MARKUS.SCHEFFEL@POPTEC.DE	
Patrik	Ryden	[illegible]	
. Lars	Kjellberg	[illegible]	
. Joakim	BENGTSSON	a.joakim.bengtsson@gmail.com	
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Appendix A2, Bucharest, Romania, 24th April 2015

Table A2-1: List of invited persons

Name	Last name	Job title / Designation	Organization	City	Country
Rinco	van Rijn	Senior Manager Marketing Communications	Philips Lighting	Eindhoven	Netherlands
Cosmin	Chirea	Director of PLS Execution Department	Luxten Lighting Company	Bucharest	Romania
Andreea	Hreapca	Mayoral Advisor	Bucharest City Hall	Bucharest	Romania
Catalin	Grosu	Executive Director DAEP	Bucharest City Hall	Bucharest	Romania
Lia Olguta	Vasilescu	Mayor	Craiova City Hall	Craiova	Romania
Marius	Stan	Mayor	Galati City Hall	Galati	Romania
Petru	Marginean	Mayor	Deva	Deva	Romania
Catalin	Chereches	Mayor	Baia Mare City Hall	Baia Mare	Romania
Dan	Vatajelu	President	ARI - Asociatia Romana de Iluminat (Romanian Lighting Association)	Bucharest	Romania
Titus Coriolan	Rus	Director	CZEC	Oradea	Romania
Mark	Burton-Page	Program Manager	European Forum for Urban Security	Lyon	France
Iuliana	Lazar	Energy Efficiency Expert	ANRE	Bucharest	Romania
Adriana	Lipoveanu	Chief Architect	Oradea City Hall	Oradea	Romania
Pieter	Bolt	Senior scientist integration / Coordinator FP7 SSL-erate	TNO	Eindhoven	Netherlands
Marinel	Poanta	Head of ADPP Service	Hunedoara City Hall	Hunedoara	Romania
Alina	Rizescu	Designer	RIZI Design	Bucharest	Romania
Radu	Stanescu	Director of Major Infrastructure Division	Luxten Lighting Company	Bucharest	Romania
Gheorghe	Patrascu	Chief Architect	Bucharest City Hall	Bucharest	Romania
Valentin	Littera	Head of the Lighting Department	Bucharest City Hall	Bucharest	Romania
Cosmin	Gheorghiu	Executive Director PUD	Bucharest City Hall	Bucharest	Romania
Aurelian	Ionescu	Designer	Luxten Lighting Company	Bucharest	Romania
Nicolaie	Paponiu	City Manager Drobeta Turnu Severin	Drobeta Turnu Severin City Hall	Drobeta Turnu Severin	Romania
Catalina	Rotaru	Project Manager	Luxten Lighting Company	Bucharest	Romania
Diāna	Čivle	Member	Society "Atklāj Rīgu"	Riga	Latvia
Gundega	Cekule	Member	Society "Atklāj Rīgu"	Riga	Latvia
Ben	de Keyser	Founder	Sacred Places	Oud-Heverlee	Belgium

Name	Last name	Job title / Designation	Organization	City	Country
Helja	Korkeala	Sales Director	Valopaa Ltd	Oulu	Finland
Heike	Scheller	Section "City Center", Section-Leader	City of Leipzig, Department for Urban Planning and Construction, City Planning Office	Leipzig	Germany
Rainer	Barth	Head of Public Lighting	City of Leipzig	Leipzig	Germany
Karin	Ermegård	Landscape Architect	Eskilstuna Municipality	Eskilstuna	Sweden
Pieter	Van Damme	Advisor	Minister of the Brussels Capital Region, M. Pascal Smet	Brussels	Belgium
Heather	Claridge	Senior Project Officer / Development and Regeneration Services	Glasgow City Council	Glasgow	Scotland
Zoltán	Pap	Managing Director	Budapest Municipality BDK Budapest Flood and Public Lighting ltd	Budapest	Hungary
Nils	Erkamp	Business Line Manager Lighting	TNO	Eindhoven	Netherlands
Christian	Endresen	Planner	Stavanger kommune	Stavanger	Norway
Sonja	Baksa	Communication Intern	LUCI Association	Lyon	France
Alexandre	Colombani	General Manager	LUCI Association	Lyon	France
Nikita	Junagade	Communication Manager	LUCI Association	Lyon	France
Albane	Tabaka	Project Manager	LUCI Association	Lyon	France
Jaap	Van der Linden	Business Segment Manager	Philips	Eindhoven	Netherlands
Pia	Rantanen	Architect	City of Helsinki	Helsinki	Finland
Piia	Raitavuo	Assistant of International Affairs	City of Helsinki (City Executive Office)	Helsinki	Finland
Frederic	Durand	Project Manager	Ville de Lyon	Lyon	France
Tarmo	Sulg	Deputy Head	Tallinn Municipal Engineering Services Department	Tallinn	Estonia
Leena	Tähkämö	Dr.	Aalto University	Espoo	Finland
Jorge	Munoz Estrada	Senior Specialist in Public Lighting	City of Malaga	Malaga	Spain
Thomas	Maare	City Lighting Responsible	City of Copenhagen, Technical & Environmental Administration - Traffic	Copenhagen	Denmark
Sami	Ewaida	Head of City Beautification Section	Ramallah Municipality	Ramallah	Palestine
Johan	Nyhus	Deputy Mayor	Urban Transport Administration	Gothenburg	Sweden
Ingemar	Johansson	Head of Street lighting	Urban Transport	Gothenburg	Sweden

			Administration		
Name	**Last name**	**Job title / Designation**	**Organization**	**City**	**Country**
Siim	Bobkov	Assistant Manager	Gridens Technologies Ltd	Tallinn	Estonia
Reino	Villand	CEO	Gridens Technologies Ltd	Tallinn	Estonia
Jan	Dictus	Founder	GOJA Consulting	Vienna	Austria
Ingjerd	Bratterud	Project Leader	City of Stavanger, Streets and parks department	Stavanger	Norway
Arthur	Noordhoek	Advisor/Project leader Lighting	City of Eindhoven	Eindhoven	Netherlands
Kari	Ström	Deputy City Engineer	City of Jyväskylä, Urban Planning and City Infrastructure	Jyväskylä	Finland
Annukka	Larsen	City of Light coordinator	City of Jyväskylä, Urban Planning and City Infrastructure, City of Light project	Jyväskylä	Finland
Andreas	Milsta	Coordinator for Gothenburg	Gothenburg	Gothenburg	Sweden
Gerben	Wigmans	Director	Department of Public Works	Rotterdam	Netherlands
Willem	Reedijk	Advisor Urban Management	Department of Public Works	Rotterdam	Netherlands
Elisabeth	Barrault	Deputy Mayor	City of Chartres	Chartres	France
Laurent	lhuillery	Deputy Mayor	City of Chartres	Chartres	France
Michael	Ferm	Marketing Director Nordic	Zumtobel Group	Landskrona	Sweden
Rik	van Stiphout	Program advisor Light & Culture	City of Eindhoven	Eindhoven	Netherlands
Karin	Zumtobel	Marketing Development Manager	Thorn Lighting	Chalfonts St. Peter	UK
Riina	Lill	Senior Expert	Tartu City Government	Tartu	Estonia
Andres	Pool	Deputy Head of Department	Tartu City Government	Tartu	Estonia
Rein	Haak	Head of Department	Tartu City Government	Tartu	Estonia

Table A2-2: Presentation from the workshop:

Structure & Format

- 6 tables
- 6 city experts
- 4 rounds
- 20 minutes time

Issues addressed

PROCUREMENT AND THE TENDERING PROCESS

Thomas Maare, City of Copenhagen

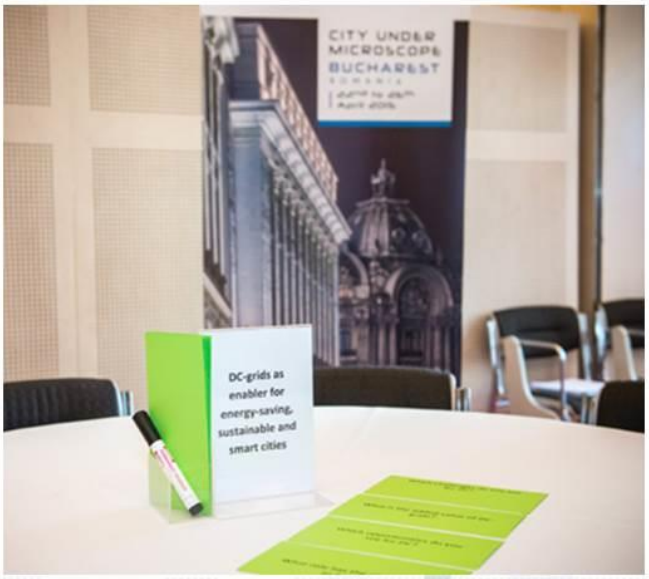
- Which type of tender process?
- What are advantages in involving private and public partners?
- What are the challenges, if you do so?
- How do you increase the level of technical and legal matters?

Issues addressed

DC-GRIDS AS ENABLER FOR ENERGY-SAVING, SUSTAINABLE AND SMART CITIES

Arthur Noordhoek, City of Eindhoven

- What is the added value of DC-grids?
- Which opportunities do you see for DC?
- Which challenges do you see for DC?
- What role has the city council to fulfill?



Issues addressed

CHOOSING THE RIGHT LUMINAIRE

Annukka Larsen, City of Jyväskylä

- Which parameters for choosing luminaire?
- How to survive light calculation phase?
- How to compare without standard information?
- How to calculate the return of investment?
- What do the citizens expect from lighting?

Issues addressed

CONTROL SYSTEMS AND PRESENCE DETECTION

Frédéric Durand, City of Lyon

- How to detect pedestrians and/or cars?
- How to communicate from supervisor to led?
- How can level changes be accepted?

Issues addressed

LED LIGHTING AND SOCIAL ACCEPTANCE

Jorge Muñoz Estrada, City of Malaga

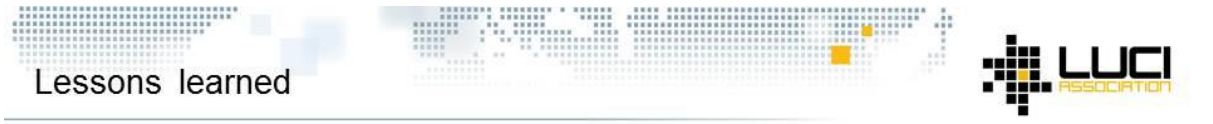
- Do citizens matter about lighting?
- Is social acceptance of led important?
- Who is in charge?
- How to promote social acceptance?
- What if they don´t want led lighting?

Issues addressed

FINANCING SOLUTIONS FOR LED LIGHTING PROJECTS

Cosmin Gheorghiu, City of Bucharest

- Which are the barriers for financing public lighting projects in Bucharest?
- How to apply a mix of funding?
- How is ebrd funding used?
- Funding in bucharest: rehabilitation vs modernization?
- How to fund international cooperation?



OPPORTUNITIES

- a good way to put forward and communicate on successful practices to less advanced cities
- well adapted format to facilitate technical discussions and get concrete answers from their peers
- enables each city to share its particular expertise and also gain expertise from other cities on their own weak points in their lighting strategy

CHALLENGES

- Reaching regional cities experts given language barriers and lack of specific contacts
- Involving small cities with limited lighting competencies

Appendix A3, London, UK, 17th July 2015

Table A3-1: Invitation for Lighting for People – Lighting workshop

The Bartlett
Faculty of the Built Environment

UCL

Lighting for People
Lighting Workshop

Specification, incentives and barriers to change

You are warmly invited to a workshop on the ways lighting systems are specified, together with incentives and barriers to change.

- How does lighting currently get specified?
- Where and who do people look to for new ideas?
- What are main barriers to change?
- What are main incentives to change?
- What could be done to make transitions to change easier?

Join representatives from a wide variety of backgrounds to share your experiences and ideas of specifying lighting, and the barriers and challenges to change. If you would like to be involved, click here to register. The password is 'lighting'.

This event is part of SSL-erate, which is a 3-year project that aims to accelerate the uptake of high-quality Solid State Lighting (SSL) technology in Europe by supporting open innovation and bringing validated information to all relevant stakeholders.

lightingforpeople

Date	Friday 17th July 2015
Time	09.30 – 15.00
Venue	Future Cities Catapult, One Sekforde Street, London, EC1R 0HD



Table A3-2: Program for Lighting for People – Lighting workshop

Lighting For People – Procurement Workshop with UCL
Friday 17th July, 9.00am to 2.00pm
Auditorium, Urban Innovation Centre

Agenda
Chair: Professor Tim Broyd

9.00am Arrival, tea and coffee

9.30am Introduction to the Future Cities Catapult
Dan Hill, Chief Design Officer, Future Cities Catapult

9.45am Introduction to the SSL-erate
Pieter Bolt, Project Manager of SSL-erate

10.00am Health Benefits of Solid State Lighting/LED
Katharina Wulff, University of Oxford

10.15am Smart Street Lighting: Experience from the Coventry City Street Lighting PFI
Councillor Rachel Lancaster, Cabinet Member for Public Services,
Coventry City Council

10.30am Questions and answers

10.45am How the workshops will operate

11.00am Coffee break

11.15am Workshops – World Café style
How does lighting currently get specified?
Where and who do people look to for new ideas?
What are main barriers to change?
What are main incentives to change?
What could be done to make transitions to change easier?

12.45pm Lunch and networking

1.30pm Feedback from workshop and next steps

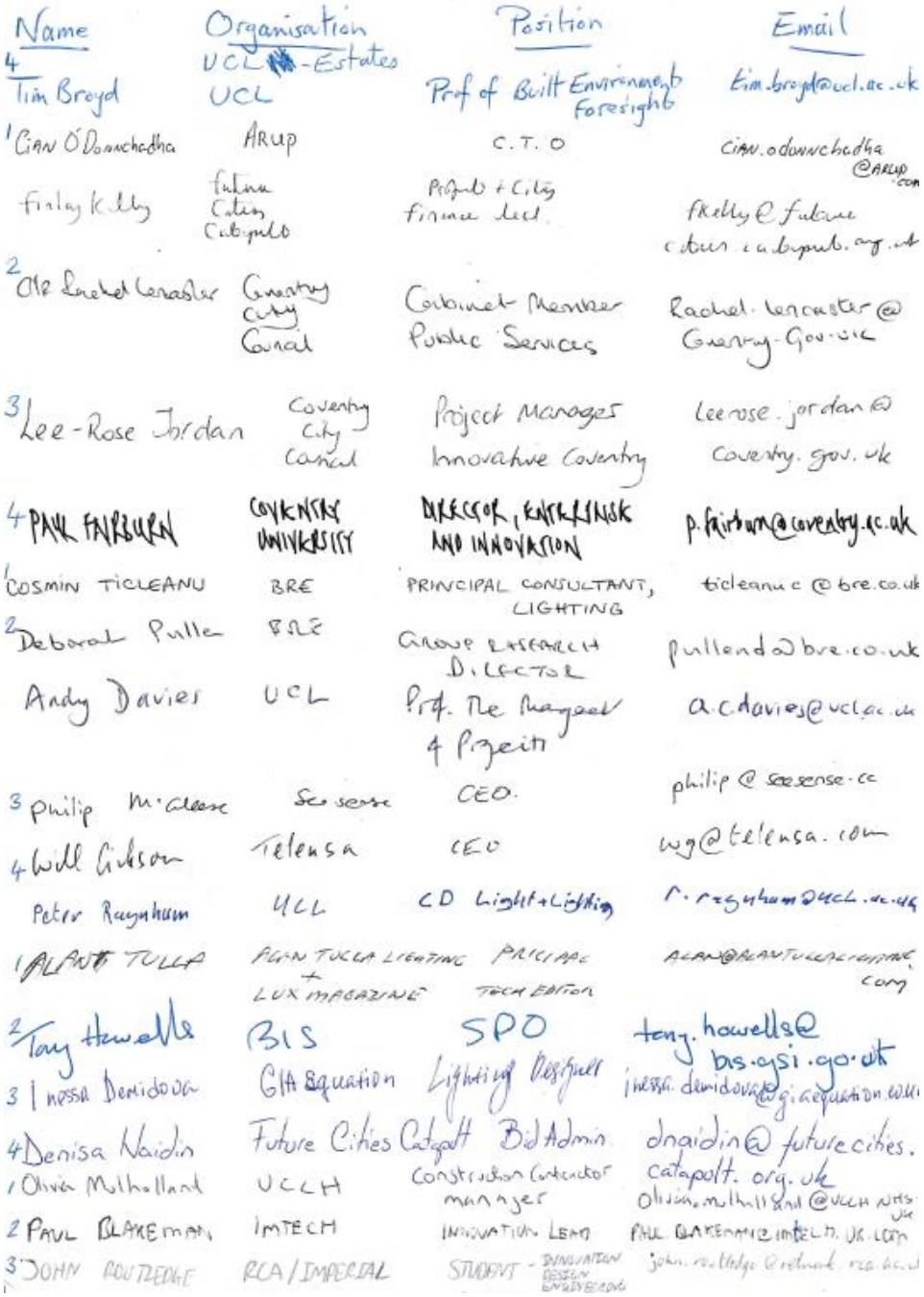
2.00pm Close

Future Cities Catapult
Urban Innovation Centre
One Sekforde St.
London, EC1R 0BE

www.futurecities.catapult.org.uk
+44 (0) 207 859 4563
info@futurecities.catapult.org.uk

Company No 08041915
England Wales

Table A3-3: List of participants signatures



Appendix A4, Malmö, Sweden, 21st October 2015

Table A4-1: Invitation (in English) for "The search for the best light"

Jakten på den bästa belysningen!

("The search for the best light")

Datum: Onsdagen den 21:e oktober
Kl: 08.30-16.00
Plats: Elite Plaza Hotel, Malmö

Objective

With the help of a real case, Lightning a in classroom:

- To map out the market of lightning in the Region of Skåne with the perspective of managing the steering of the light
- Investigate the best technique/s to manage the steering of lightning in a classroom, to create the best indoor environment to support learning
- Promote human centric lightning to the companies in Skåne

Target group

Companies within the area of lightning

Table A4-2: Invitation for "Jakten på den bästa belysningen!" (in Swedish)

Jakten på den bästa belysningen!

Välkommen att delta i expertpanelen!

Datum: Onsdagen den 21:e oktober
Kl: 08.30-16.30
Plats: Elite Plaza Hotel, Gustav adolfs Torg, Malmö

Serviceförvaltningen deltar i projektet SSL-erate. Ett nätverksprojekt som ska sprida kunskap för att påskynda införandet av förbättrad SSL-teknik (Solid State Lightning) i Europa. Målsättningen är att ha "rätt ljus på rätt plats vid rätt tidpunkt".

Serviceförvaltningen har bjudit in ett antal leverantörer som ska presentera sin lösning på ett case, belysning i ett klassrum. För case-beskrivning se bifogat dokument.

Vi vill gärna att du deltar i vår expertpanel. Lyssnar på presentationerna, ställer frågor och diskuterar. Expertpanelen kommer bestå av ca 6 personer förhoppningsvis från Malmö stad, LTH, Lunds kommun och andra kommuner i Skåne.

Om du är intresserad, maila Viktoria Olsson, viktoria.olsson@malmo.se snarast.

Table A4-3: Invitation for participating companies “Jakten på den bästa belysningen!”(in Swedish)

SSL-erate

Jakten på den bästa belysningen!

Välkommen att presentera ert förslag!

Datum: Onsdagen den 21:e oktober
Kl: Mellan 08.30-16.00 (ca 1 timme för varje presentation/företag)
Plats: Elite Plaza Hotel, Malmö

Serviceförvaltningen, Malmö stad, deltar i projektet SSL-erate. Ett nätverksprojekt som ska sprida kunskap för att påskynda införandet av förbättrad SSL-teknik (Solid State Lightning) i Europa. Målsättningen är att ha ”rätt ljus på rätt plats vid rätt tidpunkt”.

Serviceförvaltningen vill förbättra inomhusbelysningen och ge goda förutsättningar för barn och ungdomar i dagens skolor. Vi vill ha er hjälp och expertis för att skapa den bästa klassrumsbelysningen, för att se vilka möjligheter som finns.

Vi skulle vilja att ni presenterar er lösning på vårt case, belysning i ett klassrum. För case-beskrivning se bifogat dokument. Ni får 30 minuter för presentation. Därefter är det 20 minuter för frågor och diskussioner. Ni kommer göra presentationen inför en expertpanel bestående av ca 6 personer med olika kompetenser och infallsvinklar.

Om ert företag är intresserad att presentera er lösning på caset, maila Viktoria Olsson, viktoria.olsson@malmo.se, innan fredagen den 25:e september.
För frågor om caset kontakta Olle Strandberg, olle.strandberg@malmo.se

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Table A4-4: Agenda for "Jakten på den bästa belysningen!" (in Swedish)

SSL-erate

Jakten på den bästa belysningen!

Agenda

Datum: Onsdagen den 21:e oktober
Kl: 08.30-16.00
Plats: Elite Plaza Hotel, Malmö

08.30 Registration med frukost

08.45 Introduktion

0900 BrainLit AB

10.15 Fagerhult Belysning Sverige AB

11.30 Lunch

12.45 Mpel

14.00 Schneider Electric

15.00 Fika

15.15 Parans Solar Lighting AB

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Table A4-5: The case for the workshop

SSL-erate

Jakten på den bästa belysningen!

Praktiskt exempel

Vi ska bygga framtidens klassrum som är anpassat för både människa och teknik i samspel med modern pedagogik!
Många av dagens klassrum är byggda för gårdagens pedagogik. Det är inte länge sedan som undervisningen var strikt katederundervisning, och eleverna satt tysta och lyssnade, eller satt tyst och jobbade i skolmaterial, som var böcker, papper och penna. Idag är klassrummet fullt av teknik som både later och alstrar värme, dessutom sker undervisningen mer genom interaktion mellan lärare och elev och elev till elev. Att bygga ett klassrum som är förenligt med modern pedagogik är betydligt svårare än att konstruera ett klassrum för katederundervisning.

Även kring belysning har mycket hänt på relativt kort tid. Teknikutvecklingen de senaste åren ger nya möjligheter inom belysning. Forskning kring LED-teknik och hur signalsubstanser i hjärnan påverkas av olika ljusvåglängder pekar på möjligheten att designa och införa nya belysningssystem. Forskning visar även att dagsljus är att föredra i samband med inlärning. En studie i 2 000 klassrum i 3 delstater i USA visar att elever vars primära ljuskälla var dagsljus utvecklades 20% snabbare inom matematik och 26% snabbare inom läsförståelse än de elever vars primära ljuskälla var artificiell (Heschong mahone group, 1999).

Ett praktiskt exempel!

Lindängeskolan är en modern multikulturell grundskola. Vi har ca 450 elever från årskurs F-9. Vi har även en särskola för årskurs 1-9, där det finns hemvist och fritidshem. Skolan är belägen väldigt nära ett parkliknande grönområde. Detta skapar möjlighet för aktiva raster och spontan rörelse.

Ett av våra mål här på skolan är att skapa en lugn och trygg lärandemiljö för våra elever. Detta anser vi som väsentligt för att eleverna skall kunna tillåt sig kunskap på bästa sätt.

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På kvällarna bedrivs idrotter och andra aktiviter på skolan av Allaktivitetshuset. Detta för att bidra till att eleverna sysselsätts på ett utvecklande sätt även efter skoltid!

Lindängeskolan är även en skola som byggdes under 70-talets expansion, och som i många fall har varit orörd i sin förändring av de klassrumsmässiga förutsättningarna (se bild). Detta vill nu ledningen för skolan ändra på.

På senare tid har skolan upptäckt de möjligheter som LED-belysning ger, och hur ljusbilden kan styra / förändra beroende av tidpunkt på dagen och året. Skolan har även kommit i kontakt med forskning som tydligt visar på behovet av att styra belysningen beroende av vilka aktiviteter som genomförs i klassrummet, och vid vilken tid på dagen det är. Till exempel har lärdomen om att ett intensivare, blåare ljus på morgonen är att rekommendera, då detta hämmar melatonin produktionen, som är den signalsubstans i hjärnan som gör oss trötta.

Det har dock visat sig att det finns få exempel hur ett modernt, dynamiskt ljussystem skulle kunna fungera i klassrumsmiljön. Även styrningen av systemet kan ske på många olika sätt och med olika former av utrustning.

En annan utmaning är själva förändringen av ljusbilden. Hur skall denna förändras, och vem kan hantera själva programmeringen?

Skolans rektor har tänkt sig att genomföra en pilotinstallation på ett av klassrummen för 3:e klass, eftersom dessa elever har så kallat hemklassrum. Det innebär att samma elever vistas i lokalen under hela arbetsdagen.

Styrning av klassrummet

För styrningen av belysningen i klassrummet gäller följande förutsättningar:

Dynamiskt ljus:

Ett varierande ljus är mer naturliknande och känns troligen mer stimulerande. Den vetenskapliga kunskapen om hur vi påverkas av ljusets variation är dock hittills begränsad. Ljuset utomhus är mycket starkare i synnerhet mitt på dagen och det är särskilt viktigt på vintern. Dagsljuset är också blåare än det glödlampsljus vi varit vana vid.

En anledning till att ljusets variation är viktig är att kroppen har en 24 timmars klocka som styr vakenhet och sömn. Förenklat sett kan man säga att om man väcker kroppen med mer blåare ljus på morgonen ökar det också sannolikheten för att man kan komma till ro och somna på kvällen. Det bör också observeras att en väsentlig anledning till att man har svårt att komma till ro på kvällen kan vara att man sitter framför en datorskärm och dels är mentalt aktiv och dels sitter nära och tittar in i en blåaktig skärm.

Time	Intensity	CT
08:00	70 %	2700
08:40	100 %	6500
09:00	100 %	5000
11:00	70 %	4000
11:30	70 %	3000
12:00	70 %	2700
12:20	80 %	4000
13:00	90 %	5000
13:20	70 %	4000
14:00	70 %	3500
14:20	70 %	3500
14:50	70 %	3500
15:20	60 %	2700

Aktiverande: 100 %, 6500 K

Det är vetenskapligt bevisat att intensivt och blåare ljus (högre färgtemperatur) är aktiverande och det är något som allt fler belysningspersoner framhåller. Mer intensivt blåare ljus är troligen bra när det är viktigt att eleverna kan koncentrera sig på en individuell uppgift eller lyssna på läraren.

Rogivande: 70 %, 2700 K

Många svenskar föredrar ett rödare ljus (lägre färgtemperatur), i synnerhet på kvällen har man gärna dimmat ned glödlamporna. Ljus med en lägre färgtemperatur är mindre

stressande och mer rogivande. Studier har visat att rodare ljus kan hjalpa oss att lasa av varandras ansiktstarg. Det ar viktigt att vi kan se skillnaden mellan olika nyanser i ansitsfärgen (syresatt /icke syresatt blod) för att vi ska kunna tolka känsloläget hos de individer vi har omkring oss. Rodare ljus ger ofta bra foresattningar for samtal med vasentligt inslag av social kontakt.

Smartboard:

Ljuset i framre delen av klassrummet dimmas ned for att undvika blandning och mojliggora for eleverna att lasa och skriva pa bankarna medan smartboarden ar pa.

Stadljus: 100 %, 4000 K

Uppgiften!

Vi skulle vilja ha en teknisk design på en belysningslösning som ska tillgodose de krav vi har redovisat ovan. Ni bor kunna redovisa vilken typ av belysning, utrustning for styrning och protokoll samt hur denna utrustning kan interagera med fastighetssystemet som kommunen anvander.

Table A4-6: List of invitations

SSL-erate

Work shop in Malmö - A userdriven innovation

List of invitation:

Panel of experts

- Björn Lagnevik Region Skåne
- Anders Nilsson Region Skåne
- Reine Karlsson LUopen
- Mats Jönsson The department of internal services
- Torbjön Nilsson, The department of internal servicess
- Carola Lund, the department of internal services
- Jenny Grothius, The department of internal services
- Olle Strandberg The department of internal services
- Ingemar Jönsson, The department of internal services
- Peter Kisch, The municipality of Lund

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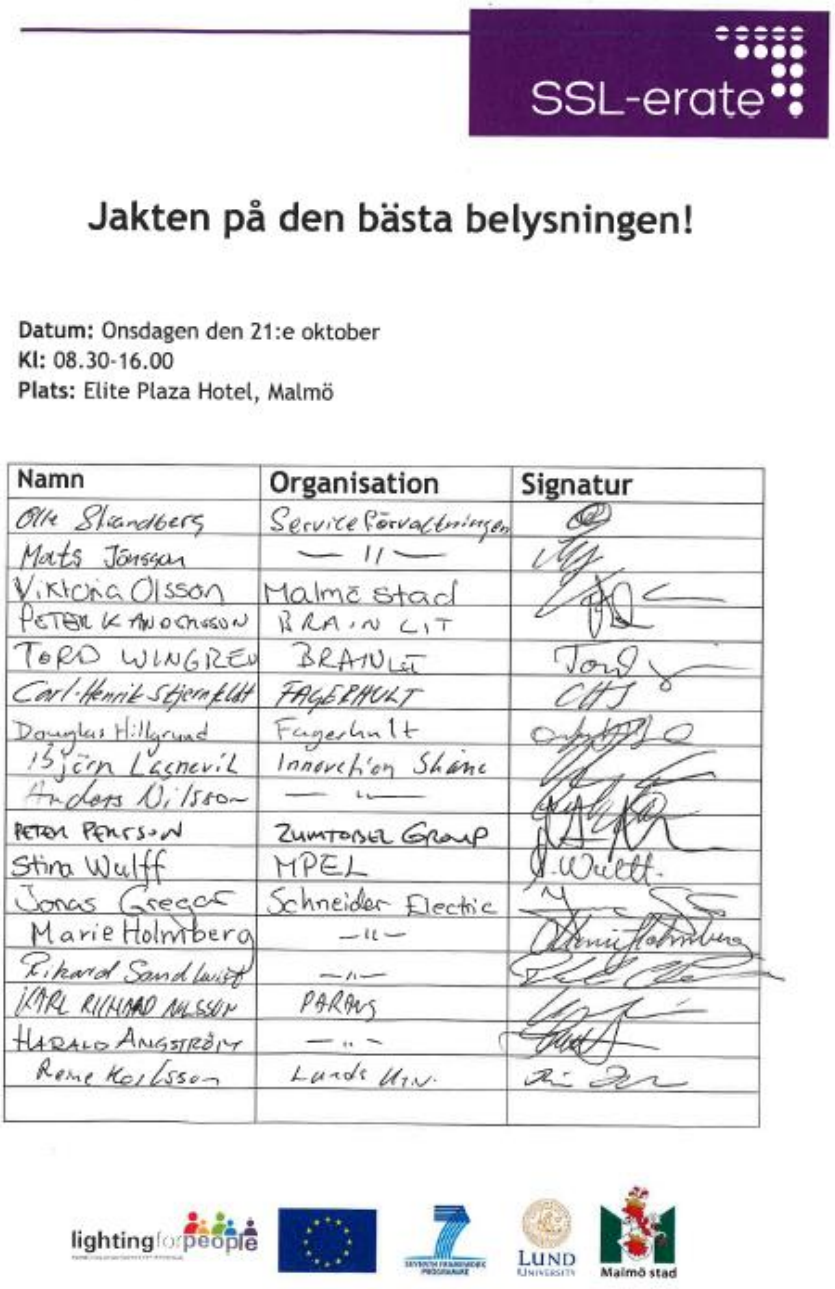
Suppliers

- Brainlit
- Fagerhult
- Zumtobel Group
- Mpel
- Schneider Electric
- Parans
- Fujitsu Sweden

Table A4-7: List of participants signatures



SSL-erate

Jakten på den bästa belysningen!

Datum: Onsdagen den 21:e oktober
Kl: 08.30-16.00
Plats: Elite Plaza Hotel, Malmö

Namn	Organisation	Signatur
Olle Svandberg	Service Förvaltningen	
Mats Jönsson	— " —	
Victoria Olsson	Malmö stad	
PETER KNUTSSON	BRAIN LIT	
TORD WINGREN	BRAINLIT	
Carl-Henrik Stjernfeldt	FAGERHULT	
Douglas Hillgrund	Fagerhult	
Björn Lagneviks	Innovation Skåne	
Anders Nilsson	— " —	
PETER PERSSON	ZUMTOBEL GROUP	
Stina Wulff	MPEL	
Jonas Gregor	Schneider Electric	
Marie Holmberg	— " —	
Rikard Sandkvist	— " —	
KARL RICHARD NILSSON	PARAS	
HARALD ÅNGSTRÖM	— " —	
Rene Karlsson	Lunds Univ.	

Appendix A5, Stavanger, Norway, 21st October 2015

Table A5-1: Invitation/ program to "workshop on smart outdoor lighting"

Program

9.30-10.00	**Attendance/coffe**
10.00-10.30	**LED teknology – challenges and opportunities** Martin Holmberg, Cowi AS
10.30 -11.00	**Vision & Roadmap Urban Lighting Eindhoven 2030** Examples from Eindhoven who have been working with lighting teknology over a long time. Arthur Noordhoek, Eindhoven
11.00-11.20	**Experience from a muncipality that has chosen to use LED lighting** Roar Andersen, former streetlights responsible in the city of Steinkjer
11.20-11.40	**Pause**
11.40- 12.00	**NPRA try out LED - what experiences are made ?** Per Ole Wanvik, The Norwegian Public Roads Administration
12.00 – 12.30	**Luminaires and lighting control- opportunities of today and tomorrow** Bram Joosen, Phillips AS
12.30 – 13.15	**Lunch**
13.15 – 13.45	**18.000 mercury luminaires to be replaced in the region - what shall we replace them with ?** Jarl Hoogstad, Lyse Elnett
13.45 – 15.00	**Round table section**

Round tables section with different themes , each table has a theme and an expert, such that it can be questioned and given answers , participants ambulate around using 20 min per table :

The following topics will be discussed :

- How can light help to give the city identity ?
- What should be emphasized so that the quality of light will be the best possible ?
- What are the key factors to achieve good long-term solutions ?
- LED is good municipal economy!
- Experiences and benefits of sensor-controlled lights ?

Participation is **free**

Registration by mail to:
christian.endresen@stavanger.kommune.no innen 14.10.2015

The workshop will be held in Lyse headquarter
Adresse: Breiflåtveien 18, audiotoriet "Lysefjorden"
www.lightingforpeople.eu
www.ssl-erate.eu

Table A5-2: List of invited participants

SSL – Workshop Stavanger 21.Oktober 2015 Participant list

Name:	**City/ Company:**	
Asgeir Kleppa	Gjesdal Kommune	
Sven-Olav Jensen	Gjesdal Kommune	
Arne Jørgensen	Sandnes Kommune	
Johannes Tonning	Sola Kommune	
Bjarte Sætevik	Sola Kommune	
Arthur Noordhoek	City of Eindhoven	
Trygve Petter Nilsen	Stavanger kommune	Park and Street Dep
Christian Endresen	Stavanger Kommune	Park and Street Dep
Rolf Øyvind Østefjells	Stavanger Kommune	Park and Street Dep
Hilde Uberg	Stavanger Kommune	Park and Street Dep
Ingjerd Bratterud	Stavanger Kommune	Park and Street Dep
Ellen Mauritzen	Stavanger Kommune	Triangulum
Katrine Svangtun	Stavanger Kommune	
Svein Søreide	Stavanger Kommune	Building Dep
Espen Svendsen	Stavanger Kommune	Building Dep
Lise Muurholm Storås	Stavanger Kommune	Planning Dep
Marthe S. Haaland	Stavanger Kommune	Planning Dep
Svein Egil Klungtveit	Stavanger Kommune	Waist Dep
Jan Oskar Haugen	Time Kommune	
Mats Nergård	Eigersund Kommune	
Espen Hyggen	Eigersund Kommune	
Jone Omdal	Eigersund Kommune	
Marta Krystkowiak	Hå Kommune	
Ole Kristian Sørensen	Bærum Kommune	
Roar Andersen	Steinkjer Kommune	
Susanne Rau	Klepp Kommune	
Consultans		
Brede Nakken	Sweco	
Martin Holmberg	Cowi	
Pål Johannes Larsen	Norconsult	
Stefan Maassen	Zenisk	
Jan Sørheim	Novaform	
Ståle Børresen	Novaform	
Norwegian Public Road Administration		
John Christian Haavin	Statens vegvesen	
Per Ole Wanvik	Statens vegvesen	
Liz Christensen	Statens vegvesen	
Arne Jørgensen	Statens vegvesen	
Hub for business development		
Kristin Hetland	Greaterstavanger	
Energy suppliers		
Arnold Vågen	Haugaland kraft	

Svein Oddvar Aksdal	Haugaland kraft	
Jarl Hoogstad	Lyse Elnett	
Sigurd Carlsen	Lyse Elnett	
Jan Magne Forseth	Lyse Elnett	
Dagfinn Våge	Lyse AS	
Trond Thorbjørnsen	Lyse AS	
Birger Clementsen	Lyse AS	
ICT Suppliers		
Steinar Olsen	Datek	
Øyvind Sløgedal	Datek	
Hardware Suppliers		
Gunnar M. Aasland	Fagerhult	
Henning Haaland	Zumtobel group	
Henning Holmøy	Stolper	
Bjørn Rune Steinsland	Philips	
Øyvind Berg	Philips	
Bram Joosen	Philips	
Jan-Christian Michelsen	Louis Poulsen	
John Helge Myhre	Multilux	
Kjell Ramberg	Solarnorge	
Tanya Kolyaka	Greinon	
Atle Olsen	Zumtobel Group	
Vidar Solberg	Iguzzini	

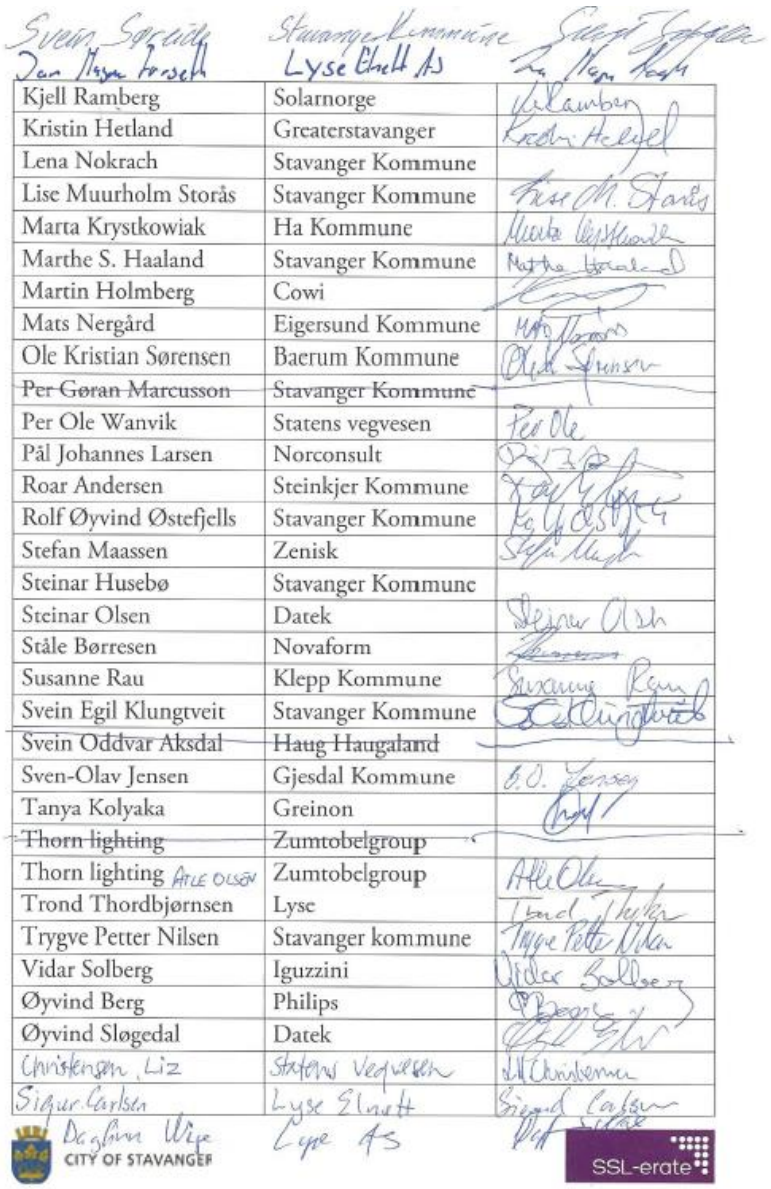
Table A5-3: List of participants signatures

SSL – Workshop Stavanger 21.Oktober 2015 Signature list

Name:	Company:	Signature:
~~Arild Volden~~	~~Gjesdal Kommune~~	
Arne Jørgensen	~~Sandnes Kommune~~	
Arnold Vågen	Haugaland kraft	
Arthur Noordhoek	Eindhoven	
Asgeir Kleppa	Gjesdal Kommune	
~~Asgeir Kleppa~~	~~Gjesdal Kommune~~	
~~Birger Clementsen~~	~~Lyse~~	
Bjarte Sætevik	Sola Kommune	
Bjørn Rune Steinsland	Philips	
Bram Joosen	Philips	
Brede Nakken	Sweco	
Christian Endresen	Stavanger Kommune	
Ellen Mauritzen	Stavanger Kommune	
Espen Hyggen	Eigersund Kommune	
Espen Svendsen	Stavanger Kommune	
Gunnar M. Aasland	Fagerhult	
Henning Haaland	Zumtobel group	
Henning Holmøy	Stolper	
Hilde Uberg	Stavanger Kommune	
Ingjerd Bratterud	Stavanger Kommune	
Jan Oskar Haugen	Time Kommune	
Jan Sørheim	Novaform	
Jan-Christian Michelsen	Louispoulsen	
Jarl Hoogstad	Lyse	
Johannes Tonning	Sola Kommune	
John Christian Haavin	Statens vegvesen	
John Helge Myhre	Multilux	
Jone Omdal	Eigersund Kommune	
Katrine Svangtun	Stavanger Kommune	

CITY OF STAVANGER

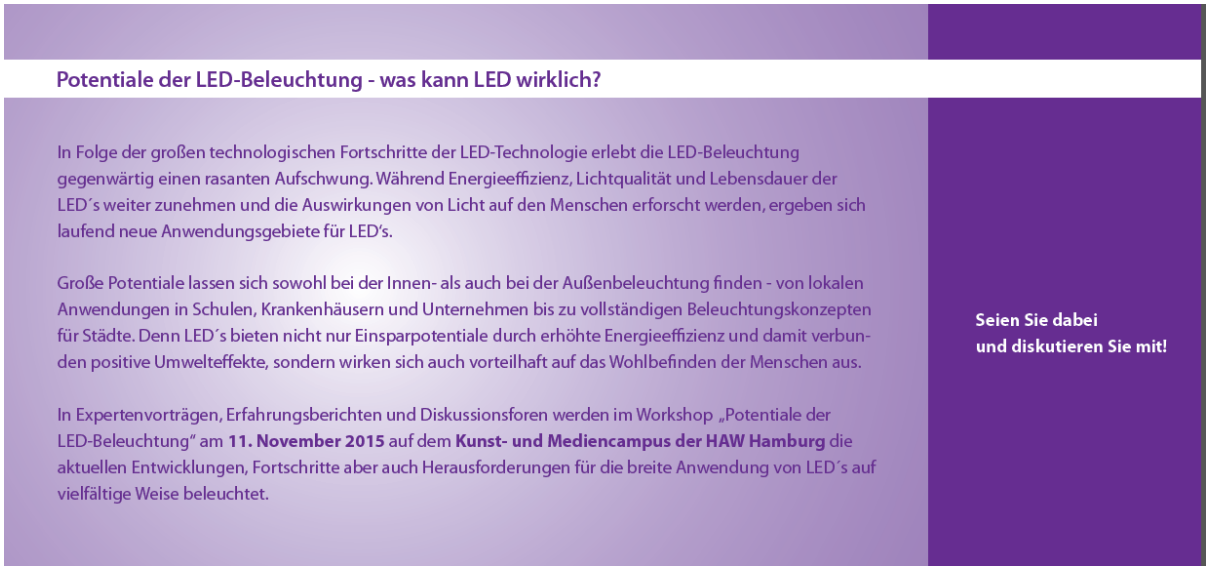
SSL-erate



Kjell Ramberg	Solarnorge	
Kristin Hetland	Greaterstavanger	
Lena Nokrach	Stavanger Kommune	
Lise Muurholm Storås	Stavanger Kommune	
Marta Krystkowiak	Ha Kommune	
Marthe S. Haaland	Stavanger Kommune	
Martin Holmberg	Cowi	
Mats Nergård	Eigersund Kommune	
Ole Kristian Sørensen	Baerum Kommune	
~~Per Gøran Marcusson~~	~~Stavanger Kommune~~	
Per Ole Wanvik	Statens vegvesen	
Pål Johannes Larsen	Norconsult	
Roar Andersen	Steinkjer Kommune	
Rolf Øyvind Østefjells	Stavanger Kommune	
Stefan Maassen	Zenisk	
Steinar Husebø	Stavanger Kommune	
Steinar Olsen	Datek	
Ståle Børresen	Novaform	
Susanne Rau	Klepp Kommune	
Svein Egil Klungtveit	Stavanger Kommune	
~~Svein Oddvar Aksdal~~	~~Haug Haugaland~~	
Sven-Olav Jensen	Gjesdal Kommune	
Tanya Kolyaka	Greinon	
~~Thorn lighting~~	~~Zumtobelgroup~~	
Thorn lighting ATLE OLSEN	Zumtobelgroup	
Trond Thordbjørnsen	Lyse	
Trygve Petter Nilsen	Stavanger kommune	
Vidar Solberg	Iguzzini	
Øyvind Berg	Philips	
Øyvind Sløgedal	Datek	
Christensen, Liz	Statens Vegvesen	
Sigur Carlsen	Lyse Elnett	

Appendix A6, Hamburg, Germany, 11th November 2015

Table A6-1: Invitation and agenda (in German)



Programm am Vormittag

9:15 Uhr Grußwort
Prof. Dr. Walter Leal, Leiter des Forschungs- und Transferzentrums „Applications of Life Sciences", HAW Hamburg

9:30 Uhr *Was macht gutes Licht aus, was braucht der Körper und was bewirkt Licht im Körper?*
Prof. Dr. Roland Greule, Professor für Lichttechnik, Lichtdesign und Virtuelle Systeme, HAW Hamburg

10:15 Uhr Erfahrungen eines Schulleiters:
Besseres Lernen durch dynamisches Licht
Andreas Wiedemann, Schulleiter an der Schule in der Alten Forst

10:45 Uhr Kaffeepause

11:15 Uhr *Möglichkeiten und Potenziale für Energieeffizienz und Lichtqualität in der Außenbeleuchtung*
Miroslav Batarilo, Lichtplaner, Philips Lighting

11:45 Uhr *Tourismusgebiet Norden-Norddeich – innovative Außenbeleuchtung mit LED-Technik*
Dipl.-Ing. Susanne Korhammer, Geschäftsführerin TARA Ingenieurbüro NordWest

12:15 Uhr *LED-Technik in der öffentlichen Beleuchtung von Hamburg*
Gérard Rose, Fachbereichsleiter Öffentliche Beleuchtung, LSBG Hamburg

12:30 Uhr Fragen und Antworten

12:45 Uhr Mittagspause

Programm am Nachmittag

13:45 Uhr *Bewertungssysteme für den Einsatz von LED-Technologie: Wie können monetäre und nicht monetäre Kriterien fair gemeinsam bewertet werden?*
Kai Nitschke, Business Development Manager, Philips GmbH

14:20 Uhr *ZVEI LED-Planungsleitfaden: Verlässliche Herstellerangeben – Status quo*
Sebastian Treptow, Manager licht.de, ZVEI - Zentralverband Elektrotechnik- und Elektronikindustrie e.V.

14:50 Uhr Kaffeepause

15:15 Uhr Diskussionsforum
Format: World Café

16:00 Uhr Abschlussdiskussion

16:30 Uhr Besichtigung des Lichtlabors der HAW Hamburg

ca. 17:00 Uhr Ende der Veranstaltung

Anmeldung und Kontakt

- Die Teilnahme an der Veranstaltung ist kostenlos.
  Bitte registrieren Sie sich bis spätestens **9. November 2015** über unser Anmeldeformular auf
  http://www.haw-hamburg.de/ftz-als/veranstaltungen/anmeldung-ssl.html

- **Veranstaltungsort**
  Hochschule für Angewandte Wissenschaften Hamburg
  Kunst- und Mediencampus - Finkenau 35, 22081 Hamburg

- **Anfahrt**
  U-Bahn: Vom Hauptbahnhof Hamburg nehmen Sie die U3 Richtung Barmbek bis zur Station Mundsburg. Verlassen Sie den Bahnhof und folgen Sie der Straße parallel zu den Gleisen in Fahrtrichtung. Wenn Sie an der Straße „Finkenau" angekommen sind, biegen Sie nach rechts ab und erreichen den Kunst- und Mediencampus der HAW Hamburg nach ca. 200m.

  Auto: Vom Zentrum Hamburgs aus fahren Sie an der Alster auf der Straße „An der Alster" Richtung Nord-Osten. Folgen Sie dieser Straße, die in den „Mundsburger Damm" übergeht, bis „Finkenau". Biegen Sie nach rechts in die Straße ein und fahren Sie noch ca. 200m bis zum Ziel.

Veranstalter

Hochschule für Angewandte Wissenschaften Hamburg
Hamburg University of Applied Sciences

Hochschule für Angewandte Wissenschaften Hamburg
Forschungs- und Transferzentrum "Applications of Life Sciences"

Ulmenliet 20
21033 Hamburg

www.haw-hamburg.de/ftz-als.html

Ansprechpartner:
Maria Kowald, Julia Haselberger
ssl-erate@ls.haw-hamburg.de

Table A6-2: Agenda - Translated

Agenda translated

Goal: the aim of the workshop is to address the challenges for implementing LEDs and to give the possibility for exchange between different stakeholders to enable a broader understanding of the topic.

Target group: we invited all relevant stakeholders in Hamburg and Germany, mainly aiming at decision makers in authorities, schools and companies. The workshop was also open for generally interested people to learn about the advantages of LED.

Heading: Potential of LED-Lighting – Knowledge and Experiences

Language: German

Agenda (professional Layout in German only):

- Short welcoming speech
  By Prof. Dr. Walter Leal (Head of the Research and Transfer Center "Applications of Life Sciences" at HAW Hamburg)

Indoor Lighting

- What defines good lighting? What does the human body need? How does light effect the human body?
  By Prof. Dr. Roland Greule (Prof. for lighting technology, lighting design and virtual systems at HAW Hamburg)
- Field report on biological light at schools – better learning due to good lighting!?
  By Andreas Wiedemann (headmaster of an elementary school in Hamburg)

Outdoor Lighting

- Possibilities and Potential for Energy Efficiency in outdoor lighting with LED
  By Miroslav Batarilo (Light planner at Philips Lighting)
- Field report on LEDs for outdoor lighting (City and Environment of Norden-Norddeich)
  By Susanne Korhammer (Manager of TARA engineering office)
- Field report on LEDs for outdoor lighting (City Hamburg)
  By Gérard Rose (Manager for Lighting at regional authority for streets, bridges and waters)

Evaluation of LED

- Assessment systems for application of LEDs – how to compare monetary and non-monetary aspects equally
  By Kai Nitschke (Philips / Association for electrical engineering)
- Manufacturers´ information – can you trust them?
  By Kai Nitschke (substitute for Sebastian Treptow)

World Café / Discussion

- World Café to discuss challenges for a wider implementation for LEDs
  - *Where do you see advantages and disadvantages of LED?*
  - *Where do you see challenges or danger for broader application of LED?*
  - *Where did you get in touch with LED application already?*
  - *Where do you see advantages and disadvantages in HCL?*
  - *What should be done to broaden the application of LED?*
- Final discussions

Time: 09:00 – 17:00 h, 11.11.2015
Place: Hamburg, Germany

Table A6-3,:Pictures from the workshop

Table A6-4: List of invited persons and list of signatures from the participants

Teilnehmerliste - Referenten

Potentiale der LED-Beleuchtung

11. November 2015 – Kunst- und Mediencampus der HAW Hamburg

Titel	Name	Vorname	Institution	Unterschrift	Hiermit bestätige ich, dass meine Präsentation auf der Veranstaltungswebsite veröffentlicht werden darf
	Batarilo	Miroslav	Philips Lighting		
Prof. Dr.	Greule	Roland	HAW Hamburg		schickt Präsi nach
Prof. Dr.	Leal	Walter	FTZ-ALS HAW Hamburg		
	Nitschke	Kai	Philips GmbH		
	Rose	Gérard	LSBG Hamburg		
Dipl.-Ing.	Korhammer	Susanne	TARA Ingenieurbüro NordWest		
	Treptow	Sebastian	ZVEI - Zentralverband Elektrotechnik- und Elektronikindustrie e.V.		
	Wiedemann	Andreas	Schulleiter an der Schule in der Alten Forst		

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Teilnehmerliste

Potentiale der LED-Beleuchtung

11. November 2015 – Kunst- und Mediencampus der HAW Hamburg

Titel	Name	Vorname	Institution	Unterschrift
	Ajideh	Mehdi	HAW Hamburg	
	Alam	Md Farid	HAW Hamburg	
	Bastian	Niklas		
	Beyer	Dirk	Ingenieurbüro Beyer, Gebäudesystemtechnik	
	Bichert	Alexander	Working Light LED Lichtsysteme GmbH	
	Blüchert	Magdalena	HAW Hamburg	
Dipl. Des.	Bock	Thomas-Mathias	HAW/HCAT Flugzeugbau	
	Böök	Timo	HAW Hamburg	
	Borgstädt	Clarissa	HAW Hamburg	

1

Titel	Name	Vorname	Institution	Unterschrift
	Braun	Arja		
	Brüel	Christian	HAW Life Sciences	
	Brummer	Simon	HAW Hamburg, Dept. Informatik	
	Dannenberg	Detlev	HAW - HIBS	
	David	Matthias	David Communication e. K.	
	Dimitrova	Margarita	HAW Hamburg	
	Ebauer	John	HAW Hamburg, DMI	
	Ehlers	Anne	GreenTech Solutions GmbH & Co.KG	
	Ehrlitzer	Alexandra	HAW Hamburg	
	Engel	Tilmann	HAW Hamburg	
	Fischer	Ulrike	Rechnungshof der FHH	
	Fischer	Thomas	HAW Hamburg	
	Flügge	Dennis	HAW Hamburg	
	Friedrichs	Sven	HAW Hamburg	

Titel	Name	Vorname	Institution	Unterschrift
	Gerke	Alexandra	HAW Hamburg	A. Gerke
	Grejdieru	Sergiu	HAW Hamburg	Sergiu Grejdieru
Prof. Dr.-Ing.	Greule	Roland	HAW-Hamburg, Fakultät DMI	
	Haselberger	Julia	FTZ-ALS HAW Hamburg	
	Hirsch	Björn	Working Light LED Lichtsysteme GmbH	
	Hollweg	Dirk	lux100	
	Hurtig	Niklas	HAW Wirtschaft	
Dr.-Ing.	Jaschke	Reinhard	Helmut-Schmidt-Universität	
	Kanev	Krasimir		
	Kapralek	Martin		
	Kapralek	Martin		
	Karakasli	Kemal	HAW Hamburg	
M.Sc.	Katerji	Julia		
	Knapp	Sarah	HAW Hamburg	

Titel	Name	Vorname	Institution	Unterschrift
	Koopmann	Roland	Rolf Fischer GmbH	
	Kowald	Maria	FTZ-ALS HAW Hamburg	
	Kozongo	Mulumba	HAW Hamburg	
	Küchenmeister	Lasse	HAW Hamburg	
	Kuhr	Matthias	HAW Hamburg	
	Laackmann	Kim Ayleen	HAW Hamburg	
	Lorenzen-Veumann	Marlo	Handwerkskammer Hamburg (ZEWU)	
	Löw	Jeannette	HAW DMI	
	Lüdeling	Marco	GreenTech Solutions GmbH & Co.KG	
	Lütz	Lucas	HAW Hamburg	
	Mikhaylov	Semyon		
	Nelson	Merc	Nelson Licht Design	
	Oberländer	Simon	HAW Hamburg	
	Ohm	Johanna	Ingenieurbüro Beyer, Gebäudesystemtechnik	

Titel	Name	Vorname	Institution	Unterschrift
	Parutkin	Artur	HAW Hamburg	
	Pflug	Arna	Department Soziale Arbeit	
Dipl. Ing.	Pohlmann	Nic	Pohlmann & Partner GmbH, Ingenieur-Büro	
	Pospiech	Jan	HAW Hamburg	
	Prigge	Hans-Peter	Lichtberatung Prigge	
	Rahimi Array	Jasmin	HAW Hamburg	
Dipl. Ing.	Reißmann	Florian	Inlux Lichtplanung	
	Reuff	Peter	Peter Reuff LICHT	
	Röske	Daniela	HAW Hamburg	
	Röthig	René		
	Scherer	Christian	SBH Schulbau Hamburg (GMH)	
	Schlüter	Jan-Hendrik	SMI Marketing und Innovations GmbH	
	Schneider	Jonathan	HAW Hamburg	
	Schulte	Kai		

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Titel	Name	Vorname	Institution	Unterschrift
Dipl.-Ing.	Seifert	Dirk	Philips Lighting / Kunsthochschule Burg Giebichenstein Halle	
	Sikora	Aljoscha		
	Silla	Marco	HAW Hamburg	
	Soosaithasan	K. Antonythas	GreenTech Solutions GmbH & Co.KG	
	Strauer	Irena	Lichtpartie	
	Streib	Stefan C.	Hess GmbH	
	Tenhaef	Sascha	Philips GmbH	
	Tödter	Joachim	FHH - SBH | Schulbau Hamburg	
	Trömmel	Tina		
	van Ratingen	René	Philips GmbH	
	von Heyntz	Matthias	New Energy Group GmbH & Co.KG	
	Weinert	Nils	HAW Hamburg	
	Westarp	Carsten	Labor für Physik, Hochschule für Angewandte Physik	

Titel	Name	Vorname	Institution	Unterschrift
	Westphal	Andreas	Stadtreinigung Hamburg	
Prof.	Winzenick	I.	HAW Hamburg	
	Wittlinger	Moritz	Technische Universität Hamburg Harburg	
	Wolf	Franziska	FTZ-ALS HAW Hamburg	

Teilnehmerliste

Potentiale der LED-Beleuchtung

11. November 2015 – Kunst- und Mediencampus der HAW Hamburg

Titel	Name	Vorname	Institution	Unterschrift
	Ajideh	Mehdi	HAW Hamburg	
	Alam	Md Farid	HAW Hamburg	
	Bastian	Niklas	HAW Hamburg	
	Beyer	Dirk	Ingenieurbüro Beyer, Gebäudesystemtechnik	
	Bichert	Alexander	Working Light LED Lichtsysteme GmbH	
	Blüchert	Magdalena	HAW Hamburg	
Dipl. Des.	Bock	Thomas-Mathias	HAW/HCAT Flugzeugbau	
	Böök	Timo	HAW Hamburg	
	Borgstädt	Clarissa	HAW Hamburg	

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Titel	Name	Vorname	Institution	Unterschrift
	Braun	Anja		
	Brüel	Christian	HAW Life Sciences	
	Brummer	Simon	HAW Hamburg, Dept. Informatik	
	Dannenberg	Detlev	HAW - HIBS	Dannenberg
	David	Matthias	David Communication e. K.	
	Dimitrova	Margarita	HAW Hamburg	
	Ebauer	John	HAW Hamburg, DMI	Ebauer
	Ehlers	Anne	GreenTech Solutions GmbH & Co.KG	
	Ehrlitzer	Alexandra	HAW Hamburg	A. E.
	Engel	Tillmann	HAW Hamburg	
	Fischer	Ulrike	Rechnungshof der FHH	
	Fischer	Thomas	HAW Hamburg	
	Flügge	Dennis	HAW Hamburg	
	Friedrichs	Sven	HAW Hamburg	

Titel	Name	Vorname	Institution	Unterschrift
	Gerke	Alexandra	HAW Hamburg	
	Grejdieru	Sergiu	HAW Hamburg	
Prof. Dr.-Ing.	Greule	Roland	HAW-Hamburg, Fakultät DMI	
	Haselberger	Julia	FTZ-ALS HAW Hamburg	
	Hirsch	Björn	Working Light LED Lichtsysteme GmbH	
	Hollweg	Dirk	lux100	
	Hurtig	Niklas	HAW Wirtschaft	
Dr.-Ing.	Jaschke	Renhard	Helmut-Schmidt-Universität	
	Kanev	Krasimir		
	Kapralek	Martin		
	Kapralek	Martin		
	Karakasli	Kemal	HAW Hamburg	
M.Sc.	Katerji	Julia		
	Knapp	Sarah	HAW Hamburg	

Titel	Name	Vorname	Institution	Unterschrift
	Koopmann	Roland	Rolf Fischer GmbH	
	Kowald	Maria	FTZ-ALS HAW Hamburg	
	Kozongo	Mulumba	HAW Hamburg	
	Küchenmeister	Lasse	HAW Hamburg	
	Kuhr	Matthias	HAW Hamburg	
	Laackmann	Kim Ayleen	HAW Hamburg	
	Lorenzen-Neumann	Mario	Handwerkskammer Hamburg (ZEWU)	
	Löw	Jeannette	HAW DMI	
	Lüdeling	Marco	GreenTech Solutions GmbH & Co.KG	
	Lutz	Lucas	HAW Hamburg	
	Mikhaylov	Semyon		
	Nelson	Marc	Nelson Licht Design	
	Oberländer	Simon	HAW Hamburg	
	Ohm	Johanna	Ingenieurbüro Beyer, Gebäudesystemtechnik	

Titel	Name	Vorname	Institution	Unterschrift
	Parutkin	Artur	HAW Hamburg	
	Pflug	Anna	Department Soziale Arbeit	
Dipl. Ing.	Pohlmann	Nic	Pohlmann & Partner GmbH, Ingenieur-Büro	
	Pospiech	Jan	HAW Hamburg	
	Prigge	Hans-Peter	Lichtberatung Prigge	
	Rahimi Array	Jasmin	HAW Hamburg	
Dipl. Ing.	Reißmann	Florian	Inlux Lichtplanung	
	Reuff	Peter	Peter Reuff LICHT	
	Röske	Daniela	HAW Hamburg	
	Röthig	René		
	Scherer	Christian	SBH Schulbau Hamburg (GMH)	
	Schlüter	Jan-Hendrik	SMI Marketing und Innovations GmbH	
	Schneider	Jonathan	HAW Hamburg	
	Schulte	Kai		

5

Titel	Name	Vorname	Institution	Unterschrift
Dipl.-Ing.	Seifert	Dirk	Philips Lighting / Kunsthochschule Burg Giebichenstein Halle	
	Sikora	Aljoscha		
	Silla	Marco	HAW Hamburg	
	Soosaithasan	K. Antonythas	GreenTech Solutions GmbH & Co.KG	
	Strauer	Irena	Lichtpartie	
	Strcib	Stefan C.	Hess GmbH	
	Tenhaef	Sascha	Philips GmbH	
	Tödter	Joachim	FHH - SBH | Schulbau Hamburg	
	Trömmel	Tina		
	van Ratingen	René	Philips GmbH	
	von Heynitz	Matthias	New Energy Group GmbH & Co.KG	
	Weinert	Nils	HAW Hamburg	
	Westarp	Carsten	Labor für Physik, Hochschule für Angewandte Physik	

Titel	Name	Vorname	Institution	Unterschrift
	Westphal	Andreas	Stadtreinigung Hamburg	
Prof.	Winzenick	I.	HAW Hamburg	
	Wittlinger	Moritz	Technische Universität Hamburg Harburg	
	Wolf	Franziska	FTZ-ALS HAW Hamburg	

Appendix A7, Vilnius, Lithuania, 11th November 2015

Table A7-1: Agenda for the Vilnius Outreach Meeting

Vilnius Outreach Meeting
Date: 11th November 2015, 13 pm
Place: Vilnius University National Open Access Scholarly Communication and Information Center, Sauletekio av. 5, Vilnius, Conference hall.

Goal:
To encourage the development of smart, human centric SSL in Lithuania.

Target groups:

- Representatives from municipalities (Vilnius and neighboring cities) and other governmental institutions like Ministry of Economy, Ministry of Energetics, Central project management agency, state companies Lithuanian Energy, LESTO etc.
- Lighting designers, architects and planners.
- Big building project development companies.
- Lighting industry people.
- Heading: "Human centric lighting - from lab to everyday day life".

Agenda:

13:00 - 13:15 Welcoming speech of the Rector of Vilnius University, prof. Artūras Žukauskas;
13:15 - 14:00 Human centric lighting - good practice examples from scientific and professional media, dr. Pranciškus Vitta (Vilnius University);
14:00 - 14:45 Public procurement of innovations, Swedish experience. Dr. Andrius Plepys (Lund University);
14:45 - 15:15 Coffee break, discussions, demonstration of prototype luminaires;
15:15 - 16:00 Introduction to a new edit of EN 13201 standard for road lighting, human centric issues in outdoor environment. Dr. Pranciškus Vitta (Vilnius University);
16:00 - 16:15 Human centric lighting at school, case study. GLAMOX representative;
16:15 - 17:00 Discussions, demonstrations, idea board, contact exchange etc.

Presentation (except Glamox) and moderation will be in Lithuanian language.

Good attendance from municipalities is very desirable but not guaranteed. We will start promoting of the event and registration of the participants next week, but no guarantee...

Table A7-2: List of invited persons and list of signatures from the participants

lightingforpeople
CONNECTING OPPORTUNITIES FOR INNOVATION

Seminaro "Į Žmogų orientuotas apšvietimas" registracija

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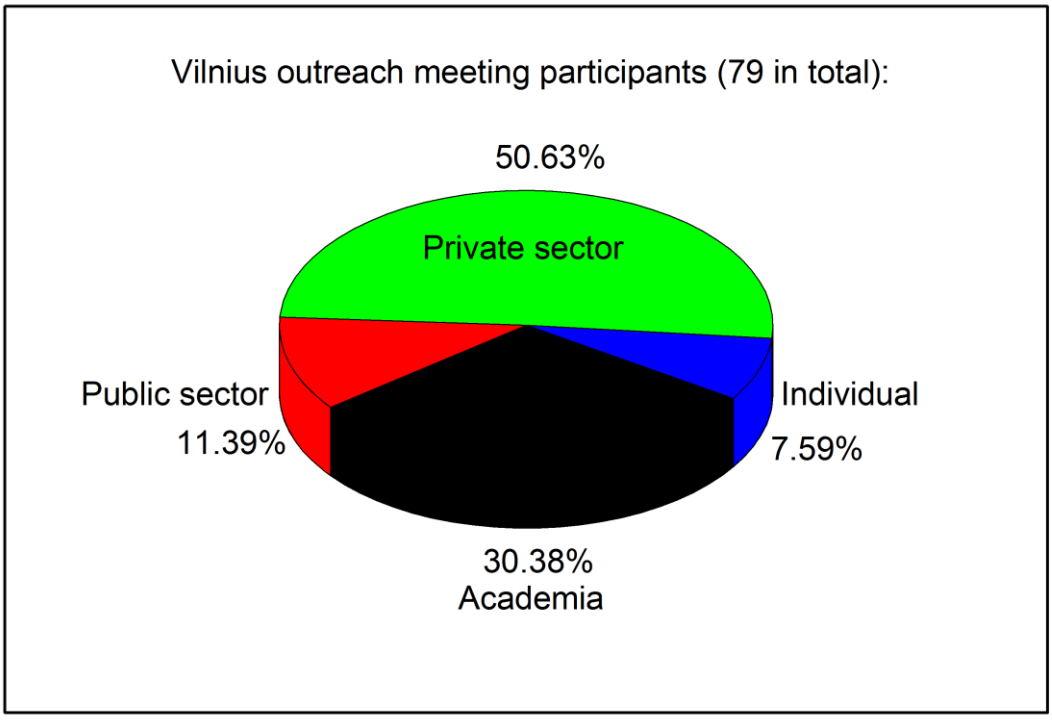
Table A7-3: Distribution of participants at the workshop



Appendix A8, Lund, Sweden, 1st December 2015

Table A8-1: Invitation to the workshop "The Future of Lights – Innovations for the future sustainable cities"

Workshop with Innovation Skåne / LU Open / SSL-erate

During a normal day we are exposed to different kinds of lights. It is both natural light and from different light sources. That light affects us is uncontentious. That we can influence the light will therefore be a factor for wellbeing. Today it is often considered that lots of light is a good light, but this is not always true. Moreover, it is often assumed that light from a light bulb is the perfect light, which is often not the case since it differs from natural light. This light is created based on a technical solution whereas today we have the opportunity to create a light based upon the human instead. A good light is a light that can be customized in a variety of ways beyond on/off. To set the light intensity with a dimmer switch is a first step. Next step is now to adjust the light composition, where various color tones and intensity are amplified.

For this reason, the project will test different lighting scenarios in different environments (demos) to get the opportunity to see how light affects us. This will generate a better insight into what a good light is, and to show a number of concrete examples. These demonstrations will then be both show of what / where we can reach today, but also act as an inspiration for the future of light.

This workshop will invite representatives from different stakeholders to elaborate on issues how to form the future light. This will provide the participants with an understanding of the wishes/demands from different stakeholders and to within the forum investigate possible solutions and how to proceed in achieving the future light in a near future.

Stakeholders

- Municipalities (Malmö, Lund, Helsingborg, etc.)
- Region Skåne
- End users (patients, students / parents, etc.)
- Light Manufacturers
- System builders/ software developers
- Installers
- Procurement
- Employees/ staff
- Lighting Designers/ Architects

Table A8-2: Presentation material from the workshop

Varför är ljus viktigt för oss?

Dr. Klas Sjöberg

Ett lyckat exempel med nytt ljus. Servicehemmet Mårtenslund

Thorbjörn Laike,

Prof. Miljöpsykologi, LTH

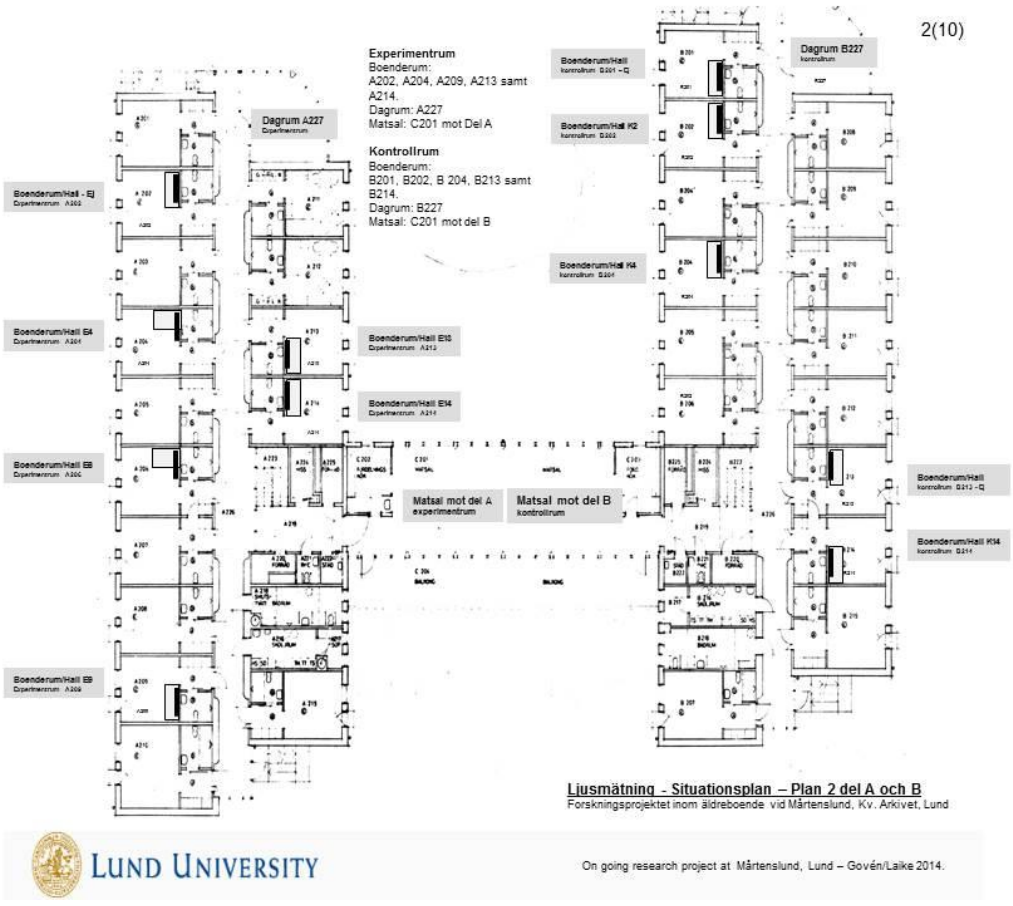
Nya energieffektiva belysningssystems inverkan på äldres välbefinnande

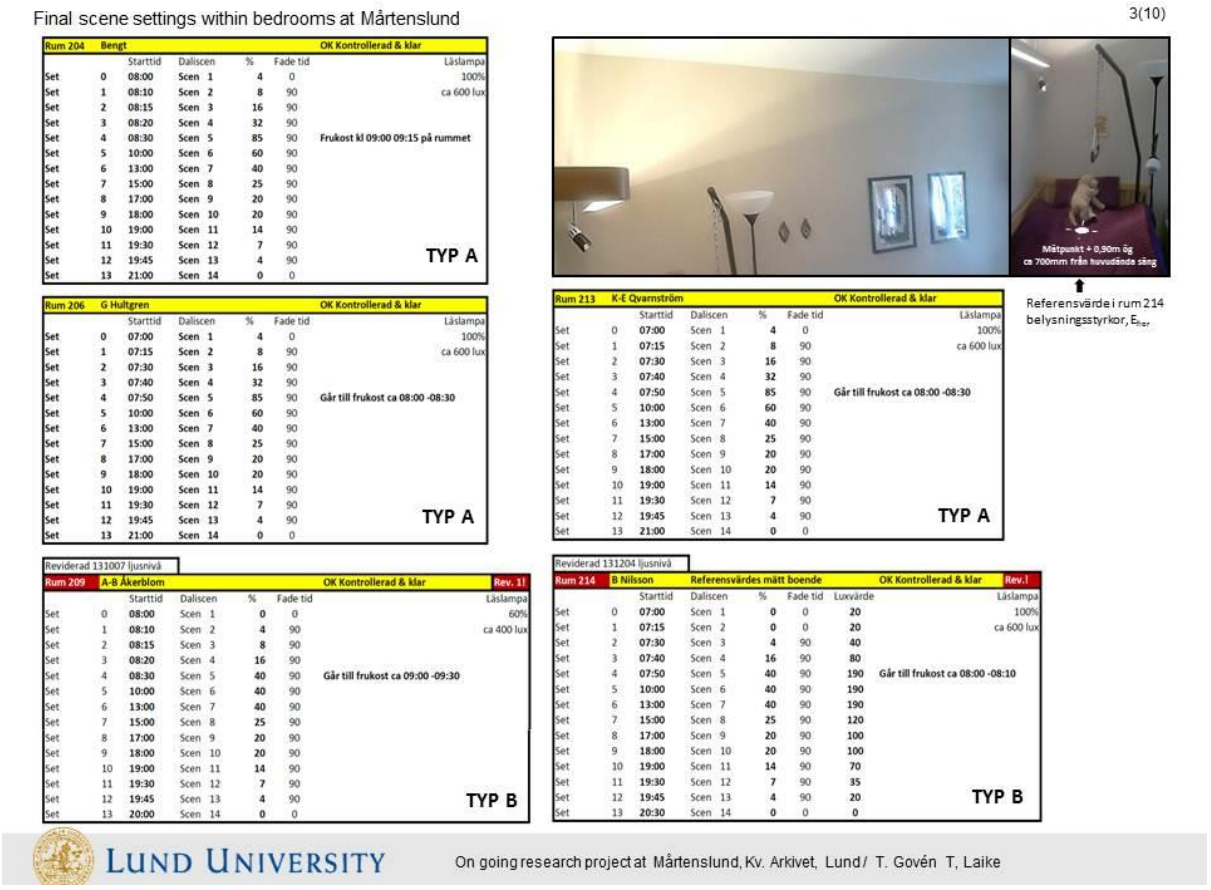
Thorbjörn Laike, Eja Pedersen, Tommy Govén, Elisabet Johnsson och Klas Sjöberg

Syfte

- Undersöka om dynamiskt omfältsljus har positiv inverkan på äldre avseende vakenhet, välbefinnande och hälsa

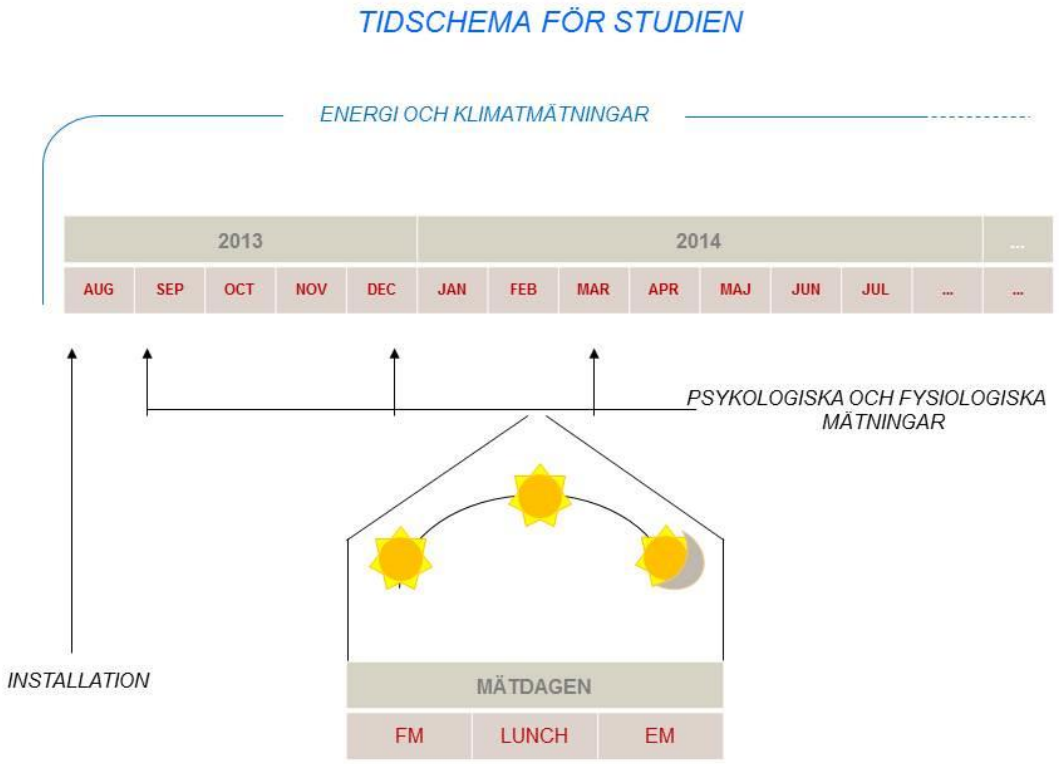
- Undersöka hur detta påverkar energianvändningen i förhållande till dagens konventionella belysningslösningar

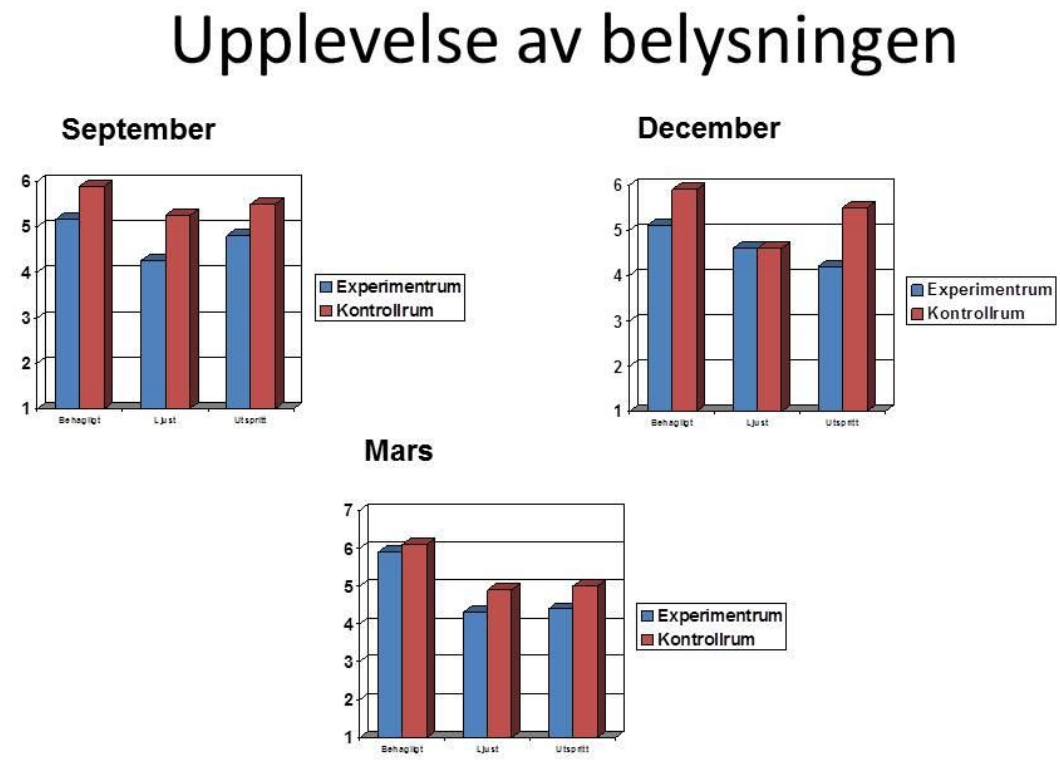




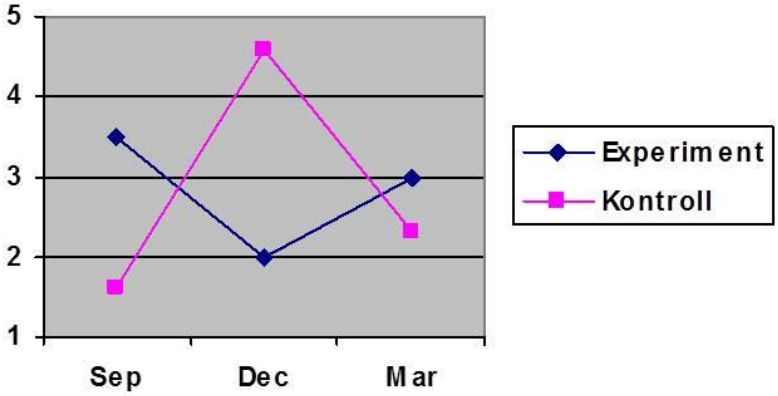
Metod

- Studien genomförs som en longitudinell fältstudie två avdelningar på ett serviceboende
- En experiment- och en kontrollavdelning – nytt belysningssystem (E) smärre justeringar (K)
- Mätning av nutritionsparameterar
- Mätning av kronobiologiska markör kortisol samt medicineringsbehov.
- Undersökning av de boendes psykiska och fysiska status före och efter interventionen
- Energimätningar
- Belysningsmätningar

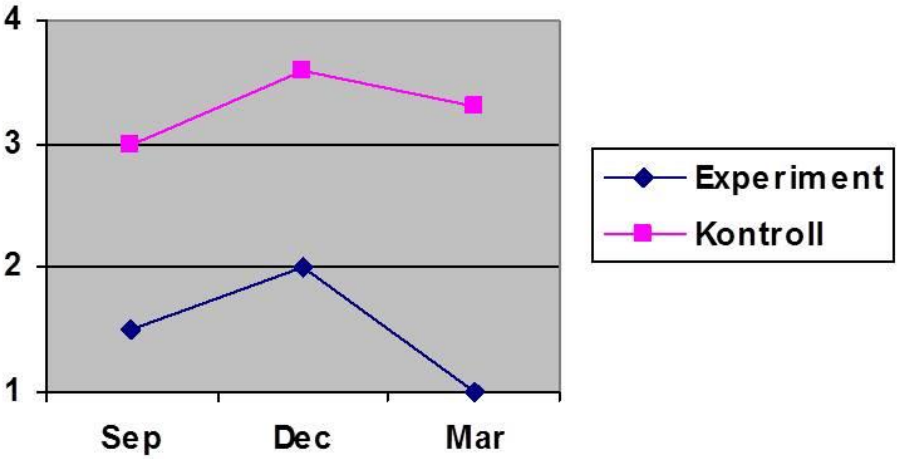




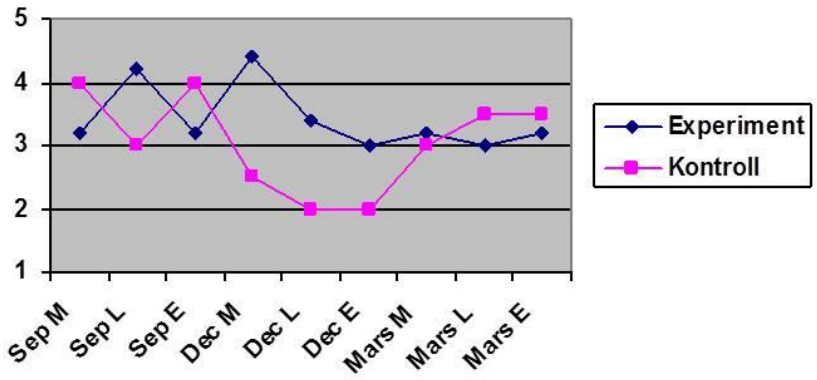
Dåsighet



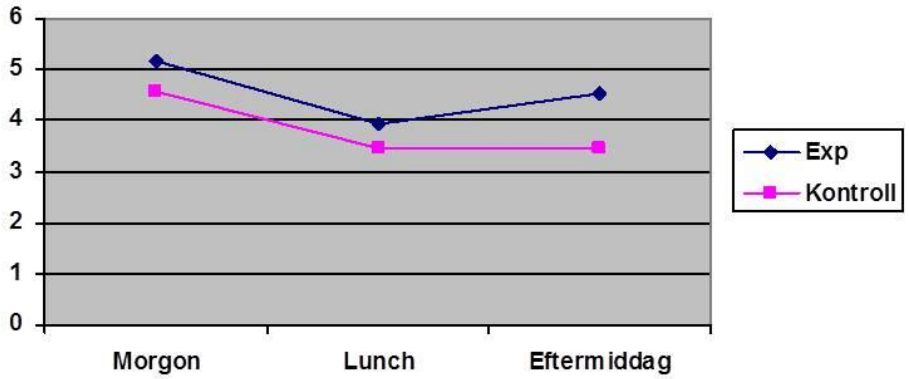
Vakna under natten

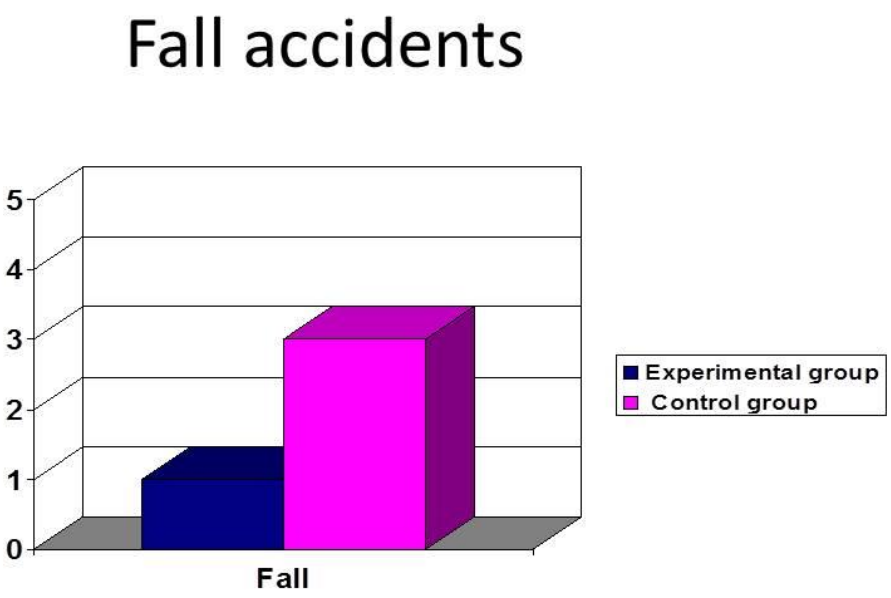


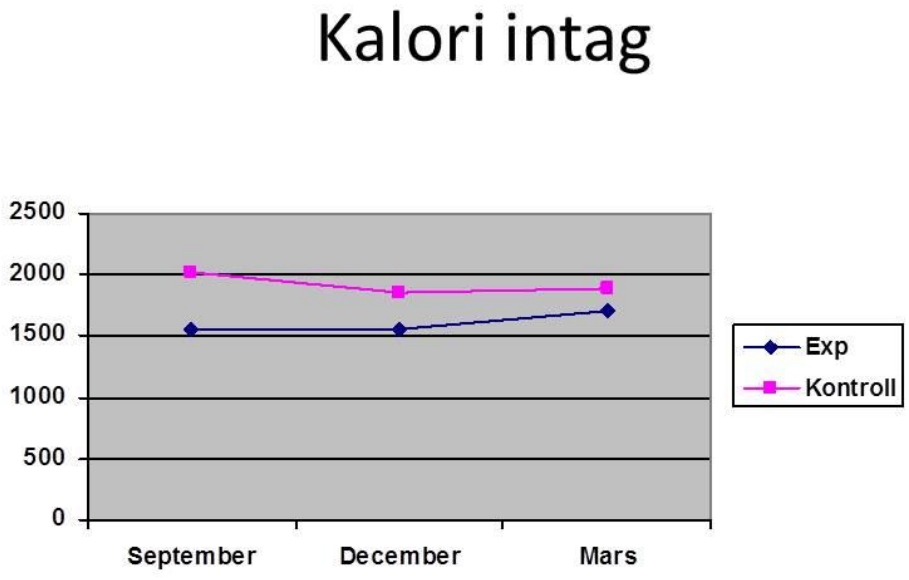
Pigg



Kortisol över dagen







Installerad effekt kontrollrum vs experimentrum

Input power (W)	Living room	Day room	Dining room
Control room - incandescent	300W	360(715)W	576W
Control room LED bulbs	43W		
Experimental rooms	43+80=123W	262W	342W
Reduced input power (%)	85/55%	28/63%	40%

Sammanfattning

- Experimentgruppen något piggare i december
- Experimentgruppen tycks sova något bättre under perioden
- Installerad effekt i boenderum reducering med 55 %
- Installerad effekt i matsal reducering med 40 %
- Installerad effekt i dagrum reducering med 63 %
- Samtliga i experimentgruppen vill behålla sina nya LED-armaturer

- Kvar att göra:
- Jämföra beräknad energianvändning med verklig energianvändning
- Analys nutrionparametrar
- Hälsoparametrar ytterligare journaljämförelser

Polhem skolan

Tankar kring framtidens belysning från en brukares perspektiv.

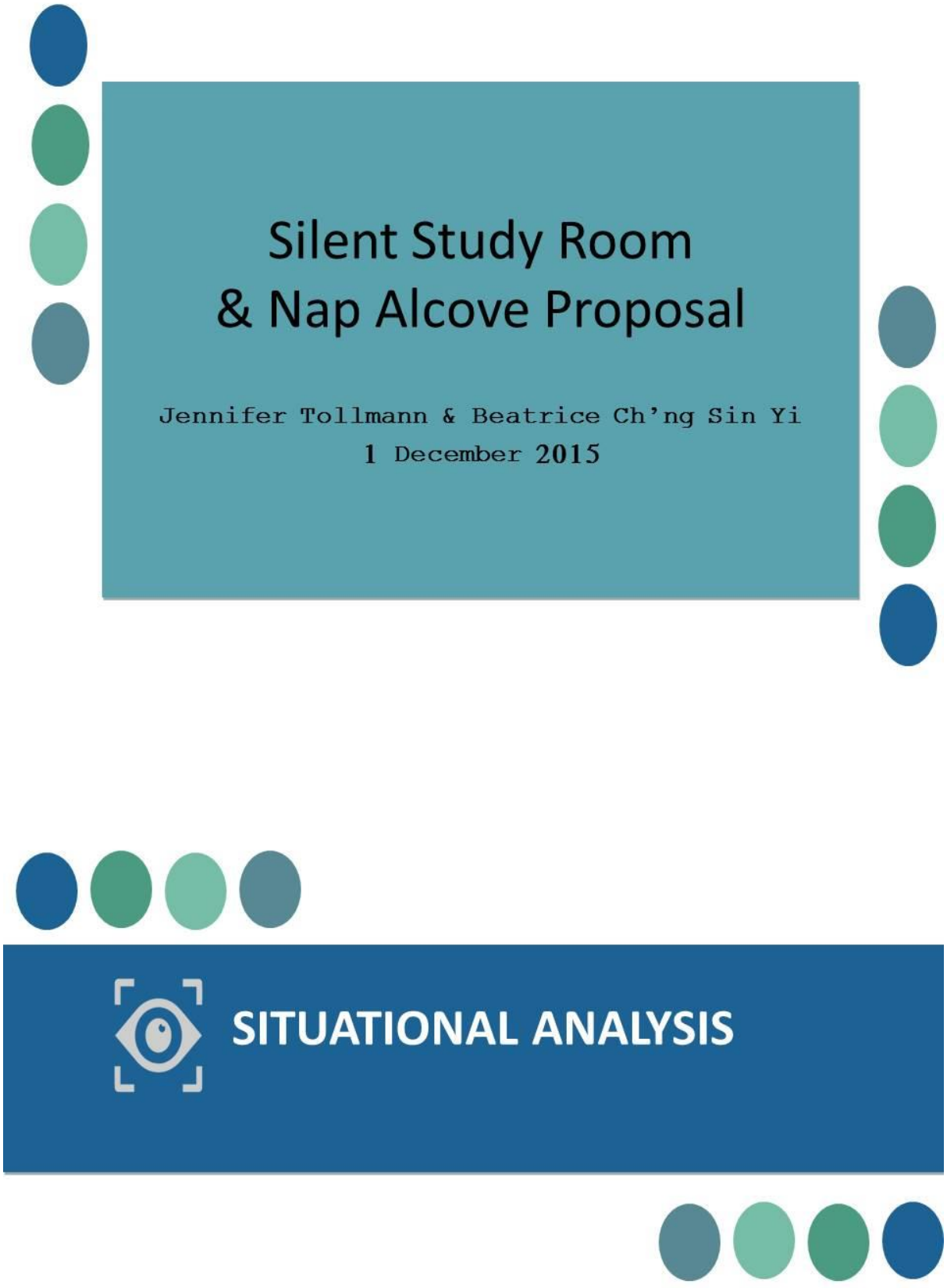
Catrina Liljegren lärare vid Polhemskolan

THE INTERNATIONAL INSTITUTE FOR INDUSTRIAL ENVIRONMENTAL ECONOMICS

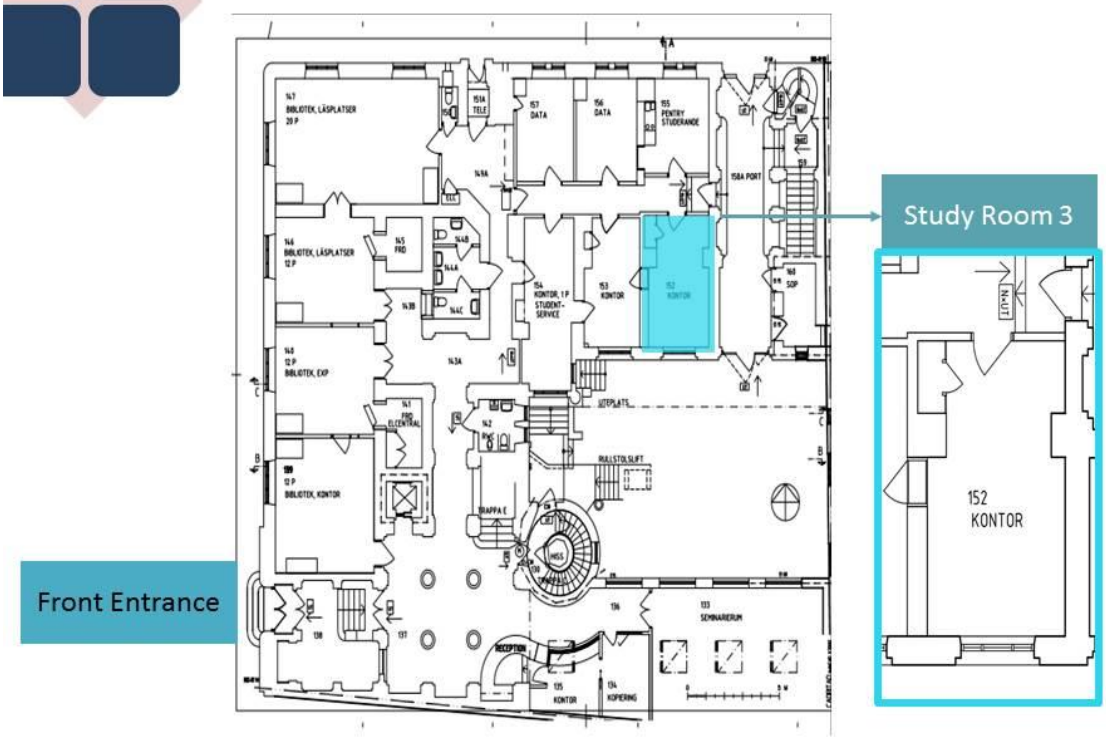
Thoughts about the future light from a users perspective

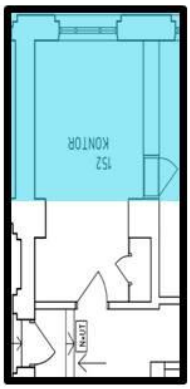
Jennifer Tollman och Beatrice Ch'ng Sin Yi från IIIEE, miljöinstitutet

MESPOM

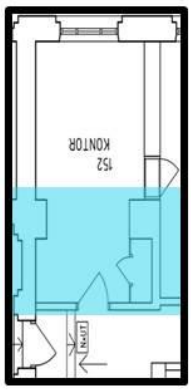


The Current Situation



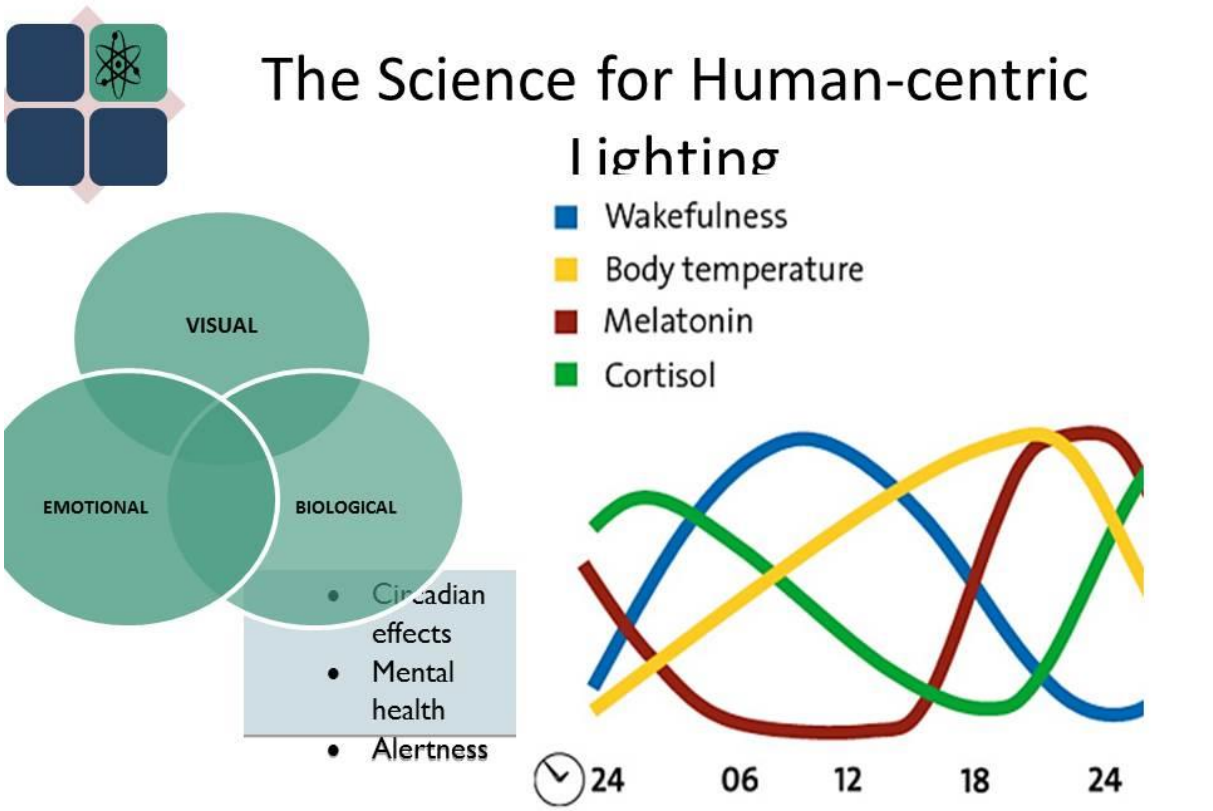


Study Space



Unused Space

THE SCIENCE



(Source: www.fagerhult.co

Survey of 29 users

68%	Dislike current lighting	60%	In favour of dedicated silent study room
16%	Experienced migraines/visual strain	44%	Have napped at the IIIEE

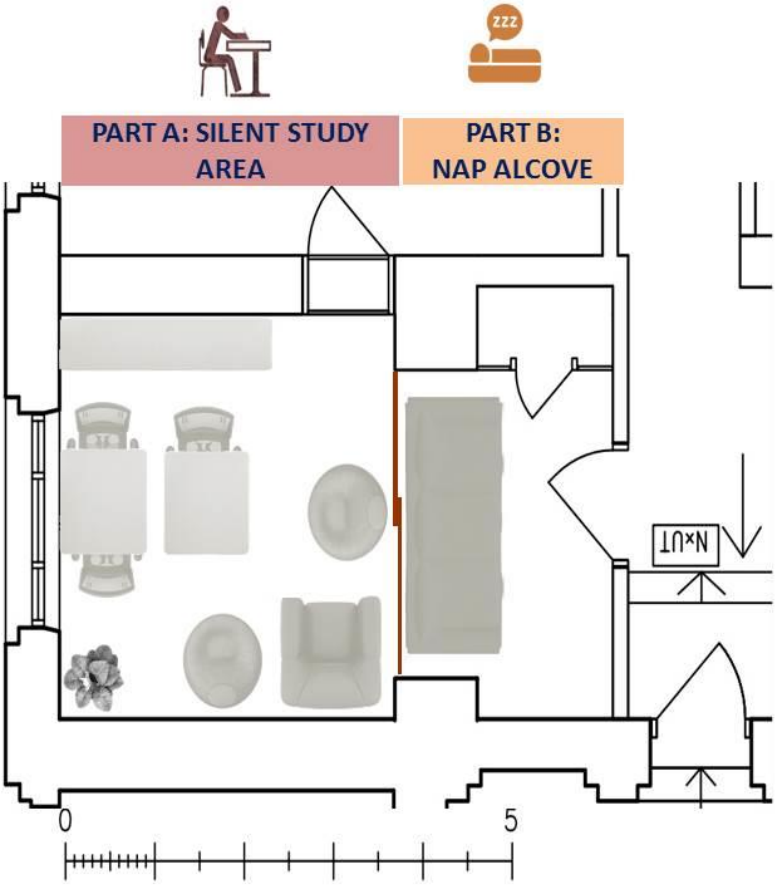
Best Feature Ranking

1. Couch;
2. Window;
3. Quiet

Will you use a nap room?

56% Yes;
16% No;
24% Maybe

OUR PROPOSAL



Product Showcase: Adaptive Ambient Light

MASTER LEDtube by Philips

34% brighter ambient light

13% lower power consumption

INDIRA Indirect & Wallwasher by Fagerhult

e-Sense Tune by Fagerhult

Lighting Proposal: Workplace Lighting

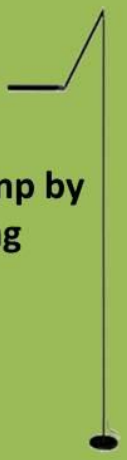
Direct study station light of 500 Lux

Criteria

1. Non-glare
2. Low heat
3. **Dimming function**
4. Adjustable angle head
5. Blue light
6. Integrated into table with plugs

Product Examples

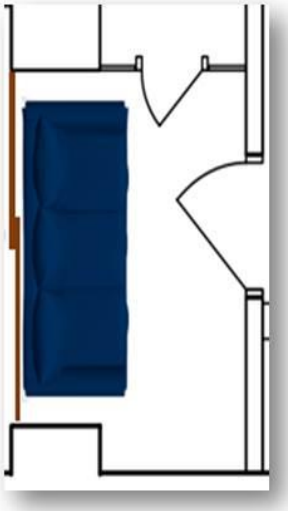
EYECARE Table Lamp
by Philips



Z-Bar LED Floor Lamp by
Koncept Lighting

NAP ALCOVE

Nap Alcove Layout



Lighting Proposal

Pre-set Lighting Cycle + Mobil App Control

Product Examples

CalmSpace nap pod by Marie-Virginie Berbet

Dark cycle

Bright cycle

Sleep Time Smart Alarm by Azumio Inc.

Senses sleep cycles based on body movements for optimal waking effect

Conclusion

Energy savings	User benefits
• Daylight sensors and adjustable lighting • Mobile app control • LED solutions • Occupancy (proximity) sensors in both area	• Study Area: – Increased focus – Personalized lighting – Human-centric lighting • Nap Area: – More effective napping – Greater productivity

THANK YOU

Visning av en demo!!

Vi beger oss in i ”Backstage”

som är runt hörnet

(vänster sida för mig och höger sida för er)

Åter här om 15 min.

Paneldiskussion med dagens deltagare

Den upplysta människan…

…The enlighted human

For every complex problem there is an answer that is clear, simple, and wrong

– H.L. Mencken

Table A8-3: List of invited persons

Inbjudningslista, workshop 1 dec 2015

Aktör	Företag	Namn	Kontaktuppgifter
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Kommun	Helsingborg	BL hade namn på en läkare	
Fastighets-förvaltare	Wihlborgs	Magnus Andersson	magnus.andersson@wihlborgs.se
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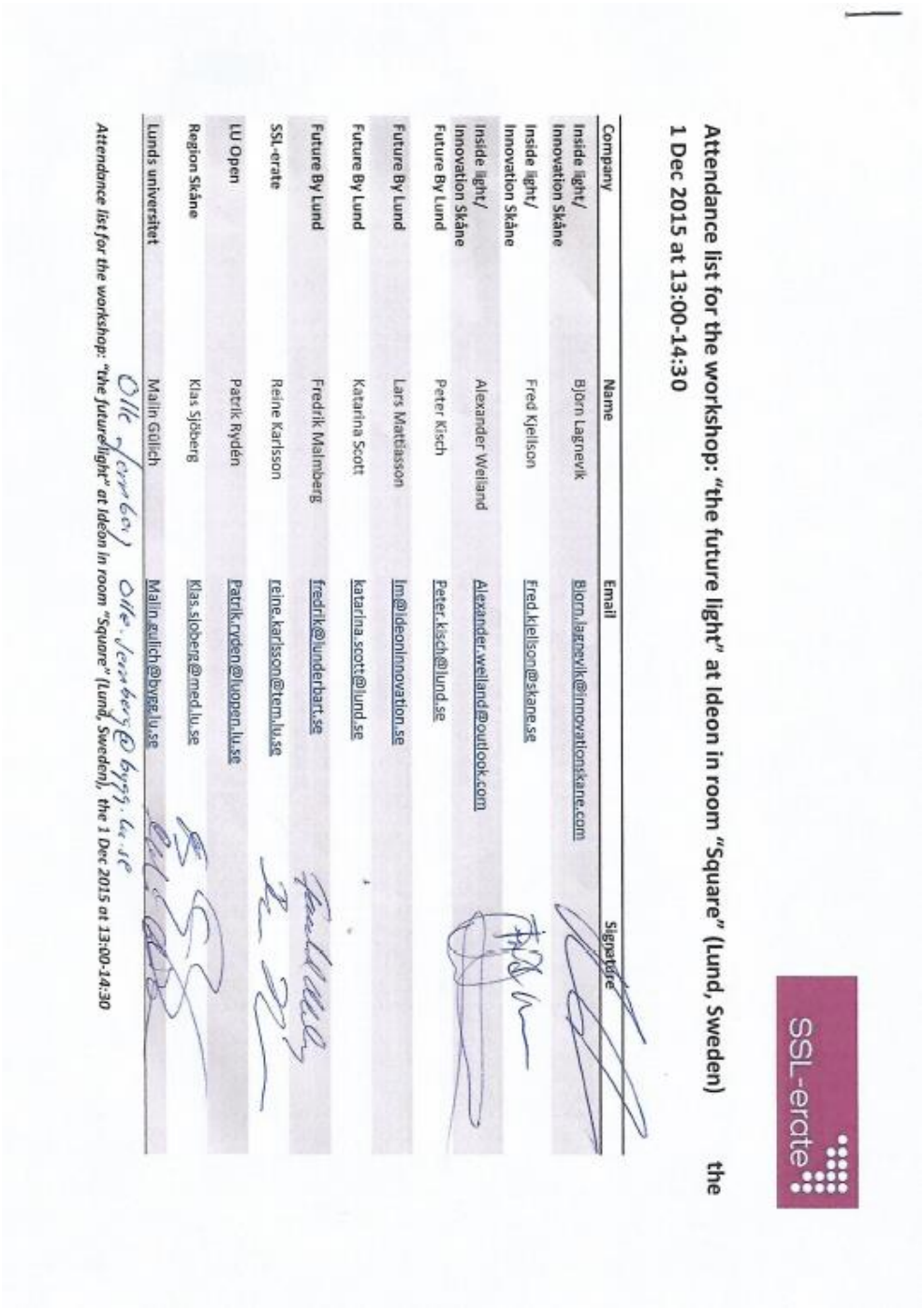
Tillverkare	Aaxsus	Mikael Risén	Mikael.risen@aaxsus.se
Tillverkare	Lundinova	Anders Alvin	and@lundinova.se
Tillverkare	Tego	Mats Flygare	mf@tego.se
Tillverkare	Brainlit, Greinon	Tord Wingren	tord.wingren@greinon.se
Ljusdesign	WSP	Katarina Henning	katarina.hennig@wspgroup.se
Inköp	Medicon Village	Cecilia Rörstrand-Nilsson Kerstin Jacobsson Erik Jagesten	cecilia.rorstrandnilsson@mediconvillage.se Kerstin.Jakobsson@mediconvillage.se Erik.Jagesten@mediconvillage.se
Inköp	Akademiska Hus	Li Lövehed Anders Håkansson Ingrid Gustavsson	Li.Lovehed@akademiskahus.se Anders.Hakansson@akademiskahus.se ingrid.gustavsson@akademiskahus.se

Aktör	Företag	Namn	Kontaktuppgifter
Inköp/ System	EON	Sonny Strömberg Tobias Övall Thomas Johnsson	Sonny.Stromberg@eon.se Tobias.ovall@eon.se Thomas.johnsson@eon.se
Installatör	APQ el	Andreas Qvarfort	andreas.qvarfort@apqel.se
Installatör	Lantz el	Thomas Lantz	Thomas@elektrolanz.se
Installatör	Mpel	Christina Wulff	Christina.wulff@mpel.se
Inköp/brukare	IIIEE, Miljöinstitutet	Mikael Backman	mikael.backman@iiiee.lu.se
Brukare	Mårtenslund, Thulehem, LKF	Veronica Welin Bertil Lundström	veronica.welin@lund.se bertil.lundstrom@lkf.lund.se
Brukare	IIIEE	Jennifer Tollman	jennifer.tollmann@mespom.eu
Brukare	Polhemskolan	Catrina Liljegren	catrina.liljegrenbergstrom@utb.lund.se
Brukare	Lerbäckskolan	Jens Kleiman	jens.kleiman@lund.se.
Affärsutveck-ling	SKJCE	Mahmoud Hmouz	mhmouz@gmail.com
Design	IKDC	Olof Kolte	Olof.Kolte@design.lth.se
Myndighet	Energi-myndigheten	Anita Aspegren Marie Claesson	Anita.aspegren@energimyndigheten.se Marie.claesson@energimyndigheten.se
Intresseorg	Sydljus	Ingvar Eriksson Johannes Linden	eriksson.ingvar@gmail.com johannes.linden@gmail.com
Forskning	Ceebel	Annika Kronqvist	annika.kronqvist@ju.se
Forskning	LTH	Annika Olsson	annika.olsson@plog.lth.se
Forskning	LTH/KIC	Markku Rummukainen	markku.rummukainen@nateko.lu.se

Table A8-4: Attendance list



SSL-erate

Attendance list for the workshop: "the future light" at Ideon in room "Square" (Lund, Sweden) the 1 Dec 2015 at 13:00-14:30

Company	Name	Email	Signature
Inside light/ Innovation Skåne	Björn Lagnevik	Bjorn.lagnevik@innovationskane.com	
Inside light/ Innovation Skåne	Fred Kjellson	Fred.kjellson@skane.se	
Inside light/ Innovation Skåne	Alexander Weiland	Alexander.weiland@outlook.com	
Future By Lund	Peter Kisch	Peter.kisch@lund.se	
Future By Lund	Lars Mattiasson	lm@ideoninnovation.se	
Future By Lund	Katarina Scott	katarina.scott@lund.se	
Future By Lund	Fredrik Malmberg	fredrik@lunderbart.se	
SSL-erate	Reine Karlsson	reine.karlsson@tem.lu.se	
LU Open	Patrik Rydén	Patrik.ryden@luopen.lu.se	
Region Skåne	Klas Sjöberg	Klas.sjoberg@med.lu.se	
Lunds universitet	Malin Gülich	Malin.gulich@byggt.lu.se	

Attendance list for the workshop: "the future light" at Ideon in room "Square" (Lund, Sweden), the 1 Dec 2015 at 13:00-14:30

Arbetsmiljö/Bygg			
Company	Name	Email	Signature
Innovation Skåne/ Niowa	Anders Nilsson	anders@niowa.se	
Innovation Skåne	Marianne Larsson	marianne.larsson@teknopol.se	
Mobile Heights			
Lunds universitet	Thorbjörn Laike	Thorbjorn.laike@arkitektur.lth.se	
Miljöpsykologi			
Dicende AB	Ingela Mauritzon	Ingela.mauritzon@dicende.com	
Survey Party	Hanway Tran	Hanway.tran@surveyparty.se	
Kraftringen	Sara Kralmark	Sara.kralmark@kraftringen.se	
Kraftringen	Eva Erdös	Eva.erdos@kraftringen.se	
Lunds kommun	Elin Dalaryd	Elin.dalaryd@lund.se	
Lunds kommun	Jesper Källquist	Jesper.kallquist@lund.se	
Wihlborgs	Anders Grönwall	Anders.gronwall@wihlborgs.se	
Wihlborgs	Magnus Andersson	magnus.andersson@wihlborgs.se	
Lundinova	Anders Alvin	and@lundinova.se	
Aaxsus	Mikael Risén	Mikael.risen@aaxsus.se	

Attendance list for the workshop: "the future light" at Ideon in room "Square" (Lund, Sweden), the 1 Dec 2015 at 13:30-14:30

Company	Name	Email	Signature
Tego	Mats Flygare	mf@tego.se	
Masterlite	Ola Lundblad	ola.lundblad@masterlite.se	
Medicon Village	Erik Jagesten	erik.jagesten@mediconvillage.se	
Akademiska Hus	Anders Håkansson	Anders.Hakansson@akademiskahus.se	
Akademiska Hus	Thomas Hallqvist	Thomas.hallqvist@akademiskahus.se	
EON	Sonny Strömberg	Sonny.Stromberg@eon.se	
EON	Tobias Öyall	Tobias.oyall@eon.se	
EON	Malin Johansson	Malin.johansson2@eon.se	
Lantz el	Thomas Lantz	Thomas@elektrolantz.se	
Mpel	Christina Wulff	Christina.wulff@mpel.se	
Lunds universitet IIIEE, Miljöinstitutet	Mikael Backman	mikael.backman@iiiee.lu.se	
Lunds universitet IIIEE, Miljöinstitutet	Jennifer Tollmann	jennifer.tollmann@mespom.eu	
Lunds universitet IIIEE, Miljöinstitutet	Sin Yi Ch Ng	sin.yi@mespom.eu	

Attendonce list for the workshop: "the future light" at Ideon in room "Square" (Lund, Sweden), the 1 Dec 2015 at 13:00-14:30

Company	Name	Email	Signature
Polhemskolan	Catrina Liljegren	catrina.liljegrenbergstrom@utb.lund.se	
DTU Fotonik	Johannes Lindén	johli@fotonik.dtu.dk	
Alpega	Mats Havskogen	Mats.havskogen@alpega.se	
KTH	Tove Karlsson	tove.karlsson@insidelight.se	
Agskonsult	vivian.erixon	vivian.erixon@agskonsult.se	
Stadsfastigheter Malmö	Lars-Erik Håkansson	lars-erik.hakansson @malmo.se	
EoN	Thomas Johnsson	@EON.SE	
Polhemskolan	Per Magnus Rökström	permagnus.rokstrom@lund.se	
-"-	[illegible]	[illegible]	
Lunds kommun	Michaela Tellenmark	michaela.tellenmark@lund.se	
Tego System AB	Mats Flygare	mf@tego.se	
Dicende AB	Ingela Mauritzon	ingela.mauritzon@dicende.com	
Xceleration Labs	Mitch de Leon	mitch@xcelerationlab.com	

Attendance list for the workshop: "the future light" at Ideon in room "Square" (Lund, Sweden), the 1 Dec 2015 at 13:00-14:30

Appendix A9, Bassano, Italy, 3rd December, 2015

Table A10-1: Agenda for the workshop

SSL-erate

HUMAN CENTRIC LIGHTING: L'INFLUENZA DELLA LUCE SULL'UOMO

INBAR (Istituto Nazionale di Bioarchitettura) Sezione di Vicenza e il Comune di Bassano del Grappa sono lieti di invitarvi al workshop che si terra il 3 dicembre prossimo a Bassano del Grappa presso l'aula Magna del Liceo "Jacopo da Ponte". Sono previsti 2 momenti di lavoro nell'ambito del progetto europeo "SSL-erate" finanziato all'interno del "Settimo Programma Quadro".
Il Progetto vede coinvolti tutti i soggetti interessati ad un confronto aperto in merito al futuro dell'illuminazione a LED nel nostro territorio e alle altre opportunità di sviluppo locale sostenibile, oltre che le tematiche connesse con gli effetti di una corretta illuminazione sulla vita dell'uomo.

3 dicembre 2015
Aula Magna del Liceo "Jacopo da Ponte"

IL PROGETTO SSL-ERATE

Il progetto SSL-erate mira ad accelerare l'adozione dell'illuminazione allo stato solido (Solid State Lighting, SSL) in Europa, sostenendo l'open innovation e attuando la disseminazione delle conoscenze ad oggi disponibili a tutte le parti interessate.

I partner del progetto raccolgono e condividono le conoscenze più recenti sull'incremento del business verde basato sullo stato solido e sulla promozione della salute e del benessere tramite la tecnologia SSL. Alla condivisione di queste conoscenze si accompagneranno opportunità di mercato in diversi cluster dell'illuminazione europei: Cluster Lumière, Cluster d'Il-Luminació de Catalunya, The Danish Lighting Innovation Network, Groen Licht Vlaanderen e Luci in Veneto. Alcune città partecipano inoltre come utenti pilota, ad esempio Malmö, Bassano del Grappa, Amburgo, Stavanger e Eindhoven.

L'obiettivo di SSL-erate è promuovere la collaborazione e l'innovazione per le aziende e tutti i soggetti, per consentirvi di tradurre conoscenze del mercato e opportunità di business in innovazioni, oltre che sensibilizzare la popolazione e tutti i portatori di interesse su un tema così rilevante per l'uomo (HCL) specialmente nel 2015 anno internazionale della Luce (IYL).

Ulteriori informazioni sono disponibili nel sito: www.ssl-erate.eu

OBIETTIVI

L'obiettivo principale di questo primo incontro è promuovere la conoscenza e le competenze verso il tema della "luce" declinato nella sua valenza di elemento fondamentale per il nostro benessere, soprattutto negli ambienti confinati e non solo, oltre che importante settore per ciò che concerne il risparmio energetico, l'innovazione, e non solo, promuovendo quindi le conoscenze sulla percezione della luce e sull'importanza di una corretta illuminazione negli ambienti indoor e su quelli che sono gli effetti della qualità illuminotecnica su salute, benessere, lavoro e studio, oltre che le innumerevoli applicazioni delle tecnologie innovative a Led.

PROGRAMMA

3 dicembre 2015 - Aula Magna Liceo J. Da Ponte - 9.00|13.00

HUMAN CENTRIC LIGHTING: L'INFLUENZA DELLA LUCE SULL'UOMO

9.00 **Introduzione alla giornata**

Saluti introduttivi e breve presentazione del Progetto SSL-erate
ass.ri **Oscar Mazzocchin** e **Giovanni Cunico**

9.30 Prima sessione

9.30 Arch. **Lucia Bucchi** (Presidente INBAR Sezione di Padova)
Luce e spazio architettonico - L'utilizzo della luce naturale e artificiale nell'edificio

10.00 Prof.ssa Arch. **Marina Vio** (Studio Associato Vio)
Luce e colore

10.30 Arch. **Francesca Cremasco** (Consigliere "AIDI Triveneto")
Luce e Cultura

11.00/11.15 pausa/ricreazione

11.15 Seconda sessione

11.15 Ing. **Alberto Sozza** (Vice Presidente del Consorzio "Luce in Veneto")
Scienza Tecnologia e innovazione - L'utilizzo dei LED

11.45 **Sergio Macchioni** (Hikari s.r.l. azienda del Consozio "Luce in Veneto")
Roberto Corradini e **Giorgio Butturini** (Lighting designers)
Francesco Suppi (tecnico luci teatrali)
Luce e creatività - L'esperienza del fare condiviso

Dibattito

Modera l'incontro l'arch. Gaia Bollini Presidente INBAR_Sezione di Vicenza

Attività finanziate nell'ambito del FP7 – ICT - CSA and PCP




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Table A9-2, list of signatures from the participants

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Nome e cognome	Scuola di appartenenza	Firma
	ITIS	
Davide Schirato	ITIS	
Edoardo Corradin	ITIS	
Marco Alessi	ITIS	
Alessandro Bonin	ITIS	
LUCA BIZZOTTO	ITIS	
ANDREA MYVOZ	ITIS	
CLAUDIA BETTINI	IUAV (Venezia)	
GIANMARCO GNOATO	DA PONTE 4ª ASA	
Luca Orlandini	Da ponte	
Grotteria Nicolas	Da ponte	
Todesco Nicola	Da ponte	
Tasselli F.	ITIS "Fermi"	

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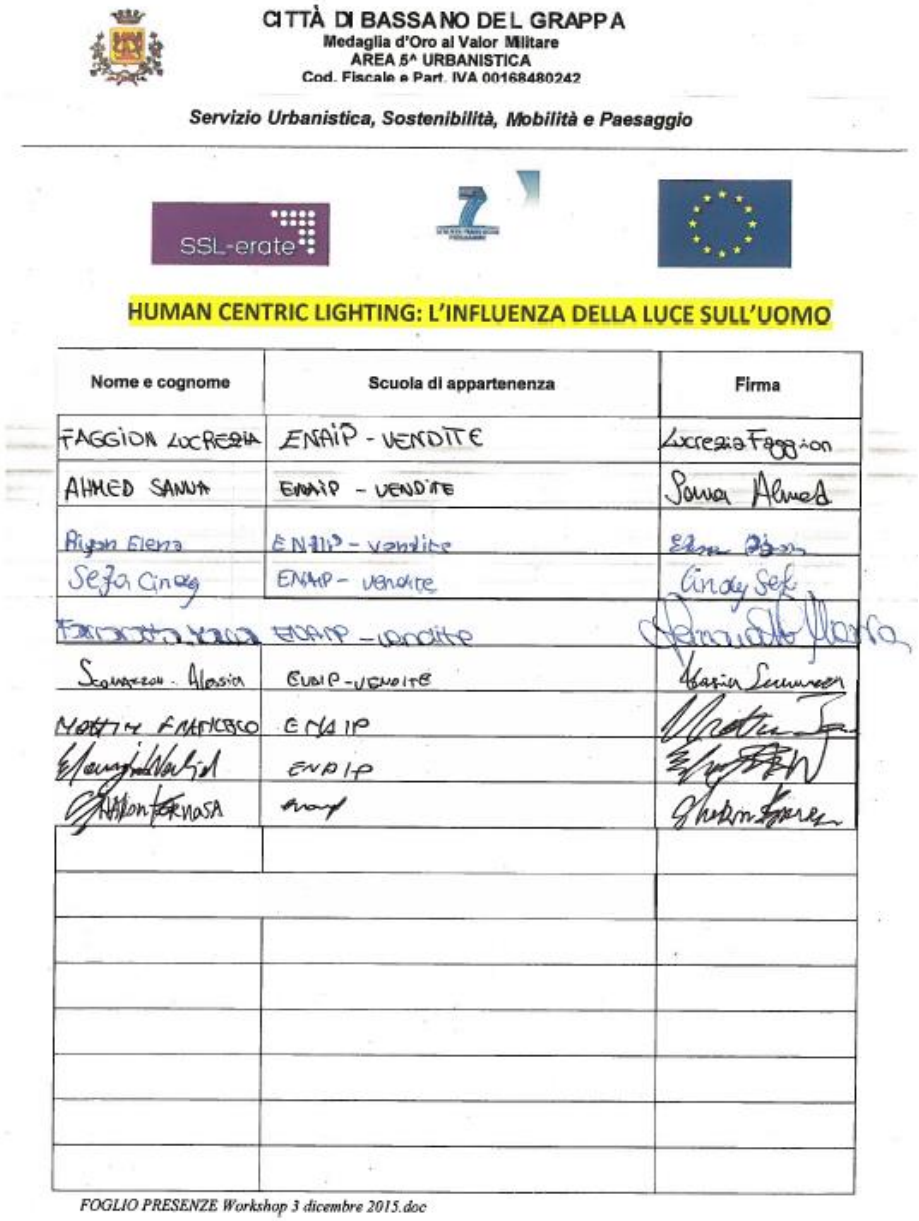

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Nome e cognome	Scuola di appartenenza	Firma
FAGGION LUCREZIA	ENAIP - VENDITE	Lucrezia Faggion
AHMED SANIA	ENAIP - VENDITE	Sonia Ahmed
Rigon Elena	ENAIP - vendite	Elena Rigon
Sejfa Cindy	ENAIP - vendite	Cindy Sejfa
[illegible]	ENAIP - vendite	[illegible]
Scarazzini Alessia	ENAIP - VENDITE	Alessia Scarazzini
Motta Francesco	ENAIP	[illegible]
[illegible]	ENAIP	[illegible]
[illegible]	[illegible]	[illegible]

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Nome e cognome	Scuola di appartenenza	Firma
Francesco Pardin	ITET Einaudi	
Leonardo Zanta	ITET Einaudi	
Daniele Novello	ITET EINAUDI	
Riccardo Carletto	ITET EINAUDI	
Sebastiano Fusaro	ITET EINAUDI	
Massimo Bonato	ITIS FERMI	
Bortot Tommaso	ITIS FERMI	
Claudio Mazzarolo	ITIS FERMI	
Davide Marcarello	ITIS FERMI	
Simonetto Ivan		
Jacopo Silvestrin	Liceo Jacopo da Ponte	
Cortese Giacomo	" " "	
Nicolò SCHIAVO	" "	

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Nome e cognome	Scuola di appartenenza	Firma
GIOVANNI DEGETTO	ITIS	Giovanni Degetto
MATTEO PAROLIN	ITIS	
FARRONATO DANIELE	II	
GERETTA Massimiliano	"	
ALESSANDRO GARBOTTO	ITIS	
ZANCHETTA LUISA	INBAR	
GIORGIA AZZOLIN	J. da Ponte	Giorgia Azzolin
Milena Valentina	J. da Ponte	
Risser Leonard	J da Ponte	

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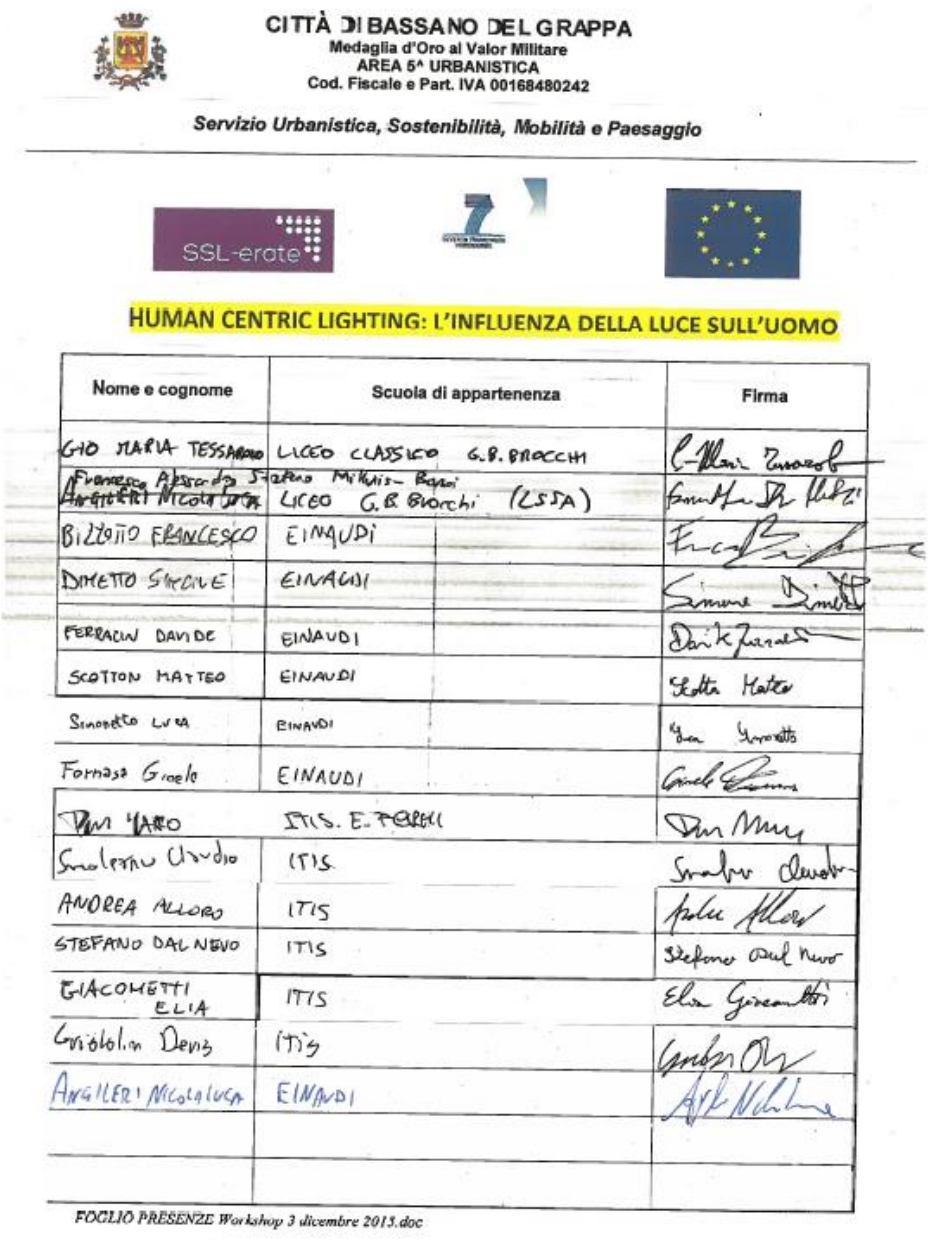

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Nome e cognome	Scuola di appartenenza	Firma
GIO MARIA TESSARO	LICEO CLASSICO G.B. BROCCHI	
Francesco Alessandro Stefano Michele Bassi Angileri Nicolaluca	LICEO G.B. Brocchi (LSSA)	
BIZZOTTO FRANCESCO	EINAUDI	
DIMETTO SIMONE	EINAUDI	
FERRACIN DAVIDE	EINAUDI	
SCOTTON MATTEO	EINAUDI	
Simonetto Luca	Einaudi	
Fornasa Gioele	EINAUDI	
[illegible]	ITIS. E. Fermi	
Smolenov Claudio	ITIS	
ANDREA ALLORO	ITIS	
STEFANO DAL NEVO	ITIS	
GIACOMETTI ELIA	ITIS	
Gribolin Denis	ITIS	
ANGILERI NICOLALUCA	EINAUDI	

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Nome e cognome	Scuola di appartenenza	Firma
GUNER RICCARDO	ITIS BASSANO	
NOVELLO NICOLA	ITIS	
DAL PONTE LUDOVICO	ITIS	
STRAPPAZZON NICOLA	ITIS	
De Rossi Luca	"	
BERCHARNIA OUASSIM	"	
BITTANTE LINDA	J. DA PONTE	
ZANON ARIANNA	J. DA PONTE	
BONT GLORIA	J. DA PONTE	
BAGGIAN MATTEO	J DA PONTE	
PISTORELLO FILIPPO	J. DA PONTE	

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Nome e cognome	Scuola di appartenenza	Firma
GIACOMO COSTA	ITIS E FERMI	
FILIPPO DALLA ZUANNA	ITIS E FERMI	
FILIPPO TRENTIN	ITIS E. FERMI	
SIMONE MARCHETTI	J. DA PONTE	

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Nome e cognome	Scuola di appartenenza	Firma
Thomas Cecato	ITIS "ENRICO FERMI"	Thomas Cecato
Nastoski Ali	ITIS "E. FERMI"	Nastoski Ali
Riccardo Zanta	ITIS "E. FERMI"	Riccardo Zanta
Marco Scarazzon	ITIS "E. FERMI"	Marco Scarazzon
Luca Pozzolato	ITIS "E. FERMI"	Luca Pozzolato
Stefano Brunello	J. da Ponte	Stefano Brunello
Filippo Marco	J. da Ponte	Filippo Marco
Lavarda Elena	J. da Ponte	Elena Lavarda

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Nome e cognome	Scuola di appartenenza	Firma
ANDREA BIZZOTTO	ITET "L. EINAUDI"	
Giona Alessi	ITET "L. Einaudi"	
[illegible]	ITET L. EINAUDI	
GIUSEPPE [illegible]	ITET L. EINAUDI	
[illegible] RICCARDO	ITET L. EINAUDI	
DATOME LUIGI	ITIS. FERMI	
BERALDO FEDERICO	ITIS	
PARISE CHRISTIAN	ITIS	
[illegible] MICHAEL	ITIS	
Alessandro Pellizzari	ITIS	
Cristopher Laudo	ITIS	
SMRISSA ANDREA	ITIS	
UTENKORFSKÁ SANDRA	LICEO DA PONTE	
FERRARA MARIKA	ENAIP	
ELHARFI KHADIJA	ENAIP	
GOTTIN ELLEN	ENAIP	
ALEN SINA	ENAIP	

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Nome e cognome	Scuola di appartenenza	Firma
GIUSEPPE BERNARDI	ITIS E. FERMI	[signature]
FRANCESCHINI ALESSANDRO	ITIS E. FERMI	[signature]
GAMBASSINI ANDREA	ITIS E. FERMI	[signature]
ARTUSO FRANCESCO	ITIS E. FERMI	[signature]
MASSIMO TONIOLO	DA PONTE	[signature]
Lazzaro Enrico	Da Ponte	[signature]
DAVIDE VIERU	Da Ponte	[signature]
TATIANA PREST	INBAR	[signature]
Alessi Emma	Enaip	Emma Alessi
Silvia Bootez	Enaip	Silvia Bootez
Moldovan Sabina	Enaip	[signature]
Porcu Clara	Enaip	[signature]

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