

DYNAMIC LIGHT

Digitalization leads to sufficiency



DYNAMIC LIGHT AIMS TO...

SUSTAINABLE CITY



Liveable city



Healthy city



Economically
attractive city

PROJECT FACTS

Dynamic Light: Interreg Central Europe Programme

- **17 partners, 9 pilot projects**
- **Budget: 3 500 000 €**
- **Duration: June 2016 - May 2019**

- municipalities, universities, energy agencies, manufacturers etc.
- Poland, Italy, Austria, Croatia, Slovenia, Czech Republic, Germany
- Hochschule Wismar (Lead Partner)



DYNAMIC LIGHT PROJECT

WP 1: **Dynamic Light on User Level**

Designing Dynamic Light!

WP 2: **Dynamic Light on City Level**

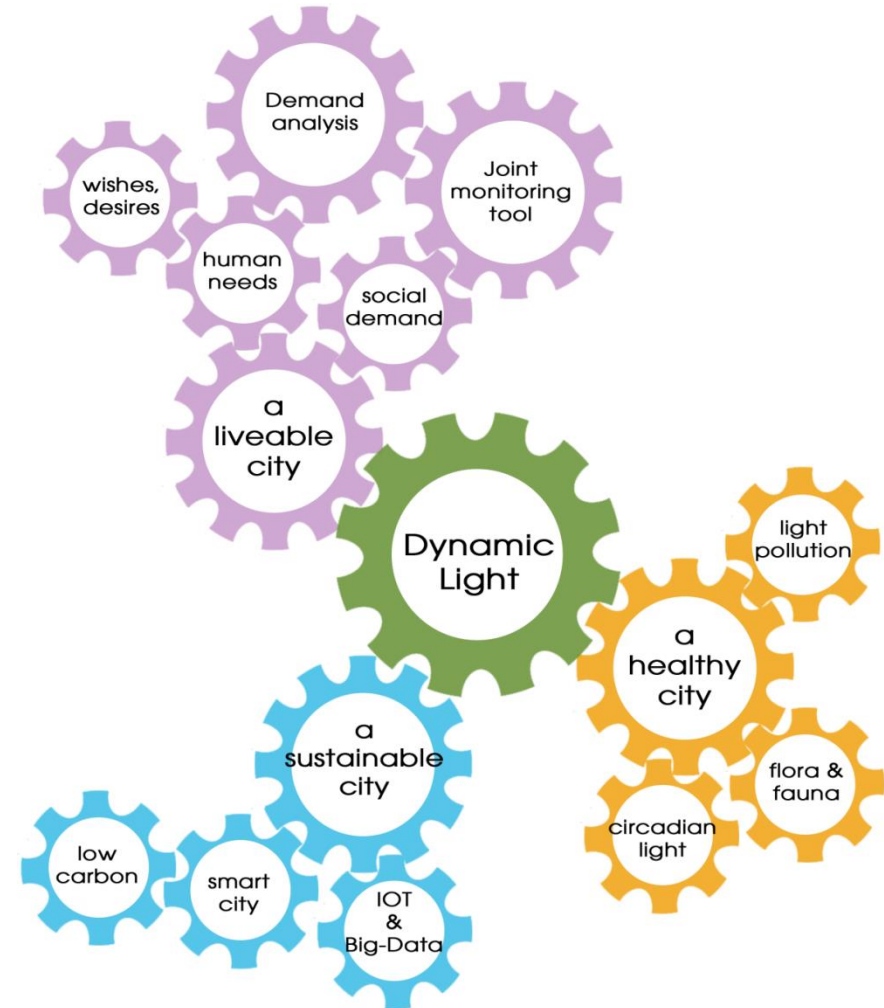
Integrate dynamic light into the city!

WP 3: **Dynamic Light solutions**

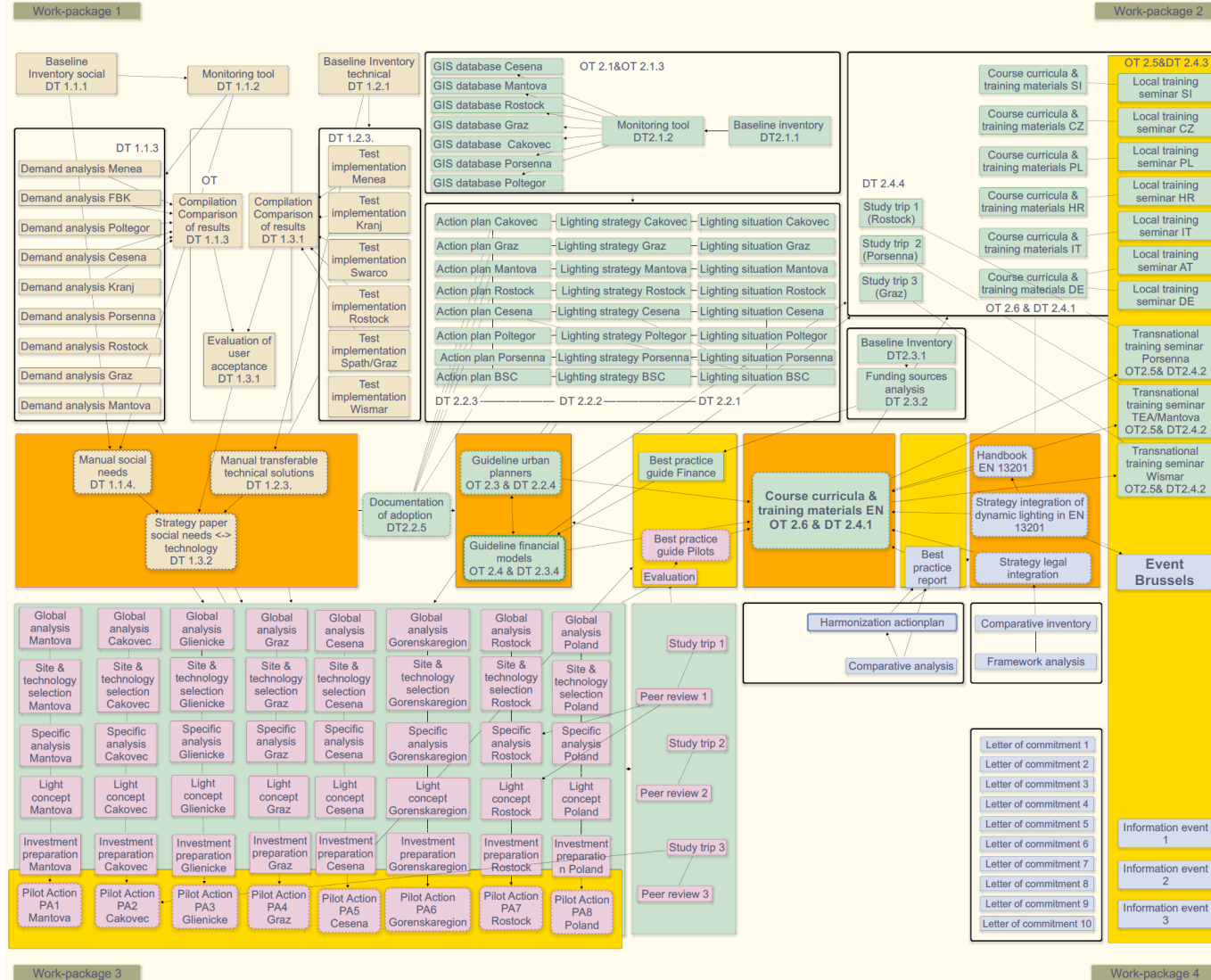
Pilot Projects in practice

WP 4: **Legal aspects**

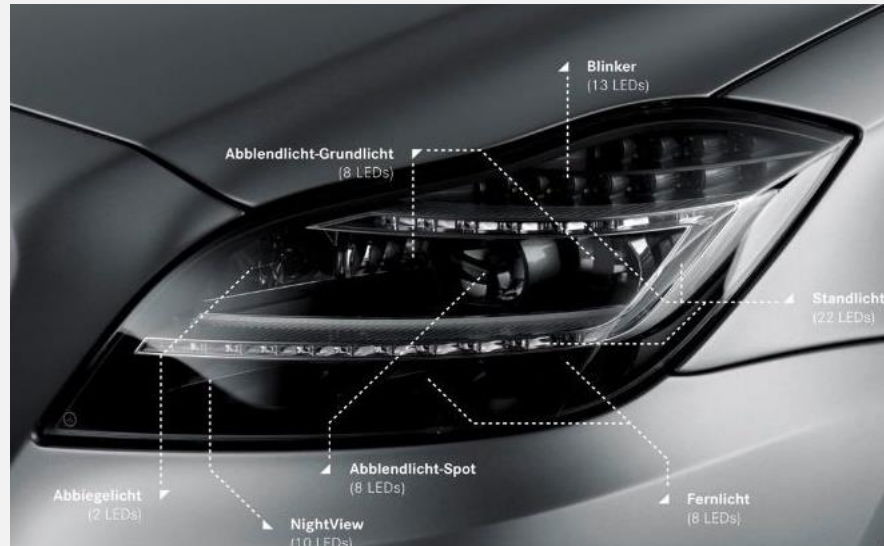
Legal aspects and harmonization of standards



DYNAMIC LIGHT PROJECT



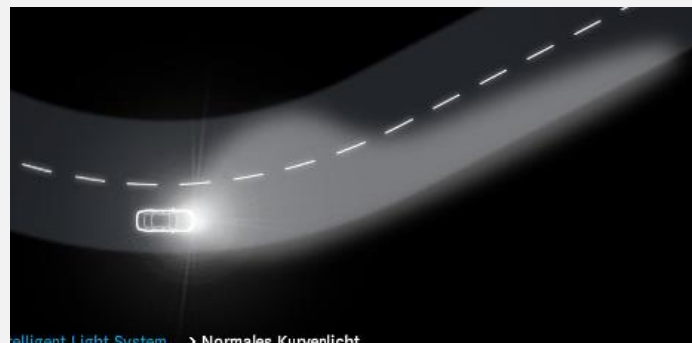
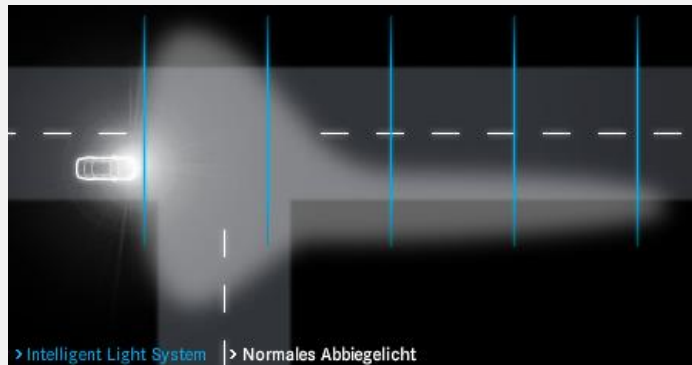
DYNAMIC LIGHT - DEFINITION



- DIMMED HEADLIGHTS
- GROUND LIGHT
- SPOT
- HIGH BEAM
- SIDELIGHTS

***THE LIGHT IS
ADAPTIVE!***

DYNAMIC LIGHT - DEFINITION

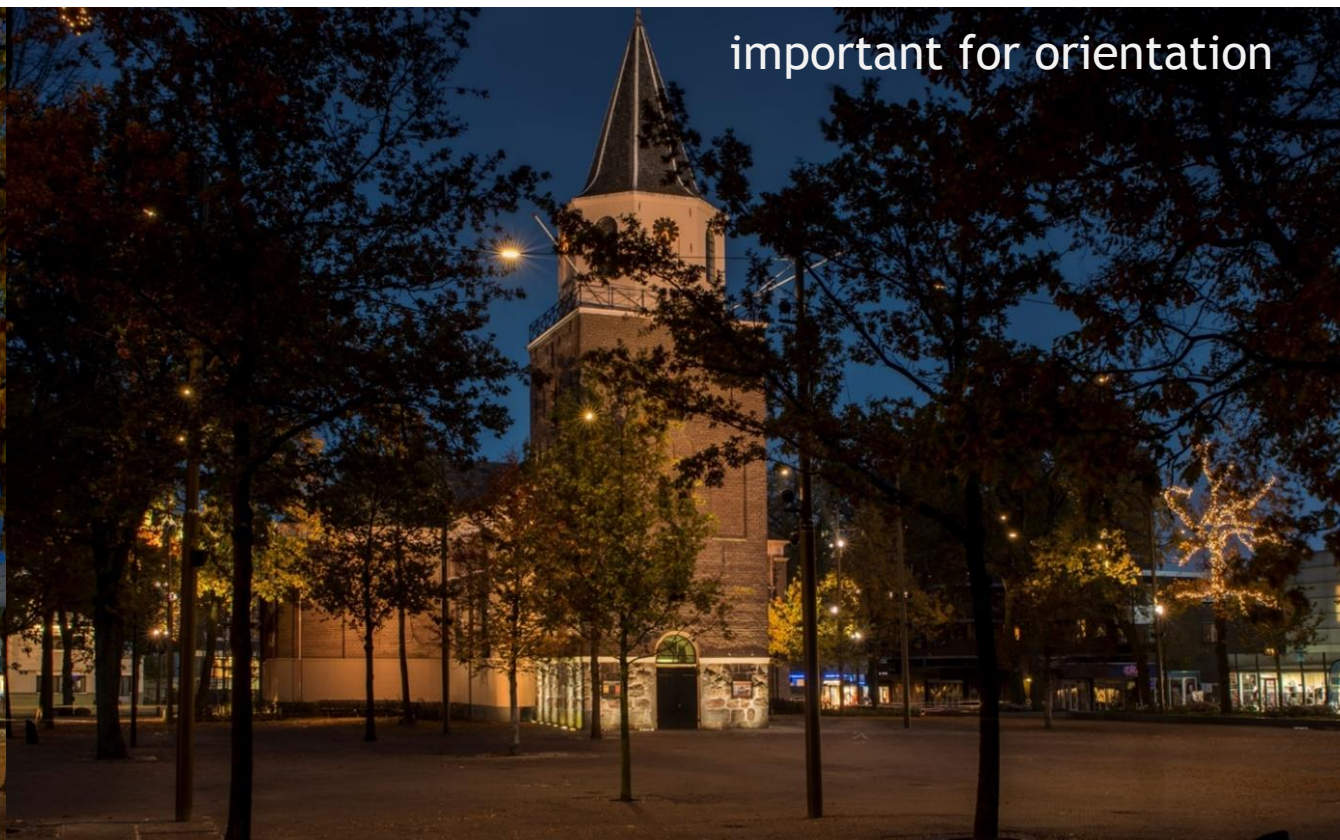


NEW SENSORS DETECT SITUATIONS.

They allow the light to be shaped according to the current behavior and the visual requirements and the social context.

THE LIGHT IS PROACTIVE!

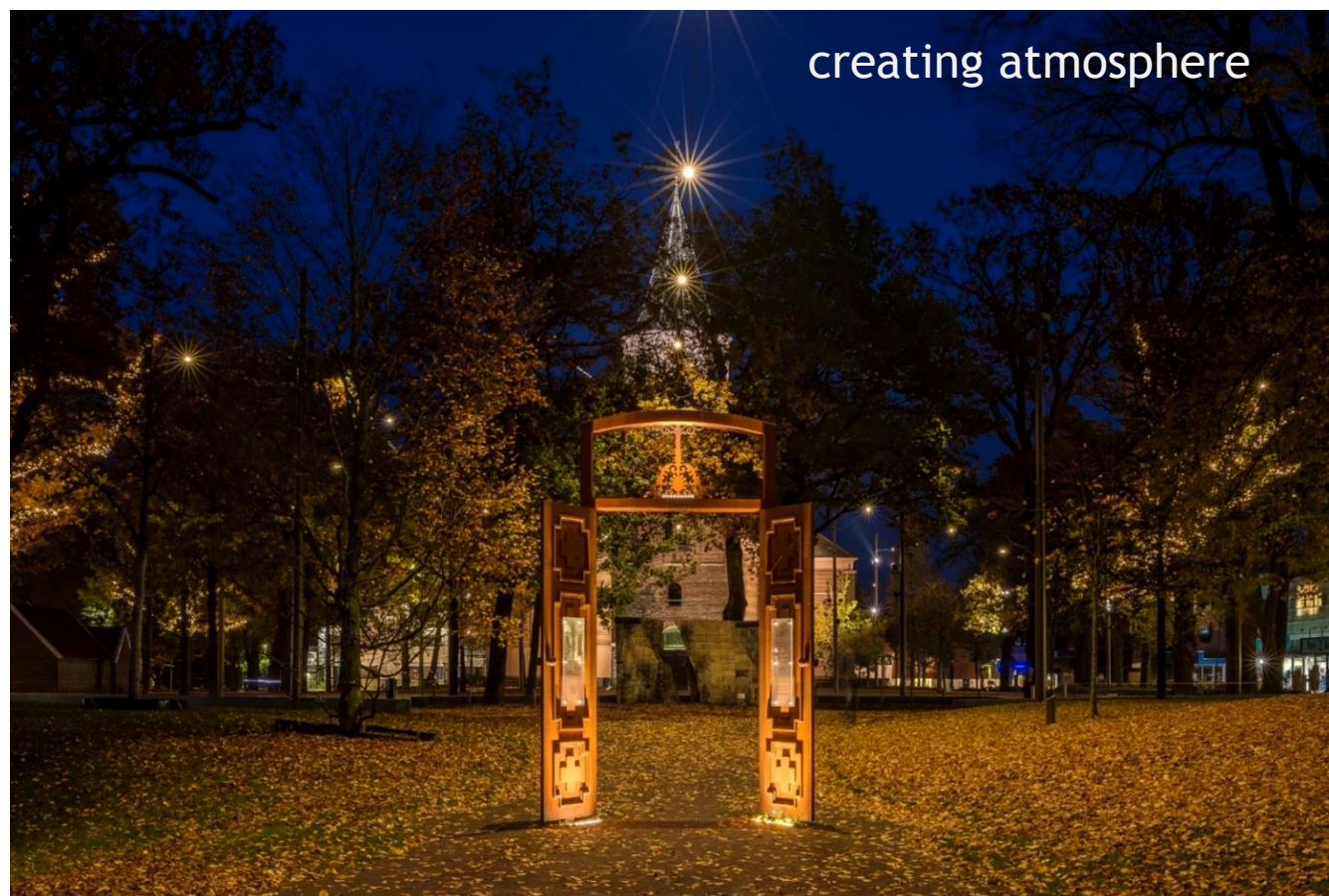
GROTE KERK IN EMMEN



StudioDL_Emmen_Dirk-Andre-Betz



GROTE KERK IN EMMEN

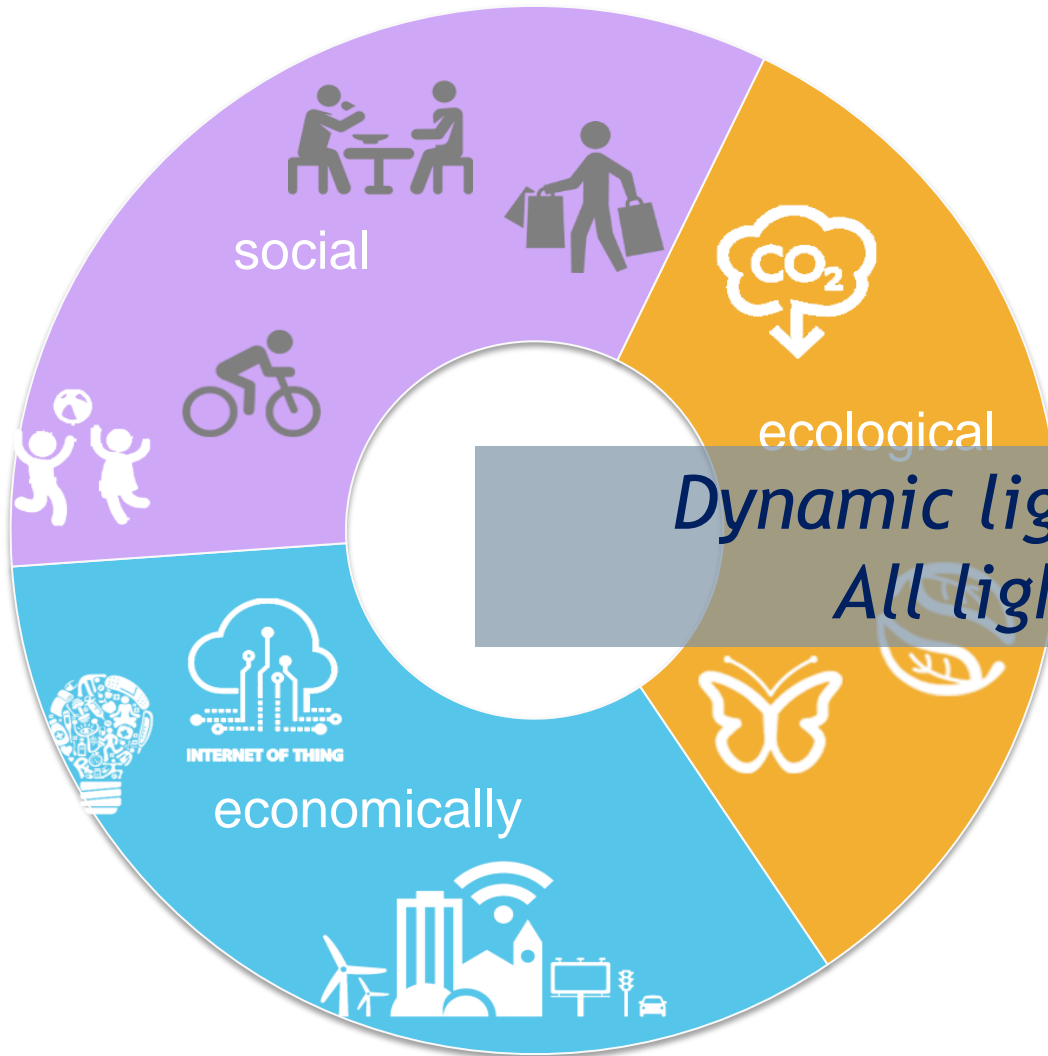


creating atmosphere

StudioDL_Emmen_Dirk-Andre-Betz



SUSTAINABLE LIGHTING



*Dynamic light sustainable and sufficient!
All light needed, but not more!*

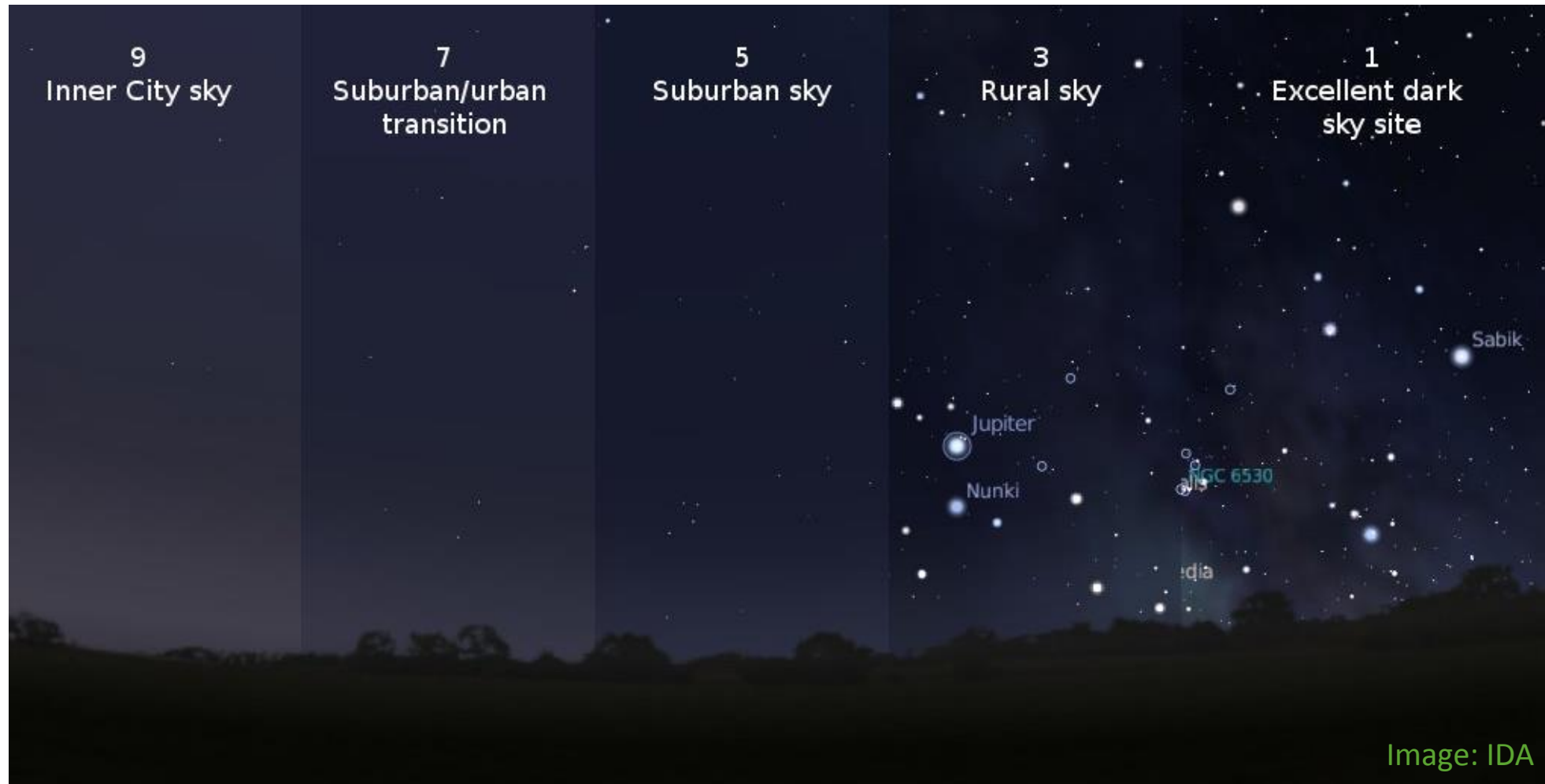


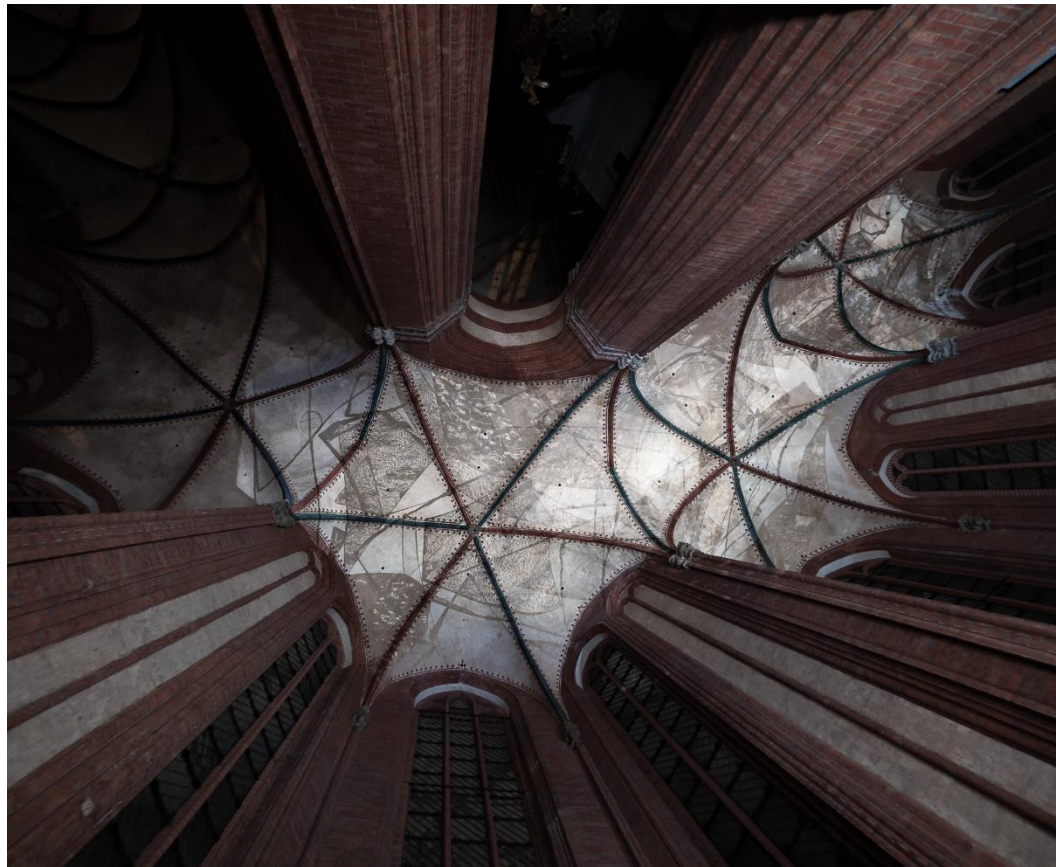
THE RIGHT OF ACCESSIBILITY (DIETRICH HENKEL)



HAUPTSTRASSE KÜNZELSAU

THE RIGHT OF DARKNESS (DIETRICH HENKEL)





The Future
of Lighting
is

Communication!



Megatrend: Design

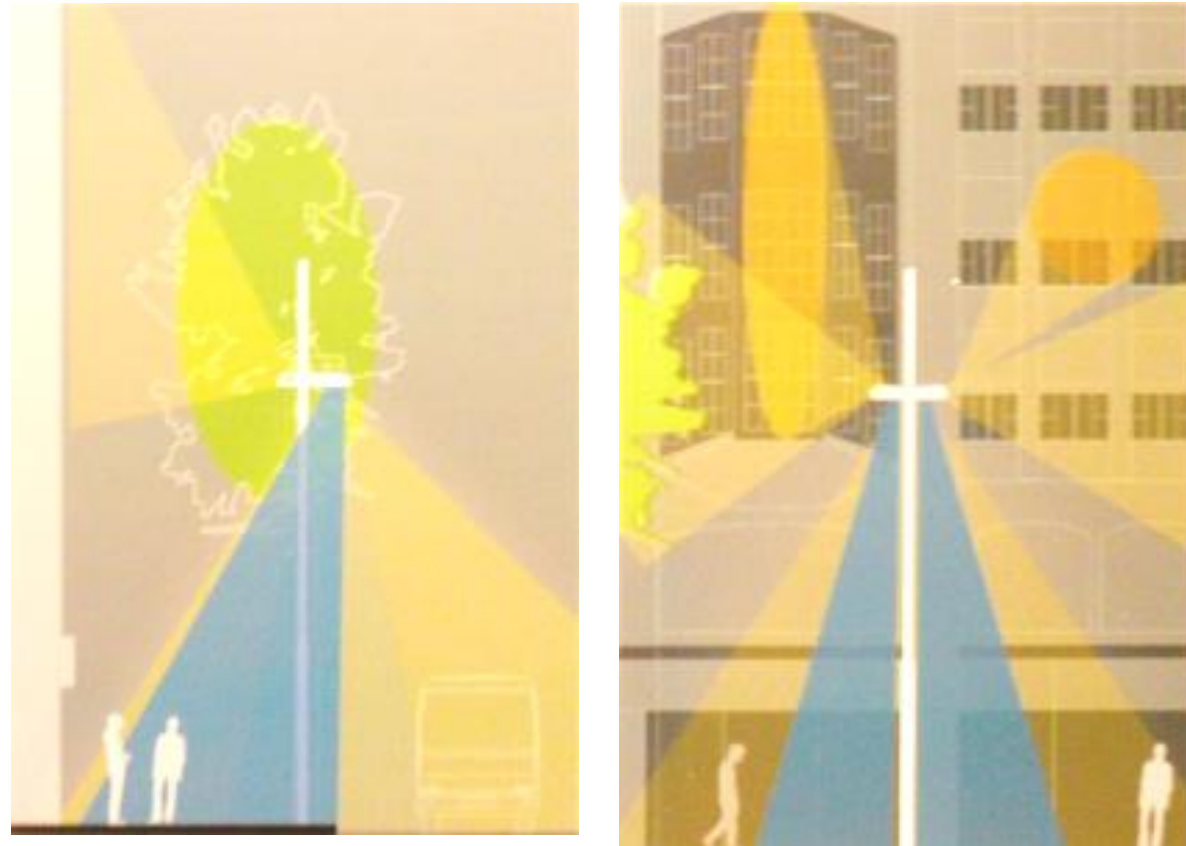
More than beautiful things!

The new design possibilities create unknown spaces to be creative and create innovations. But they also create a pressure to use these possibilities.

<https://www.welt.de/kmpkt/article166416327/So-soll-sich-unser-Leben-bis-2030-veraendern.html>

The age of creative economy has dawned - and it is time to say goodbye to the rational performance society ...
We no longer work to live, and we no longer live to work.
(Zukunftsinstitut.de)





Hamburg Mönckebergstraße (T.Schlothfeld/ I guzzini)

MEGATREND: DESIGN

The new design possibilities create unknown spaces to be creative and create innovations. But they also create a pressure to use these possibilities.

LED technology allows more flexibility!

New lighting forms create new visual experiences!

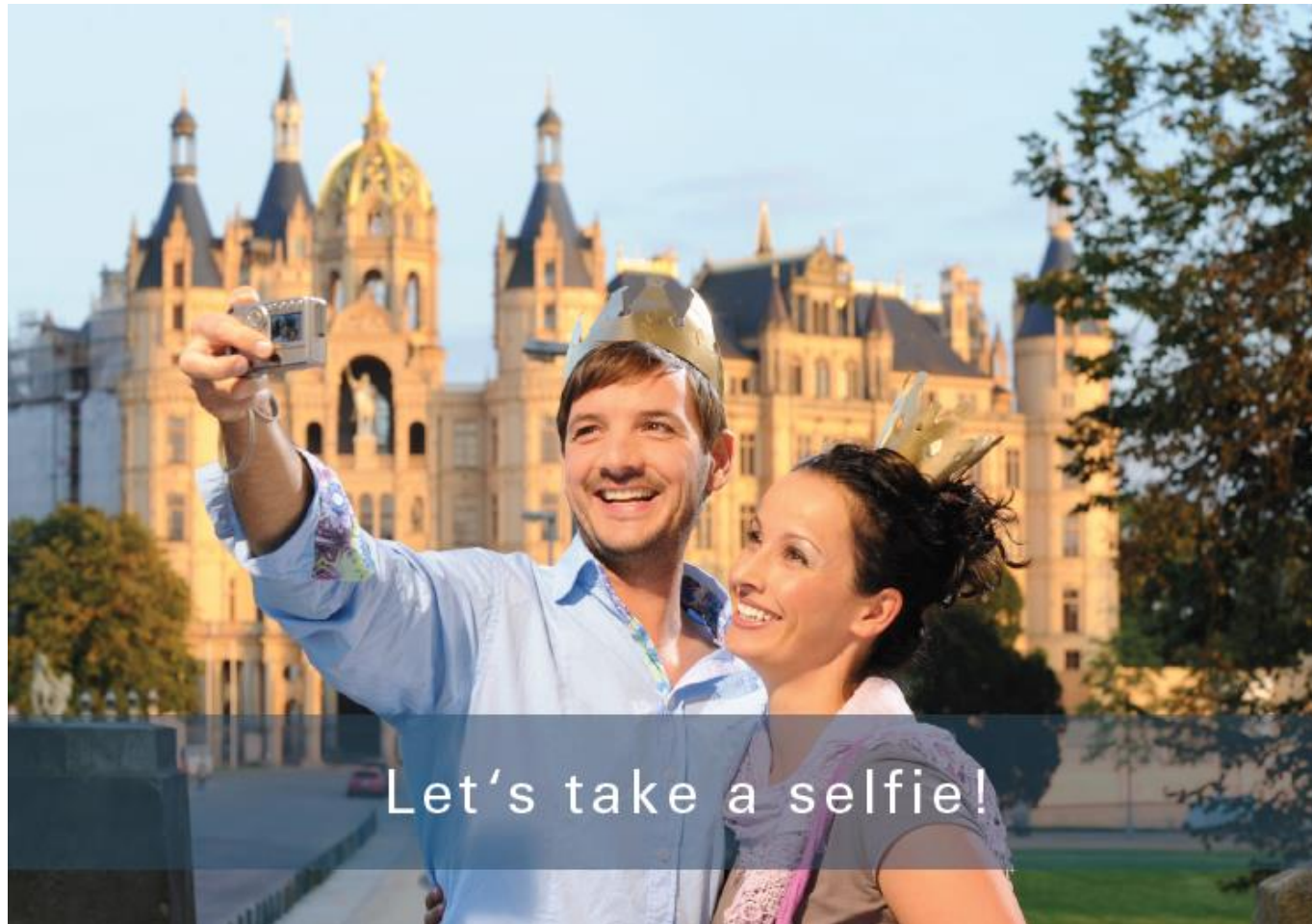


Megatrend: Individualization

More than hygge or branding!

Individualization is the central cultural principle of the Western world and increasingly unfolds its impact globally. ... It touches value systems, consumption patterns and everyday culture alike. At heart, individualization means the freedom of choice. However, their effects are complex, producing both apparent counter-trends and a we-culture, as well as new pressures. (Zukunftsinstitut.de)





MEGATREND: INDIVIDUALIZATION

Individualization touches value systems,
consumption patterns and everyday culture.
Individualization means the freedom of choice.

LED technology allows a lot of variety!

**Individual public lighting needs common
parameters!**





'Lights in Alingsås', Sweden
LDE BELZNER HOLMES
2002



Megatrend: Utilization

I want to be what drives me!

According to Humboldt's ideal, self-realization, the unfolding of the self, is a value in itself. It's about what you carry in the innermost to sprout into the world. Like a tree that grows towards the sun.

According to the analysis of the GIM market researchers, self-actualization increasingly takes the place of self-evaluation.

<https://www.welt.de/kmpkt/article166416327/So-soll-sich-unser-Leben-bis-2030-veraendern.html>





Lichtplanung: Art light Mario Rechsteiner
Ortsdurchfahrt Waldenburg, © Ralph Lehner

MEGATREND: UTILIZATION

According to Humboldt's ideal, self-realization, the unfolding of the self, is a value in itself. self-actualization increasingly takes the place of self-evaluation.

LED technology makes it possible to design an individual light!

Public lighting should serve the public!



Megatrend: Wellbeing

More than health and satisfaction!

Health is the synonym for a good life. As a central goal in life, the megatrend has deeply embedded itself in the consciousness, culture and self-understanding of societies and shapes all areas of life. Health and satisfaction are barely distinguishable. (Zukunftsinstitut.de)



TOURISM,
NATURE,
IDENTITY,
HERITAGE,
SUSTAINABILITY



MEGATREND: WELLBEING

Health meaning satisfaction as a central goal in life has deeply embedded itself in the consciousness, culture and self-understanding of societies and shapes all areas of life.

LED technology should not be harmful!

New solutions must reduce the negative impact of public lighting!



Megatrend: Connectivity

More than digitization and algorithms!

The principle of networking dominates social change and opens a new chapter in the evolution of society. Digital communication technologies fundamentally change our lives, reprogramming socio-cultural codes and creating new lifestyles and patterns of behavior. In order to successfully accompany this fundamental change, companies and individuals need new network competences and a holistic-systemic understanding of the digital transformation (zukunftsinstitut.de).





MEGATREND: CONNECTIVITY

Digital communication technologies fundamentally change our lives, reprogramming socio-cultural codes and creating new lifestyles and patterns of behaviour.

LED technology has the same technical roots as connectivity!

New lighting solutions can easily be integrated into this development!



DYNAMIC LIGHT- HYPOTHESIS

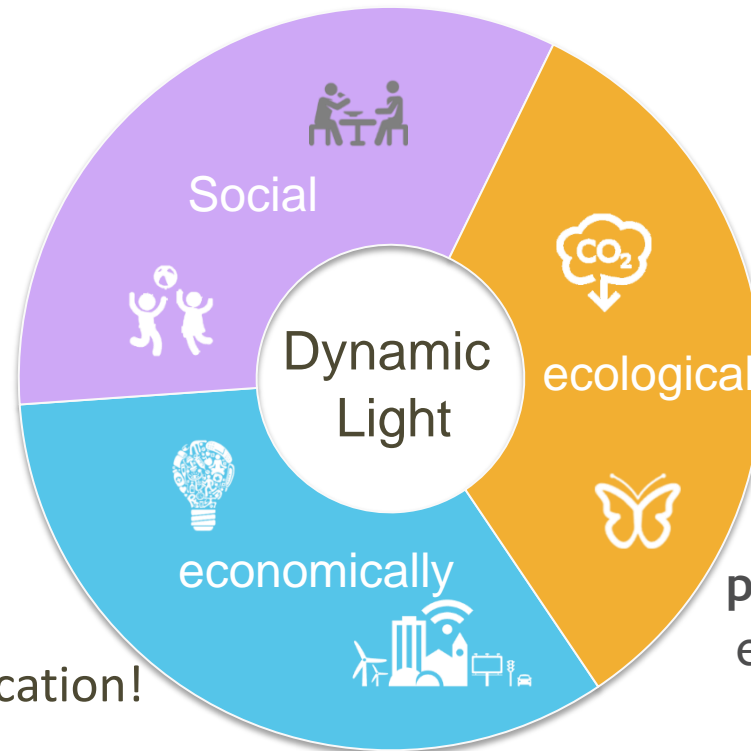


Dynamic light improves the **Quality of Light** according the social needs!

Dynamic Light can improve energy efficiency!



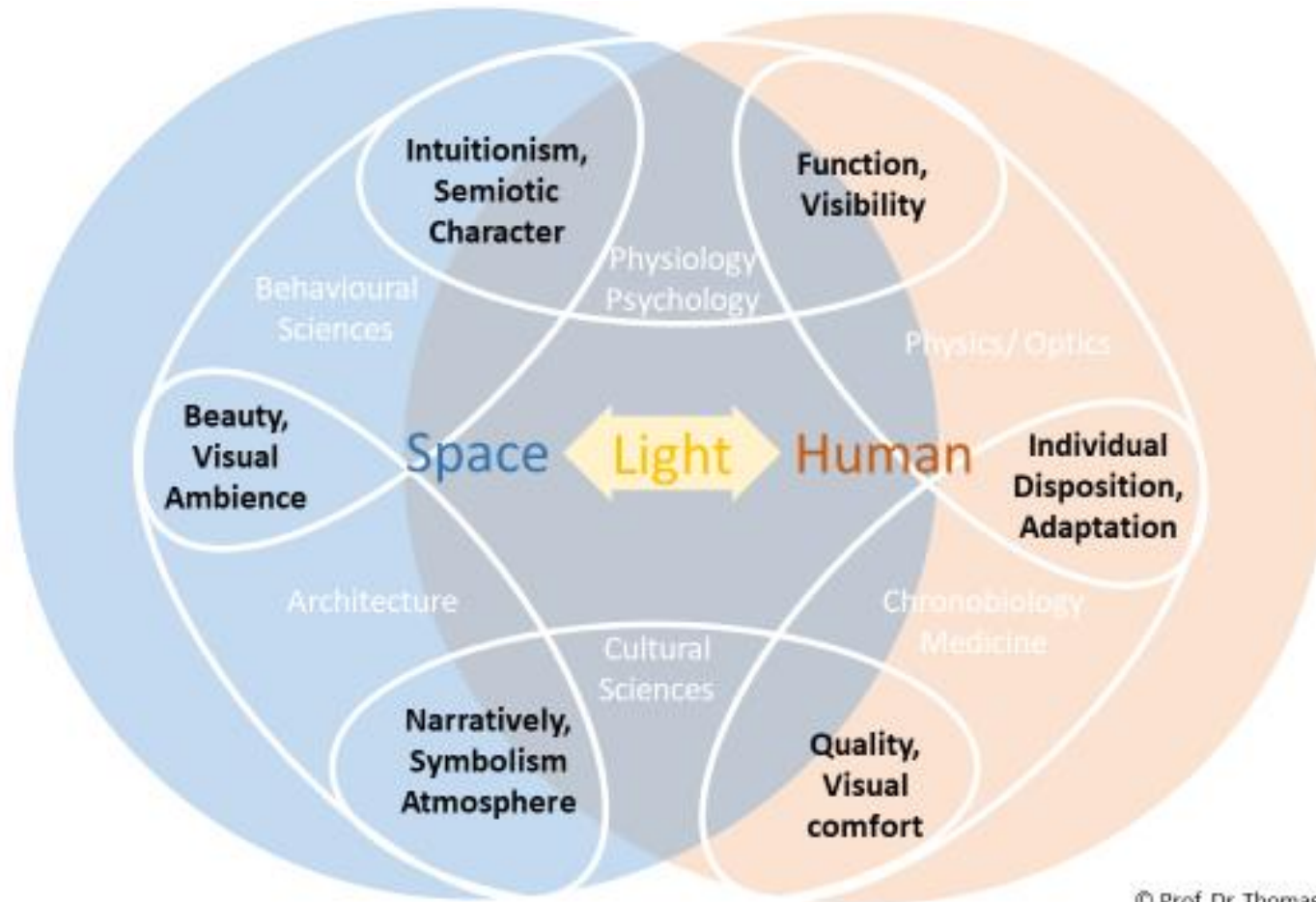
Better **Quality of Light** improves the business location!



Dynamic light reduces light pollution! Dynamic light can also enhance the **Quality of Light** for other species!.



LIGHTING DESIGN- QUALITY CRITERIA



© Prof. Dr. Thomas Römhild 2018

Light quality determined

Function, Visibility

Defined and calculable

Human

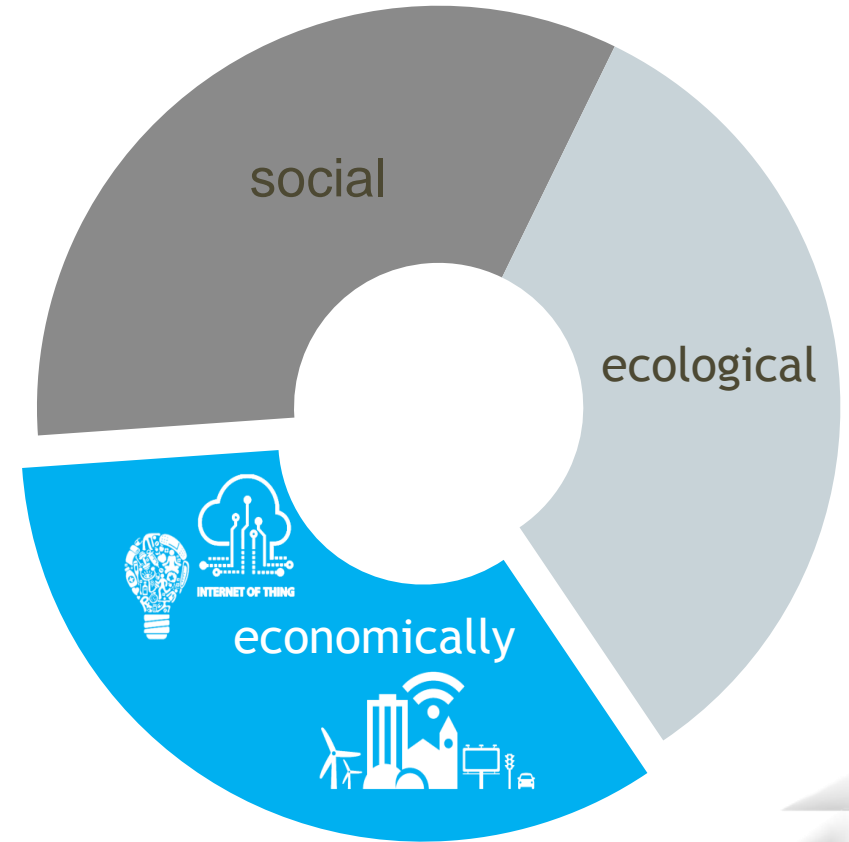
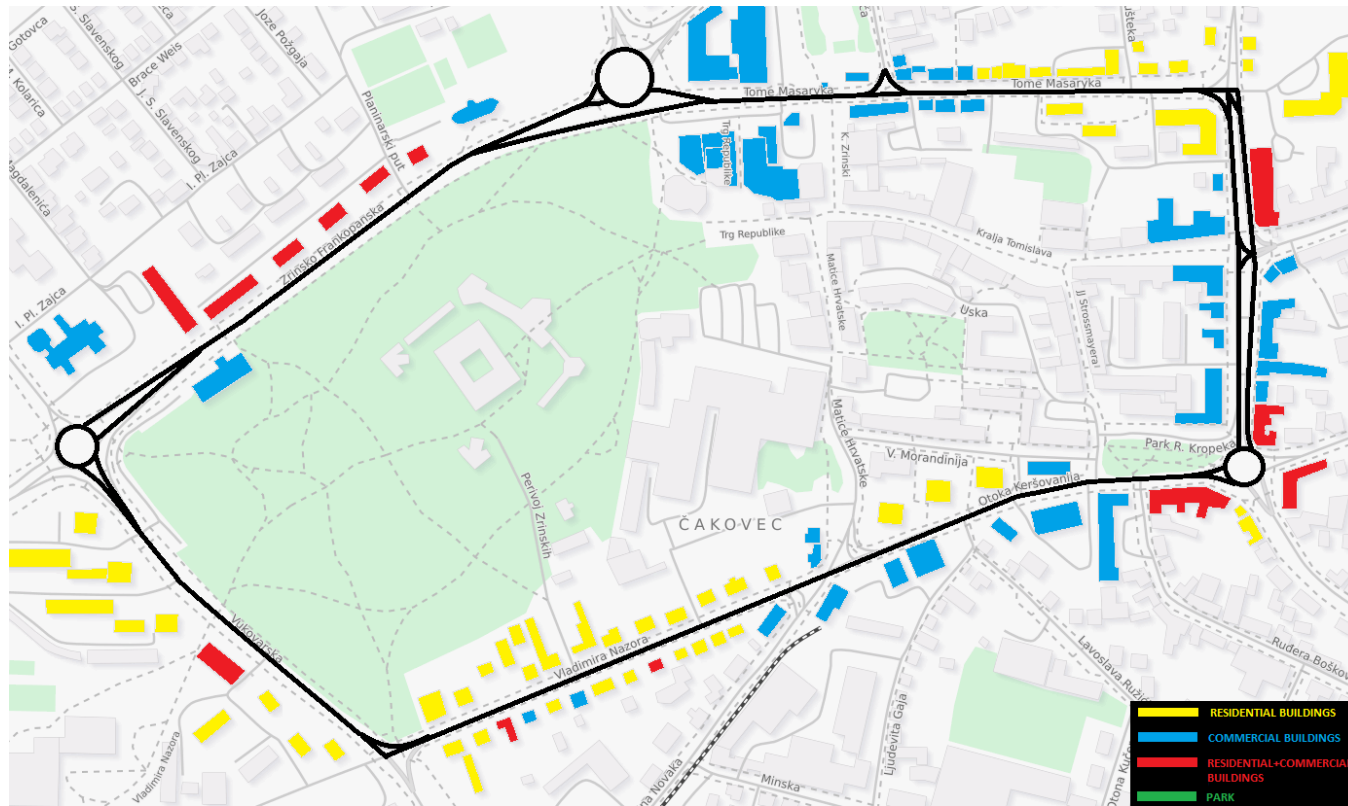
Visual performance enables working people to perform visual tasks under difficult circumstances and for a long time. The visual tasks are distinguished by the size of the luminance and color contrasts that occur, the size of the essential structural elements (details), the speed at which these visual tasks must be perceived, the desired security of the recognition, the duration of the visual work.

(www.trilux.com)

Decisive criteria are lighting level and glare.

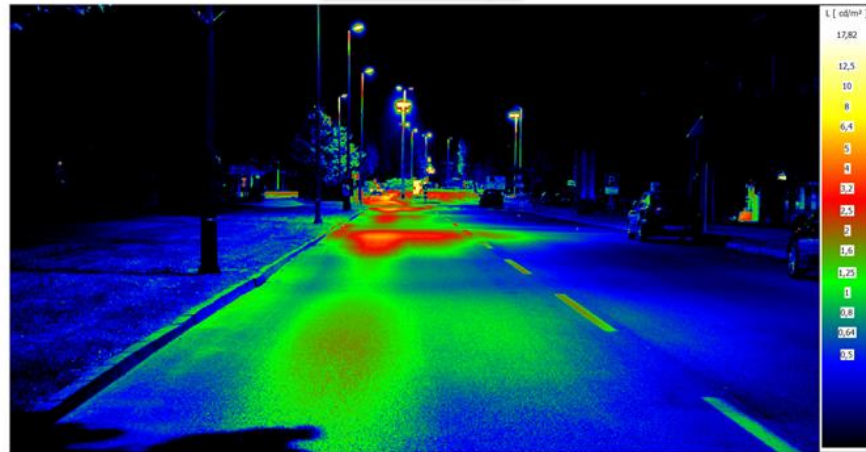


PILOT INVESTMENT - ČAKOVEC



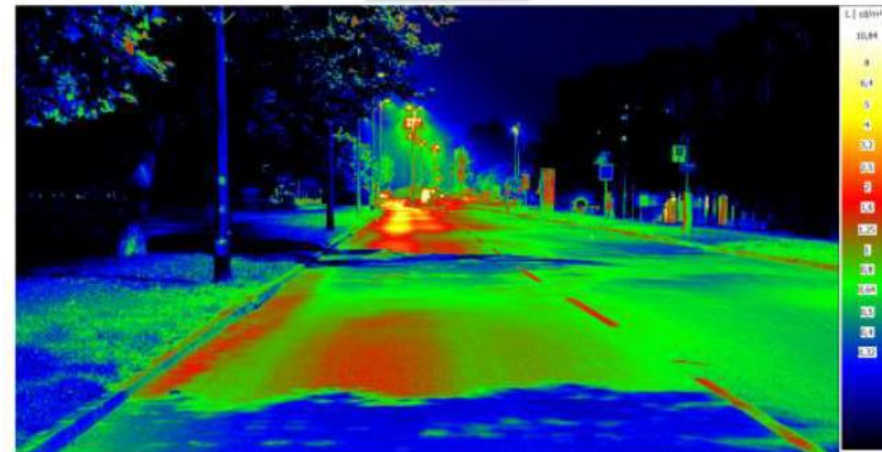
PILOT INVESTMENT - ČAKOVEC

Before

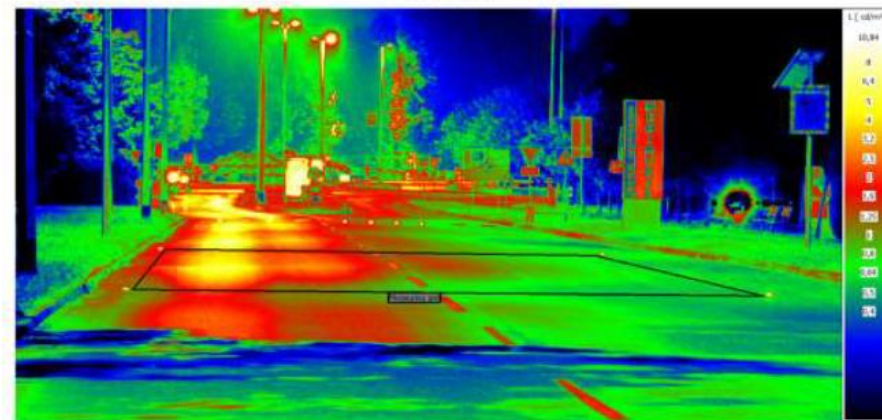
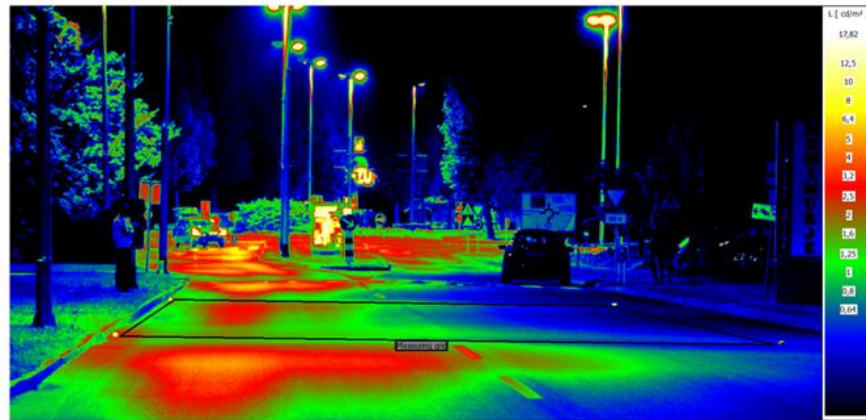


Measurement field

After



Mjerno polje



Light quality determined

Individual Disposition, Adaptation

Partly predictable

Human

Visual acuity, adaptation, color perception are individually different and require different lighting requirements. But even the individual circadian rhythm may require lighting, which can be controlled individually in terms of brightness and spectral composition.



Area of the chapel St Angel the Guardian

Architectural lighting:

Important role in city events

--Show importance with special lighting

Public lighting:

Low energy consumption

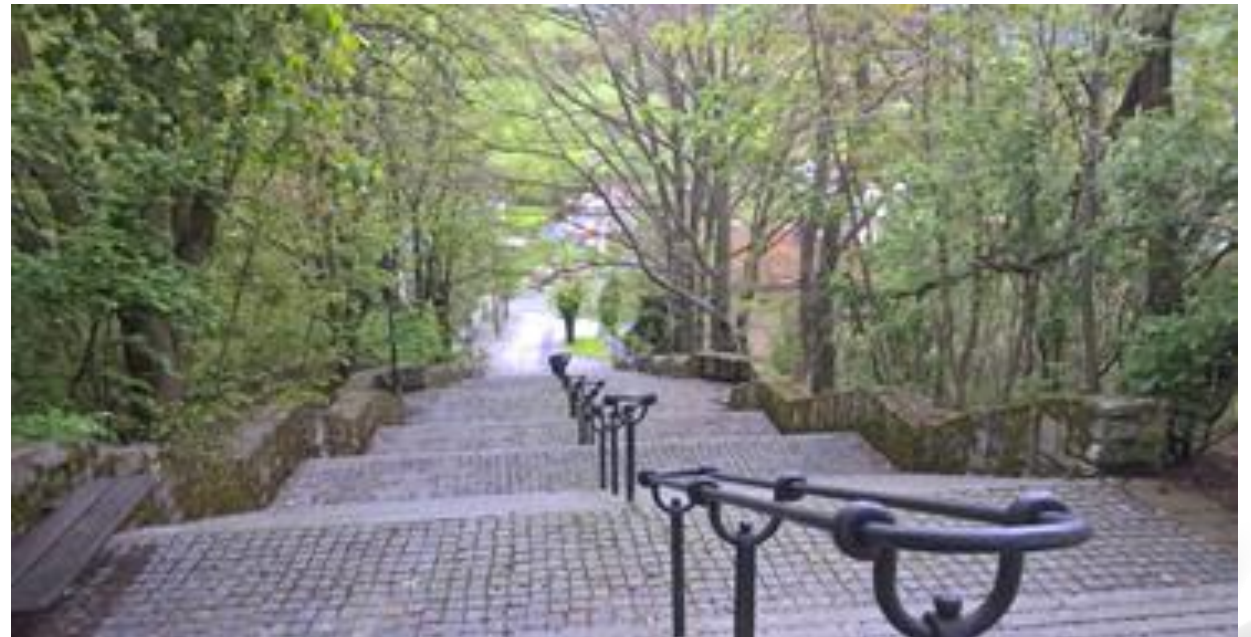
Secure use of stairs, Reduce light impact,

Light only when it is needed

Showing potential of **Dynamic light**

→ bigger areas planned with dynamic light

→ Acceptance

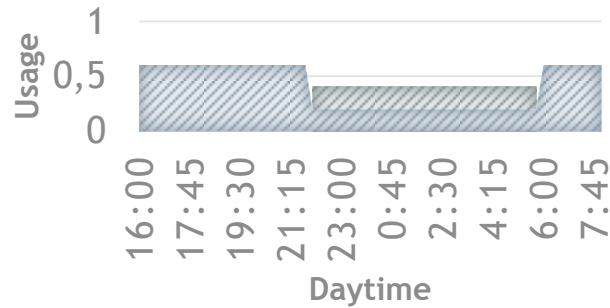


PILOT INVESTMENT - SUŠICE



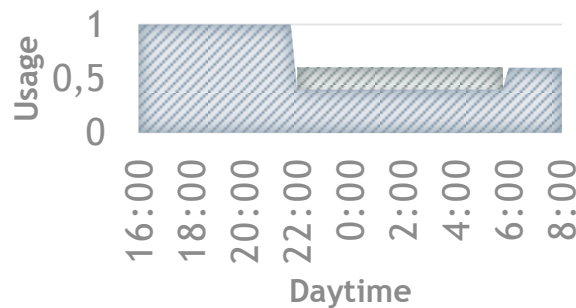
What is the adequate light?

- Common



■ adaptive ■ minimal

- Ceremonial



■ adaptive ■ minimal

100%

Light intensity according to time + presence

6500K

Colour temperature according to daytime

1%

Light intensity according to weekday/ festivities

2700K

Colour temperature according to weekday/festivities

Colour temperature according to season



PILOT INVESTMENT - SUŠICE



Light quality determined by
Quality, Visual comfort
Measurable and planable

Human

Color temperature and color location define the color rendering of the materials in the room.
A favorable brightness distribution and not too high contrasts increase the visual comfort.



PILOT INVESTMENT - MANTOVA

EQUIPMENT

74 “Full Cut-Off” LED lighting systems with bio-dynamic light (2.700K ÷ 4.000K) and point-to-point remote control

-Videocamera control system

Current installed power:

7,00 kW

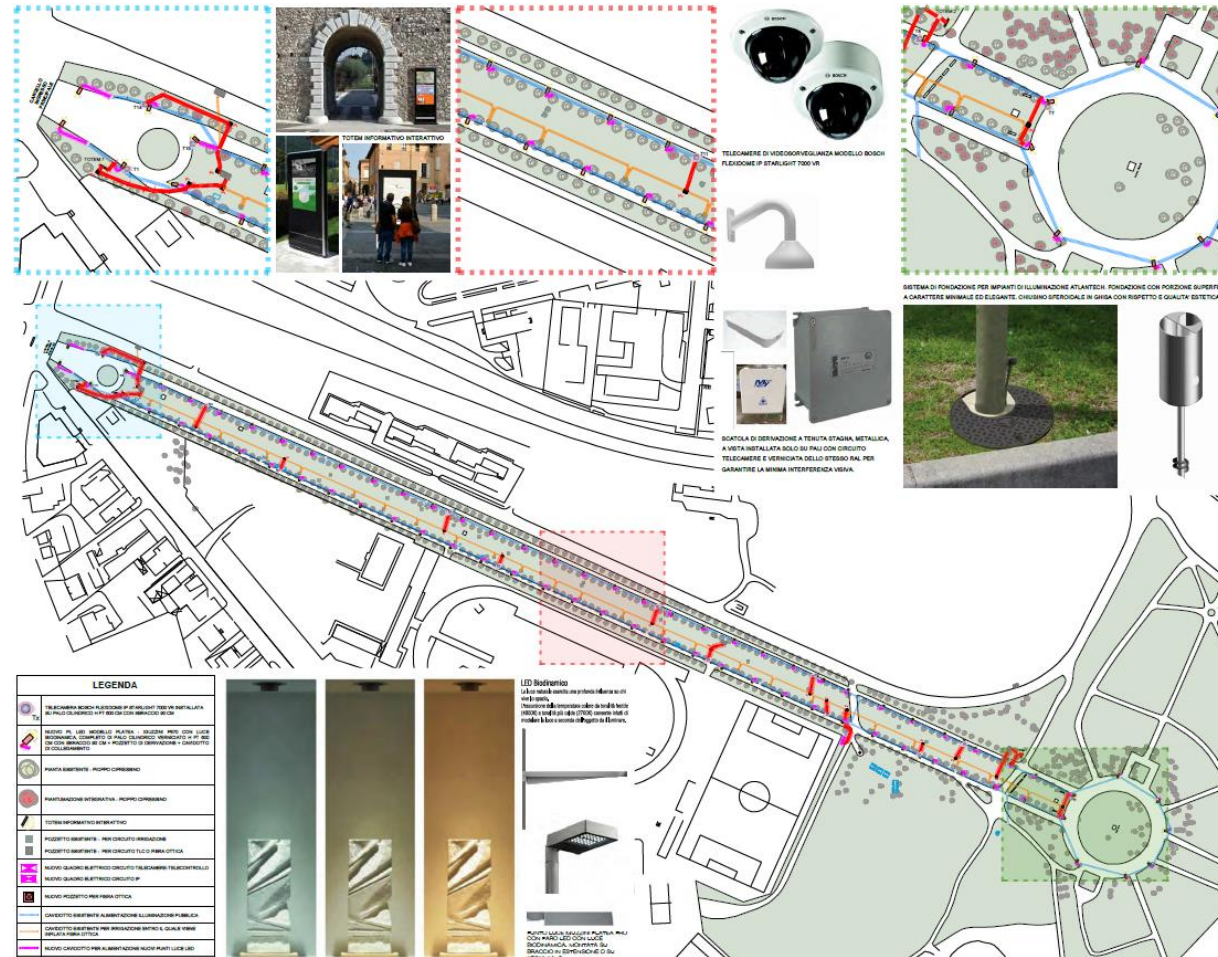
After-Revamp power: 2,60 kW

Estimated energy saving

(Revamping + Dynamic): ~65%,

Amount of “Urban Sky Glow”

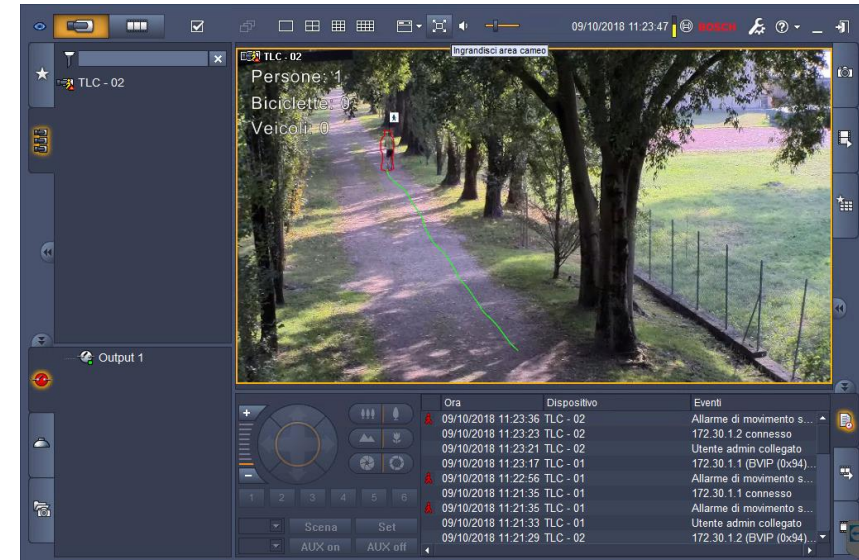
< 0,49 cd/Klm



LIGHT ACCORDING TO USER CATEGORIES

Parameters

- User groups detection
- Time and frequency of use
- Seasons and weather conditions (Fog!)
- Special events
(Sports, Educational, meetings)
- Emergency Lighting
- Light intensity
- Colour temperature



Light quality determined by

Narrativity, Symbolism, Atmosphere

In the mirror of cultural experiences

Space

The light must fit into the context, it should tell a story that fits the architecture and is appropriate to the social situation. Not only the shape and material of the luminaires can complement the interior design, but also the light.

,



POWER PLANT SCHWERIN

Narrativity Telling the story



Light quality determined by

Beauty, Visual Ambience

Show the habitat from the best side

Space

Modeling of the body and surfaces by light direction, shadiness and reflexes support the possibilities of spatial perception. The appropriate light color determines the material impression and the atmosphere.



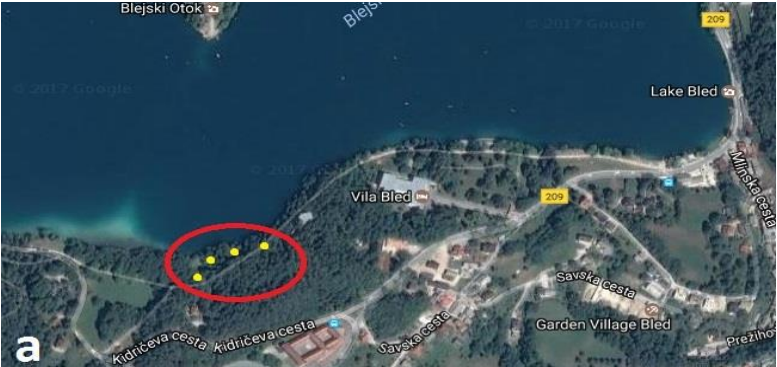
MONTFORTHHAUS FELDKIRCH



LDE Belzner Holmes_Montforthaus Feldkirch Aussenbeleuchtung_Fotograf Kolm

PILOT INVESTMENT - BLEED LAKE AND VILLA

ENHANCING THE USABILITY IN TERMS OF BEAUTY



Light quality determined by

Intuitionism, Semiotic

To show how to use

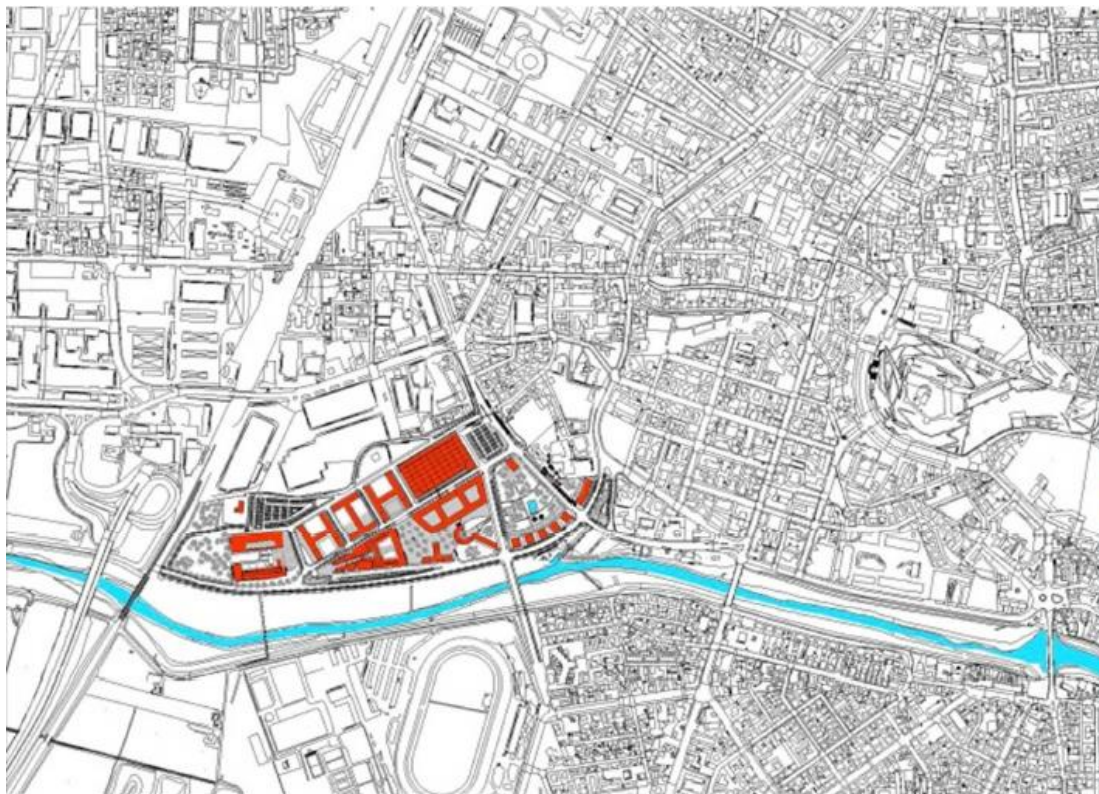
Space

The light must make it possible to orientate yourself in a room or building and to adapt the behavior according to the usage. The intuitive nature of lighting influences behavior by directing attention and interpreting spatial perception.

„



PILOT PROJECT ITALY-CESENA



PILOT PROJECT ITALY-CESENA

Reviving area by lighting

Demand Analysis

High strategic potential

Social Problems

Respecting expectations from citizens

Concepts for special micro sites:

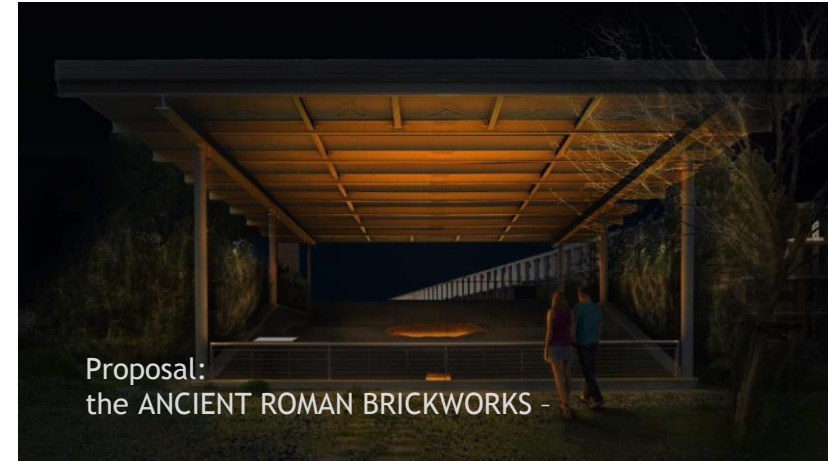
Respecting rhythm of site use

Encouraging intended use

Garden 11. September 2001

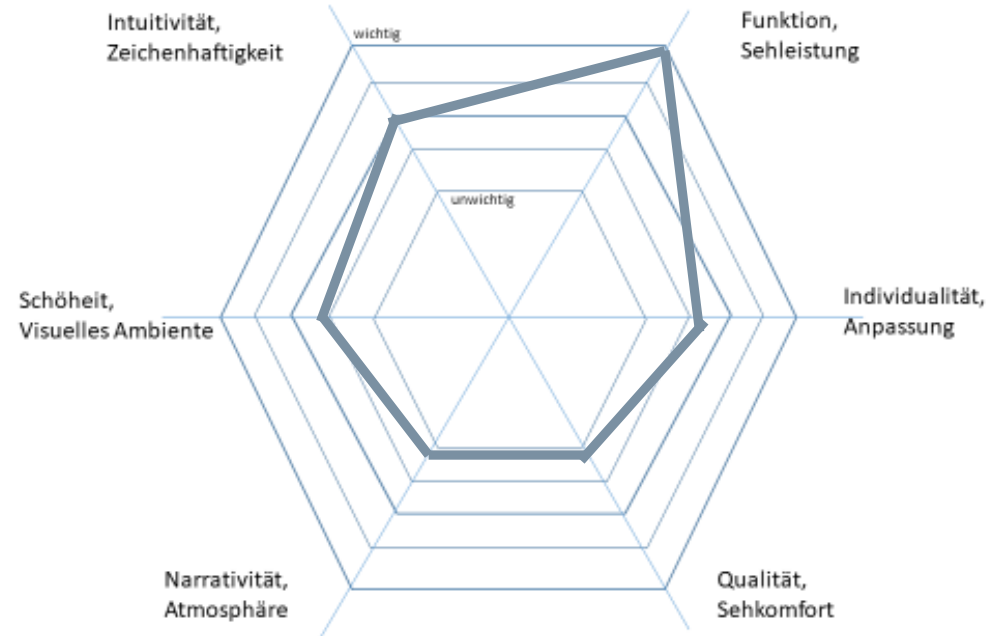
→ Presence sensor-based lighting

→ Controlling individual luminaires for special occasions



LIGHTING DESIGN - VISUAL EFFECTIVENESS

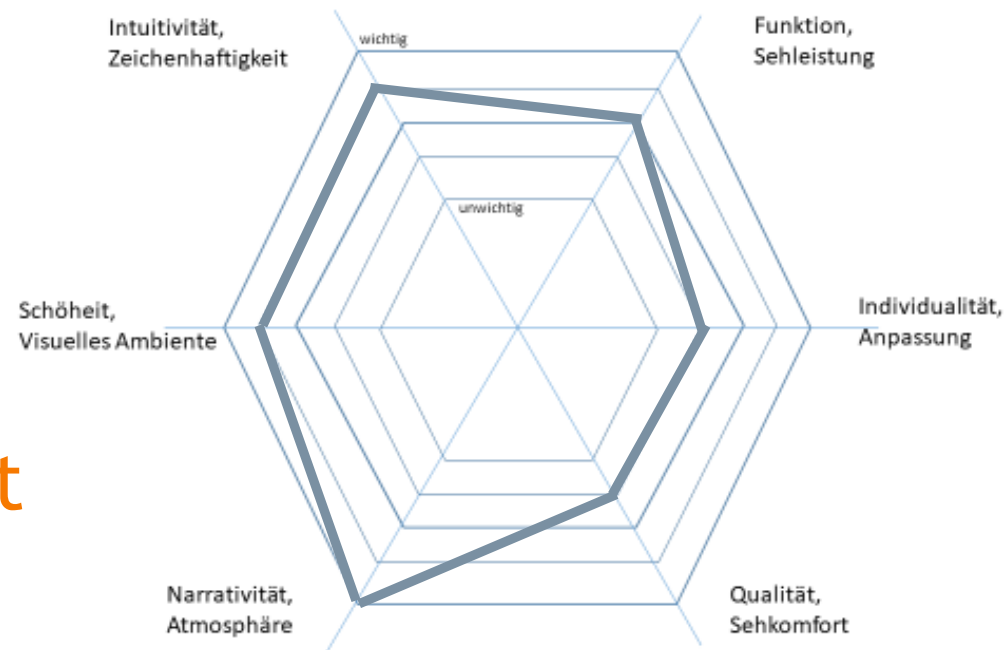
Spinnendiagramm zur Beschreibung der visuellen Effektivität/ gewichteten Lichtqualität



Office

LIGHTING DESIGN - VISUAL EFFECTIVENESS

Spinnendiagramm zur Beschreibung der visuellen Effektivität/ gewichteten Lichtqualität



Restaurant



DARK SKY REGION NOSSENTINER HEIDE



DARK SKY REGION NOSSENTINER HEIDE



KLOSTER BAD DOBERAN



Bad Doberan Monastery

LED
Light in Public Space



What does that mean for digitization?



What does that mean for digitization? A Smart City concept?



What does this mean
for digitization?

**A Smart city concept needs a
good lighting concept!**



in the "24hours society,"

Changing expectations of users:

Increased use of public space during dark hours has increased the demands on spatial quality and lighting

Improved adaptation to the respective situation of the users:

stronger networking results in better predictability of events and the individual situation.

New possibilities of lighting:

Digital urban infrastructure and data available on the Internet as a basis for lighting control.



Student Project „Darkness“ Akanpinar, Choi, Mankhongphithakkul, Pribadi



Technology oriented Design

- Which data can be collected and how?
- How to evaluate these data?
- Which technologies are available to use the data?
- Which improvements for the lighting could be realized?

Programming algorithms!



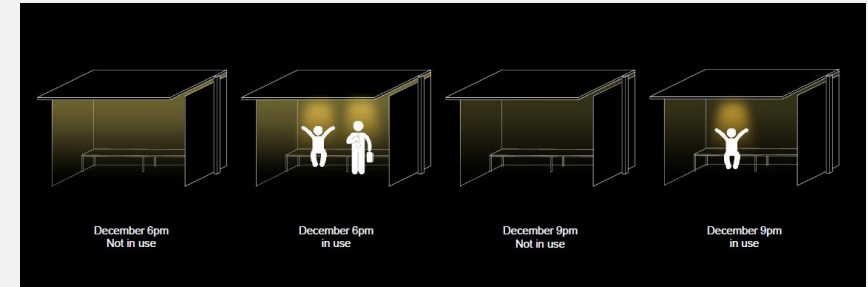
Student Project „Darkness“ Akanpınar, Choi, Mankhongphithakkul, Pribadi



User-oriented Design

- Who is the user?
- Which requirements does the user have?
- Which improvements can be offered the user?
- Who decides and who benefits?
- Which technologies are available and which ones can be used for their benefits?
- Which data do I have to collect for using the technologies best?
- How do I evaluate the data?

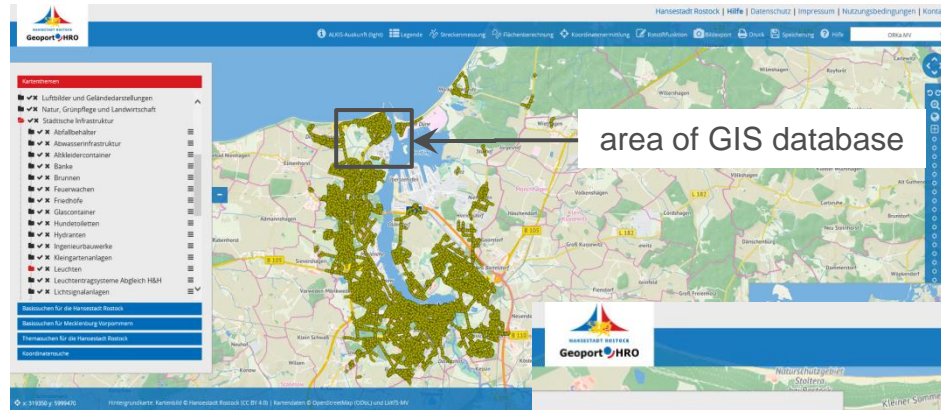
Programming algorithms!



Student Project „Darkness“ Akanpinar, Choi, Mankhongphithakkul, Pribadi

INTEGRATE DYNAMIC LIGHT INTO THE CITY!

GIS-basierte Datenbanken

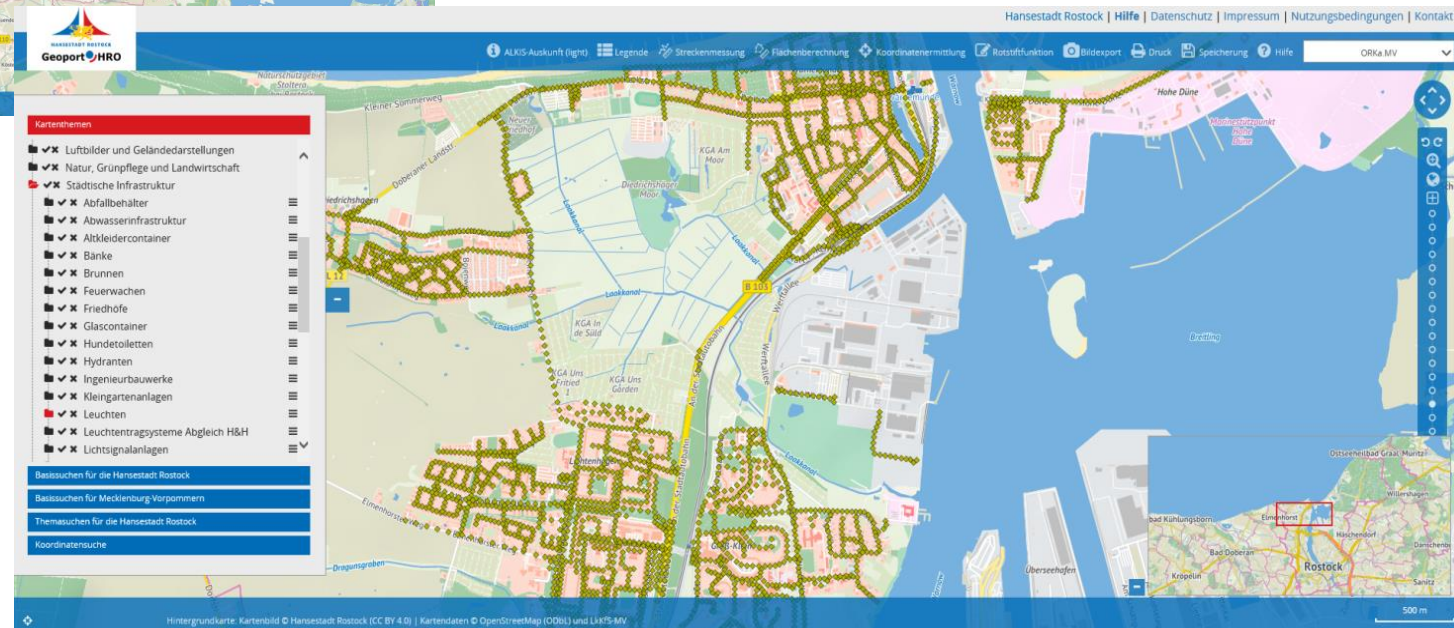


Area of GIS database

- north-west of Rostock
- around the pilot area
- about 140 luminaires

Hanseatic City of Rostock

- about 22.100 luminaires owned bac HRO
- GIS database „sisnet“ owned and data maintained by SWRAG
- internal free database „Geoport.HRO“ is weekly updated by „sisnet“



SCHULHOF WISMAR



LED
Light in Public Space

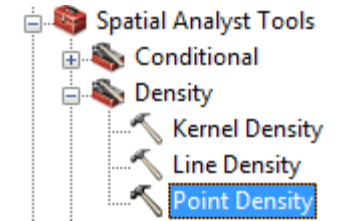
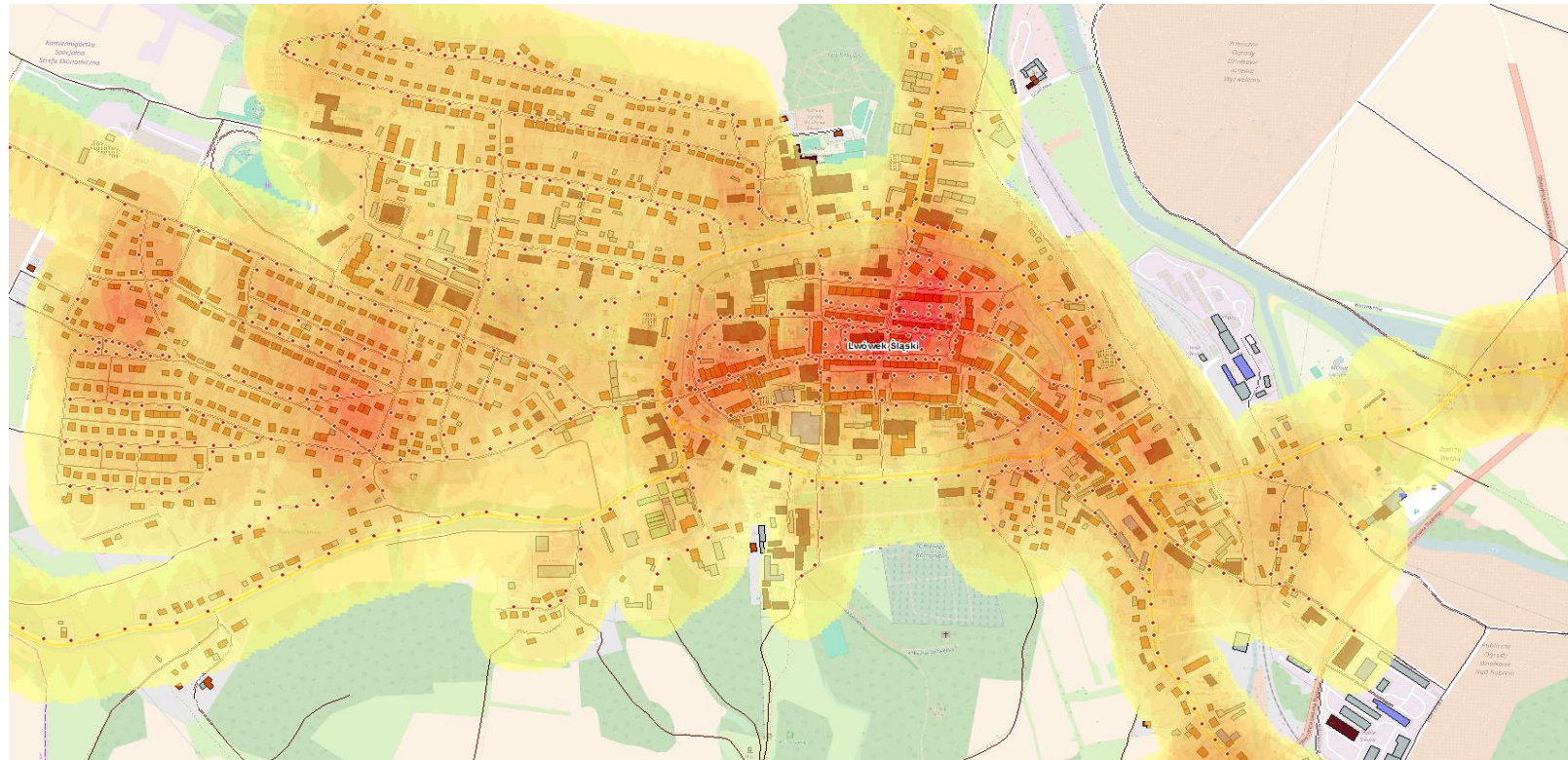


INTEGRATE DYNAMIC LIGHT INTO THE CITY!

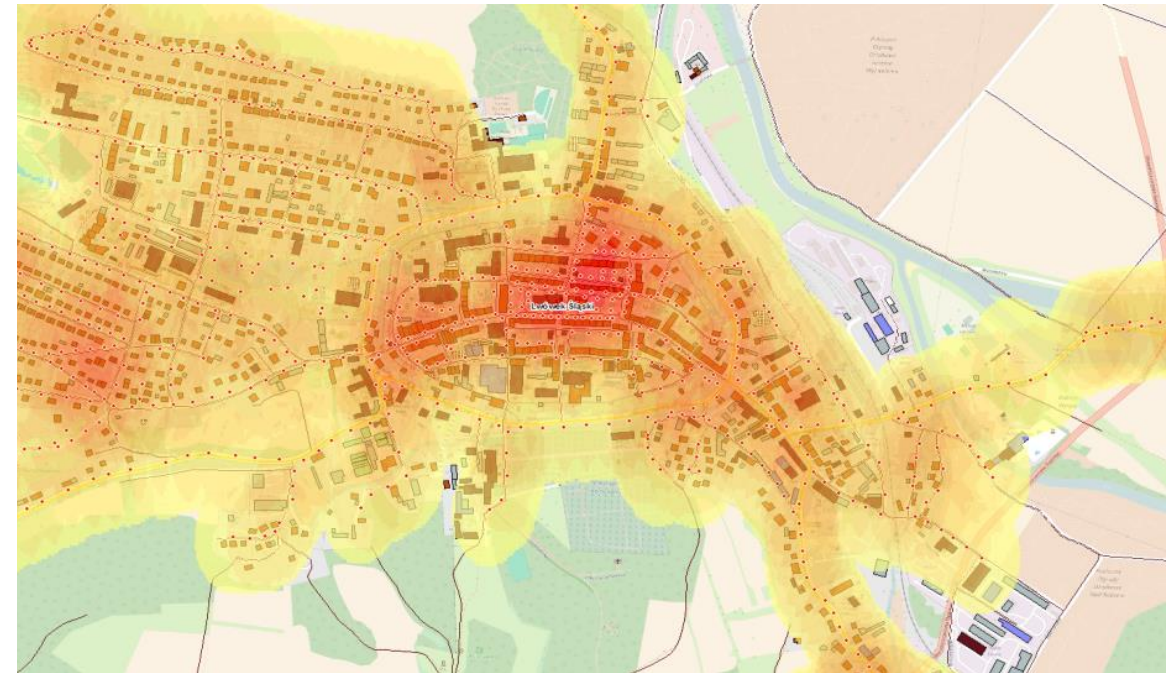
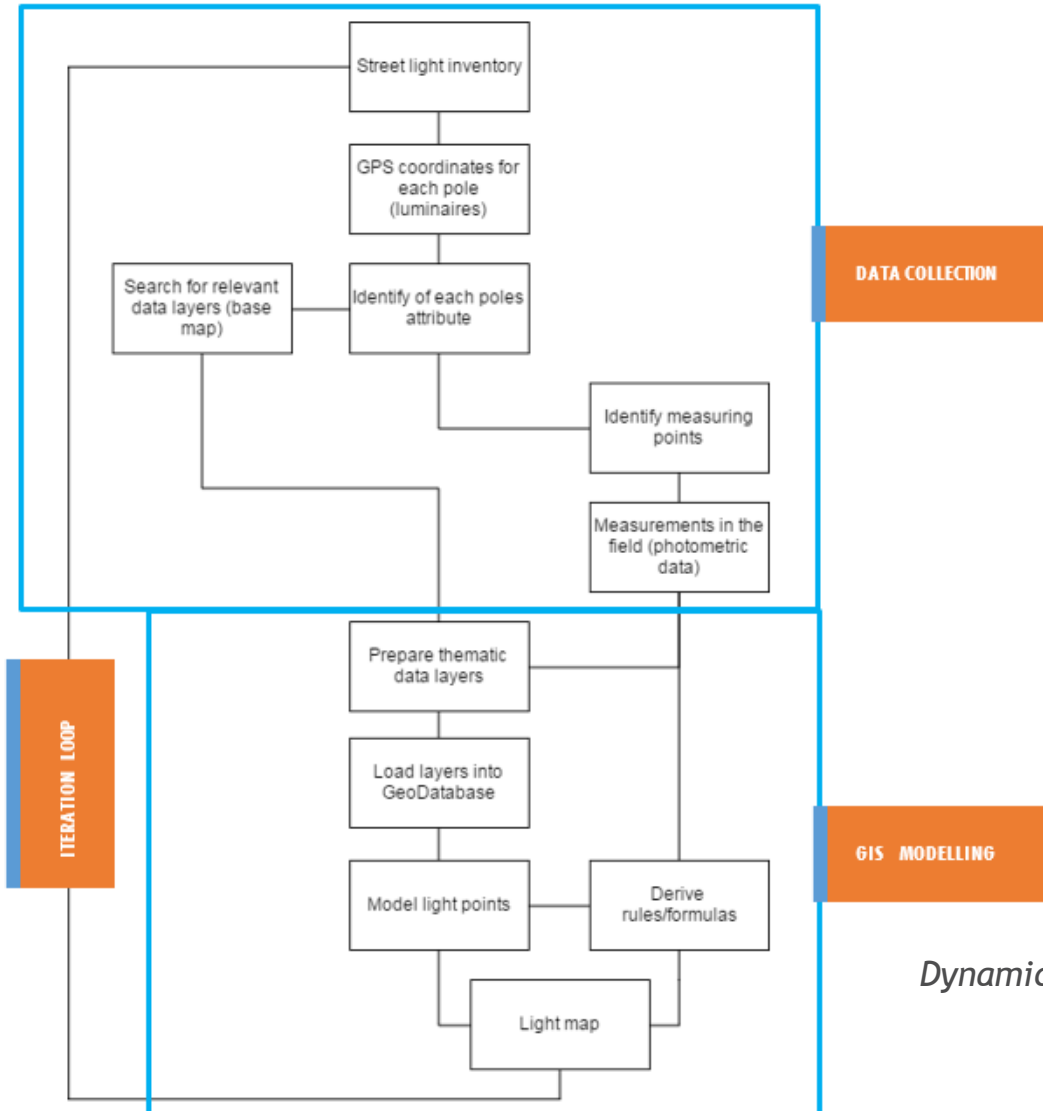
ANALYSIS AND FINDINGS

Density Map :

1. What scale of analysis makes sense?



INTEGRATE DYNAMIC LIGHT INTO THE CITY!



Dynamic Light - WP2 - D.T2.1.2 - Joint monitoring tool



INTEGRATE DYNAMIC LIGHT INTO THE CITY!



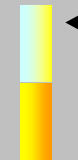
Masterplan for Dynamic Lighting

In different streets there are different conditions identified, which are leading to variations of light in the fabric of the city during the night.

Here the proposal is a differentiation in colour temperature and light level.

Different szenarios for the light are needed!

Colour
temperature



Light level



25 %

DYNAMIC LIGHT

Summary

The use of new technologies in street lighting can lead to even more efficient use of energy!

- But more important is the potential, **to tailor the lighting** to the social needs of users,
- **to increase the attractiveness** of the evening public space and
- **to reduce light pollution**
- to take better account of the fauna.

Dynamics Light means
the "adequate lighting"
to use the evening space by night
In more liveable, healthy, attractive way!



DYNAMIC LIGHT AIMS TO....

Sufficiency!



THANK YOU!

