GREEN BUILDING PROFESSIONAL

Intelligent Lighting Design

Location: on-line

Saveznik prirode i ljudi / *Nature and People's Partner*

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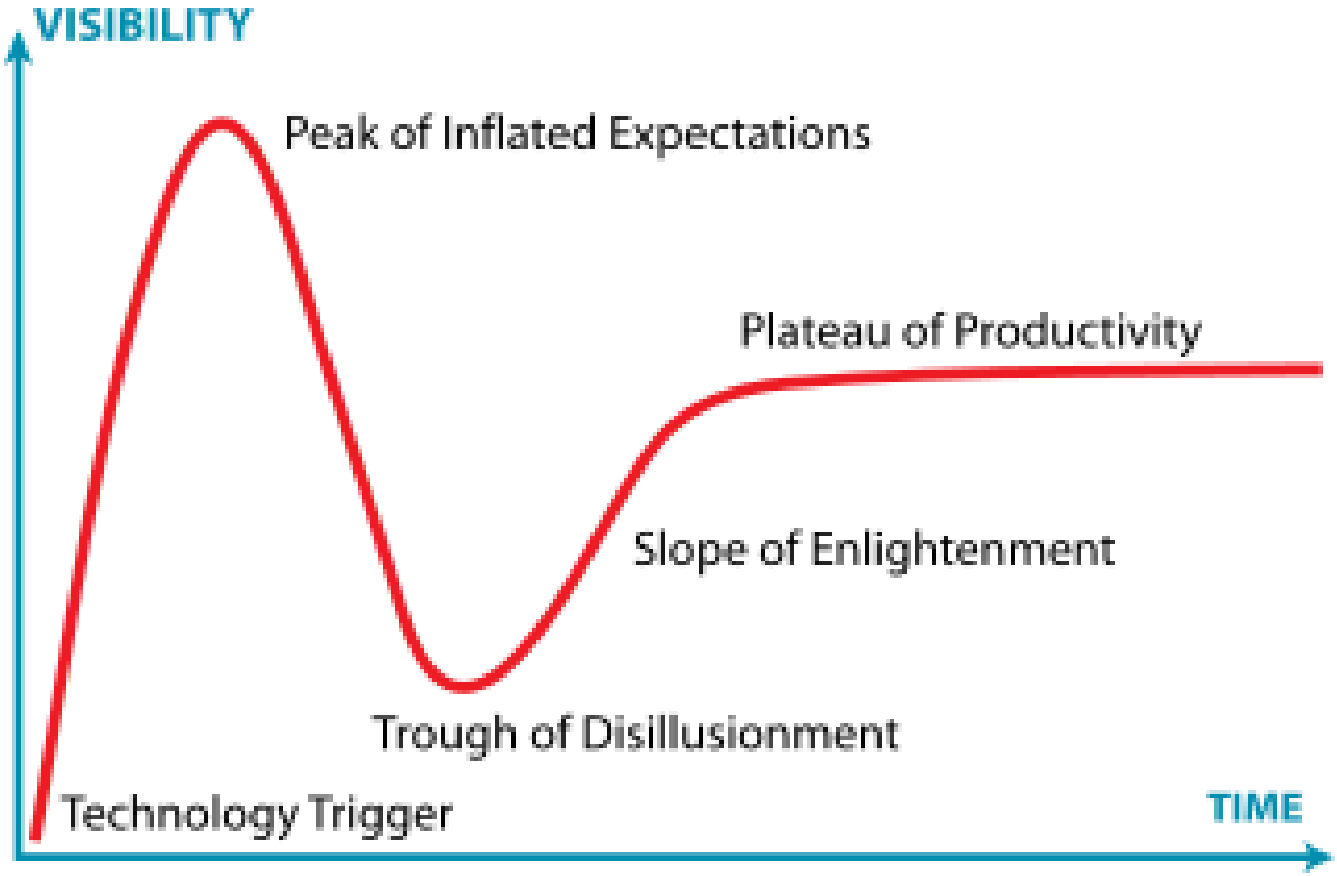
LED-ification



Lighting Basic

- There are several European Norms that set the requirements (EN 12464 part 1 and 2 and EN 1838 for emergency lighting) and EN 15193 for performance
- LED has no influence on norms
- No norm on human health (blue light and melatonin)
- Watch-out any system that enhance „circadian rhytm“
- Who is a lighting professional?

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LED SUCCESS

- Luminaire efficiency over 130 lm/W
- There is no limit in installed power
- Total control of luminous flux, color temperature, but not yet of photometry
- Interior lighting installations: specific connected load <1.0 W/sqm/100 lx
- Best 0.7 – 0.8

LED CONTROL SYSTEMS

- Clarify the needs
- Importance of sensors
- Communication interface
- Easy to use
- Future proof?

IoT, Li-Fi

- LED luminaires (Internet connected) can send information about energy consumption, hours, dimming and constant luminous flux
- Li-Fi sending information through light modulations (speed higher than through cable). Information will get to you as you are under the luminaire (new Apple smartphone will have the Li-Fi function)

LED ISSUES

- LED luminaires is not a mature technology (if you specify today and buy in one year, this is a problem)
- LED luminaire and energy prices have ups/downs, so difficult to calculate a ROI correct
- Lack of third-party information about maintenance
- What is in reality a 5 year warranty?
- How to set a correct maintenance factor - M?

LED ISSUES

- Cybersecurity – risks of loosing control on the system
- A luminaire could become a virus source
- Privacy issues: micro or camera in the luminaire
- No communication standard accepted by everyone

EXISTING CONVENTIONAL LUMINAIRES

- Use of LED tubes or LED modules with opal cover is not an efficient solution ($50 < \eta < 70$ lm/W)
- Recycle existing luminaires and take care of hazardous waste (FL and discharge lamps)
- Use Power Line Communication PLC instead of two extra wires for DALI

GfK TRENDS

- Invisible analytics
- Virtual reality
- Wearables
- Smart home
- Drones
- Artificial intelligence
- Video consumption
- Mobile payments
- Connected cars
- 3D printing

INVISIBLE ANALYTICS

- Data from sensors will be used as statistical data (usage of spaces, presence in corridors or walkways, etc.)
- Informations about the hours of usage, dimming or fault luminaires will be very important for producers or users

VIRTUAL REALITY

- Clients or arhitects will want simulations more realistic (movies included) of interior/exterior lighting
- This will lead to complex teams of arhitects/designers/lighting specialists

WEARABLES

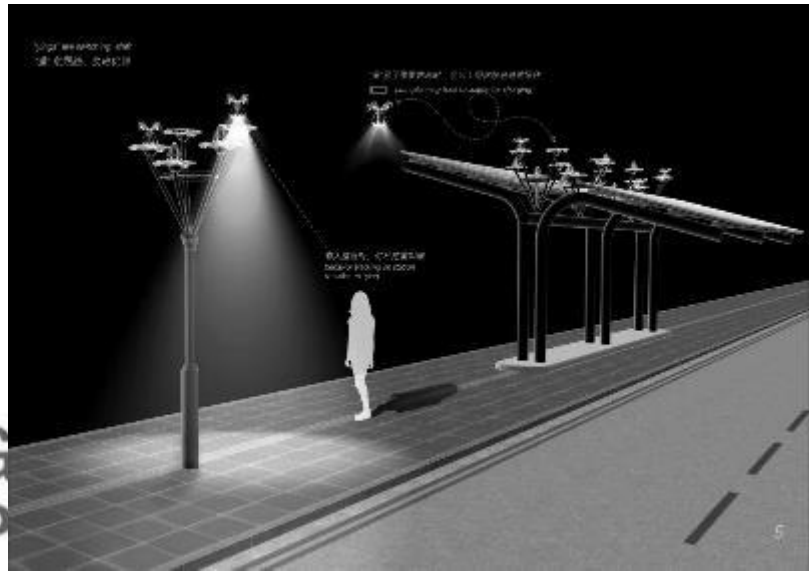
- Bluetooth-enabled jackets or wristbands will be used to detect people and switch on/off lighting
- Wristbands can contain preferences regarding preferred illuminance level or correlated color temperature

SMART HOME

- Dimming, change color temperature and light direction
- Electric lighting adjustment according to available daylight
- Active daylight, through mirrors that track sunlight
- User adapted lighting controlled through smartphone

DRONES

- Used for luminaire mounting, repairs or projector orientation.
- Used for exterior lighting, instead of pole lighting, or for special occasions



ARTIFICIAL INTELLIGENCE

- Control systems will learn individual behavior and preferences regarding lighting.
- Diagnosis of control systems

VIDEO CONSUMPTION

- Luminaire mounting instructions will be as a video
- Flyers, brochures and catalogues are replaced by on-line video

CONNECTED CARS

- Public lighting could be switch on according to car destination (especially in crossroads, where only one road will be lit)
- Lighting signage of the free parking spaces

3D PRINTING

- Printing missing accessories on site.
- Sub-parts industry developments (LED module, driver, cables etc.) so only diffuser or lenses will be made by user.
- Possibility to buy on Internet a luminaire file, which than can be printed

3D - Printing

CONCLUSIONS - LIGHTING

1. It is a rapid changing industry
2. Energy savings are high, but be aware of risks related to simplistic solutions
3. Energy managers should have clear demands regarding lighting (Emed, u, UGR, Ra, CCT, W/sqm/100lx, LENI etc.) and control
4. Pilot projects or patience to choose the right solution

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