

M5.5 Measuring non-visual effects of daylight

WP5. Measuring, T5.3

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1 Introduction

This report covers the investigations within FACEcamp ITAT1039 in the field of non-visual comfort measurements for modern facades. Based on the literature research done within WP4, which is presented already in M4.4 about Modelling of non-visual comfort, this report will extend the knowledge towards appropriate measurement methods to evaluate non-visual effects by (day)light.

2 Objective

The work done in the field of the measurement of the non-visual comfort aimed at deepening such complex and innovative aspect of the (day)light, narrowing the gap between existing theories, tools, measurement experiences and the world of building envelopes. All what has been done in this field during the FACEcamp activity of Task 5.3 has been summarised and presented physically during a dedicated workshop as described in the following chapters and technical annex.

3 Method

The workshop covers an introduction into the basics and the state of science in non-visual effects of (day)light including mental performances, physiological processes as well as mood and emotion connect to daylight. Based on the natural circadian rhythm and the internal clock, the aspects of “human centric lighting” (HCL) are highlighted. Furthermore, different concepts to realize HCL are discussed and presented. As a fundamentalism, the ipRCSs (so called “3rd receptor”) is mentioned, which contributes in combination with the rods and cones (therefore all retinal photoreceptors) to the effects of non-visual perception. The different standards and calculation methods are highlighted.

In detail, the new standard for non-visual effects of (day-)light (CIE S 026/E:2018) is discussed and the concept of EDI (equivalent daylight illuminances) highlighted. Therefore, EDI is the new metric to evaluate the stimulus reached by the lighting levels, while the established horizontal illuminance on workplane (E_h) to fulfil the illumination task. In this concern, the new lighting concept to enrich EDI.

Several demonstration cases are presented, including different lighting scenes and evaluating the resulting horizontal illuminance as well as the result for the equivalent daylight illuminance.

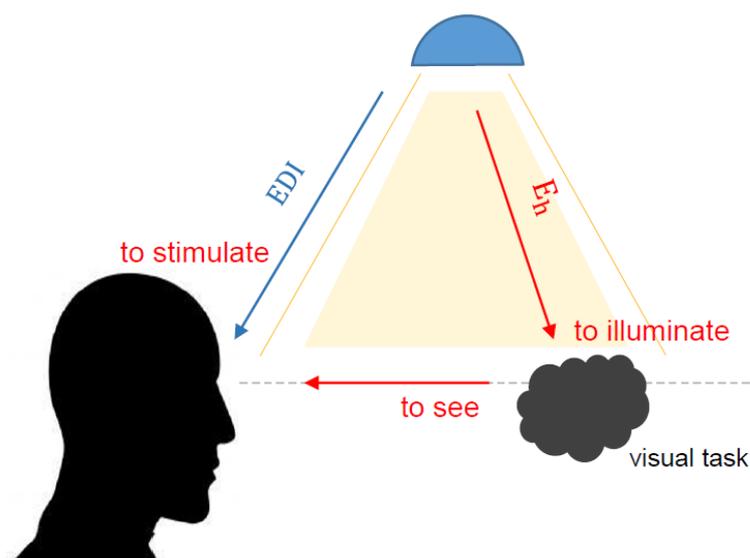


Figure 1: New lighting concept for circadian entrainment

4 Results

The working contents of this task have been presented to the consortium partners via an interactive workshop, due to this the report format is also in the form of power point slides presented in the workshop. Those slides are available now for any further use or presentation of the contents. In any use please always refer to Bartenbach as copyright of the slide materials attached.

5 Conclusions

Human Centric Light (HCL) is still an open field for research, especially matching HCL principles to the building envelope, trying to exploit the daylighting. There are indicators available for the non-visual comfort, but still commonly recognised thresholds are far to be agreed becoming practical design requirements.

- Integration of daylight in HCL concepts today is very limited.
- Daylight shows high potentials to achieve higher vertical illuminance on eye level.
- Mostly artificial light controls add light when daylight levels are insufficient in terms of work plane illuminance, but do not consider non-visual criteria.
- Potential of integrating daylight is enormous.
- Long term health effects are still not fully validated and a topic for further studies.

FACEcamp partners

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	<p>IDM IDM Suedtirol - Alto Adige</p>	<p>Partner</p>
	<p>UIBK Universität Innsbruck, Arbeitsbereich Energieeffizientes Bauen</p>	<p>Partner</p>
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