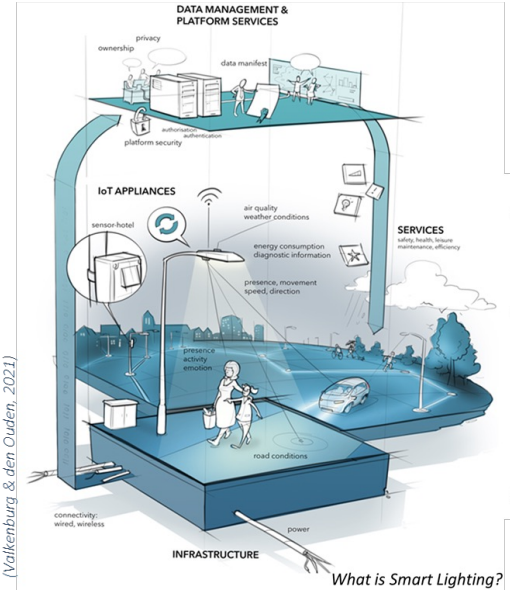
DESIGN of THE UXE TOOLBOX

This PDEng Project is a part of an Interreg Project called the Smart Space. It consists of nine work packages with the participation of 12 partners to introduce the smart urban lighting solutions to small and mid-sized municipalities across the North-West Europe. The PDEng project is a part of joint monitoring and evaluation work package with the supervision of Intelligent Lighting Institute in particular Lighthouse and Building Lighting Group within the Faculty of Built Environment Faculty, TU/e.

THE SMART-SPACE PROJECT



(Valkenburg & den Ouden, 2021)

What is Smart Lighting?

ecology economy citizens

- in four pilot cities

  Middelburg (NL), Sint-Niklaas (BE), Oostende (BE) , Tipperary (IR)

- three clusters of anticipated use

  A- Improving Road Safety

  B- Enhancing Leisure Experience

  C- Increasing Nightlife Security

- five interaction levels

  1-Static, 2-Active, 3-Rective, 4-Interactive, 5-Intelligent

URBAN LIGHTING and UX

attitude
perception
behavior

UX with URBAN LIGHTING

existing methods and tools

person-centered (PEC)

place-centered(PLC)

self-report technique

emotional appraisal
(e.g. PAD model, PANAS model)

environmental appraisal
(e.g. impression, atmosphere)

acceptance model
(e.g. TAM, USTAM)

physical and physiological

visual performance
(visual test, obstacle detection etc.)

body signals
(HRV, GSR, FEA, etc.)

eye tracking
(fixation, gaze points, etc.)

observation

behavioral mapping
(e.g., aggression, walking speed)

explorative walks
(e.g. unstructured observations)

monitoring

historical reports
(traffic accidents, crime, etc.)

ICT and IoT
(counting, sound detection etc.)

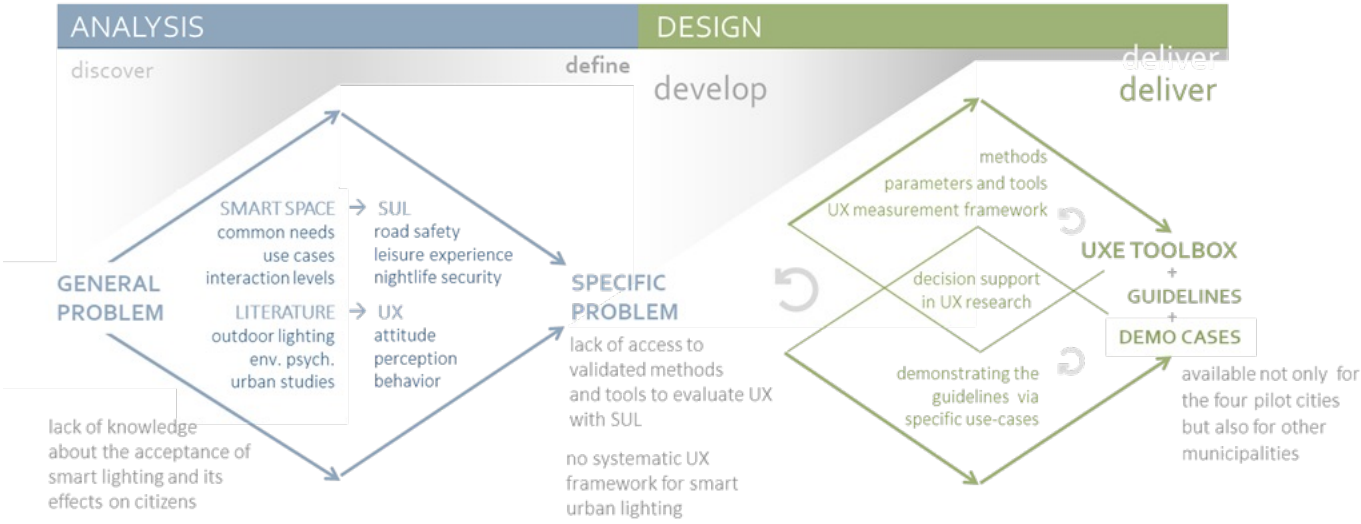
DESIGN CHALLENGE

Problem: Lack of knowledge about acceptance and appraisal of smart urban lighting and its effects on citizens.

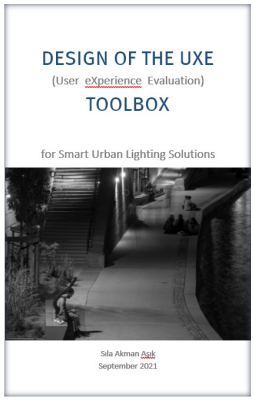
Design challenge: A toolbox to assist small and medium-sized municipalities in UX research.

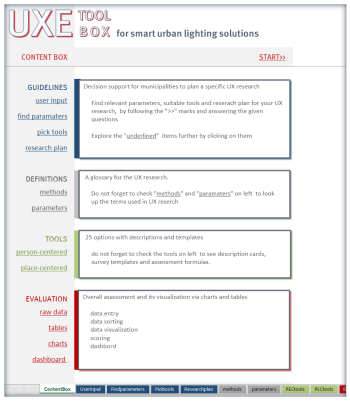
The goal of this PDEng project is to design a toolbox to support municipalities in the evaluation and monitoring of citizen's perspective. This toolbox is entitled the User eXperience Evaluation (UXE) Toolbox. The UXE Toolbox presents 25 tools in five categories (i.e., self-report technique, measuring body signals, information and communication technologies, statistics of official documents, and site observations) to measure 23 sub-parameters under seven parameters (i.e., acceptance, visual performance, visual comfort, perceived safety, attractiveness, liveliness, and safety) in three dimensions (i.e., attitude, perception, and behavior). It provides an excel-based tool, guidelines, and demo cases. Guidelines help municipalities to find relevant parameters and choose suitable tools. Demo cases show how the guidelines work over the use cases co-created within the Smart Space Project.

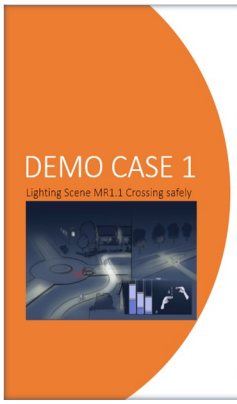
Double Diamond Design Model

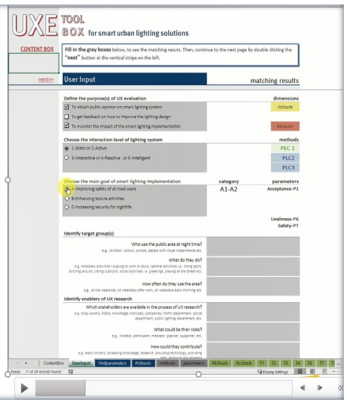


Deliverables:
(1) project report, (2) excel-based tool, (3) demo videos



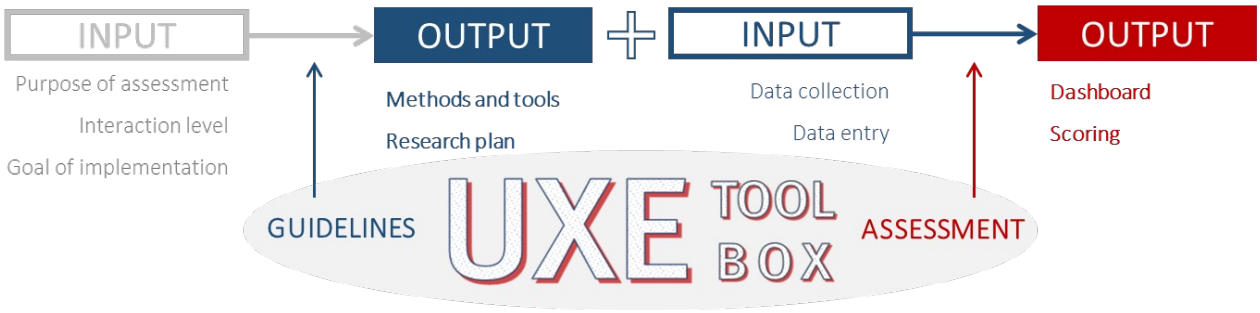






A set of methods and tools addresses the different purposes of measurement (i.e., obtaining public opinion, receiving feedback to improve the lighting design, and monitoring the impact of the smart lighting implementation), goals of implementation (i.e., A- increasing road safety for all, B-enhancing leisure activities and C-enhancing nightlife & security), and interaction levels (i.e., 1-active, 2-active, 3-reactive, 4-interactive, 5-intelligent). Thus, the UXE toolbox offers case-specific methods and tools in line with the needs of municipalities. The UXE Toolbox designed based upon eight use-cases in four cities within the Smart Space Project, however, is not only available for the four pilot cities but also for other municipalities that are willing to adopt smart urban lighting.

CONCLUSION



- The UXE Toolbox facilitates an integrated database
- The measurement framework consisting of 2 categories (PEC and PLC) in 3 timeframes (before, test, and after) for a systematic data collection.
- 7 parameters in 3 dimensions
- 25 tools in five categories
- Presenting emerging technologies in UX research like biosensors, image processing algorithms, and other ICT applications
- Guidelines to support decision making to set a case-specific UX research plan

This project proposed a toolbox to support municipalities in finding appropriate methods and tools to monitor and evaluate their citizens' experience with the smart lighting system. The UXE Toolbox was designed prioritizing the needs of the small and mid-sized municipalities. The functional requirements were based on the relevant activities within the Smart Space Project and the literature review in the field of urban lighting and environmental psychology. At the end of this study, eight requirements out of ten was achieved. The rest is planned to be finalized by the end of the Smart Space Project.

Information:

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Name of company: TU/e Light House
Period of project: Aug 2019 – Jul 2021