



GreenerBuildings

An ubiquitous embedded systems framework for energy-aware buildings using activity and context knowledge

Editorial

Users are the most essential aspect of the Greener Buildings proposition. In Greener Buildings, we seek to minimise energy-waste through intelligent building adaptation, whilst at the same time, to maximise the user experience in terms of productivity, comfort and satisfaction. Our strong belief within the project is that, in order to make buildings truly adaptable and maximize efficiency and comfort, they need to be more sensitive to the activities of the users and to the context of their environment. Activity-awareness will be achieved through ubiquitous sensing and data processing. However, since this is a new way of thinking about buildings, we need to develop validated insights and user requirements that come from our stakeholders, from literature (such as from the field of environmental psychology) and from a set of validated scenarios that will later be realized as a within a living lab as a proof of concept.

Academic and industrial R&D has been ongoing in the field of occupant comfort and productivity for several decades (more recently in relation to energy-efficient buildings). Thus, to start off our requirements, we conducted a detailed literature review in the field of user comfort and control in energy efficient buildings. Over 120 papers, articles and publications were reviewed and were divided across partners according to their expertise (including visual comfort, thermal comfort, user control, economic aspects, etc.). This helped us to for example, understand the suitability of different metrics for user comfort and satisfaction and to see which application aspects should be validated in the field. To compliment those aspects that were not clear to us from literature, a series of surveys were conducted with facility managers, energy providers and office workers to elaborate on certain aspects envisioned by GreenerBuildings.



As well as looking at general requirements related to adaptive buildings, a series of ideation sessions were conducted to determine specific building services and showcases that go beyond the state-of-the-art. As a result, four types of building services were developed covering energy, user health and wellbeing and user control and productivity. Showcases include dashboard services, activity-oriented services, background services and user-control oriented services.

Dr. Paul Shrubsole, Philips Research

At a Glance

Duration: 36 months

Start: 2010.09.01

Contract Number: INFISO-ICT-258888

Contact

Project Coordinator

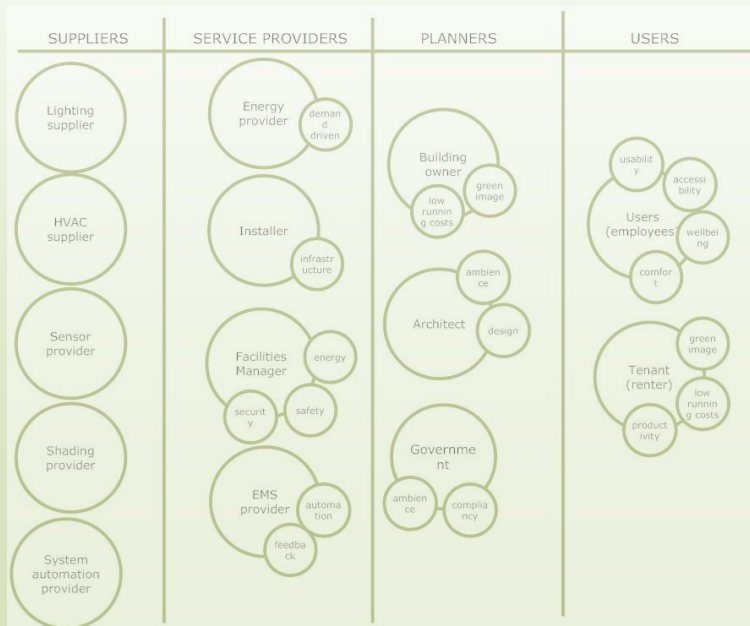
Oliver Amft (TU Eindhoven) - amft@tue.nl

Project Technical Manager

Marco Aiello (Univ. of Groningen) - aiellom@cs.ruq.nl

Technical Approach

In order to extract the user requirements, we have identified and defined the key stakeholders of GreenerBuildings solutions, their requirements and primary usage scenarios of GreenerBuildings. The intention is to capture the key user requirements/needs for GreenerBuildings, but not necessarily to aspire to support all possible user requirements in all possible building situations. For each of the users, we address needs such as **comfort, usability, overall satisfaction, productivity, economic value and energy saving potential**. In addition to the user requirements on the specific GreenerBuildings services listed in the previous chapter, there are many additional user requirements that must be included in order to account for the general comfort and productivity of occupants, economic constraints for investing in GreenerBuilding infrastructure and energy related requirements pertaining to facility managers. For the office workers (end-users), and facility managers, these are listed in terms of visual comfort, thermal comfort, automation and control, sensing requirements and workplace requirements.



GreenerBuildings has identified and extracted user requirements from the following categories:

- **Suppliers:** HVAC, Lighting, Sensors, Shades, Building Automation/ Controls
- **Service Providers:** Energy provider, Installer, Facilities Manager, EMS Provider, Building Administrator
- **Planners:** Architect/Designer, Building Owner, Government/Regulator
- **End Users:** Employees, Tenant (renter)

Requirement extraction has been performed by the user of surveys distributed among the interest groups.

Project Partners

TU Eindhoven, coordinator (NL),
 University of Groningen (NL),
 Consorzio Interuniversitario Nazionale per l'Informatica (I),
 Sapienza University of Rome (I),
 Fluid Solutions - alternative Srl (I),
 Philips Research Laboratories Eindhoven (NL),
 Advantic Sistemas y Servicios S.L. (SP),
 Industrial Technology Research Institute of Taiwan (RC)

