

# Domho project: an accessible and inclusive smart co-housing solution for people with disability

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## Abstract

Nowadays, technologies are increasingly designed and developed from a human-centered perspective. This latter aspect is even more relevant when the end users are individuals with special needs. Domho adopted a participatory design approach involving end users and stakeholders to create an accessible and inclusive smart environment (i.e., an apartment) exploiting the Internet of Things (IoT) technologies. The apartment will be inhabited on weekends by people with severe motor disabilities and mild cognitive impairments and their caregivers. These individuals will experience the potentiality of various smart technologies in a co-housing context. The IoT devices are intended to increase individuals' independence, autonomy, and safety in carrying out daily activities without the continuous need for support. Through this social intervention based on smart co-housing, we expected benefits in the well-being and quality of the end users' life and interpersonal relationships. The fully-integrated system is already implemented, and soon trials will be performed involving individuals with disabilities and their caregivers.

## Activity Description

In the first phase of Domho, co-design activities were conducted to identify the end-users' needs, preferences, and expectations. The pieces of information gathered through different Focus Groups (Fig. 1) allows identifying a set of smart technologies and their specific locations inside the environment.



Fig. 1. Focus Group with end users and caregivers.

Furthermore, mobile and voice-activated user interfaces were designed and developed to permits end-users to control IoT technologies easily. Laboratory experiments were carried out to assess these software applications' accessibility and usability involving individuals with disabilities and their caregivers (Fig. 2).



Fig. 2. Accessibility assessment of voice assistants.

The Domho architecture comprises a set of different communication protocols that allow the control and interoperability among several devices installed in the smart co-housing apartment (Fig. 3). 3D smart cameras will be exploited to detect falls and to promptly alert for assistance.

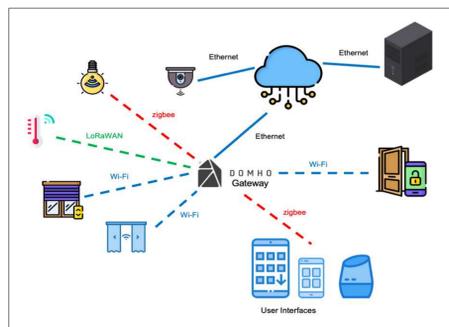


Fig. 3. Domho architecture.

These preliminary works lead to the installation of a prototype AAL system (Fig 5 and 6) in a highly ecological environment.

In future trials, individuals with disabilities and their caregivers will have the opportunity to live inside the apartment and interacting with all the smart devices to perform specific daily tasks. Perceived usability, accessibility, user experience, wellbeing, and quality of life will be assessed considering different tools and methodologies (i.e., video analysis, questionnaire, semi-structured interviews).



Fig. 5. One of the apartment's bedroom



Fig. 6. Examples of installed technologies to increase accessibility.

## Conclusion

Domho will have a profound social impact. The themes of inclusion, autonomy, independence, and safety of individuals are incredibly topical subjects. Interventions such as the current project highlighted the need to provide technological support to both people with disabilities and their caregivers or families. Furthermore, the development of modular architecture and the integration of the vocal assistant make the designed system highly customizable, meeting different end users' needs. The idea is that an individual can choose an initial set of devices and then later adding other smart tools.

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