# Exploring Novel Approaches to Understand Seniors' Aesthetic, Functional, and Ergonomic Preferences towards Kitchen Furniture.

The aging process of societies in highly developed countries is one of the biggest challenges today, both from a scientific point of view and from a social and economic point of view. This process also changes the character of the furniture design. While rapid demographic changes can be observed around the world, Europe is at the epicenter of a demographic crisis. As the human body ages, it undergoes many changes that affect the way furniture is used. As a result of the aging process, there is loss of muscle mass (approximately 8% between the ages of 50 and 70, with an average loss of 10% to 15% after age 70) and changes in height. There is a clear tendency for height to decrease with age (from 2 cm to 5 cm per decade). Activities such as getting up and sitting down, reaching for items located overhead, and opening furniture doors can become challenging as we age. To date, several studies have been carried out to identify the needs and preferences of seniors in their use of furniture in private and public spaces to make an important contribution to the design process. However, they are mainly based on survey research, interview research, and focus group research. With the rapid development of new technologies, new approaches to implementing extended reality (xR) applications, such as virtual reality (VR), augmented reality (AR), and mixed reality (MR) with eye trackers, as well as kinematic analysis and Mobile Brain/Body Imaging (MoBI), should be incorporated to identify the needs and preferences of seniors and create an environment that is safe, comfortable and supports the concept of aging in place, which means enabling seniors to live in their own homes for as long as possible.

Thus, the planned research aims to compare the traditional methodology of recognition of needs and preferences of seniors connected with the design of kitchen furniture based on the survey studies, with the novel approaches using real-life 1:1 scale furniture models, AR headsets with eye-trackers, kinematic analysis, and the MoBI system to support the development of new knowledge in the field of senior-friendly furniture design, providing a safe and comfortable environment, and support of the aging in place idea.

The project will start with a comprehensive review of currently available tools and methods to identify the needs and preferences of seniors in terms of kitchen furniture design. It will allow the identification and evaluation of the effectiveness of these tools and methods. The first phase of research will be dedicated to examining traditional tools and methods used to identify the needs and preferences of seniors in terms of kitchen furniture design. To achieve this, the project team will develop survey research questionnaires and face-to-face interview questionnaires, conduct pilot studies, and a full-scale investigation among seniors living in Poland and Slovenia. The survey will gather data from a larger sample of seniors to get a more complete picture of their needs and preferences. Face-to-face interviews will be conducted with a smaller sample of people to gain a deeper understanding of their experiences and challenges when using the kitchen environment. Data gathered from surveys and direct interviews will be analyzed to identify common themes and patterns, which will be used to develop a set of kitchen furniture design recommendations that meet the unique needs of the aging population. These data will also serve as the basic input for the second phase of the research.

The second phase of research will be dedicated to investigating alternative tools and methods to determine the needs and preferences of seniors in kitchen furniture design. This includes creating visualizations of the preferred kitchen layouts based on the data obtained in the first phase, constructing a real, movable, and modular kitchen layout at a 1:1 scale, allowing testing of different kitchen arrangements from an aesthetic and functional point of view using MoBI approach, kinematic analysis, and AR in conjunction with eye trackers among seniors in Poland and Slovenia.

The study will explore the potential of using advanced technologies such as augmented reality, eye tracking, and MoBI to identify the needs of seniors and develop age-friendly furniture designs. Ultimately, an innovative model will be developed that be used to guide the process of making custom kitchen furniture according to the needs and preferences of seniors.