



How Can We Build an Accessible and Inclusive Built Environment?

The AccesS User Centered Design Approach



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About AccesS

AccesS aims to **revolutionise the accessibility and inclusivity of smart buildings and smart cities** with the groundbreaking Universal Accessibility Suite initiative. By leveraging advanced technologies and innovative solutions like AI, BIM, and GIS, AccesS aims to create barrier-free environments, facilitate smooth mobility, and enable equal access to essential services and facilities.

About the report

This report outlines the User-Centered Design (UCD) approach for the AccesS project and highlights **findings related to user needs, expectations** and challenges for accessibility of **the built environment and active mobility solutions** across the six demo sites of the project, focusing on three different types of buildings:

- **Case of cultural heritage buildings**, which covers the Brancacci Chapel in Florence, Italy and Christo and the Jeanne-Claude Center in Gabrovo, Bulgaria.
- **Case of people care facilities**, which covers the Droom je Thuis Foundation in Naaldwijk, Netherlands and the Casa Girasole in Massagno, Switzerland.
- **Case of public services buildings**, which covers the Palazzo di Città in Bari, Italy and the Mercado de Verónicas in Murcia, Spain.

This report is intended to inform a broad spectrum of stakeholders engaged in the planning, design, implementation, and evaluation of inclusive and accessible built environments and mobility solutions. Its findings are particularly relevant to urban planners, architects, municipal decision-makers, technology developers, and digital tool designers, who play a central role in shaping physical and regulatory infrastructures and in the creation of accessible smart systems. Additionally, the UCD approach offers a knowledge base for academic researchers and evaluators working in the areas of smart cities, universal design, and mobility systems.

Access User-Centered Design Approach

User-Centered Design (UCD) puts the user at the centre of the design process and encourages an iterative and collaborative approach. Key features of UCD are:

- **User centrality:** This empathetic approach helps create truly useful and desirable solutions by deeply understanding users' needs, desires, and challenges.
- **Iterative approach:** Ideas are continuously tested, refined, and improved based on the feedback received. The design process goes through a cycle of subsequent stages that are not linear and often overlap, with continuous returns to the previous stage to improve the final solution.
- **Multidisciplinary collaboration:** promotes collaboration between people with different skills and perspectives. Multidisciplinary teams work together to tackle complex challenges, stimulating innovation and creativity.

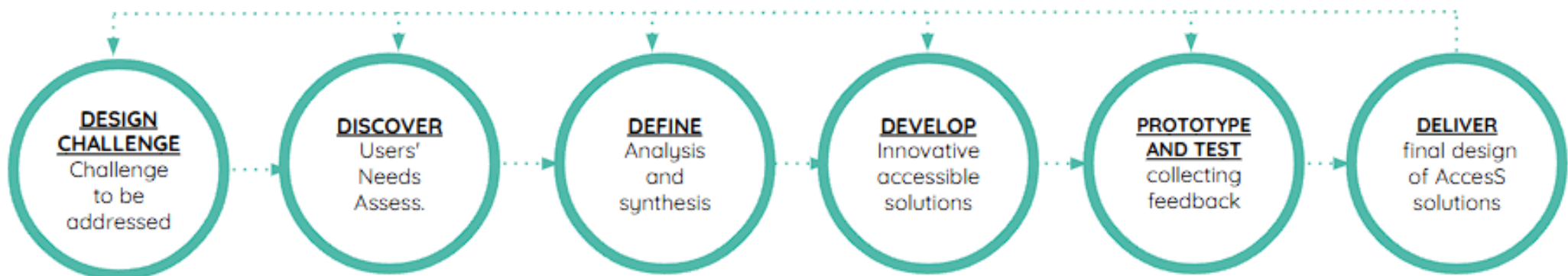
By adopting this approach, the objective is to ensure that the design and development of AccessS solutions across the project's demo sites are informed by a deep understanding of the needs and challenges faced by individuals with disabilities, reduced mobility, and other vulnerable groups at the six demo sites.

Access UCD approach follows six main steps:

1. **Definition of the design challenge**
2. **Discover**
3. **Define**
4. **Develop**
5. **Prototype and test**
6. **Deliver**

This report presents a tailored roadmap for each demo site, **outlining the key considerations while developing the AccessS solutions.** The roadmap builds on the findings of step 3, i.e., defining the user insights, needs, challenges, and expectations that emerged from the engagement of actors for each pilot site. The subsequent steps, develop, prototype and test, and deliver, will be applied during the remaining phases of the project.

For detailed information on the approach, refer to [Deliverable 2.1 User-centered Design Approach and Inclusive Active Mobility Solutions.](#)



I. Brancacci Chapel



About

It is located in one of the central districts of Florence, Italy. The Chapel is situated within the boundaries of the **UNESCO area** and is housed in the Santa Maria del Carmine Church. It is one of the most significant examples of the Renaissance era in Florence, with frescoes by Masaccio, Masolino, and Filippino Lippi, and operates as a **civic museum**, owned by the Municipality of Florence. The Chapel is intended to serve as a model for Florence, promoting accessibility for all and exemplifying urban sustainable regeneration that incorporates the surrounding area into the city's smart framework, reflecting the principle of **“no person and no place left behind”**. Importantly, carrying out structural changes is not feasible due to legal protections and heritage conservation constraints.



User Characteristics

On average, the Brancacci Chapel receives **200 visitors per day**, amounting to approximately **70,000 annually**. The majority of visitors are first-time visitors, and the most common reasons for visiting the Chapel were as part of a longer trip and for religious interest.

The Chapel's structure permits **access only for small groups of up to 30 people** and requires prior reservation. Entry is limited to 30 visitors every half hour to safeguard the frescoes, which have been recently restored and are subject to continuous monitoring and diagnostics.

At the site, there are three companies and cooperatives that provide services: ticket office, security, and cleaning staff. A total of 30 people work there, with an average of 6 per day. During the conservation and diagnostic activities on the frescoes, conservators and researchers were also active at the site.

AccessS roadmap

Considerations while **developing AccessS tools**, taking into account that structural modifications within the Chapel are constrained by legal and heritage protection requirements. It imposes limitations in addressing various user needs, especially those requiring physical alterations.

Wheelchair users or those with reduced mobility

- Precise measurements of doorways, pathways, and inclines to ensure wheelchair and mobility aid accessibility.
- Reliable and spacious wheelchair lifts and improved handrail usability.
- Design of seating areas with varying heights and armrest options for diverse comfort needs.
- Layout of emergency exits, ensuring clear and accessible routes for all mobility levels.
- Improve pedestrian pathways around the Chapel by levelling uneven surfaces.

Deaf visitors

- Development of clear video guides, both in LIS and with captions and navigation cues.
- Emergency exit instructions include visual alerts.
- Development of video guides for public transport.
- Train staff in sign language and deaf awareness.
- Offer navigation apps with visual cues and vibration alerts.

Blind or visitors with low vision

- Integration of Braille and high-contrast informational materials, and audio descriptions for frescos.
- Development of clear navigation with tactile floor markers.
- Appropriate lighting levels to minimise glare while maximising visibility.
- Install tactile paving and high-contrast visual signage on key routes to the Chapel.

Neurodivergent visitors

- Trained staff for better support and understanding, accommodating cognitive and sensory processing needs.
- Simplified navigation, using clear symbols and concise language, and consistent layout and wayfinding to reduce confusion.

Elderly and other vulnerable groups

- Improved handrail usability.
- Easy to read fonts in all signage.
- Comfortable seating areas with armrests.
- Improve access to the Chapel through better wayfinding and signage.
- Enhance pedestrian safety with smoother surfaces, lighting, and handrails.
- Raise awareness on accessible micromobility solutions such as adapted scooter services.

Workers at the site

- Control over lighting, sound, and temperature levels to create a comfortable sensory environment.
- Ensure smooth pathways for movement.
- Training to understand and accommodate the needs of diverse visitors.

II. Christo and Jeanne-Claude Center



About

It is centrally situated in Gabrovo, Bulgaria and will be located within the premises of the **former vocational textile high school**, owned by the Municipality of Gabrovo. Abandoned since 2009, the building is in a state of significant disrepair and **has several accessibility challenges**. Currently, the center is in the preliminary **planning and design phases of an extensive renovation**, with construction works foreseen to start by mid-2026. The Center is part of integrated territorial investments planned under Gabrovo's Integrated Development Plan (2021-2027), which includes the renovation of the building and the revitalisation of the adjacent riverside zone as part of integrated territorial investments. The renovation efforts aim to meet high energy efficiency standards, aligning with Gabrovo's strategic objectives for smart, sustainable and inclusive growth.



User Characteristics

The center will cater to a diverse range of users, broadly classified into two main categories: **employees and resident artists working within the building** and **visitors** engaging with its cultural and artistic activities. The first category includes **museum staff** responsible for administration, curation, visitor engagement, security, and maintenance. Additionally, **artists-in-residence** will use the space for creative activities, exhibitions, and performances. The second category of users consists of visitors, the center will attract the general public, **local citizens** interested in exhibitions, performances, and other cultural activities. **Students** will visit for guided tours and educational programs. **Tourists, both domestic and international**, will explore Gabrovo's cultural heritage through exhibitions and artistic showcases.

AccessS roadmap

Results presented below for this site differ from those of other pilots due to the Center's current non-operational status. The data collected includes expectations and recommendations aimed at ensuring the renovated building is inclusive and accessible for everyone.

Considerations while developing AccessS tools:

Artists and Center staff

- Accessibility training programs, resources, and guidelines for creating accessible content, promoting awareness of diverse user needs.
- Include staff involvement in co-design workshops for infrastructure planning and cultural programming, to ensure inclusivity is embedded in project design.
- Create internal feedback loops to capture staff observations on day-to-day access challenges faced by visitors and co-workers.

Visitors and city community

- Programs that actively involve people with and without disabilities, including multisensory and interactive activities.
- Provide clear and accessible information about the center and its services, with alternative formats, such as audio, braille, digital versions. For instance, audio guides can be complemented by video guides in sign language to support deaf users.
- Collaboration with local disability organisations, and also providing trained mediators (such as sign language interpreters) to assist individuals with diverse needs.
- Ensure walkable connections between nearby urban points and the center (e.g., riverside path), with inclusive signage and safety infrastructure.
- Promote sustainable, community-based mobility solutions (e.g., volunteer-driven shuttles) that bridge gaps in public transport.

Wheelchair users or those with reduced mobility

- Precise measurements of doorways, pathways, and surfaces to ensure wheelchair and mobility aid accessibility.
- Installation of ramps and elevators with accessible controls.
- Ensure exterior paths to the center are restructured with appropriate slopes, surface conditions, and uninterrupted pedestrian continuity.
- Develop inclusive parking/drop-off points near the entrance, particularly due to the site's placement near a high-traffic road.

Blind or low vision visitors

- Development of clear navigation with tactile paving
- Information in braille and large print and provide audio versions of written materials.
- Ensure staff is trained to guide and assist visitors with sight disability.

Neurodivergent visitors

- Provide quiet spaces and sensory-friendly environments, with spaces dedicated to different uses.
- Train staff to recognize and respond to sensory and communication needs.

III. Droom je Thuis Foundation



About

The Droom je Thuis Foundation is a **residential care facility** in the heart of Naaldwijk, dedicated to providing individuals with multiple or intellectual disabilities a secure and supportive environment characterized by warmth and a sense of belonging.

The facility was realised by a parent-initiated foundation, for providing residential care 24 hours a day for twelve young adults with intellectual or multiple disabilities. In April 2023, Droom Je Thuis care facility was ready, with **12 care flats, communal areas and fully equipped with state-of-the-art care technology**. The foundation's core mission is to cultivate a supportive, small-scale living environment prioritizing individualized care, companionship, and personal attention.

User Characteristics

It is home to **young adults with multiple and intellectual disabilities**, who require 24-hour care and support: the residents are **12**, with **ages ranging from 20 to 30 years** as of 2024; the gender distribution is balanced, with 5 women and 7 men; all residents have intellectual disabilities, and approximately 50% also have physical disabilities. The group is noted to be **diverse in terms of their level of functioning and need of support**. In particular, residents present diverse disabilities, primarily in the following categories:

- **Cognitive disabilities**
- **Multiple disabilities and mobility challenges**
- **Sensory sensitivities and autism spectrum conditions**

AccessS roadmap

Considerations while **developing AccessS tools**:

Wheelchair users and residents with reduced mobility

- Ensure all doorways and thresholds are compatible with wheelchairs and walkers, including turning radius and approach space.
- Consider automated or sensor-based doors to reduce reliance on physical force.
- Include accessible kitchens and bathrooms, with adjustable or lowered surfaces and appliances.

Residents with intellectual or cognitive disabilities

- Consider simple, consistent layouts and predictable spatial organization.
- Develop visual cues, icons, and color-coded systems to aid in recognition of spaces.
- Avoid overstimulation: favour clear design and minimize visual noise.
- Support memory and routines through reminders, symbolic markers.

Residents with multiple disabilities

- Combine design solutions that support both mobility and cognitive needs.

Caregivers and assistants

- Ensure smooth workflows through intuitive design and automated systems (e.g., remote-controlled doors, central communication panels).
- Design equipment solutions to facilitate care delivery without congesting the space.
- Involve staff in the testing of assistive features to ensure ease of use and integration in daily care routines.

Family members and visitors

- Ensure all doorways and entrance point are compatible with wheelchairs and walkers, including turning radius and approach space.
- Involve families in the testing of assistive features to ensure ease of use and integration in daily care routines.

IV. Casa Girasole



About

Casa Girasole is a non-profit **residential care home** located in Massagno (Switzerland), owned by the Municipality, offering care services outside the hospital environment, since 2002. The home care aims at providing a secure and comforting atmosphere, ensuring residents receive essential care to preserve their well-being and life quality.

Casa Girasole actively participates in the 'Motta District' energy community, demonstrating a proactive approach to energy transition, thanks also to the municipality supports to Casa Girasole's inclusion in the energy community, aiming at fostering energy transition within the urban district of Via Motta in Massagno.



User Characteristics

Casa Girasole primarily **serves elderly people facing reduced autonomy**. These individuals often require different levels of assistance with daily living activities, encompassing personal care, medication management, and nutritional support. The facility offers both long-term residency and temporary assistance (for those who need rehabilitative activities or lack family support for certain periods) catering to diverse needs arising from age-related fragility, chronic issues or post-hospitalization recovery.

Beyond the core user group, represented by elderly people (aged between, Casa Girasole's user base extends to its healthcare and management employees. This team comprises professionally qualified nurses, caregivers, administrative personnel, volunteers to animate leisure time with recreational activities and the parish priest. Their roles are crucial in delivering comprehensive care and fostering a supportive and stimulating environment

AccessS roadmap

Considerations while **developing AccessS tools:**

Residents (elderly people with reduced mobility, hearing and low vision or blind)

- Clear and diverse navigation supports (for example: the use of tactile maps, visual cues, hearing aids and the integration with digital tools such as apps, electronic signage) to ensure circulation for people with physical disabilities and reducing reliance on caregivers' assistance.
- Improve and facilitate the movement from one space to another in the building, through the installation of automated accessibility solutions, such as automated doors.
- Appropriate space for wheelchair movements in common areas.
- Evaluate lighting levels in different interior spaces to maximise visibility (e.g., installation of LED lights with motion sensors in corridors and common areas).
- Improve energy efficiency and indoor air quality and comfort through the installation of battery-powered sensors to monitor humidity and temperature and visualize the values on a display.
- Ensure clear and accessible routes to emergency exits for all mobility levels and instructions include visual alerts.

Technology developers

- Take into account that the current main challenge is the maintenance of the building and devices used by both the residents and the workers.

Users (family members and Casa Girasole workers) with disabilities or reduced mobility

- Install a charging area for electric vehicles, designed with accessibility as a core principle, in the parking adjacent to Casa Girasole for improving accessibility for both visitors and workers

V. Palazzo di Città



About

Palazzo di Città functions as the central administrative hub of the municipal government, offering a range of essential public services, for instance it provides information, guidance, and assistance to citizens regarding municipal procedures, manages the issuance of official documents, such as residence and family status certificates, registration of births, marriages, and deaths, etc.

It is situated in the city's historic core and has undergone multiple transformations since its establishment in the mid-19th century. The **building is architecturally significant**, that frames historic **Teatro Piccinni**. The **building houses notable artistic and historical elements**, which highlight Bari's artistic heritage.



User Characteristics

It serves a diverse range of users, including **municipal employees**, **local citizens** accessing administrative services and visitors engaging in various events. The Municipality employs approximately 1,800 staff members, who are distributed across multiple municipal offices located throughout the city. Of these, **122 employees have their primary workplace at the Palazzo di Città**. The municipality estimates that **approximately 500 individuals, including municipal staff, citizens, and visitors, access the central office on a daily basis**. Special attention is given to **employees with reduced mobility**. To accommodate these employees effectively, their workstations are strategically **located on the ground floor**. However, the broader goal remains to extend this level of accessibility throughout the entire building, creating a fully inclusive environment for all users, including those with visual or other sensory disabilities.

AccessS roadmap

Considerations while **developing AccessS tools:**

Wheelchair users or those with reduced mobility

- Ensure seamless, step-free access at all public entry points and within internal circulation routes through the installation of ramps, wide corridors, and automatic doors.
- Elevators or inclined platforms must be reliable and accessible across all floors, particularly where municipal services are located.
- Need accessible restrooms with sufficient space, support bars, and easy-to-reach fixtures.
- Require service counters at accessible heights and layouts designed for wheelchair users.
- Improve pedestrian pathways: remove obstacles, level surfaces, add ramps.
- Design rest points and shaded seating along routes.
- Deploy adapted micromobility vehicles, including seated scooters and low-step e-bikes, with designated docking hubs

Blind or low vision visitors

- Require tactile and auditory guidance, such as Braille signage, large-print maps, and voice-based navigation tools.
- Ensure all public information, online and physical is compatible with screen readers, available in audio formats, and presented with clear visual contrast.
- Install non-glare, well-distributed lighting in corridors, stairwells, and service areas to improve visibility and orientation.
- Enhance public transport with audio announcements and GPS-integrated navigation apps.
- Promote use of accessible tools with real-time wayfinding

People with cognitive or intellectual disability

- Need simplified signage, easy-to-read maps, and visual aids to navigate the building independently.
- Ensure staff are trained to provide simple explanations and visual cues when offering services.

People with sensory disabilities

- Implement visual communication tools including text-based announcements, visual alert systems for emergencies, and service counters equipped with visual display screens.
- Offer public service information in Italian Sign Language (LIS), captioned video, and written instructions.

People with chronic fatigue or visitors

- Require seating and resting areas throughout the building to pause and recover during visits.

Employees

- Need improved ventilation, lighting, and thermal regulation in shared workspaces.
- Ensure ergonomic, inclusive work environments with adjustable desks, appropriate seating, and accessible staff facilities
- Offer training on inclusive service delivery and communication with citizens with diverse need.
- Equip staff with feedback channels to report accessibility incidents and manage real-time BOMS adjustments.

VI. Mercado de Verónicas



About

The Mercado de Verónicas is a main municipal **food market** in Murcia, situated in the Plano de San Francisco. It is a two-floor historic building with a surface of 3.000 m² to be renovated; it has served as a **focal point for commerce and social interactions** for over a century. Although the facade has remained intact, the market's interior has been modified over time to meet changing commercial needs. The Murcia City Council has approved the initial **phase of renovating the Mercado de Verónicas**, allocating €3.7 million to the project. The **first phase** (ongoing) **restores the exterior**, enhancing energy efficiency while preserving its historic character. The **second phase** (from 2027 onwards) **will upgrade the interior**, modernizing systems and layout to improve accessibility and functionality.



User Characteristics

It serves diverse end users: shopkeepers and customers who frequent its food market for fresh, high-quality produce. The market attracts two main demographic segments: **middle-aged and elderly shoppers, as well as younger, health-conscious consumers**. A significant portion of the visitors are individuals aged 50-60 and retirees, many of whom reside in the surrounding neighbourhood. Moreover, the market occasionally draws **tourists** who visit Murcia and seek authentic local experiences. The market has a highly variable occupancy depending on the time of day or day of the week. On average, the market receives **500+ daily users**, including **52 regular shopkeepers, 430 consumers** (estimated from 1,720 daily tickets divided by four), and **60 tourist visitors**.

AccessS roadmap

Considerations while **developing AccessS tools:**

Wheelchair users or those with reduced mobility, strollers or shopping carts

- Install accessible ramps and sturdy handrails wherever there are level changes.
- Reconfigure stall layout to reduce congestion and create wider aisles for strollers and mobility aids.
- Provide accessible restrooms with appropriate fixtures and support bars.
- Design seating and furniture (service counters) with appropriate height and clearance for wheelchair users.

Deaf or hard-of-hearing individuals

- Include sign language-trained staff or video interpretation services.
- Install visual and acoustic emergency alerts that are accessible from all areas of the market.
- Equip elevators with translucent doors to enable visual communication.
- Provide accessible websites and information portals with Spanish Sign Language and subtitle options.

People with cognitive/intellectual disability or first-time visitors

- Design intuitive navigation aids such as color-coded paths and logical spatial layouts.
- Incorporate visual icons and tactile maps to support users with cognitive challenges.
- Use user-friendly digital navigation aids (e.g., QR codes) to guide first-time visitors.
- Provide staff support or guidance stations to help newcomers find their way easily.

People with visual disabilities

- Improve lighting quality with LED fixtures that reduce glare and increase visibility.
- Use high-contrast colour schemes and tactile signs for easier orientation.

Shopkeepers

- Provide dedicated rest zones for shopkeepers to rest.
- Install clean, dedicated restroom facilities with showers for market staff.
- Use real-time data systems to manage crowd levels and services.
- Improve thermal comfort, ventilation and air circulation to reduce discomfort during warmer months and improve overall air quality.
- Improve lighting systems to ensure bright, glare-free, and consistent illumination that supports both visibility and safety.

People with chronic fatigue

- Install resting areas at regular intervals to accommodate those who need breaks.
- Ensure family-friendly restrooms with changing stations for children.

All visitors

- Install visual alarms and illuminated exit signs to guide people during emergencies. Provide tactile signage and auditory emergency announcements.
- Ensure emergency exits are barrier-free and clearly marked from all areas.
- Ensure regular hygiene and sanitation within the market and its surroundings.
- Minimize noise levels.

Conclusions

This report aimed to identify and assess the needs, expectations, and challenges experienced by diverse user groups, individuals with disabilities, reduced mobility, and other vulnerable groups across six demo sites, with a dual focus on the accessibility of the built environment and the inclusivity of active mobility solutions. The approach aims to ensure that technological and infrastructural innovations respond effectively to the real needs of users.

This work has provided **a roadmap for capturing the diverse needs of end-users**, especially those with cognitive, physical, or multiple disabilities **and translating them into actionable insights for the development and implementation of AccesS tools and mobility solutions and plans**.

Moreover, the analysis of the pilot sites has highlighted the **diversity of challenges faced by users not only in terms of physical accessibility, but also regarding cognitive, sensory, and social aspects**. The process of adequately addressing the full spectrum of disabilities, such as sensory, cognitive, and psychosocial dimensions, remains a continuous learning effort. Equally important is the need to ensure **accessible information and communication**, which must be designed to accommodate diverse needs, including multiple formats (such as Braille, sign language, easy-to-read versions, and digital tools). Accessible information and effective communication systems are essential for enabling independent navigation, active participation, and informed decision-making by all users, particularly those with communication or sensory disabilities. There is a need for deeper collaboration with disability advocacy groups, experts in inclusive design, and local communities to ensure that future design iterations are comprehensive and representative of all user groups.

The analysis of user needs has shown that **accessibility, usability, comfort, and sustainability are not separate goals, but deeply interconnected dimensions of inclusive innovation**. The findings collected so far will guide the prototyping and testing phases, enabling iterative development of smart and adaptable tools co-created with stakeholders and tested in real-life settings to support active mobility, energy awareness, and digital inclusion.