

Assessing a Rehabilitation Living Lab Research Project: The Meta-Analysis of an Inclusive Environment for People with Disabilities

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Abstract

This paper presents the results of a research based Living Lab experience, where people participate together as users, researchers, stakeholders and collaborators working to effect change to improve social inclusion and social participation for persons with functional difficulties. The Rehabilitation Living Lab in the Mall (RehabMall) transforms an urban shopping mall into an interdisciplinary, multi-sectorial research platform that supports multiple projects investigating what constitutes an accessible and inclusive environment for people with physical, sensory and cognitive disabilities. We present an overview of the RehabMALL Living Lab, the contexts of the project and the project meta-analysis to present the salient issues emerging from the projects that were done. Grounded in a design research approach, and inspired by the Ecological Systems Theory of Bronfenbrenner (1979), the investigations conducted focus on subjective and inter-subjective experiences within understanding obstacles and facilitators that frame how people experience going to the mall, and how the physical, cognitive and virtual environments that support these activities might be better served. Disability is defined within the framework of the “World Health Organization’s International Classification of Functioning (WHO, 2003). The overview of the project is presented with particular attention to the various collaborations and partnerships created alongside the issues that emerge in terms of results, and how people might be better served when public spaces are designed with their input and within a perspective of universal design.

Keywords: living lab, participatory research approaches, universal design, social inclusion, interdisciplinary approaches, functional difficulties

Living Labs are an innovative platform for doing research in the context of the urban environment, where co-design and research can come together to effect change. We present the results of an extensive research initiative done within a Living lab known as the Rehabilitation Living Lab/RehabMALL, the first of its kind in Canada. The Rehabilitation Living Lab takes place within both virtual platforms and the real physical environment of a commercial mall. The RehabMALL transforms an urban shopping mall into an interdisciplinary research platform that supports multiple projects investigating what constitutes an accessible and inclusive environment for people with physical, sensory and cognitive disabilities. The ultimate goal of the RehabMALL was to “create an inclusive environment that optimizes social participation and inclusion for all” (Kehayia & Swaine, 2016). This research project was lead by researchers with stakeholders including the owner of a Montreal downtown commercial centre Place Alexis-Nihon, “FPI Cominar”. We present what happens when a Living Lab becomes the catalyst for change, and when researchers work with stakeholders and industry professionals to change the conditions for access and inclusion for persons with disabilities using various forms of research

including design research. This project is the result of four years of investigation in collaboration with over 50 researchers and students.

We present an overview of the RehabMALL project and the overall results of some different studies undertaken during this four-year interdisciplinary, multi sectoral project. First, the research is presented in light of the overall project objectives and subsequent application in terms of virtual, physical and technological solutions. Second, the lived experiences of persons living with disabilities are also presented. This aspect of the projects was helpful within the RehabMALL work, as research was done early on and was influential in the decision-making that occurred in terms of physical changes made to the environment and in terms of how the mall changed to accommodate the emergent results and considerations that were provided to decision-makers on the renovation of the mall itself. Third, we present the meta-analysis of the entire project with an overview of the dynamics of the research project itself as a Living Lab, and including the collaborations and partnerships created to bring new knowledge and new forms of investigation. Finally, the discussion and conclusion present how the entire process was evaluated, what different research projects contributed, and what potential future initiatives have emerged.

The Context: The Rehabilitation Living Lab project objectives and process

The RehabMALL is composed of three main streams (as identified in the project overall objectives): 1) Identify the environmental, physical and social obstacles and facilitators to participation in the Living Lab space (for activities such as shopping or meeting with friends); 2) Development of technologies and interventions to optimize physical and cognitive function, social participation and inclusion of persons with disabilities; 3) Implement and evaluate the impact of technology, rehabilitation and design interventions in vivo in the Living Lab on physical and cognitive function, social participation and inclusion of persons with disabilities (Kehayia & Swaine, 2016: 1).

The research process is iterative in that it allows observation, creation and action with new reflections and actions from different levels and perspectives, and over several years. As a first step, it was important for the researchers to construct metrics of the existing situation and conditions, and identifying the factors that participate in creating optimal conditions for social inclusion in public spaces. The research methodologies included both quantitative and qualitative methodologies within different projects, and with the implementation of virtual and technological tools in vivo that can be developed and then be applied into practice. Several projects used a holistic approach centered on the person and their interactions with the environment, with the findings serving as a catalyst for the innovative tools and practices that ensued. The framework for these projects was the Living Lab.

The Living Lab Approach – Inclusion through rehabilitation and access

What is a “Living Lab”? The Living Lab is a methodology, an environment, a multidimensional and a dynamic system where people engage together to understand issues. This approach focuses on experimentation and co-creation, with the real users of environments, and where all stakeholders collaborate together to discover new solutions, new products and new services (European Network of Living Labs, ENoLL; Ahmed and al., 2015). The Living Lab operates in a

real context within public-private partnerships and integrates various researchers from different disciplines. It makes the real world a platform of interaction for experimentation, research and design. In light of this approach, the following questions guided the framework of the lab: i) How to increase the quality of public spaces for people living with disabilities?; ii) What are the facilitators and obstacles that help or prevent persons with disabilities to access a commercial centre? As Living Labs are somewhat organic in nature, the overall project was structured to provide cohesion and guide researchers as they developed their projects.

Focus on user experience: Physical, Psychological, Social and Virtual Reality in the RehabMALL

From a theoretical perspective, the project espouses a holistic approach centered on the person and its interactions with the environment. It includes the relation with oneself, the body, the other persons, the physical environment but also sociocultural aspects of the environment such as society values and ideologies. Inspired by the Ecological Systems Theory of Bronfenbrenner (1979), the investigation focus on subjective and inter-subjective experiences. It understands the relation with the environment as participation and interaction with the society. Disability is defined within the framework of the “World Health Organization’s International Classification of Functioning”, that means it considers disability and health as a complex physical, cognitive and social phenomenon (WHO, 2003). Therefore, it helps in understanding the link between individuals, participation, body structure and functions, and environmental factors.

Many studies were conducted in the RehabMALL to explore and assess the usability of the mall (Swaine et al, 2014; Kehayia et al, 2014; Poldma et al., 2014). Early projects explore the social and physical environment of the existing commercial centre, the facilitators and the barriers that users with disabilities encounter during their experiences when frequenting the public spaces of a mall. These projects included diverse studies on users’ perception using participatory research with walkabouts and “in situ” discussions with various stakeholders and individuals living with disabilities. The data collection included focus groups, participant observations and informal discussions alongside lived experiences in the walkabouts around the public spaces. Some participants were engaged over the four years of the data collection with walkabouts both before and after changes were implemented in the mall. Furthermore, stakeholders such as the owners, mall administrators, shopkeepers and vendors were invited to participate to the research. Specific questionnaires were developed for participants with particular diseases and/or disabilities and specific aspects of rehabilitation, including the entourage of persons with disabilities such as caregivers and parents.

In terms of design research, some projects explored the “psycho-social” and “physical-social” elements of the mall. Both physical characteristics and the social activities that occur as people navigate the mall were documented (Poldma et al, 2014). Existing characteristics on site such as circulation pathways, physical surfaces, lighting, colour and materials and noise levels were documented to provide a portrait of the existing obstacles and facilitators within the public spaces. Furthermore, researchers documented the issues faced and what design elements support or hinder access, social participation and active inclusion in the everyday activities of people. Here in Figure 1 we see a typical view of the public spaces at the beginning of the project.



Figure 1: View of the public space at the mall lower level, prior to implementation of changes

In another comparative study of the environment before and after renovation, the physical changes of the mall and the impact on user experience were documented as well as documenting how the renovations impact on people's lives. In yet another study, the universal design and way-finding elements in the mall were examined in light of how information is understood. This study included a post-evaluation of the physical environment, recommendations for signage, way-finding and how information is read by people navigating the mall.

Once design changes were made, the researchers returned to the mall to conduct a post occupancy assessment, a tool used to record both physical changes and to understand the users' satisfaction post renovations to the existing public spaces. This tool enables studying what impact these changes have on well-being and social inclusion. As Poldma notes: "The Post Occupancy Assessment is a tool used in design and architecture and is a standard tool for documenting user satisfaction post-building construction. This form of assessment is used also to evaluate user satisfaction in different types of interior environments." (Poldma et al., 2016: 2). Here in Figure 2 we see the interior space of the mall after renovations.



Figure 2: View of the mall lower level after changes were made

Co-creation and virtual reality

Furthermore, many of the 45+ studies undertaken during this investigation addressed the needs identified in objective 1. As Kehayia & Swaine note, project research included “...co-creation of simulations of the mall environment using virtual reality (VR) to train navigation in a secure laboratory setting before entering the real mall environment” (Kehayia & Swaine, 2016:2). Tests were conducted in virtual/laboratory environments. For example, tests evaluated new measures designed to study sensorimotor integration for balance and mobility enhancement, thus preparing individuals with disabilities before they actually go to the mall. This research simulated different environments, developing software and testing new techniques to support rehabilitation with the simulation of real environments. For example, geographic overviews help participants to plan their trip and allow for “virtual travel” before or during the real-time experience. In another example, global positioning systems (GPS) were used to help navigating within the mall, and special modules were co-created to train individuals with cognitive limitations, post traumatic brain injury and/or stroke. Projects were for visual, auditory and language challenges (language process and visual-linguistic interaction) and Communication Enhancing Systems were developed in both in laboratory and real environments. In Figure 3 we see a simulation of a person testing their reactions within a simulated virtual environment:



Figure 3: Virtual shopping demonstration at the mall by researcher T. Weiss

RehabMALL as collaboration and partnership: A Community of Practice for co-construction and sharing knowledge

This project was a massive undertaking that included multiple researchers, stakeholders and collaborators. As a people-driven project in an exploratory environment of the MALL, the project required structures to support the interdisciplinary, international and multi layered participation that occurred. First, researchers participated from many universities in Quebec and Canada, and from countries such as Israel, Italy and the United States. Collaborators and partners included the users with disabilities themselves, who come largely from the local and surrounding community. In this holistic perspective, researchers come from diverse disciplines as sociology, anthropology, design, architecture, engineering; partners come from different sectors as

development, retail, rehabilitation, industry, academic (Bertin et al., 2013). Second, in terms of communication and process, each study included valuable information, providing recommendations and guidelines for the mall administration, the architects, and other decision-makers in the public-private dyad. Thus fundamental knowledge changes the design of the mall renovations made with a universal design approach in mind and considering the research done to date.

Engagement and partnerships as a driver of change in the Mall

In terms of the mall interior, some visible changes made during the renovation of the mall included: 1) the addition of an access ramp giving direct access from the subway station to the mall; 2) a new centrally located elevator; 3) new signage design and implementation; 4) new lighting and new materials and furnishings throughout including seating areas. Furthermore, extensive work was done in the garage and at access points to the mall to facilitate parking and arrival at the various levels.

The partnership between researchers, engineers, architects and administration rendered the mall more accessible overall and the design provided new places for congregation and activity on each level, an element deemed necessary for affording social inclusion. There was an overall increase in the use of the mall by people with disabilities, as traffic patterns studied indicated an increase in the traffic of older persons at some entrances, from the existing 6% to 23% (Kehayia & Swaine, 2016).

The Living Lab approach resulted in easier access, changes in attitudes, new and strengthened partnerships and increased engagement. First, changes made to the mall had a positive impact in terms of providing easier access for various people with disabilities. It also changed attitudes within the mall and among stakeholders. Second, the partnership raised awareness about the importance of taking into account the needs of people with disabilities, which can positively contribute to change culture and perspective in creating inclusive environments. Finally, this approach led to increased community engagement and this had a positive impact in terms of its influence on the process of the investigation, on the methods and indicators used for assessment of the project, and on the multidisciplinary collaborations that developed between researchers and practitioners. The multiple projects brought new understandings about community concerns, about different levels of intervention and about what is needed when rehabilitation patients integrate back into society. The added creation of the CoP virtual platform facilitated discussions between stakeholders on important mall-related topics such as public accessibility issues, community needs to optimize social participation and inclusion, and the setting of research priorities.

A bilingual website was also created to facilitate communication and inform the general public. Annual meetings have been held since 2011 bringing together 70 stakeholders, partners and team members together with the Advisory Committee who provides oversight. Events such as the Scientific and Open House Day (2015) held at the commercial complex itself, provided a real time experience within the venue of the mall, showing an overview of achievements and results of the research to various representatives, affiliated universities, general public, shopkeepers, members of the Living Lab, researchers, students and government officials.

Community of Practice

As mentioned, an important element in the structuring of the activities was the Community of Practice (CoP). As a concept, communities of practice are a loosely organized group of people with common interests who meet to engage in the issues of importance to them. CoPs are an important facilitator in an evolving participatory research approach and in the case of the RehabMALL, the CoP helped to frame the issues facing the project and the various ways that stakeholders participated. CoPs encourage creativity and innovation by bringing knowledge profusion, multiplying perspectives and combining different research fields. Furthermore, CoPs prevents the division of the stakeholders, helps to prevent duplication and make it possible for all the partners to be part of the project (Poldma et al., 2016). The Community of Practice had an impact on individuals and on organizations by facilitating the vitality of exchanges, communication modes and members' satisfaction. Participants were encouraged to raise new subjects, to make comments, and to explain their ideas in a collaborative environment of exchange. They also get a better understanding of the different aspects of the projects and how they can contribute to it. The CoP offered an opportunity to exchange information with people in a related domain, speak about their own experience, and see the advantage of working with similar organizations. Globally, participants were satisfied with CoP exchanges and the virtual platform that accompanied the CoP meetings and exchanges.

A Meta-Analysis of the RehabMALL Project: The overall assessment five years later

The meta-analysis was conducted to study the overall impact of the research studies and the implementation of innovative technologies, social programs, programs to raise awareness, physical changes of the environment, and development of new tools. After five years, over 60 research projects have been conducted with the participation of over 55 researchers. Also, at the end of the project life, it was essential to evaluate not only the results of this project but also the outcome of the process and the impact of the research done, for future continuation of other initiatives, and to understand the real impact of the research on changing the environment on multiple levels. It is important to both understand the results from a holistic perspective and to question the process of the RehabMALL itself, for the development of new research. As Poldma noted:

“The Rehabilitation Living Lab requires both a post-mortem of the research and renovations done to date, and a meta- analysis of the entire Living Lab project at this stage. Questions to be asked include: What are the processes and impact of the research carried out by the PSI Mall project to date? What is needed to address gaps in interventions and outcome evaluation to continue to evaluate the implementation process and impact of the mall “Living Lab” physical changes and the various research programs? Furthermore, issues such as stakeholder involvement and user experiences have been documented at least partially but not analysed in the context of policy.” (Poldma et al., 2016)

The focus of this meta-analysis was the evaluation of the process and the impact of the MALL project. From a methodological point of view, it was important to analyse the impact of the changes made within the physical environment, understanding the diverse investigations to synthesize their results, all the while considering the “Living Lab” both as a phenomenon as well as a meta-project that provided the support for a variety of research projects and initiatives.

The use of the Grounded Theory (Charmaz, 2006; Glaser & Strauss, 1967) assisted in the data collection process of the different research projects for the meta-analysis and for providing the overall framework developed for the data collection that ensued. As the researchers involved in the meta-analysis noted:

“This phenomenon can best be assessed with grounded theory methods, wherein the phenomenon is studied “ from the ground up ” and considers the elements of the project in terms of sifting the data collected to glean a complete picture of the research done to date (Glaser & Strauss, 1990; Charmaz, 1988). We are interested in discovering what has happened, how the research projects have influenced the outcomes in the MALL, and how the MALL has influenced the research undertaken...” (Poldma et al., 2016: 3)

Four researchers evaluated the entire RehabMALL with five different perspectives (projects) that were conducted within the meta-analysis framework. These included:

1. The Precede-Proceed Model;
2. The Physical Post-Occupancy Assessment of the RehabMall;
3. A comparative study of the accessibility of the mall relative to the International Classification of Functioning, Disability and Health (ICF) criteria;
4. The assessment of relative increase in satisfaction and social participation;
5. A policy analysis.

Discussion: The emergent results of the studies within the Meta-Analysis

As per the perspectives, we present the summary of five studies conducted within the Meta-Analysis and their results:

1- Precede-Proceed Model (Sara Ahmed): The PRECEDE-PROCEED model was applied as a framework for the implementation and evaluation of the project performance over the course of the entire five years (Green & Kreuter, 2009; Ahmed, 2014). It is a participatory planning model often used to evaluate public health programs. It meets planning, implementation and evaluation aspects to provide a framework for activities (Ahmed and al., 2015). The model presents the pre- and post- research goals and objectives and compares the results of the research and the Living Lab changes. The PRECEDE-PROCEED Model (PPM) was applied to existing mall setting and was used to develop a framework for an inclusive environment. It meets consumer, participation and social needs of persons living with disabilities. According to Sara Ahmed, leader of the PPM: “The PPM provides the blueprint for the construction and evaluation of health programs in nine steps divided between the planning components (phases 1-5), implementation (phase 6) and evaluation components (phases 7 to 9) (Crosby & Noar, 2011). Use of such a framework for the MALL project was considered important to promote the transferability of the process to other similar research environment and national and international programs.” (Ahmed and al. 2015b: 3-4). The model is composed of nine steps divided in two phases. The first phase “PRECEDE” deals with the planning, the assessment of the community, the user needs (social and epidemiological, behavioural and environmental), and the development of intervention programs (educational and organisational diagnostic, administrative and policies assessments). The second phase “PROCEED” deals with the evaluation, which corresponds to the implementation of activities and programs (including technologies and interventions in vivo), and to the processes,

impacts and results assessments. The model enables to identify and fills the gaps on different aspects that emerged: the general conditions outside the mall and inside the mall, the social support, the education, the society/policy, and the person (Ahmed and al. 2015).

2- The Physical Assessment of the mall environment and Post Occupancy analysis (Tiiu Poldma): The post-occupancy evaluation assesses users satisfaction after the design and the changes made due to the renovations made physically to the mall. A content analysis of visual elements was also conducted to compare the quality of the environment both before and after the renovations. Parallel to the documenting of the physical changes, people's experiences were documented with walk-about that were conducted with individuals living with disabilities (Poldma & Herbane, 2016). Narrative of these experiences included comments about the changes made, and the different elements of the environment. Emergent themes included characteristics such as ramps and access points, circulation, overall accessibility, equipment, services, signage and whether or not social inclusion was successful. Before the renovations, some elements were absent, such as useable access ramps, railings and signage. Some problems identified included the lack of luminosity, difficulty in reading the space cognitively, lack of floor markings to help visually impaired persons to identify obstacles, among other issues. Changes made included the installation of two access ramps and an elevator in the central core of the public spaces, reorganizing the information booth to the central core, the design of new signage, the increase of luminosity, changes to the material choices, the improvement of visual conditions, and better space organisation with wider aisles for easier circulation. Finally, while most participants made positive comments, social inclusion concerns remain. Users with disabilities often need help, and they feel degraded when they have to ask or to wait for help. Some people can be curious and ask questions, other just let them do what they want. There is still work to do on the social level to raise awareness and to inform the general public on the interaction with people with disabilities, to counteract these types of stigmas.

3- Comparative Study of the accessibility with the ICF criteria of the World Health Organization (Geneviève De Repentigny Roberge): The International Classification of Functioning, Disability, and Health (ICF) defines various aspects of disability: physical, mental, functional and environmental (De Repentigny, 2015). The analysis conducted post renovation was done to compliment the post occupancy evaluation. This analysis compared the accessibility and its relative success with the ICF criteria. Issues emerging from this study include the following: a) The products and the technical systems can facilitate or create a barrier to communication. Some elements such as access ramps, elevators, signage, the information booth, and the indication of services help the navigation and the way-finding. However, the lack of access ramps, lack of clear visibility, automatic doors, fountain and seats that are easily accessible, all contribute to limitations. Specifically, problems with signage included high and far locations, a limited access to needed information, and an overall lack of signage available at lower levels constitute obstacles. b) The physical environment includes people in movement, light and sounds all together. These elements worked together better in the new renovation, as in the existing conditions the lack of luminosity, the presence of shadows and the high level of traffic constituted obstacles. c) The social environment corresponds to the help that family, friends, other users, community members, guide-dogs from associations for the visually impaired (such as MIRA in Québec, Canada) and assistants can give to individuals with disabilities. And while the central relocation of the information booth helped to create a clear place for people to ask for

help, conversely several people noted that the personnel at the information booth was not trained to help persons with disabilities. d) This study also reviewed the attitudinal environment, as per the ICF - this refers to attitudes people have when they are around individuals with disability. This may include family, friends, health-care assistant, users, and so on. Despite the many positive changes made to the mall, some disparities still exist depending of the type of deficiency (visual, motor, language) of the person navigating the mall. There is still work to do to change perceptions and to encourage people to be more tolerant towards different persons. e) While specific services, systems and policies were not studied extensively before the changes made to the mall, some issues did emerge, such as the need to have Internet access and to have mobile applications to help people with disabilities to navigate and find their way within the mall.

4 – The assessment of the increase of satisfaction and social participation (Guylaine Le Dorze and Geneviève de Repentigny Roberge): An analysis of the satisfaction and social participation was conducted to understand how these were affected by two elements: environmental factors and lived experience (Le Dorze & De Repentigny, 2016). The environmental factors include attitudes, help, relations, and the physical environment. The researchers analysing the mall post renovation considered the visibility, the use, the comfort, the positive and open attitudes, the patience and the support of people in the mall, and the presence of pets. An adequate environment helps orientation, visibility, use and comfort. Also, the question of “sense of safety” is important and is tied to the social aspect of coming to the mall and meeting someone, not hampered by these types of concerns. Overall the mall satisfied people for these perspectives, as many stated they were happy to come to the mall whereas before they were not as comfortable due to issues that hampered an increase in satisfaction and social participation.

5- Policy analysis (Keiko Shikako Thomas): An environmental scan and a series of assessments with focus groups were done to analyse the different phases of the project from the perspective of social policy (Shikako-Thomas and al., 2016). The main objectives were to identify actionable policy points from the mall and policies that can impact on individuals living with disabilities. The goal was also to develop a framework to transfer knowledge between research and policy. A participatory research segment was conducted to analyse existing policies. The framework was based on selected social determinants of health in Canada (such as income, education, unemployment, job security, etc.), environmental and social factors, and life style. Specific documents analysed included the UN Convention on the Rights of Persons with Disabilities (2016), priorities listed from the Provincial Office for Disabled Persons (Office des Personnes handicapées du Québec, OPHQ) and some components of the provincial laws (Quebec Law E-20.1) that support the social integration of persons with disabilities. Focus group and interviews were done to understand the issues and to structure potential policy strategies. Concerns that emerged included: the need to go beyond policy charts, strategies to engage stakeholders in the research to policy dyad, ethics of applying research to practice and the need to include other vulnerable populations in social spaces (Shikako-Thomas and al., 2016). Overall, it is determined that integrating research information with policy guidelines and research policy facilitates participation of individual with disabilities in society in general, and at the mall, in particular. Encouraging stakeholders in disability to inform research and policy through continuing collaboration supports rehabilitation research with policy impact and is vital to pursue.

Conclusion

This complex and large investigation had many potential, intrinsic challenges. The first challenge was to assure transparency and flexible management of communication that changed the management culture of the commercial centre. The second challenge was to ensure that user needs are central to research. The third challenge was to work in an environment such a commercial centre where public and private interactions are dynamically occurring. Finally, the fourth challenge was to connect the healthcare system perspectives and needs with those of a commercial centre.

The project has had an enormous outreach on multiple levels including researcher recruitment, student training, involvement of the general public and the clinicians milieu, training of highly qualified personnel, diffusion and publication of knowledge, organization of conferences, technological innovations, and more (Kehayia & Swaine, 2016). Furthermore, this project expanded the comprehension of the lived experience of users and especially in terms of the context where these conditions are experienced. The project also provided recommendations for health care providers and community organizations. The RehabMALL provided a new platform for reconsidering intervention planning with the organizations involved and how the collaboration, of both the different partners and the collaborators, was vital with the shared desire to create a more inclusive society. Furthermore, the project documented different research processes, and developed a variety of assessment tools and cross-disciplinary collaborations. It developed a virtual platform to encourage and facilitate communication – the community of practice (CoP) and various projects provided technological tools. Globally, the project had a positive impact on collaborative work and helped create the feeling of taking part in a community. In turn, this community feeling enabled a shared leadership, raised mutual trust and autonomy, generated creativity and innovation, while offering continuing training opportunities and stimulate reflection (Poldma and al., 2016).

The impact of the project was substantial in terms of research and the resultant accessibility of public spaces. Research informed renovations that in turn improved the circulation, the perception, the orientation and the way-finding for persons with disabilities who come to the mall. In terms of universal standards, the access ramp and the elevator facilitate the passage from the metro station to the commercial centre and the street level, while circulation changes facilitated movement within the mall. Way-finding was facilitated by both spatial changes and signage changes. The project integrated research within the decision-making structure of the shopping mall and in doing so, built new forms of collaborations and research.

The project made the public spaces more inclusive and opened to people living with functional difficulties. It encouraged administrators, researchers and health care professionals to change practices and to reinvent ways to transfer knowledge from research to the professional milieu. In the end, it essentially demonstrated the need to persevere in designing inclusive environments to fulfill universal design needs in society.

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