Design for People, Design with People: The Complexities and Breakouts of Public Service Design in Practice

Wei-An Hsieh and Hsien-Hui Tang(✉)

Department of Design, National Taiwan University of Science and Technology, Taipei, Taiwan
`drhhtang@gapps.ntust.edu.tw`

Abstract. Public service innovation for the underprivileged minority is challenging for meeting users' needs while avoiding compromising the rights of non-users. It also suffers from limited resources under considerations of proportionality and efficiency of public welfare. Commonly, to quickly respond to social needs, public sectors often take technology-oriented solutions instead of clarifying the underlying complexity. Lacking user-centered design, public services are often criticized for low usability and result in unsatisfaction and even more significant problems. Can service design, as a strategic method to counter issues with poorly defined parameters, non-binary solutions, help drive better public innovation?

Through a case study of EyeBus, the research purpose is to explore how service design enhanced the bus-riding experience for the visually impaired. The research objectives are (1) to clarify the complexities in the process of accessible public service design (2) to analyze how service design resolved the difficulties (3) to study how stakeholders' cooperation accelerated the practice of public services. The results of the research are (1) providing a case and principles of applying service design to public service innovation (2) promoting action plans for public sectors to encouraging more demand-oriented public service innovations. We hope that better practices of service design will drive more public good.

Keywords: Public service innovation · Service design · Visually impairment

1 Introduction

The number of the visually impaired in Taiwan has grown over 56000 until 2020, accounting for 0.2% of the country's population. Same as sighted people, the visually impaired have to go to work or school via public transportation. The bus is a preferred choice for the low ticket price and the significant bus routes among all public transports. However, it also can be dangerous for the unpredictable approaching time and location. Visually impaired passengers suffer from hailing buses in time, not mentioning finding bus doors in the few seconds buses stop by. Even though central and local governments in Taiwan have made attempts for accessible bus systems, few cases were of full implementation.

The contracting out pursuing cost-efficiency has led to the stagnation of public service innovation. The public sector tends to rely on technology-oriented solutions for

predictable and instant outcomes, ignoring public demands and thus caused complaints. Though the consensus of public-private collaboration has risen in recent years, conflicts exist among the multiple stakeholders. How can we design public services that satisfy stakeholders?

Service design as a strategic design method can deal with complex problems without clear boundaries and non-binary solutions (Prendeville and Bocken 2017). It is believed to unveil meta-questions (Sung 2020) that lie beneath the demands. Following the triple diamond process (Tang 2019), service designers solve problems by demand recognition, design iteration, and service validation.

The study is to first uncover the complexities of accessible public service innovation through literature review. Secondly, through a case study of EyeBus, we perform the strategies and results of service design approaches to improving the bus-riding experience. Last, we conducted semi-structured interviews to examine the challenges of demand-oriented solutions in practice.

2   The Complexities of Innovation in Accessible Transportation

Design Inclusively. WCAG (Web Content Accessibility Guidelines) addressed perceivable, operable, understandable, and robust as the four principles of accessible digital design. CABE (2006) put another four principles for accessible environment design: 1. Place people at the heart of the design process. 2. Acknowledges diversity and difference. 3. Offer choice where a single design solution cannot accommodate all users. 4. Provide for flexibility in use. In conclusion, accessibility designers should recognize diverse patterns of interaction and offer them with adjustable, consistent experience of service.

Deal with Interest Conflict Among the Public. Accessible public service designed for the specific ones may, on the contrary, threaten others' rights. (Chang and Yan 2011) The construction of tactile paving in Taiwan, as an example, has caused spinal injuries to wheelchair users (Liao 2008).

Avoid Reducing the Efficiency of the Public Transport System. People take the entire cost and time into consideration when choosing a means of transportation. Public transportation as a non-door-to-door service where the first-and-last mile exists between stations and households are less competitive to private vehicles.

Avoid Hardware Constructions. Taiwan is too densely populated to afford irreversible changes to the environment. Frequent public works may push people to private vehicles instead of the public transportation system. The Ministry of Transportation has recommended that public transportation should innovate based on the existing hardware system.

Ensure the Stability and Versatility of Solutions. Accessible public transportation as a service is a series of touchpoints related to each other (Stickdorn et al. 2018). Cases of bus-riding experience enhancement in Taiwan consisted of a single technology, which was unstable in the field. Since service gaps exist in every touchpoint may reduce

usability or even availability, back-up experience design is vital in public service design. Besides, service planners should foresee the challenges of scaling up a solution to avoid costly redesigns in the future.

Reduce the Cost of Solutions. Public services are the ones provided for large numbers of citizens, in which there is a potentially significant market failure (Leinonkoski 2012). Therefore, the benefits of social innovations should be proven to overweigh the costs. Cases of bus-riding experience enhancement in Taiwan were unaffordable due to costly hardware constructions.

Convince Stakeholders to Commit to Innovation. The revenue of public transport companies constrained due to the fixed ticket price designated by the government. Hard to reach break-even points, companies lack the motivation to invest in innovations.

The complexities of accessible transport innovation were found through the case study of EyeBus, referring to varied domain knowledge, including public transport, public administration, and design. On the premise that multiple professions and stakeholders were involved in public services, solution providers should think holistically.

3 Service Design Methods to Overcome the Complexities

Service design originated in management is an approach to enhance the customer experience. It is expected as a strategic thinking tool to deal with wicked problems (Prendeville and Bocken 2017). Also, it is believed to re-think the relationships between public sectors and the citizens based on an equal interaction. (Cox et al. 2015). Stickdorn et al. (2018) suggested six principles in service design: human-centered, collaborative, iterative, sequential, real, and holistic.

EyeBus team proposed a service aiming to assist the blind to ride buses alone for work or school. EyeBus consisted of digital and physical touchpoints, including an app, bus telematics system, and boarding point. Visually impaired passengers could make bus reservations via the app and the bus telematics system. Boarding points represented tactile and visual hints where passengers and drivers met. Below were the strategies EyeBus made to counter the complexities of accessible public transport design.

Clarify User Needs. Given the different experiences of sighted and visually impaired people, the EyeBus team first applied shadowing, a research method observing detailed behaviors in the field to build empathy with visually impaired people and inclusive design principles for the solution. Secondly, the EyeBus team defined the target user and service goal with customer journey maps and persona matrix.

Survey for Opportunities. To help visually impaired passengers "hail" the buses in advance, the EyeBus team searched for existing touchpoints between passengers and bus drivers. Analyzing the six-channel service model proposed by Tang (2019), The EyeBus team chose well-developed technologies such as apps, bus telematics systems, and tactile hints among all the digital and physical touchpoints (Fig. 1).
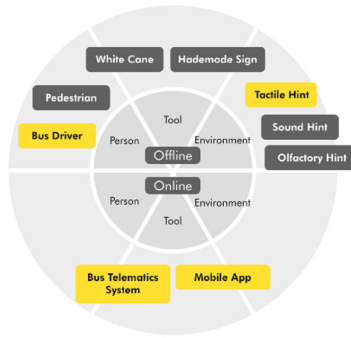
Fig. 1. The six-channel analysis of existing bus-riding service

Propose with Graphics. The EyeBus team proposed their solution with a storyboard describing what users experience reserving a bus. Service blueprint as a graphical tool presenting how a service worked frontstage and backstage, the EyeBus team also introduced it to reach consensus among stakeholders.

Develop Prototypes and Iterate. Following the agile development principles, the Eye-Bus team validated the service feasibility with minimum viable products applying wizard of Oz. The EyeBus team invited visually impaired users to examine the app's usability, bus drivers to experience the degree of burden serving passengers, and O&M (orientation & mobility) instructors to evaluate the versability of boarding points (Fig. 2). Every iteration of the design was based on user feedback.
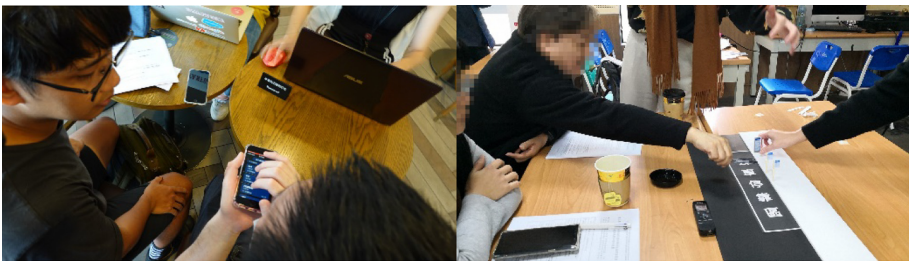

Fig. 2. The EyeBus team conducting tests with visually impaired users and O&M instructors.

Bridge the Gaps Between Touchpoints. Regarding that gaps in service touchpoints may cause poor experience, especially in multi-channel and cross-scenario services, the EyeBus team sketched back-up user flows instead of just proposing an ideal user journey. Moreover, they also had app hints matchable to physical environments, offering a sense of security for visually impaired users.

Validate the Feasibility of the Service. Upon the first launch of the service, the EyeBus team conducted a soft launch to examine its usability and feasibility. Facing the uncertainties in realities, they recorded every service gap with quantitative and qualitative research methods such as the G-S-M model for the next iteration (Fig. 3).
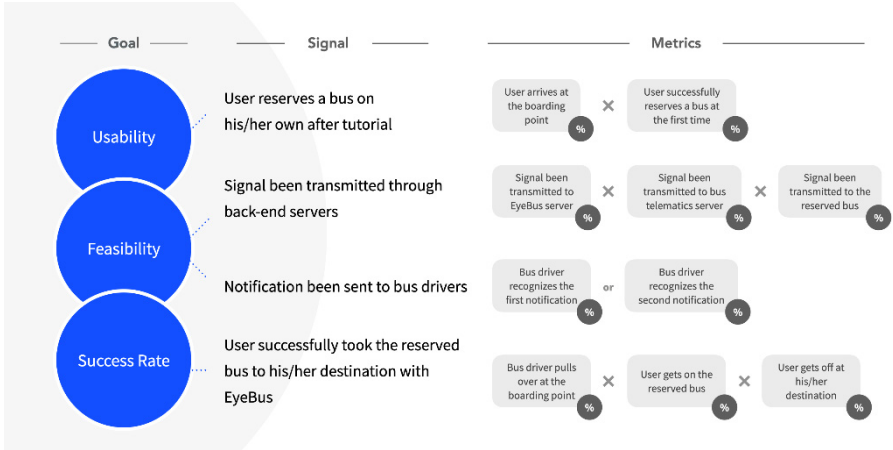

Fig. 3. The team applying the G-S-M model, a quantitative research method, to evaluate the usability and feasibility of EyeBus.

4   Challenges on Practicing a Demand-Oriented Solution

Multiple stakeholders are involved in EyeBus, including service receivers like visually impaired people and O&M instructors; service providers like bus corps and telematics system corps; service supervisors like central and local governments (Fig. 4). The EyeBus team put effort into managing stakeholder requirements during development. Through interviews among stakeholders, we summarized the underlying challenges to launch a demand-oriented solution as follows.
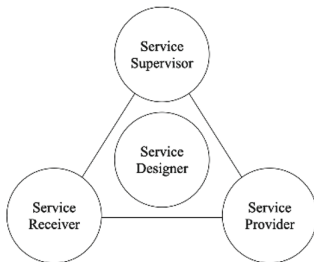

Fig. 4. The simplified stakeholders' map of public services

Service receivers – the low expectation of public interest. Though service receivers are the most benefited ones to EyeBus, they had already been disappointed at countless accessible attempts ending with nothing. Holding low expectations of public innovation, they tended to show a passive attitude of cooperation.

Service providers – ineffective collaboration among varied professions. Service providers played as partnered developers during the EyeBus project and the service operators by the end of the project. However, lacking incentives of accessible design, service providers paid less attention to the schedule and specifications of development and thus delayed the soft launch of EyeBus.

Service supervisors - distrust of the design profession. Public sectors were in charge of investing, supervising, and evaluating public service innovation. Accustomed to grading policies by its quantitative performance, the government distrusted service designers who presented qualitative skills more. Lacked confidence in designers, the government was once reluctant to invest in the EyeBus team.

Service supervisors - lack of sustainable service operation. To scale up the public service, the government had a lot of challenges to counter with: proposing procurements, communicating with multiple sectors, and meanwhile devoting to continuous iteration. Lacking the profession of human-centered design, the government would only end up investing in an incomplete service.

5   Final Remarks and Future Work

Prahalad and Ramaswamy (2004) proposed the DART model, which stood for the building blocks of co-creation: dialogue, access, risk assessment, and transparency. Several related attempts made by the EyeBus team were proved effective to break the barriers of collaboration. Stakeholders were convinced and thus willing to devote their recourse due to the actions below.

Make Strategies Visible. Inviting stakeholders to monthly meetings and making meeting minutes open to the public, the EyeBus team informed them of every consideration behind the decisions. Under frequent communication, the supervisors finally realized the importance of field tests and helped arranged bus stop constructions across departments.

> *"I was granted full access to your research, which helped me realize every effort you made under a decision. Feeling trustful of the team, I felt responsible for negotiating with the public sectors."*

Improve the Understanding of the Design Profession Among Stakeholders. The EyeBus proved the usability and feasibility of the service with quantitative and qualitative methods. Convinced by the credible research results, the government committed to expanding EyeBus to Taiwan's capital city.

> *"It wasn't until watching the POC (proof of concept) video did we realized that you were validating the feasibility of service instead of computer simulations. Since then, we changed our view of service design, believing that human-centered design research was crucial for presenting users' needs."*

Enhance the Empathy with Users Among Stakeholders. Quoting users' feedback, the EyeBus team proved the improvement of bus-riding experience among the past projects. Also, the EyeBus team invited stakeholders to field tests to help them get a clearer picture of users. With a deeper understanding of the visually impaired, the public sector became more observative on other related projects.

> *"I heard a lot of feedback from the visually impaired interviewee at your field test. Therefore, I felt brushed off when operators in other projects were submitting user feedbacks with mere 1-2 sentences."*

Accelerate the Resource Leverage with Agile Development. The EyeBus team found the pivot of the seemingly exclusive relationship between service supervisors, providers, and receivers. They formed a cycle among stakeholders to introduce resources and accelerated it: (1) Service designers proposed and prototyped the solutions that overcame the recognized complexities. (2) Service designers verified and alternated the service by third-party users. (3) Service designers asked service supervisors and their cooperating companies for laboratory resources. (4) With an experimental environment closer to reality, service designers built prototypes with higher fidelity for the next iteration cycle.

In conclusion, we outlined the complexities of accessible transport design, which might be broadly interpreted as the ones of public service. Through the case study of EyeBus, we found out that professional service designers could play as the solution innovator and negotiator considering all stakeholders' needs. With service design tools and methods, designers were capable of and developing and examining service prototypes.

However, service design as a human-centered approach only specializes in proposing more feasible solutions. More challenges are to be solved during its implementation, especially after designers handing over the project to the responsible operators. To improve the demand-oriented public service, the public sector should help build iteration cycles by integrating resources across departments, introducing professional service validators, and systematically collecting user feedback. In this way, public service innovations can thrive and bring about the greater public interest. Lastly, the ones who put the solutions into practice and keep iterating for social needs are doing public service design.

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