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How to Apply Service Design Thinking on Designing Accessibility Apps: A Case Study of public transportation for the Visually Impaired

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Abstract: Accessibility App programming consists of multiple technical utilizations and ease-of-use specifications. Many challenges were encountered when landing in complex contexts, making it difficult for traditional App designers to overcome. As a result, the success rate of the service and satisfaction stays stagnant after the App launches. This research takes the service design case "improving the public transportation for the visually impaired", which received critical acclaims from service participants as the research subject. We explored service design as problem-solving-oriented innovative thinking and how it assists and improves the design process for App designers, thereby increasing the success rate of the overall service. This research presents the design process of service design integrated into accessibility Apps, the process and result of responding to related challenges. Subsequently, setting them as guidelines for App designers to follow while pointing out the integration of service design thinking can increase the integrity of accessibility apps.

Keywords: accessibility Apps; service design; public transport; visually impaired

1. Introduction

With the advancement of technology, accessibility Apps seem to have mature techniques and referenceable specifications and technical support. However, there is still no technology that can completely solve the difficulties met by the visually impaired when taking public transport (Hersh, 2018). The lack of research done on the integration of App and service design is obvious. In practice, countless challenges accumulated for App designers. Eventually, the App only offers ease of use, but altogether, the success rate of the service stays stagnant.

This study takes the EyeBus program, a public transportation assistance for the visually impaired, as the research case. In addition to the difficulty of accessibility App design, the real field's complexity must also be resolved. Therefore, the EyeBus executive team explored service design thinking throughout the entire research and design process of Eyebus. Interviews were conducted with bus drivers, orientation instructors, the visually impaired, bus manufacturers, and bus industry operators. From there, a bus booking App was developed, with it being the primary service system, along with a priority boarding area and a bus telecom system.

A total of 30 proof of service tests were conducted on the Taipei Nanjing Main Line, achieving a service success rate of 96.7%. Eyebus was later implemented and distributed by the Taipei City Government.

Based on the EyeBus case, three related research questions are explored in detail.

1. When dealing with the service in accessibility Apps, what are the challenges faced?
2. How are the challenges resolved, after the service design is introduced?
3. What is the impact of service design on App design?

This research employs participatory case studies to clarify the preceding mentioned issues. Three research objectives are formulated based on integrating service design thinking into accessibility App design.

1. Difficulties encountered in current accessibility Apps.
2. Record the practical implementation details and results after the implementation of service design thinking
3. Summarize the method of introducing service design thinking into accessibility Apps

2. Literature review

This chapter covers four sectors. Namely, describing the visually impaired riding the bus, expounding the recent development of accessibility Apps, summarizing the difficulties designers have stated and, illustrating the definition and characteristics of service design to fix the challenges met.

2.1 Bus ride for the visually impaired in Taipei

"Visual impairment" is defined as a defect in a person’s ability to perform visual-related activities; with lifelong impacts in their quality of life in the International Statistical Classification of Diseases (ICT, 2018). With the increase in the number of visually impaired (Bourne, 2017), the demand for accessibility access cannot be ignored.

Transportation by bus is by far the most popular and common method for visually impaired adults to commute. (Xin-Yi Wu, 2018). It has numerous advantages, including a smaller financial burden, high-density routes, and it covers areas not accessible by the MRT.

For this purpose, the Taiwan government has set up various auxiliary equipment, hardware, and software. However, many visually impaired individuals wrote to the media about their negative experiences and extremely low operational efficiency. Possible reasons could be difficulties in coordination with bus drivers, the location of the bus stops is unclear (Yong-Jun

Li, 2008). Lastly, government policies have been in place for many years, but they can still not solve the problem, which requires new innovative methods.

2.2 Accessibility App

There are three types of assistive devices for the visually impaired developed to increase their independence in mobility: Electronic travel aids, electronic orientation aids, and position locator devices (Lin, Lee & Chiang, 2017). Among these devices, positioning devices are the most widely used to determine where the device holder is, such as global positioning system (GPS) and geographic information system (GIS) technologies (Adagale & Mahajan, 2015).

Recently, designers have begun incorporating “Accessibility” as a key aspect of accessibility Apps to improve the usability for the visually impaired. (Alexander Dey, 2004).

Accessibility aims to reduce the burden of operation and implements the spirit of equality of human rights. The most common accessibility auxiliary functions, such as the screen reader function, have been widely used in the built-in system of mobile phones.

Accessibility aims to reduce the burden of operation and uphold the spirit of equality of human rights. Several accessibility auxiliary functions are widely used in the built-in operating systems of mobile phones, such as VoiceOver for iOS and TalkBack for Android OS, the operation mode of which is shown in Figure 1.

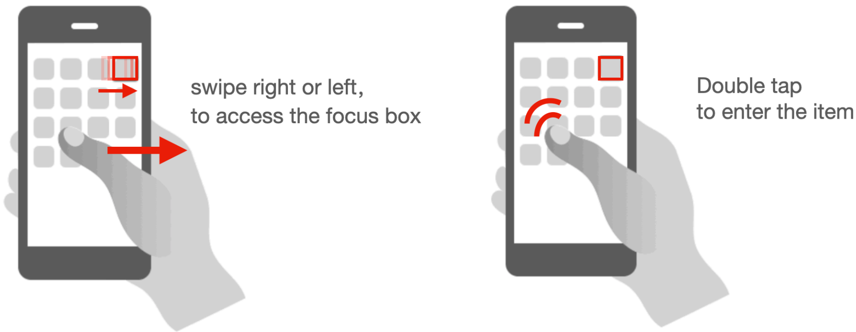


Figure 1 Schematic diagram of screen reading operation

2.3 Challenges while using accessibility Apps in services

In theory, accessibility Apps are excellent auxiliary methods for public transportation, but in reality, they are not. Even with new technologies, very few technologies could completely solve the difficulties the visually impaired face when taking public transportation, and there is still no successful case being widely used (Hersh, 2018).

Based on literature reviews, the reasons are:

1. The heterogeneity of the visually impaired.
   The behaviour of visually impaired people will differ depending on their personality, age, and health. Taking mobility as an example, a person with good somatosensory skills and confidence is more comfortable moving. They

do not require complicated training in a new environment. (Su Yifan, Huang Guoyan, Bi Hengda, 2012); to reduce the degree of eye use and protect the eyesight, some people with degenerative ophthalmology avoid excessive use of eye recognition while operating digital products. (Lin Ying, 2013). Since the visually impaired cannot be defined solely by their visual symptoms, designers of websites and Apps may not instinctively understand their needs and habits. (Overby, Woodruff & Gardial, 2005).

2. The riding process spans multiple channels.
   Taiwan currently has numerous service channels to help the visually impaired take the bus, including guide bricks, broadcast systems, bus tracking Apps, et cetera.
   Despite this, each channel has its own set of pain points for the visually impaired, including drivers with different standards. (Sen-Guang Li, 2017). Poor-quality guide bricks and obstacles along the path caused visually impaired people to lose confidence in guide bricks and other aids (Yun-Yan LV, 2002; Ming-Mei Wang, 2000). Furthermore, each measure was implemented independently under different circumstances and only focused on the benefits of a single point of contact (Wei-An Xie , 2021), a lack of integration between services.
3. User feedbacks are challenging to implement efficiently.
   The complicated risk considerations relating to accessibility projects often result in designers investing too many resources and costs on projects without clarifying the goals.
   Besides the difficulty of incorporating feedback into the design process, the original intention may be significantly diverted.
   (Kun-Qing Li, Hou-Sheng Wang, 2015).
4. Results of usability test decoupling from actual service value.
   In accessibility App projects, there are often cases where the ease-of-use score meets the basic standards, yet the service fails. The designers reported that their judgements were too subjective, lacked meaningful standards to follow, and could not intuitively understand its relationship with service effectiveness (Rui-Zhe Zhang, 2007).
5. Risk factors are difficult to identify and track.
   There are many other risks associated with accessibility Apps.
   Often, designers make mistakes such as overlooking communication gaps with users, omitting variables, failing to understand the requirements, et cetera (Huai-Yuan Zuo & Gen-Suo Mi, 2008). In addition, designers do not know the time of disability, the cause of disability, and the types of obstacles faced by each visually impaired individual. (Yi-Fan Su & Guo-Yan Huang, 2012; Chuan-Yu Zou, 2014) Finally, third-party vendors were relied upon (Yao-Xian Huang, 2011), and accessibility projects were ineffective for years.

2.4 Service design

Service design thinking is used for decision-making and designing to resolve the multifaceted difficulties in this case study.

It is becoming an increasingly popular trend in product innovation. Apps developed with service design integrated have received positive feedback and used in various areas, including emerging technology AR games competitions (Pei-Ling Shi, 2019) and bus services for the disabled, et cetera. (Jing-Ting Yun, 2019).

The definition of service design is continuously evolving. Marc Stickdorn, in 2016 invited 150 service designers to unify the most widely accepted definition: "Service design helps organizations view their services from the perspective of their customers. This method can balance the needs of both users and businesses when designing services-creating a smooth, high-quality service experience".

Based on the above, this research summarizes the following features of service design:

1. Emphasize stakeholders
   Service designers must consider the entire service journey experience of all participants (Normann, Ramirez, 1993), which emphasizes the involvement of stakeholders to increase efficiency and effectiveness (Tong-Zheng Song, 2014).
2. Sequence
   Service design emphasizes the meticulous service experience (Schneider & Stickdorn, 2018) and treats each service stage as a series of closely linked actions. Designers must avoid interruptions throughout the service process and create a smooth experience.
3. Evidence
   Service providers deliver service value through "channels" and "touchpoints" (NNGrop, 2016). In recent years, services have been developing "omnichannel" capabilities (NNGrop, 2016), which allow users to switch between different channels at their convenience (Mirsch et al. 2016).
4. Holistic view
   When designing services, all influencing factors are considered, including stakeholders, online and offline scenarios.
   Therefore, designers should consider commercial operations and technical support to develop a sustainable service system (Schneider & Stickdorn, 2018).
5. Realistic
   Service design promotes first-hand experience to their service participants (Shu-Xuan He & Tong-Zheng Song, 2014) and emphasizes that before the design results are produced, stakeholders must be involved with service

participants through continuous iteration and field visits. Field testing of small-scale implementation is required once the design results are produced, and it serves as a guide for further implementation.

3. Research method

The purpose of this chapter is to clarify the method we use to explore whether service design can impact the design of accessibility Apps. We use the case study method to examine the target project, EyeBus, for the influence of service design thinking on accessible App design.

3.1 Research subject

The "improving the public transportation for the visually impaired" program is a proposal initiated by the Ministry of Science and Technology of Taiwan in 2018. This project has the most seconders among a series of projects, with the ultimate goal of combining services with technology to assist visually impaired individuals to travel independently by bus.

The EyeBus team worked with the Taipei City Government, Taipei's **Department of Transportatio**n, bus industry operators, and bus equipment manufacturers while incorporating service design thinking into the design process.

Finally, Eyebus completed the field test on the Nanjing Main Line in Taipei City and received critical acclaim from the visually impaired and public sectors.

The Eyebus case consists of three channels: the EyeBus App, bus telecom system, and priority boarding area (see Figure 2).

The booking process: The visually impaired arrives at the "priority boarding area" and send a booking notice with "EyeBus App" to the "bus telecom system". The "bus telecom system" will later remind the driver to stop at the "priority boarding area". The "EyeBus App" will notify the visually impaired as the bus approaches the station. Upon boarding the bus, Eyebus will prompt the visually impaired passenger with the option to notify them when they are reaching their destination. (See Figure 3)

Figure 2 Schematic diagram of the core service

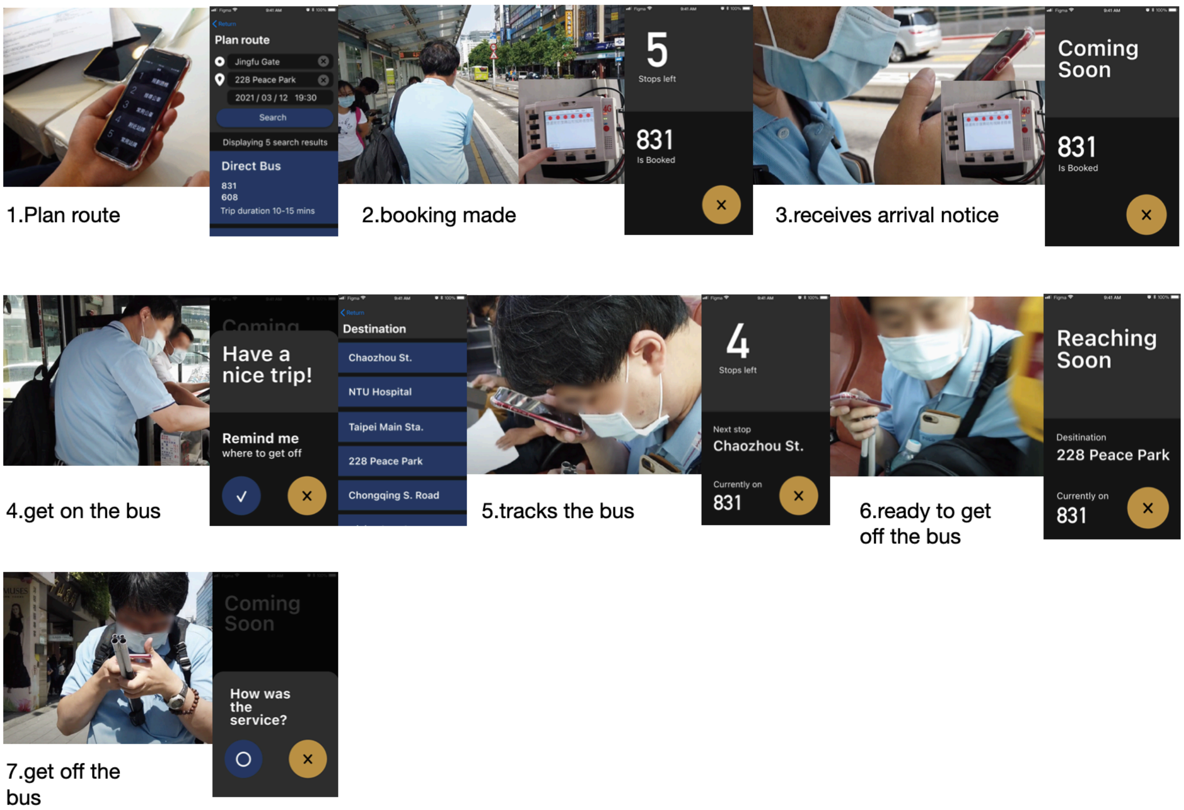


Figure 3 Diagram of bus telecom system prompts throughout the entire

The EyeBus App offers five ways to query buses to meet the different needs of the visually impaired, namely "plan route", "search", "Favourite: Bus", "Nearby bus stop", and "Favourite: Bus stop" (see Figure 4). EyeBus App also considers each visually impaired individual's condition when designing the voice and visual interface: the voice interface offers intuitive voice registration. It will promptly notify the user when the interface changes, providing background push notifications as well. The visual interface conforms to the visual style of amblyopia and colour blindness and uses a card-like design to display the location and status of the bus.

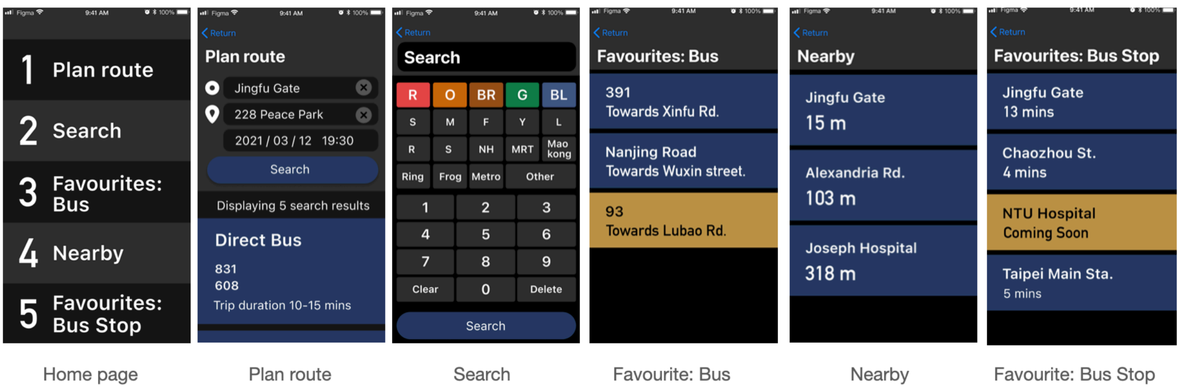


Figure 4 Schematic diagram of EyeBus's five functions

3.2 Research method

Considering that the entire project encounters many special conditions, such as ethnic groups, topics of discussion, and the development process. Every design process will differ depending on the stage of development.

Four characteristics conform to this study (Wimmer & Dominick, 1994): particularity, descriptiveness, enlightenment, and generalizability. Thus, this study uses a case study to better understand the context of development background, practical experience, and interaction (Issac & Michael, 1983) to effectively eliminate the complexity of the research subject and provide insights into the rapidly changing design development environment. In addition to being the designer of the App, the researcher also serves as the researcher. During weekly meetings, he provides first-hand information. There are 85 documents pertaining to internal meetings and 24 documents pertaining to external meetings. Details were recorded in the progress of the project from June 2019 to mid-September 2020.

During the project, this researcher was in direct contact with service participants and accumulated 94 documentations of follow-ups and tests with the visually impaired individuals. These documentations include screen recordings, audio, and video recordings. Of the 94 subjects, 84 were non-repetitive. The field test included interviews with 30 bus drivers and three focus interviews with orientation instructors. The App development team itself has accumulated three versions of App Iteration Records. The interactive details of a single record can include up to 250 items; more than six online iterative prototype files were collected, along with multiple HTML transfer files and cropped original files.

4. Research results

In order to clarify the influence of service design thinking on Apps, this research uses EyeBus as the research subject to examine the challenges encountered by blind and visually impaired individuals travelling by bus using accessibility Apps and how design thinking addresses them.

Based on the literature review, this research has identified five unique difficulties, each of which hampers the App's effectiveness in the service and increases the likelihood of a project delay or failure. Therefore, this study presents the solution of the EyeBus program from the viewpoint of service design, demonstrating the outcome of "research through design".

The figure illustrates the three major areas of pain point, namely personnel, machine, and environment.

The services of EyeBus span across these three service channels that are interconnected with each other. As this study focuses on App programs, bus telecom systems and priority boarding areas are excluded from the list, only suggestions around collaboration with Apps are included.

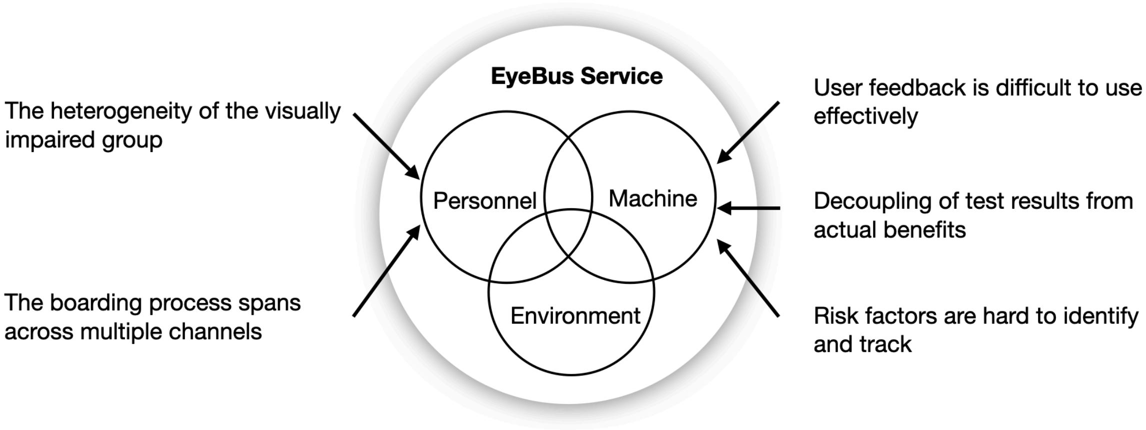


Figure 5 Schematic diagram of accounted challenges

4.1 Response to "The heterogeneity of the visually impaired groups"

In service design, the goal of the design basis is to identify and clarify the users and the scope and boundaries of the service subject comprehensively and holistically. Unlike the past, where user journey maps were solely used, the EyeBus executive team used a persona matrix to classify the visually impaired into groups and identify the heterogeneous factors that affect the service.

In the preliminary research stage, the team integrated the follow-up results of 14 visually impaired individuals, collected their usual riding solutions to counter temporary inconveniences, and delineated the service subject based on their experience to delineate service subjects.

Finally, using the persona matrix to classify the sense and personality as the two quadrant axes to identify the four types of service subjects; namely, visual experimenters (those open to new experiences), auditory experimenters (those open to new experiences), visual conservatives (Unreceptive to new experiences), and auditory conservatives (Unreceptive to new experiences). The executive team classifies the two quadrants in the matrix distinctively (Table 1, Table 2) and proposes a design concept that ultimately results in the selection of auditory conservatives as the primary development target (Figure 6).

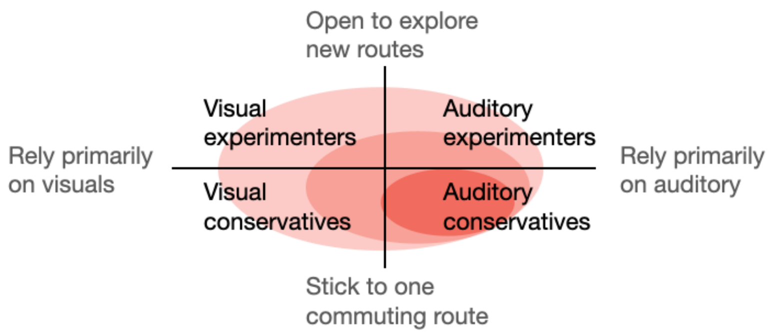


Figure 6 The persona matrix of visually impaired bus passengers

Table 1 Sensory recognition axis

	Rely primarily on visuals	Rely primarily on auditory
Description	When travelling by bus, accustomed to visually identifying the bus, the surrounding environment, and reading text messages. (Patients suffering from glare and nystagmus are not included as the service subject.)	When travelling by bus, unable to visually recognize the bus and surrounding environment. Requires external assistance and are accustomed to using screen reader software. (Some severe amblyopia patients rely mainly on auditory recognition.)
Design	Improve the visual interface (VUI): 1. Use coloured cards to allow amblyopia patients better recognize the status and location of incoming bus 2. Use colour-blind friendly colours and increase contrast 3. Vertical data flow	Improve the Voice Interface (AUI): 1. Define alt text for all interface components, and add connective words to strengthen the relationship between the context and the context of the information 2. Proactively notify the user when new information is updated to the screen 3. Improve traditional operations that are difficult to describe
Design sketch	1. Bus status and location 2. Contrast detection: Meet WCAG2.1 AAA standard 3.Vertical data flow	1.Route guidance: Improve contextual relations 2. Route planning: Proactively display search results 3. Change the direction of the bus route: Redesign the button

Table 2 Riding Habits axis

	Stick to one commuting route	Open to exploring new routes
Description	Stick to current commuting routes and avoid exploring new routes.	Besides usual commuting routes, new routes are regularly explored, are able to travel and conduct business on their own.

Design	Provide quick booking function: "Favourites: Bus" and "Favourites: Bus stop" provide quick operations. Within three swipes, the booking interface will be displayed, reducing the need for visually impaired passengers to search repeatedly.	Offers multiple query functions: 1. In the "plan route" function, user can see the bus and the MRT route options for trips with a single transit and provide step-by-step instructions for easy exploration with relatives, friends, and orientation instructors. 2. "Search by bus number" and "Nearby stop signs" respectively provide the user with information about the bus they wish to take for the first time.
Design sketch	Flow diagram for the three swipes mentioned above	1. Plan route 2. “Search bus number” and “Nearby bus stops”

4.2 Response to “The boarding process spans across multiple channels”

Traditionally, Apps have focused on the interface, demonstrating their logic.

Using tools such as information architecture and interface flowcharts. A complete service structure is difficult to present when working with external channels.

However, using service design visual tools such as service blueprint, designers can easily see the connections between front-end and back-end channels, which allows them to see the external connection problems holistically.

The EyeBus executive team generated storyboards to visualize the ideal riding scenario, generating a use case diagram (see Figure 7) to visualize the coordination of the three channels and drafted a service blueprint (see Figure 8) to indicate each channel operating in the order of timeline concretely, this in turns provides team members with multi-angle views, which is helpful for external presentations and meeting an agreement in a short period of time.

Finally, the online and offline linkage scenarios are thoroughly tested using side-shootings and screen recordings to ensure the service blueprint's effectiveness.

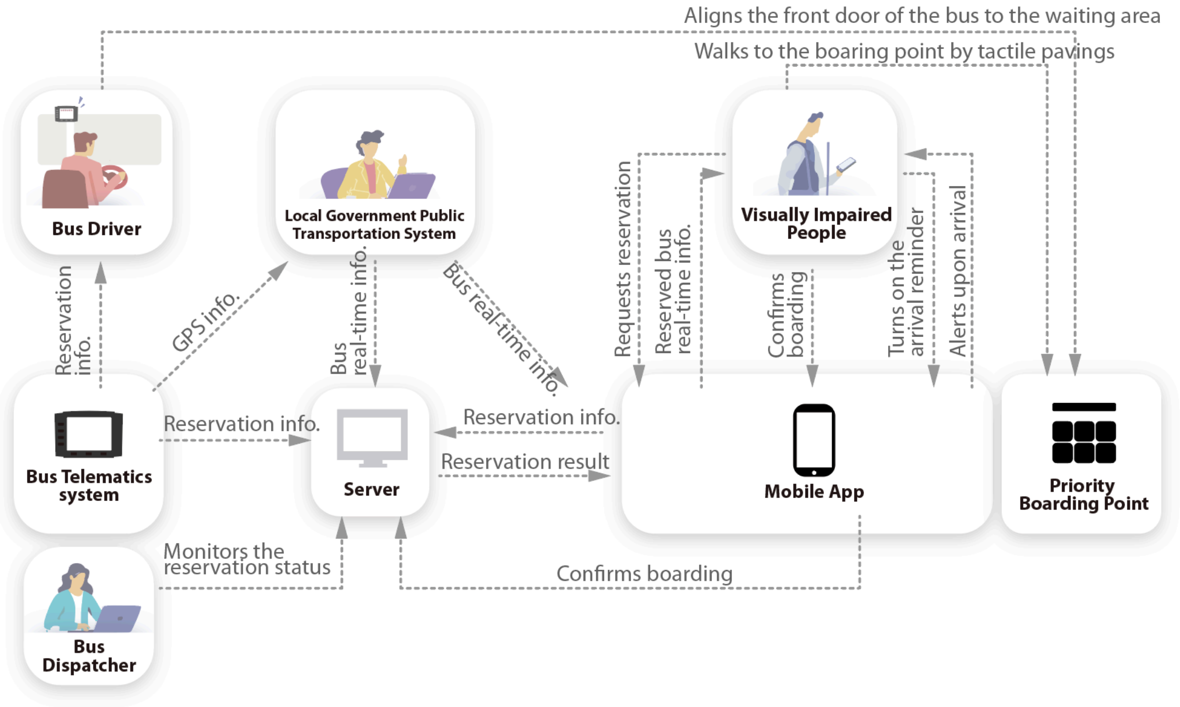


Figure 7 EyeBus use case diagram

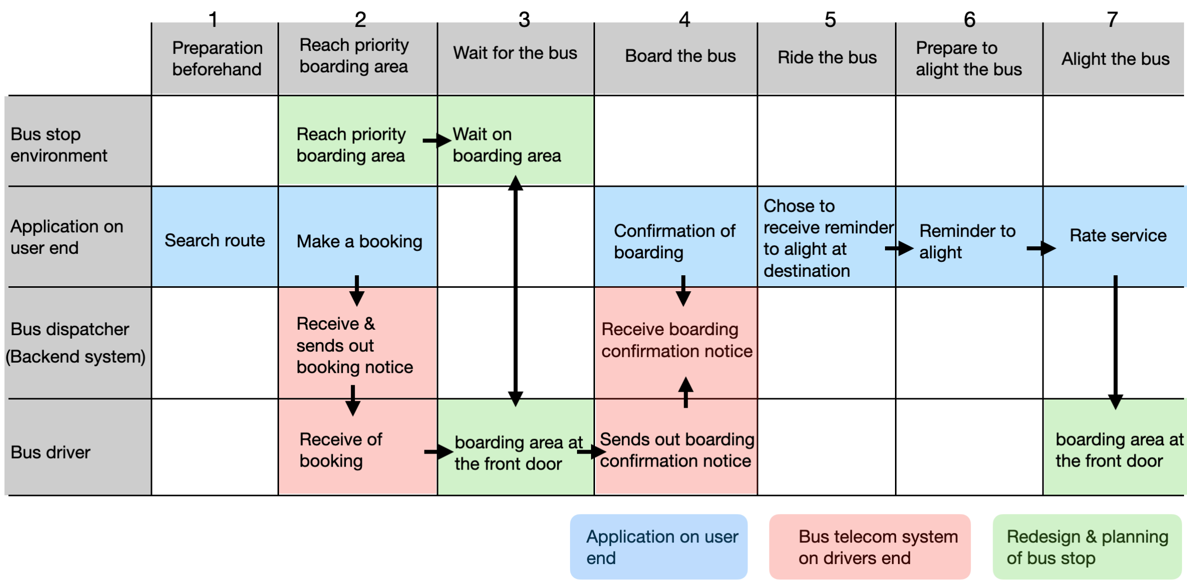


Figure 8 Simplified version of the service blueprint

4.3 Response to "User feedback is difficult to use effectively"

Often, designers spend too much time and money discovering requirements when designing accessibility Apps. Consequently, complex and unnecessary functions are added as a result of the inefficient use of resources.

Service design emphasizes the relationship between the designer and the service subject, and this is achieved through a flexible development process with the goal of maintaining contact with the service subject at every stage to avoid creating designs that do not meet the requirements. EyeBus uses the three-diamond service design model to allocate time between three phases, research, design, and field testing, to maximize feedback conversion (see table 3) and avoid overlapping objectives. Furthermore, the executive team uses agile iterative methods to speed up the design process (see table4).

Table 3. 3 diamond diagram of service design

Stage	Aim of the stage	Actions carried out
Problem research	Construct a clear image of the visually impaired	1. Recruit 14 interviewees and engage them in the Wizard of Oz method 2. Define service customer groups and scenarios, create persona matrix and storyboard 3. Visualize the pain points of the ride and create an affinity map of user pain points 4. Conduct desktop research and list down channels to uncover design opportunities 5. Discuss ways to collaborate with service-related providers
Design iteration	Step by step, gradually improve the App's integrity.	1. Confirm the collaboration method between channels and draft the service blueprint 2. Determine the stakeholders and create the service relationship diagram 3. Conduct focus workshops with orientation instructors 4. Iterate through various channels in an agile manner. A total of 73 people were recruited; one low-fidelity prototype, two high-fidelity prototypes and one service verification prototype were created 5. Organize the iteration feedback form
Field verification	Observe the overall performance of the service and the results of the app after its official launch	1. Connecting different channels. 2.Recruitment of 30 people for testing on the Nanjing Main Line 3. Account all iteration feedback forms

Table 4 Schematic diagram of EyeBus App design iteration stage

	Low-fidelity prototype	High-fidelity prototype I and II	Service verification prototype
Test goal	The possibility of a booking function	Ease of operation process and interface	Test service performance through arbitrary bookings

Tested induvial	4, all blind	High-fidelity prototype I: 10. Seven blind, three amblyopia patients High-fidelity prototype II: 29. 15 auditory recognition, 14 visual recognition	30. 19 auditory recognition, 11 visual recognition
Description	Whether the booking function can be related to the visually impaired passengers' experience	Whether the booking process is seamless. Whether AUI and VUI can be well recognized	Use NPS, service success rate and message transmission stability to determine user satisfaction
Test Process	Indoor briefing→ indoor booking→ indoor interview	Indoor briefing→ indoor simulation→ indoor interview	Indoor briefing→ outdoor testing indoor interview

4.4 Response to "Decoupling of test results from actual benefits"

Traditional App design focuses on the interface's ease of use and usability and it provides designers with a clear direction for rectifying interface components. However, other factors that need be considered when launching the product are ignored, which increases the possibility of failure.

Service design emphasizes the App as a delivery channel; besides consolidating the basic ease of use and functionality, the service performance in a real-world environment should also be considered.

Thus, when the executive team performs field tests, both the SUS ease of use score and the App's effectiveness from the front-end and back-end standpoint are tested (see Table 5). Finally, with qualitative Feedback (see Table 6), designers can intuitively and comprehensively grasp the App's benefits.

Table 5 Test result table

Subject	Calculation method	Result	Remark
App：SUS	SUS	90.83	Current App SUS score: 68
Overall: NPS	NPS	70	Original NPS score: -69
Front-end: Service success rate	In this test session, the visually impaired can use the service to board the booked bus and alight at their intended destination / total test sessions.	96.7 %	Previous projects have not been continued, making comparisons difficult.
Backend: Message transmission stability.	In this test session, the EyeBus App signals a booking notice, successfully delivered to Eyebus's server and to the bus telecom server as well as the	86.7 %	Reasons for failure: 1. The bus operators temporarily dispatched other buses to enter the test route. However, those vehicles'

	telecom system on the intended booked bus. / total test sessions.	telecom system has not been modified. 2. PTX system undergoing temporary maintenances.

Table 6 Qualitative feedback form

Categories	Feedback
Discard stereotypes	"Was not treated "specially" throughout the bus ride. It's what I have always hoped for, to be treated like everyone else, the more natural the better!" (P30)
Effectively integrate external resources	"I think this App is more efficient and thoughtful. You can use the App to check bus arrival time and plan routes. You can use this App directly without switching to other auxiliary apps." （P22） "I'm surprised Eyebus is connected to Google maps! Google maps is my last resort to search for stop signs, as I rarely use it. If I can't find the route, I usually ask pedestrians first. Now that they're connected, I can find the route by myself just with Eyebus!" (P23)
Satisfy desire to explore freely	"Make up for many missing functions in current Apps on the market. As I mentioned, it provides information such as how far away the stop is from the user. Currently only Eyebus provides this function." (P15) "I thought the concept of relative distance, how far is the bus stop from me, was outstanding. I now open the App to check the bus stops around my current location." (P16)

4.5 Response to "Risk factors are hard to identify and track"

Traditional App designers tend to ignore the risks associated with multichannel when managing risks. Hence, to acquire random variables from the perspective of visually impaired passengers, EyeBus applied the service design method and the Wizard of Oz method when conducting contextual inquiries on the visually impaired passengers; while including stockholders in the scope of the study by collecting orientation instructors' teaching experiences and the actions of visually impaired individuals.

By analysing the results, the executive team discovered three types of risk factors, namely blind spots in the bus system, distortion caused by the high expectations of the visually impaired, and offline operation variables. To reduce the likelihood of these occurrences, countermeasures were developed. The details are described in the table below.

Table 7 Risk factor table

Risk factors	Description	Solution

Blind spots in the bus system	EyeBus App gets its data from the Public Transport data eXchange, and its data can be problematic for the visually impaired in the following situations: 1. When buses with the same route arrive at the station at the same time: Visually impaired passengers may board the bus without the reservation made 2. Different stop signs with the same stop name: The visually impaired passenger may be waiting at the wrong bus stop 3. Different starting and ending points for buses travelling the same route: The visually impaired passenger may not reach their intended destination 4. The system fails for a short period: EyeBus will display the wrong information	The Ministry of Transportation of Taiwan manages PTX. Over the years, the developers have reported these issues multiple times but are still unable to solve them. As a result, the EyeBus team implemented the following solutions: 1. A unique serial number is appended to the stop name of different bus stops with the same name. 2. Providing drivers with related education and training will improve the success rate of services. 3. If the visually impaired user misses the bus, EyeBus will prompt the user asking if assistance is needed
Distorted feedback due to the high expectations from the visually impaired	Since previous projects have failed, the visually impaired are hoping EyeBus will be launched. As a result, they tend to give positive feedback at all times, creating a biased interview process.	As part of the post-test interview, designers will ask the visually impaired to recall the function they just performed and describe the operation method and time of usage.
The operation of an App is affected by offline situations	The visually impaired generally adjust how they use their mobile phone depending on the level of noise, shaking, or crowdedness in their immediate surroundings.	Designers designed interfaces that can be used in any situation, such as a homepage that can be operated with one hand, and stop button that prevents accidental tapping.

5. Conclusion

This study takes the EyeBus program as the research subject, exploring the following:
1. Role of service design as problem-solving-oriented innovative thinking

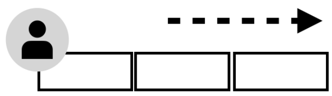
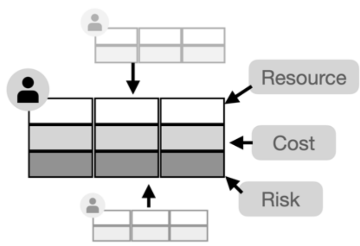
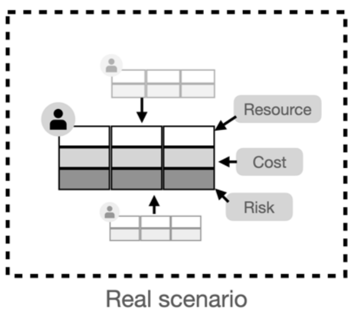
2. How to assist App designers from the standpoint of an App

3. How to create a holistic view of bus rides for the visually impaired

4. How to overcome the almost insurmountable challenges faced by traditional accessibility Apps.

Based on the five characteristics of service design and the practical design process of EyeBus, this study summarizes five guidelines that accessibility App designers can refer to and apply when integrating service design thinking into their design processes (see Table 8).

Table 8 Design guidelines for accessibility Apps

Characteristic	Schematic diagram	Description
1.Emphasize stakeholders		1. User-centred 2. Recognize related stakeholders 3. Break out of the Silo effect
Sequence		Define the scope and stages of the service process
Evidence		In addition to using the App users can also access the service via omnichannel or multichannel.
Holistic view		1. Allocate resources appropriately while gradually clarifying the impact factors 2. Consider the collaborative methods of stakeholders, as well as the implications of resources, costs, and risks.
Realistic		1. Carry out tests in the real field 2. The continuous contact between the designer and service participants 3. Develop evaluation standards that are in line with reality

Based on the above, three contributions are derived from this research:

1. Difficulties encountered by designers when designing accessibility Apps.

In the past, accessibility Apps could not effectively improve the service of public transportation. This study summarized five difficulties designers had trouble overcoming in the past, outlined their causes, and provided a clear outline of the problem.

2. Describe how EyeBus integrates service design into its processes
Based on the EyeBus App designer's standpoint, the researcher lists the design process and methods for solving challenging points based on first-hand data records. The design results were detailed and clearly showed how service design can reduce the complexity of accessibility App cases.
3. Summarize the principles of service design for integration into accessibility Apps

Using the design process of EyeBus and characteristics of service design, five fundamental principles are summarized for future designers to compare and refer to when faced with similar projects or as a foundation for future discussions.

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