Development of a Mobile Navigation Smartphone Application for Seniors in Urban Areas

Urban Connector

August 2019
C2SMART Center is a USDOT Tier 1 University Transportation Center taking on some of today’s most pressing urban mobility challenges. Using cities as living laboratories, the center examines transportation problems and field tests novel solutions that draw on unprecedented recent advances in communication and smart technologies. Its research activities are focused on three key areas: Urban Mobility and Connected Citizens; Urban Analytics for Smart Cities; and Resilient, Secure and Smart Transportation Infrastructure.

Some of the key areas C2SMART is focusing on include:

Disruptive Technologies
We are developing innovative solutions that focus on emerging disruptive technologies and their impacts on transportation systems. Our aim is to accelerate technology transfer from the research phase to the real world.

Unconventional Big Data Applications
C2SMART is working to make it possible to safely share data from field tests and non-traditional sensing technologies so that decision-makers can address a wide range of urban mobility problems with the best information available to them.

Impactful Engagement
The center aims to overcome institutional barriers to innovation and hear and meet the needs of city and state stakeholders, including government agencies, policy makers, the private sector, non-profit organizations, and entrepreneurs.

Forward-thinking Training and Development
As an academic institution, we are dedicated to training the workforce of tomorrow to deal with new mobility problems in ways that are not covered in existing transportation curricula.

Led by the New York University Tandon School of Engineering, C2SMART is a consortium of five leading research universities, including Rutgers University, University of Washington, the University of Texas at El Paso, and The City College of New York.

Development of a Mobile Navigation Smartphone Application for Seniors in Urban Areas

Ruey L. Cheu
The University of Texas at El Paso

Natalia Villanueva-Rosales
The University of Texas at El Paso

Guillermina Gina Nunez-Mchiri
The University of Texas at El Paso

Joseph Chow
New York University

Matthew Vechione
The University of Texas at El Paso

Raul Alejandro Vargas Acosta
The University of Texas at El Paso

Corina Marrufo
The University of Texas at El Paso

Okan Gurbuz
The University of Texas at El Paso

Maria Jimenez
The University of Texas at El Paso

Assel Dmitriyeva
New York University

Diana Becerra
The University of Texas at El Paso

Emiliano Ruiz
The University of Texas at El Paso
Disclaimer

The contents of this report reflect the views of the authors, who are responsible for the facts and the accuracy of the information presented herein. This document is disseminated in the interest of information exchange. The report is funded, partially or entirely, by a grant from the U.S. Department of Transportation’s University Transportation Centers Program. However, the U.S. Government assumes no liability for the contents or use thereof.
Acknowledgments

This research is funded by the Connected Cities for Smart Mobility towards Accessible and Resilient Transportation (C2SMART), a Tier 1 University Transportation Center awarded U.S. Department of Transportation under contract 69A3551747124.

The authors gratefully acknowledge the El Paso Metropolitan Planning Organization and The University of Texas at El Paso for contributing to the local matching fund that made this research possible.

The authors also thank the City of El Paso Parks and Recreation Department for permission to survey the seniors at its 11 senior centers throughout the city. The advice given by Mr. Josue David Lopez is well appreciated.

The authors would also like to express appreciation to students in the Anthropology and Sociology Department at The University of Texas at El Paso who helped to conduct the survey.
Executive Summary

As lifestyle changes seniors start having mobility issues. Switching from driving alone to carpooling, taking a taxi or public transportation are some common examples. Seniors need information about traffic congestion and available alternative means of transportation to keep attending their daily activities. However, there are not enough tools to assist seniors with their specific mobility constraints. Smartphones are potentially useful tools. While there are many navigation apps on the market, very few cater to the specific mobility needs of seniors (such as incorporating information on ADA compliant infrastructure), and the few that exist have limited functions. This study aims to understand the lifestyle and mobility needs of seniors and to develop a prototype smartphone application that caters needs. The main focus is on the development of a mobile smartphone application, named Urban Connector. As a first step, to identify the senior needs, a survey was conducted (in English and Spanish) at various senior centers across El Paso, Texas. Questions were asked to 458 seniors to gain a better understanding of their lifestyle, mobility needs, and technological literacy (especially the use of smartphones). A similar survey of 61 seniors was conducted in New York, New York. It was discovered from the survey that the greatest mobility need of the seniors is avoiding traffic congestion. Although there exist some navigation applications and there is a market for developers (i.e. many seniors own a smartphone), existing tools are not being preferred by seniors to avoid such traffic congestion. Therefore, the primary focus of the Urban Connector was decided as navigation. The survey results provided guidelines on the functions and user interface designs. After the initial version of the Urban Connector had been developed in the Android platform, a pilot survey was conducted in which 65 seniors were asked to comment on the suitability of the functions and ease of use (user interface and menu). Pilot survey findings were used to improve and refine the Urban Connector application. A follow-up usability survey was implemented as the third effort to collect user feedback. In this usability survey, 40 seniors were recruited and they installed the Urban Connector application on their smartphones to field test the application for one month. At the end of one month, 38 participants completed this survey. Most of the questions in this survey asked the participants to state the level of agreement with a given statement related to the ease of use of the application. The survey results revealed that more than half the participants strongly agreed or agreed with statements about the application being easy to use or beneficial. The participants gave the Urban Connector application an average rating of 3.47 out of 5.00. Sixty-eight percent (68%) of the participants said that they would like to recommend the Urban Connector application to their friends.
# Table of Contents

**Urban Connector** ................................................................. i

Executive Summary ................................................................. v
Table of Contents ........................................................................ vi
List of Figures .............................................................................. viii
List of Tables ................................................................................. xi

**SECTION 1. Introduction** .............................................................. 1
1.1. Motivation ........................................................................ 1
1.2. Objective ......................................................................... 1
1.3. Outline of Report .............................................................. 1

**SECTION 2. Review of Background Materials** ................................... 2
2.1. Smart Mobility .................................................................. 2
2.2. Issues Faced by Seniors ................................................... 3
2.3. Smartphone Technology .................................................. 5
2.4. Smartphone Applications ................................................. 6
2.5 Summary .......................................................................... 12

**SECTION 3. Research Work Plan** .................................................. 13

**SECTION 4. Mobility Needs Surveys** ............................................. 15
4.1. Background and Purpose .................................................. 15
4.2. Survey Instrument ........................................................... 15
4.3. Survey Implementation ................................................... 15
4.4. Survey Results – El Paso .................................................. 18
4.5. Survey Results – New York City ....................................... 19
4.6. Summary of Findings ....................................................... 20

**SECTION 5. Prototype Application Development** .......................... 22

**SECTION 6. Pilot Survey** ............................................................. 24
6.1. Background and Purpose .................................................. 24
6.2. Survey Instrument ........................................................... 24
6.3. Survey Implementation ................................................... 24
6.4. Survey Results ............................................................... 26
6.5. Summary of Findings ....................................................... 27

**SECTION 7. Usability Survey** .......................................................... 28
7.1 Background and Purpose ................................................... 28
7.2 Survey Instrument ........................................................... 28
7.3 Survey Implementation ................................................... 28
7.4 Survey Results ............................................................... 30
7.5 Summary of Findings ....................................................... 31

**SECTION 8. Conclusions** ............................................................ 34

**REFERENCES** ........................................................................... 35

**APPENDIX A – Mobility Needs Survey Flyer** .................................. 40
**APPENDIX B – Mobility Needs Survey Results** .......................... 41
B.1. El Paso Results ............................................................... 41
B.2. New York Results ............................................................ 122
<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>APPENDIX C – Pilot Survey Infographic Flyer</td>
<td>138</td>
</tr>
<tr>
<td>APPENDIX D – Pilot Survey Results</td>
<td>140</td>
</tr>
<tr>
<td>APPENDIX E – Usability Survey Infographic Flyer</td>
<td>156</td>
</tr>
<tr>
<td>APPENDIX F – User Usability Survey Results</td>
<td>157</td>
</tr>
</tbody>
</table>
List of Figures

Figure 1. Survey booth at Grandview Senior Center, El Paso. ...............................................................17
Figure 2. Urban Connector application screenshots.................................................................23
Figure 3. Survey booth at Pavo Real Senior Center on National Fitness Day. ...........................25
Figure 4. Urban Connector Recruitment Booth at Pavo Real Senior Center ..........................30
Figure 5. Age range [English responses] El Paso. .................................................................41
Figure 6. Age range [Spanish responses] El Paso. .................................................................42
Figure 7. Gender [English responses] El Paso. .................................................................42
Figure 8. Gender [Spanish responses] El Paso. .................................................................43
Figure 9. Employment [English responses] El Paso. ...............................................................44
Figure 10. Employment [Spanish responses] El Paso. ...............................................................44
Figure 11. Ethnicity [English responses] El Paso. .................................................................45
Figure 12. Ethnicity [Spanish responses] El Paso. .................................................................46
Figure 13. Languages [English responses] El Paso. ...............................................................47
Figure 14. Languages [Spanish responses] El Paso. ...............................................................47
Figure 15. Zip code [English responses] El Paso. .................................................................49
Figure 16. Zip code [Spanish responses] El Paso. .................................................................49
Figure 17. Zip code [all responses] El Paso. .................................................................50
Figure 18. Zip code [US Census data 2010 for El Paso seniors] ..............................................50
Figure 19. Type of residency [English responses] El Paso. ......................................................51
Figure 20. Type of residency [Spanish responses] El Paso. ......................................................52
Figure 21. Impairments/disabilities [English responses] El Paso. ............................................54
Figure 22. Impairments/disabilities [Spanish responses] El Paso. ............................................55
Figure 23. Electronic device use [English responses] El Paso. ...............................................57
Figure 24. Electronic device assistance [English responses] El Paso. ......................................58
Figure 25. Electronic device use [Spanish responses] El Paso. ...............................................59
Figure 26. Electronic device assistance [Spanish responses] El Paso. .......................................59
Figure 27. Mobility assistance needed [English responses] El Paso. .......................................60
Figure 28. Mobility assistance needed [Spanish responses] El Paso. .......................................61
Figure 29. Concerns when planning a trip [English responses] El Paso. .....................................67
Figure 30. Concerns when planning a trip [Spanish responses] El Paso. .....................................68
Figure 31. Mobility challenges [English responses] El Paso. .....................................................69
Figure 32. Mobility challenges [Spanish responses] El Paso. .....................................................70
Figure 33. Desired application functions [English responses] El Paso. .....................................71
Figure 34. Desired application functions [Spanish responses] El Paso........................................71
Figure 35. Motivation to use smartphone application [English responses] El Paso. ..................72
Figure 36. Motivation to use smartphone application [Spanish responses] El Paso. ..................73
Figure 37. Data sharing [English responses] El Paso. ..........................................................74
Figure 38. Data sharing [Spanish responses] El Paso. ..........................................................75
Figure 39. Gender, New York City. ..................................................................................122
Figure 40. Age range, New York City. ................................................................................123
Figure 41. Employment, New York City. ..........................................................................124
Figure 42. Race & Ethnicity, New York City. .................................................................124
Figure 43. Languages, New York City. ..........................................................................125
Figure 44. Zip code, New York City. ............................................................................126
Figure 45. Type of Residency, New York City. ...............................................................126
Figure 46. Impairments/disabilities, New York City. ......................................................127
Figure 47. Electronic device use, New York City. ..........................................................128
Figure 48. Electronic device assistance, New York City. .............................................129
Figure 49. Mobility assistance needed, New York City ................................................130
Figure 50. Concerns when planning a trip, New York City. .............................................133
Figure 51. Mobility challenges, New York City. .............................................................134
Figure 52. Desired application functions, New York City. .............................................135
Figure 53. Motivation to use a smartphone application, New York City. .....................136
Figure 54. Data sharing, New York City. .....................................................................137
Figure 55. Smartphone or tablet use [all responses]. .....................................................140
Figure 56. Smart device operating system [all responses]. ...........................................141
Figure 57. Needs assistance to demonstrate the app [all responses]. ..........................142
Figure 58. Age range [all responses]..........................................................................143
Figure 59. Gender [all responses].............................................................................143
Figure 60. Electronic device use [all responses]............................................................144
Figure 61. Electronic device assistance [all responses]. ..............................................145
Figure 62. Smartphone use [all responses]. ..................................................................146
Figure 63. Home screen menu [all responses]...............................................................147
Figure 64. Home screen menu [all responses]...............................................................148
Figure 65. Transportation Services Menu [all responses]. ..........................................148
Figure 66. The Graphic Images [all responses]..............................................................149
Figure 67. Entering Preferences [all responses]. ............................................................150
Figure 68. Names of Menus [all responses]................................................................151
Figure 69. Size of buttons and text [all responses] .......................................................... 151
Figure 70. Colors used [all responses] ............................................................................. 152
Figure 71. Recommend to a friend [all responses] .............................................................. 153
Figure 72. Age Range [all Responses] .............................................................................. 157
Figure 73. Gender [all Responses] .................................................................................... 158
Figure 74. Electronic Device Use [all Responses] .............................................................. 159
Figure 75. Device Assistance [all Responses] ................................................................. 160
Figure 76. Electronic Device Use [all Responses] .............................................................. 160
Figure 77. Application Use [all Responses] ..................................................................... 161
Figure 78. Usage Reason [all Responses] ....................................................................... 162
Figure 79. User Preferences [all Responses] ................................................................. 162
Figure 80. Frequent Places Menu [all Responses] .......................................................... 163
Figure 81. Frequent Places Menu [all Responses] .......................................................... 164
Figure 82. Graphic Images [all Responses] ..................................................................... 164
Figure 83. Entering Preferences [all Responses] .............................................................. 165
Figure 84. Disorientation [all Responses] ....................................................................... 166
Figure 85. Traffic Congestion [all Responses] ................................................................. 166
Figure 86. Late Arrivals [all Responses] ......................................................................... 167
Figure 87. Size of Buttons [all Responses] ..................................................................... 168
Figure 88. Menu Options [all Responses] ....................................................................... 168
Figure 89. Visual Needs [all Responses] ........................................................................ 169
Figure 90. Crash/Freeze [all Responses] ........................................................................ 170
Figure 91. Fast Learning [all Responses] ....................................................................... 170
Figure 92. Efficiency/Productivity [all Responses] ......................................................... 171
Figure 93 Friend Recommendation [all Responses] ....................................................... 172
List of Tables

Table 1. Downloaded and tested smartphone applications. ................................................................. 9
Table 2. Survey dates, times, and venues – El Paso. ........................................................................... 16
Table 3. Survey dates, times, and venues – New York City. ............................................................... 18
Table 4. Number of survey responses – El Paso. ................................................................................ 19
Table 5. Number of survey responses – New York City. ................................................................. 20
Table 6. Prototype feedback survey dates, times, and venues. .......................................................... 25
Table 7. Number of second survey responses.................................................................................... 26
Table 8. Usability Survey Recruitment Dates, Times and Venues. ..................................................... 29
Table 9. Number of Third Survey Responses..................................................................................... 31
Table 10. Trip frequencies [English responses] El Paso. .................................................................... 63
Table 11. Trip frequencies [Spanish responses] El Paso. .................................................................... 64
Table 12. Modes of transportation [English responses] El Paso. ......................................................... 65
Table 13. Modes of transportation [Spanish responses] El Paso. ......................................................... 66
Table 14. Trip frequencies, New York City. ......................................................................................... 131
Table 15. Modes of transportation, New York City. ......................................................................... 132
SECTION 1. Introduction

1.1. Motivation

As lifestyle changes seniors start having mobility issues. Switching from driving alone to carpooling, taking a taxi or public transportation are some common examples. Seniors need information about traffic congestion and available alternative means of transportation to keep attending their daily activities. However, there are not enough tools to assist seniors with their specific mobility constraints. Smartphones are potentially useful tools. While there are many navigation apps on the market, very few cater to the specific mobility needs of seniors (such as incorporating information on ADA compliant infrastructure), and the few that exist have limited functions. This research covers the initial steps of developing a smartphone application that is customized to the mobility and other needs of seniors.

1.2. Objective

The objectives of this project are: (a) to understand the lifestyle and mobility needs of the seniors; (b) to develop a prototype smartphone smart mobility application that caters to the needs identified; and (c) to conduct a usability survey to obtain feedback on the prototype.

1.3. Outline of Report

This report is outlined as follows. The next section reviews background materials. Section 3 presents the work plan for this research. The fourth section provides information regarding the seniors surveyed in El Paso and New York City and the findings. The fifth section describes the development of the smartphone application. The following sections (Sections 6 and 7) report on the pilot survey and usability survey respectively.
SECTION 2. Review of Background Materials

This section reviews the background materials related to this project. First, the concept of smart mobility, which is the domain problem this project addresses, is introduced. Next, the mobility issues faced by seniors, as found in the literature, are discussed. Then, technologies that enable our solution approach, namely smartphone technology (the hardware) and smartphone applications (the software) are reviewed. The last portion of this section highlights the recommended design features that should be considered when designing smartphone applications for seniors.

2.1. Smart Mobility

Smart Mobility which comes with Smart City concept is a recent topic, however it is spreading fast and being studied by different researchers. There are different definitions for the Smart Mobility and Smart City concepts:

- Bakici et al. (2012) defined Smart city as “a high tech high-tech intensive and advanced city that connects people, information and city elements using new technologies in order to create a sustainable, greener city, competitive and innovative commerce, and an increased life quality.”
- Nam and Pardo (2011) describe a smart city which “infuses information into its physical infrastructure to improve conveniences, facilitate mobility, add efficiencies, conserve energy, improve the quality of air and water, identify problems and fix them quickly, recover rapidly from disasters, collect data to make better decisions, deploy resources effectively, and share data to enable collaboration across entities and domains.”
- Faria et al. (2017) describe Smart Mobility as a key concept to transform urban transportation and change the way our cities move. Smart Mobility is, among others, one of the main components of a Smart City; and as such, “Smart Mobility helps cities to reduce gridlocks, lower accident rates, improve air quality, shrink the urban footprint required for parking, and be a tool to achieve sustainable city’s development.” Faria et al (2017) listed majority of the previous definitions of Smart Mobility and Smart Cities in their study:
  - Albino et al. (2015) describe Smart Mobility as “the use of Information and Communication Technology in modern transport technologies to improve urban traffic.”
  - Chun and Lee (2015) state that Smart Mobility “is a concept of comprehensive and smarter future traffic services in combination with smart technology. A Smart Mobility society is realized by means of the current intelligent traffic systems.”
  - Vanolo (2014) refers to Smart Mobility as “local and supra-local accessibility, availability of ICTs, modern, sustainable and safe transport systems.”
  - Griffinger and Gudrun (2010) describe a Smart City as “a city well performing in a forward-looking way in economy, people, governance, mobility, environment, and living, built on the smart combination of endowments and activities of self-decisive, independent and aware citizens.”
  - Harrison et al. (2010) mention that “Smarter Cities are urban areas that exploit operational data, such as that arising from traffic congestion, power consumption
statistics, and public safety events, to optimize the operation of city services. The foundational concepts are instrumented, interconnected, and intelligent. Instrumented refers to sources of near-real-time real-world data from both physical and virtual sensors. Interconnected means the integration of those data into an enterprise-computing platform and the communication of such information among the various city services. Intelligent refers to the inclusion of complex analytics, modeling, optimization, and visualization in the operational business processes to make better operational decisions.”

- Bowerman et al. (2000) state that a Smart City is “a city that monitors and integrates conditions of all of its critical infrastructures, including roads, bridges, tunnels, rail/subways, airports, seaports, communications, water, power, even major buildings, so that it can better optimize its resources, plan its preventive maintenance activities, and monitor security aspects while maximizing services to its citizens.”

In summary, a smart city is a city that integrates people, technology, and information to create a sustainable and resilient infrastructure that provides high-quality services for residents. Smart mobility refers to the ability of travelers to acquire, share and use information and resources to make transportation systems more accessible, sustainable and resilient.

2.2. Issues Faced by Seniors

The issues faced by seniors depends on what the definition of seniors is. In spite of the fact that seniors’ needs may change based on physical wellbeing or mental health, they are legally recognized from the rest by their age. Indeed, different agencies organizations report different age ranges in characterizing seniors. These are some examples of senior definitions:

- The United States Census Bureau (2017) definition for a senior is a person who is older than the age of 65. There were around 47.8 million seniors in 2015 which was around 14.9% of United States population.
- According to the United States Department of Health and Human Services (n.d.), every day more than 10,000 individuals become seniors. In this study, the defined age is 65.
- The United States Department of Labor (2017) Senior Community Service Employment Program was designed to provide work based training for seniors. Minimum age to participate in the program was identified as 55.
- The age defined by social security benefits was 65 after Congress passed legislation in 1983 (National Academy of Social Insurance, n.d.).
- In El Paso, Texas, Sun Metro Bus Service offers a reduced fare program for eligible passengers. Sun Metro’s reduced fare program provides discounts off the standard fares for, among others, persons 65 years of age or older (Sun Metro, n.d.).

Based on the findings the age definition for the seniors ranges from 55 to 65. Since the majority of them preferred to use 65, this project considered an individual as a senior with an age of 65 or older.
Seniors’ limited access to different transportation alternatives has always been an issue. (BTS, 2016). The American Association of Retired Persons Public Policy Institute estimated that in 2009 seniors took 12% of all trips and 10% of all miles traveled in the United States. According to the same study, from 2001 to 2009, the share of seniors among transit users had increased by 40%. 2009 findings also reported that seniors used public transportation for more than 1 billion trips (BTS, 2016). With the increase in the use of public transit by seniors, transportation agencies efforts to provide senior-friendly services become more important. Being unable to access transportation causes seniors feeling of isolation from the community that does not develop solutions to fix their problems (McDonnal et al., 2016). It is very difficult for older adults to access transportation alternatives due to proximity issues, long waits, crime, uneven or unsafe sidewalks, urban congestion, and mobility issues which are all associated with depression, social isolation, and health problems (Turner et al., 2017).

Individuals’ movability and mobility may reduce due to aging. Health in Aging Foundation listed some of the mobility problems of older adults (Health in Aging, 2017). Joint problems, weakness of muscles, pain, disease, and some other neurological disorders cause falls which is the number one issue that older seniors experience.

In addition to falls, many seniors are affected by visual and/or hearing impairments, as well as rheumatism (arthritis) (March et al., 1998). Arthritis greatly affects typing on a keyboard, tablet, or phone in a negative way. These physical impairments not only restrict their mobility options but also limit their ability to use certain tools (e.g., desktop computers, tablets, smartphones).

In addition to the biological and biomechanical issues, many seniors face cognitive decline and dementia (Geerlings et al., 1999). Due to cognitive decline and memory loss, disorientation may subsequently follow (Hanley, 1981). Some seniors can easily become disoriented during a commute and have difficulties understanding where they are as well as how to return home or to their original destination.

However, the majority of older adults prefer driving as their preferred transportation because it symbolizes independence that seniors value deeply (Turner et al., 2017). A smartphone, if used with the right applications, is one solution to the mobility problems faced by the seniors. Smartphones are not only communication devices, but they can also be programmed with applications to help with estimation choices, route planning, navigation, transportation services scheduling, reminding appointments, and some other functions may assist the seniors with mobility and other issues. There should be some focus on dealing with older people who have communication or sensory ailments in order to find a solution.

It is very important for older adults to go out. In fact, going outside has a positive effect on their physical and cognitive health and social activities, whereas older adults who do not go outside frequently have higher mortality, cognitive impairments, and poorer psychological well-being than those who do
Dattilo et al. (2005) found in their study that regular interactions with peers improve seniors’ self-determination with participating enjoying activities while promoting independence.

Technology is evolving at such a rapid pace, therefore, accessibility to applications for seniors is becoming more important. Applications can help improve care support, safety, social connectivity, and engagement (Czaja, 2019). Having this type of technology can help guide many to new doctor’s appointments, senior centers, and engaging activities in the community. In fact, research has demonstrated that technology features that improve one’s ability to complete a task are appealing to users (Li & Luximon, 2018), meaning that the user interface and usability are correlated to the usage of technology for older people. This can be achieved with better and more accessible technology for older adults to maintain contact with and travel to their friends and family members and providing support for engagement in social activities. Technology can combat social isolation and increase social participation for older adults (Baker et al., 2018).

2.3. Smartphone Technology

A smartphone may be defined as a handheld device with the computing power of a personal computer, mobile operating system, and mobile broadband cellular network connection for internet data communication (Smith, 2013). The term ‘smartphone’ refers to “a new class of mobile phones that provided integrated services from communication, computing, and mobile sectors including voice communication, messaging, personal information management (PIM) applications and wireless communication capability.” (Sarwar and Soomro, 2013).

In 1999, the Japanese firm NTT DoCoMo released the first smartphones to achieve mass adoption within a country (Rose, 2001). These phones provided data transmission speeds up to 9.6 kbit/s. However, smartphones were rare outside of Japan at that time and began moderately increasing until the release of the Apple iPhone in 2007. Before the introduction of the iPhone to the mass consumer market, many smartphones had a physical keypad or keyboard (Jobs et al., n.d.). Some differences between a smartphone and a traditional cell phone, other than the computing power, are: (i) the ability to run a variety of third-party software components (called “applications” or simply “apps”) purchased and downloaded from servers like the Google Play Store or Apple App Store; (ii) the ability to receive bug fixes and gain additional functionality through operating system updates; (iii) have a touchscreen color display; and (iv) high speed wireless communication capabilities.

One of the main characteristics of a smartphone is its screen. Smartphones are almost entirely comprised of a full-color touchscreen, through which the user may enter data, command, and control the phone by touching the screen, as opposed to a numerical keypad. The interface is designed such that the users may input commands or data by the use of their fingers. Smartphones may also have a return button to navigate back to the main screen or when held, restart the smartphone in the event it freezes. In the
past several years, voice/speech has emerged as the secondary source of data entry to smartphones, and to command and control the phone.

In 2014, half of Americans over the age of 65 owned a smartphone or tablet (Medical Alert Advice, 2014). Furthermore, approximately 75% owned some kind of cell phone. Likewise, Rainie and Perrin (2017) from the Pew Research Center affirmed that 77% of U.S. adults said they owned a smartphone. This number was a dramatic increase from 35% in 2011, making the smartphone one of the most quickly adopted consumer technologies by seniors in recent history. In 2017, 42% of those over the age of 65 (i.e. seniors) reported that they owned a smartphone. The recent study showed that within 1 year the rate of smartphone users over the age of 65 increased to 53% (Pew Research Center, 2019).

The two major mobile operating systems used by smartphones are Android and iOS (formerly iPhone OS). The Android operating system is used by many smartphone manufacturers (such as Samsung, LG, Google) while iOS is used only in Apple’s iPhones (and other Apple mobile devices). In 2013, Android-operated phone owners represented 28% of the cell phone owning population, while iOS OR iPhone owners represented 25% of the cell phone owning population. Phones that operate with Blackberry and Windows systems only make up 4% and 1% of the cell phone owning population, respectively. The remaining 31% is comprised of traditional flip-phone users Smith (2013).

Some similarities between the two platforms (i.e. Android and iOS) are the simplicity and commands made by the user’s fingers. Users typically choose one platform over the other simply due to personal preference more than functionality, as the user interfaces of the two platforms are very similar. The differences are primarily for application developers. In order to have an application available in Apple’s App Store, the application developer must pay $99 per year and must update the application accordingly based on Apple’s newest operating software requirements. The Google Play Store, on the other hand, charges Android application developers a one-time fee of $25 to have one’s application available in the store. For this reason, the Android platform was selected as the initial mobile operating system platform to develop the smartphone application in this research.

2.4. Smartphone Applications

This sub-section focuses on smartphone applications. An application may be defined as a program designed to run on a mobile device such as a smartphone or tablet.

2.4.1. Functional Characteristics

To create an application for the Android operating system, the Android Studio software is required (Android, 2018). To create an application for the iOS operating system, the XCode software is required (Apple, 2019). It should be noted that each software (application development tool) is free to download; however, Apple charges application developers $99 per year to have an application available in the Apple
App Store for iPhone or iPad users to purchase or download, whereas Android charges developers a one-time fee of $25 to have an application available in the Google Play Store.

To best illustrate how an application works, a popular mobility application, Uber (Uber, 2019), is used as an example. Uber is a rideshare service by which a rider may use the Uber application to request a driver (who drives his/her private vehicle to serve the rider), track the progress of the trip, make a payment, etc. The following steps describe how a rider can use the Uber application to improve his/her mobility. First, if the rider does not have the Uber application installed on their smartphone, he/she may access Apple’s App Store or Google Play Store, for iPhone and Android users, respectively. Then, the rider searches for Uber and downloads the Uber application. Once the Uber application has been downloaded and installed on the rider’s smartphone, the rider accesses or “opens” the Uber application. When the rider uses the Uber application for the first time, the rider is prompted to create a username and password, enter his/her profile as well as payment information. Once an account is created, the rider may request a ride to a specific destination. At this point, the Uber application, on the backend, accesses the global positioning system (GPS) location of the smartphone and subsequently searches for surrounding drivers. The nearest driver who meets the criteria set forth by the rider is then directed to the rider based on the GPS location of the rider’s smartphone. While waiting for the ride, the rider is shown the name and photograph of the driver and the vehicle model and license plate. The rider can also see the real-time location of the driver by a map displayed on his/her smartphone screen. The driver then picks up the rider and transports him/her to their desired location. During the trip, the rider can use the Uber application’s map to track his/her real-time location. Once the driver confirms that the trip is complete, the Uber application will charge the rider’s payment account directly from the application and credit the driver. The above steps are the operations of the application from the rider’s perspective. There is another version of the Uber application that is developed for the drivers.

2.4.2. Review of Existing Applications for Mobility

There are currently many smartphone applications available for smart mobility for users of all ages. Some examples of these applications are Google Maps, Waze, and Metropia.

Google Maps may be downloaded for free from Apple’s App Store or Google Play Store. Google Maps does not require an account. When the user opens the application, a map is displayed centered at the GPS location of the smartphone (i.e. the user’s current location). The user then inputs a destination and mode of travel, based on traffic condition the application decides the best route and provides directions accordingly.

Waze is another navigation software owned by Google that provides turn-by-turn navigation information. Unlike Google Maps, which acquires its real-time traffic condition data from commercial
vendors, Waze relies on the travel time data provided by the user’s smartphone and user-submitted incident details.

Metropia (2017) is another application aims to cater to mobility needs. Once the Metropia application has been activated, the user may input a destination, similar to Google Maps. Metropia, however, has a different way of encouraging the app use by providing incentives for the selection of the alternative mode of transportation (i.e. through in-app game points). For example, a user would like to drive to work during the morning peak hour. A certain number of points are awarded for this commute; however, more points are awarded if the user carpool, uses the bus, or travels outside the morning peak hour to work. The application’s algorithm determines the number of points for each alternative based on how well the alternative benefits the network’s traffic conditions as a whole. The points may be redeemed for prizes such as gift cards.

There are a few popular applications available for senior users. Some of these applications are Pill Boxie, MedCoach, and Medisafe. Some of the most popular applications are described in detail in the next section. In general, most of these applications are very intuitive and user-friendly, but limited functions for the seniors.

Many, if not all, of the existing applications for mobility are not designed specifically for seniors. The tech-savviness of the seniors is not considered with current mobility applications (e.g. large font, use of fingers, etc.). In fact, research shows that older adults would like to use technology more when barriers to use including lack of knowledge, vision, hearing, and fine motor difficulties are handled. (Gitlow, 2014). On the other hand, many of the applications designed specifically for seniors are not related to mobility. The applications are primarily related to the medical needs of the seniors (e.g. medicine reminders, emergency buttons for when falls occur, etc.). Czaja (2019) research findings demonstrated that seniors would like to learn more about the technology related to their needs to live independently. An application that integrates both functions to serve the mobility, social, medical, and other needs of the seniors is potentially very valuable for this segment of the population. This is the objective of this research.

2.4.3. Review of Existing Applications for the Seniors

After researching some of the most popular smartphone application for seniors (as described in the next sections), some of the applications were downloaded by the research team and tested. Table 1 presents a general description and the authors’ remarks about each downloaded application.
<table>
<thead>
<tr>
<th>Name</th>
<th>Logo/Icon</th>
<th>Description</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>AARP</td>
<td><img src="AARP.png" alt="AARP Logo" /></td>
<td>General news, events, and deals based on your location, specifically for those who are AARP members.</td>
<td>The user interface is intuitive, but the application is designed for those who recently retired.</td>
</tr>
<tr>
<td>Mag. Light</td>
<td><img src="Mag.jpg" alt="Mag. Light Logo" /></td>
<td>Uses the smartphone’s camera as a magnifying glass.</td>
<td>The application can use the smartphone’s flash for additional light and can even freeze frame.</td>
</tr>
<tr>
<td>MedCoach</td>
<td><img src="MedCoach.png" alt="MedCoach Logo" /></td>
<td>An application that has a very intuitive user interface (i.e. a 3 x 3 application grid layout) for medicine, doctors, pharmacies, etc.</td>
<td>One key feature is “urgent care” which serves as a panic button while the user is making a trip.</td>
</tr>
<tr>
<td>Medisafe</td>
<td><img src="Medisafe.png" alt="Medisafe Logo" /></td>
<td>An application that tracks pill usage throughout the day and can track when missing or taken.</td>
<td>Tracks what pills look like to create virtual pillbox, not just the name, which is key to memory loss.</td>
</tr>
<tr>
<td>My Pain Diary</td>
<td>![My Pain Diary Logo](My Pain Diary.png)</td>
<td>Award winning application, which allows users to track the type of pain and location for doctors to better diagnose prior to a patient visiting the doctor.</td>
<td>Very intuitive application and currently used by many seniors.</td>
</tr>
<tr>
<td>Koala Phone</td>
<td>![Koala Phone Logo](Koala Phone.png)</td>
<td>Application in which the user interface was designed based on research (large text and keyboard, but very limited features).</td>
<td>This application was designed for seniors who are still relatively independent, and as such, want an easy-to-use smartphone to maintain their social status (e.g. taking pictures while traveling).</td>
</tr>
</tbody>
</table>

Table 1. Downloaded and tested smartphone applications.

*Salter* (2015) released an article regarding the top six smartphone applications for seniors. The list is summarized below.

1. Magnifying Glass with Light. This application illuminates and magnifies books, magazines, newspapers, and restaurant menus.

2. Skype. This application allows users to “see” each other by video conferencing.
3. Pill Boxie. This application allows the user to set-up reminders with visual pillboxes within the mobile application.

4. MedCoach. This application has quick access to lists of medications, pill reminders with easy set-up, and access to the pharmacy’s website to fill prescriptions.

5. Games. These applications (e.g. crosswords, Sudoku, and Lumosity) keep seniors’ brains active.

6. Red Panic Button. This application allows the user to input a relative’s contact information should an emergency occur. In the event of an emergency or a need for assistance, seniors open the application and hit the red button in the middle of the screen.

Additionally, Belval (2015) also released a list of the top seven smartphone applications for seniors.

1. Lumosity. This application keeps the minds of the seniors engaged to facilitate the prevention of Alzheimer’s.

2. Prismatic. This application provides an intuitive user interface for viewing current news.

3. Medisafe. This application provides reminders pertaining to medication.

4. Mint Bills & Money. This application manages bills and finances and can be used by anyone, especially seniors.

5. WebMD. This application allows any user to ask a medical question and receive an answer without visiting a doctor.

6. Kindle. This application may be used by anyone who loves to read; however, there are advantages for senior users such as controls over text size, brightness, and a built-in dictionary.

7. Audible. This application provides audiobooks, which can be helpful for anyone with a visual or literacy impairment, including seniors.

Medical Alert Advice (2014) developed a list of the top smartphone applications for seniors that were related to their medical needs. They are listed below, in no particular order.

- Fade. This application detects falls and can send a text or email to a predefined person.
- iPBB Blood Pressure. This application requires a separate monitor but can track blood pressure of the user over time.
- Pill Boxie. This application provides reminders of which medication to take and at what time during the day.
- Viz Wiz. This application aids a visually impaired user in taking pictures and asking a question by which the user will receive an answer through the application.
- Motion Doctor. This application searches for physical therapy videos to help the user when an actual physical therapist is unavailable.
2.4.4. Design Considerations for Senior Users

Campbell (2015) provides recommendations to consider when developing a smartphone application.

- The first recommendation was related to the hearing and visual loss of the seniors (i.e. users). It is recommended that font sizes smaller than 16 pixels should be avoided, or to even allow the user to adjust the text size themselves. With respect to visual impairments, Campbell suggested avoiding the blue color, especially in text.

- The second suggestion was related to motor control. Interface elements that are likely to be used in the sequence should be close to each other, as long as they are at least two millimeters apart. Furthermore, buttons on touch interfaces should be at least 9.6 millimeters apart diagonally and form fields should be at least 11 millimeters apart diagonally.

- Memory is another key factor to consider when designing an application for seniors. Currently, many seniors rely on hard copy materials such as notes in wallets, calendars, and diaries to supplement their memory loss. An application for the seniors should be designed to introduce features gradually over time to prevent cognitive overload, and avoid splitting tasks across multiple screens if the seniors require memory of previous actions.

A slump in tablet sales in recent years has shown that seniors have longer upgrade cycles. In addition, seniors do not rely on text messages to convey important information. In social networking, many seniors connect with a smaller, more important group of people rather than a large, undifferentiated social network as many younger users do.

One important assumption in the application development is the user’s familiarity with the device. It is important that smartphone application developers do not assume seniors have any prior knowledge or experience with smartphones. In fact, many seniors are unaware of how to use a scrollbar and some have never used a search field before (Campbell, 2015).

When marketing smartphones to seniors who are not existing owners or users, it may be difficult to persuade them to want a “complicated” phone that is not actually designed for them. One suggestion is to consider an Android phone with a senior-friendly “launcher app” which is only one application but serves as the entire user interface for the senior user (Miller, 2015). This allows the senior to use a smartphone with the common features (e.g. phone, text messaging, contacts, etc.) with no excess clutter. There are “launcher apps” currently available including Necta Launcher, Wiser, Seniors Phone, Fontrillo, and Big Launcher, which are for Android devices only. Once a senior begins to use the “launcher app” and become more familiar with a smartphone, they can be introduced to the actual smartphone user interface.
2.5 Summary

A smart city is a city that integrates people, technology, and information to create a sustainable and resilient infrastructure that provides high-quality services for residents (Villanueva-Rosales et al., 2016). Smart mobility refers to the ability of travelers to acquire, share and use information and resources to make transportation systems more accessible, sustainable and resilient.

Seniors are defined by their ages. The minimum ages of seniors vary from 55 to 65, with a majority of definitions using 65 as the minimum. For this project, an individual with an age of 65 or older is considered as a senior. Seniors are often challenged by mobility issues related to physical, visual and hearing impairments. Such impairments necessitate transportation services to be designed according to their needs. The impairments also require that electronic devices and their software, such as smartphones and mobile applications, be designed for ease of use by the seniors.

Smartphone refers to a new class of mobile phones that integrates services from communication, computing, and mobile sectors including voice communication, messaging, personal information management applications and wireless communication capability. In 2017, 42% of those over the age of 65 (i.e. seniors) reported that they owned a smartphone. Smartphone technology can potentially help the seniors to improve their mobility. However, very few smartphone applications are designed specifically for the seniors and even less so to meet the mobility needs of the seniors.

An application may be defined as a program designed to run on a mobile device such as a smartphone or tablet. Smartphone applications for the seniors need to be designed with the following considerations in mind: large font size, simple navigation menu, strategic placement of large buttons, color-coded for the visually impaired. The applications should also come with memory aids, visual aids, haptic aids, and an emergency help button. They should also be designed to minimize user input errors.

The Android platform was selected as the platform by which to develop this smartphone application.
SECTION 3. Research Work Plan

This section describes the work plan performed to meet the objective and deliver the products of this project. The work plan for this research consisted of the following tasks:

**Task 1:** Review of existing smartphone applications for mobility and for seniors, and the lifestyle of the seniors. [months 1 to 3]

In this task, issues with seniors’ mobility and existing smartphone applications for mobility and for seniors were reviewed.

**Task 2:** Preliminary design and programming of the prototype application. [months 4 to 7]

In this task, the tools and the devices for the application were determined. The initial prototype of the application was designed and programmed.

**Task 3:** Conduct the mobility needs survey in El Paso, TX. [months 8 to 10]

After getting approval from IRB, a survey was conducted to understand the lifestyle and mobility needs of seniors in El Paso, TX.

**Task 4:** Conduct the mobility needs survey in New York, NY. [month 11]

After getting approval from IRB, a survey was conducted to understand the lifestyle and mobility needs of seniors in New York, NY.

**Task 5:** Analyze the survey data [months 12 to 13]

Data obtained from the surveys in El Paso, TX and New York, NY were analyzed to understand the lifestyle and mobility needs of the seniors.

**Task 6:** Incorporating the needs of seniors in the prototype application. [months 13 to 14]

The application prototype was programmed to incorporate the needs of seniors.

**Task 7:** Conduct a pilot survey in El Paso [months 15 to 16]

With approval from IRB, a pilot survey in El Paso was conducted. Participating seniors were given a demonstration of the application and were asked to provide feedback on the user interface and functions.
**Task 8:** Analyze the pilot survey data. [months 17 to 18]

The data obtained from the pilot survey in Task 7 were analyzed to identify the improvements that were needed for the application.

**Task 9:** Refine the prototype application. [months 19 to 24]

According to the findings of the pilot survey, the prototype application was refined with improved user interface and functions.

**Task 10:** Conduct a usability survey in El Paso. [months 25 to 26]

After the prototype application had been refined, a usability survey was performed in which participating seniors were asked to install this application on their smartphones and use it for one month, before providing feedback via interviews.

**Task 11:** Analyze the usability test data. [months 26-27]

The comments and feedback collected from the usability survey in Task 10 were compiled.

**Task 12:** Write report. [months 1 to 27]

All the research findings were documented in a final report in this task. The report was written as the tasks were in progress throughout the duration of this project.
SECTION 4. Mobility Needs Surveys

4.1. Background and Purpose

A survey was conducted to better understand the mobility needs and to identify common challenges faced by seniors. The authors met with officials from the City of El Paso Parks and Recreation Department to gather information about the seniors and senior centers in El Paso. Seniors from senior centers were considered as the potential users of the application since they participate in daily events at senior centers. The authors and the El Paso Parks and Recreation Department discussed the details of the surveys and agreed on the instrument, incentives, venues, and the schedule.

4.2. Survey Instrument

It was determined that all seniors at the senior centers are potential survey subjects. A survey instrument was created which incorporated a consent form and questions about the subject’s demographics, daily activities, physical limitations, and open-ended questions. The draft version was shared with the El Paso Parks and Recreation Department and was then approved. Survey instrument translated into Spanish to recruit Spanish speaking seniors. English and Spanish versions of the consent form and the questions were reviewed and approved by the UTEP Institutional Review Board (IRB). The final version of the survey instrument consisted of 17 questions and survey duration was estimated as 7 minutes. 17 questions were designed into four different parts: (1) 6 questions asking demographics of the responder; (2) 3 questions about lifestyle of the responder; (3) 5 questions related to responder’s mobility needs; (4) 3 questions about smartphones and smartphone applications,

4.3. Survey Implementation

Overall, El Paso has eleven senior centers which are located across the city. City of El Paso Parks and Recreation Department owns and manages all of the senior centers. After approval of the City of El Paso Parks and Recreation Department, the authors organized the surveys with coordination of the staff in each senior center. The survey dates, times, and venues are presented below in Table 2. Flyers (such as the one shown in Appendix A) were posted at the senior centers to advertise the survey.
<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Venue</th>
</tr>
</thead>
<tbody>
<tr>
<td>November 6, 2017</td>
<td>9:00 AM – 12:00 PM</td>
<td>Hilos de Plata Senior Center</td>
</tr>
<tr>
<td>November 6, 2017</td>
<td>10:00 – 11:00 AM</td>
<td>East Side Senior Center</td>
</tr>
<tr>
<td>November 7, 2017</td>
<td>9:00 AM – 12:00 PM</td>
<td>Hilos de Plata Senior Center</td>
</tr>
<tr>
<td>November 8, 2017</td>
<td>9:00 AM – 12:30 PM</td>
<td>Hilos de Plata Senior Center</td>
</tr>
<tr>
<td>November 8, 2017</td>
<td>9:00 AM – 12:00 PM</td>
<td>Wellington Senior Center</td>
</tr>
<tr>
<td>November 9, 2017</td>
<td>10:00 AM – 12:45 PM</td>
<td>Grandview Senior Center</td>
</tr>
<tr>
<td>November 10, 2017</td>
<td>10:00 – 11:00 AM</td>
<td>East Side Senior Center</td>
</tr>
<tr>
<td>November 13, 2017</td>
<td>9:00 – 11:00 AM</td>
<td>San Juan Senior Center</td>
</tr>
<tr>
<td>November 14, 2017</td>
<td>9:30 AM – 12:30 PM</td>
<td>Pavo Real Senior Center</td>
</tr>
<tr>
<td>November 15, 2017</td>
<td>9:30 AM – 12:30 PM</td>
<td>Happiness Senior Center</td>
</tr>
<tr>
<td>November 15, 2017</td>
<td>9:00 AM – 12:00 PM</td>
<td>Pavo Real Senior Center</td>
</tr>
<tr>
<td>November 15, 2017</td>
<td>9:00 – 11:30 AM</td>
<td>Polly Senior Center</td>
</tr>
<tr>
<td>November 16, 2017</td>
<td>9:00 – 11:00 AM</td>
<td>San Juan Senior Center</td>
</tr>
<tr>
<td>November 16, 2017</td>
<td>9:00 – 11:30 AM</td>
<td>Polly Senior Center</td>
</tr>
<tr>
<td>November 16, 2017</td>
<td>9:00 – 11:30 AM</td>
<td>Polly Senior Center</td>
</tr>
<tr>
<td>November 17, 2017</td>
<td>9:00 – 11:30 AM</td>
<td>Polly Senior Center</td>
</tr>
<tr>
<td>November 20, 2017</td>
<td>9:30 AM – 12:30 PM</td>
<td>Pavo Real Senior Center</td>
</tr>
<tr>
<td>November 27, 2017</td>
<td>11:00 AM – 12:00 PM</td>
<td>South El Paso Senior Center</td>
</tr>
<tr>
<td>November 27, 2017</td>
<td>9:00 – 11:30 AM</td>
<td>Memorial Senior Center</td>
</tr>
<tr>
<td>November 28, 2017</td>
<td>9:30 – 10:00 AM</td>
<td>Friendly Senior Center</td>
</tr>
<tr>
<td>November 29, 2017</td>
<td>9:30 AM – 12:30 PM</td>
<td>Happiness Senior Center</td>
</tr>
<tr>
<td>November 29, 2017</td>
<td>11:00 AM – 12:00 PM</td>
<td>South El Paso Senior Center</td>
</tr>
<tr>
<td>November 30, 2017</td>
<td>9:30 AM – 12:30 PM</td>
<td>Happiness Senior Center</td>
</tr>
<tr>
<td>December 1, 2017</td>
<td>9:00 – 11:30 AM</td>
<td>Grandview Senior Center</td>
</tr>
</tbody>
</table>

Table 2. Survey dates, times, and venues – El Paso.

The authors recruited student volunteers to assist in the implementation of the surveys from the Anthropology Department at The University of Texas at El Paso (UTEP) through a course assignment. Twenty student volunteers received proper training and acquired certifications that met the IRB requirement to conduct the survey.

Hard copies of both the English and Spanish versions of the survey instrument were brought to each senior center at the time of survey implementation. A table was set up with the incentives and UTEP logos to attract potential survey participants. Figure 1 presents a photo taken at the Grandview Senior Center.
The seniors at the recreation centers were recruited and guided to complete the surveys as follows. A pollster first asked if a senior would like to participate in the survey, and if so, in English or Spanish. The pollster then asked if this senior participant would like to take the survey independently or if he/she needs help to fill out the survey form. The pollster then provided the participant with the information and consent form, followed by the actual survey instrument. Once the survey was completed, the pollster handed the incentives to the participant. At the end of each survey day, the collected responses were then manually entered into Qualtrics for post-survey analysis.

Concurrent to the survey conducted in El Paso, Texas, an identical survey was conducted in New York, New York. The purpose of this survey was to see the differences and for quality control and quality assurance.

In order to conduct the survey in New York City, New York, two students from New York University (both of whom had the proper IRB certification to survey human subjects) volunteered to conduct the survey at the senior centers. There are several senior centers in New York City, all of which are sponsored by different agencies. They are geographically located throughout all areas of the city. Five senior centers gave permission to the surveyors to conduct the survey at their venues. With the Institutional Review Board (IRB) approval on January 4, 2018 surveys conducted from February 5 to February 16, 2018. The survey dates, times, and venues are presented in Table 3.
<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Venue</th>
</tr>
</thead>
<tbody>
<tr>
<td>February 5, 2018</td>
<td>1:30 PM</td>
<td>PSS King Towers Center</td>
</tr>
<tr>
<td>February 8, 2018</td>
<td>1:00 PM</td>
<td>Fort Washington Ave. Rehab</td>
</tr>
<tr>
<td>February 9, 2018</td>
<td>3:00 PM</td>
<td>Taft Houses Senior Center</td>
</tr>
<tr>
<td>February 12, 2018</td>
<td>10:00 AM</td>
<td>Corsi Senior Center</td>
</tr>
<tr>
<td>February 16, 2018</td>
<td>11:00 AM</td>
<td>Lehman Village Senior Center</td>
</tr>
</tbody>
</table>

Table 3. Survey dates, times, and venues – New York City.

The survey instrument was first initially developed in Qualtrics software, at the same time, hard copies were prepared and brought to the senior centers. At the end of each survey day, the completed survey form (hard copies) were brought back and the responses manually transcribed to Qualtrics.

4.4. Survey Results – El Paso

A total of 458 responses were received. Of those, 229 were in the English version of the instrument and 229 were in the Spanish version of the instrument. The number of responses received for individual questions is summarized in Table 4.

A full listing of all the responses are compiled and listed in Appendix B.1. The statements listed in Appendix are deliberately not edited (including spelling or grammatical errors) in order to retain their real inputs. For each question, the responses in English and Spanish were analyzed separately.
<table>
<thead>
<tr>
<th>Question no.</th>
<th>Nature of question</th>
<th>No. of responses in English</th>
<th>No of responses in Spanish</th>
<th>Total no. of responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Age</td>
<td>226</td>
<td>221</td>
<td>447</td>
</tr>
<tr>
<td>2</td>
<td>Gender</td>
<td>226</td>
<td>221</td>
<td>447</td>
</tr>
<tr>
<td>3</td>
<td>Employment status</td>
<td>219</td>
<td>212</td>
<td>431</td>
</tr>
<tr>
<td>4</td>
<td>Ethnicity</td>
<td>223</td>
<td>216</td>
<td>439</td>
</tr>
<tr>
<td>5</td>
<td>Language</td>
<td>229</td>
<td>229</td>
<td>458</td>
</tr>
<tr>
<td>6</td>
<td>Zip code</td>
<td>223</td>
<td>217</td>
<td>440</td>
</tr>
<tr>
<td>7</td>
<td>Type of residence</td>
<td>224</td>
<td>219</td>
<td>443</td>
</tr>
<tr>
<td>8</td>
<td>Impairment or disability</td>
<td>229</td>
<td>229</td>
<td>458</td>
</tr>
<tr>
<td>9</td>
<td>Electronic device used</td>
<td>229</td>
<td>229</td>
<td>458</td>
</tr>
<tr>
<td>10</td>
<td>Mobility assistance</td>
<td>229</td>
<td>229</td>
<td>458</td>
</tr>
<tr>
<td>11</td>
<td>Trip frequencies</td>
<td>214</td>
<td>219</td>
<td>433</td>
</tr>
<tr>
<td>12</td>
<td>Mode choice</td>
<td>214</td>
<td>219</td>
<td>433</td>
</tr>
<tr>
<td>13</td>
<td>Concern when planning a trip</td>
<td>229</td>
<td>229</td>
<td>458</td>
</tr>
<tr>
<td>14</td>
<td>Mobility challenge</td>
<td>155</td>
<td>144</td>
<td>299</td>
</tr>
<tr>
<td>15</td>
<td>Desired application functions</td>
<td>85</td>
<td>73</td>
<td>158</td>
</tr>
<tr>
<td>16</td>
<td>Motivation to use application</td>
<td>119</td>
<td>94</td>
<td>213</td>
</tr>
<tr>
<td>17</td>
<td>Data sharing</td>
<td>213</td>
<td>218</td>
<td>431</td>
</tr>
</tbody>
</table>

Table 4. Number of survey responses – El Paso.

4.5. Survey Results – New York City

A total of 61 responses were received in New York City. Different from the El Paso survey, all surveys were conducted in English. The survey results were shared according to total responses in single figures for each. Table 5 outlines the number of survey responses for New York City.

Appendix B.2 and its subsections share the results obtained for each question. For each question, the responses were analyzed separately under the corresponding sub-sections.
<table>
<thead>
<tr>
<th>Question no.</th>
<th>Nature of question</th>
<th>Total no. of responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Age</td>
<td>58</td>
</tr>
<tr>
<td>2</td>
<td>Gender</td>
<td>61</td>
</tr>
<tr>
<td>3</td>
<td>Employment status</td>
<td>61</td>
</tr>
<tr>
<td>4</td>
<td>Ethnicity</td>
<td>61</td>
</tr>
<tr>
<td>5</td>
<td>Language</td>
<td>61</td>
</tr>
<tr>
<td>6</td>
<td>Zipcode</td>
<td>61</td>
</tr>
<tr>
<td>7</td>
<td>Type of residence</td>
<td>60</td>
</tr>
<tr>
<td>8</td>
<td>Impairment or disability</td>
<td>61</td>
</tr>
<tr>
<td>9</td>
<td>Electronic device used</td>
<td>61</td>
</tr>
<tr>
<td>10</td>
<td>Mobility assistance</td>
<td>61</td>
</tr>
<tr>
<td>11</td>
<td>Trip frequencies</td>
<td>61</td>
</tr>
<tr>
<td>12</td>
<td>Mode choice</td>
<td>61</td>
</tr>
<tr>
<td>13</td>
<td>Concern when planning a trip</td>
<td>61</td>
</tr>
<tr>
<td>14</td>
<td>Mobility challenge</td>
<td>21</td>
</tr>
<tr>
<td>15</td>
<td>Desired application functions</td>
<td>15</td>
</tr>
<tr>
<td>16</td>
<td>Motivation to use application</td>
<td>13</td>
</tr>
<tr>
<td>17</td>
<td>Data sharing</td>
<td>61</td>
</tr>
</tbody>
</table>

Table 5. Number of survey responses – New York City.

4.6. Summary of Findings

The mobility needs surveys were conducted in El Paso, Texas and New York, New York. The survey instruments in El Paso were prepared in English and Spanish. On the other hand, the survey in New York was conducted only in English. El Paso survey results in each language, for each question, were analyzed separately in this report. On the other hand, combined results of El Paso and New York surveys were analyzed and compared by Vechione et al. (2018).

The key findings from this survey are:

- Smartphone applications for seniors should be intuitive, simple, and easy-to-use;
- Smartphone applications should have ADA-compliant alternate transportation modes (e.g. ADA-compliant buses, paved sidewalk, etc.) for senior users;
- Smartphone applications for the seniors should provide adjustable large font option to serve individuals with visual impairments;
- Smartphone applications for the seniors should have speech-to-text and text-to-speech recognition for those with hearing impairments;
- Smartphone applications for the seniors should be inexpensive, or even free;
• Smartphone applications for the seniors should get the users’ permission to share their data anonymously with the developers; and

• The greatest mobility challenges faced by the seniors (which applications should help to solve) were traffic congestion (including work zones) and difficulty in finding places to park.

These are the key findings of the first survey which all were taken into account during the development of the prototype version of the Urban Connector application. The next section describes the development of the application, the tools used, functional, non-functional requirements, and user menu.
SECTION 5. Prototype Application Development

The development of the mobile application is based on the results obtained from the survey described in Section 4, using the state-of-the-art tools and techniques in the area. This section describes the main functionality of the application and how to operate it, along with the tools used during the development process.

As described in the Vargas-Acosta et al. (2019), Urban Connector application was developed using Android software tool (Android Studio, 2018). Functional requirements were developed with reference to the findings of the mobility needs survey reported in Section 4. On the other hand, the recommendations that an application designed for seniors should have were listed (Vechione et al., 2018). Users should be allowed to set the preferred language (Spanish or English), adjust the font size. All main features should be accessed with a minimum number of clicks or text. It was also recommended that users should have chance to input the information using speech to text feature. Similarly text to speech recognition will help seniors who have visual impairments.

Urban Connector allows users to configure his/her settings for the first time. With this one time configuration, users can adjust the perfect font size, select the preferred language, list the impairments, and add the home address to be used for navigation purposes. The frequent places menu was designed to make most interaction by the users (see Figure 2). If a home address is provided, the Home icon will become colored and clickable. By clicking the Home button, the Urban Connector application will make use of Google Maps to show the route to get to the address provided in the home address screen. By clicking on the Family & Friends icon, the Urban Connector application will show a list of family and friends. By clicking on a name, the Urban Connector application will make use of Google Maps to show the route to get to the address that has been entered in the record. To add a new record by using a map, Google Maps is used to enter the location by selecting a point on the map with a desired Name for that record. Open resources for El Paso were all collected and listed under the “Transportation services” and users access to this menu with two clicks form the main menu (three horizontal bars). Till now, research team have succeed to fulfill the six of the 16 recommendations (Vargas-Acosta et al., 2019).
Figure 2. Urban Connector application screenshots
SECTION 6. Pilot Survey

6.1. Background and Purpose

After developing the prototype version of the Urban Connector application, another survey was conducted to collect first-time users’ feedback. The authors met with the representatives of the City of El Paso Parks and Recreation Department to demonstrate the prototype application and asked for permission to conduct the second survey. The authors were advised to recruit the majority of the participants from an event called National Fitness Day on May 30th, 2018, which was organized by the Parks and Recreation Department for the entire City. The authors were also given permission to visit senior centers to recruit additional participants.

6.2. Survey Instrument

A survey instrument was created which incorporated a consent form and questions about the subject’s demographics and opinion about the prototype application. The consent form and questions were first drafted in English and then translated into Spanish. Both English and Spanish versions of the survey instrument were reviewed by representatives of the City of El Paso Parks and Recreation Department and then approved by UTEP’s Institutional Review Board (IRB). Survey final version has four parts with 16 questions: (1) First part has five questions on participant’s demographics and the use of mobile devices; (2) Second part has five questions on participant’s opinion about the user menus and ease of navigation between and within the menus; (3) Third part consisted of three questions on participant’s opinion about the user interface designs (e.g., font size, icons); (4) Last part has three questions on the participant’s overall rating of the prototype Urban Connector application and open-ended feedback.

6.3. Survey Implementation

To advertise this survey and to help recruit participants, posters and videos were created. The posters have English and Spanish versions (see Appendix C). They summarize the results of the first survey. Four two-minute animated videos were prepared. Two of the videos were in English and the other two were in Spanish. For each language, the first video explained viewers the general characteristics and potential function of smartphones, while the second video presented the prototype Urban Connector application. Besides the National Fitness Day on May 30th, 2018, five different senior centers were visited in coordination with the staff at each center. The survey dates, times, and venues are presented in Table 6.
On the day of the pilot survey, a table was set up at the survey site with the UTEP logo. Incentives (water bottles, tote bags) and posters were displayed, and videos were played repeatedly on laptop computers to draw the attention of potential participants. Five student volunteers, trained and certified to follow IRB procedure, assisted in the survey. Figure 3 presents a photo taken at the site. At the end of each survey day, the hardcopy versions of the survey instruments were brought back to the transportation laboratory on the UTEP campus. The responses were manually transcribed into Qualtrics.

Table 6. Prototype feedback survey dates, times, and venues.

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Venue</th>
</tr>
</thead>
<tbody>
<tr>
<td>May 29, 2018</td>
<td>10:00 – 11:00 AM</td>
<td>East Side Senior Center</td>
</tr>
<tr>
<td>May 30, 2018</td>
<td>8:00 AM – 01:30 PM</td>
<td>Pavo Real Senior Center – National Fitness Day</td>
</tr>
<tr>
<td>June 4, 2018</td>
<td>10:00 – 12:00 PM</td>
<td>Grandview Senior Center</td>
</tr>
<tr>
<td>June 5, 2018</td>
<td>11:00 AM – 12:00 PM</td>
<td>Hilos de Plata Senior Center</td>
</tr>
<tr>
<td>June 6, 2018</td>
<td>10:00 AM – 12:00 PM</td>
<td>Polly Senior Center</td>
</tr>
<tr>
<td>June 7, 2018</td>
<td>10:30 AM – 12:00 PM</td>
<td>Pavo Real Senior Center</td>
</tr>
</tbody>
</table>

Figure 3. Survey booth at Pavo Real Senior Center on National Fitness Day.
6.4. Survey Results

A total of 65 responses were received in the pilot survey. Of those, 22 were in the English version of the instrument and 43 were in the Spanish version of the instrument. The number of responses received for individual questions are summarized in Table 7.

The following sub-sections report the results obtained for each question. Full listing of all the responses are compiled and listed in Appendix D. The statements listed in Appendix D have been left deliberately not edited (including spelling or grammatical errors) in order to retain their original inputs. For each question, the responses in English and Spanish were analyzed separately, and results were combined for demonstration in this report.

<table>
<thead>
<tr>
<th>Question no.</th>
<th>Nature of question</th>
<th>No. of responses in English</th>
<th>No. of responses in Spanish</th>
<th>Total no. of responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-1</td>
<td>Smart device use</td>
<td>22</td>
<td>43</td>
<td>65</td>
</tr>
<tr>
<td>Pre-2</td>
<td>Operating system of the smart device</td>
<td>22</td>
<td>43</td>
<td>65</td>
</tr>
<tr>
<td>Pre-3</td>
<td>Ask for assistance</td>
<td>22</td>
<td>43</td>
<td>65</td>
</tr>
<tr>
<td>1</td>
<td>Age</td>
<td>22</td>
<td>43</td>
<td>65</td>
</tr>
<tr>
<td>2</td>
<td>Gender</td>
<td>22</td>
<td>43</td>
<td>65</td>
</tr>
<tr>
<td>3</td>
<td>Electronic device use</td>
<td>22</td>
<td>43</td>
<td>65</td>
</tr>
<tr>
<td>4</td>
<td>Device assistance need</td>
<td>22</td>
<td>43</td>
<td>65</td>
</tr>
<tr>
<td>5</td>
<td>Smartphone use</td>
<td>22</td>
<td>43</td>
<td>65</td>
</tr>
<tr>
<td>6</td>
<td>Home screen menu</td>
<td>22</td>
<td>43</td>
<td>65</td>
</tr>
<tr>
<td>7</td>
<td>Frequent places menu</td>
<td>22</td>
<td>43</td>
<td>65</td>
</tr>
<tr>
<td>8</td>
<td>Transportation services menu</td>
<td>22</td>
<td>43</td>
<td>65</td>
</tr>
<tr>
<td>9</td>
<td>Graphic images</td>
<td>22</td>
<td>43</td>
<td>65</td>
</tr>
<tr>
<td>10</td>
<td>Entering preferences</td>
<td>22</td>
<td>43</td>
<td>65</td>
</tr>
<tr>
<td>11</td>
<td>Names of menus</td>
<td>22</td>
<td>43</td>
<td>65</td>
</tr>
<tr>
<td>12</td>
<td>Size of buttons</td>
<td>22</td>
<td>43</td>
<td>65</td>
</tr>
<tr>
<td>13</td>
<td>Colors used</td>
<td>22</td>
<td>43</td>
<td>65</td>
</tr>
<tr>
<td>14</td>
<td>Overall Evaluation</td>
<td>22</td>
<td>43</td>
<td>65</td>
</tr>
<tr>
<td>15</td>
<td>Recommendation to a friend</td>
<td>22</td>
<td>43</td>
<td>65</td>
</tr>
<tr>
<td>16</td>
<td>Suggestions for improvement</td>
<td>9</td>
<td>18</td>
<td>27</td>
</tr>
</tbody>
</table>

Table 7. Number of second survey responses.
6.5. Summary of Findings

The pilot survey on the prototype Urban Connector application was conducted in El Paso on six different days at six different senior centers, from May 29 to June 7, 2018. Sixty-five (65) seniors participated in this survey, with 22 of them answering the English version of the survey form, and 43 of them answering the Spanish version of the survey form.

The survey first asked for the participant’s familiarity with mobile devices. Of the 65 participants, 68% of them were already smartphone or tablet users and among them, 68% had Android operating system in their devices. Eighty-eight percent (88%) of the participants asked UTEP student-assistants to demonstrate the Urban Connector application before answering the survey questions.

The last part of the survey asked participants to give overall evaluations for the prototype Urban Connector application:

- Participants gave the application an average score of 4.63 on a scale of 1 to 5.
- 97% of the participants would recommend this application to a friend.
SECTION 7. Usability Survey

7.1 Background and Purpose

After the development of the prototype version of the Urban Connector application and the subsequent modifications based on the pilot survey results, an additional survey was conducted to test the efficacy of the application’s features. In collaboration with El Paso Parks and Recreation Department, the authors were advised to attend the 37th annual El Paso Senior Games as this event attracts a suitable conglomeration of seniors. During these events, the individuals demonstrating an interest in the application were recruited and received assistance to download the application on their personal devices. The recruited participants were then asked to engage in a minimum 30-day trial period concluding with the usability survey and bestowal of their participation incentives.

7.2 Survey Instrument

A survey instrument incorporating questions about the participants’ demographics, application usability, and overall rating was developed in English and translated into Spanish. Both versions were first reviewed by representatives from the City of El Paso Parks and Recreation Department and later approved based on the guidelines set forth by UTEP’s Institutional Review Board (IRB). The final version of the usability survey consisted of 24 questions in four parts:

- Part 1: About Yourself. Five questions on participant’s demographics and usage of mobile devices;
- Part 2: About the Urban Connector Application in General. Ten questions on participant’s opinion on user menu options, ease of use and usefulness of the functions;
- Part 3: Application Design Features. Three questions on the participant’s opinion regarding the user interface design (e.g. font size, icons, colors);
- Part 4: Final Evaluation. Six questions on participant’s overall satisfaction and rating of the tested application, as well as open-ended feedback.

7.3 Survey Implementation

A video, as a visual aid tool, was created to recruit seniors. The videos, created in both English and Spanish, feature how to install, personalize according to the user’s preferences and apply the resources available to start the application’s navigation capabilities. In addition to the mentioned Senior Games, frequently visited places by seniors in El Paso including Cafe Mayapan and El Paso Public Library were visited to meet an adequate recruitment turnout (in geographical spread and sample size). Authors also recruited participants from the Helping Hand Adult Day Care. The survey recruitment dates, times, and venues are summarized in Table 8 below.
Table 8. Usability Survey Recruitment Dates, Times and Venues.

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Venue</th>
</tr>
</thead>
<tbody>
<tr>
<td>February 26, 2019</td>
<td>11:00 AM – 12:00 PM</td>
<td>Pavo Real Senior Center</td>
</tr>
<tr>
<td>February 27, 2019</td>
<td>11:00 AM – 12:00 PM</td>
<td>Pavo Real Senior Center</td>
</tr>
<tr>
<td>February 28, 2019</td>
<td>11:00 AM – 12:00 PM</td>
<td>Pavo Real Senior Center</td>
</tr>
<tr>
<td>March 2, 2019</td>
<td>9:00 AM – 12:00 PM</td>
<td>Polly Harris Senior Center</td>
</tr>
<tr>
<td>March 8, 2019</td>
<td>9:00 AM – 12:00 PM</td>
<td>Cafe Mayapan</td>
</tr>
<tr>
<td>March 9, 2019</td>
<td>9:00 AM – 1:00 PM</td>
<td>Noland Richardson Rec. Center</td>
</tr>
<tr>
<td>March 15, 2019</td>
<td>10:00 AM – 11:00 AM</td>
<td>El Paso Community College</td>
</tr>
<tr>
<td>March 17, 2019</td>
<td>2:00 PM – 5:00 PM</td>
<td>El Paso Library</td>
</tr>
<tr>
<td>March 21, 2019</td>
<td>9:00 AM – 1:00 PM</td>
<td>Helping Hand Adult Day Care</td>
</tr>
</tbody>
</table>

During recruitments, the developed visual tool was repeatedly played on computer monitors. Posters demonstrating the previous survey’s findings were displayed, and colorful flyers (as shown in Appendix E) were distributed to the seniors.

**Figure 4** presents a photo of the recruitment booth set up at Pavo Real Senior Center. The volunteer students attending these events received proper IRB certification to survey human subjects and special training to prepare for expected frequently asked questions about the application. They aimed to encourage seniors to become participants in the study period.

The recruited seniors engaged in a phone call or personal interview to complete the survey after the 30-day period was over. Participants are first called to see whether they wanted to take the survey on the phone or in person. Many wanted to meet in person to complete the survey and be rewarded with the gift card. Researchers would ask for the time, date, and location that would be most convenient for the participants to meet. Many participants asked to meet at their local senior center or recreational center. Most were available in the morning with the exception of 6 participants that were available in the afternoon. Once the researchers met the participants, they asked the participants to complete the survey. Having submitted the survey, these individuals were rewarded with the promised $10 gift card as an incentive. One participant did not want to receive the gift card. Most seniors wanted to take the survey in person except for five participants who took it over the phone. It took three to five minutes for each participant to answer the survey over the phone and in person.
7.4 Survey Results

A total of 38 responses were received in this usability survey. Of those, 22 were in the English version of the instrument and 16 were in the Spanish version of the instrument. The number of participants who responded in Spanish was less than the number of participants who responded in English. The number of responses received for individual questions is summarized in **Table 9**.
<table>
<thead>
<tr>
<th>Question No.</th>
<th>Nature of Question</th>
<th>No. of Responses in English</th>
<th>No. of Responses in Spanish</th>
<th>Total No. of Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Age</td>
<td>22</td>
<td>16</td>
<td>38</td>
</tr>
<tr>
<td>2</td>
<td>Gender</td>
<td>22</td>
<td>16</td>
<td>38</td>
</tr>
<tr>
<td>3</td>
<td>Electronic Device Use</td>
<td>22</td>
<td>16</td>
<td>38</td>
</tr>
<tr>
<td>4</td>
<td>Device Assistance</td>
<td>22</td>
<td>16</td>
<td>38</td>
</tr>
<tr>
<td>5</td>
<td>Smartphone Use</td>
<td>22</td>
<td>16</td>
<td>38</td>
</tr>
<tr>
<td>6</td>
<td>Application Use</td>
<td>22</td>
<td>16</td>
<td>38</td>
</tr>
<tr>
<td>7</td>
<td>Usage Reason</td>
<td>22</td>
<td>16</td>
<td>38</td>
</tr>
<tr>
<td>8</td>
<td>User Preferences</td>
<td>22</td>
<td>16</td>
<td>38</td>
</tr>
<tr>
<td>9</td>
<td>Frequent Places Menu</td>
<td>22</td>
<td>16</td>
<td>38</td>
</tr>
<tr>
<td>10</td>
<td>Home Screen Menu</td>
<td>22</td>
<td>16</td>
<td>38</td>
</tr>
<tr>
<td>11</td>
<td>Graphic Images</td>
<td>22</td>
<td>16</td>
<td>38</td>
</tr>
<tr>
<td>12</td>
<td>Entering Addresses</td>
<td>22</td>
<td>16</td>
<td>38</td>
</tr>
<tr>
<td>13</td>
<td>Disorientation</td>
<td>22</td>
<td>16</td>
<td>38</td>
</tr>
<tr>
<td>14</td>
<td>Avoid Traffic Congestion</td>
<td>22</td>
<td>16</td>
<td>38</td>
</tr>
<tr>
<td>15</td>
<td>Fear of Late Arrivals</td>
<td>22</td>
<td>16</td>
<td>38</td>
</tr>
<tr>
<td>16</td>
<td>Size of Buttons</td>
<td>22</td>
<td>16</td>
<td>38</td>
</tr>
<tr>
<td>17</td>
<td>Menu Options</td>
<td>22</td>
<td>16</td>
<td>38</td>
</tr>
<tr>
<td>18</td>
<td>Visual Needs</td>
<td>22</td>
<td>16</td>
<td>38</td>
</tr>
<tr>
<td>19</td>
<td>Crash / Freeze</td>
<td>22</td>
<td>16</td>
<td>38</td>
</tr>
<tr>
<td>20</td>
<td>Fast Learning</td>
<td>22</td>
<td>16</td>
<td>38</td>
</tr>
<tr>
<td>21</td>
<td>Efficiency / Productivity</td>
<td>22</td>
<td>16</td>
<td>38</td>
</tr>
<tr>
<td>22</td>
<td>Friend Recommendation</td>
<td>22</td>
<td>16</td>
<td>38</td>
</tr>
<tr>
<td>23</td>
<td>Application Rating</td>
<td>22</td>
<td>16</td>
<td>38</td>
</tr>
<tr>
<td>24</td>
<td>Features Suggestion</td>
<td>19</td>
<td>10</td>
<td>29</td>
</tr>
</tbody>
</table>

Table 9. Number of Third Survey Responses

The following sub-sections report the results obtained for each question. All the responses are compiled and listed in Appendix F. For each question, the responses in English and Spanish were analyzed separately, and the results were combined.

7.5 Summary of Findings

The usability test for the Urban Connector application was conducted in El Paso by recruiting 40 seniors in March 2019. Thirty-eight (38) seniors used the Urban Connector for one month followed by answering the survey questions in English and Spanish. Twenty-two (22) completed the English version of
the survey form, and 16 answered the Spanish version of the survey form. The usability survey was divided into four parts.

- Part 1 asked the participants about their profiles. Among the 38 participants:
  - 79% were aged 65 or over;
  - 79% were female;
  - 100% used a smartphone, 42% used a tablet, and 42% used a home computer;
  - Smartphones are mainly used for calling, followed by 89% texting, and 84% taking photos. Only 61% of the participants use their smartphone for navigation.
  - More than half of the participants did not need assistance to install the Urban Connector application.

- Part 2 of the survey asked about the participant’s usage of the Urban Connector application. Participants were given five answer choices for each question: strongly agree, agree, neutral, disagree or strongly disagree. From the responses of the survey:
  - 92% used the Urban Connector application at least once per week;
  - 98% strongly agreed or agreed that entering their preferences was easy, no participants disagreed or strongly disagreed;
  - 68% strongly agreed or agreed that the Home Screen menu was easy to use and only 16% disagreed or strongly disagreed, and they mainly asked for the font size to be increased;
  - 82% strongly agreed or agreed it was easy to understand the Frequent Places menu. 10% disagreed or strongly disagreed;
  - 82% strongly agreed or agreed that the graphic images were easy to understand. 10% disagreed or strongly disagreed;
  - 53% strongly agreed or agreed that it was easy to enter the addresses of family members and friends. 21% disagreed or strongly disagreed;
  - 53% strongly agreed or agreed that the fear of getting lost was reduced by using the application. 21% disagreed or strongly disagreed;
  - 52% strongly agreed or agreed that the Urban Connector application helped them to avoid traffic congestion, 27% disagreed or strongly disagreed;
  - 53% strongly agreed or agreed that their concerns for arriving late were reduced by using the Urban Connector application; 16% disagreed or strongly disagreed.

- Part 3 of the survey asked the participant’s opinions about the application design features.
  - 95% strongly agreed or agreed that the size of the buttons and text met their visual needs. 6% disagreed or strongly disagreed;
  - 100% strongly agreed or agreed that the names of the menus accurately reflected their functions;
94% strongly agreed or agreed that the colors, labels, and images used in the application met their visual needs. No one disagreed or strongly disagreed.

- Part 4 of the survey asked the participant to evaluate the overall impression of the Urban Connector application.
  - Participants gave the application an average score of 3.47 stars out of 5;
  - 68% of the participants would recommend this application to a friend;
SECTION 8. Conclusions

Seniors encounter mobility issues and change in their lifestyle. Smartphone applications are a potentially useful tool to assist seniors in meeting their mobility needs. However, the available applications have not been adequately designed to cater to the needs of the seniors.

The objectives of this project are: (a) to understand the lifestyle and mobility needs of seniors; (b) to develop a prototype smartphone application that caters to the needs identified; and (c) to conduct tests and gather feedback for the prototype application.

Seniors are defined by their ages. The minimum age at which one is considered a senior varies from 55 to 67, with a majority of definitions using 65. Seniors are often challenged by mobility issues related to physical, visual and hearing impairments. Such impairments necessitate transportation services to be designed according to their needs. Electronic devices and their software (such as smartphone applications) should be designed for the ease of use by seniors.

Before and during the development of the application, the research team conducted three surveys with seniors. The first survey was conducted in El Paso, Texas and New York City, New York, with the same questions in English and Spanish, in both locations. The objective of this survey was to better understand the mobility needs of the seniors so that the smartphone application could be developed to better meet those needs. Researchers reached out 458 participants in El Paso and 61 participants in New York City. Based on the key findings of the first survey, the Android platform was selected as the platform by which to develop the Urban Connector smartphone application.

After the development of the prototype of the Urban Connector application, a second survey was carried out in El Paso with 65 participants. The second survey focused on collecting the first time users’ feedback. Researchers provided seniors with mobile devices with the application installed. The participants were asked to explore the application for five minutes and then answered questions about the features of the application. Over 70% of the seniors agreed that the features of the application met their needs. The participants gave the application an average score of 4.63 on the scale of 1 to 5, and 97% of the participants said that they would recommend this application to a friend.

The comments received in the second survey included features that seniors would like to see in the Urban Connector application. The research team implemented the requests, improved the functions and user interface. The new prototype was field-tested by 38 seniors in El Paso, followed by a third survey of the pilot test group. The recruited participants were asked to use the Urban Connector application for a 30-day trial period concluding with a usability survey. Most of the questions in this survey asked the participants to state if he/she strongly agreed, agreed, was neutral, disagreed, or strongly disagreed with a given statement. The statements were related to the ease of use or benefits of the Urban Connector applications. Overall, in the third survey, more than half the participants said that they strongly agreed or agreed with the statements given in the questions. The average rating was 3.47 out of 5.00 and 68% of the participants said that they would like to recommend the Urban Connector application to a friend.
REFERENCES


Hughes, L., Done, J., and Young, A. (2011). Not 2 old 2 TXT: There is potential to use email and SMS text message healthcare reminders for rheumatology patients up to 65 years old. *Health Informatics Journal*. Vol. 17, No. 4, pp. 266-276.


Justinmind. User Guide. 360 description of the product. Retrieved from
https://www.justinmind.com/support/


Sun Metro. *Reduced Fare.* Retrieved from http://www.sunmetro.net/fares/reduced-fare


MAKE YOUR OPINION COUNT!

Participate in a survey conducted by UTEP to gather information about your mobility needs. The goal is to develop a mobile application (App) named Urban Connector that caters to the transportation needs of senior citizens.

WHEN: November 06
WHERE: Hilos de Plata
TIME: 9:00 AM-12:00 PM

Funded in part by the National Science Foundation Grants HRD-1342038, HRD-1242122, CNS-1551221 and the Department of Transportation Grant F8741-02.
APPENDIX B – Mobility Needs Survey Results

B.1. El Paso Results

B.1.1. Age

*English – What is your age range?*

In this question, participants were asked to select the answer choice that included their age. The answer choices given were based on the age ranges in the definitions for seniors (i.e. 55 to 67), as reviewed in Section 2. The number of participants who answered this question (in English) was 226. As shown in Figure 5, the highest group was between the age of 65 and 74. This was followed by the age range of 75 and older.

![Figure 5. Age range [English responses] El Paso.](image)

*Spanish - ¿Qué edad tiene?*

The same question was asked in Spanish. As shown in Figure 6, of the 221 participants who responded to the Spanish version of the survey, the largest group was 75 years or older, followed by the age range of 65 to 74. It appeared that the participants who answered the Spanish version of the survey were older than those who answered the English version of the survey.
Figure 6. Age range [Spanish responses] El Paso.

B.1.2. Gender

_English - What is your gender?_

In this question, participants were asked to select the answer choice for their gender. There were only two answer choices: male or female. The results for the 226 responses collected in the English version of the survey for this question are presented in **Figure 7**. There were almost twice as many female participants as males.

Figure 7. Gender [English responses] El Paso.
The same question was asked in Spanish, and 221 responses were collected. As shown in Figure 8, there were almost three times as many female participants as males.

![Figure 8. Gender [Spanish responses] El Paso.](image)

**B.1.3. Employment Status**

**English – What is your current employment status (optional)?**

In order to reduce the length of the survey, as per the City of El Paso Parks and Recreations Department official’s advice, this question was made optional. However, 219 participants still chose to answer this question. For this question, participants were asked to select the answer choice for their employment status. Each answer choice was a range of the number of working hours per week. Choices such as volunteer and retired were also given. The result of the English responses to this question is presented in Figure 9. A majority of the participants who answered the English version of the survey were retired, followed by those who have a full-time job (i.e. 40 hours or more per week with salary). These results are expected, as many of the seniors who frequent the senior centers were likely retired.
The same question was asked in Spanish, and 212 responses were collected. As shown in Figure 10, the majority of participants were retired, followed by those who work full-time with salary.

Figure 9. Employment [English responses] El Paso.

Figure 10. Employment [Spanish responses] El Paso.
B.1.4. Ethnicity

*English – What is your ethnicity (optional)?*

This question asked the ethnicity of the survey participant and was the second optional question in the survey. There were 223 responses. The results for the participants who answered the English version of the survey are presented in Figure 11. The majority of participants reported being Hispanic or Latino, followed by White. This result is expected, given the geographical location of El Paso near the Mexican border.

![Figure 11. Ethnicity [English responses] El Paso.](image)

*Spanish - ¿Cómo se identifica? (etnia/raza) (opcional)?*

The same question was asked in Spanish, and there were 216 responses. As shown in Figure 12, the majority of participants were Hispanic or Latino, followed by White.
Other Answers

Hispanic/Anglo mix

Native American/Hispanic

Black Latina

Mexican American

Mexican

B.1.5. Languages

*English – What languages are you able to understand, speak, and write with confidence? (You may select more than one).*

This question asked what language the participant was able to use with confidence. The purpose of this question was to determine which language(s) to use in the smartphone application’s interface. The results for the 229 English responses are presented in Figure 13. As expected, the majority of participants who responded to the English version of the survey reported speaking English with confidence, with a smaller percentage who could also speak Spanish with confidence. The Other category responses included, among others, German, French, Sign Language, and Hebrew.
Figure 13. Languages [English responses] El Paso.

Spanish - ¿En qué idioma(s) se comunica con confianza? (entiende, habla, y escribe) (Puede seleccionar más de una respuesta.).

The same question was asked in Spanish, and there were 229 responses. As shown in Figure 14, the majority of participants who responded in the Spanish version of the survey reported speaking Spanish with confidence, followed by those who could also speak English with confidence. The Other category responses only included Sign Language.

Figure 14. Languages [Spanish responses] El Paso.
Other Answers

very little German
German
FRENCH
Sign language
Hebrew
German
German, Italian
sign language
Spanglish

B.1.6. Zip Code

*English – What is the zip code of your residential address?*

This question asked what zip code the participant lived in. The purpose of this question is to: (i) verify all areas of El Paso are represented; and (ii) determine what areas of El Paso the potential users live in, so that the initial content of the smartphone application may concentrate on those zip codes. The results of the 223 participants who answered the English version of the survey are presented in Figure 15. Virtually all zip codes in El Paso were represented, as well as some in New Mexico (i.e. zip codes greater than 88000).
The same question was asked in Spanish, and there were 217 responses. As shown in Figure 16, virtually all zip codes in El Paso were represented, as well as New Mexico.
The combined results from both the English and Spanish responses for this question (440 responses) are presented below in **Figure 17**. **Figure 17** provides justification that all areas of El Paso were represented for this survey.

**Figure 17. Zip code [all responses] El Paso.**

**Figure 18. Zip code [US Census data 2010 for El Paso seniors]**
In order to understand the spread of the data collection, the zip codes of the respondents are compared to the US-Census data for El Paso. The percent distribution of the survey respondents and the census information of population who are above 65 years old are listed according to the zip codes. The Census data information plotted in Figure 18 above. As shown, the survey respondents are perfectly distributed compared to El Paso census data.

B.1.7. Type of Residency

*English – How would you describe your type of residence?*

This question asked the participant to select the answer choice for their type of residence. The purpose of this question was to gain a better understanding of the independence of the seniors. The results for the 224 participants who answered the English version of the survey are presented in Figure 19. The majority of participants who answered the English version of the survey reported living in houses, followed by apartments. Very few respondents reported living in senior citizen homes. Other category responses included living with a relative or friend, a mobile home, and homeless. These results are expected, as much of the surveys were conducted at the senior centers, places where mobile and independent seniors frequently visit.

![Type of Residence [English Responses]](image)

*Figure 19. Type of residency [English responses] El Paso.*
The same question was asked in Spanish, and there were 219 responses. As shown in Figure 20, the majority of participants who answered the Spanish version of the survey reported that they live in a home, followed by those who live in an apartment. There was a greater percentage of participants who answered the Spanish version of the survey who reported living in an apartment, as compared to participants who answered the English version of the survey. There was no participant who lived in a senior citizen home. Other category responses included living with a relative or friend, a mobile home, and military housing.

Figure 20. Type of residency [Spanish responses] El Paso.

Other Answers

- With my brother/House
- no answer
- mobile home
- homeless
- Living with friend
- Trailer
- Duplex
- son's house
Mobil Home
Shelter/ Farm worker's center
adult daycare and special housing
Military Housing (lives with her son)
Mobile Home
rents a studio
Mobile home

B.1.8. Impairments and Disabilities

\textit{English – Do you have any of the following impairments or disabilities? (You may select more than one answer)}

This question asks the participant to choose all applicable answer choices for the impairments and disabilities that they may have. The purpose of this question was to gain a better understanding of the impairment and disability needs of the seniors. The results for the 229 participants who answered the English version of the survey are presented below in \textbf{Figure 21}. Slightly less than half of the participants who answered the English version of the survey reported having no impairment or disability, followed by those with trouble walking. It should be noted that every disability type was checked by at least 5% of the participants who answered the English version of the survey. Other impairments or disabilities included memory loss, arthritis, and fatigue.
Figure 21. Impairments/disabilities [English responses] El Paso.

Spanish – Indique si tiene alguna discapacidad de la siguiente lista (Puede seleccionar más de una respuesta)

The same question was asked in Spanish, and there were 229 responses. As shown in Figure 22, approximately one-third of the responses reported having no impairment or disability. This percentage was lower than those who did the English version of the survey. It should be noted that similar to the English-responses, every disability type was reported by at least 5% of participants who answered the Spanish version of the survey. The Other category included high blood pressure and the ability to understand new information due to age.
Impairments or Disabilities [Spanish responses]

<table>
<thead>
<tr>
<th>Impairment/Disability</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>30%</td>
</tr>
<tr>
<td>Visual (including color blindness)</td>
<td>25%</td>
</tr>
<tr>
<td>Hearing</td>
<td>19%</td>
</tr>
<tr>
<td>Walking</td>
<td>27%</td>
</tr>
<tr>
<td>Typing, Testing</td>
<td>18%</td>
</tr>
<tr>
<td>Muscle Control</td>
<td>13%</td>
</tr>
<tr>
<td>Other</td>
<td>10%</td>
</tr>
</tbody>
</table>

Figure 22. Impairments/disabilities [Spanish responses] El Paso.

Other Answers

- military disabled
- Knees
- fatigue
- memory loss
- arthritis
- Chronic back pain
- limited walking
- Controlled diabetic
- Diabetes, neuropathy
- Vertigo
- Stroke
- Diabetic
- Fatigue
- I can't Drive
- High blood pressure
understanding new information due to advanced age

Padezco de osteopoasis en la columna yertesnol. en ocasiones tengo maneos. Tengo cataratas ojo izquierdo.

Dolor de cuerpo, Visual solo un poco
defaf

Prosthetic leg

my knees hurt when I walk

doe

arthritia and osteoporosis

high blood pressure

heart problems

Autism

pacemaker

Respiratory, oxygen tank

Hernia

N/A

Not specify

Major Depressive Disorder, chronic bronchitis with bursting of blood vessels

Diabetes

Hip fracture

Back Issues

N/A

B.1.9. Electronic Device Used

This question consisted of two sub-questions.
English – Do you use any of the following electronic devices? (You may select more than one answer)

This question provided a different electronic device for each answer choice and asked the respondent to select all answer choices for the electronic devices that they use. The purpose of this question was to gain a better understanding of the market for the proposed application. If a majority of seniors do not even own or use a smartphone for example, then it is likely that the application will not be used, as there is no market for it. Fortunately, for the 229 participants who answered the English version of the survey, approximately two-thirds of seniors use a smartphone, as presented in Figure 23. Furthermore, virtually all seniors used at least one electronic device, as only 1% of participants who answered the English version of the survey reported using no electronic device at all.

![Electronic Device Used [English responses]](image_url)

**Figure 23.** Electronic device use [English responses] El Paso.

English – If you selected one or more options, do you need assistance using these devices?

This question was a follow-up question to the question of electronic device usage. This question asked the participants who used at least one device if they require assistance to use such device(s). The purpose of this follow-up question was to gain a further understanding of their familiarity with the devices. The results of the 224 participants who answered the English version of the survey are presented in Figure 24. Over three-quarters of participants reported that they do not require assistance to use electronic devices. The remaining 24% need assistance. This indicates that this segment of the seniors may need some training, or their caregivers may be the users. It should be noted that this question asks the senior directly if they require assistance; therefore, the results for this part of the question are biased.
For example, if a senior believes they do not require assistance to use their smartphone, but they can only perform the most basic of tasks, they do require assistance to operate the smartphone altogether; however, that is not reflected in these survey results.

![Chart](image)

**Figure 24. Electronic device assistance [English responses] El Paso.**

Spanish – ¿Usa algún teléfono o equipo electrónico para comunicarse de la siguiente lista (Puede seleccionar más de una respuesta)?

The same questions regarding electronic device use were asked in Spanish, and there were 229 responses. As shown in **Figure 25**, only one-third of the participants who answered the Spanish version of the survey reported that they use a smartphone. Approximately half of the Spanish speaking respondents reported that they use a basic cell phone (flip phone).
The same follow-up question regarding assistance to use the electronic device was asked in Spanish, and there were 217 responses. As shown in Figure 26, almost three-quarters of participants reported that they do not require assistance to use their electronic devices.

Figure 26. Electronic device assistance [Spanish responses] El Paso.
B.1.10. Mobility Assistance

*English – Do you need any assistance when you make a trip to the city? (You may select more than one answer)*

This question provided different assistance types for each answer choice and asked the respondent to select all answer choices for the types of assistance they use when making a trip. For this question, a “trip” is defined as a one-way journey of at least ¼ mile from an origin to a destination. The purpose of this question is to determine what types of assistance the seniors require when they travel. If a majority of seniors need a wheelchair when they travel, for example, this should be incorporated into the mobile application accordingly. The results for the 229 participants who answered the English version of the survey is presented in **Figure 27**. A majority of seniors do not require any assistance when making a trip. Among the types of assistance needed, walking cane was most frequently used. These results are expected, as many of the seniors were surveyed at a senior center, a place where mobile, independent seniors frequently visit. It should be noted that the question asks the senior directly for their perception of assistance needed. Many seniors might report that they do not require any assistance when they really do require help from a spouse or family member. This was addressed in the other category answer choice. Some of the other choices are a sister, limited walking, and an escort.

![Figure 27. Mobility assistance needed [English responses] El Paso.](image-url)
Spanish – Indique si necesita el apoyo de alguna de las siguientes opciones cuando realiza un viaje (Puede seleccionar más de una opción).

The same question was asked in Spanish, and there were 229 responses. As shown in Figure 28, more than half of the participants who answered the Spanish version of the survey reported that they do not require assistance when making a trip within the city. Among the types of assistance needed, walking cane was most frequently used. The other category included glasses, spouses, and family members.

![Mobility Assistance Needed [Spanish responses]](image)

**Figure 28. Mobility assistance needed [Spanish responses] El Paso.**

**Other Answers**

Other (please specify) - Text

- sister
- sometimes I need a cane, other times not
- Wait on transport (usually son or daughter)
- escort
- I have no need for such services
- limited walking
- Provider services
- Needs hearing aid, but doesn't own one
Husband
Hasta ahora no
glasses
supportive belt
glasses
Glasses
glasses, but doesn't likes to use them
N/A
Depend on daughter
machine to sleep, machine for muscle control.
husband/daughters
assistance with spouse
n/a
Lack of speed, sometimes need help from someone as support
N/A

B.1.11. Trip Frequencies

English – How many times do you visit the following places in a week? (One answer per row)

This question was in tabular form and asked the participant to report the approximate number of times per week that they visit various places. The purpose of this question was to determine the frequency of the trips made by seniors on a weekly basis so that the navigation function of the smartphone application can prioritize the destinations. The results for the participants who answered the English version of the survey is presented in Table 10. Each row in the table should sum up to 100%. This question received 214 responses in the English version of the survey. All of them provided the trip frequencies for every destination.
A majority of the participants who answered the English version of the survey reported that they did not work or volunteer, as many were retired. Close to half the participants who answered the English version of the survey reported that they visited family members, relatives or friends one to three times a week. Similar percentages of the participants also visited the grocery store, market, retail shop, restaurant, coffee shop, diner, and a civic or religious center once to three times per week. A majority of them went to a healthcare facility, pharmacy, bank, ATM, or an office less than once per week.

Spanish – ¿Cuántas veces a la semana visita los siguientes lugares (Seleccione una respuesta por línea)?

The same question was asked in Spanish. The results for the participants who answered the Spanish version of the survey are presented below in Table 11. This question received 219 responses in the Spanish version of the survey. All of them provided the trip frequencies for every destination.

A majority of the participants who answered the Spanish version of the survey reported that they did not go to a workplace or places they volunteered to help. The percentages are higher than those participants who answered the English version of the survey. The frequency distributions of the visits to the various places, especially the most frequently reported number of visits per week to the same destinations, appeared to be the same between the participants who answered the English and Spanish versions of the survey.

B.1.12. Modes of Transportation

*English – How many times do you use each of the following means of transportation in one week? (Select one answer per row). Count a round-trip as two separate one-way trips. If one-way consists of bus followed by a taxi, count both of them as one trip.*

This question is also in tabular form and asked the participants to report the approximate number of times per week that they used various modes of transportation. The purpose of this question was to determine the frequency of each mode of transportation used by seniors on a weekly basis. The result for the participants who answered the English version of the survey is presented below in Table 12. This question received 214 responses in the English version of the survey. All of them provided the trip frequencies for every destination.
A majority of the participants reported that they never use bicycle, motorcycle, carpool, bus, taxi and rideshare as their modes of transportation. Of those who traveled by car, a majority of them drove every day,

*Spanish – ¿Cuántas veces usa cada uno de los siguientes medios de transporte en una semana (Selecciona una respuesta por línea)? Un viaje de ida y vuelta cuenta como dos viajes separados. Si un viaje de ida consiste en un autobús seguido de un taxi, cuente ambos como uno solo.*

The same question (in tabular form) was asked in Spanish. The results for the participants who answered the Spanish version of the survey are presented below in Table 13. This question received 219 responses in the Spanish version of the survey. All of them provided the trip frequencies for every destination. The distributions of trip frequencies for each mode of transportation appeared similar to those participants who answered the English version of the survey.

<table>
<thead>
<tr>
<th>Mode of Transportation</th>
<th>Never</th>
<th>Less Than Once/Week</th>
<th>1 to 3 Times/Week</th>
<th>3 to 6 Times/Week</th>
<th>7 Times or More/Week</th>
</tr>
</thead>
<tbody>
<tr>
<td>Walking More Than 1/4 Mile</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bicycle</td>
<td>37%</td>
<td>18%</td>
<td>23%</td>
<td>11%</td>
<td>11%</td>
</tr>
<tr>
<td>Motorcycle/Scooter</td>
<td>96%</td>
<td>0%</td>
<td>2%</td>
<td>0%</td>
<td>1%</td>
</tr>
<tr>
<td>Car (as Driver)</td>
<td>19%</td>
<td>4%</td>
<td>7%</td>
<td>16%</td>
<td>54%</td>
</tr>
<tr>
<td>Car (as Passenger)</td>
<td>35%</td>
<td>23%</td>
<td>20%</td>
<td>13%</td>
<td>8%</td>
</tr>
<tr>
<td>Carpool (as Driver or Passenger)</td>
<td>79%</td>
<td>8%</td>
<td>6%</td>
<td>4%</td>
<td>3%</td>
</tr>
<tr>
<td>Public Bus</td>
<td>75%</td>
<td>12%</td>
<td>5%</td>
<td>3%</td>
<td>4%</td>
</tr>
<tr>
<td>Special Bus (e.g. Lift)</td>
<td>91%</td>
<td>3%</td>
<td>2%</td>
<td>3%</td>
<td>0%</td>
</tr>
<tr>
<td>Taxi</td>
<td>94%</td>
<td>6%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Rideshare (e.g. Uber)</td>
<td>94%</td>
<td>4%</td>
<td>1%</td>
<td>0%</td>
<td>0%</td>
</tr>
</tbody>
</table>


<table>
<thead>
<tr>
<th></th>
<th>Never</th>
<th>Less Than Once/Week</th>
<th>1 to 3 Times/Week</th>
<th>3 to 6 Times/Week</th>
<th>7 Times or More/Week</th>
</tr>
</thead>
<tbody>
<tr>
<td>Walking More Than 1/4 Mile</td>
<td>45%</td>
<td>9%</td>
<td>21%</td>
<td>11%</td>
<td>14%</td>
</tr>
<tr>
<td>Bicycle</td>
<td>94%</td>
<td>0%</td>
<td>3%</td>
<td>1%</td>
<td>1%</td>
</tr>
<tr>
<td>Motorcycle/Scooter</td>
<td>99%</td>
<td>0%</td>
<td>0%</td>
<td>1%</td>
<td>0%</td>
</tr>
<tr>
<td>Car (as Driver)</td>
<td>42%</td>
<td>3%</td>
<td>5%</td>
<td>13%</td>
<td>37%</td>
</tr>
<tr>
<td>Car (as Passenger)</td>
<td>49%</td>
<td>9%</td>
<td>17%</td>
<td>10%</td>
<td>15%</td>
</tr>
<tr>
<td>Carpool (as Driver or Passenger)</td>
<td>79%</td>
<td>4%</td>
<td>9%</td>
<td>5%</td>
<td>3%</td>
</tr>
<tr>
<td>Public Bus</td>
<td>68%</td>
<td>10%</td>
<td>9%</td>
<td>5%</td>
<td>9%</td>
</tr>
<tr>
<td>Special Bus (e.g. Lift)</td>
<td>88%</td>
<td>5%</td>
<td>3%</td>
<td>2%</td>
<td>1%</td>
</tr>
<tr>
<td>Taxi</td>
<td>96%</td>
<td>3%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Rideshare (e.g. Uber)</td>
<td>96%</td>
<td>3%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
</tbody>
</table>

B.1.13. Concerns When Making a Trip

*English – What is your main concern when planning a trip? (You may select more than one answer)*

This question provided a common concern when planning a trip for each answer choice and asked the respondent to select all answer choices for their main concerns, so the smartphone application can be developed to address such concerns. In the question, the participants were provided with a list of 10 concerns. They may select any number of concerns from the list. There are 229 responses to this question, and the percentage of participants who have similar concerns is plotted in Figure 29. The most frequently mentioned concerns were cost, followed by on-time departure, and protection from extreme weather. This indicates that seniors: (i) base their trips on cost (e.g. closer destinations, inexpensive modes of transportation, etc.), (ii) are concerned with on-time departure and arrival; and (iii) base their trips on the current weather.
Figure 29. Concerns when planning a trip [English responses] El Paso.

Spanish – ¿Qué es importante para usted cuando planea un viaje (Puede seleccionar más de una respuesta)?

The same question was asked in Spanish, and there were 229 responses. The results for the Spanish-speaking respondents are plotted below in Figure 30. The participants who answered the Spanish version of the survey reported that on-time departure, followed by protection from extreme weather, were the main concerns. The Spanish-speaking respondents are more concerned with on-time departure and arrival than the English-speaking respondents.
B.1.14. Mobility Challenges

**English – Describe your biggest challenge when you commute in the city.**

This is an open-ended question, which asked the participant to write down their biggest challenges when they travel in the city. The purpose of this question was to determine which mobility issues were faced by seniors. The results for the participants who answered the English version of the survey are presented below in **Figure 31**. 155 participants answered this question in the English version of the survey. Their written answers were organized into categories and the percentage of the participants who reported challenges in each category out of the 155 written responses was calculated and plotted in **Figure 31**. Traffic congestion and parking was the most frequently reported challenge they faced. There are 45 responses which are not included, as the participant either did not have any challenges or did not provide an applicable answer (e.g. “N/A”).

![Figure 30. Concerns when planning a trip [Spanish responses] El Paso.](image-url)
The same question was asked in Spanish, and there were 144 responses, as shown in Figure 32. The most frequently reported challenges are traffic congestion and parking, walking issues, and nighttime driving. There are 37 responses which are not included, as the participant either did not have any challenges or did not provide an applicable answer (e.g. “N/A”). In general, the responses for the English and Spanish versions were relatively the same.
B.1.15. Key Application Functions for Seniors

**English – What is one function you would like to see in a mobile application (or App) that would cater to seniors needs?**

This is an open-ended question, which asked the participant to write the most important function they would like to have in a smartphone application. The purpose of this question is to determine what functions the smartphone application for seniors should have. The results for the participants who answered the English version of the survey is presented below in Figure 33. There are 85 participants who answered the English version of the survey who reported at least one function they would like to have. The most frequently stated functions are traffic conditions and navigation, followed by bus routes and accessibility provided by infrastructure.
Spanish – ¿Qué función o característica le gustaría ver en una aplicación móvil específica para adultos mayores?

The same question was asked in Spanish. 73 participants who answered the Spanish version of the survey wrote down the functions they would like to have in a smartphone application. The written answers were organized and plotted in Figure 34. The most commonly desired functions were navigation, followed by bus routes.

Figure 33. Desired application functions [English responses] El Paso.

Figure 34. Desired application functions [Spanish responses] El Paso.
B.1.16. Motivation to Use Application

*English – If you were offered to use a mobile application (or App) that is designed to assist seniors to find places and commute, what would motivate you to use the application?*

This is an open-ended question, which asks the participant to state the factor(s) that would motivate them to use an application that is designed specifically for their mobility needs. The purpose of this question is to gain a better understanding of what would motivate a senior to want to use the proposed smartphone application. The results for the participants who answered the English version of the survey is presented below in Figure 35.

119 participants who answered the English version of the survey wrote down at least one reason that would motivate them to use the smartphone application. There were 80 participants who did not provide an answer because they do not own a smartphone. The most frequently cited reasons are, in decreasing order of frequency:

1. The navigation function;
2. The application was easy to use and accessible;
3. The cost of the application was low;
4. The application was easy to learn;
5. They needed the application to use in emergency situations.

The above reasons may be divided into motivation related to the application’s functions (navigation, emergency) and motivations related to the application’s features (easy to use, low cost, easy to learn).

![Motivation to Use App [English responses]](image)

**Figure 35. Motivation to use smartphone application [English responses] El Paso.**
Spanish – Si hubiera una aplicación móvil para ayudar a adultos mayores a encontrar lugares de interés y viajar en la ciudad, ¿Qué le motivaría a usar dicha aplicación?

The same question was asked in Spanish. For the participants who answered the Spanish version of the survey, 94 of them reported at least one motivation. There were 118 participants who did not provide an answer because they do not own a smartphone. The most common answers, plotted in Figure 36, were similar to the motivations as shown in Figure 35. The only minor difference was relatively more participants who answered the Spanish version of the survey would use the application if it was easy to learn.

![Figure 36. Motivation to use smartphone application [Spanish responses] El Paso.](image)

B.1.17. Data Sharing

English – If you were a user of an App designed to assist seniors to find places and commute, would you be willing to anonymously share your data (e.g. location, route, means of transportation) to improve the services offered by to users (including yourself)?

This question asked the participants if they were willing to share their data (e.g. location, route, means of transportation) to improve the services offered by the smartphone application to the users. The purpose of this question was to determine if the potential users would be willing to allow the application developer to use their usage data to improve the application and its database. The results for the 213 participants who answered the English version of the survey is presented below in Figure 37.
Approximately three-quarters of the participants who answered the English version of the survey are willing to anonymously share their data.

![Data Sharing Chart](image)

**Figure 37. Data sharing [English responses] El Paso.**

Spanish – Si usted usara una aplicación diseñada a ayudar a adultos mayores a encontrar lugares de interés y viajar en la ciudad, ¿estaría dispuesto a compartir sus datos de manera anónima (ej., ubicación, rutas) para mejorar los servicios ofrecidos a los usuarios (incluyéndolo a usted)?

The same question was asked in Spanish, and there were 218 responses. As shown in **Figure 38**, and compared to **Figure 37**, an even higher percentage of participants (80%) who answered the Spanish version of the survey are willing to anonymously share their data.
B.1.18. Describe your biggest challenge when you commute in the city

<table>
<thead>
<tr>
<th>Challenge</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>no</td>
<td>Not experiencing any challenges. I just walk to take the bus. I'm not experiencing any struggles with the bus.</td>
</tr>
<tr>
<td>Doesn't drive at night</td>
<td>Not really, I just use it to come here to the center</td>
</tr>
<tr>
<td>I pay $5 per day to come to the senior center. They should lower the price. They always pick me up late</td>
<td></td>
</tr>
<tr>
<td>None, just driving at night</td>
<td></td>
</tr>
<tr>
<td>Legs hurt when I walk too much. It hurts even more when its cold</td>
<td></td>
</tr>
<tr>
<td>None, We still drive around our neighborhood</td>
<td></td>
</tr>
<tr>
<td>the waiting time for transportation</td>
<td></td>
</tr>
<tr>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>It scares me when I'm alone waiting</td>
<td></td>
</tr>
<tr>
<td>Getting to appointments on time</td>
<td></td>
</tr>
<tr>
<td>traffic (a lot)</td>
<td></td>
</tr>
<tr>
<td>walking</td>
<td></td>
</tr>
<tr>
<td>traffic and parking facilities</td>
<td></td>
</tr>
<tr>
<td>traffic and construction</td>
<td></td>
</tr>
<tr>
<td><strong>Urban Connector</strong></td>
<td></td>
</tr>
<tr>
<td>---------------------</td>
<td></td>
</tr>
<tr>
<td><strong>fighting traffic</strong></td>
<td></td>
</tr>
<tr>
<td>don't go much to the city? If I do my daughter goes with me</td>
<td></td>
</tr>
<tr>
<td>with main street or streets in the neighborhood they are some in bad situations where I can't even go on the sidewalk I to get off on the streets</td>
<td></td>
</tr>
<tr>
<td>no answer</td>
<td></td>
</tr>
<tr>
<td>traffic and construction-road work</td>
<td></td>
</tr>
<tr>
<td>traffic. depends on spouse to drive or other</td>
<td></td>
</tr>
<tr>
<td>traffic on the freeway</td>
<td></td>
</tr>
<tr>
<td>no answer</td>
<td></td>
</tr>
<tr>
<td>no answer</td>
<td></td>
</tr>
<tr>
<td>no answer</td>
<td></td>
</tr>
<tr>
<td>no courtesy. cant walk too far</td>
<td></td>
</tr>
<tr>
<td>no answer</td>
<td></td>
</tr>
<tr>
<td>i usually take the bus and get as close as possible to my destination</td>
<td></td>
</tr>
<tr>
<td>walking long areas</td>
<td></td>
</tr>
<tr>
<td>none</td>
<td></td>
</tr>
<tr>
<td>not to get lost and find place</td>
<td></td>
</tr>
<tr>
<td>no answer</td>
<td></td>
</tr>
<tr>
<td>no answer</td>
<td></td>
</tr>
<tr>
<td>no answer</td>
<td></td>
</tr>
<tr>
<td>construction</td>
<td></td>
</tr>
<tr>
<td>finding parking space</td>
<td></td>
</tr>
<tr>
<td>traffic</td>
<td></td>
</tr>
<tr>
<td>Transportation</td>
<td></td>
</tr>
<tr>
<td>Traffic</td>
<td></td>
</tr>
<tr>
<td>Traffic</td>
<td></td>
</tr>
<tr>
<td>Traffic, bad drivers</td>
<td></td>
</tr>
<tr>
<td>Walking</td>
<td></td>
</tr>
<tr>
<td>Sense of direction (need GPS)</td>
<td></td>
</tr>
<tr>
<td>Transportation</td>
<td></td>
</tr>
</tbody>
</table>
Hoping that I don't fall
traffic and dumb drivers
traffic
heavy traffic
not getting ran over
no problem
finding my way around
mobility
traffic
traffic and construction
being on time because I am always late because of traffic. I walk sometimes
usually getting lost
traffic
traffic
none
traffic
traffic, congestion
knees both
traffic
None

Money, don't have enough money for my expenses. When my car breaks down I need to go to a senior center closer to my house because I can't walk a lot or long distance, and the bus doesn't come this way. It's getting difficult to walk.
traffic & road construction

WEATHER

heavy traffic on I10

parking

changing lanes in traffic

Parking

traffic

Traffic

Street construction/repairs

restroom accessibility

Travel time and sufficient handicap parking

Traffic

traffic

Time

Traffic and health (depending on how I feel)

Climate

Places with too much noise

Forgetting something very important

Level places

Access to areas for easy walking

Long distance walking

The construction on the west side: closures

Parking

None

too many cars on road

Rush hour traffic

Safety in traffic

I am my husbands main care taker, so I struggle careing for his mobility.
Parking

not enough side walk

parking

over-all accessibility, e.g. sidewalks, entrances, bathrooms

My biggest challenge when I travel to the city is that it takes me a long time to reach my destination for so much avenue under construction.

traffic

none

Language

none

sometimes I don't know when buses are leaving or arriving when I'm at a bus stop.

None I use my car.

Parking

N/A

TRAFFIC/CONSTRUCTION

heavy traffic

Not to get stranded especially in the dark or bad weather

none

traffic

Traffic

Transportation car and walking

need to have a road or city map

access to public transportation and money

no answer

being able to find a handicap parking

None

Getting in and down the car

Construction/traffic
Shopping around, had difficulty moving around the stores. She doesn't own a smart phone

<table>
<thead>
<tr>
<th>Traffic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Walking from parking to facility</td>
</tr>
<tr>
<td>Hace an older vehicle. High gas use.</td>
</tr>
<tr>
<td>Heavy traffic</td>
</tr>
<tr>
<td>Obtaining directions/traffic congestion/do i have enough gas</td>
</tr>
<tr>
<td>Dealing with traffic due to active freeway construction</td>
</tr>
<tr>
<td>My mother is in a wheelchair, when we have to commute to dr visits or any activity it?s really hard to find handicapped accessible spots. Very few places have ramps, automatic doors or even parking spots.</td>
</tr>
<tr>
<td>None</td>
</tr>
<tr>
<td>Traffic because of bad driving of other drivers</td>
</tr>
<tr>
<td>Traffic</td>
</tr>
<tr>
<td>Traffic</td>
</tr>
<tr>
<td>congested traffic</td>
</tr>
<tr>
<td>Traffic and distracted drivers</td>
</tr>
<tr>
<td>City under construction</td>
</tr>
<tr>
<td>construction delays</td>
</tr>
<tr>
<td>I10 construction problems</td>
</tr>
<tr>
<td>Lack of parking spaces available.</td>
</tr>
<tr>
<td>Sun metro has been doing a good job. Maybe after the age of 75, bus fare should be free.</td>
</tr>
<tr>
<td>NONE</td>
</tr>
<tr>
<td>Traffic causes me to only stay on the west side</td>
</tr>
<tr>
<td>Finding the place</td>
</tr>
<tr>
<td>Visibility (signs/paint not bright enough, especially at night)</td>
</tr>
<tr>
<td>Traffic</td>
</tr>
<tr>
<td>Traffic is bad, so I only stay on the westside</td>
</tr>
<tr>
<td>Staying awake</td>
</tr>
<tr>
<td>Timing schedule for buses</td>
</tr>
</tbody>
</table>
I do not use internet and I hate to see people on their phones constantly

<table>
<thead>
<tr>
<th>Knowledge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traffic</td>
</tr>
<tr>
<td>Mobility or maneuverability</td>
</tr>
<tr>
<td>Distance from bus stop to my office. Okay most days, but when transporting things can be a bit far. I also hate crossing Mesa after dark--I often take Lyft so I can avoid crossing Mesa after dark.</td>
</tr>
<tr>
<td>My health, access to bathrooms</td>
</tr>
<tr>
<td>I rely on my husband and it's dangerous driving</td>
</tr>
<tr>
<td>Traffic, young people cutting me off</td>
</tr>
<tr>
<td>Traffic, speed bumps, cars going too fast</td>
</tr>
<tr>
<td>No challenges, I can move around well</td>
</tr>
<tr>
<td>Finding good places to eat</td>
</tr>
<tr>
<td>Traffic, speed, getting lost</td>
</tr>
<tr>
<td>Traffic</td>
</tr>
<tr>
<td>People drive too slow</td>
</tr>
<tr>
<td>Traffic</td>
</tr>
<tr>
<td>Cost, gas</td>
</tr>
<tr>
<td>Cars cutting me off</td>
</tr>
<tr>
<td>To get to the destination on time</td>
</tr>
<tr>
<td>Memory, losing consciousness, forgetful. I like to be at senior center by 9:00 AM and I get my hair done once per week</td>
</tr>
<tr>
<td>Time management (making appointments on time)</td>
</tr>
<tr>
<td>N/A</td>
</tr>
<tr>
<td>N/A</td>
</tr>
<tr>
<td>Traffic (safety, more traffic control and not enough police)</td>
</tr>
<tr>
<td>Traffic</td>
</tr>
<tr>
<td>N/A</td>
</tr>
<tr>
<td>N/A</td>
</tr>
<tr>
<td>N/A</td>
</tr>
<tr>
<td>Bus scheduling and making sure I can carry all my stuff when I get on the bus</td>
</tr>
</tbody>
</table>
Many stores do not have the motorized carts. I cannot walk for any length of time

<table>
<thead>
<tr>
<th>I don't drive</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Don't like to drive in heavy traffic</td>
<td>N/A</td>
</tr>
<tr>
<td>None</td>
<td>Traffic</td>
</tr>
<tr>
<td>Traffic and condition, safe route for bad weather.</td>
<td>Walking</td>
</tr>
<tr>
<td>None</td>
<td>Secure transportation, drive with precausion.</td>
</tr>
<tr>
<td>I cannot drive at night</td>
<td>Traffic</td>
</tr>
<tr>
<td>Knowing where everything is</td>
<td>Being on time</td>
</tr>
<tr>
<td>Being on time</td>
<td>Being on time</td>
</tr>
<tr>
<td>Parking downtown</td>
<td>N/A</td>
</tr>
<tr>
<td>My nephew takes me</td>
<td>To know where I go, Knowing</td>
</tr>
<tr>
<td>The traffic and the closing of streets.</td>
<td>None</td>
</tr>
<tr>
<td>I walk to slow so the bus leaves me behind.</td>
<td>caminar</td>
</tr>
<tr>
<td>can't go by myself, I can't walk by myself anymore, I fall easily. I need my husband to take me.</td>
<td>walking</td>
</tr>
<tr>
<td>Traffic. Safety, need to drive cautiously to prevent accident.</td>
<td></td>
</tr>
</tbody>
</table>
parking
None
Bad drivers
Traffic
traffic

When I need to take the bus. My daughter takes me to places

Fall risk. Has trouble walking. When she goes to the store she can only buy a few items because she needs to carry them back home. It is hard going to the stores and buying stuff when you ride the bus. She has a hard time attending her doctor's appointments. The other day one of her friends gave her a ride to her appointment, but there was no one to pick her up.

I rest when I get tired of walking. I struggle with the schedule that is why I go walking. On the weekend the bus schedule is even worst, it takes a while.

The street where I get the bus will be closed for three weeks. I don't think I'll be able to come here (senior center) in the meantime. The bus is sometimes far and I'm not sure when I need to get off. When that happens I call my children so that they can give me a ride.

Traffic and accidents

traffic, construction & and closed streets

Sometimes the bus is late and we have to wait

No, I walk everywhere. I like to walk to remain active. I only use the bus when I have a doctor’s appointment.

I don't like to drive at night or when it's snowing. He is independent.

Not yet. I'm still driving at night and on the freeway

Not yet

On Saturdays morning the bus is always late and on Sundays its even worse. Sometimes I need to ask my sister or I'll go a little earlier to get on time to work. At nights when I get off from work, I need to walk all the way from here (montana and ochoa) to EPCC to take the bus.

traffic

Uses the Lift to go to the senior center. Bus (lift) sometimes picks her up on the opposite side of the building and she has a hard time walking. She no longer drives long distances. Her children don't want her driving anymore so they drive her around.

Completely depends on the adult day care program

Getting to know important places

When there is no transportation and I have to walk to go somewhere.
Finding a ride. Right now I have to go to San Vicente and I do not have anyone to take me. At this moment I don't use the lift yet, but I would like to get those services the problem is that they charge a lot. Sometimes I walk to my appointment or to different places, but right now it's really cold to do that.

Drives and walks slow. He doesn't go out when it's snowing.

I have a hard time walking. I do not drive anymore, my husband takes me to places. The bus is expensive, the charge us $5 to bring us here to the center and pick us up from here. A lot of people cannot afford and that is why they do not come everyday to the center. We get a very small check for all of us to drive well. There are several accidents for that reason. We need to drive in a calm manner and follow the laws.

I don't go out as often anymore. Today I came to the senior center because they brought me here, but I hardly come. I'm not interested in going out anymore. Now I just stay at home because I don't want to bother my children by asking them for a ride. They already take me to my doctor's appointment. The doctor said I need a surgery on my knee to help me walk.

Mi condicion fisica debil

Planificacion del viaje para llegar a tiempo

La segunidady puntualidad en la hona de necogida y regreso a mi casa

N/A

Trafico

Ya no puedo ir sola to walk

my son takes me in the car. If not, I use the bus

I hardly go out, my daughter drives me around. She sometimes doesn't want me to drive because of traffic and because I have a hard time seeing at night doesn't drive long distance. Her daughters or friends take her to places. She doesn't drive in the freeway safety/traffic

cannot walk long distance that why she doesn't uses the bus

not a lot

loneliness

the time it takes me to get to my destination when there is traffic or construction work going on driving with precaution

transportation
waiting for the bus
staying alive
the fatigue
Nothing

Ella dice que su mayor reto es estar sola. Ella dice que ella a estado en muchas situaciones donde ella a tenido que hacer cosas ella sola como cambiar una llanta o ir a agarrar gas porque se a quedado tirada pero para ella siempre es muy dificil

precautions

Le preocupa de so seguridad. Ella siente que su edad la pone mas a arriesgo de que la puedan asaltar.

traffic

not enough awareness for the deaf community and the lack of services
walking where there are no sidewalks
a lot of traffic and closed streets
she has the lift to go to places and its $5
bus schedule
closed streets

Become familiar with streets and when the street is one way only
traffic and closed streets

it's uncomfortable the waiting time at the bus station

traffic

the traffic and appointments when it's rush hour

I have to arrive on time otherwise i miss the bus

traffic

Traffic

Finding parking nearby, I can't walk long distance. There are only a few spots for handicapped in most places. I have to wait until there is one available to park. I hardly go to the stores for the same reason.

There are several people who are in a hurry and do not obey the traffic laws.

Not yet

N/A

Trafico
Llegar a tiempo

none

ninguno

traffic, dark

insomnia

I hardly leave my house because I don't have a ride. I only walk to my son's house and to the gas station.

I don't know the schedule for the bus

traffic

the traffic, wait for rush hour to pass, can't see at night

I'm still strong for my age, but the weather is strong during summer.

batteries for my hearing aid

find someone who can help me when I cannot move my arms

They don't allow my dog in several places

transportation

batteries for hearing aid

traffic

traffic

Traffic

long distance. If the place I'm going to is nearby I'll drive, but when it's not I look for someone to take me. Also, I didn't qualify for the bus card.

none

traffic

Has problems with his leg. He uses public transportation and the bicycle as means of transportation

When I drive long distance I need to stop for a break

none

traffic
He uses public transportation, doesn't own a car. Doesn't have family in El Paso, friends usually give him a ride or uses public transportation.

I don't go to places that are far from my house anymore.

remembering to bring with me my glasses and other things

Sister assisted participant complete survey. My brother only needs a calm environment when traveling.

my wheelchair gets stuck in some streets. I'm afraid of falling

I have visual problems, have difficulty driving at noon

I know how to use Uber and my son transports me, but my only problem is to move around with my oxygen tank

traffic, doesn't drive at night

stress due to traffic, fear of falling

moviendome

no puedo conducir

carreteras rapidas, muy saturadas..freeway.

Traffic

The waiting time of the bus.

When the bus is not in time. This is important because we have doctor's appointments we need to attend. The bus takes a long time. My daughter and grandsons sometimes take me to places.

There is no public transportation outside city limits. The time that I need to wait for the Lift is a lot. After calling to schedule my pick up i need to wait half an hour for the bus to arrive. We time we spend waiting for the lift is longer than the travel time.

Has limited places she visits

Traffic

none, I depend on my daughter.

Traffic

Hates traffic, not afraid to go out, 1/2 hr 1/2 mile on sunland

Not enough signs with large font on the street.
I don't experience any challenges. I don't drive on the freeway anymore because there are a lot of big trucks.
The parking lots

Trafic

Trafic

when the bus does not arrive

The trafic

Reckless drivers

El trafico

My feet get swollen

I can't be alone, I need to be with someone.

I don't have a car, my husband is the one who drives.

I have a car

Car exhaust makes me cough and vomit violently, dizziness, anxiety attacks, convenience

Be punctual

trafico

traffico

None

No puedo usar transporte publico porque no funciona bien. Camino, uso el coche o uso Uber

Tragic

weather and driving long distance

to have a safe trip

"I have no problem". Reported that her daughter does not allow her to use public transportation, and she feels limited. Fall risk/ history of falling.

make people happy, trouble walking

weather, fear of driving when it is snowing or raining.

walking around the stores

I walk slow

Needs help from a provider. Provider helps her move around.
Being alert and distractions while driving

driving long distance and poor eyesight

Husband helps her when she needs to go to places

none

going up and down of the car. My back hurts

none

traffic

walking

None, I don't drive. My daughter takes me to places. She is always available for me.

Everything is fine, I can still drive.

Traffic

Not experiencing any problems

The traffic

Daughter drives me around, I don't know how to drive or use public transportation. I have poor eyesight.

Traffic, sometimes people drive bad

Traffic. Have trouble driving at night

The weather, I don't like hot weather. Sometimes there is no one to take me to places and there is no bus stop near home

Getting up and down the bus

Driving long distance. When I use public transportation I have difficulty getting in the bus

El no saber manejar limita mis actividades

walk

I'm worried about the weather because I have diabetes.

no answer

Traffic, needs help, owns a cane and walker-she is fall risk, cost of app.

doesn't drive. Her husband takes her and she depends on her children.

no, she already know her way around

don't drive long distance
Tall stairs
the traffic and the schedule.

El clima de afuera y dentro del bus
it is safe to commute in taxi than driving myself. Traveling in public transportation is difficult because my legs hurt.

Que haya mas informacion sobre las paradas y horarios del transporte publico en mi comunidad. Y lugares para saber donde esta desponible el transporte publico?

Traffic, protecting self from those who drive recklessly

needs to walk, uses the bus and needs to know the route. Her sister picks her up.
problems with her car/ cost of gas/ cost of living. Has app, but does not know how to use them.
spending a long time sitting
traffic and depends on her husband and children to move around
fear of falling, arriving late, house is 20 min. away from food city
none
Traffic
gets rides from friends
traffic, don’t know where to go.
traffic and translation
Traffic and transfer
construction in downtown, and moving around the city when the streets are closed.
traffic
transfer time
getting lost or not knowing how to get to my destination. I get lost easily. For example, when I go to the hospital I don't know how to find the exit. I only know how to use my smart phone to make calls.
traffic and transfer
traffic, excessive traffic/ too many cars
none
Lack of money and scare of falling
traffic
bad drivers
B.1.19. What is one function you would like to see in a mobile application (or App) that would cater to senior needs?

No answer
I'm not sure. No smartphone
I would like a smartphone
transportation information
N/A everything is good
None
I tend to stay to my self. My sister in law tells me that I'm not friendly. Maybe information to socialize
N/A everything is fine
distinguish what type of transportation is
N/A
if I would like but I do not use it
Sites to sit down
give bus routes that people can take when no car
area of service

easier access to transportation

to be easy

to facilitate handicap

i don't use a mobile

to have better equipped doors in stores, doctors, and offices. No equipped automatic doors

no answer

no answer

smartphone

no answer

none

on time departure

i don't know

no answer

no answer

n/a

no answer

no answer

senior discount

no answer

no answer

Ambulance and medical

no answer

no answer

Accuracy in destination

Easy access

Easy access

Parking accessibility

Large font
Directions
Simplicity
How much time it takes to get to my destination.
not sure
senior events
i don't have access to an app
no answer
none
map
to better use technology
learning what transportation is available. Learning how to use technology
service information for older adults
when traffic is down
when using public transportation, a reminder of when I should get off the bus
show when there is less traffic
no answer
simplify technology to seniors
lifts on all buses
emergency alert
none
night drivers when it gets dark
I hardly use the cellphone. I lose it all the time
Navigation
Bus routes and times
HOW TO USE APP
Gps
large text for eye problems
n/a
That it include Southern NM

LARGE VISUAL ICONS

Traffic warnings

destination parking availability

know in advance about road closures or accidents

none

First aids aboard

accurate information regarding street closings

easy picture identification

bus schedule app that works like google maps. Put in origin and destination and it shows bus routes and transfers along with time table

Best routes and how long it will take

things to do

Easy to operate

How long it will take to get from one place to another

Doctor appointments

Places for seniors

Places for seniors to go

Transportation and reminders

Transportation

Easy route directions

understandable icons

Hand free should not ask to enter a number

None

Hands off voice commands

Simplified

An app for flip phones or a service line.

Easy use.
<table>
<thead>
<tr>
<th>Feature</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>map driving</td>
<td>&quot;I'm at this bus stop -- how soon will the bus be here?&quot;</td>
</tr>
<tr>
<td>simplicity</td>
<td>Be easy to use for everyone</td>
</tr>
<tr>
<td>informaci?n</td>
<td>I don't know</td>
</tr>
<tr>
<td>more buses</td>
<td>none</td>
</tr>
<tr>
<td>I don't know</td>
<td>something that would allow me to see time departures of public buses around the city.</td>
</tr>
<tr>
<td>Easy call for medical service transportation</td>
<td>Easy to use</td>
</tr>
<tr>
<td>Easy to use</td>
<td>Appointment Scheduling</td>
</tr>
<tr>
<td>VOICE INFO</td>
<td>Social Security App</td>
</tr>
<tr>
<td>Social Security App</td>
<td>easy magnification</td>
</tr>
<tr>
<td>easy magnification</td>
<td>Larger letters ok</td>
</tr>
<tr>
<td>Larger letters ok</td>
<td>Availability of transporation choices and places if I can't drive</td>
</tr>
<tr>
<td>Availability of transporation choices and places if I can't drive</td>
<td>n/a</td>
</tr>
<tr>
<td>n/a</td>
<td>no cellphone; make it easier to understand like where other stress/ freeways are located. where libraries are located.</td>
</tr>
<tr>
<td>no answer</td>
<td>Places that are handicap friendly</td>
</tr>
<tr>
<td>Places that are handicap friendly</td>
<td>Easy navigation</td>
</tr>
<tr>
<td>Easy navigation</td>
<td>no</td>
</tr>
<tr>
<td>no</td>
<td>to show me how to get to places</td>
</tr>
<tr>
<td>to show me how to get to places</td>
<td>bus information</td>
</tr>
<tr>
<td>bus information</td>
<td>Formularies of medications that way dr cant rip you off</td>
</tr>
<tr>
<td>Formularies of medications that way dr cant rip you off</td>
<td>Where to find places that offer senior discounts</td>
</tr>
</tbody>
</table>
Rideshare info

Easy bilingual instructions in large print

Simplicity

Age friendly

Buildings that are easily accessible with a wheelchair.

Do not use apps

None

An app that tells me what is happening in the city

None

info about drugs and doctors and local hospitals

Accessibility simple and big letters

Construction obstructions

not sure

Ease of use.

Mobility options.

Able to see bus routes, times, and see where the bus is

none

Events/construction downtown (ball games) and help with parking

Easy to use for senior

N/A

Route to avoid traffic congestion

Easily accessible, simple

Wheelchair access

More training to use a smartphone

I rely on my daughter as my driver

N/A

Recreation places (camping)

Traffic updates and where I am in the city (big picture)
<table>
<thead>
<tr>
<th>Feature</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accurate arrival times</td>
<td>Very large print</td>
</tr>
<tr>
<td>Walking routes with sidewalks (not gravel)</td>
<td>N/A</td>
</tr>
<tr>
<td>Places to eat</td>
<td>N/A</td>
</tr>
<tr>
<td>Shortest route to destination</td>
<td>N/A</td>
</tr>
<tr>
<td>Ability to call 911 from App</td>
<td>N/A</td>
</tr>
<tr>
<td>Main concern is to go see the doctor</td>
<td>I don't know</td>
</tr>
<tr>
<td>Availability and knowledge of local resources</td>
<td>Look for stuff</td>
</tr>
<tr>
<td>I have a flip phone</td>
<td>I have a flip phone</td>
</tr>
<tr>
<td>Tracking the bus to expedite pick-up</td>
<td>Tracking the bus to expedite pick-up and not be in extreme heat/cold on the street, not enough money to buy smartphone</td>
</tr>
<tr>
<td>Transportation</td>
<td>Transportation (Sun Metro does not have enough lifts and drivers)</td>
</tr>
<tr>
<td>Learn languages</td>
<td>N/A</td>
</tr>
<tr>
<td>Include cost of service</td>
<td>Include cost of service for the bus so I can administer money and know what service goes to what place (help identify services I need) so I can make sure I have a schedule to go back home</td>
</tr>
<tr>
<td>Simple app</td>
<td>Simple app that is easy to see. I don't want to mess with phone pop-up settings and there must be room for error (if I enter the wrong information)</td>
</tr>
<tr>
<td>Large address numbers</td>
<td>N/A</td>
</tr>
<tr>
<td>Resources</td>
<td>N/A</td>
</tr>
<tr>
<td>Feature</td>
<td>Feedback</td>
</tr>
<tr>
<td>----------------------------------------------</td>
<td>--------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Bigger prints</td>
<td>N/A</td>
</tr>
<tr>
<td>food delivery</td>
<td>N/A</td>
</tr>
<tr>
<td>Traffic condition information, where to avoid traffic, and good reception.</td>
<td>N/A</td>
</tr>
<tr>
<td>Information about transportation at night</td>
<td>N/A</td>
</tr>
<tr>
<td>How to get somewhere by myself without assistance</td>
<td>None</td>
</tr>
<tr>
<td>Having exact addresses and more information about the destination place</td>
<td>N/A</td>
</tr>
<tr>
<td>Make it less complicated</td>
<td>N/A</td>
</tr>
<tr>
<td>Schedule</td>
<td>N/A</td>
</tr>
<tr>
<td>Don't even want to mess with it</td>
<td>N/A</td>
</tr>
<tr>
<td>Information about the places I can go (Medical clinic &amp; senior center)</td>
<td>N/A</td>
</tr>
<tr>
<td>Easier to use</td>
<td>N/A</td>
</tr>
<tr>
<td>To find the place</td>
<td>N/A</td>
</tr>
<tr>
<td>none</td>
<td>N/A</td>
</tr>
<tr>
<td>Don't know how to use it.</td>
<td>N/A</td>
</tr>
<tr>
<td>Don't use any of that, not even the computer.</td>
<td>N/A</td>
</tr>
<tr>
<td>very user friendly</td>
<td>N/A</td>
</tr>
<tr>
<td>to tell you when you arrive to your destination.</td>
<td>N/A</td>
</tr>
<tr>
<td>safety</td>
<td>N/A</td>
</tr>
<tr>
<td>Community Centers</td>
<td>N/A</td>
</tr>
<tr>
<td>accessibility of destinations</td>
<td>N/A</td>
</tr>
<tr>
<td>up to date and accurate information on local resources</td>
<td>N/A</td>
</tr>
<tr>
<td>picture of the bus</td>
<td>N/A</td>
</tr>
</tbody>
</table>
I don't have a cellphone

Information on the bus or someone that can pick me up for my appointments. She has a hard time getting the services because there are a lot of instructions she needs to follow.

places that are safe to go on our own. Uses smartphone to answer and make calls

Lift and information on transportation. I don't know how to use my cellphone. I only use it to answer calls. I'm scared that my phone will lock if I do something wrong

bus schedule is what I struggle the most with. Something easy to use

easy to use; doesn't have a smartphone

simple

Doesn't know how to use her cellphone. Sometimes I don't understand it (cellphone)

Information on much time I have to get to a place

Transportation information is necessary for everyone that comes to the senior centers

maps

Discounts for older adults. He doesn't own a smartphone

Other options for the bus. For example, like if the bus doesn't get here on time you can take this other bus. Or even discount for the Uber.

Doesn't uses his cellphone, something easy to use

Something that I can use it and order transportation on my own. That's something I don't like about Uber, I need to call my daughter so that she can order an Uber for me. I don't want to be asking her to do it for me. Something that we can use even if we don't own that type of cellphones (smartphones).

for it to have music

picture of the bus

picture of the bus

Information on who could take me to my doctor's appointments which are every three months. The bus takes a while to arrive.

transportation

Transportation, the majority of older adults don't drive

More access for older adults such as sidewalks and special doors. There are several people that struggle with that, but not me yet.

No, I can't think anymore. I don't use my cellphone and I don't have that type of equipment

Localizar rapido un camion

Hovarios y rutas de los viajes ademas, costos

Communicacion direct y practica. Facilidad en la aplicacion en su disenue e imagen. siempre
Si tubiera un teléfono lo usaría
Emergencias
Algo gratis
Foto del autobús
auditory
Information on services. I hardly sees
no cellphone
Doesn't have smartphone. Transportation for when one can no longer drive
heath
doesn't uses her cellphone
transportation information
buses to travel
for it to be simple and practical
app to use uber
nothing
nothing
nothing
none
signing classes
Ella quisiera que la aplicacion la haga sentir feliz e acompañada.
none
Ella quisiera una aplicacion donde ella pudiera tener todas sus contraseñas.
none
services that facilitate mobility among deaf older adults
i need to know what an app is
large font, and light contrast settings
no
large font
cheap

Ability to keep in touch with my PCP

provide information to older adults without asking for personal information

large font

the weather

handicapped parking and weather

easy to use. i don't want to be answering or doing a lot of things for it to work.

something that is easy such as a button

just one button that gives you the map fast and easy

parking availability, to know what places are handicapped friendly.

You cannot see the signs at night or the names of the streets

Everything needs to be more clear, I hardly see

N/A

Como llegar a lugares mas facil

N/A

Descripción de lo que hay disponible

Tiempo que toma para llegar a lugares

no

none

don't know

learn how to use the bus and taxi.

to tell me the exact time for the bus. Like the time, days, and location the bus comes.

I would like to know more and how to get to places with the map. Information on specials

interested, but does not have a smart phone

none. I'm not interested in that, they should work on other things.

no answer

I would like an app that offers uber services but for older adults.

no, my children and grandchildren order taxis or ubers for me
<table>
<thead>
<tr>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>locate transport areas</td>
</tr>
<tr>
<td>reminders of appointments or stuff for personal use</td>
</tr>
<tr>
<td>I hardly use my phone</td>
</tr>
<tr>
<td>equipped transportation</td>
</tr>
<tr>
<td>transportation that is well equipped</td>
</tr>
<tr>
<td>I prefer having it on paper, and something with easy questions or commands. At this age its hard to understand what they want. It needs to be easy to use and understand. I'm afraid of using the internet.</td>
</tr>
<tr>
<td>easy to use, doesn't know how to use smartphones</td>
</tr>
<tr>
<td>doesn't own a smartphone and doesn't know how to use them</td>
</tr>
<tr>
<td>information on social services. I use the map service on my phone and struggle to use it, but I eventually I get it to work. I think something easier to use</td>
</tr>
<tr>
<td>music or things to distract me. Sometimes I struggle because I have poor vision and need help from my provider</td>
</tr>
<tr>
<td>He is on the process of getting a free flip phone</td>
</tr>
<tr>
<td>no answer</td>
</tr>
<tr>
<td>none</td>
</tr>
<tr>
<td>don't know, doesn't own a cellphone</td>
</tr>
<tr>
<td>Only uses phone to answer and to make calls.</td>
</tr>
<tr>
<td>reminders for doctor's appointments.</td>
</tr>
<tr>
<td>Not only for adults, but also for the nurses.</td>
</tr>
<tr>
<td>I don't have a smartphone, I would prefer for the streets and buses to improve</td>
</tr>
<tr>
<td>i don't use apps, I don't need them</td>
</tr>
<tr>
<td>I would like to have an app that is actualized and specific to El Paso</td>
</tr>
<tr>
<td>easy</td>
</tr>
<tr>
<td>easy to use</td>
</tr>
<tr>
<td>simple de usar</td>
</tr>
<tr>
<td>Horario del autobus</td>
</tr>
<tr>
<td>no entiendo a que se refiere?</td>
</tr>
<tr>
<td>Practicalidad</td>
</tr>
</tbody>
</table>
un mapa de la parte de la ciudad donde me encuentre.

Mas disponibilidad

uber

I don't know how to use it, you would have to teach me. Maybe if we could have classes to learn how to use the cellphone.

the bus, faster transportation options and routes.

Does not have a smart phone, For emergencies

Had a cell phone, no longer has one

Easy to use

Finding the route to take with less traffic.

Not a user, just calls

Major information on services and maps of your destination.

No answer

Doesn't apply

Show how to use the app

Easy to use

Information on bus schedule, I leave my house at 8 AM

To not take to much space on my phone.

show how to arrive to destination

None

Games

I don't use my phone, I use a walker.

Everything is okay, if it was probably in Spanish

no answer

No selling or sharing data on me. Privacy. No invasive permissions. No tracking.

The time that the trip would take

pay in cash

facil de usar
No entiendo para que serviría

doesn't uses apps and doesn't own a smartphone.

let us know about traffic.

Doesn't know how to navigate the internet. She needs classes to learn and needs a smartphone.

something similar to google maps

Only uses phone for calls and social media apps. It helps her keep in touch with friends. She is not a social person, she hardly goes out.

easier ways to arrive to place of destination

Only uses cellphone to answer calls and to make calls

does not uses cellphone

Does not uses cellphone

information on where I can seek help.

weather information. struggles when it's extremely cold.

Maps

Already uses google maps and understands it. If anything, medication information would be useful. Sometimes he struggles with that when he visits the doctor.

none

doesn't own a smartphone

Maps

Doesn't have smartphone

I don't know how to read or write. I don't have that type of phone (smartphone)

Does not has a smartphone. Provide information on transportation services for those who do not have transportation or means to come to senior centers. A lot of people don't come for that reason

Doesn't own a smartphone

Amplitude

I don't know how to use apps. Needs help using phone

I still drive. I don't have a smart phone

Big letters

Transportation options
Don't have a smartphone
Information about transportation and for it to be accessible
Facil de usar
don't know
Information on health, someone to pick me up
no
hasn't used apps
hasn't used apps.
uses phone to make calls, hardly uses apps.
doesn't own a cellphone
big letters
what the best routes are, and locations of interest.
to help us move around the city and information on health.
Que nos informe donde y a que horas va pasar el transporte publico para poder usar lo en mi comunidad.
don't know
map of routes and directions
learn how to use the programs in the phone.
no answer
doesn't have a smart phone
how to get from one place to another, and how to use apps.
learn to use other applications
the cost of the phone, don't have one.
does not know how to use computer
the cost for a smart phone/ and accessible
a car
not to know where to go
updates on traffic, what places have the most traffic, and what the easiest routes is. Get notifications when the freeway is closed and for the app to have an auditory feature
the cost of the phone
the phone to use the cost
transportation information and to learn how to use the app
have access to uber
do not have interest/ need
to teach me how to drive and play the piano
let it be easy to use, and in spanish
transportation to tourist places
traffic information
bus schedule
none
N/A
accessible and easy
Map service
Map service
GPS map
Easy access
Free for everyone
To let me know when there are accidents
Information about public bus

B.1.20. If you were offered to use a mobile application (or App) that is designed to assist seniors to find places and commute, what would motivate you to use the application?

No answer
No smartphone
No smartphone. She needs to learn how to use it
No smartphone just a basic cellphone
No

in the future when I can't anymore

I try not to get involved

I think in the future when I needed I would

if I did not have to go until the last of the way

I do not see anymore I should talk

I had the big name so that I can see it

To get to where I go

places to go to eat, have fun (not be stuck at home)

if it's safe

easy way of accessing app

yes

no answer

yes

no answer

to get more convenient designated access to place I go to

no answer

no answer

smartphone

to find how to get to places

no answer

no answer

yes

maybe

no answer

we have a Garmin and also an app-map on our computer and we use it frequently

yes

no answer

no answer

yes

Urban Connector
<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Simple to use</td>
<td>One touch connect, helpful information, accuracy, easy to understand, yes</td>
</tr>
<tr>
<td>Ease of access and form</td>
<td>Easy access and form to find out about seniors, training</td>
</tr>
<tr>
<td>Storage</td>
<td>No answer</td>
</tr>
<tr>
<td>Training</td>
<td>Someone teach me how to use it, having a map designed for hospitals, more education on use of new technology, yes</td>
</tr>
<tr>
<td>Mobility</td>
<td>Have access to internet and maps to move around, being on time, being able to take the bus without feeling like I am going to get lost, if the app accurately showed traffic live time on the roads of El Paso TX</td>
</tr>
<tr>
<td>Time, knowledge, and actual use</td>
<td>No answer</td>
</tr>
<tr>
<td>More concern on event attendance</td>
<td>No answer</td>
</tr>
</tbody>
</table>

Urban Connector
none

**speak to the application**

I already know how to move around, but sometimes I don't know the name of the streets. I would use it so I can show people how to get to places.

**User Friendly**

More technology education

**EASE OF USE**

Nothing

if it made my travel faster

time of commute

**accessibility & inclusion in program**

NO

Need

YES!

**user friendly**

none

traffic reports

For Dr appt

**ease of use**

user friendly

Simplicity, ease of use

**Easy to use**

ease of accessibility

Yes

N/A

N/A

N/A

N/A
Urban Connector

N/A

N/A

Friendly use

nothing

Yes

Easy maps

already using GPS

Easy steps to navigate

Safety, no falls

If someone can teach me then yes.

Fair prices.

when needs to travel

ease of use

simplicity

Be on time to any destination

ease of use

doctor

To visit places

none

reassurance that it can be used by a family member to track me down if I ever get lost.

I don't need it

Accuracy

Efficiency of app

HEARING, rather than reading instructions

fast and easy

Easier way to communicate with children and grandchildren from out of town.

Conducting business from home

easier than Google maps
<table>
<thead>
<tr>
<th>Its for seniors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Need this App to stay active</td>
</tr>
<tr>
<td>to get to your destination faster</td>
</tr>
<tr>
<td>to find places &amp; to show you where there are better places, libraries to use the computer.</td>
</tr>
<tr>
<td>to go where we need to go as much as we need to</td>
</tr>
<tr>
<td>if it told me that handicap parking is close to the place I want to go.</td>
</tr>
<tr>
<td>Being able to help</td>
</tr>
<tr>
<td>no answer</td>
</tr>
<tr>
<td>to show me how to arrive easier to my destination</td>
</tr>
<tr>
<td>If I was by myself.</td>
</tr>
</tbody>
</table>

**Cost**

| Any cost savings that would be involved |

**Usefulness**

| Real Needs |

**Functionality**

| Yes |

**Do not have smart phone**

| If it is really helpful |

**Free**

| No |

| free of charge |

| It can get me to my destination with ease and for it to be simple to use, one two or three steps not more |

| Don't know |

| easily understood |

**Ease of use.**

Points for rewards similar to those used by Metropia.
<table>
<thead>
<tr>
<th>Make it easy to use and understand</th>
<th>yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>To guide someone who is taking me</td>
<td></td>
</tr>
<tr>
<td>To find places</td>
<td></td>
</tr>
<tr>
<td>N/A (no interest) - Older people are afraid of technology (build a wall against)</td>
<td></td>
</tr>
<tr>
<td>Getting around (avoiding traffic and construction)</td>
<td></td>
</tr>
<tr>
<td>Being able to meet all the concerns</td>
<td></td>
</tr>
<tr>
<td>When I can't drive</td>
<td>Yes 100%</td>
</tr>
<tr>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Reliability</td>
<td></td>
</tr>
<tr>
<td>A good app that is possibly free</td>
<td></td>
</tr>
<tr>
<td>Traffic to avoid time wasted during commute</td>
<td></td>
</tr>
<tr>
<td>finding new places to get to with public transportation</td>
<td></td>
</tr>
<tr>
<td>I do not have a cell phone</td>
<td></td>
</tr>
<tr>
<td>I only use my phone for emergencies</td>
<td></td>
</tr>
<tr>
<td>Help seniors and encourage them to walk</td>
<td></td>
</tr>
<tr>
<td>Help me move around</td>
<td></td>
</tr>
<tr>
<td>Understand how to use it and classes on how to use it</td>
<td></td>
</tr>
<tr>
<td>Easy to read and surf</td>
<td></td>
</tr>
<tr>
<td>Affordable price</td>
<td></td>
</tr>
<tr>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Warning about traffic problems</td>
<td>Yes</td>
</tr>
<tr>
<td>Yes</td>
<td>N/A</td>
</tr>
<tr>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>I have one</td>
<td></td>
</tr>
<tr>
<td>To be taught the app and what's new with technology</td>
<td></td>
</tr>
<tr>
<td>When is there less traffic and my daughter lives far so I don't get to see her often</td>
<td></td>
</tr>
<tr>
<td>Economics</td>
<td></td>
</tr>
<tr>
<td>-------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Look for places to visit</td>
<td></td>
</tr>
<tr>
<td>Need phone first</td>
<td></td>
</tr>
<tr>
<td>Visiting museums (going downtown for walking) and visiting friends more often and going to events</td>
<td></td>
</tr>
<tr>
<td>If the app was easy to use</td>
<td></td>
</tr>
<tr>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>My own personal needs</td>
<td></td>
</tr>
<tr>
<td>Easy to use</td>
<td></td>
</tr>
<tr>
<td>Free</td>
<td></td>
</tr>
<tr>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Finding locations</td>
<td></td>
</tr>
<tr>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>if it were actually helpful and easy to use</td>
<td></td>
</tr>
<tr>
<td>If bad weather &amp; have to travel long distance &amp; time of date depends on traffic.</td>
<td></td>
</tr>
<tr>
<td>Don't have to worry about who can take us.</td>
<td></td>
</tr>
<tr>
<td>Learn how to use the App</td>
<td></td>
</tr>
<tr>
<td>improve the mobility for peoples services</td>
<td></td>
</tr>
<tr>
<td>Not a big fan of technology</td>
<td></td>
</tr>
<tr>
<td>Emergencies &amp; other</td>
<td></td>
</tr>
<tr>
<td>Cost</td>
<td></td>
</tr>
<tr>
<td>Free and not complex (as simple as possible)</td>
<td></td>
</tr>
<tr>
<td>Free and not complex (as simple as possible)</td>
<td></td>
</tr>
<tr>
<td>Free (low cost)</td>
<td></td>
</tr>
<tr>
<td>None</td>
<td></td>
</tr>
<tr>
<td>I don't have a way to move around</td>
<td></td>
</tr>
</tbody>
</table>
To be able to move and discover places.

It would be good to go out and distract myself.

The Price

none

For emergencies when I need to use the phone for something.

To learn

Being taught how to use it

sometimes I don't know the address and it tells me where its at.

relevance to my situation

Events

handicap accessibility

how useful it is after trying it.

picture of the place. Go to the grocery store

No cellphone

no

to go to places and for distraction purposes

doesn't know how to use her cellphone

in case I get lost

no

No smartphone

Doesn't own a cellphone

the transportation, like how to drive at night

I don't understand how to use the cellphone that much

I don't have the need for that yet. I have my two cars that are still working well.

Information that is there like what the schedule for the bus is or other options on what bus to take

Doesn't own a smartphone

Being able to use it without asking my daughter to do it for me.
Grandfather

Ability to talk to the device to say things like "take me to this place"

picture of the place

It's really good for older adults to use. There are several that live on their own.

none

transportation

Doesn't own a cellphone. That there would be more ease and opportunity

I don't like to leave my house anymore so that I don't bother my family, and I don't like to seek attention

Si la utilizaria si me ensenan

Si

Museus, luganes histoicu y tunesticos; teatnos; restaurantes y tiendas

Algo de torar

Citas medicas

Que me ensenen

Foto del lugar

doesn't have a smartphone. Has a flip phone, but has a hard time hearing it

no cellphone

no cellphone

no smartphone

to socialize

I don't have that equipment, how would I be able to have access to this service (app) if I only have a flip phone

no, i don't have a cellphone. She is not in the stage where she forgets a lot of things

trip or go out for a ride

si

when they are older and depend on someone

no answer

no answer
Lo que motivaría sería si ella viera que otra gente como ella también lo están usando.

social services

Que no cueste dinero y fuera fácil de comprender.

my mobility

for it to facilitate my mobility when I go out

routes to get to places, directions, weather

no

learn to use the cellphone

becoming familiar with different routes to get to places

to find my destination in a fast and easy way

in case I want to go somewhere

to go to the doctor

maps and routes

maps

maps

a map

maps

I would like to use it because it takes us a while to learn new things and we forget everything

I don't need it

I don't need it

N/A

Que sería fácil de usar

N/A

El poder llegar al lugar indicado
Learn to use the bus and taxi to be able to go out
when my daughter cannot take me somewhere, I would like to be able to move around by myself using the bus or taxi
yes, to learn.
access. Questions on how to qualify for services
no
no answer
It would facilitate my mobility
no
Not interested
I'm not interested
I would like to learn, but I don't know how
there are several new streets that now a days we don't even know maps
when I have doctor's appointments
doesn't own a smartphone
none
none
Right now I'm fine, but when I get older I'll probably need things like special transportation with medical equipment such as a wheelchair
doesn't own a cellphone
no answer
information
doesn't own a cellphone
Doesn't own a smartphone
<table>
<thead>
<tr>
<th>Question</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>I'm not interested</td>
<td></td>
</tr>
<tr>
<td>not at this moment.</td>
<td></td>
</tr>
<tr>
<td>nothing</td>
<td></td>
</tr>
<tr>
<td>I wouldn't use it</td>
<td></td>
</tr>
<tr>
<td>yes, I like museums and parks a lot</td>
<td></td>
</tr>
<tr>
<td>easy and cost</td>
<td></td>
</tr>
<tr>
<td>cost and easy to understand</td>
<td></td>
</tr>
<tr>
<td>educacion tecnologico</td>
<td></td>
</tr>
<tr>
<td>Si la gente me diera paseos</td>
<td>no se..</td>
</tr>
<tr>
<td>Que sea gratis</td>
<td></td>
</tr>
<tr>
<td>como en realidad no conozco la ciudad, algo que me ayude a saber donde estoy y que tan lejos estoy de mi casa.</td>
<td></td>
</tr>
<tr>
<td>Costco</td>
<td></td>
</tr>
<tr>
<td>Spanish and large font</td>
<td></td>
</tr>
<tr>
<td>n/a</td>
<td></td>
</tr>
<tr>
<td>For myself and for other people who come. We cannot afford to buy a car and it's necessary to know what options are available for us.</td>
<td>no</td>
</tr>
<tr>
<td>None</td>
<td></td>
</tr>
<tr>
<td>None</td>
<td></td>
</tr>
<tr>
<td>Easy to operate</td>
<td></td>
</tr>
<tr>
<td>Not use tech</td>
<td></td>
</tr>
<tr>
<td>no answer</td>
<td></td>
</tr>
<tr>
<td>No answer</td>
<td></td>
</tr>
<tr>
<td>Would like to know more</td>
<td></td>
</tr>
<tr>
<td>To show if the place accepts credit cards</td>
<td></td>
</tr>
<tr>
<td>To connect with friends</td>
<td></td>
</tr>
<tr>
<td>no answer</td>
<td></td>
</tr>
<tr>
<td>Easy to use.</td>
<td></td>
</tr>
<tr>
<td>---</td>
<td></td>
</tr>
<tr>
<td>to see new places in El Paso</td>
<td></td>
</tr>
<tr>
<td>None</td>
<td></td>
</tr>
<tr>
<td>Spending time with more people</td>
<td></td>
</tr>
<tr>
<td>I good to know how to move through the city with my daughter.</td>
<td></td>
</tr>
<tr>
<td>no answer</td>
<td></td>
</tr>
<tr>
<td>no answer</td>
<td></td>
</tr>
<tr>
<td>Convenience of access, immediate access without reservations, reliability, timelines to know how long it will take to get there</td>
<td></td>
</tr>
<tr>
<td>Easy to understand (someone explain)</td>
<td></td>
</tr>
<tr>
<td>Facil de entender; una persona que por favor me explique</td>
<td></td>
</tr>
<tr>
<td>none</td>
<td></td>
</tr>
<tr>
<td>No entiendo para que serviria. Acuerdense que no somos fanaticos de explorar apps. Necesitamos que nos los expliquen</td>
<td></td>
</tr>
<tr>
<td>Conocer</td>
<td></td>
</tr>
<tr>
<td>none reported</td>
<td></td>
</tr>
<tr>
<td>make life easier and not get lost.</td>
<td></td>
</tr>
<tr>
<td>Learn how to use the cellphone</td>
<td></td>
</tr>
<tr>
<td>To not get lost</td>
<td></td>
</tr>
<tr>
<td>To have updated information and well informed.</td>
<td></td>
</tr>
<tr>
<td>It would make her daughter's life easier to drive</td>
<td></td>
</tr>
<tr>
<td>Doesn't know how to use cellphone, only uses it to answer calls.</td>
<td></td>
</tr>
<tr>
<td>does not uses cellphone or apps.</td>
<td></td>
</tr>
<tr>
<td>doesn't know</td>
<td></td>
</tr>
<tr>
<td>Being able to go out.</td>
<td></td>
</tr>
<tr>
<td>don't know</td>
<td></td>
</tr>
<tr>
<td>I don't have a smartphone, I don't even know how to use it.</td>
<td></td>
</tr>
<tr>
<td>When he needs something (ex: finding locations)</td>
<td></td>
</tr>
</tbody>
</table>
more map information

the stability to move around

Directions to places I don’t know how to get to.

Needs to learn how to use it

Maybe in the future when I need it

Needs to learn how to use phone. It would be easier to find places

Learn how to use smartphone

Finding places of interest and travel to meet places in the city

My daughter uses it and she takes me to places.

I just know a few streets but not all the streets sometimes I get lost looking for an address

Move around and go out with my friends. We usually go out for dinner on Wednesdays

Don’t know

Don’t know

Don’t know

Don’t know

Qué fuera gratis

don’t know

spend time with people

no

better options to move and how much it costs.

no answer

has friends that struggle to move around the city.

no answer

map services

find places easier

Qué hubiera más lugares interesantes que visitar

to go downtown or civic center.

Qué sea sencilla para aplicar en mi teléfono y este en mi idioma.
for emergencies like getting directions when needed. Wife uses the phone and guides him when he drives.

use the map

accurate information and easiest way to arrive

no answer

directions to get to places

would like to use it to visit and spend time with her children.

information on senior centers

don't have a smart phone

relies on granddaughter

no answer

know how to use technology, have access to uber

access to uber

I need to know since I move around the city a lot.

being able to pay the cost of the phone

cost

learn more about technology

access to uber

n/a uses flip phone

know what other places people go

If I was to be hurt for me to be able to use the application without any issues

museums

no

motivated to go to new places

none

availability of schedules and various routes

free and comfortable

easy to use
easy to use

easy to use

Learning how to use it

that it caters to all type of needs

To make life easier while driving

not a fan of technology

B.2. New York Results

B.2.1. Gender

What category best describes your gender?

In this question, participants were asked to select the answer choice for their gender. There were three answer choices: male, female or other. The results for the 61 responses collected in the survey for this question are presented in Figure 39. There were almost four times as many female participants as male.

Figure 39. Gender, New York City.
B.2.2. Age

*What is your age?*

In this question, participants were asked to declare their age. Then the responses are distributed among the ranges which were already defined in the El Paso survey. The number of participants who answered this question was 58. As shown in Figure 40, the highest group was between the age of 65 and 74. This was followed by the age range of 75 and older.

![Figure 40. Age range, New York City.](image)

B.2.3. Employment Status

*What is your current employment status?*

61 participants answered this question. For this question, participants were asked to select the answer choice for their employment status. Each answer choice was a range of the number of working hours per week. Choices such as volunteer and retired were also given. The results of this question are presented in Figure 41. A vast majority of the participants who answered the survey were retired, followed by the others with the same percentages. These results are expected, as many of the seniors who frequent the senior centers were likely retired.
B.2.4. Race & Ethnicity

Choose one or more races that you consider yourself to be:

This question asked the race of the survey participant and allowed the respondents to select more than one. There were 61 responses. One participant has two races. The results for the participants who answered the survey are presented in Figure 42. The majority of participants reported being African American, followed by Hispanic or Latino.
B.2.5. Languages

What languages are you able to understand, speak, and write with confidence?

This question asked what language the participant was able to use with confidence. The purpose of this question was to determine which language(s) to use in the smartphone application’s interface. The results for the 61 responses are presented in Figure 43. As expected, the majority of participants who responded reported speaking English with confidence, with a smaller percentage who could also speak Spanish with confidence.

![Figure 43. Languages, New York City.]

B.2.6. Zip Code

What is your zip code?

This question asks what zip code the participant lived in. The purpose of this question is to: (i) verify all areas are represented; and (ii) determine what areas the potential users live in, so that the initial content of the smartphone application may concentrate on those zip codes. The results of the 60 participants are presented in Figure 44. It is not as well distributed as the El Paso results.
B.2.7. Type of Residency

How would you describe your type of residence?

This question asked the participant to select the answer choice for their type of residence. The purpose of this question was to gain a better understanding of the independence of the seniors. The results for the 61 participants are presented in Figure 45. The vast majority of participants reported living in apartments, followed by houses and senior citizen homes. These results are expected, as much of the surveys were conducted at the senior centers, places where mobile and independent seniors frequently visit. The results are quite different from El Paso results where most of the respondents reported they live in houses.
B.2.8. Impairments and Disabilities

*Do you have any of the following impairments or disabilities?*

This question asks the participant to choose all applicable answer choices for the impairments and disabilities that they may have. The purpose of this question was to gain a better understanding of the impairment and disability needs of the seniors. The results for the 61 participants are presented below in Figure 46. Slightly less than half of the participants reported having no impairment or disability, with the same amount of respondents reporting having other impairments or disabilities including heart problems, diabetes, asthma, and paresis. The next most common impairment or disability is walking, which nearly one-third of the respondents reported.

![Impairments or Disabilities](image)

**Figure 46. Impairments/disabilities, New York City.**

B.2.9. Electronic Device Used

This question consisted of two sub-questions.

*Do you use any of the following electronic devices?*

This question provided a different electronic device for each answer choice and asked the respondent to select all answer choices for the electronic devices that they use. The purpose of this question was to gain a better understanding of the market for the proposed application. If a majority of
seniors do not even own or use a smartphone for example, then it is likely that the application will not be used, as there is no market for it. Fortunately, for the 61 participants, approximately two-thirds of seniors use a smartphone, as presented in Figure 47. Furthermore, the majority of seniors used at least one electronic device, as only 7% of participants reported using no electronic device at all.

![Electronic Device Used](image)

**Figure 47. Electronic device use, New York City.**

*Do you need assistance using these devices?*

This question was a follow-up question to the question on electronic device usage. This question asked the participants who use at least one device if they require assistance to use such device(s). The purpose of this follow-up question was to gain a further understanding of their familiarity with the devices. The results are presented in Figure 48. Slightly less than three-quarters of participants reported that they do not require assistance to use electronic devices. The remaining 30% need assistance. This indicates that this segment of the seniors may need some training, or their caregivers may be the users. It should be noted that this question asks the senior directly if they require assistance; therefore, the results for this part of the question are biased. For example, if a senior believes they do not require assistance to use their smartphone, but they can only perform the most basic of tasks, they do require assistance to operate the smartphone altogether; however, that is not reflected in these survey results.
B.2.10. Mobility Assistance

Do you need any assistance when you make a trip in the city? (For this part “a trip” is defined as a one-way journey of at least ¼ mile from an origin to a destination.)

This question provided different assistance types for each answer choice and asked the respondent to select all answer choices for the types of assistance they use when making a trip. For this question, a “trip” is defined as a one-way journey of at least ¼ mile from an origin to a destination. The purpose of this question is to determine what types of assistance the seniors require when they travel. If a majority of seniors need a wheelchair when they travel, for example, this should be incorporated into the mobile application accordingly. The results for the 61 participants are presented in Figure 49. One-third of seniors do not require any assistance when making a trip. Among the types of assistance needed, a walking cane was most frequently used. These results are expected, as many of the seniors were surveyed at a senior center, a place where mobile, independent seniors frequently visit. It should be noted that the question asks the senior directly for their perception of assistance needed. Many seniors might report that they do not require any assistance when they really do require help from a spouse or family member. This was addressed in the other category answer choice. Some of the other choices are oxygen tank, home member, and a supporter.
B.2.11. Trip Frequencies

*How many times do you visit the following places in a week?*

This question was in tabular form and asked the participant to report the approximate number of times per week that they visit various places. The purpose of this question was to determine the frequency of the trips made by seniors on a weekly basis so that the navigation function of the smartphone application can prioritize the destinations. The results are presented in **Table 14**. Each row in the table should sum up to 100%. This question received 61 responses. All of them provided the trip frequencies for every destination.

A majority of the participants reported that they did not work or volunteer, as many were retired. Around one-quarter of the respondents reported that they visited family members, relatives or friends less than once a week. Over one-third of the participants visited the grocery store, market, or retail shop one to three times a week. 30% of the respondent visited a healthcare facility or pharmacy less than once a week. Nearly half of the respondents reported that they visited a senior center, library, park or gym three to six times a week. A similar percentage of the respondents visited civic or religious centers less than three times a week. Only one quarter visited a restaurant, coffee, shop or diner less than once a week. A majority of them went to a bank, ATM, or an office less than once per week.
Table 14. Trip frequencies, New York City.

<table>
<thead>
<tr>
<th>Destination</th>
<th>Never</th>
<th>Less Than Once/Week</th>
<th>1 to 3 Times/Week</th>
<th>3 to 6 Times/Week</th>
<th>7 Times or More/Week</th>
</tr>
</thead>
<tbody>
<tr>
<td>Volunteering Place</td>
<td>69%</td>
<td>2%</td>
<td>15%</td>
<td>5%</td>
<td>10%</td>
</tr>
<tr>
<td>Family Member, Relative, or Friend</td>
<td>41%</td>
<td>26%</td>
<td>15%</td>
<td>11%</td>
<td>7%</td>
</tr>
<tr>
<td>Grocery Store, Market, or Retail Shop</td>
<td>21%</td>
<td>11%</td>
<td>38%</td>
<td>20%</td>
<td>10%</td>
</tr>
<tr>
<td>Healthcare Facility, or Pharmacy</td>
<td>33%</td>
<td>30%</td>
<td>20%</td>
<td>15%</td>
<td>3%</td>
</tr>
<tr>
<td>Senior Center, Library, Park, or Gym</td>
<td>7%</td>
<td>5%</td>
<td>15%</td>
<td>44%</td>
<td>30%</td>
</tr>
<tr>
<td>Civic or Religious Center</td>
<td>43%</td>
<td>20%</td>
<td>28%</td>
<td>7%</td>
<td>3%</td>
</tr>
<tr>
<td>Restaurant, Coffee Shop, Diner</td>
<td>48%</td>
<td>25%</td>
<td>15%</td>
<td>10%</td>
<td>3%</td>
</tr>
<tr>
<td>Bank, ATM, or offices</td>
<td>31%</td>
<td>36%</td>
<td>25%</td>
<td>5%</td>
<td>3%</td>
</tr>
<tr>
<td>Other</td>
<td>85%</td>
<td>3%</td>
<td>3%</td>
<td>2%</td>
<td>7%</td>
</tr>
</tbody>
</table>

B.2.12. Modes of Transportation

How many times do you use each of the following means of transportation in one week? Count a round-trip as two separate one-way trips. If one-way consists of bus followed by a taxi, count both of them as one trip.

This question is also in tabular form and asked the participants to report the approximate number of times per week that they used various modes of transportation. The purpose of this question was to determine the frequency of each mode of transportation used by seniors on a weekly basis. The results are presented below in Table 15. This question received 61 responses and all of them provided the trip frequencies for every destination.

A majority of the participants reported that they never use a bicycle, motorcycle, car as a driver, special bus and rideshare as their modes of transportation. Of those who traveled by car as a passenger, one-fifth of them drove less than once a week. The public bus usage was well distributed among frequency selections. Nearly all the responses were around 20%. The most frequently used mode of transportation according to the New York City survey was public buses. Nearly one-fifth of all respondents reported that they used public buses seven times or more in a week. Other modes of transportation included subway and train.
Table 15. Modes of transportation, New York City.

<table>
<thead>
<tr>
<th>Walking More Than 1/4 Mile</th>
<th>Never</th>
<th>Less Than Once/Week</th>
<th>1 to 3 Times/Week</th>
<th>3 to 6 Times/Week</th>
<th>7 Times or More/Week</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bicycle</td>
<td>16%</td>
<td>10%</td>
<td>21%</td>
<td>23%</td>
<td>30%</td>
</tr>
<tr>
<td>Motorcycle/Scooter</td>
<td>93%</td>
<td>5%</td>
<td>0%</td>
<td>0%</td>
<td>2%</td>
</tr>
<tr>
<td>Car (as Driver)</td>
<td>90%</td>
<td>5%</td>
<td>2%</td>
<td>2%</td>
<td>2%</td>
</tr>
<tr>
<td>Car (as Passenger)</td>
<td>54%</td>
<td>20%</td>
<td>7%</td>
<td>11%</td>
<td>8%</td>
</tr>
<tr>
<td>Carpool (as Driver or Passenger)</td>
<td>87%</td>
<td>5%</td>
<td>5%</td>
<td>2%</td>
<td>2%</td>
</tr>
<tr>
<td>Public Bus</td>
<td>20%</td>
<td>26%</td>
<td>20%</td>
<td>16%</td>
<td>18%</td>
</tr>
<tr>
<td>Special Bus (e.g. Lift)</td>
<td>80%</td>
<td>5%</td>
<td>10%</td>
<td>5%</td>
<td>0%</td>
</tr>
<tr>
<td>Taxi</td>
<td>56%</td>
<td>26%</td>
<td>11%</td>
<td>5%</td>
<td>2%</td>
</tr>
<tr>
<td>Rideshare (e.g. Uber)</td>
<td>87%</td>
<td>5%</td>
<td>5%</td>
<td>2%</td>
<td>2%</td>
</tr>
<tr>
<td>Other</td>
<td>93%</td>
<td>3%</td>
<td>2%</td>
<td>2%</td>
<td>0%</td>
</tr>
</tbody>
</table>

B.2.13. Concerns When Making a Trip

What is your main concern when planning a trip?

This question provided a common concern when planning a trip for each answer choice, and asked the respondent to select all answer choices for their main concerns, so the smartphone application can be developed to address such concerns. In the question, the participants were provided with a list of 13 concerns. They may select any number of concerns from the list. There were 61 responses to this question, and the percentage of participants who have similar concerns is plotted in Figure 50. The most frequently mentioned concerns were cost, followed by protection from extreme weather and on-time departure and arrival. This indicates that seniors: (i) base their trips on cost (e.g. closer destinations, inexpensive modes of transportation, etc.), (ii) are concerned with on-time departure and arrival; and (iii) base their trips on the current weather.
Figure 50. Concerns when planning a trip, New York City.

B.2.14. Mobility Challenges

*Describe your biggest challenge when you commute in the city.*

This is an open-ended question, which asked the participant to write down their biggest challenges when they travel in the city. The purpose of this question was to determine which mobility issues were faced by seniors. The results for the participants are presented below in Figure 51. Only 21 participants answered this question for the survey. Their written answers were organized into categories that fit the El Paso results, and the percentage of the participants who reported challenges in each category out of the 21 written responses was calculated and plotted in Figure 51. Waiting time was the most frequently reported challenge they faced, followed by traffic congestion & parking, accessibility to vehicles & buildings and other challenges including safety and train use.
B.2.15. Key Application Functions for Seniors

What is one function you would like to see in a mobile application (or App) that would cater to seniors needs?

This is an open-ended question, which asked the participant to write the most important function they would like to have in a smartphone application. The purpose of this question is to determine what functions the smartphone application for seniors should have. The results are presented below in Figure 52. There were 15 participants who answered the survey who reported at least one function they would like to have. The most frequently stated functions are related to features of the application followed by bus routes and navigation. The other response was eager to learn the new technology about applications.
B.2.16. Motivation to Use Application

If you were offered to use a mobile application (or App) that is designed to assist seniors to find places and commute, what would motivate you to use the application?

This is an open-ended question, which asks the participant to state the factor(s) that would motivate them to use an application that is designed specifically for their mobility needs. The purpose of this question is to gain a better understanding of what would motivate a senior to want to use the proposed smartphone application. The results for the participants of the survey are presented below in Figure 53.

13 participants who answered the survey wrote down at least one reason that would motivate them to use the smartphone application. The most frequently cited reasons are, in decreasing order of frequency:

1. The navigation function;
2. The application was easy to use and accessible;
3. The application was easy to learn;

The above reasons may be divided into motivation related to the application’s functions (navigation) and motivations related to the application’s features (easy to use, easy to learn).
B.2.17. Data Sharing

*If you were a user of an App designed to assist seniors to find places and commute, would you be willing to anonymously share your data (e.g. location, route, means of transportation) to improve the services offered by to users (including yourself)?*

This question asked the participants if they were willing to share their data (e.g. location, route, means of transportation) to improve the services offered by the smartphone application to the users. The purpose of this question was to determine if the potential users would be willing to allow the application developer to use their usage data to improve the application and its database. The results for the 61 participants who answered the survey are presented below in Figure 54. More than half of the participants in the survey are not willing to anonymously share their data.
Figure 54. Data sharing, New York City
APPENDIX C – Pilot Survey Infographic Flyer

**The University of Texas at El Paso**

**Results of Survey About Mobility Needs of Seniors in El Paso**

**Conducted Fall 2017**

- **Respondents’ Ages**
  - 75+ 35
  - 65 to 74 38
  - 60 to 64 13
  - 55 to 59 8
  - under 55 5

- **Gender**
  - 69% Female

**Survey Responses**

- 50% English
- 50% Spanish

**Electronic Device Usage**

- 49% use a smart phone
- 39% use a flip phone
- 38% use a home phone

- 26% interested in learning technology with their devices

**Most Desired App Functions**

1. Navigation
2. Bus Routes
3. Accessibility

**Biggest Challenges During Commute**

- 68% “traffic congestion & parking”
- 10% “walking issues”
- 8% “getting lost”

**Places Seniors weekly visit most**

- 42% “cost”
- 52% “protection from extreme weather”
- 53% “on-time departure”

**Weekly visits**

- Never
- Less Than Once
- 1 to 3 Times
- 3 Times or More

<table>
<thead>
<tr>
<th>Location</th>
<th>Never</th>
<th>Less Than Once</th>
<th>1 to 3 Times</th>
<th>3 Times or More</th>
</tr>
</thead>
<tbody>
<tr>
<td>Work Place</td>
<td>79%</td>
<td>1%</td>
<td>2%</td>
<td>10%</td>
</tr>
<tr>
<td>Volunteering Place</td>
<td>59%</td>
<td>9%</td>
<td>14%</td>
<td>18%</td>
</tr>
<tr>
<td>Family Member, Relative, or Friend</td>
<td>14%</td>
<td>22%</td>
<td>44%</td>
<td>20%</td>
</tr>
<tr>
<td>Grocery Store, Market, or Retail Shop</td>
<td>8%</td>
<td>21%</td>
<td>55%</td>
<td>16%</td>
</tr>
<tr>
<td>Healthcare Facility, or Pharmacy</td>
<td>15%</td>
<td>64%</td>
<td>12%</td>
<td>7%</td>
</tr>
<tr>
<td>Senior Center, Library, Park, or Gym</td>
<td>15%</td>
<td>11%</td>
<td>23%</td>
<td>49%</td>
</tr>
<tr>
<td>Civic or Religious Center</td>
<td>25%</td>
<td>22%</td>
<td>48%</td>
<td>5%</td>
</tr>
<tr>
<td>Restaurant, Coffee Shop, Diner</td>
<td>14%</td>
<td>30%</td>
<td>43%</td>
<td>12%</td>
</tr>
<tr>
<td>Bank, ATM, or offices</td>
<td>21%</td>
<td>54%</td>
<td>29%</td>
<td>5%</td>
</tr>
</tbody>
</table>

**The project is funded by C2SMART (U.S. Dept. of Transportation Tier 1 University Transportation Center). For more information, please contact Dr. Guillermina Gina Núñez-Mehan (ggnunez@utep.edu) or http://c2smart.engineering.nyu.edu/current-projects.**
RESULTADOS DE ENCUESTA SOBRE LA NECESIDAD DE MOVIDAD EN ADULTOS MAYORES EN EL PASO

Realizado en 2017

EDAD PROMedio DE ENCUESTADOS
- 75+: 36%
- 65-74: 39%
- 60-64: 13%
- 55-59: 5%
- menor 55: 8%

USO DE APARATOS ELECTRÓNICOS
- 49% usa teléfono inteligente
- 39% usa teléfono móvil de lapa
- 38% usa teléfono de casa
- 26% están interesados en aprender sobre la tecnología con sus aparatos

69% FEMENINO

RESPUESTAS DE ENCUESTA
- 50% Inglés
- 50% Español

FUNCTIONES MÁS REQUERIDAS EN LA APLICACIÓN
- 1. Navegación
- 2. Rutas de Autobús
- 3. Accesibilidad

La preocupación más grande al planear una salida

- 53% "salidas a tiempo"
- 52% "protección en climas extremos"
- 42% "costos"

Distribución de encuestados por dirección

- 49% Este (1)
- 23% Noroeste (2)
- 18% Norte (3)
- 10% Centro (4)
- 6% Oeste (5)

68% "congestión del tráfico y estacionamiento"

10% "problemas al caminar"

8% "temor a perderse"

Lugares más visitados por adultos mayores

- 79% Lugar de Trabajo
- 59% Lugar de Voluntariado
- 14% Miembro de Familia o Amigo
- 15% Trabajo de voluntarios y Despensa, Supermercado
- 15% Centro Médico o Farmacia
- 15% Centro para Mayores, Biblioteca, Parque, Gimnasio
- 25% Centros Cívicos o Religiosos
- 14% Restaurantes, Cafeterías, Cafes
- 21% Bancos, Cajeros Automaticos, u Oficinas

Este proyecto es patrocinado por C2SMART (Departamento de Transporte), el I. Centro de Investigación sobre Transporte). Para más información, contacte a Dr. Guillermo G. Núñez-Michín (ggunnun2@utep.edu) o http://c2smart.engineering.nyu.edu/current-projects

Urban Connector
APPENDIX D – Pilot Survey Results

D.1. Smart Device Use

I am a smartphone or tablet user. (Please write yes or no):

The combined results from both the English and Spanish responses to this question (65 participants) are presented below in Figure 55. A majority of the survey participants (68%) reported having a smartphone or tablet. The results of the previous survey demonstrated that there were fewer smartphone or tablet users (49%). This indicates that smart device users (current possible users) were more likely to participate in the second survey where the participants are asked to use the smart devices and share their feedback. The survey responses of the remaining 32% of the participants were still useful, as they may acquire smart devices in the future, becoming potential users of the mobile application. Their responses were integrated and analyzed with those who have smart devices.

![Smartphone or Tablet Use](image)

Figure 55. Smartphone or tablet use [all responses].

D.2. Operating System Use

The type of smartphone or tablet I am using is,

In this question, participants were asked to select the answer choice between Android or Apple iOS. The combined results to this question (44 participants) are presented below in Figure 56. A majority of the survey participants (68%) reported having Android operating system on their smart devices, so it
seemed developing the application for Android devices was a good starting point. To reach the other 32% of the participants, the Urban Connector application should be developed for Apple iOS in future research.

![Figure 56. Smart device operating system [all responses].](image)

D.3. Need assistance to demonstrate the app

*I prefer UTEP assistance to demonstrate the application (Please write yes or no):*

In this question, participants were asked to select yes or no regarding whether they prefer the student-assistant to demonstrate the prototype Urban Connector application. The results with 65 participants are presented below in Figure 57. A majority of the survey participants (88%) reported that they need assistance to demonstrate the application before the student-volunteers handed them the mobile devices installed with the application. This indicates the need to educate seniors on the use of mobile devices (smartphones, tablets) so that they feel confident to operate them without assistance.
D.4. Age

What is your age range?

In this question, participants were asked to select the answer choice which included their age. The choices given were based on the age ranges in the definitions for seniors (i.e. 55 to 65), as reviewed in Section 2. The responses to this question (65 participants) are presented below in Figure 58. Majority of the survey participants (78%) reported being age 65 or over. In the previous survey, the rate was 73%. Both surveys indicate that the volunteers were successful in recruiting the target participants (i.e. seniors over the age of 65).
D.5. Gender

What is your gender?

In this question, participants were asked to select the answer choice for their gender. There were only two answer choices: male or female. Results are presented below in Figure 59. A majority of survey participants (75%) were females. In the previous survey, it was 69%.
D.6. Electronic Device Used

*Do you use any of the following electronic devices? (You may select more than one answer)*

This question provided a list of different electronic devices for the respondent to select “yes” or “no” for each of them. The purpose of this question was to gain a better understanding of the market for the application and check the sample profile with the previous survey results. The responses to this question (65 responses) are presented below in Figure 60. Almost two thirds (65%) of the participants reported that they use a smartphone, followed by a basic cell flip phone (28%), and a home phone (23%). The results from Figure 60 provide justification for the previous survey results and evidence that there is a market for a smartphone application for seniors.

![Figure 60. Electronic device use [all responses]](image)

D.7. Assistance to Use Electronic Device

*If you selected one or more options, do you need assistance using these devices?*

This question was a follow-up question to the question of electronic device use. This question asked the participant if they require assistance to use any electronic device. The purpose of this question was to gain a further understanding of their familiarity with the devices and identify the need for assistance. The combined results from both the English and Spanish responses for this follow-up question are presented below in Figure 61. More than half of the total participants reported that they do not
require assistance to use their electronic device (62%). The results from Figure 61 provide justification that, not only are the seniors using smartphones and other electronic devices, they believe they do not require assistance to use their smartphones and other electronic devices.

![Figure 61. Electronic device assistance [all responses].](image)

**D.8. Smartphone Use**

*What do you do on your smartphone (select all that apply)*

This is a question in which the participant can select more than one answer. This question asked about the seniors’ use of their smartphones. It asked the participant to select the functions in their smartphones they always used. The combined results from both the English and Spanish responses to this question are presented below in Figure 62. The functions, in order from the three most selected functions, are calling (voice), texting and taking photos.
D.9. Home screen menu

From Question 6 onwards, participants were asked about their opinion and to provide feedback for the prototype Urban Connector application.

The Home Screen menu is easy to use.

The Home Screen is the main menu from which the user can reach all the different services that the Urban Connector application provides. The participants are asked to comment on the ease of use of

Other Answers

facebook

hobbies

email

email

make payments

none

email, bank, pay bills, create videos

time, location
this menu. There are 5 choices ranging from strongly agree to strongly disagree. The combined results from both the English and Spanish responses to this question are presented below in Figure 63. 25% of the participants do not agree that this menu is easy to use. The most frequently mentioned issue with this menu is the non-adjustable font size.

![Home Screen Menu [Combined]](image)

**Figure 63. Home screen menu [all responses].**

D.10. Frequent Places menu

*The Frequent Places menu is easy to use.*

The Frequent Places menu allows users to add or remove the locations of frequently visited places. Once a location has been stored, the user will receive alternative routes to the address with the help of the phone’s navigation function. The participants were asked to comment on the ease of the use of this menu. The responses to this question are presented below in Figure 64. Of the 63 participants, 97% of them agreed or strongly agreed that the Frequent Places menu was easy to use.
D.11. Transportation Services menu

The Transportation Services menu is easy to use.

This is the menu that links users to the transportation services (City of El Paso, Sun Metro, Sun Metro Lift, Texas Department of Public Safety, etc.). The user can reach the most commonly used web pages for these services from the Transportation Services menu. The participants are asked to comment on the ease of use of this menu. There were five choices ranging from strongly agree to strongly disagree. The combined results to this question are presented below in Figure 65. 93% of the participants agreed or strongly agreed that this menu was easy to use.
D.12. The Graphic Images

The graphic images (buttons, icons) of Urban Connector Application are easy to understand.

This question asked users’ opinion about the intuitiveness of graphic images (buttons, icons) used in the application. There are 5 choices ranging from strongly agree to strongly disagree that the buttons and icons were easy to understand. The combined results from both the English and Spanish responses to this question are presented below in Figure 66. 68% of the respondents strongly agreed that the buttons and the icons were easy to understand. Another 25% of the respondents agreed that the buttons and the icons were easy to understand.

Figure 66. The Graphic Images [all responses].

D.13. Entering Preferences

The prototype Urban Connector application starts with asking users to enter his/her preferences about the application, including the font size, the language and the disability or impairments the user has. Then, the user has the opportunity to enter his or her home address and this address is stored in the Frequent Places menu. Whenever the user clicks the Home icon, the routes to his home address appears on the screen. This question is designed to understand the users’ opinion about the ease of entering their preferences.
Entering my preferences on Urban Connector was easy.

There were five choices ranging from strongly agree to strongly disagree to evaluate their opinion about the easiness of entering the preferences. The combined results from both the English and Spanish responses to this question are presented below in Figure 67. 86% of the participants reported that entering their preferences were easy and only 3% of the participants reported that it was not easy.

![Figure 67. Entering Preferences [all responses]](image)

D.14. Names of Menus

The names of the menus accurately reflect their functions.

This question asked the users if the names of the menus accurately reflect their functions. There are 5 choices ranging from strongly agree to strongly disagree. The responses to this question are presented below in Figure 68. 60% of the participants strongly agreed that the names of the menus reflect their functions accurately, while another 35% of the participants agreed with the same statement.
D.15. Size of the buttons and text

The size of buttons and text met my visual needs.

The user has the opportunity to adjust the size of the displayed text in Urban Connector. This question asked if the size of the buttons and the text are large enough, or need to be adjusted to meet the participant’s visual needs. There were five choices ranging from strongly agree to strongly disagree. The combined results from both the English and Spanish responses to this question are presented below in Figure 69. In total, 95% of the participants agreed or strongly agreed that the size of the buttons and texts met their visual needs.
D.16. Colors used

*The colors used in the application met my visual needs*

Although the user has the option to adjust the size of the text, the colors were set by the designer. This question asked the participants if the pre-set colors meet their visual needs. There were five choices ranging from strongly agree to strongly disagree. The combined results from both the English and Spanish responses to this question are presented below in **Figure 70**. In total, 96% of the participants agreed or strongly agreed that the assigned colors met their visual needs.

![Figure 70. Colors used [all responses].](image)

D.17. Final Evaluation

*What would be your rating for the application?*

The five-star rating system was used to evaluate the overall performance of the prototype Urban Connector application. This question asked participants to rate the overall impression on the application. There were five different choices, from excellent (5 stars), good (4 stars), average (3 stars), fair (2 stars) and poor (1 star). The combined results from both the English and Spanish responses for this question were aggregated. From all the 55 participants, the average rating was 4.63 stars. This is a good indicator that the overall evaluation of the prototype application was between good and excellent.
D.18. Recommendation of the app to a friend

*I would recommend Urban Connector Application to a friend.*

If an application is useful, users will naturally recommend it to their friends. This question asked if the participant would recommend this application to a friend. There were three choices; yes, no or not sure at this moment. The combined results from both the English and Spanish responses to this question are presented below in *Figure 71*. In total, 97% of the participants reported they would recommend the application to a friend. Another 1.5% of the participants stated that they were not sure right now and the last 1.5% of the participants stated they would not recommend this application to a friend.

![Figure 71. Recommend to a friend [all responses]](image)

D.19. Suggestions for Improvement

- allow images and buttons to be larger. After release someone to come to centers and teach how to use the application
- just to need to understand how to use the buttons
- personalized routes with drivers
- option for calling or texting that you add to the list can be good
- there should be no limit on number of addresses you can add
- trolley and parking information, your location sending to your friends and family members
- you have covered everything probably include drug store. medical appointment, information or medical emergency, police department
excellent

it is sufficient, find a way to communicate and explain app to older adults

no pop-up screens when clicking other things

has no internet and use of computers at senior centers

not every seniors have vehicles or smartphones, my advice is sun metro should provide a special bus for seniors,

letras en el menu se quedar chicas avando cambiamos el tamano

come more time to fully explain

mas grandes letras

main menu letters bigger

ayuda a usar aplicacion

ayuda para usar aplicacion y letras mas grandes

easier bus schedules

come and teach, vengan a enseñar todo para preparacion

ofrecer mas ayuda para entenderla

n/a

que vengan a enseñarnos la aplicacion a nuestro telefono

n/a

esta bien, tracker

na, se me hizo suficiente lo que vi y esta bien

more applications for senior citizens

esta bien

brighter color

muy bien

n/a

teach senior citizens how to utilize the application

parece que todo esta bien solo mejorar las letras para que sea mas grande

muy bien todo
n/a

n/a

No hasta que nola vea por completo

perfect

excellent

suggestions of churches, times of metro, direction suggestions

que se termine lo mas pronto posible
APPENDIX F – User Usability Survey Results

F.1. Age

The following five questions inquire about the participants’ demographics and technological proficiency.

**What is your age range?**

In this question, participants were asked to select the answer that accurately represented their age. The answer choices included less than 55, 55 to 59, 60 to 64, 65 to 74 and 75 or older. The combined results from both the English and Spanish responses amounted to a total of 38 responses. As seen in Figure 72, the highest answer frequency corresponds to the age group of 65 to 74. The majority (79%) of the participants were older than 65. Compared to the age distribution results from the previous two surveys, this survey has the highest rate of over 65 years old senior participants.

![Figure 72. Age Range [all Responses].](image)

F.2. Gender

**What is your gender?**

This question required the recruited seniors to select the answer corresponding to their gender. The possible selections were either male or female. The combined results are presented in Figure 73. It is noted that 79% of the participants were female and 21% were male. Similar to the previous survey results, female participants are more interested in the study.
F.3. Electronic Device Use

Do you use any of the following electronic devices? (You may select more than one answer)

In this question, participants were given a list of electronic devices and were asked to select those they have interaction with. These devices include smartphones, flip phones, and laptop computers. The question was included in the usability survey with the goal of obtaining a better understanding of the participants’ technological proficiency. As seen in Figure 74, for the combined English and Spanish responses, 100% of them used a smartphone. Other popular electronic devices were tablet at 42% and home computer at 42%. These results differ from the first survey because this survey recruited seniors who had smartphones.
F.4. Device Assistance

*If you selected one or more options, do you need assistance using these devices?*

This question was a follow-up question to the previous one on electronic device use. This question is intended to gain a better perspective of the sample as well as to identify the need for assistance for those seniors who want to use an electronic device. The combined results from both the English and Spanish responses to this question are represented in Figure 75. About 55% of the participants did not need any assistance and 45% of participants needed assistance when using electronic devices. This may be interpreted as seniors using a new application in their devices are more likely to seek technical support.
F.5. Smartphone Use

*What do you do on your smartphone? (Select all that apply)*

This question allows for multiple selections. The purpose of this question was to gain a better understanding of the capabilities of the senior in using smartphones through the usage pattern. The combined results from both the English and Spanish responses to this question are presented in Figure 76. Smartphones are used by 100% of the participants for calling and 89% for texting, followed by 84% for taking photos. Only 61% of the participants used their smartphone for navigation purposes.
F.6. Application Use

The following ten questions inquire about the participant’s interaction with the Urban Connector application in general.

*How often did you use the Urban Connector application since the installation?*

This question refers to the frequency of the participant’s interaction with the application. Users were asked to select the option that best fits their usage of the Urban Connector. A total of 38 participants provided answers. Figure 77 presented below shows that on average, at least 92% of the participants used the application at least once per week.

![Urban Connector Use [Combined]](image)

*Figure 77. Application Use [all Responses].*

F.7. Reason of Use

*What was the reason you used/did not use the application?*

This question allows seniors to provide open-ended feedback based on their personal opinion as to why they did/did not utilize the application. The response statements are listed and grouped into five main reasons. The combined results of this question are presented in Figure 78. Navigation resulted in the most answered response with 38% of participants saying this was why they used the application. 13% of participants mentioned they did not use the application because it did not work.
F.8. User Preferences

The following eight questions required the participants to rate their level of agreement with the statements. They were prompted to select their answer based on the following options: Strongly agree, agree, neutral, disagree or strongly disagree.

*When you started using the application, entering your preferences (selecting the font size, language, and impairments) and your home address were easy.*

In this question, participants were asked to enter their level of agreement with the statement that entering their preferences for the application’s graphics, as well as their personal user information, was easy. The combined results were given by 38 participants, and are presented in Figure 79. The results demonstrate that more than 90% of the participants strongly agreed or agreed it was easy to enter their user preferences.
F.9. Frequent Places Menu

The Frequent Places menu is easy to use.

The Frequent Places menu allows the Urban Connector users to input the addresses of their most-visited locations, such as their personal address or that of friends, family members, stores, etc. Once a location has been stored, end-users will be shown routes from their current location to these locations by tapping on the menu’s graphical icons. This question prompted the seniors to evaluate how easy it was to use the Frequent Places menu. The combined results from both the English and Spanish participants for this particular question are presented below in Figure 80. Overall, there were 38 participants and 82% of them reported that the menu was easy to use. There was 10% who disagreed or strongly disagreed.

![Figure 80. Frequent Places Menu [all Responses].](image)

F.10. Home Screen Menu

The Home Screen menu is easy to use.

The Home Screen menu is the main menu where Urban Connector users have access to different options, including the City of El Paso’s transportation services. The participants were asked to comment on the main menu’s ease of use. The combined results from both versions of the survey were analyzed by plotting Figure 81. Sixty-eight percent (68%) of all the participants strongly agreed or agreed that the Home Screen menu was easy to use. Those who disagree or strongly disagreed made up 16% of the respondents. They commented that the font size should be larger.
F.11. Graphic Images

The graphic images (buttons, icons) of the application were easy to understand.

This question asked participants to comment on the intuitiveness of the graphical images presented within the Urban Connector applications. Specifically, they were required to take into consideration if the home, family, store, and other icons within the application were easy to understand. For example, if it was easy to understand that tapping the Home icon in the Frequent Places menu would provide users with a route to navigate to the address stored under the tapped icon. The combined results for both the English and Spanish versions of the survey for this question are presented below in Figure 82. Of all the 38 participants, 82% of participants strongly agreed or agreed that the graphic images were easy to understand. On the other hand, 10% of the participants disagreed or strongly disagreed.
F.12. Entering Addresses

*It was easy to add your family members and friends’ addresses in the Frequent Places menu.*

This question asked participants to comment on how comfortable their experience was when inputting their addresses in the Frequent Place menu. As mentioned previously in question nine, this menu offers users the flexibility to enter the addresses of their most-visited locations. The combined results for this question for both the English and Spanish version of the survey are presented below in Figure 83. Half of the participants agreed that entering their preferences was easy. A total of 32% of participants found it difficult to input family members’ and friends’ addresses.

![Figure 83. Entering Preferences [all Responses].](chart)

F.13. Disorientation

*Your fear of getting lost is reduced with the use of the application.*

The results from the previous surveys from both El Paso and New York demonstrated that seniors commonly experience fear of getting lost or disoriented, which directly hinders their mobility. In this question, participants were asked if they agree that the fear of getting lost is reduced with the use of the Urban Connector. The combined results for both the English and Spanish responses are tabulated in Figure 84 below. About 53% of the participants strongly agreed or agreed that their fear of getting lost was reduced by using the application and 21% disagreed or strongly disagreed.
F.14. Traffic Congestion

The Urban Connector application helped you avoid traffic congestion.

This question asked the participants if they agreed that the Urban Connector application helped them to avoid traffic congestion. The combined results for both the English and Spanish responses to this question are presented in Figure 85. It should be noted that 52% of the participants strongly agreed or agreed that they avoided traffic congestion by using the application whereas 27% of the participants reported the application did not help them to avoid traffic congestion.
F.15. Late Arrivals

Your concern for arriving late to an appointment is reduced with the use of the application.

The last mobility concern expressed by seniors during the previous surveys was arriving late to their personal events or medical appointments. This question asked the participants if their chance of late arrivals was reduced by using the Urban Connector. The combined results were organized and plotted in Figure 86. Approximately 53% of the surveyed seniors agreed that their concern for arriving late was reduced by using the application.

![Figure 86: Late Arrivals [all Responses]](image)

F.16. Size of Buttons

The following three questions solicited feedback about the participants’ level of agreement with statements about the application’s user interface.

*English – The size of buttons and text met your visual needs.*

Once the application has been installed on the user’s personal mobile device, the application will require the user to adjust the size of the buttons and text based on his/her personal preferences. This personalization is necessary to meet the visual needs of the user. This question directly asked participants if the application’s size configuration adjustment helped them meet their visual needs. Responses to this question were organized and plotted in Figure 87. To summarize, 95% of the participants agreed or strongly agreed that the size of the buttons met their visual needs. Only 6% of participants mentioned that the size of the buttons did not meet their visual needs.
F.17. Menu Options

*The menu options accurately reflect their functions.*

This question was incorporated into the usability survey to measure the accuracy of both the Frequent Places and Home menu functions. As expected, the combined results show the same trend that all respondents agreed that the Frequent Places and Home menu accurately reflect their functions *(see Figure 88).*

*The colors, labels, and images used in the application met your visual needs.*

Although the user has the flexibility to adjust the size of the buttons and text based on their personal preferences, the colors are standardized. This question required the respondents to state if the selection of colors met their visual needs. The combined results from both the English and Spanish responses for this question were aggregated and are graphically presented in *Figure 89*. A majority of the respondents, at 92%, strongly agreed or agreed that the colors, labels, and images used in the application met their visual needs. There was no disagreement.

![Figure 89. Visual Needs [all Responses].](image)

F.19. Crash/Freeze

The remaining six questions asked the participants to evaluate the Urban Connector application. These questions ranged from yes or no responses to an open-ended format.

*Did the Urban Connector application crash or freeze during use?*

This question was included in the usability survey in order to obtain a status of the application’s stability. The available response choices included from yes- several times, yes-just once, and no. The combined results from all the responses to this question, in both languages, are presented in *Figure 90*. The majority of participants (55%) mentioned that the application did not crash or freeze during use followed by 32% who mentioned it crashed and froze several times. Only 13% of the participants said it crashed only once.

![Image](image)
F.20. Fast Learning

*Did you learn how to use the application quickly?*

During the design process of Urban Connector, the authors alongside the design team envisioned a relatively easy to use application, as the target population is not familiar with mobile applications and technology in general. This question is intended to measure the adaptability of users, taking specifically into account if they were able to learn to use the application in a rapid manner. The combined results from both the English and Spanish responses to this question are presented below in Figure 91. Overall, 47% of all participants learned how to use the application quickly. Of the remaining participants, 29% were not sure and 24% did not learn how to use the application quickly.
F.21. Productivity

*Does this application help you become more effective and productive in your everyday activities?*

This question was incorporated into the survey to understand the benefits experienced by the users. The three possible answers were yes, no, and not sure. The combined results from both the English and Spanish responses to this question are presented below in Figure 92. Half of the participants responded that they were not sure if the application helped them to be more productive. This is followed by 42% of the participants who said that the application helped. The last 8% of the participants responded that it did not help.

![Figure 92. Efficiency/Productivity [all Responses].](image)

F.22. Friend Recommendation

*Would you recommend the application to a friend?*

To have a better understanding of the usefulness of the Urban Connector application, this question is incorporated to measure the users’ inclination to recommend the mobile application to a friend. The question consisted of three possible answer selections including yes, no, and not sure at this moment. The combined results from both the English and Spanish responses to this question are presented below in Figure 93. In total, 68% of participants would recommend the application to a friend, while 32% of participants said they were not sure if they would recommend it to a friend. No participant responded they would not recommend it.
F.23. Application Rating

What would be your rating for the application?

The commonly found 5-star rating system was used to evaluate the participant’s overall opinion of the Urban Connector application. This question asked users to rate their overall impression of the product by selecting one of the following choices: excellent (5 stars), good (4 stars), average (3 stars), fair (2 stars) and poor (1 star). The combined results from both the English and Spanish responses for this question was 3.47 stars.

F.24. Features Suggestion

What features do you think we should add to the application?

In order to understand the features that users would like to see implemented in the future versions of Urban Connector, this question invited seniors to provide additional recommendations. The response statements are listed below and have been deliberately left unedited (including spelling and grammatical errors) to capture the users’ real input.

- make it easier to use
- Voice activation- like google microphone should send location (current location) to other people
  There are some icons inactive- they should be functional
- make it simpler explain better how to use it fix the application
- Fix icons to make it work
• Fix application
• Make it work Name of places instead of addresses
• Modifying it to make it work fix icons
• make it simpler
• mimic other existing applications not user friendly make it easier
• Voice command more icons Emergency phone numbers contacts and 911 Be able to locate wherever they are
• Improve icons to work
• Map did not work. it did not ope. it kept on crashing. Explain how to use it better
• Put name instead of addresses because it took me to new mexico instead of texas or make it easier to fill in the address in friends and family icon
• Safest not fastest Piggybacking google- it is making me use google maps
• Work on icons and it would even be more excellent
• Improve icons so they can work
• More icons
• Make it work could not get very far in the app
• We don't need familiar places
• Events happening in the city, and parks
• Name the place instead of addresses More icons
• More icons like going to mall
• Write name of place instead of address More icons (doctor)
• Doctor icon
• Open the icons
• More options/ More icons such as fine arts, theaters, movies, events
• Fix icons make it easier to put addresses on friend and family Name of place instead of address voice activation
• voice command
• Make it easier to see the buttons