

Marshall Plan Scholarship Report on **Salzburg Travel Aid Application**

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Abstract

The Salzburg Travel Aid Application was developed in order to help student travelers experience Salzburg more easily. To develop this application, research included investigating existing map navigation tools and usability techniques. After performing a needs analysis by consulting potential users, the key functions of the application were identified, designed, and tested. The Salzburg Travel Aid Application helps travelers explore the city by giving them access to information on all points of interest and public transportation.

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1. Introduction

The study of Human-Computer Interaction focuses on how the user works with an application on a computer. A computer application is only worthwhile creating if users find it usable. If users find it difficult to operate, they will have little desire to continue to use it. The application needs to not only have a high functionality to accomplish the goals of the user, but also users need to know *how* to accomplish their goals with the application.

The goal of this research project was to develop an application to aid tourists, especially students, exploring the city of Salzburg and surrounding areas. One example would be: a student gets off a train at the *Hauptbahnhof* (main train station) and needs directions to the hostel; another could be finding a cheap restaurant nearby. Ideally, the application could be used on any desktop or mobile device with Wi-Fi capabilities, as well as at a docked kiosk in the *Hauptbahnhof* and/or other major bus stops. A significant part of this research involved investigating the best practices for representing the required information to develop a good user interface so that any user, regardless of technical skill, could operate it. The target user group included student travelers on a budget; therefore there would be a wide range of technical skills and a wide variety of needs from such an application.

2. The Development Process Overview

There were several development stages to create an application to aid student travelers in visiting Salzburg. Development began with preliminary investigations into designing a good user interface and existing research on map navigation and route

finding; the latter was considered to be a core required feature *a priori*. The second phase was to perform a *needs analysis*, including use case diagrams and a hierarchical task analysis, based on input from surveys and a focus group of frequent student travelers of various ages and backgrounds. After there was a more complete idea of how potential users would interact with the application and what functionality they would expect from the application, the third phase was to develop a paper prototype of the application. From this prototype, a web application was designed with slight modifications based on suggestions from a focus group and limitations from the coding languages. Ideally, following the development of the actual web application, a usability assessment including further user testing would be completed and modifications from the test results would be implemented.

2.1 Preliminary Investigations

The old-fashioned paper map is going out of style when travelers are route finding because computerized applications that route find are usually faster and easier. These online applications allow users to simply type in addresses for points A and B, and then the applications return written directions as well as a map with a highlighted route. Also, these applications permit manipulation of the map, and users can search for locations of nearby points of interests such as restaurants, hotels, and tourist attractions. The investigation began with examining the most popular online route finding applications: HopStop, MapQuest, and Google Maps.

HopStop provides transit maps for 70 American cities, 12 Canadian cities, and 4 European cities. Users have the option to select subway/rail, bus, walking, taxi, or car

rental as the type of transportation they want to take. HopStop can perform a multi-search of any combination of these transportation options and then users can pick the route that suits them best based on time or cost. It also allows users to enter a departure time and return time if they are doing a round-trip search. It is even possible to do a multi-stop search so that users can map out their entire day's plans in one search. There are mobile application versions of HopStop available for all the popular smart phones.

MapQuest's route finding capabilities provide the option to search for directions via driving, walking, or taking transit. Its public transit option is not very inclusive though since it only serves six large cities in the United States. On MapQuest the user has the ability to easily search for nearby places in several categories: Lodging, Restaurants & Bars, Travel Services, Shopping, Activities, and Local Services. By the simple click of a button, all the nearest restaurant locations can appear on the map, and users are even able to decide which specific types of restaurants they want to see. Similarly, hotels, motels, campgrounds, resorts, gas stations, airports, car rentals, parking garages, grocery stores, department stores, bookstores, shopping centers, tourist attractions, museums, parks, movie theaters, banks, pharmacies, churches, post offices, ATMs, etc. can all appear on the map. Each type of location is color coded, and there is an optional box to check to allow all locations to show on one map. Right clicking on the map creates a pop-up that displays information about the nearest address and gives the option to get directions to that point on the map; therefore, users would not necessarily need to know the exact address of their destinations. Like HopStop, MapQuest also has a mobile application for iPhones and Android phones.

Similar to MapQuest, Google Maps allows for the options of driving, walking, or taking transit. Google Maps also has a beta option of biking which highlights routes that are more bike-friendly or roads with bike lanes. Google Transit, which specifically handles the route finding for public transit, covers 72 cities in 12 countries internationally. Google Maps has the standard ability to type in addresses to find directions from point A to point B to point C, etc. The user can also right click on the map anywhere and select the option from the pop-up menu to use that point on the map as a starting point or destination. So again, it would not be entirely necessary to know the address of the destination. With a single destination selected, it is possible to search nearby places by clicking on the words “search nearby.” This creates a text box that the user can enter a generic word like “shopping” to find all local stores or “pizza” to find all local restaurants that serve pizza. A full feature Google Maps mobile application is available for Android phones.

Along with examining the functionality of current route finding applications, key components to developing a good user interface for the target user group were also investigated. The international standard ISO 9241-11 defines *usability* as the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency, and satisfaction in a specified context of use (Leventhal 27). From examining several models of usability such as Brian Shackel’s, Jakob Nielson’s, and Kenneth Eason’s, Leventhal and Barnes developed their own model of usability that integrated the most important features of the other three mentioned. Their model closely considers situational variables and user interface variables (Leventhal 27-33).

Situational variables take a closer look at how different users trying to accomplish

different tasks with a user interface can affect the usability. These variables can be separated into task frequency, task rigidity, situational constraints, user expertise, and user motivation. Task frequency considers how often a user will need to complete a certain task. Typically, the more frequent a task is completed, the more familiar the user is with completing it meaning the user would be assumed to have a good understanding of the task. Task rigidity considers how many options there are. Options could refer to the number of ways one could complete the same task or the number of choices and steps there are in order to complete the task. Situational constraints is a “catch-all” category variable since every application deals with different key situations. A few examples of situational constraints are the type of hardware used by the application, the users’ modes of interaction, and security restrictions. User expertise considers a user’s general experience with the task and with technology. User motivation considers the effort and persistence a user would have to complete the task (Leventhal 34-6).

User interface variables take a closer look at the actual interface and include the following categories of evaluation: ease of learning, ease of use, ease of relearning, flexibility, satisfaction, and task match. Ease of learning examines how easy it is for new users to learn to use the application. If an application frequently has new users, this is an important variable to consider. Ease of use refers to how easy it is for experienced users to continue to use the application. Ease of relearning considers how easy it is for previously experienced users to return to using the application after some time of not using it. These users would need to at least partially relearn the application. Flexibility is determining how good the application is at handling abnormal or

unanticipated usage patterns, and user satisfaction considers the users' attitude toward the user interface and application (Leventhal 36-7).

2.2 Needs Analysis

To better understand what travelers would want from an application that could help them more easily navigate and explore the city of Salzburg, a survey was developed for potential users and a focus group was organized to discuss typical travelers' activities. The survey and focus group discussion questions can be found in Appendix I and II respectively. As mentioned previously, the target user group was student travelers; therefore, both the survey participants and focus group participants were international college students between the ages eighteen and twenty-six. First, the survey results will be reviewed, followed by comments from the focus group discussion.

Participants who were surveyed answered questions involving their German language abilities, their ticket purchasing preferences, and their frequency of using public transportation. The German-speaking skill level of the participants ranged from native-speaking to knowing very little German or none. A high majority of the participants—including those who at the lowest skill level—responded that their language abilities did not affect their use of public transportation in Salzburg.

When buying train tickets, a person can use a machine, buy online, or talk with a representative at the Travel Center at the train station. Not all these options were apparent to all survey participants, but there was a relatively even preference for all three ticket purchasing options. Those who said they preferred buying from a person

explained that they felt more comfortable that they would be receiving the ticket they actually needed and the representative could offer some trip planning advice if needed. A few said that they are just bad with technology so they naturally default to talking to someone in order to avoid working with a computer of any kind. Those who preferred buying from a machine think it is quicker and easier, especially once they have used the machine a few times. The online application is preferred because it is convenient since the user would just need Internet instead of having to travel all the way to the train station. Each group of preference holders had some who commented that they felt that they could receive the best price deals through their method of purchasing, although it is unclear which actually offers the best price consistently.

According to the survey, the large majority of college students who travel will use public transportation in an unfamiliar city. The main form of transportation used by participants living in Salzburg was the bus or S-Bahn followed closely by bicycle. Walking came in third. Some who ride their bicycles commented that it is a cheaper one-time purchase to buy a bicycle than to continuously buy bus tickets. Bicycle riders also have complete access to the city since busses have specific routes to follow, and the bicycle riders do not have a time table to follow so their schedule can be more flexible with no time wasted waiting at a bus stop. Comments about taking the bus include that it was relatively cheap and convenient for students with the semester bus pass, and it was more environmentally friendly than driving and simpler. Others commented that it was their only option for means of transportation because they did not own a bicycle or car. Some international students are only in the city for a few months so buying a bicycle seemed impractical. The participants who said that the bus

was their main form of transportation throughout the city typically responded that they would use it multiple times daily and even those who said bicycling was their main form of transportation still occasionally would use public transportation.

After the survey results were compiled, a set of questions were discussed by a focus group. These questions investigated what the student travelers plan before a trip, how they interact with the current ticket machines and online application, what they consider when choosing a route, what influences their use of public transportation, and what they would want from a travel application in Salzburg. These are important questions because if student travelers plan everything before heading to a new city then they would have already looked up all the information they would need and would have little use for a travel aid application to be developed. Second, getting their opinions on current systems they interact with is important because good features of the current applications should be examined and confusing or disliked features should be avoided. If there are features that users like, then repeating these are helpful for the users' way-finding since it would be similar to a familiar application. Knowing what influences their choices in route finding such as time or money or distance, can help design how the application suggests the routes to the users. Learning about how and why student travelers use or don't use public transportation influences what information would be helpful to include in the travel aid application.

Generally, the participants in the focus group plan very few specifics of their trip. They figure out what their budget will be, purchase their train or plane tickets, and typically book a hostel for at least their first night in the new city. One participant stated that she would occasionally look up bars or suggested restaurants as well as the gay

and lesbian scene in the destination, but if she did not have time or motivation, then she would arrive without any prior planning. It was also stated that it is typically just easier to get to the hostel and then ask the receptionists what there is to do and what are good places to eat nearby than to do any online research. Other times it is considered easier to simply go explore the city and stumble upon a place because then there is no time wasted looking for a specific address and getting lost.

Apparently the current ticket machines and the online application to purchase train tickets or look up train schedules can be intimidating. In fact, some of the participants have not used them because they were unsure how they work. One comment was that while using the online application, the user was informed that there was a transfer in the route but would not know at what station the transfer should occur. To this user, it was unclear that there was a button to click that would show the specific details of a route including where to make transfers. There was a consensus that when working with the machines, there was room for many personal errors. This meant that the machine was working correctly, but the users would operate it incorrectly resulting in unwanted results, for example, trying to insert money before selecting a ticket, not knowing there was a language option, or selecting incorrect tickets. Overall, they agreed that once they interacted with the machine or online application a few times, it was much easier to use and less intimidating.

When choosing a route between cities, the cost plays a major role in the decision for college students since they are typically on a tight budget. While money was definitely expressed as the main concern, they also discussed that occasionally time plays a role because there are weekends that they would want to take a quick trip, and

in order to have more time to explore a new city, they would want the most time efficient route to get there. When choosing routes within a city, one participant expressed that she prefers busses because an underground system does not allow her to see landmarks which would help orient herself in the city. Another participant felt that an underground system was easier to understand as well as quicker and more comfortable. Generally, it is preferred to have fewer transfers since every transfer creates room for more errors or possibly missing a connection, but again money plays a role in choosing a direct route over multiple transfers.

Participants in the focus group expressed that their main influences when deciding to use public transportation are cost and usability; therefore, using public transportation over a taxi service would be crucial to traveling cheaply, but efficiently. One participant described a map of a city's public transportation system as a blob of dots and lines. Initially, she finds the whole drawing itself to be rather confusing but eventually she can figure it out. Sometimes it is difficult to comprehend the maps of the public transportation or the traveler does not know what stop would best suited for their final destination considering not all destinations are directly next to a bus stop or metro station. If tickets for public transportation are too expensive or too complicated to buy, participants stated that they would then choose to just walk to everything they could in the city. Occasionally they would cut out activities based on the distance it would be to walk since they wouldn't want to spend money on a bus or metro ticket. Some tickets are confusing to buy because the traveler isn't quite sure how many zones they would be passing through or there are different types of tickets that are not clearly explained. A traveler can be uncertain how to validate a ticket considering some public

transportation requires it and others do not. There was also some hesitation about language barriers expressed by the group. One participant stated that if he does not know at least some of the language, he will avoid using public transportation. Some trains when making what seems like important announcements, will only share the message in the native language, so foreign travelers feel clueless and uninformed.

Participants also shared what they would want from a travel application in Salzburg. One participant expressed interest in something like a GPS device. Others branched off this idea stating that they would want to know nearby locations to eat or lodge or closest points of interest. Along with searching these locations, they would want to be able to get directions to them. If the location is not right next to a bus stop, it would be helpful to also get a set of directions for the foot path from the bus stop to the location. Having the estimate travel time by foot compared to travel time by bus would also be helpful when deciding whether they would want to use the bus instead of simply walking. One participant currently travels mostly by bike and so she said she would want directions with the best bike route. They also would like to make route comparisons based on time, cost, and number of transfers. It was also suggested to be able to view what points of interest are at any particular stop and what the most common stops for each bus line are as well as specific indicators of where the bus ends. One mentioned that she really liked having the language option appear with flags and the text of the name of the language.

From the survey and focus group the following key tasks for travelers were identified: make a budget, pack, book accommodation, buy train or plane tickets, research tourist attractions, bars, restaurants, and clubs, and possibly learn some basic

phrases of the native language. From these typical traveling tasks, the list was narrowed down to which certain tasks a travel aid application could assist and these are shown in the Use Case Diagram pictured in Figure A. From here, it is easy to identify the four main categories that are essential to any successful travel experience: transportation, accommodation, dining, and sight-seeing.

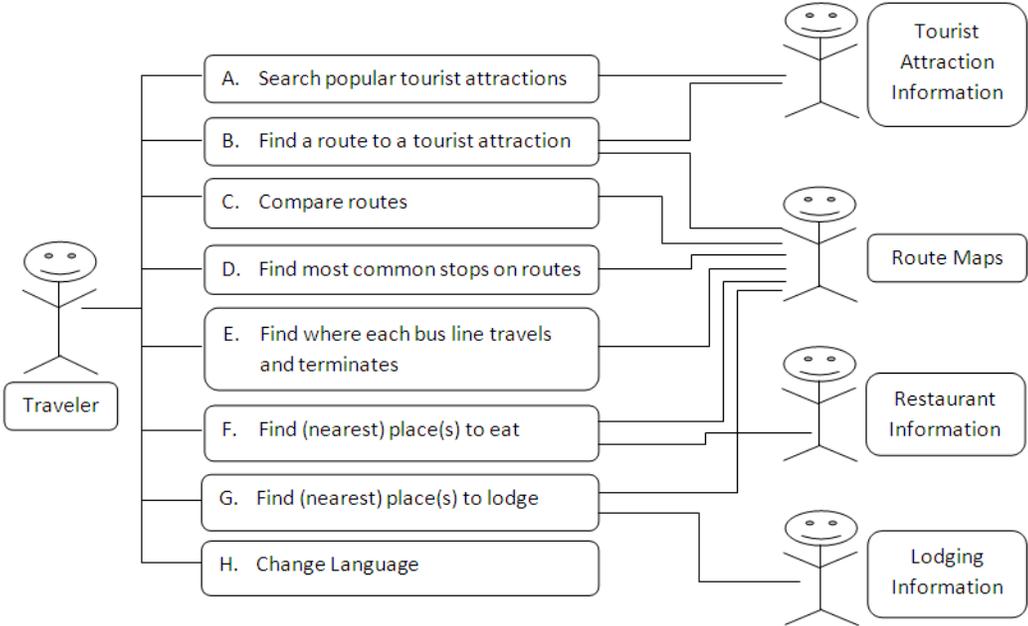


Figure A.
Use Case Diagram for the travel aid application

2.3 Paper Prototype

Combining the user’s needs with the model of usability, a paper prototype of the travel aid application was created. Sketches of what the interface would look like were drawn, and they included notes about what the probable functions of each of the buttons would be. Having a paper prototype allowed for a quick view of what the hopes of what the application would become. It also allowed for a more detailed thought for how all the desired functionality could come together before being entangled in coding.



Figure B.

Sketch of the welcome screen on the travel aid application

The welcome screen of the travel aid application shown in Figure B resembles the Deutsche Bahn ticket and routing machines interface. The idea behind the similarity relates to the *ease of learning*. Since it is likely that a traveler in Salzburg has interacted with these ticket machines, having a similar interface would allow the user to more easily learn the new application. The four large rectangles in the middle of the screen would be clickable buttons that take the user to the appropriate page when clicked. The buttons on the bottom of the screen would be the language selection buttons. Other pages would have a “Home” button that when clicked would return users to this welcome screen.

Clicking the “Bus Routes” button would bring the user to a page like Figure C. This screen would allow users to input where they were departing from and where they wanted to arrive. To allow quicker results, the application would provide a default departure of wherever the machine was location (i.e. Salzburg Hauptbahnhof) but would be easy to modify if users would want to look for routes of future endeavors with a

different departure location. It also would allow the users to choose their departure date and time which would be defaulted to “immediately.” Ideally, a Google Maps API would

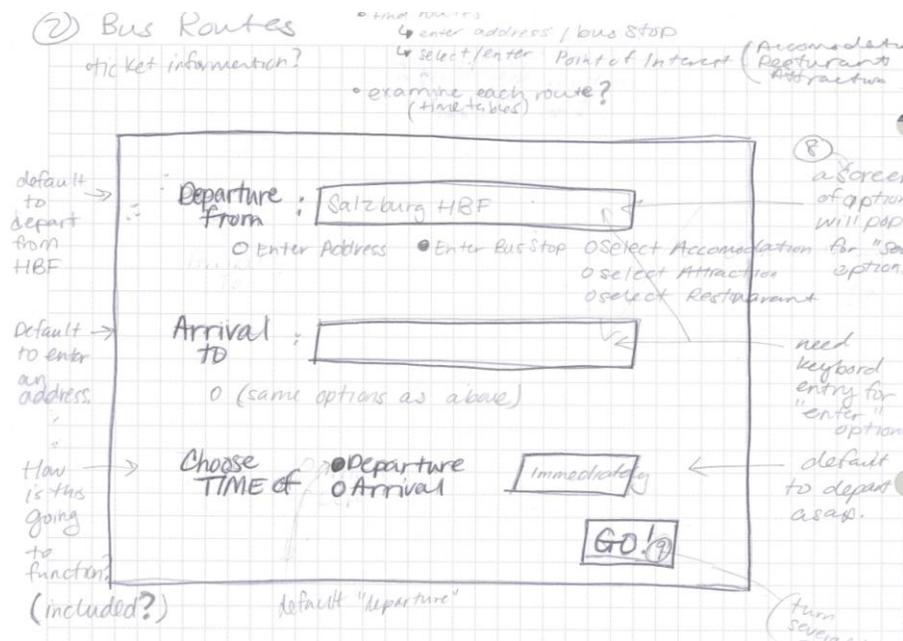


Figure C.

Sketch of the bus routing page for the travel aid application

be embedded to do all the logistics of routing for the application. Once a departure and arrival location as well as the time of departure are all selected, users would click “Go,” and a new page displaying a map along with a written set of direction would appear. Ideally, from this page users could easily print the directions or possibly email them to themselves.

Also reachable by clicking the “Bus Routes” button on the welcome screen would be a page like Figure D. These two pages would be tabbed options. The *Tickets* page would help users better understand how to buy and validate tickets. It would show what standard printed tickets would look like with descriptions of where to find certain important information on the ticket. It would explain what kinds of trips are allowed and length of time for each of the different tickets and show a list of prices based on the type

of ticket as well as the ticket vendor. It would also display a picture of a machine that a person could purchase tickets with explanations of how to use the machine.

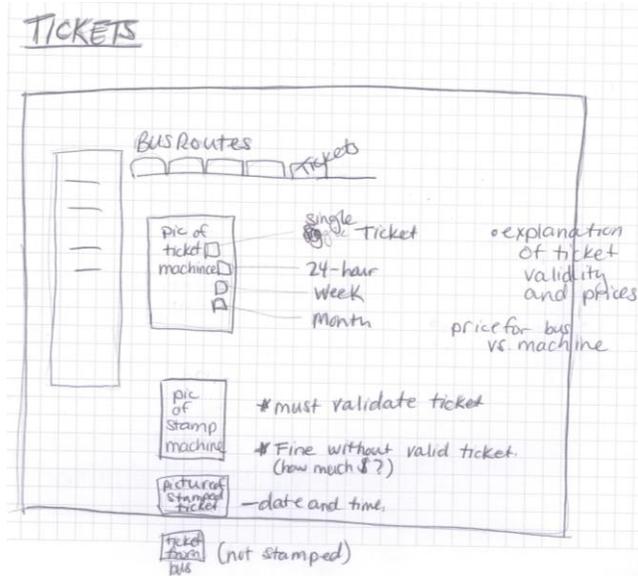


Figure D.

Sketch of the ticket information tab for the travel aid application

If users would click on the “Restaurants” button on the welcome screen, they would be brought to a page like in Figure E that allowed them to search through different food options in the city of Salzburg. The screen that would show would include a grid-like list of restaurants. The user could click on the restaurant of interest to have a

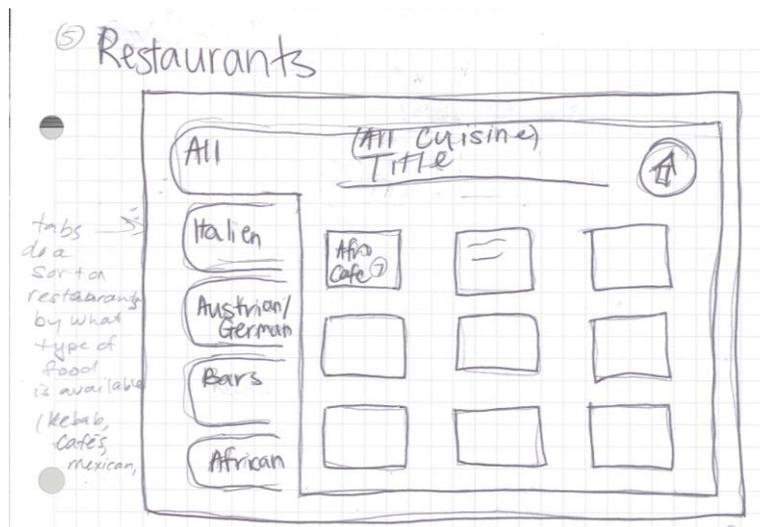


Figure E.

Sketch of the Restaurant page for the travel aid application

pop-up window displaying a description, location, and contact information for each restaurant. Since the complete list of restaurants would be quite lengthy, a search feature and tabbed categories would be included. Each tab would be labeled with a specific type of food, so if users were looking for traditional Austrian cuisine, they could click the tab labeled “Austrian” and then only those restaurants in that category would appear in the grid. Like before, users could select a restaurant for more details. On the pop-up display there would be a “Go” button that users could click that would take them directly to the page for routing (shown in Figure B). The arrival text box on the routing page would automatically be filled in with the location of the selected restaurant. The circle button in the top right corner would be the “home” button that would return the user to the welcome page.

The *Attractions* and *Accommodations* pages would have similar layouts as the *Restaurants* page only with different categories and the respective information regarding sight-seeing and lodging. There was some consideration to include these three pages as tabs instead of separate pages as shown in Figure F. This would allow for easier navigation for the users to switch from searching for lodging to searching for restaurants. Having a tabbed system over three separate pages would only slightly

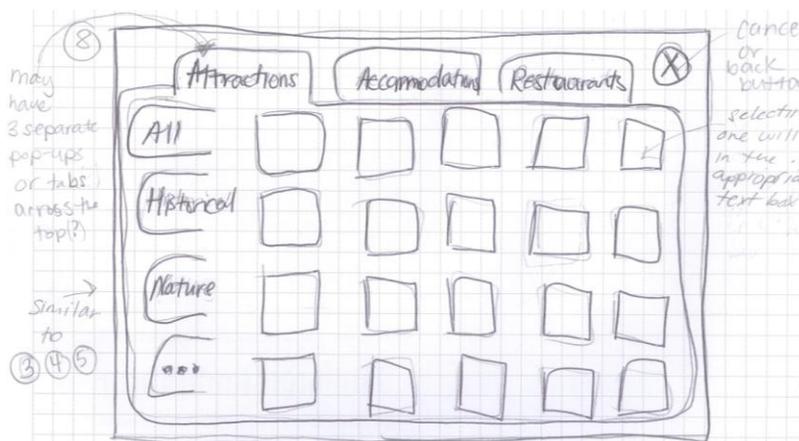


Figure F.

Sketch of the tabbed option to include all points on interest

change the welcome screen functionality. When clicking on the *Restaurant* button on the welcome screen instead of redirecting the user to the separate *Restaurants* page, they would be brought to this master page of all points of interest with the “Restaurant” tab selected and likewise if the user selected the “Attractions” button.

2.4 Modifications Based on User Input

After some preliminary coding and reviewing the paper prototype with potential users, some concerns were addressed and adjustments were made. With the paper prototype, there would be a lot of button pushing that could become frustrating or annoying to users. Since the functionality of this application is not as extensive as the Deutsche Bahn Ticket Machines, the welcome screen could be changed to a side bar menu always accessible. If all four options are always accessible on the side menu, then the idea of the tabs for the *Accommodation*, *Attraction*, and *Restaurant* pages would no longer be needed. It was also discussed to rearrange how the list of points of interest could be displayed. Instead of having the names shown in a grid pattern that would require users to click on to receive more information, it could be simplified to a list that would display all the important information in a single row all on the same page. It would also have the “Go” button to get direction to that specific location.

2.5 Web Application Design

From the paper prototype and modifications, the web application was developed. The development tool XAMPP and the languages HTML, PHP, and SQL were used for development. Behind the scenes of the user interface, a relational database was

created in order to store all the data about all the points of interest and bus routes. Having a database would allow for easier changes to the information instead of hard coding all the data onto the web page directly.

As mentioned previously, there is no welcome screen or home page. Instead, there is a menu sidebar that appears on every page to allow for quick navigation from one page to another. When launching the application it will bring the user directly to the *Bus Routes* page since searching for routes would probably be the most common task. Each page has several tabs that also allow for easy and quick navigation because more options are visibly available to users so if they are uncertain of where to find what they want it would not take long to click through a few tabs without ever needing to click a back button. On the *Bus Routes* page, as seen in Figure G, there are five tabs relating to transportation. There is the “Ticket Info” tab highlighted in Figure G and originally sketched in Figure D. Along with this tab, there is also a “Find Route” tab that has the

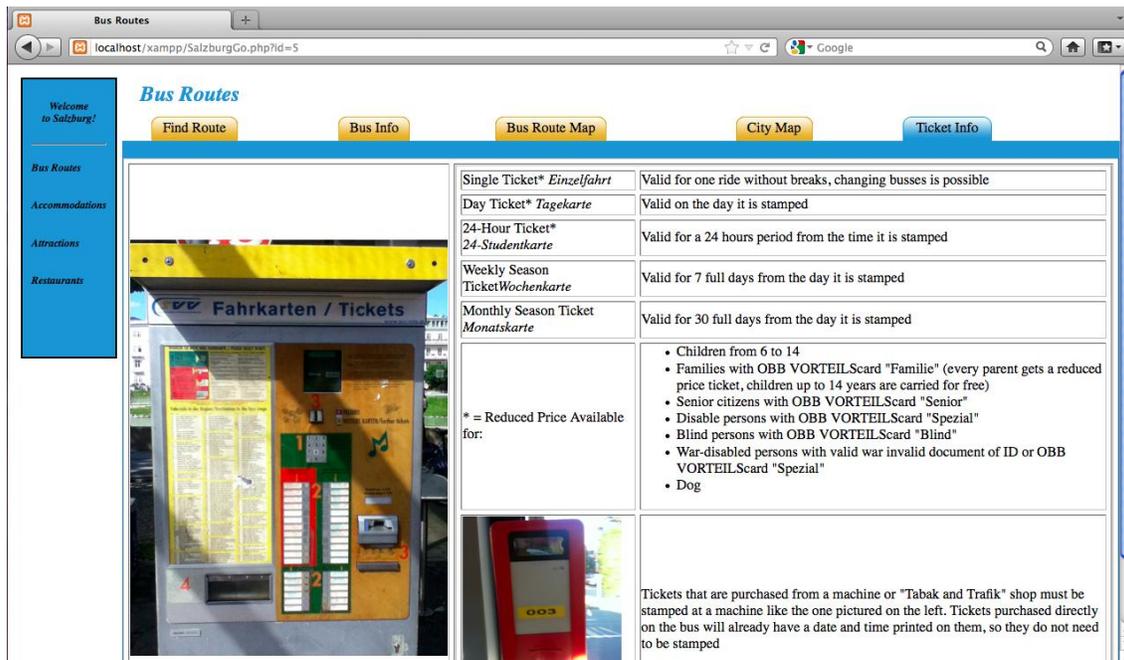


Figure G.
Screen shot of the user interface of the travel aid application displaying the “Ticket Info” tab on the *Bus Routes* page

form to be filled out by the user for departure and arrival locations and times. The “Bus Info” tab has all the information about individual bus lines including where they start, end, and popular stops. It also includes what popular attractions are at each bus stop. The “Bus Route Map” tab displays the map of the bus network in Salzburg, and the “City Map” tab displays a political street map of the city. The combination of these tabs allows users to become more familiar with the transportation system in Salzburg and how they can use it efficiently and correctly.

The *Accommodation*, *Attraction*, and *Restaurant* pages, as shown in Figures H, I, and J are all very similar and only vary in the types of information being displayed. This

Name	Description	Street Address	Phone	Website	Email
Jufa Salzburg	Guesthouse is centrally located, within 5 minutes walking distance to the old town, and of course to	Josef-Preis-Allee 18	05 70 83 613		
Yoho International	Situated in the city centre right between the train station and the old town, both just a 10 minute	Paracelsusstraße 9	(0662) 87 96 49		
Hotel Stein	completely revitalised 4-star hotel. located directly on the salzach, overlooking salzburg's old town centre.	giselakai 3-5	+43 662 8743460	http://www.hotelstein.at/	info@hotelstein.at

Figure H.

Screen shot of the user interface of the travel aid application displaying the “All” tab on the *Accommodations* page

Name	Description	Street Address	Phone	Website	Email
Dom	The Salzburg Cathedral dominates with its distinctive twin-towered facade and building the powerful image of the old town.	Kapitelplatz 2, Postfach 62	+43 (0)662 65901-518	http://www.salzburger-dom.at/	salzburg@domkapitel.kirchen.net
Festung Hohensalzburg	a castle atop the Festungsberg. Erected at the behest of the Prince-Archbishops of Salzburg, it is one of the largest medieval castles in Europe with dimensions of 250m (820ft) by 150m (490ft).	Mönchsberg 34	+43-662-62 08 08-400	http://www.salzburgmuseum.at/149.html	
Zoo Salzburg	The unique zoo territory at the foot of the Hellbrunner Mountain with the steep rocky Cliffside on one side and the hilly floodplain landscape on the other is home to around 800 animals.	Anifer Landesstraße 1	+43 (0)662/820176-0	http://www.salzburg-zoo.at/	office@salzburg-zoo.at
Hellbrunn Castle	It is an early Baroque villa, named for the "clear spring" that supplied it. It is also famous for its jeux d'eau ("watergames") in the grounds.	Furstenweg, 37	+43 (0)662 82 03 72-0	http://www.hellbrunn.at/	info@hellbrunn.at

Figure I.

Screen shot of the user interface of the travel aid application displaying the “All” tab on the *Attractions* page

consistency allows for users to know what to expect, and it also allows the application to be easy to learn quickly. The green buttons on the left are the “Go” buttons that take users to the routing page to find directions to that specific location. The tabs on these pages are categories that those points of interest can be sorted into. For example, on the *Attractions* page a user can click on the “Historical” tab to view a list of all the tourist attractions that have a historical background.

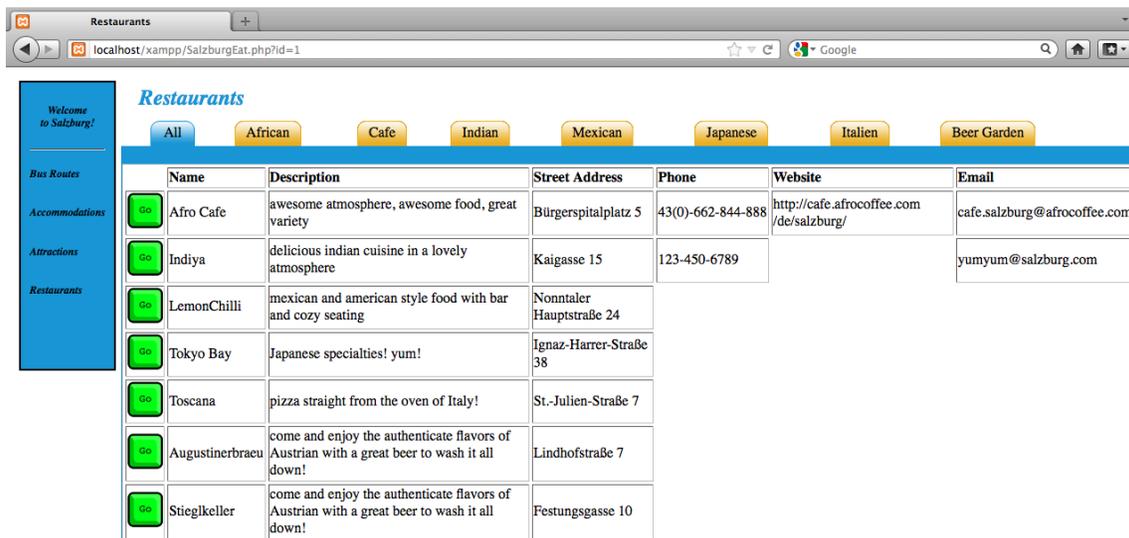


Figure J.

Screen shot of the user interface of the travel aid application displaying the “All” tab on the *Restaurants* page

Currently, there is still more development to complete. The “Go” buttons do not have complete functionality since Google Transit does not include the public transportation data needed for the city of Salzburg. Also, the database has an incomplete list of points of interest. The compilation of all this data would require an intense collection of information on hundreds of places within the Salzburg area. A few of the most popular and well-known points of interest for restaurants, accommodations, and attractions were inserted to show proof of concept.

2.6 Usability Assessment

Once the development of the Salzburg travel aid application would be close to completion, it would undergo testing by potential users to scrutinize all details and functions to better improve the application to fit the users' needs. It would be useful to ask all testers to share their personal opinions and comments about their experience with the travel aid application. This subjective and qualitative assessment would most likely result in a wide variety of responses that may or may not be helpful. Therefore it would also be important to assess the application objectively and quantitatively. This could be accomplished by having certain tasks for the testers to accomplish and timing them. If on average, the task takes longer to complete than expected then adjustments would be recommended in the design.

3. Future Improvements

The major concern for the entire application is that even though a Google Maps API can be embedded, Google Transit's public transportation feature is unfortunately only available for cities that have provided information about their public transportation maps and time tables and Salzburg's public transportation information has not been provided yet. There is also not a working language selection for the application; it can currently only be viewed in English, so including more language options would be an important future enhancement. On each of the points of interest pages, a search bar could be included to allow users to search for specific restaurants quickly. This would be particularly useful if the user has a restaurant chain in mind and wants to see if a location exists in Salzburg. It could also be useful if a restaurant was previously

recommended to the user. It would also be an interesting feature to include the bus route information on an interactive map so that users could have a better visual of where places are located in relation to the bus stop. Other future improvements would be identified after an excruciating usability assessment was performed.

4. Conclusion

Throughout this research project, the best practices for usability design were explored and implemented in the development of the travel aid application for the city of Salzburg. Current route-finding applications were investigated and a survey and focus group provided information about the target user group. Following a paper prototype and suggested modifications, a web application was developed. Also, future improvements of this application have been discussed.

Creating this travel aid application can allow people to save money and have a more enriching experience in Salzburg. Traveling is a great way to integrate people into new and different cultures, but it can also be quite intimidating for that very reason. Not only can there be language barriers, but traveling can also become quite expensive. People do not want to pay even more money to someone to help them plan their trip when the cost of transportation, accommodation, eating, and sight-seeing can already add up to a large bill; yet, people need guides if they are truly going to experience a new city. Technology can significantly improve the world of traveling.

Bibliography

Leventhal, Laura M., and Julie A. Barnes. *Usability Engineering: Process, Products, and Examples*. Upper Saddle River, NJ: Pearson Education, 2008. Print.

"Google Transit Partner Program." *Google Transit Partner Program*. Web. 1 Mar 2012. <<http://maps.google.com/help/maps/transit/partners/faq.html>>.

HopStop. Web. 3 Mar. 2012. <<http://www.hopstop.com/>>.

MapQuest Maps. Web. 1 Mar. 2012. <<http://www.mapquest.com/>>.

Appendix I: Survey

Gender: 1.Female 2. Male **Age:** _____

Nationality: _____

Length of time in Salzburg: _____

What is your German skill level? 1. Native speaking

2. Advanced

3. Intermediate

4. Beginner

5. Know very little or no German

Do your German abilities affect your use of public transportation in Salzburg?

YES NO

Comments:

Main form of transportation used by you in Salzburg: 1. public (bus/ S-Bahn)

2. Bike

3. Taxi

4. Walking

5. Personal vehicle

Frequency of use of public transportation in Salzburg (on average):

1. Multiple times daily

2. Once Daily

3. A few times a week

4. Once a week

5. Occasionally

6. Rarely

7. Never

8. Other: _____

Frequency of traveling outside of Salzburg area (approximately):

1. Twice a week
2. Once a week
3. Three times a Month
4. Twice a Month
5. Once a month
6. Once every two months
7. Rarely
8. Other: _____

Do you use public transportation when traveling? YES NO

Why or Why not?

EXPERIENCE with the current travel related applications

Have you ever used a machine at a train station to buy a ticket or look up an itinerary?

1. YES 2. NO (t/i = tickets/itinerary)

If yes, how often? 1. for all t/i 2. for most t/i 3. for some t/i 4. for one t/i

Have you ever used the online application to buy a ticket or look up an itinerary?

1. YES 2. NO (t/i = tickets/itinerary)

If yes, how often? 1. for all t/i 2. for most t/i 3. for some t/i 4. for one t/i

When buying train tickets, which do you do more frequently:

1. Use a machine at the HBF 2. Buy online 3. Buy from a person behind the counter

Why?

Feel Free to leave other comments:

Appendix II: Focus Group Discussion Questions

- 1. When planning a trip somewhere, what do you plan ahead of time and what do you wait to plan until you get to the city?**
- 2. When choosing a route what do you consider? (time, distance, money)**
- 3. What if every route would cost the same?**
- 4. What about when you are in a city, what do you do about routing?**
- 5. What if the city is huge, and you can't get anywhere fast enough?**
- 6. You just arrived in Salzburg at the HBF and a machine can help you use public transportation in Salzburg. What sort of questions would you want it to answer for you?**
- 7. What do you find confusing about public transportation?**
- 8. What about the ticket machines are difficult or confusing? And what do you like?**
- 9. What about the online application is difficult or confusing? And what do you like?**
- 10. How could public transportation be easier or better?**
- 11. Is using public transportation intimidating?**
- 12. How do you find your way around on public transportation when you arrive in a new city?**
- 13. How does language play a role?**