San Juan Islands Environmental Display

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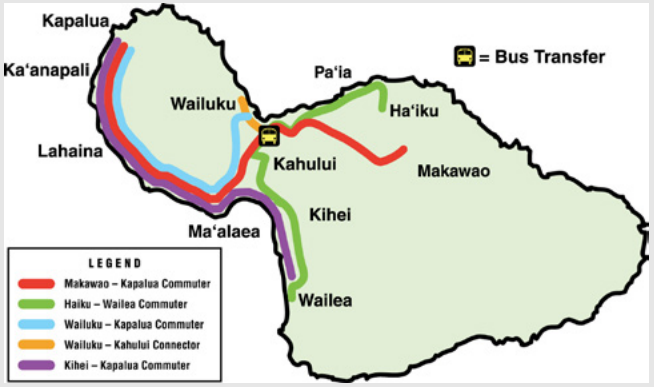
Problem Statement

When travelers arrive in a transit hub and look for a transportation display, they want a clean and simple view of their information - not a giant ominous spreadsheet that towers above them.

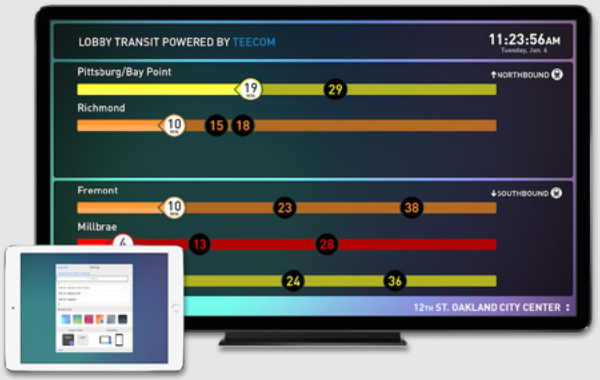
With a traditional display, it is very difficult to show connections and how travelers can reroute their trips on the fly in case of a cancellation.

By diving deep and analyzing the data from the client, we were able to develop a new type of environmental display that organizes travel information into routes and combines clear route visualization with single destination focus that meets traveler's needs.



Maui Commuter Bus Map

Washington DC Transit Display



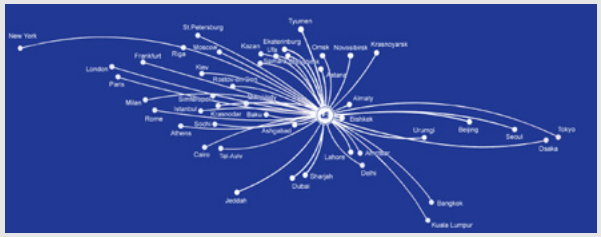
Teecom Lobby Transit System

Competitive Research

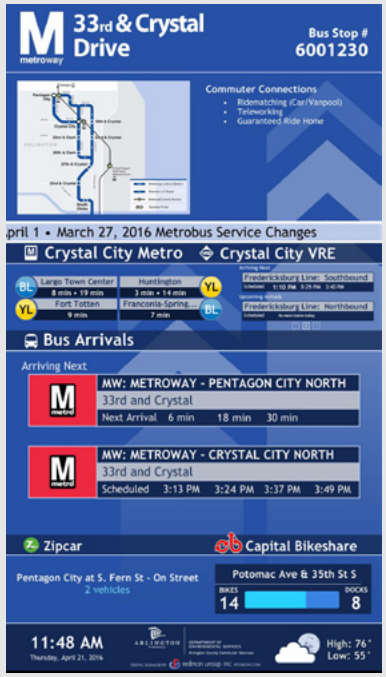
Before diving into the data, we researched existing modes of non-traditional transit displays. While none of these do a perfect job at meeting user's needs, they each have something interesting and novel.

By looking at screens that combine travel information, we understood that splitting it out into separate categories does not facilitate trip planning in an efficient way. We also noticed that route visualization was an important feature that helped users understand the area if they are not familiar.

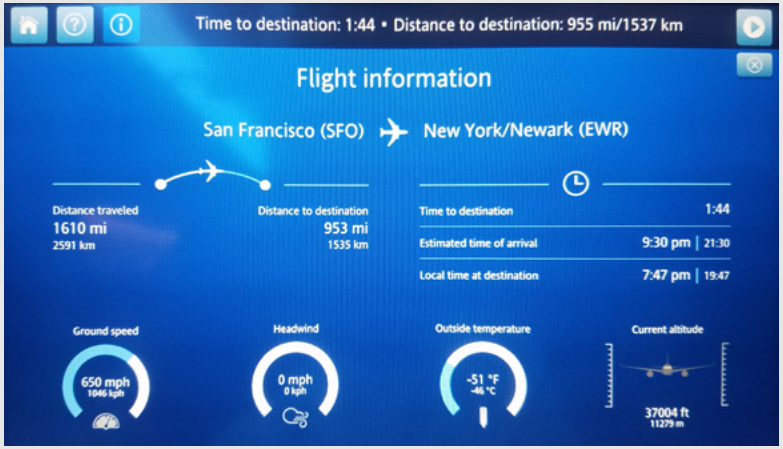
Another key takeaway is not breaking traditional mental models of how time and distance passes in relation to the destinations. The Teecom example of the BART system in the San Francisco area, in particular shows upcoming metro trains without showing any kind of time line.



Tajikistan Flights Visualization



Crystal City Potomac Yard Transitway Transit Display



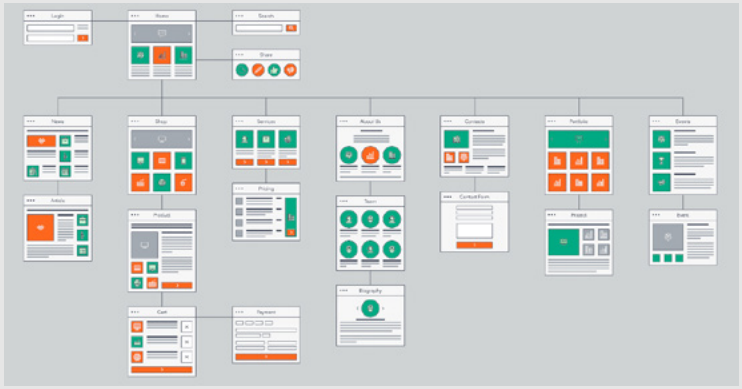
United Airlines Flight Info

Internal Dashboard Ideation

Ideation Inspiration

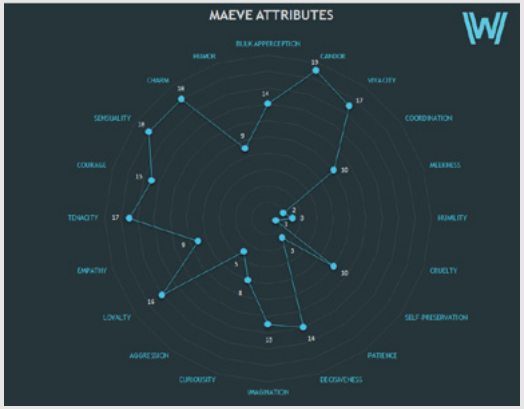
We set the tone for the upcoming design challenges by creating a mood board of various travel-related images as well as inspiration for assorted color schemes for dealing with a lot of data.

Oyster Card



Card Sorting Visualization

Simplified Transit Map



Spider Plot

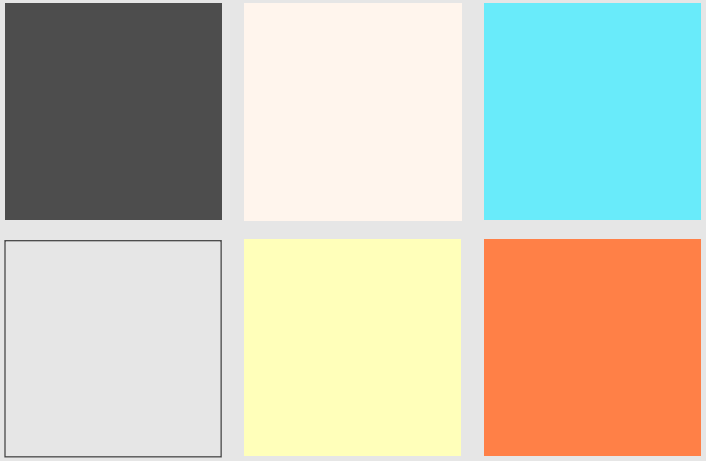
Stakeholder & User Analysis

We dived into the personas for this project and analyzed what their motivations are and what features they will find to be the most valuable.

Elizabeth values her customers and their satisfaction, but also the prospects as they roll out the PTF program - she wants them to understand the ease and flexibility of the pass. She also wants a highly readable display of fluid data however, her company's reputation is important, and she is also concerned with risk reduction, profits/ROI, and resources load.

George is a local family oriented business owner who wants to be able to get around quickly using the PTF pass, but also wants his grandchildren to have the freedom to roam and travel on their own. He values the ability to plan ahead and know that his family is safe.

Because Patrick is a frequent visitor to the islands on business, he values a very quick reroute based on transport status and using the PTF to streamline his business costs.



Futura Medium

Futura Light

Destination

on time

delayed

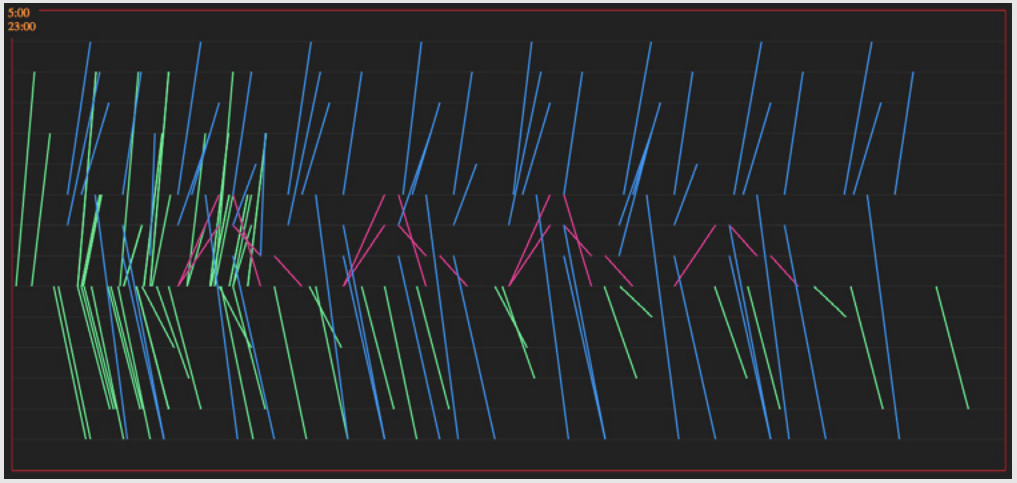
cancelled

Style Guide

The colors for this display were optimized for a dark background and stood out at a distance of 20ft. By staying with the range of primary colors, they exude familiarity, comfort, and safety. The pastel variations of red, cyan, and yellow allow for the user to not have to decipher the meaning behind them, especially when associating them with the simple travel iconography.

Travel status uses the same color scheme, but a much more saturated version; catching the user's eye when the status changes.

The Bauhaus font Futura is the perfect selection for a display that needs to be scan-able and not stand out. It's geometrically even letters create wonderful blocks of text that flow beautifully into the grid structure of the design. It's common use as a headline and advertising font expedite the recognition from users.

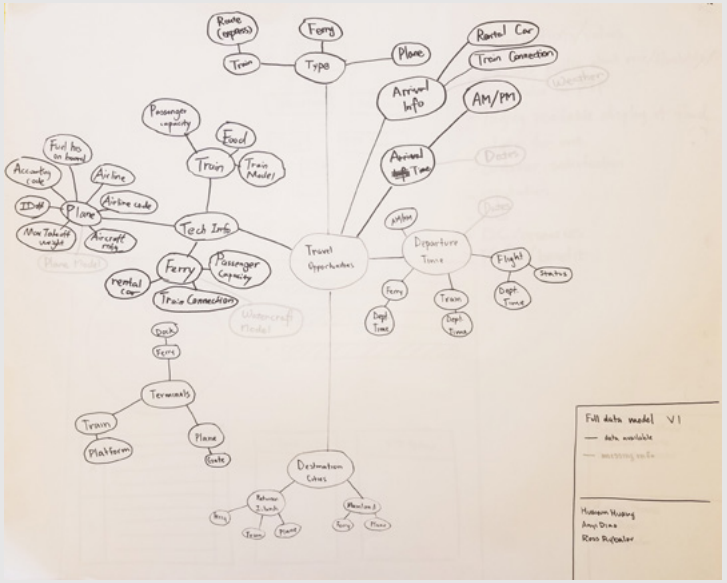


Mapping arrival times, routes, and departure points

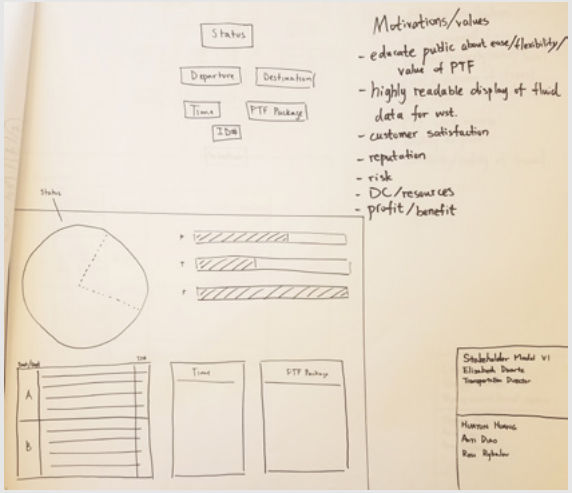
Data Modeling & Ideation for Stakeholders

We started by analyzing the data in spreadsheet for the Atlantis Transportation Hub, and created a data model containing all the entries listed in the spreadsheet and missing information that might also be needed (weather, date, etc).

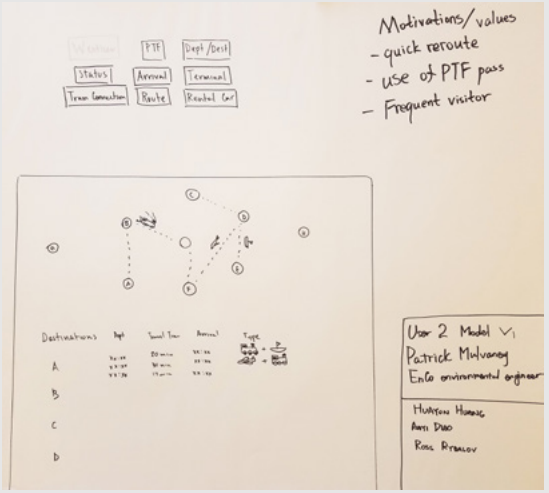
To help us better understand the traffic condition in different time periods across the San Juan Islands, we created a custom HTML program to generate a visualization for all routes based on time and destinations color coded to the transportation types.



Visually Mapping all of the raw data categories



Spider Plot



Spider Plot

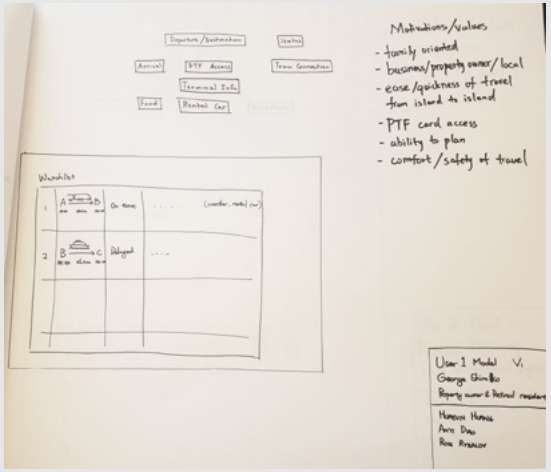
Data Modeling & Ideation for Users

Based on the persona of the stakeholder and the two users, we first listed out their motivations/values ranked by importance. Then we hand sketched draft displays for each of them that address their specific needs.

For the stakeholder, we included pie chart showing the percentage of on-time trips and bar chart showing number of trips with PTF package.

For Patrick, a frequent user who values quick re-routes in case of bad weather, we came up with a geographic map visualization that shows all routes between islands, and a table that shows detailed information about the routes.

For George, a local who values easily trip planning for his families, we created a table showing one destination at a time, with all possible routes, transportation type, status, and PTF pass access.



Spider Plot

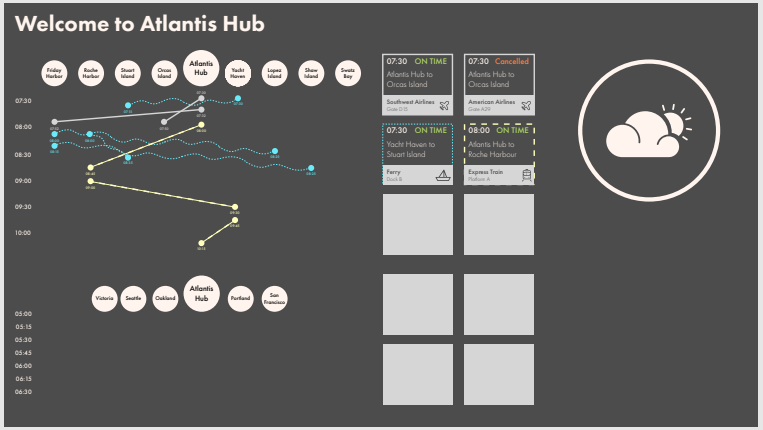


Fig 1 - adding in visualized routes with crossing lines

Initial Prototype

After receiving feedback for our draft displays, our next prototypes focused on the common goal of the stakeholder and the two users - suggesting possible routes by combining modes of transport.

The first design (Fig 1 & Appendix A) lists locations on the x-axis and time line on y-axis. We used lines (color coded by transportation type) connecting the departure and destination to represent possible routes. Islands and mainland destinations are separated into two parts for clarity. Details of each route are shown on a list of cards on the right of the map. We also included the current weather condition for travelers like Patrick.

The second iteration (Fig 2) takes into account that complicated lines may not be productive during busy times. Since most routes are departing from Atlantis Hub, we use vertical lines to show trips from Atlantis Hub to the destination, and a few dashed lines to show routes between other islands.

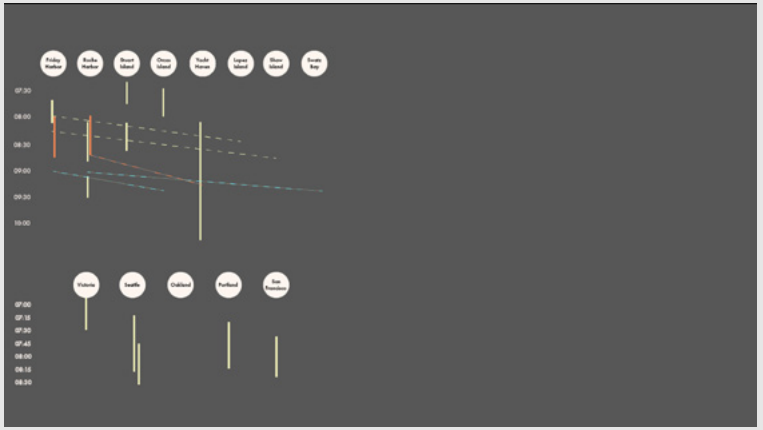
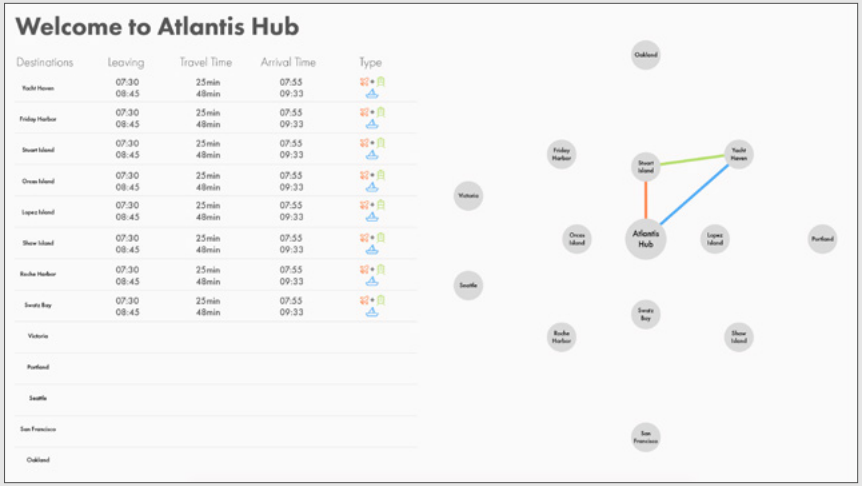


Fig 1 - adding in visualized routes with more direct lines

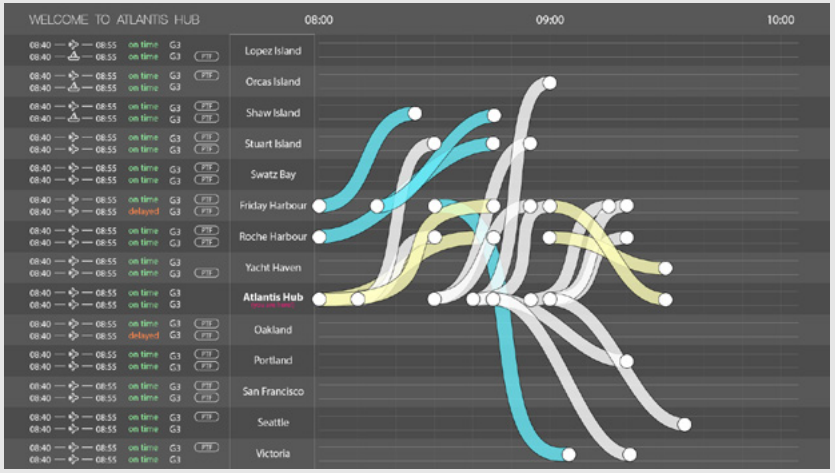


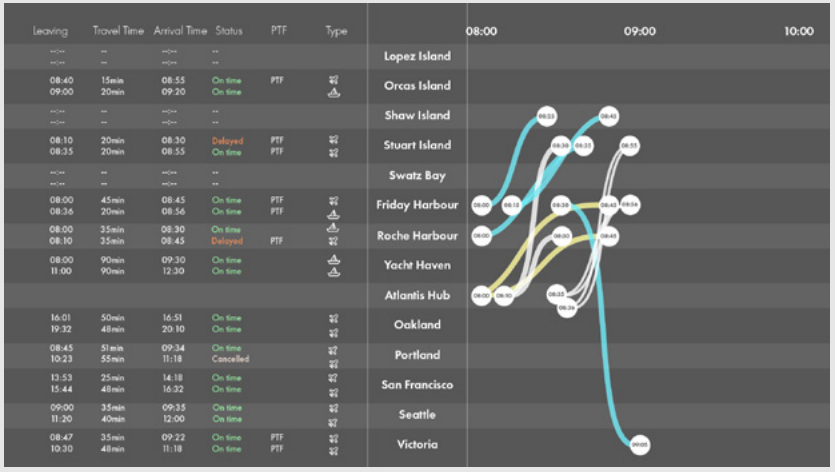
Experimenting with Maps

The third design (Appendix B) direction is a continuation for the geographic map idea, however this time it approaches it from the "subway-style" angle. The table on the left shows the two earliest routes from Atlantis Hub to each destination, and the map on the right provides the visualized connections for those routes.

Critique indicated that although this was a fairly clear way of showing the content, it was too simplified and left out key information such as status, gate/dock/platform info, and the all-important PTF pass. Adding those into this configuration would have created a spreadsheet-like view, which is not helpful to our user goals.

Destinations	Leaving	Travel Time	Arrival Time	Type
Yacht Haven	07:30 08:45	25min 48min	07:55 09:33	
Friday Harbor	07:30 08:45	25min 48min	07:55 09:33	
Stuart Island	07:30 08:45	25min 48min	07:55 09:33	
Orcas Island	07:30 08:45	25min 48min	07:55 09:33	
Lopez Island	07:30 08:45	25min 48min	07:55 09:33	





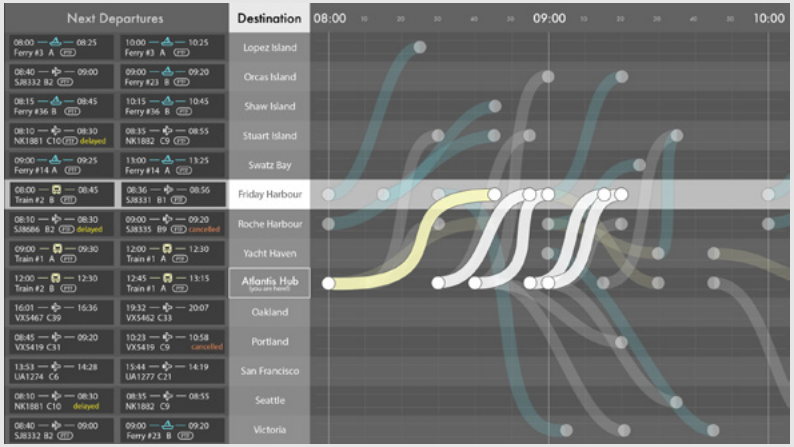
Facilitating Trip Visualization

Another takeaway from the critique was being weary of breaking the mental model for how people use the X/Y axes to show time and location.

We focused on the incorporating the visualization in the first design with table containing the top two routes to each destination in the next couple of iterations (Appendix C).

We flipped the time and location axises in the map, matching the user's mental model with a horizontal time. We also removed the destination column of the table so that the left and right part of the display shared one column of destinations in order to connect the two sides together.

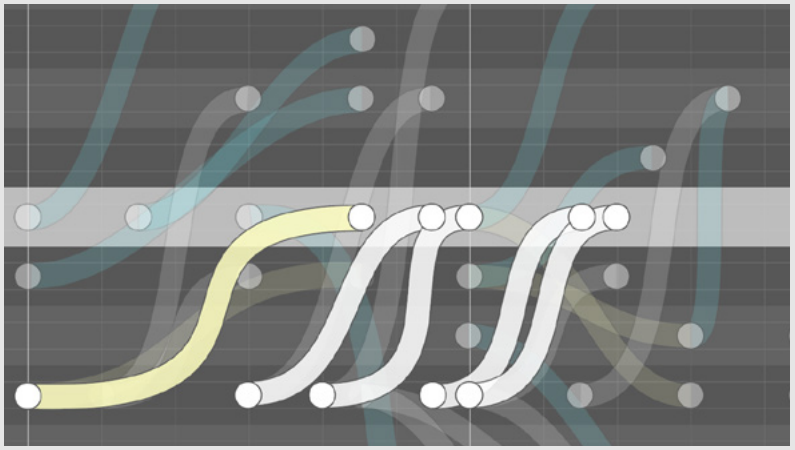
At this point, we added animation showing when a flight status changed from 'on time' to 'delayed'. The status field in the table and the corresponding line in the map turned orange and flashed at the same time.



Adding Control

Through another round of design critiques, we learned that people were confused over the spatial relationship between the list on the left and the data visualization on the right - there was no visual linkages between the two concepts for information intake. To solve this, we rearranged the list on the left to change make the information box flow from right, the same direction as the time flow in the data visualization on the right.

We also chose to highlight one destination per rotation as a visual aid, so that people can build up their mental model quickly (Appendix D). The screen will automatically flow through each destination every seven seconds as well as let the users touch each destination separately to see their desired routes.



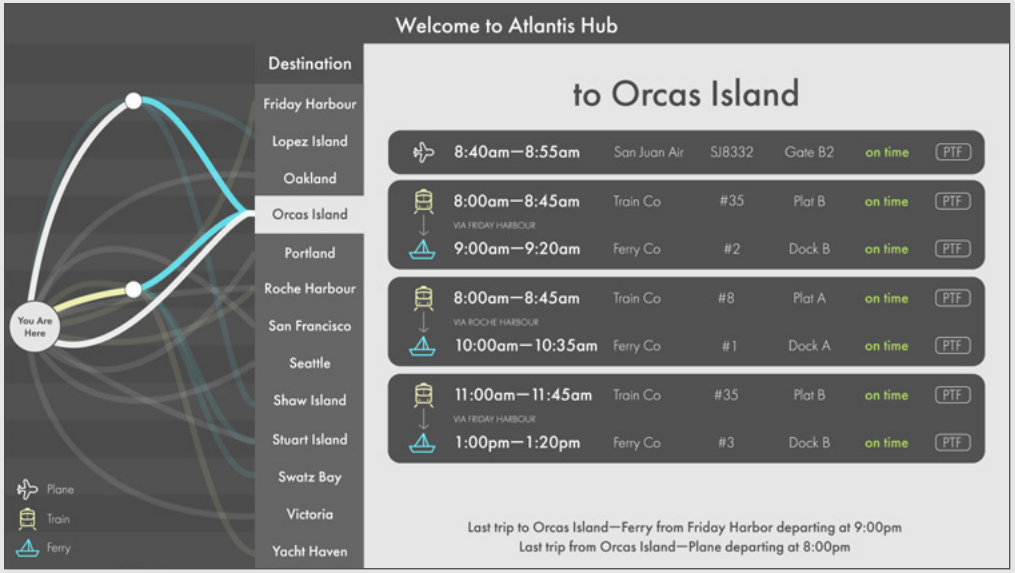
Focusing on one destination at a time

Incorporating Feedback & Focusing on Routes

Although we tried to solve for this during the last several iterations, in-class feedback stressed a huge cognitive load in interpreting the chart - this would be a great solution as a dashboard, but it does not fit with the mental model of casual travelers. It also failed to display enough information for trip planning as only two trips were shown. This did not meet the needs of our users, and by doing so, failed the stakeholder as well.

We considered these to be severe usability issues, which results in us trimming down the visualization to only show the trip availability (rather than the precise time schedule, because these are redundant data already implied by the schedule table) to give more space to the time schedule table. We experimented with a large card format showing many trips, but settled on showing one destination at a time to ease the cognitive load (Appendix E).

Incorporating multiple destinations within the card system

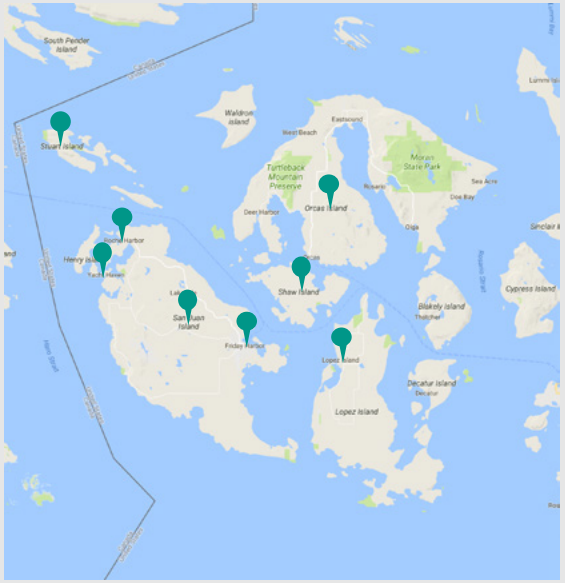


Final Design

We believe that the final design (Appendix F) solves the problems of the previous prototypes. By moving the visual routes to the left side, we created a flow from left to right that users can follow directly from the "You Are Here" sign, to their destination location, and finally to the available routes.

By isolating each destination into it's own card, we created visual clarity and removed the cognitive load that accompanies trying to figure out trips vs locations. For routes that have layovers, there is clear information showing connections and where to go when you get to the middle stop. We also added the "last trip" reminders to facilitate trip planning.

The roll-out for this display solution is created to be accompanied by seven of these displays at each destination within San Juan Islands. This creates consistency no matter where the traveler is.



Features Considered

A concept that we had mulled over was whether or not to display the routes as merged trips (as they do on travel booking sites - showing just the relevant info to make decisions) or show the specifics for each leg of the route.

This was a crucial distinction because it spoke directly to our users. George and his family could find the trips to be more useful, but Patrick will want to see each leg to reroute quickly.

In the end, we decided that the trips view would break mental models too much, and the info was still all contained within the connections view, and both users would be better served by more information.

Futures & Next Steps

One consideration that carried a lot of weight with us was keeping the display extremely flexible to changes with the transit system. As new companies start offering ferry and train services, it will be easy to differentiate them through by name. In addition as there are more travel hubs added to the San Juan's it will be simple to add more possible destinations.

We designed the display to grow as the San Juan Island Transit system grows - quickly and simply.

Variation showing how multiple companies can fit easily

Presentation & Pitch

Our pitch philosophy was to keep things simple and emphasize how our solution meets the needs of Elizabeth the stakeholder, and George and Patrick, our users. We split time between showing the pitch deck and the display itself, focusing on the animation and controls.

The audience brought up a lot of good points during the Q&A that we were able to use to emphasize the value that our solution brings. Although there were some tradeoffs that had to be made in the final design, our core personas will find that all of their requirements are met.

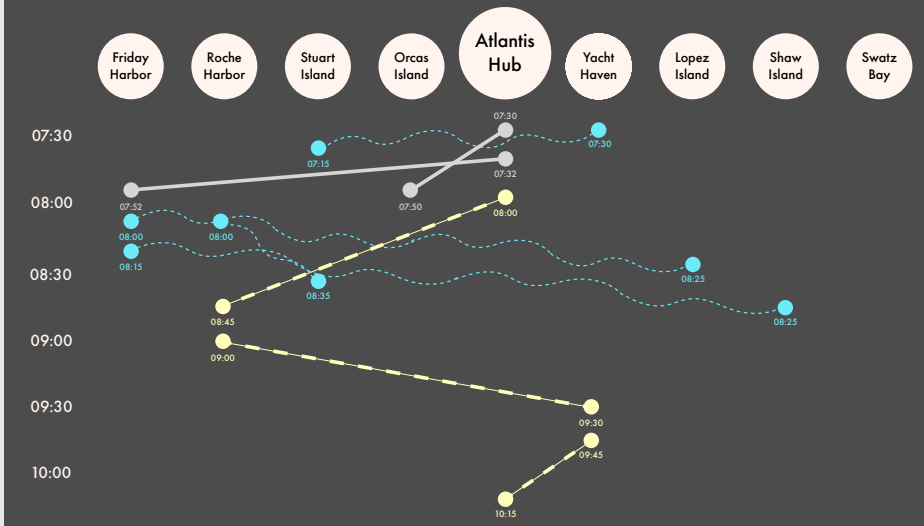
Takeaways & Reflection

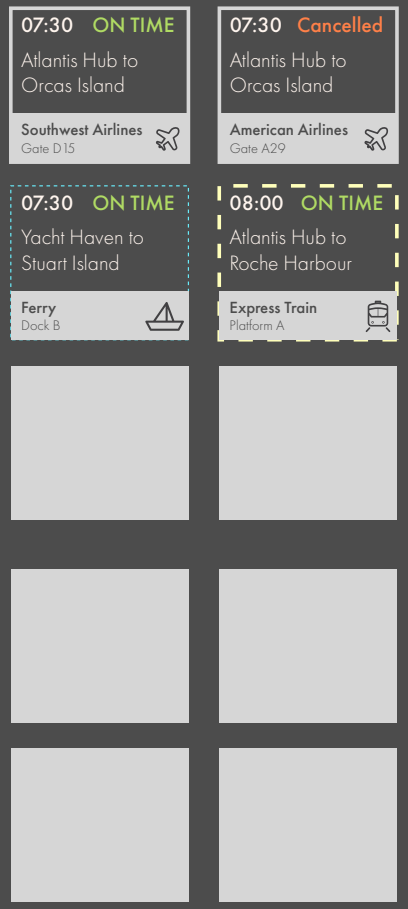
This was a huge learning experience for all of us. Some very pressing teachable moments have everything to do with hanging on to our overly precious design ideas for too long in the prototyping phase. Although we fully stand behind our final design, perhaps if we made a more significant pivot with our intermediate prototypes, we could have had more time for further feedback and spent more time thinking through creating perceptual affordances and feed-forward for our controls.

There was a lot of valuable critique in the Q&A. Folks brought up the idea that our design doesn't allow views of more than one destination at a time, and there is nothing for the user to know that the screen is interactive - all very valid criticisms. We also mentioned that further user testing would be needed to iron out some of the issues - something that the client may not be able to afford.

Appendix A

Welcome to Atlantis Hub

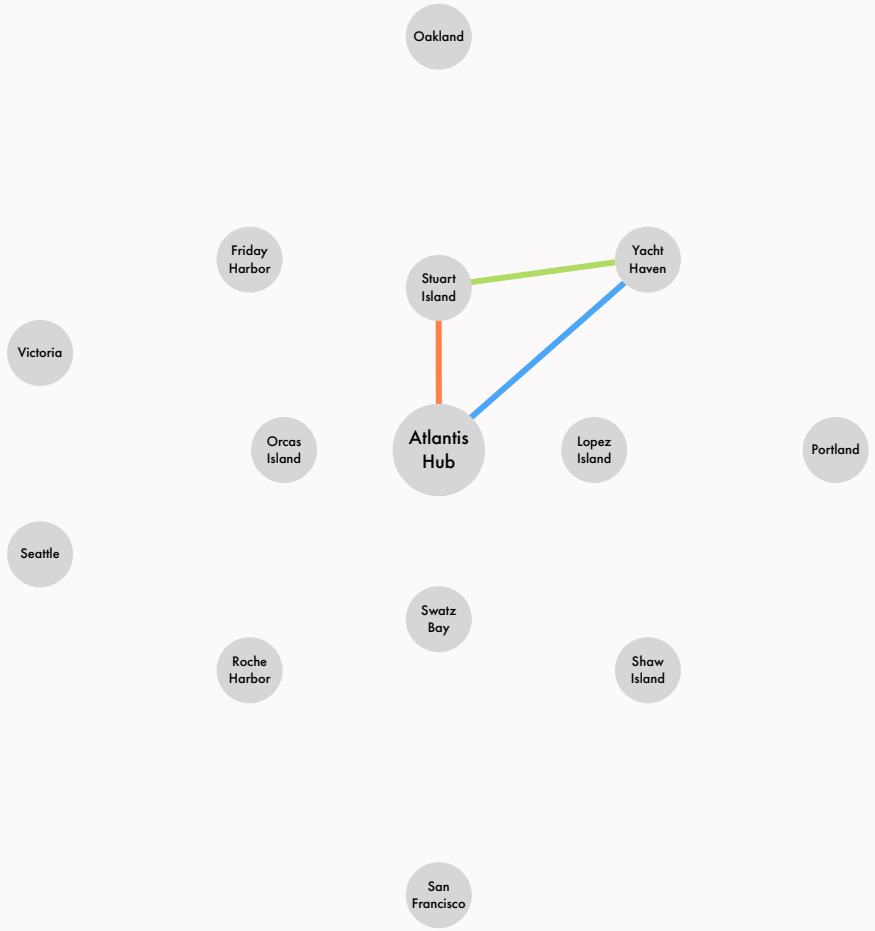




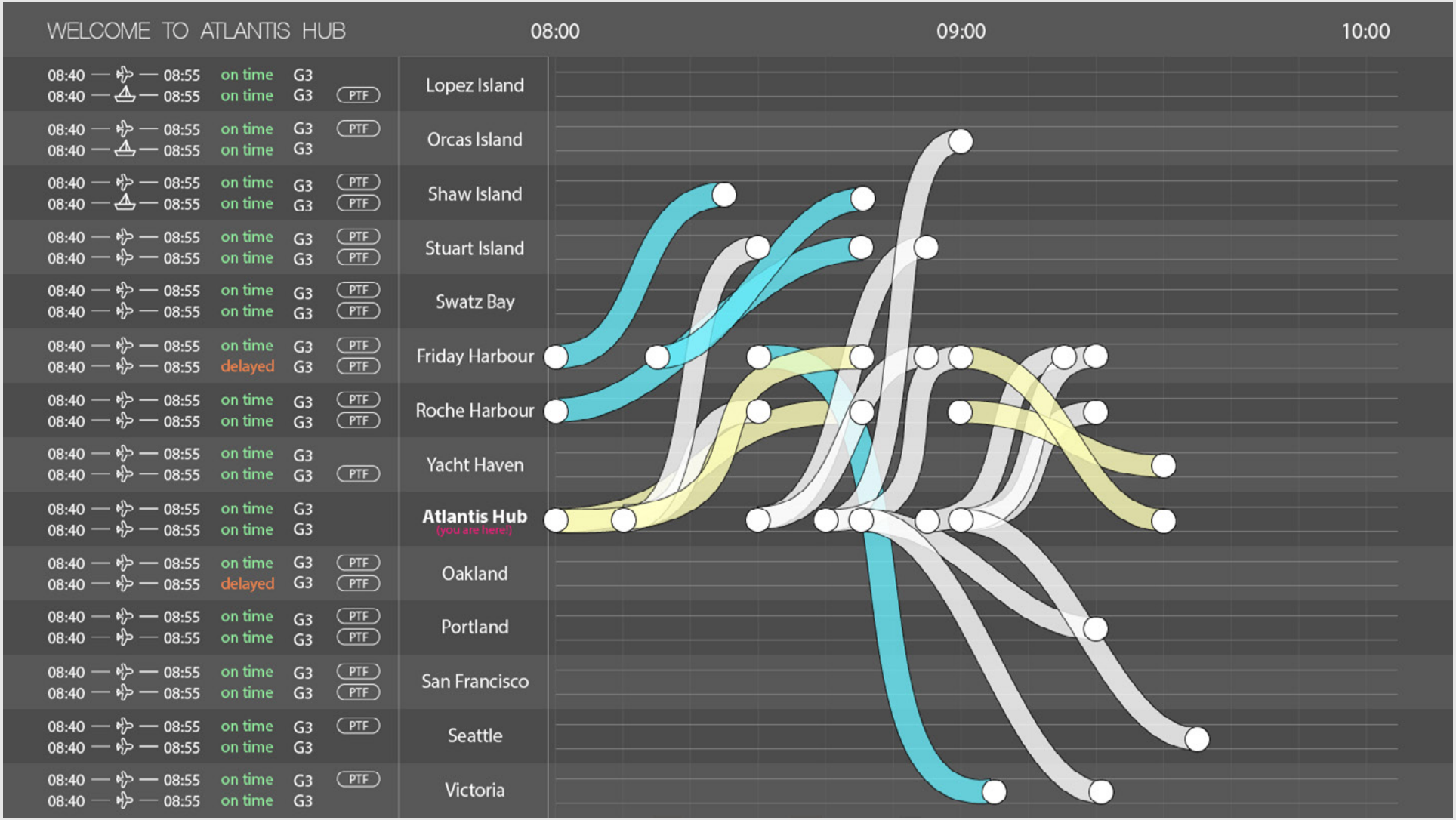
Appendix B

Welcome to Atlantis Hub

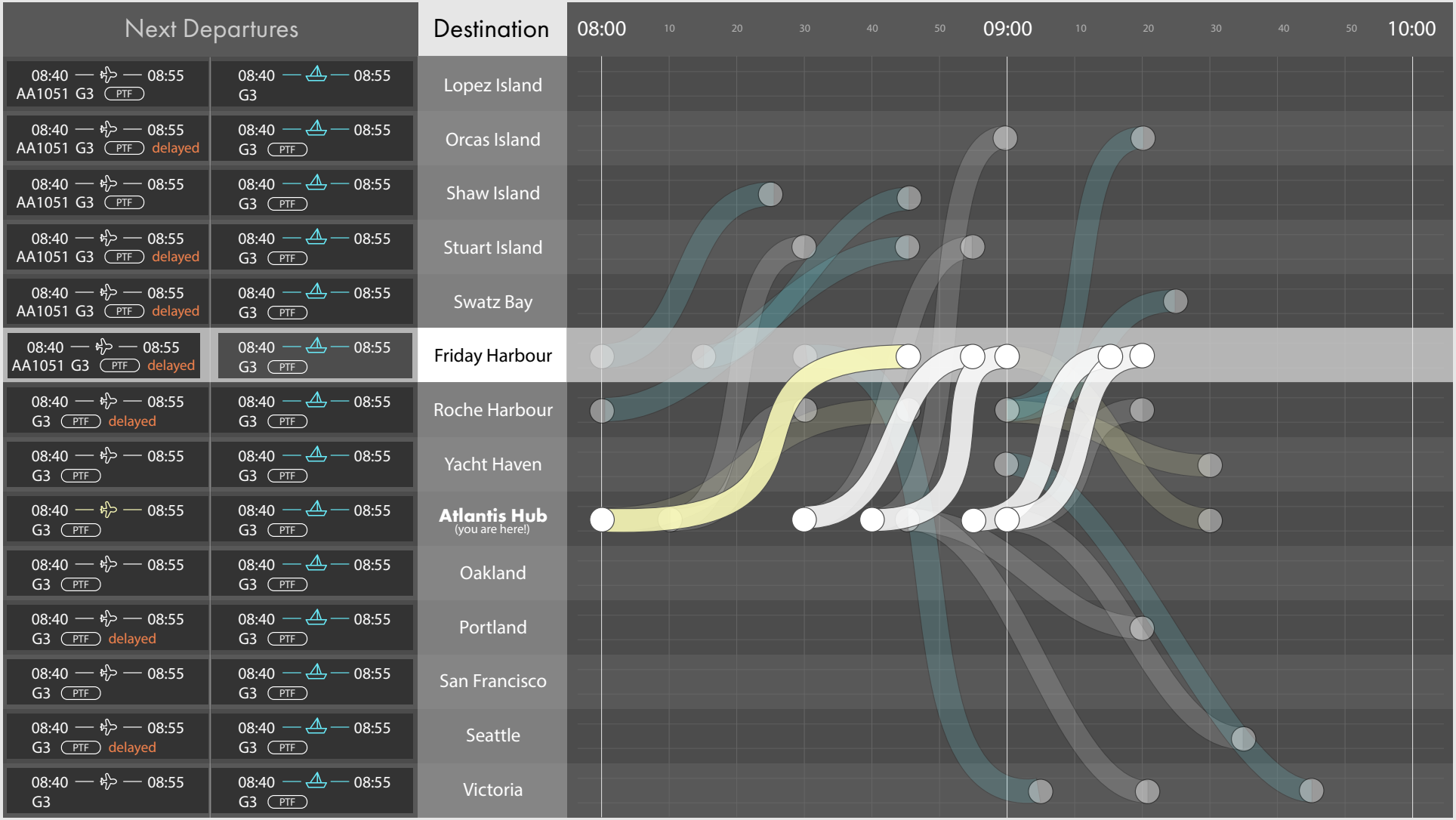
Destinations	Leaving	Travel Time	Arrival Time	Type
Yacht Haven	07:30 08:45	25min 48min	07:55 09:33	
Friday Harbor	07:30 08:45	25min 48min	07:55 09:33	
Stuart Island	07:30 08:45	25min 48min	07:55 09:33	
Orcas Island	07:30 08:45	25min 48min	07:55 09:33	
Lopez Island	07:30 08:45	25min 48min	07:55 09:33	
Shaw Island	07:30 08:45	25min 48min	07:55 09:33	
Roche Harbor	07:30 08:45	25min 48min	07:55 09:33	
Swatz Bay	07:30 08:45	25min 48min	07:55 09:33	
Victoria				
Portland				
Seattle				
San Francisco				
Oakland				



Appendix C


WELCOME TO ATLANTIS HUB
08:00
09:00
10:00
08:40 — 08:55 on time G3
08:40 — 08:55 on time G3 PTF
Lopez Island
08:40 — 08:55 on time G3 PTF
08:40 — 08:55 on time G3
Orcas Island
08:40 — 08:55 on time G3 PTF
08:40 — 08:55 on time G3 PTF
Shaw Island
08:40 — 08:55 on time G3 PTF
08:40 — 08:55 on time G3 PTF
Stuart Island
08:40 — 08:55 on time G3 PTF
08:40 — 08:55 on time G3 PTF
Swatz Bay
08:40 — 08:55 on time G3 PTF
08:40 — 08:55 delayed G3 PTF
Friday Harbour
08:40 — 08:55 on time G3 PTF
08:40 — 08:55 on time G3 PTF
Roche Harbour
08:40 — 08:55 on time G3
08:40 — 08:55 on time G3 PTF
Yacht Haven
08:40 — 08:55 on time G3
08:40 — 08:55 on time G3
Atlantis Hub
(you are here!)
08:40 — 08:55 on time G3 PTF
08:40 — 08:55 delayed G3 PTF
Oakland
08:40 — 08:55 on time G3 PTF
08:40 — 08:55 on time G3 PTF
Portland
08:40 — 08:55 on time G3 PTF
08:40 — 08:55 on time G3 PTF
San Francisco
08:40 — 08:55 on time G3 PTF
08:40 — 08:55 on time G3
Seattle
08:40 — 08:55 on time G3 PTF
08:40 — 08:55 on time G3
Victoria

Appendix D

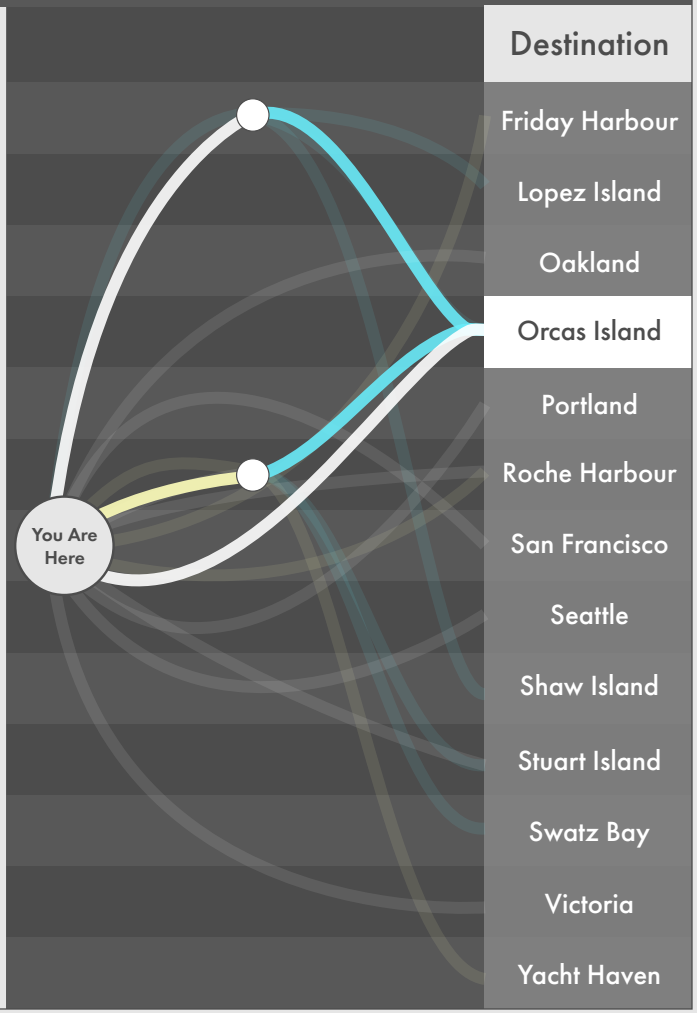

Next Departures
Destination
08:00
10
20
30
40
50
09:00
10
20
30
40
50
10:00
08:40 — 08:55 AA1051 G3 PTF
08:40 — 08:55 G3
Lopez Island
08:40 — 08:55 AA1051 G3 PTF delayed
08:40 — 08:55 G3 PTF
Orcas Island
08:40 — 08:55 AA1051 G3 PTF
08:40 — 08:55 G3 PTF
Shaw Island
08:40 — 08:55 AA1051 G3 PTF delayed
08:40 — 08:55 G3 PTF
Stuart Island
08:40 — 08:55 AA1051 G3 PTF delayed
08:40 — 08:55 G3 PTF
Swatz Bay
08:40 — 08:55 AA1051 G3 PTF delayed
08:40 — 08:55 G3 PTF
Friday Harbour
08:40 — 08:55 G3 PTF delayed
08:40 — 08:55 G3 PTF
Roche Harbour
08:40 — 08:55 G3 PTF
08:40 — 08:55 G3 PTF
Yacht Haven
08:40 — 08:55 G3 PTF
08:40 — 08:55 G3 PTF
Atlantis Hub
(you are here!)
08:40 — 08:55 G3 PTF
08:40 — 08:55 G3 PTF
Oakland
08:40 — 08:55 G3 PTF delayed
08:40 — 08:55 G3 PTF
Portland
08:40 — 08:55 G3 PTF
08:40 — 08:55 G3 PTF
San Francisco
08:40 — 08:55 G3 PTF delayed
08:40 — 08:55 G3 PTF
Seattle
08:40 — 08:55 G3
08:40 — 08:55 G3 PTF
Victoria

Appendix E

Welcome to Atlantis Hub

to Orcas Island

08:40—08:55	San Juan Air 8332	on time	Gate B2	PTF
08:00—08:45	Train #35	on time	Plat B	PTF
THROUGH FRIDAY HARBOUR				
09:00—09:20	Ferry #35	on time	Dock B	PTF
08:00—08:45	Train #8	on time	Plat A	PTF
THROUGH ROCHE HARBOUR				
10:00—10:35	Ferry #35	on time	Dock A	PTF
11:00—11:45	Train #35	on time	Plat B	PTF
THROUGH FRIDAY HARBOUR				
13:00—13:20	Ferry #35	on time	Dock B	PTF



Appendix F - Final Design