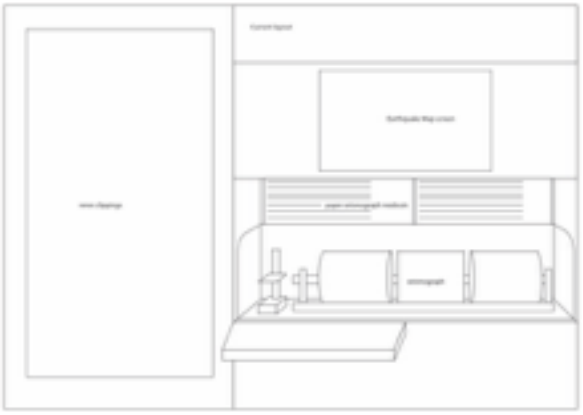
1: Introduction

The Discovery Room offers families, and especially children ages 5-12, an interactive gateway to the wonders of the Museum and a hands-on, behind-the scenes look at its science. Every major field of Museum science and research, from anthropology to zoology, is represented. Children, accompanied by adults, can explore an array of artifacts and specimens, puzzles, and scientific challenges. Activities for older visitors (aged 8+) are located on the upper level.

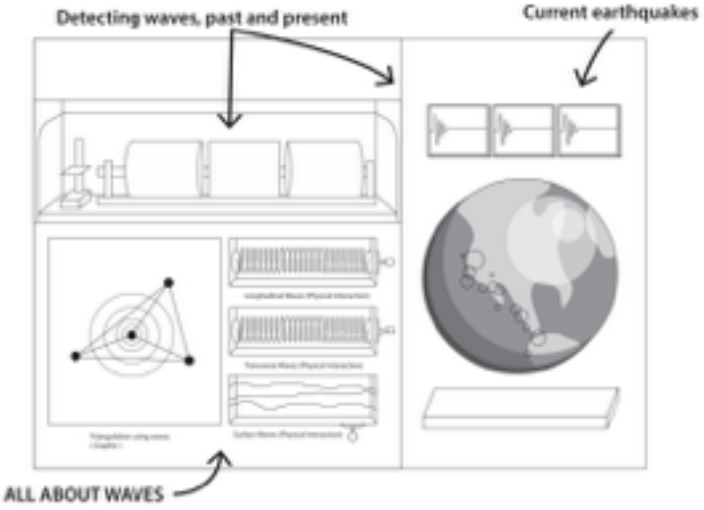
The current earthquake exhibit lets visitors track real-time earthquakes on a three-drum seismograph as well as mapping earthquake locations on a digital map of the world. Unfortunately, the seismograph no longer works and interest in the exhibit has waned.

By redesigning the exhibit, I hope to bring new interaction and reinvigorate excitement around earthquake education and awareness.

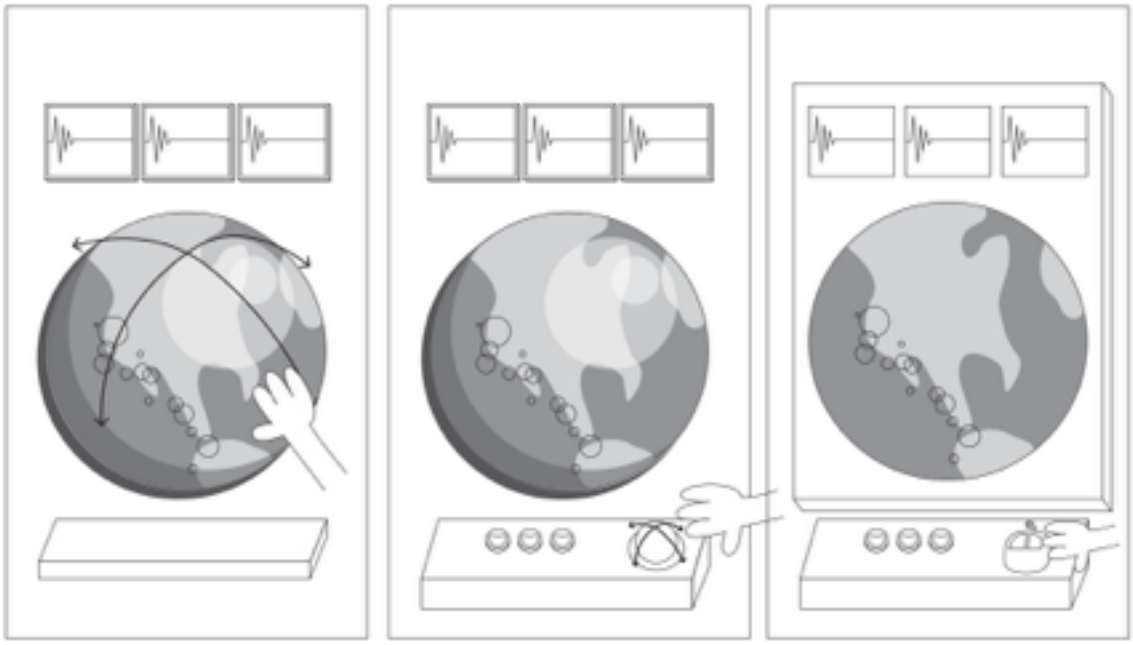


2 : Design and conceptualization

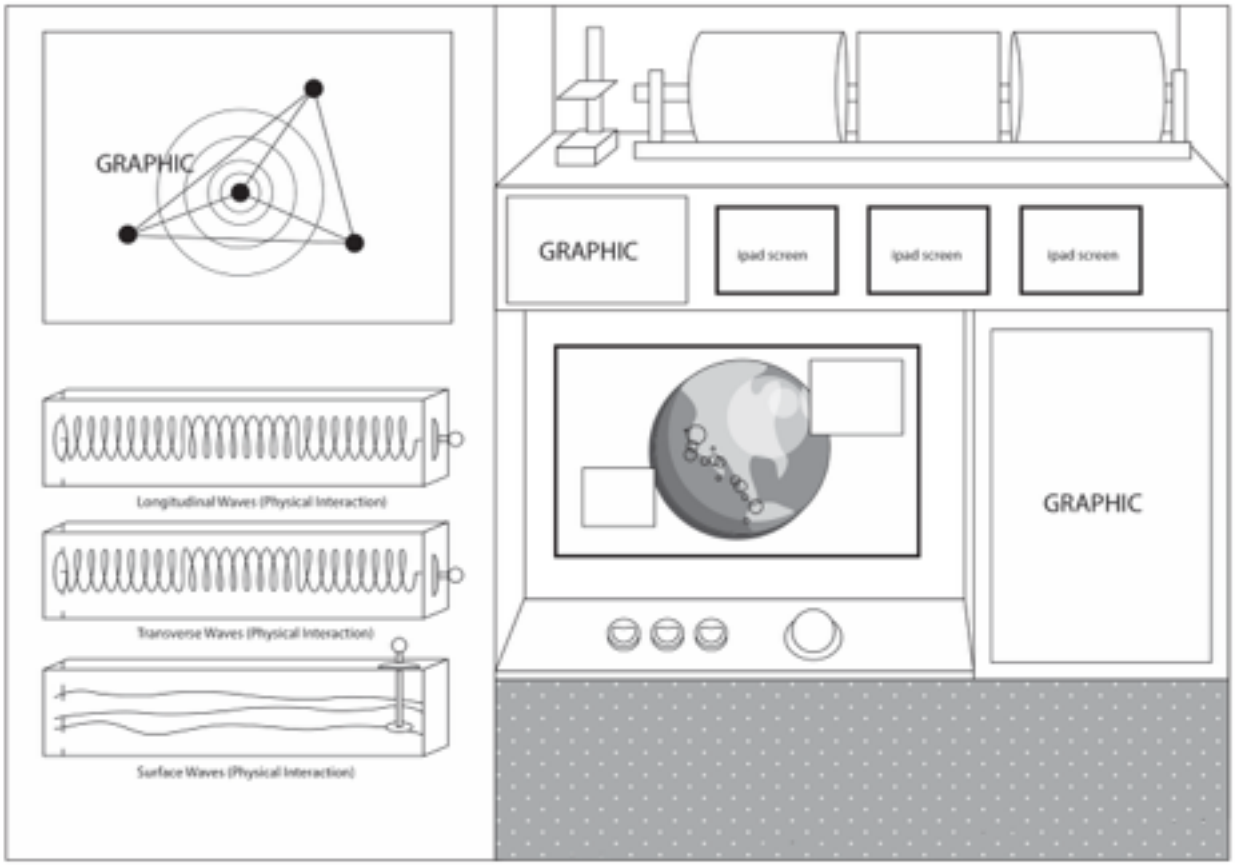
Exhibit development
Began reimagining the design.
Restructuring information by category, moving the seismograph out of the main focal area but retaining as historical artifact.



Designing earthquake map as 3D projection mapped half-sphere, with a choices of conceptual interfaces -
1) a touch interface created by using a camera and tracking system to detect when hands touched the globe in order to rotate it.
2) arcade game inspired trackball interface
3) mouse or trackpad as a final option

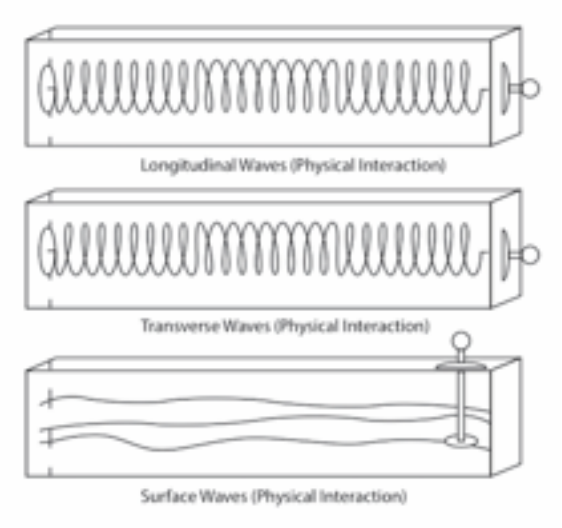


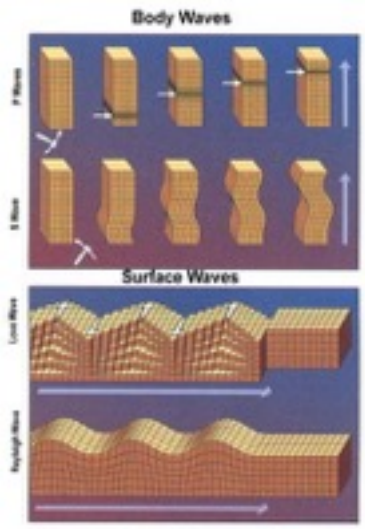
Upon further examination of project scope, desired map functionality, and budget - project redesigned to account for least amount of cabinet construction possible, and utilizing computer and screen already in possession for map.



Physical interactives
An entirely new element to the exhibit, including physical interactives contribute playfullness to the exhibit. Considering that the Discovery Room is a space for a young audience to play and learn, using these interactives as physical metaphors for earthquake phenomena seems like a good way to encourage participation.

Slinkies as a metaphor for Transverse and Longitudinal waves are a well established and accepted learning tool. As seen in the Nature's Fury exhibit.





The surface wave interactive added in as a way to visualize the third type of seismic waves in a creative way - using splashing water as a metaphor for how the waves travel through earth.

3 : Beginning production

To actually produce the exhibit we needed to bring in partners. We hired Roger Westerman for design and New Project for fabrication and installation, who have worked with AMNH and Discovery Room in the past.

Roger took the concept sketch and worked with it to create actual design mockups for fabrication. He altered the installation idea for the physical interactives to include a floor-stand that would remove the need to hang heavy items off the front of the cabinet face we would otherwise not be altering.
By adding in a floor stand, there would be enough space for the transverse waves interactive to slide back and forth across the surface.
Roger also conceptualized a fully enclosed cylindrical surface wave interactive that would be activated by impact on one end, setting a small wave going lengthwise down an acrylic tube. By fully enclosing the liquid, you solve any problems encountered by leaving a hole open for a plunger to create a splash and also remove and potentially fragile components associated with a plunger hole.

4 : Digital interactive development

Seismograph Data
For the digital seismograph information, software called JamaSeis from IRIS can be used to connect to active seismograph stations and stream their data. JamaSeis can be run on a raspberry pi instead of a full computer, which lowers budget considerably.

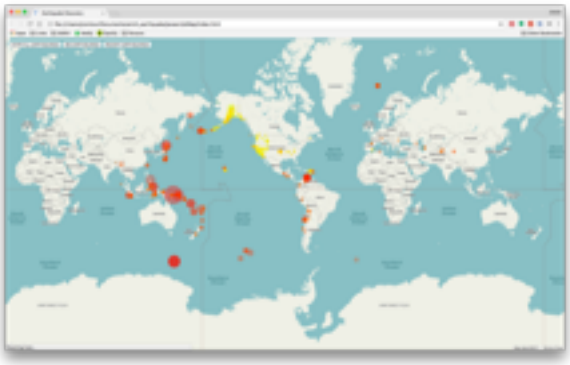
Earthquake Map

Phase 1: Google Maps Prototype

To quickly prototype a map of earthquake data, I started by utilizing the Google Maps API which has many built in features for map customization, XML layer visualization to show edges of tectonic plates, and style layers for showing earthquake data points.

It was quick to get working, but the Google Maps API loaded very slowly, and trying to filter and interact with a large amount of data was frustrating and non-responsive.

Positives include the built in labeling systems for environment areas and countries, and being well documented API.



Negatives include show load time and laggy interaction.
Google maps has many useful features that slow it down, we aren't using any of these features and so are not benefitting from the extra data being loaded. It's only an anchor on our interactivity.

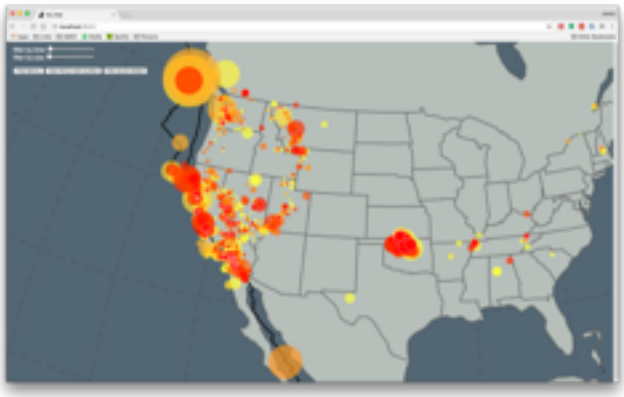
Phase 2: D3.js Prototype

Moving away from Google Maps, I looked into using D3.js as a visualization tool. D3.js is a well known and documented data visualization library for javascript.
D3 has more tools for customizing data markers, easier and less controlled methods for labeling and interaction with other features, and plays well with other javascript libraries.

Initial testing proved that D3 could visualize and process many times the amount of earthquake data that the Google Maps prototype used without significant lag.

In addition, it allowed for the mapping of data onto a sphere, letting information be shown without the mapping errors of a mercator projection.

This prototype was developed to include filtering of size and date, rotation to specified location to view special earthquake events, and highlighting of earthquake information on hover.



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