

HCI and Design

Admin

Reminder: Assignment 4

- Due Thursday before class
- Questions?

Today: Designing for Virtual Reality

- VR and 3D interfaces
- Interaction design for VR
- Prototyping for VR

3D Interfaces

We live in a 3D world

- Natural interfaces are better
- Therefore 3D interfaces will be the best

What's wrong with the above?

- Natural interfaces aren't always better!
- Making the interface simple (thus unnatural) often aids performance
 - Constrains movement
 - Limiting possible actions

Depends on application and goal of the UI

- Surgery simulation, military simulation
architecture, education, video games



3D Interfaces

What we really want are *enhanced* interfaces

Give us powers we don't normally have

- Flying, x-ray vision, teleportation, etc.

Be careful we don't become overzealous

- Air traffic control 3D display?
- Library interfaces using a books on shelves?

3D interfaces can hurt performance

- Study results show that 3D Bar charts don't help

Not every application is suited to VR!!

Brief History of VR

In 1950s, flight simulators were built by US Air Force to train student pilots.

In 1965, a research program for computer graphics called “The Ultimate Display” was laid out.

In 1988, commercial development of VR began.

In 1991, first commercial entertainment VR system “Virtuality” was released.

Despite being around for so long, VR only really started to become “mainstream” in 2015ish

Goals of VR

Trying to simulate reality or an experience

- Training, Learning, Exploring
- Expensive
- Dangerous
- Logistically Difficult

Example of successful VR interaction?

- Flight simulators (they can cost \$10 mil, but that's still a good deal!)
- Why do video game flight sims not cut it?

Types of VR Systems

Immersive VR

Mixed (Augmented) Reality

And other in-between stuff...



What makes designing for VR difficult?

Spatial input

Lack of precision

Lack of constraints

Fatigue

Lack of standards

Layout more complex

Lack of tools

Perception

Keep in mind: VR makes many people feel
(and be) sick!!!

Goals of (all) interaction design

Performance

- efficiency, accuracy, productivity

Usability

- ease of use, ease of learning, user comfort

Usefulness

- users focus on tasks
- interaction helps users achieve goals

Universal interaction tasks

All of the systems you design should consider:

Navigation

- Travel – motor component
- Wayfinding – cognitive component

Selection

Manipulation

System control

Basic Guidelines for VR Design

Use occlusion, shadows, perspective carefully

- Can improve use of spatial memory
- Can also be distracting and confusing

Minimize navigation steps

Keep text readable (good contrast, 30 degree tilt max)

Simple user movement (why lock to a floor?)

Prevent Errors (put in guides to help)

Simplify object movement

Organize groups of items into alignments that facilitate visual search and recall (allow user choice)

Basic Guidelines for VR Design

Always think about your users.

What are their real world constraints?

What are their virtual world constraints?

E.g.,

- Where are they interacting?
- How much movement is required?
- How tiring/complex is the interaction?

Ok, so let's design some stuff

Now that you promise to follow all the basic guidelines.

How do we go about prototyping for VR?

Prototyping for VR

First, the Bad News

- Unfortunately, the vast amount of resources that currently exist for prototyping (Figma, Sketch, InVision, Balsamiq, etc.) just don't exist for VR (yet).
- Sorry for crushing your dreams.
- BUT, new tools are being created ... and quickly.
- We will take a look at a few.


Prototyping for VR

Now, the Good News

Everything you have already learned about good prototyping and design in this class STILL APPLIES

Focus on Users

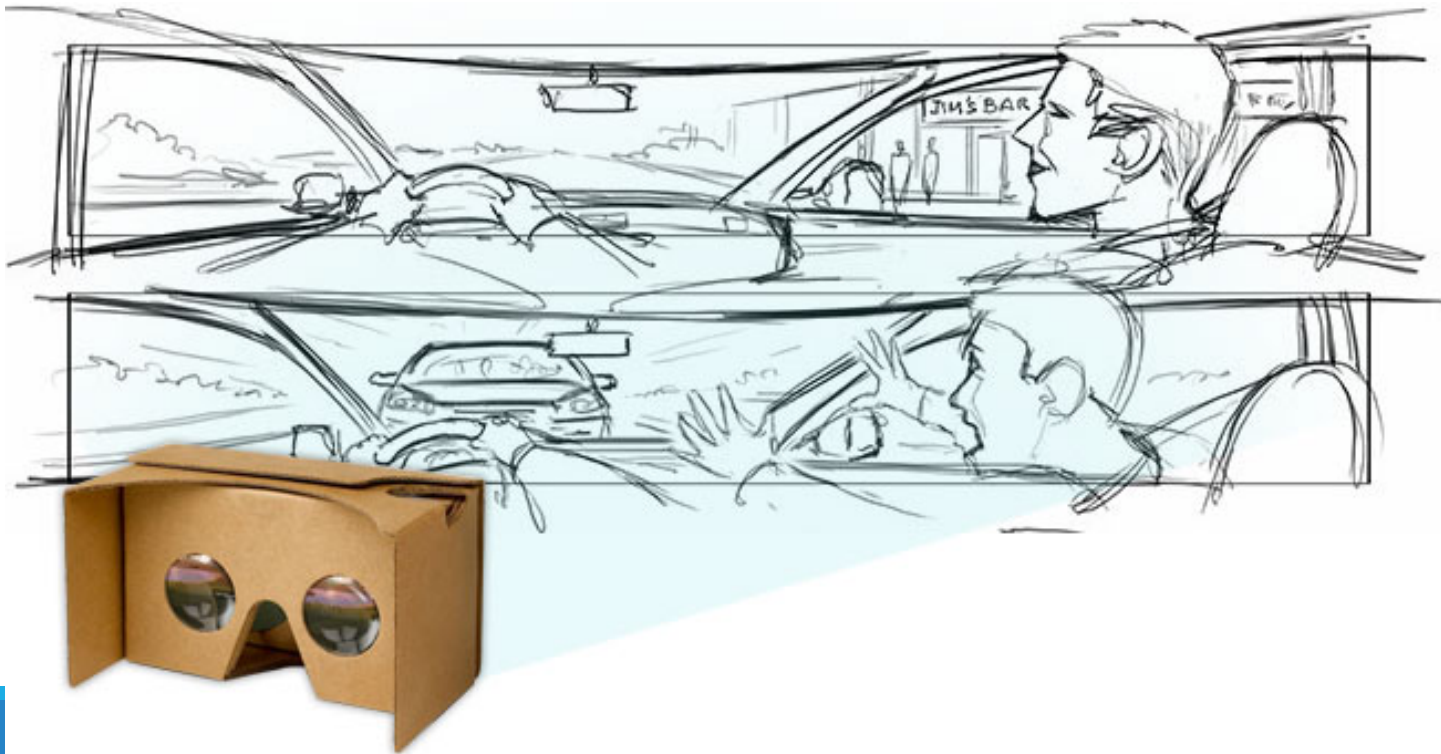
- Start with user journeys / stories
 - Same as any system / application / design
- Then do paper prototyping
- Then do digital prototyping
- Then do implementation and development



Even more important because development is SO time consuming!

Paper-prototyping for VR

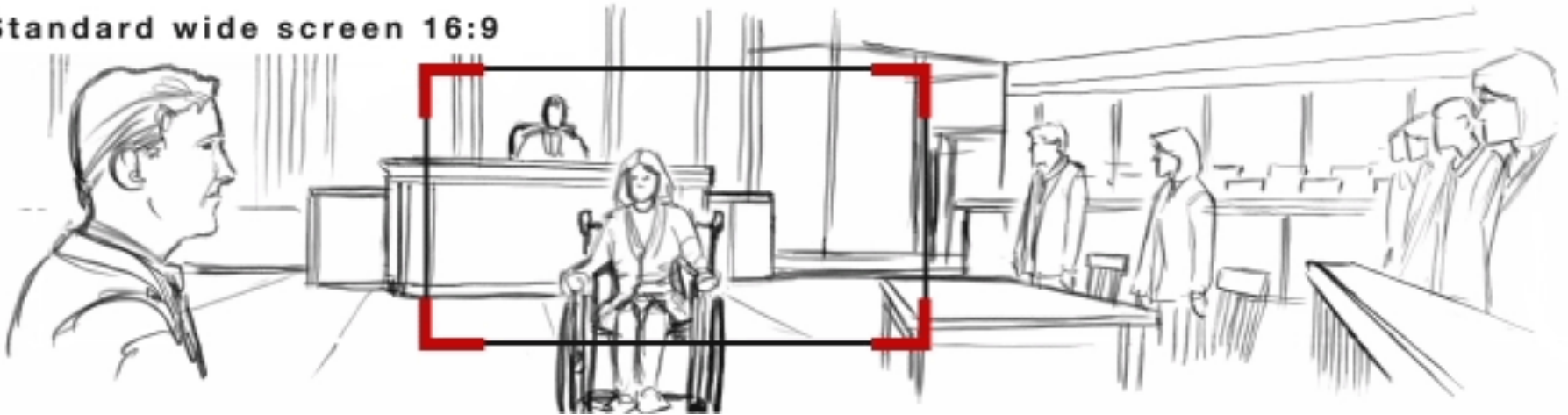
In many ways, paper prototyping is the same or easier for VR
Just draw what the user will see
Kind of like a first-person storyboard



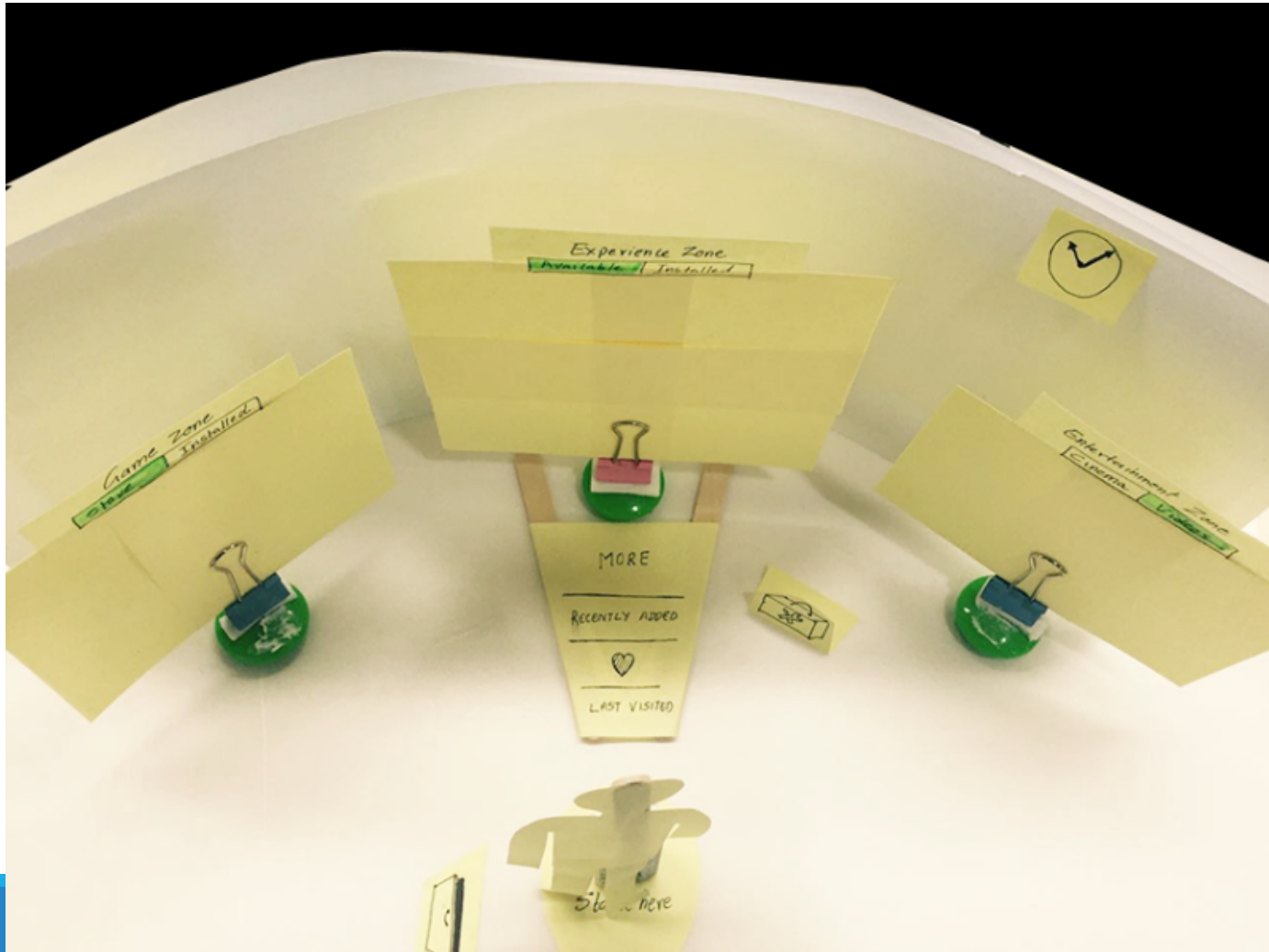
Paper-prototyping for VR

Can also draw the whole scene and just specify which part the user is currently “looking at”

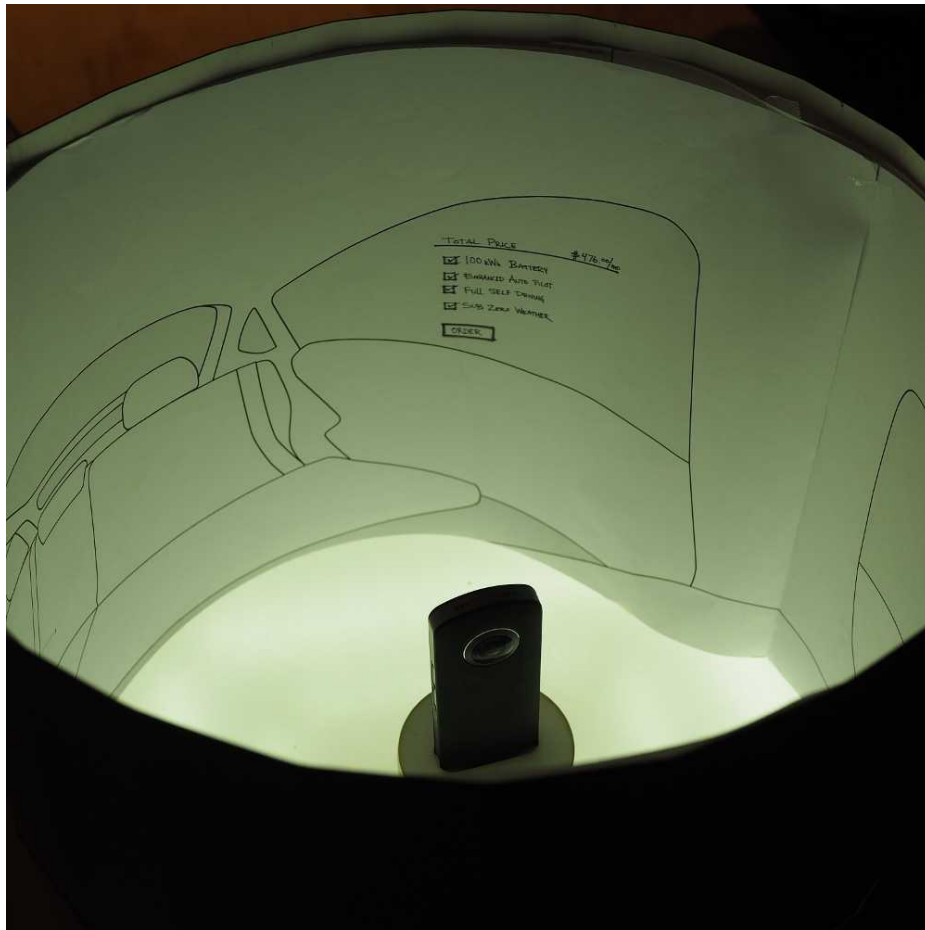
Standard wide screen 16:9



Paper-prototyping for VR



Paper-prototyping for VR



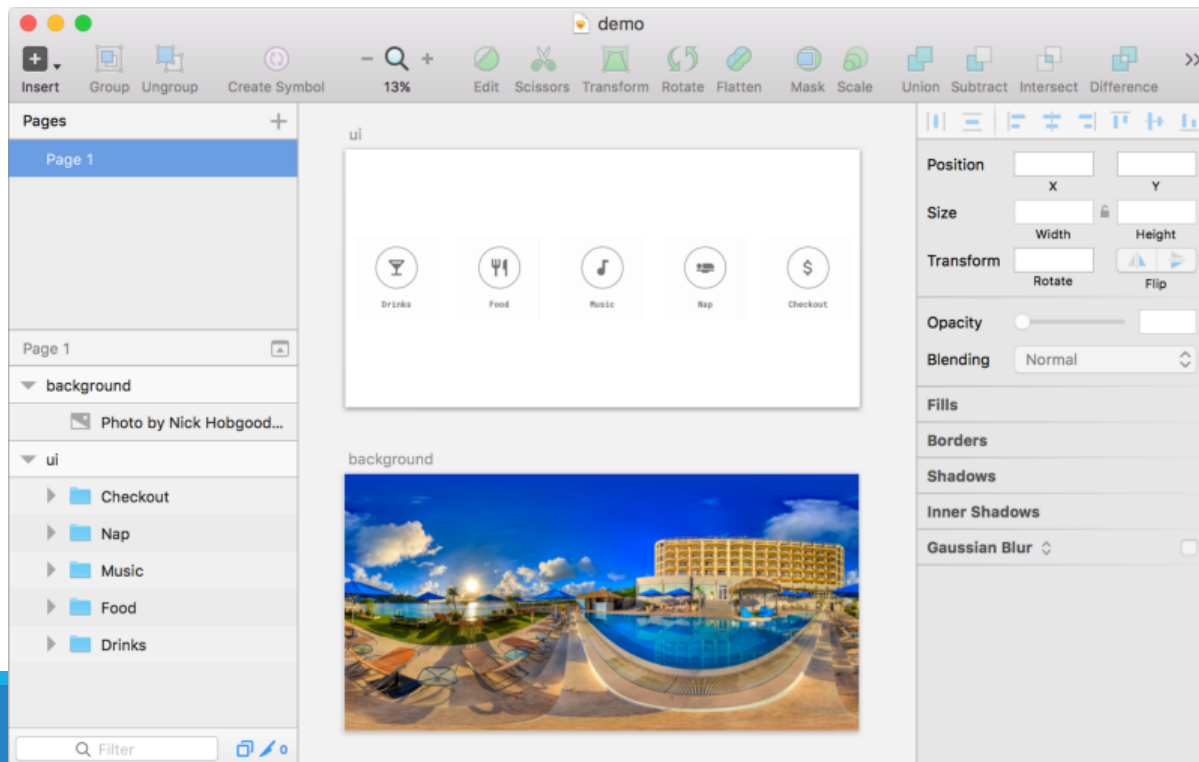
Digital prototyping for VR

- Several digital prototyping tools exist or are in development
- Most allow you to upload already created digital resources and then they render them as 3D environments
- 3D cameras/images can help a lot!

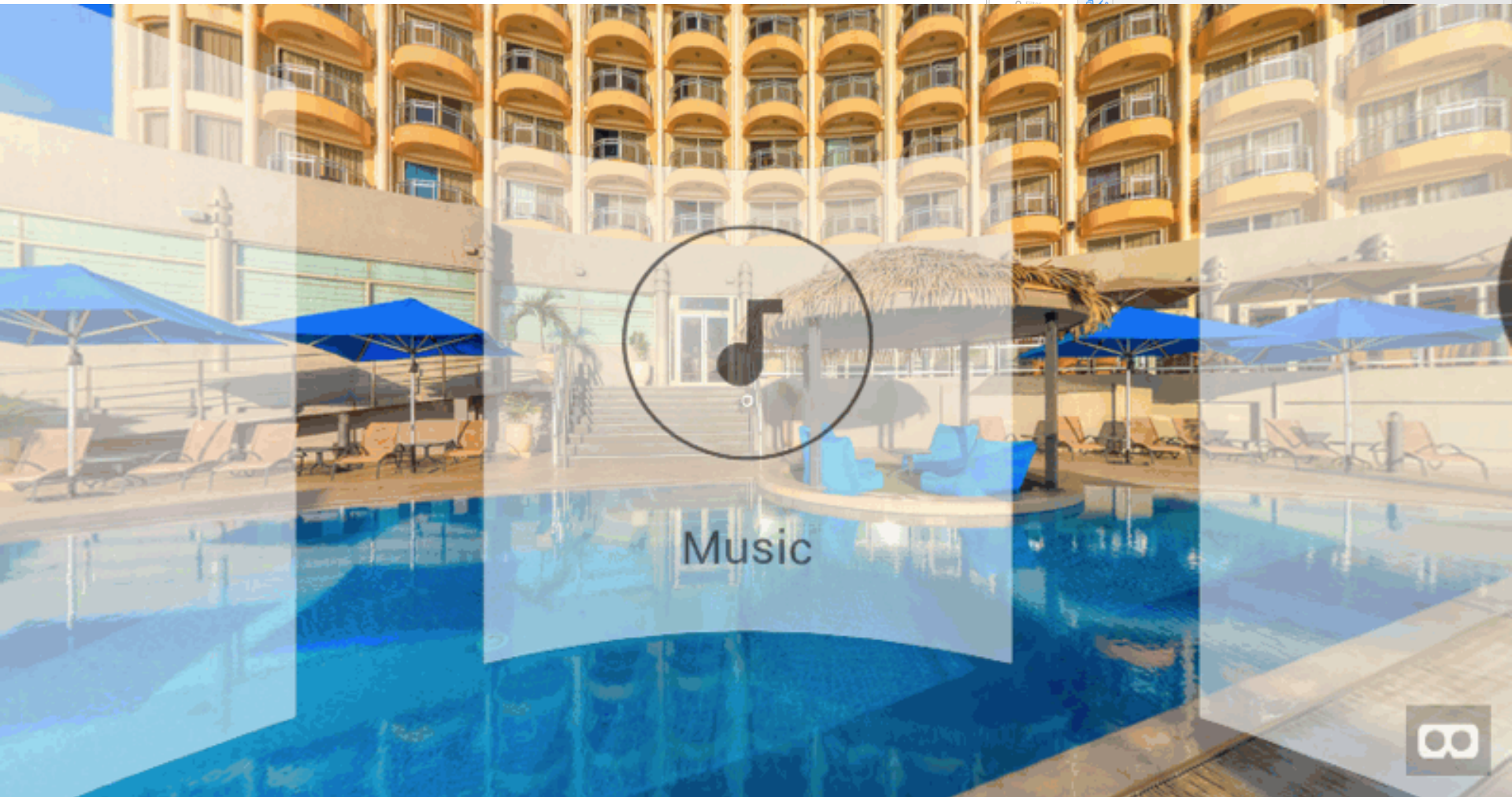
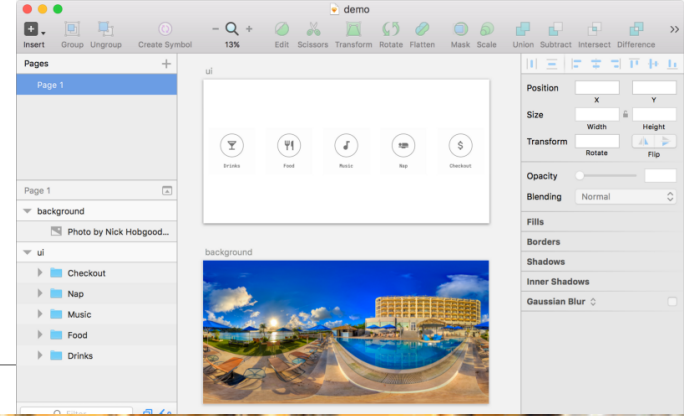
One option: Sketch to VR Plug-in

Cool plug-in for Sketch: <http://sketchapp.rocks/plugins/sketch-to-vr/>

Allows you to overlay UI and other design elements on top of equirectangular 360° photos



Sketch to VR Plug-in



Another Option: Storyboard VR

New tool (in Alpha) from Artefact

For Windows and HTC Vive

Similar workflow

- Upload already created digital resources
- Render them as 3D environments

<https://www.artefactgroup.com/work/storyboard-vr/>

Implementation and Development: Unity

Unity is a cross-platform game engine developed by Unity Technologies and used to develop video games and VR applications



Steep learning curve

Requires some coding chops

This means that developing in Unity can be time-consuming and resource intensive

- All the more reason to try and find ways to prototype!

Implementation and Development: Unity



More reading and resources

Low-Fi prototyping to speed up VR development:

<https://virtualrealitypop.com/how-to-develop-apps-for-virtual-reality-hint-low-fidelity-prototyping-adb85c0cea09>

How We Did It: Prototyping in Virtual Reality:

<https://labs.ideo.com/2016/03/07/how-we-did-it-prototyping-in-virtual-reality/>

NY Times 360 videos: <https://www.nytimes.com/video/360-video>

Sketch Plugin: Sketch to VR: <https://blog.prototypr.io/sketch-plugin-sketch-to-vr-4e23ced47e6>

For Windows and HTC Vive: Storyboard VR:

<https://www.artefactgroup.com/work/storyboard-vr/>

Summary

VR is cool and becoming popular as a platform

BUT: It has drawbacks, limitations, and constraints you should keep in mind (like it makes many people feel sick!)

DON'T try to use it for everything

Because it is so new, designing and prototyping for VR can be challenging

Follow the same good HCI and Design practices that you have learned for designing any product or system

Keep an eye out for new prototyping tools... there will no doubt be many in the coming few years

Activity

Option 1: Do a Sketch-to-VR tutorial + create your own

- Written tutorial: <https://blog.prototypr.io/sketch-plugin-sketch-to-vr-4e23ced47e6>
- Youtube video tutorial (7 min): <https://www.youtube.com/watch?v=sdhloitHGEE>
- Complete the tutorial then edit to make your own UI

Option 2: Make a paper prototype for a VR application

- Pick any VR application you like. Identify a user journey
- Create a paper prototype for the user journey

Turn in paper or email screenshot to hci_c75d@sendtodropbox.com

- Filename example: NetID1_NetID2.png