IMGD 5100: Immersive HCI

Wayfinding

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Navigation

- Navigation = Travel + Wayfinding
- Travel is the component of VR that involves moving from one place to another
- Wayfinding is:
  - Knowing where you are,
  - Knowing where your destination is, and
  - Having some knowledge of how to get there.

Wayfinding in the Real World

- How do we do wayfinding in the real world?

Why Study Wayfinding?

- Two reasons for wayfinding improvement in VR
  - VR performance enhancement
  - Training transfer
- We can show that:
  - One set of wayfinding cues works better than another
  - Exposure to wayfinding cues in VR improve wayfinding in the real world.
- Spatial Comprehension:
  - The ability to perceive, understand, remember, and recall for future use.

Spatial Knowledge Acquisition

- Direct environmental exposure
- Indirect tools, like maps
  - These can be used outside or inside of the environment
- Direct cues (urban situations)
  - ***Landmarks***
  - ***Routes*** (or paths) between landmarks
  - ***Nodes*** are junctions in routes
  - ***Districts*** are regions of the city
  - ***Edges*** prevent or deter travel
    - Typical edge is a river or lake
  - Landmarks and nodes typically live in districts, and routes pass through districts and connect them

Spatial Knowledge Acquisition Using Maps

WPI

- Can be used prior to travel
  - Used to plan ahead
  - Should be "North Up"
- Can be used during travel
  - Require a ego-to-geo transformation
  - Where am I? Which direction am I facing?
  - This must be updated during travel
  - Should be "Forward Up"
- The key to map use for navigation is resolving the egocentric to geocentric perspective transformation.

Spatial Acquisition

- Landmark, Route, Survey (or LRS) model described by Seigel and White and Thorndyke and Goldin
  - Landmarks are acquired
  - Route knowledge is added to go between certain pairs of landmarks
  - Survey knowledge allows me to plan a route between any two landmarks
- The use of maps allows us to leapfrog directly to survey knowledge
  - But, this is inferior to real-world survey knowledge development

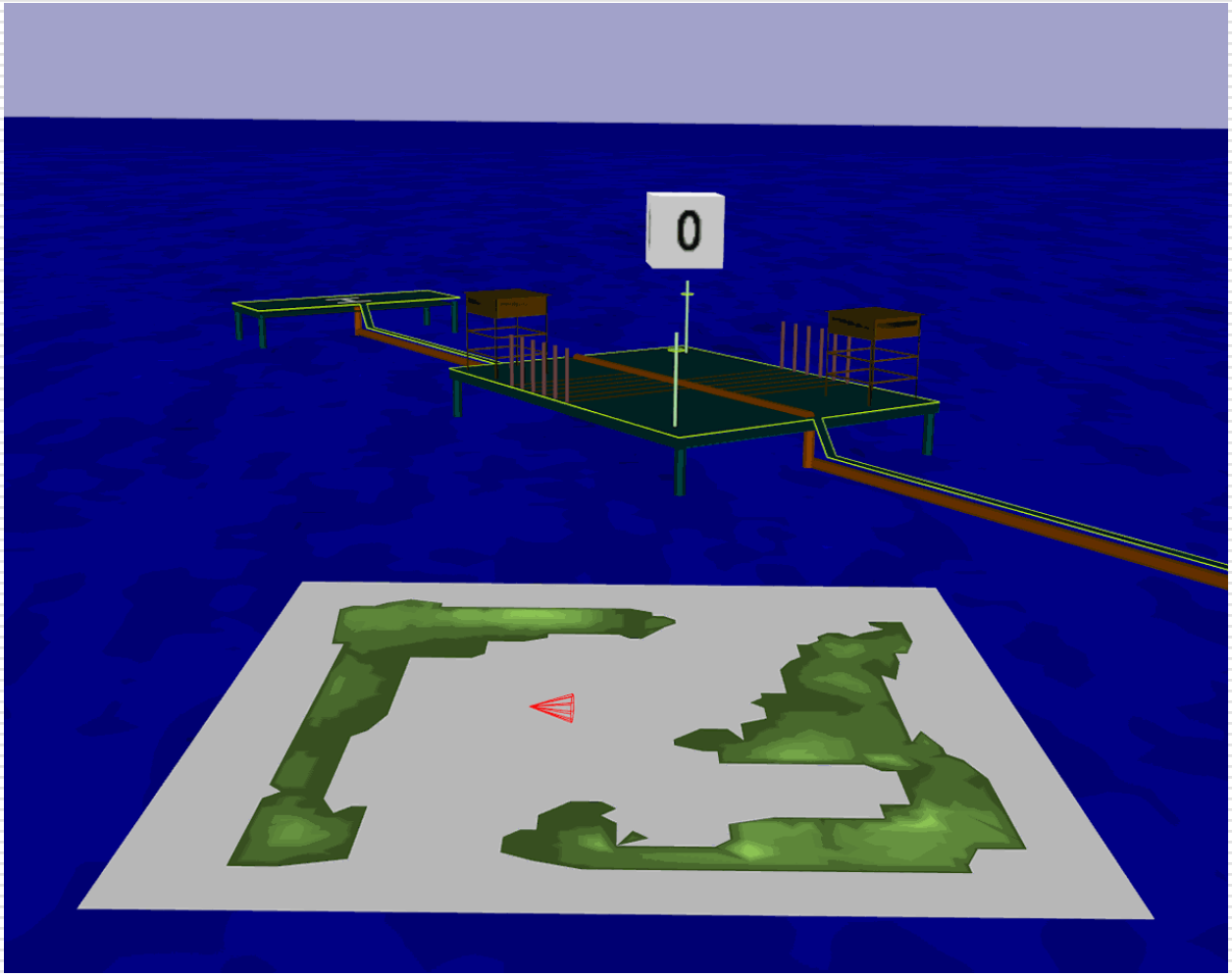
Strategies

- Looking for shoes in the mall

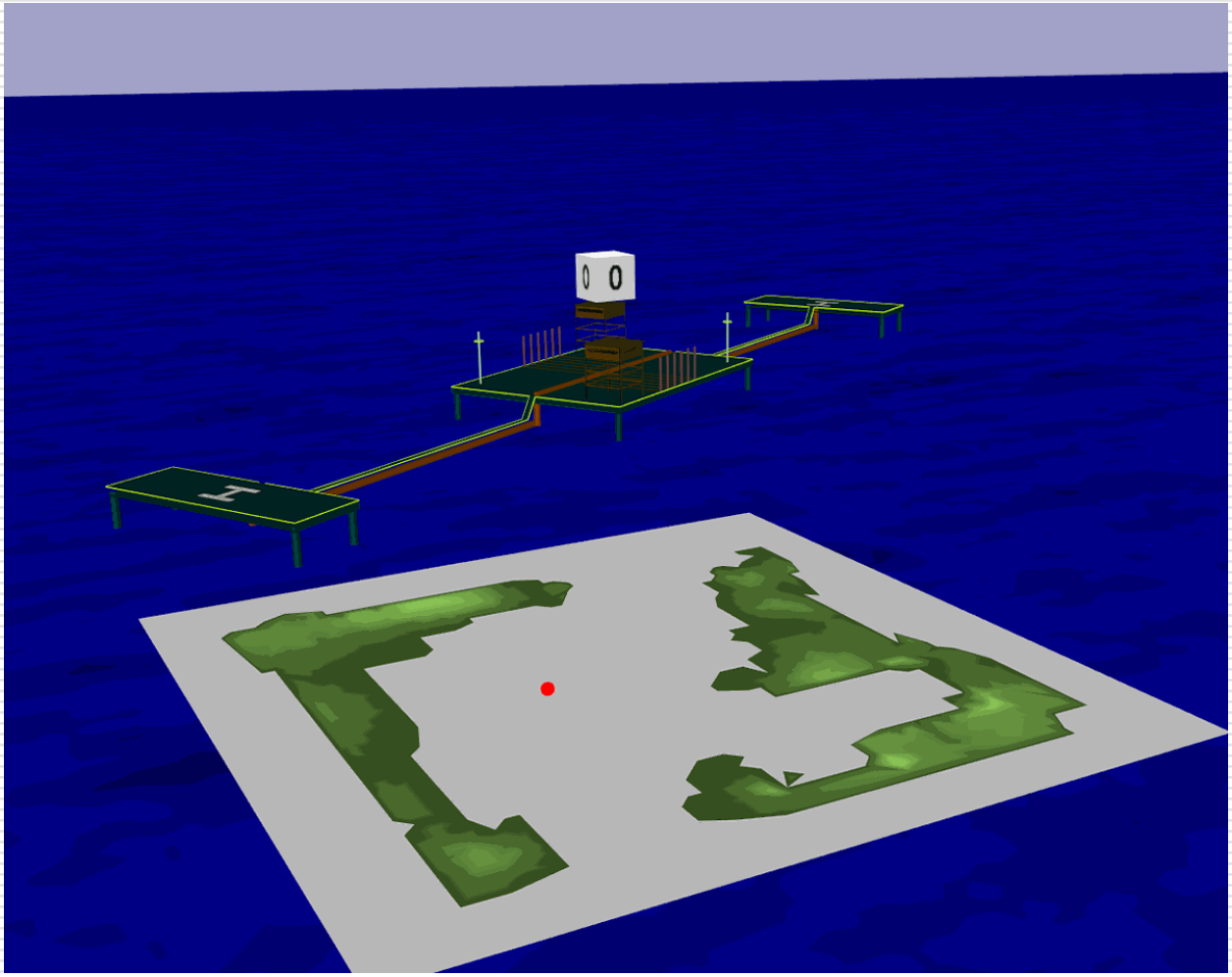
Map Examples

- Forward-Up Map
  - http://www.gametrailers.com/player/32457.html
  - http://www.gametrailers.com/player/17541.html
- North-Up Map
  - http://www.gametrailers.com/player/19720.html

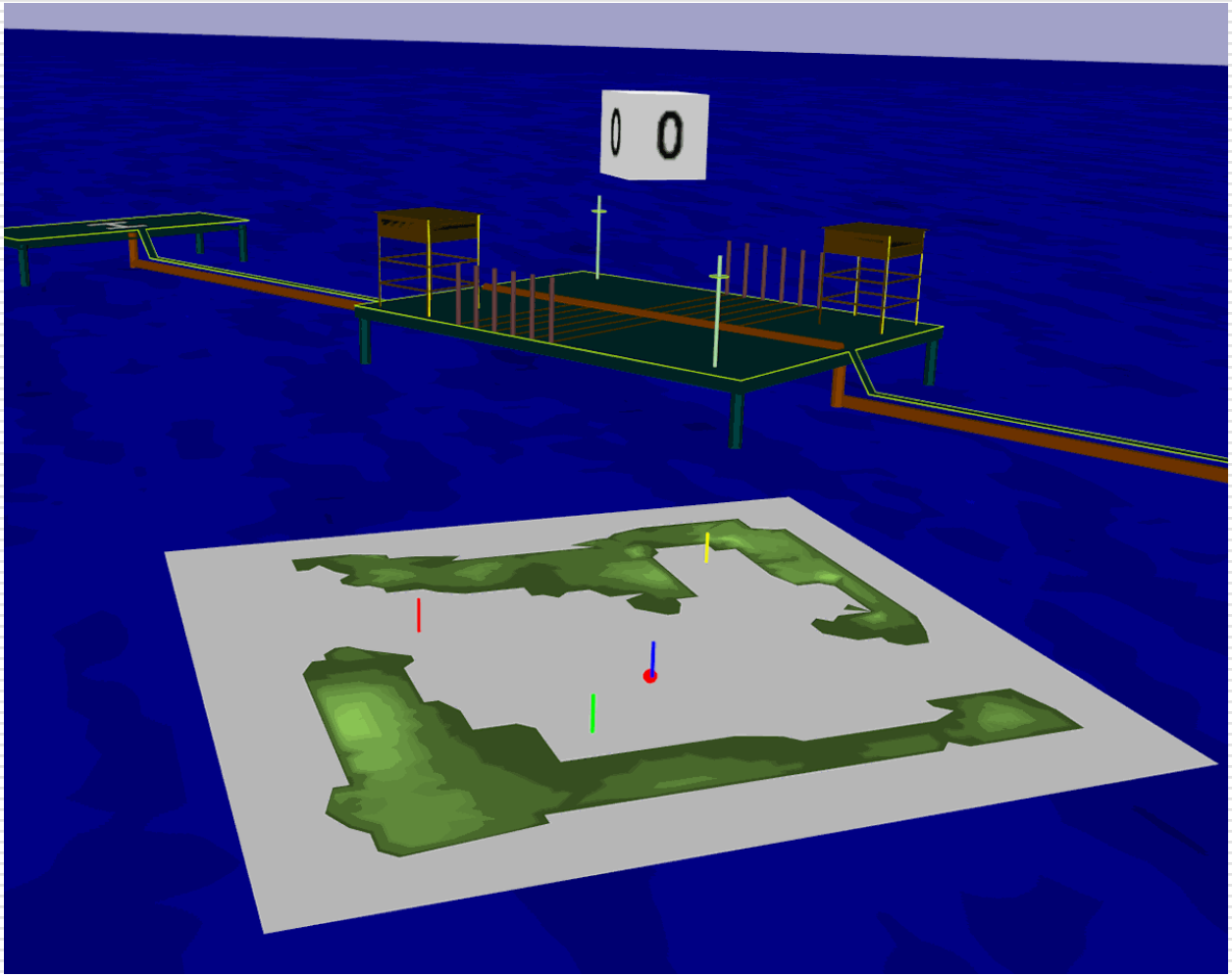
Maps: North Up



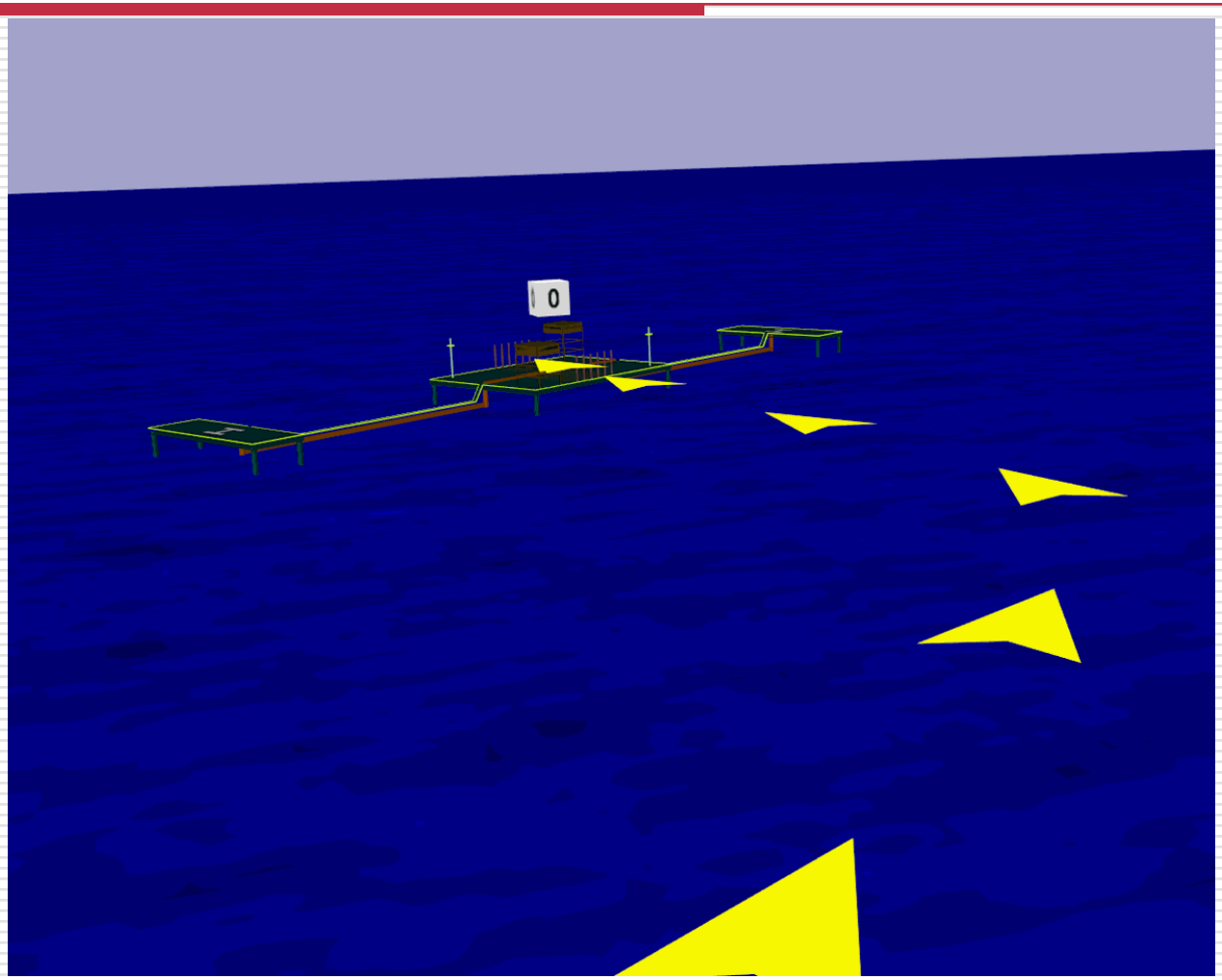
Maps: Forward Up



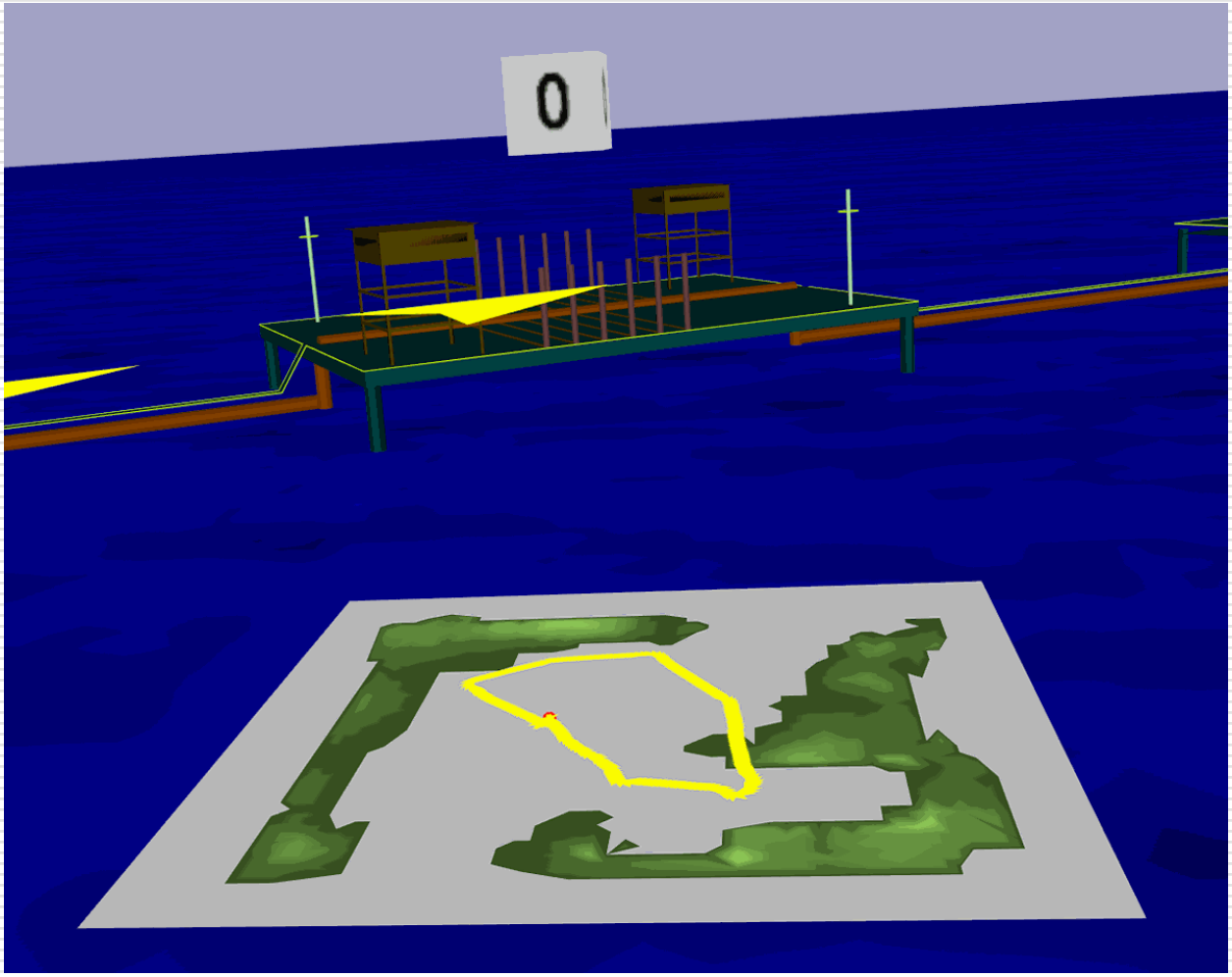
Maps: Forward Up + Landmarks



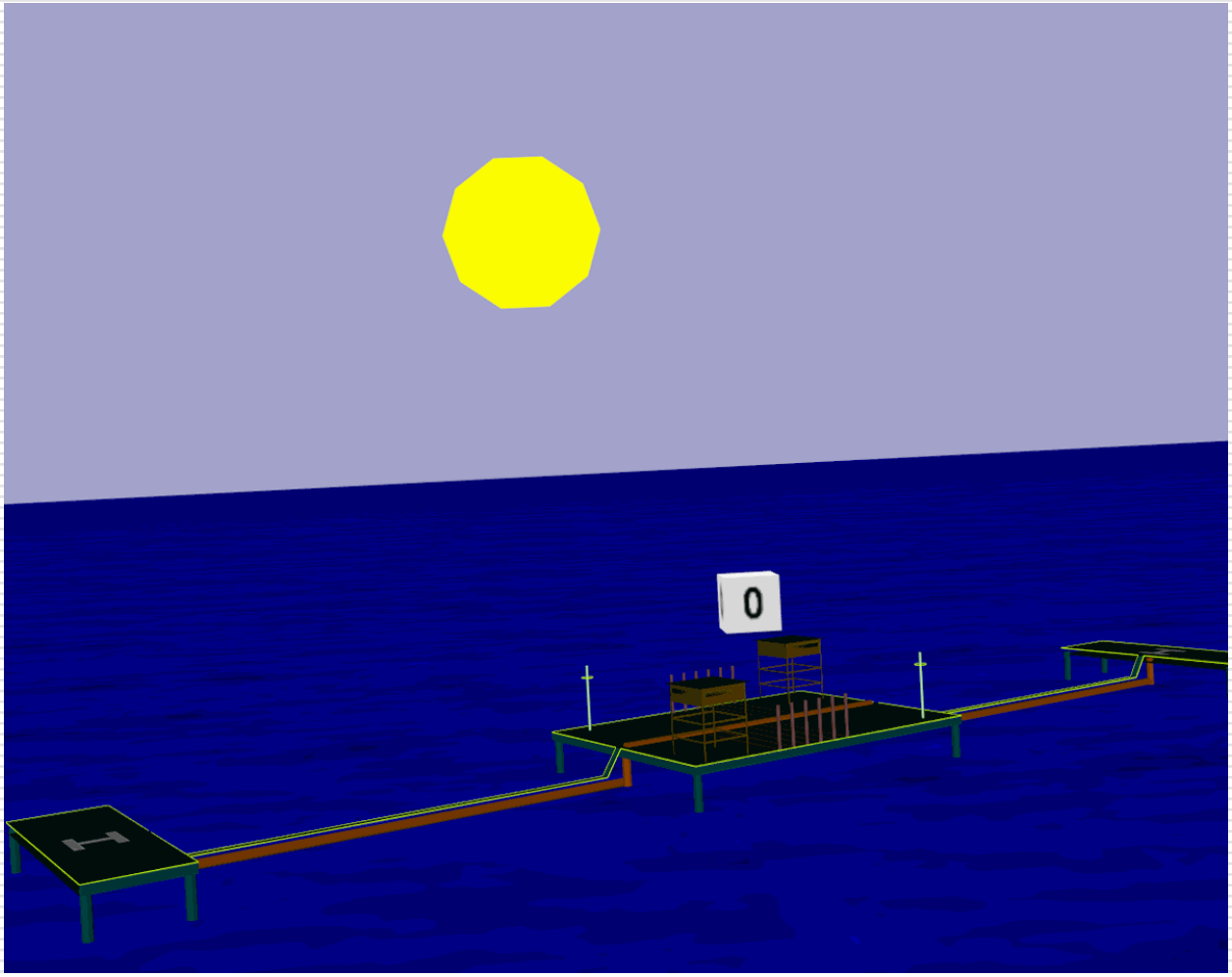
Maps: Paths



Maps: Paths on the Map



Maps: Sun as Landmark



Landmarks

- Distinguishable (unique)
- Viewable from a good distance
- Memorable

Signage

- Can be:
  - World fixed
  - Body fixed
  - Object fixed

Signage

(http://www.FourWindsInteractive.com/)

Reference

- Much material from
  - Darken, R.P., Peterson, B. (2002) "Spatial Orientation, Wayfinding, and Representation," *Handbook of Virtual Environments: Design, Implementation, and Applications*, Kay M. Stanney (ed.), pp. 493-518.

http://vehand.engr.ucf.edu/handbook/Chapters/Chapter28/Chapter28.html