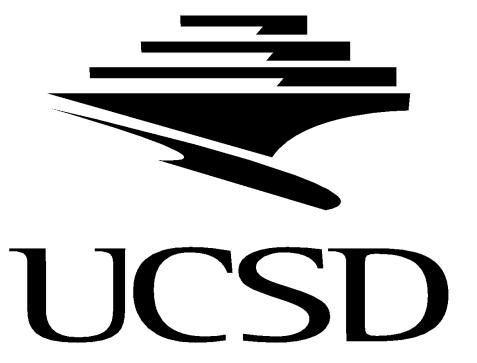


MULTITOUCH INTERACTION TECHNIQUES FOR LARGE DISPLAYS

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BACKGROUND

The HIPerSpace Wall is...

- 70 x 30" Dell monitors tiled together.
- 35,840 x 8,000 pixel resolution for a total of **286,720,000 pixels**.

and a great model for next generation high resolution displays. It's an excellent medium for **large-scale visualizations** crucial for experimental and theoretical research (e.g. high resolution maps to investigate seismic waves or high clarity images of microscopic cells to identify structure).

PROBLEM STATEMENTS

1. Natural interaction techniques

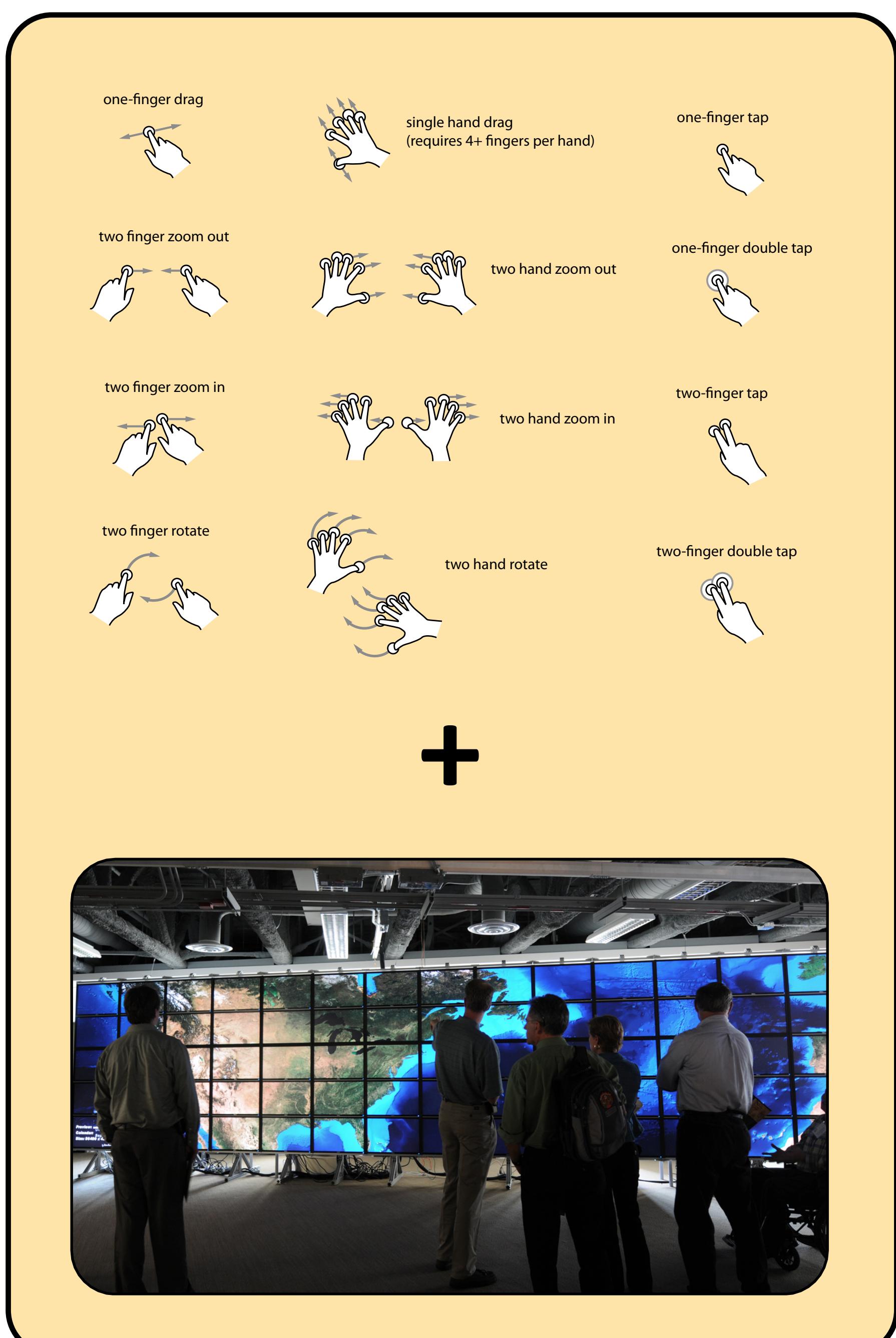
Currently, a **mouse and keyboard** are primarily used to interact with visualizations on the wall.

Unfortunately, this can feel quite **crude**:

- The mouse pointer has been scaled up in order to easily traverse the width of the wall.
- Interaction with the visualization requires an **obscure combination** of mouse and keyboard buttons (e.g. right click to zoom in).

2. Handling multiple users simultaneously

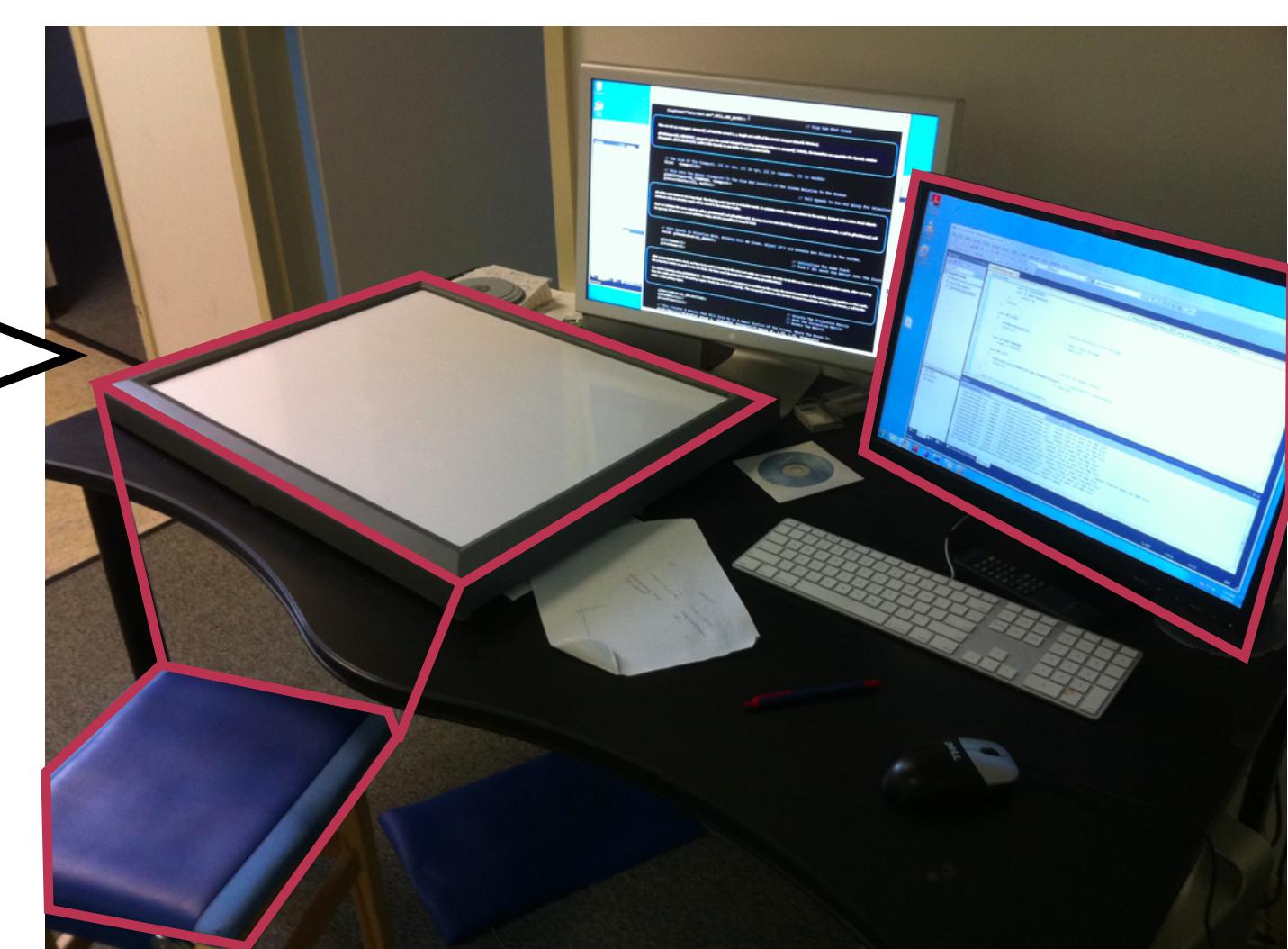
While the HIPerSpace Wall software is capable of distinguishing input coming from different devices (e.g. an iPhone, a Wiimote, etc.), two different users cannot use two separate devices to perform two different tasks on the wall at once.



MULTITOUCH HARDWARE

DiamondTouch

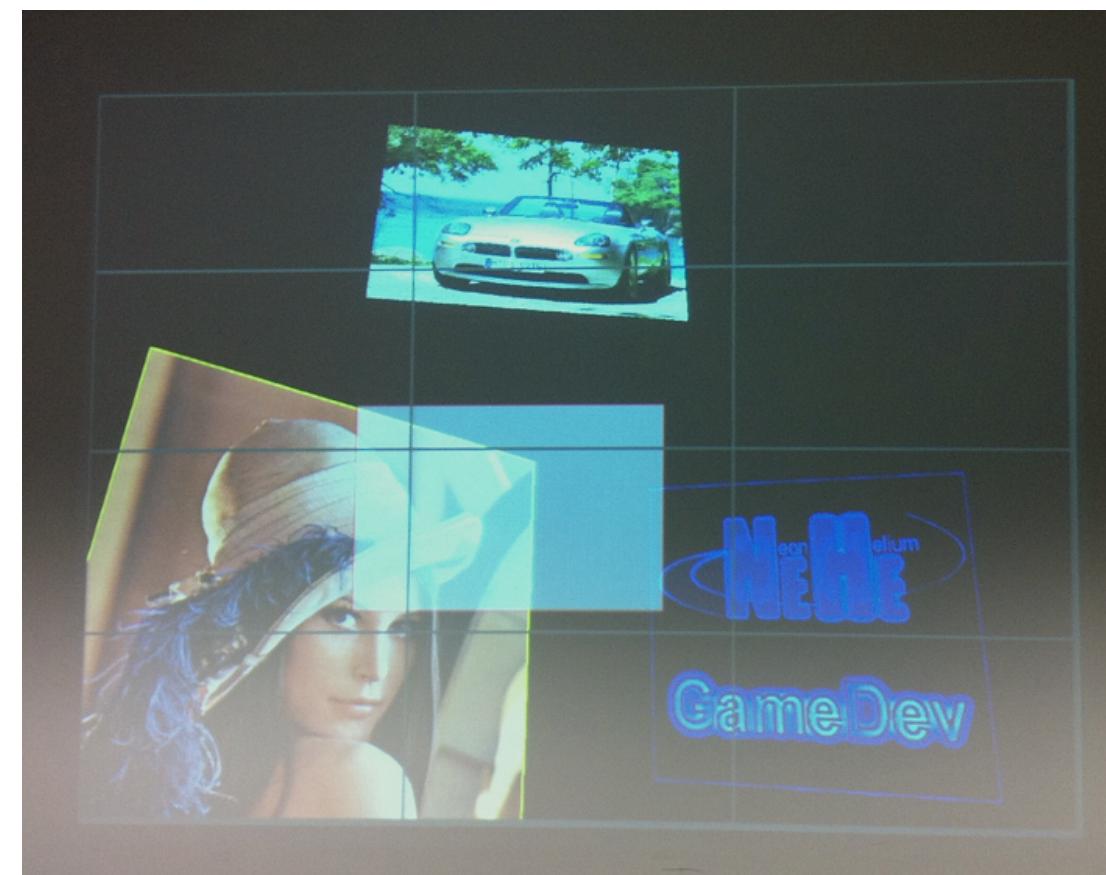
- + Hardware-level support to differentiate up to 4 users.
- API makes it difficult to track each individual touch point.



3M Touch Screen

- + Capable of tracking up to **50 distinct touch points** and returns (x, y) **coordinates** for each: makes it easy to **build complex gestures**.
- No hardware-level support to differentiate multiple users.

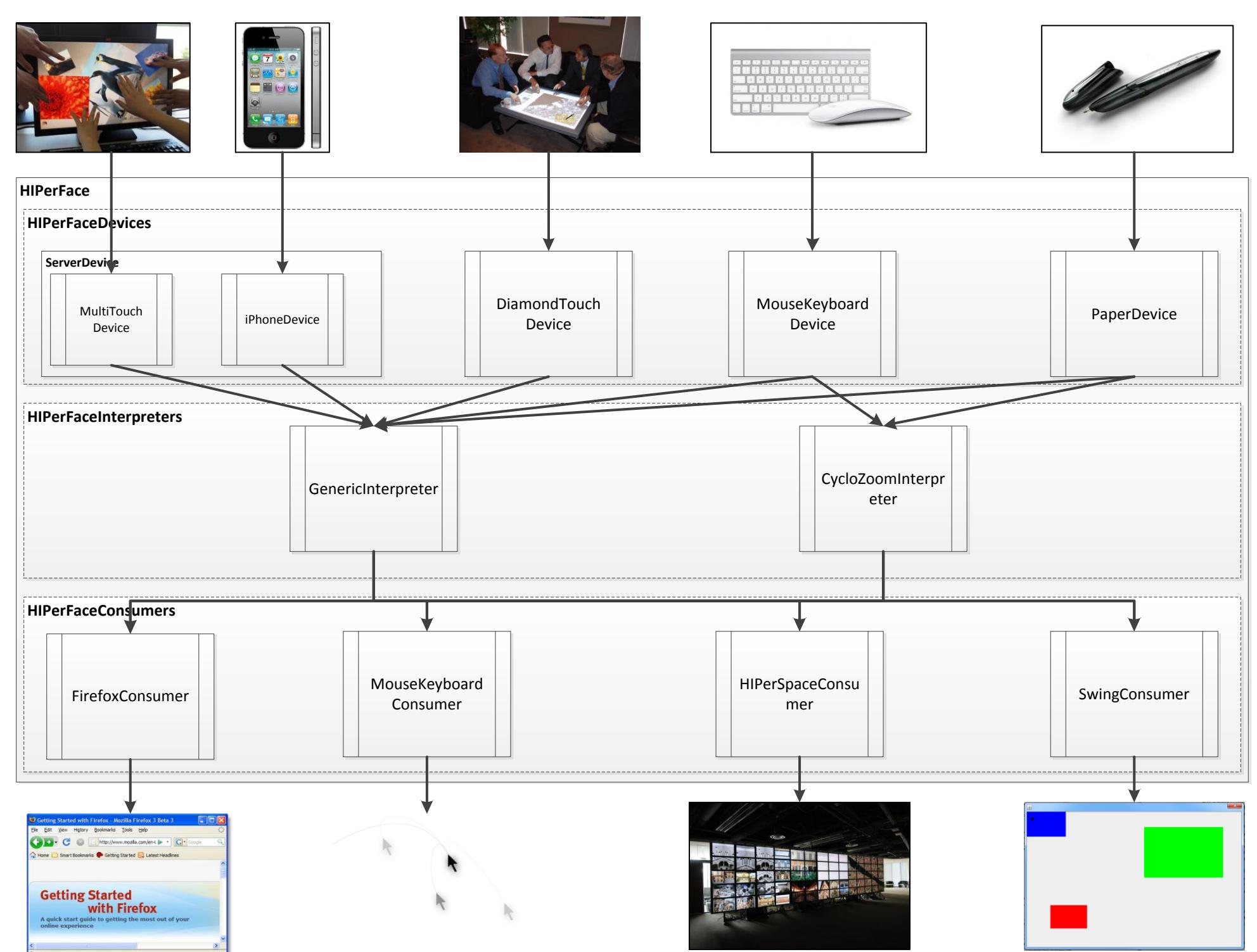
THE OVERLAY



HIPerSpace Wall simulation in our lab, the overlay is the white rectangle in the center.

- Helps to **focus a user's attention** to a sub-section of the entire display.
- Normal **multitouch gestures** (tap, pinch, drag) **map within** the confines of the **overlay**. **Touch points** are represented within the overlay as **colored circles** to help **orient** the user.
- Use a **5-finger** drag or pinch gesture to position or scale the overlay with respect to the entire HIPerSpace Wall.
- **Each user** gets their own **distinct overlay**, differentiated with a different **colored outline**.

HIPERFACE: A JAVA FRAMEWORK



A new **entirely extensible framework** that allows us to receive interactions from **multiple input** devices, build **composite interactions** from them and then output them to **multiple display** devices.

What is a **composite interaction**? We can simultaneously process input coming from multiple devices and add meaning/definition to them. For example, pressing ctrl on the keyboard and pinching on the touchscreen could allow us to rotate pictures.