

Large Scale Haptic Virtual Environments

- The problem

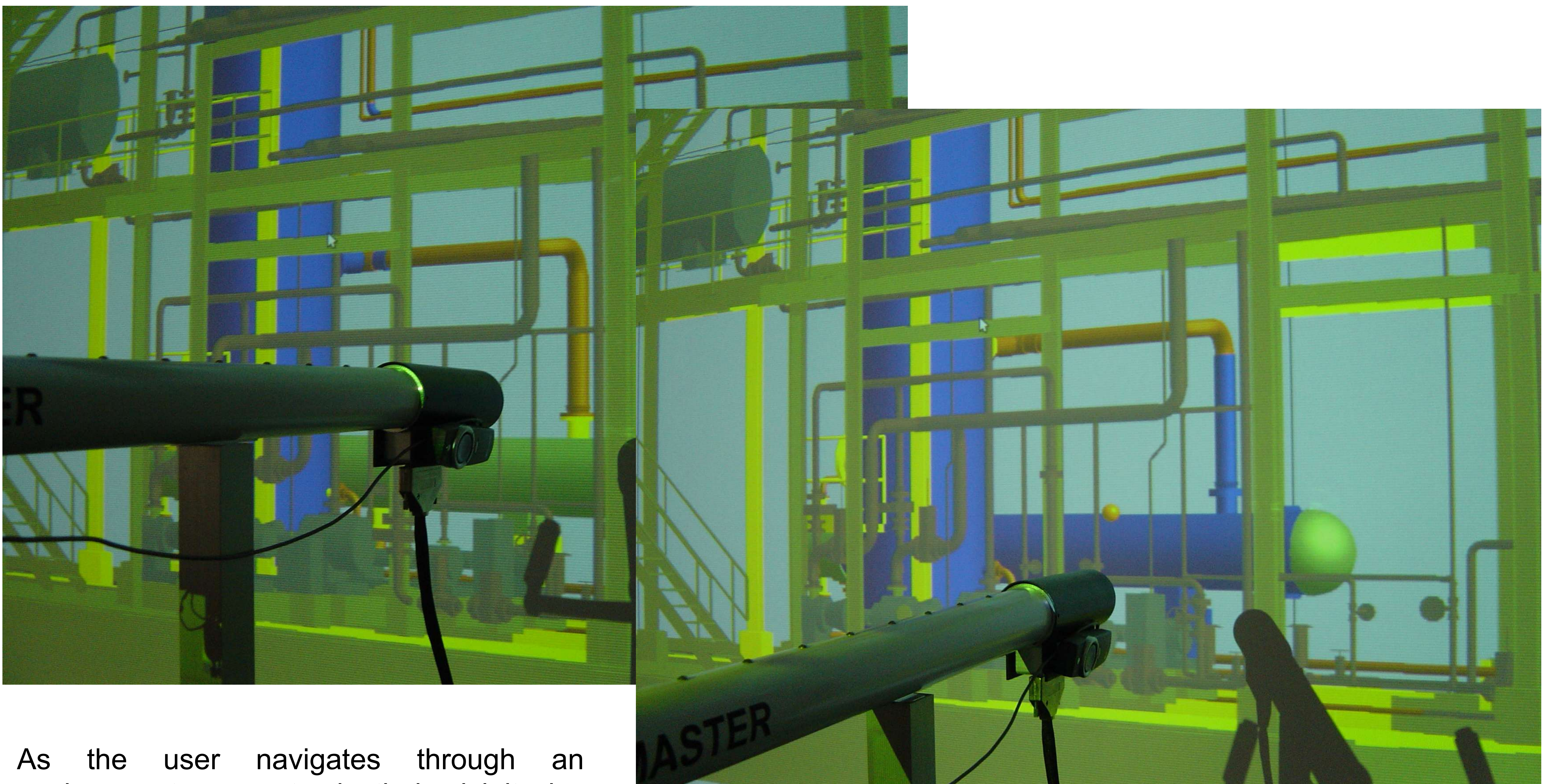
Large scale VE's are too complex to haptically render fast

- The solution

Simplify the problem! Maintain local region of interest, only activate required geometry

- Results

Haptic interaction with models containing hundreds of thousands of distinct primitives



As the user navigates through an environment, geometry in their vicinity is dynamically activated in a haptic server. A simple model illustrated above shows the haptically enabled geometry (highlighted in blue) as it is updated.

Two different partitioning methods were employed to manage geometric complexity, voxel grids and hierarchies of bounding boxes (HBBs), and the performance impact of each analysed. For massive models, the use of HBBs was found to provide the lowest additional computational overhead.

The image on the right shows a user navigating and haptically interacting with a large model containing over 25,000 distinct geometric objects. Larger models containing up-to 120,000 primitives have been shown to be rendered at interactive frame rates while still maintaining the haptic region of interest.

