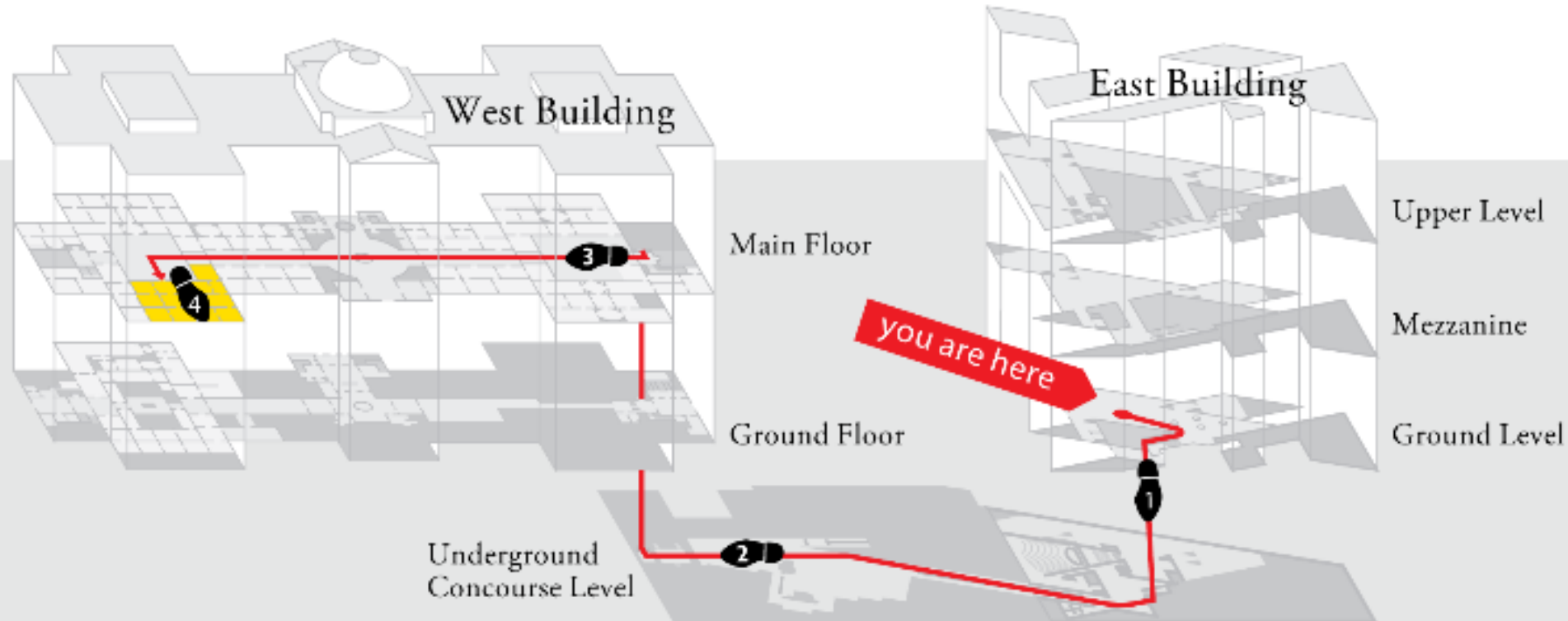


# Mapping 3D Environments

James F Hamlin

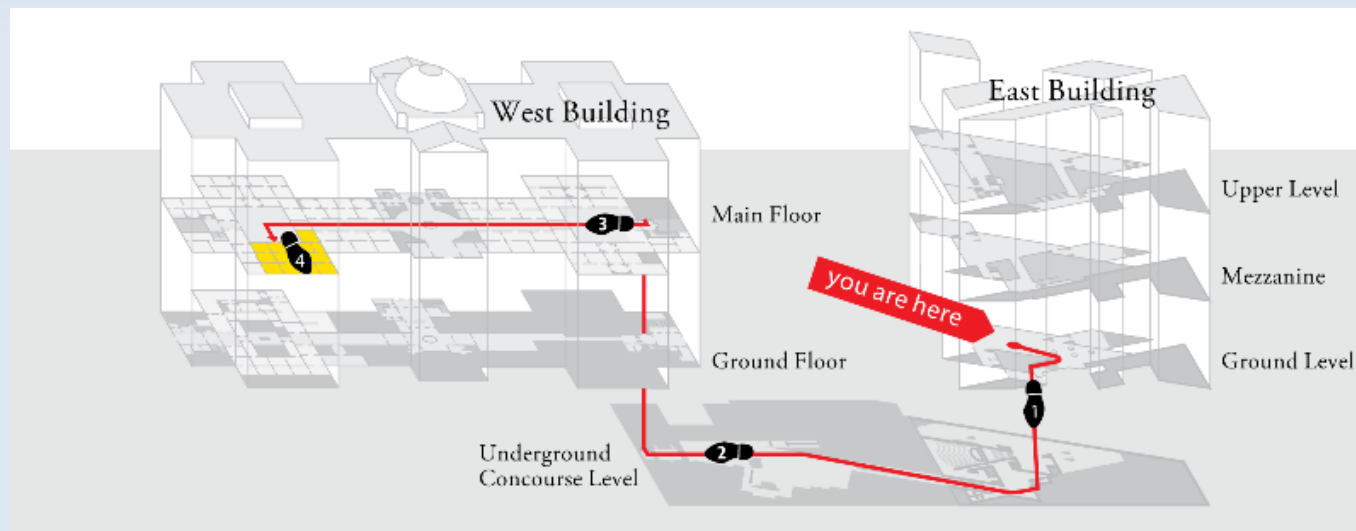


*Edward Tufte. Visual Explanations. Graphics Press, 1997.*

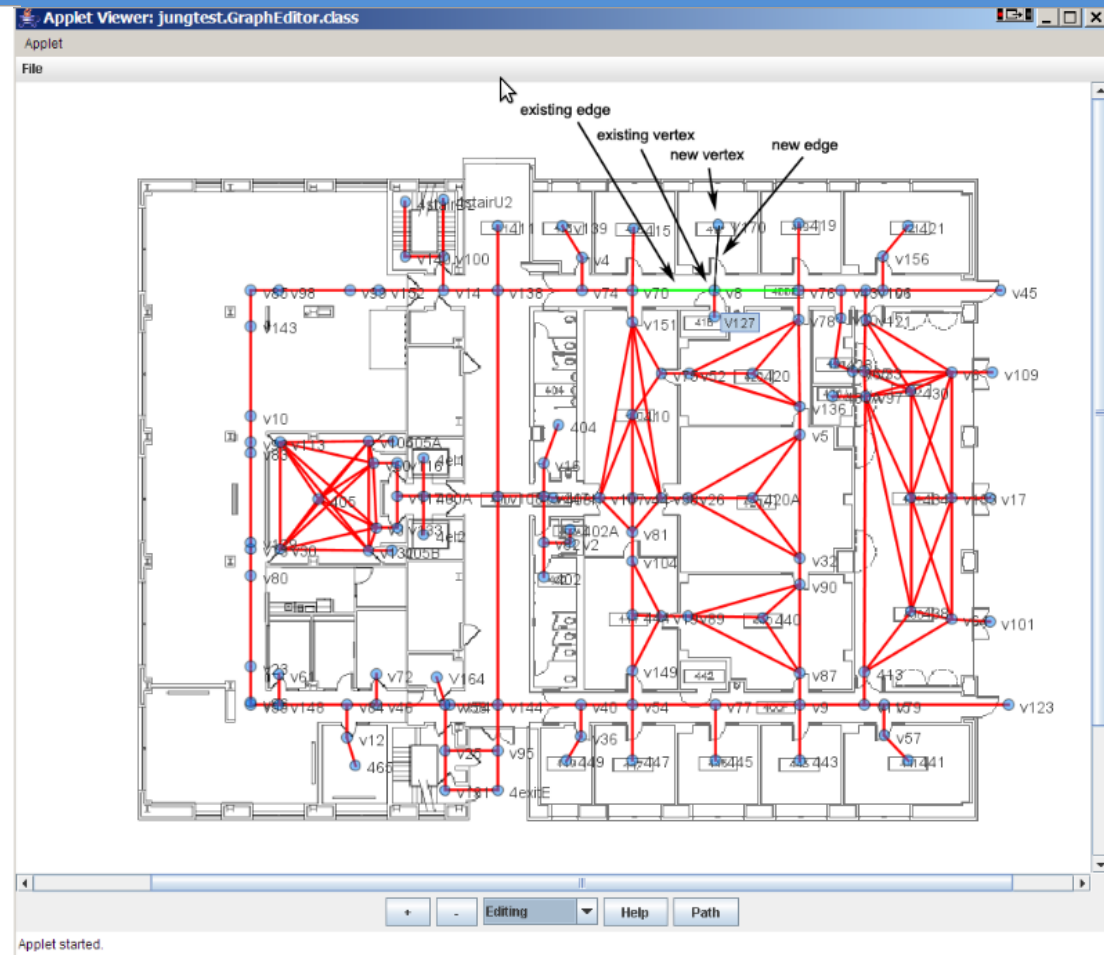
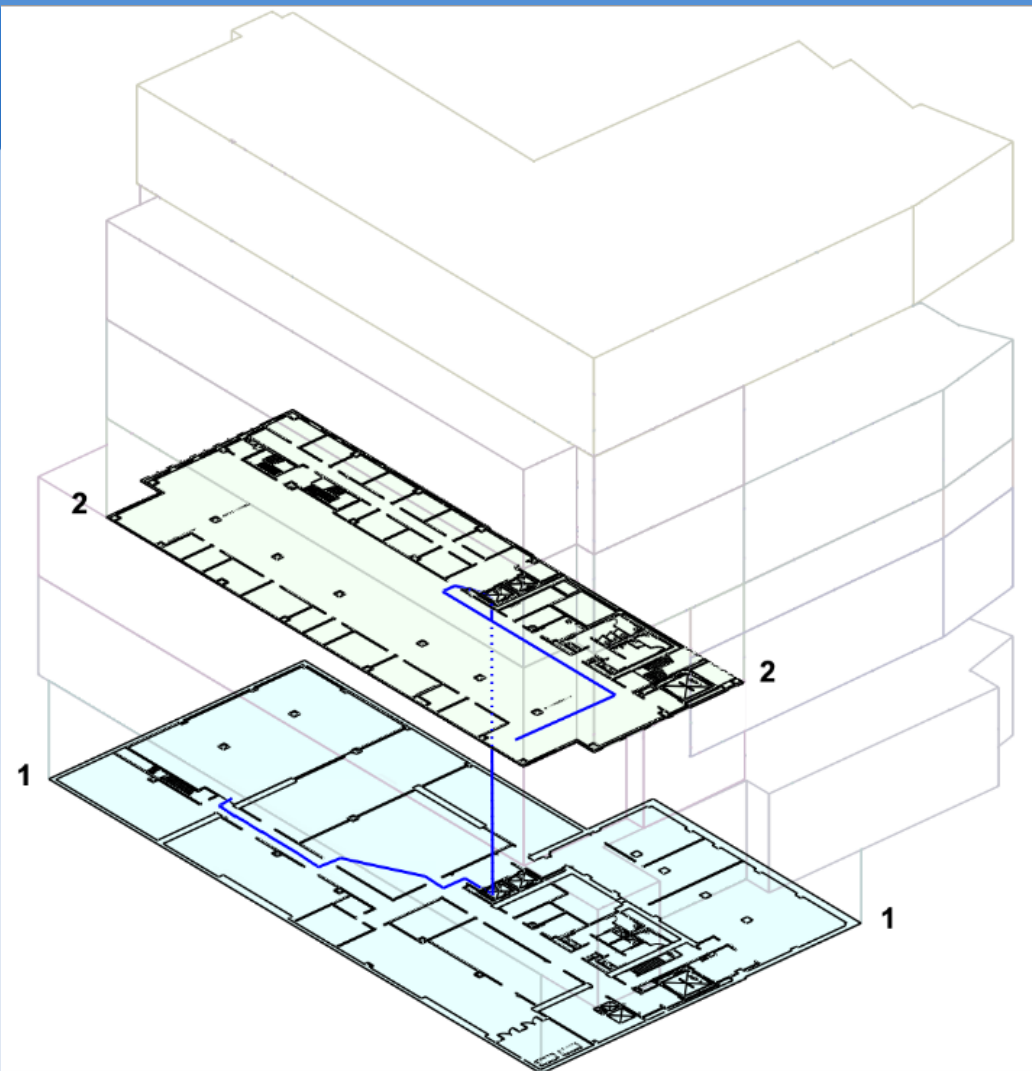
*From Navtej Sadhal. The Presentation of 3D Maps of Building Interiors for Easy Way-Finding.*

# Project Description

- Generate static and interactive maps showing the path between any two rooms in a 3D architectural environment.



# Related Work



*Navtej Sadhal*

The Presentation of 3D Maps of Building Interiors for Easy Way-Finding

# Project Description

- Input:
  - Triangle soup (Quake 3 maps at the moment)
  - Height of a human navigator
  - Number of floors (?)

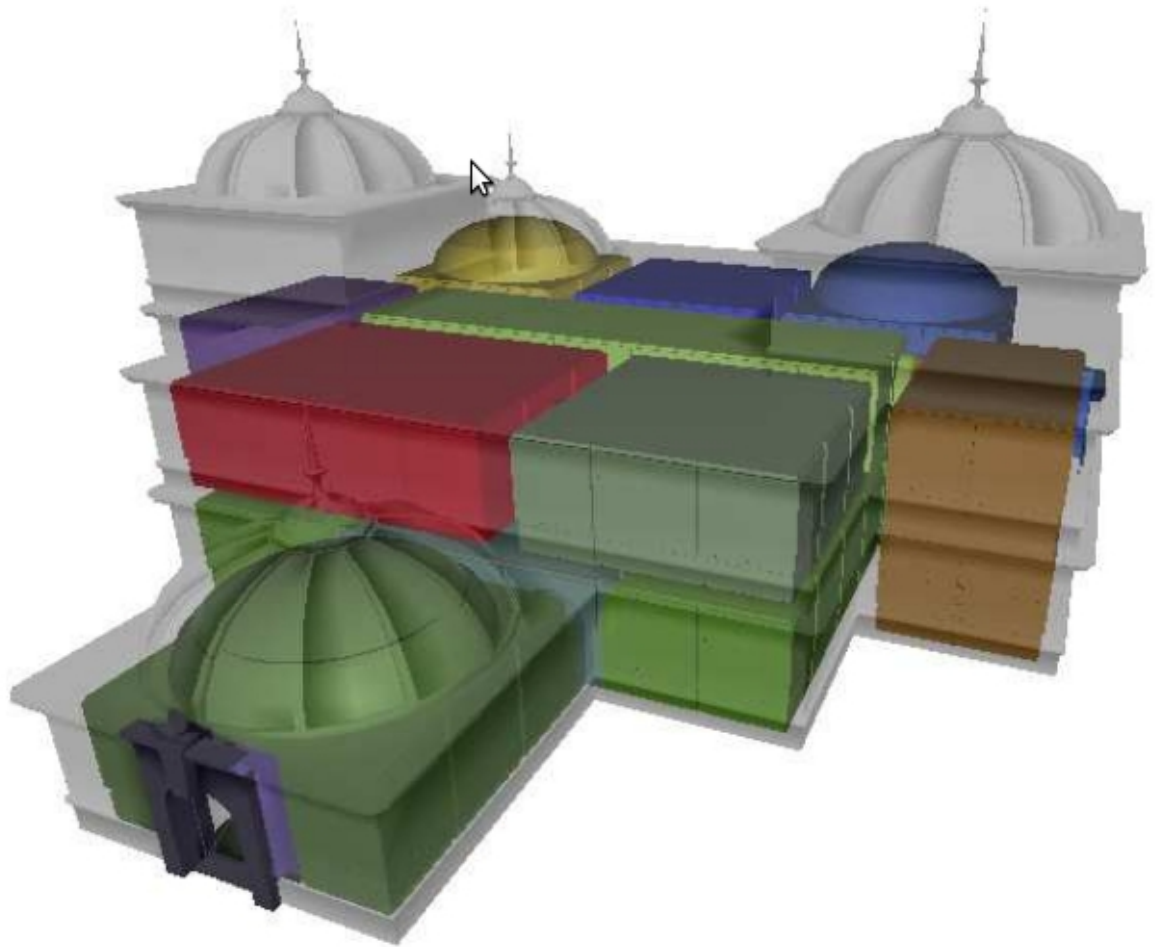


# Project Description

## Result:

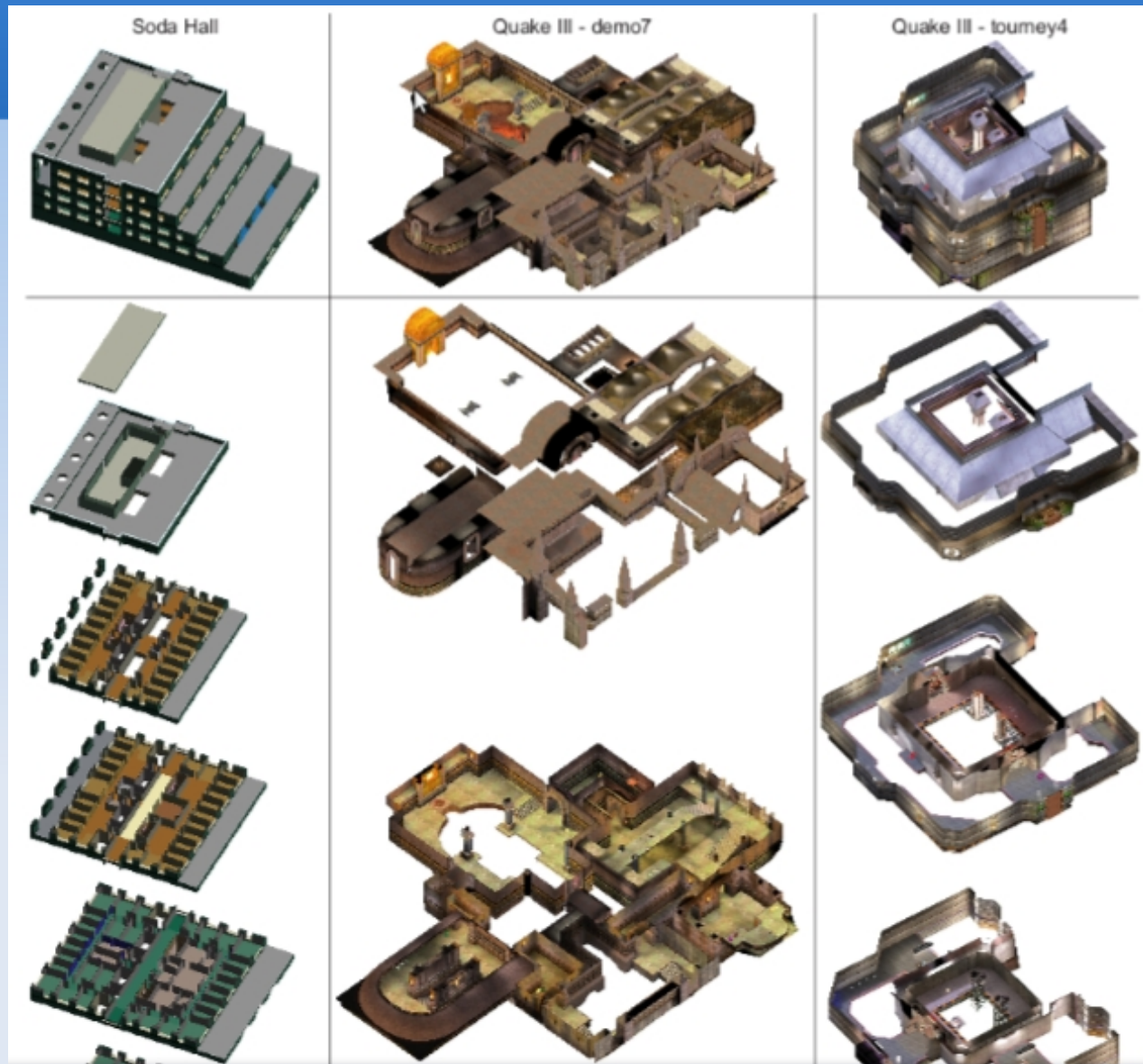
- Environment segmented into rooms.
  - User may apply labels, edit segmentation by hand.
- User may choose any two rooms from an exploded view and the system will visualize a road map describing the path between them.

# Relevant Work



*D. Haumont, O. Debeir, F. Sillion*  
Volumetric cell-and-portal generation

# Relevant Work

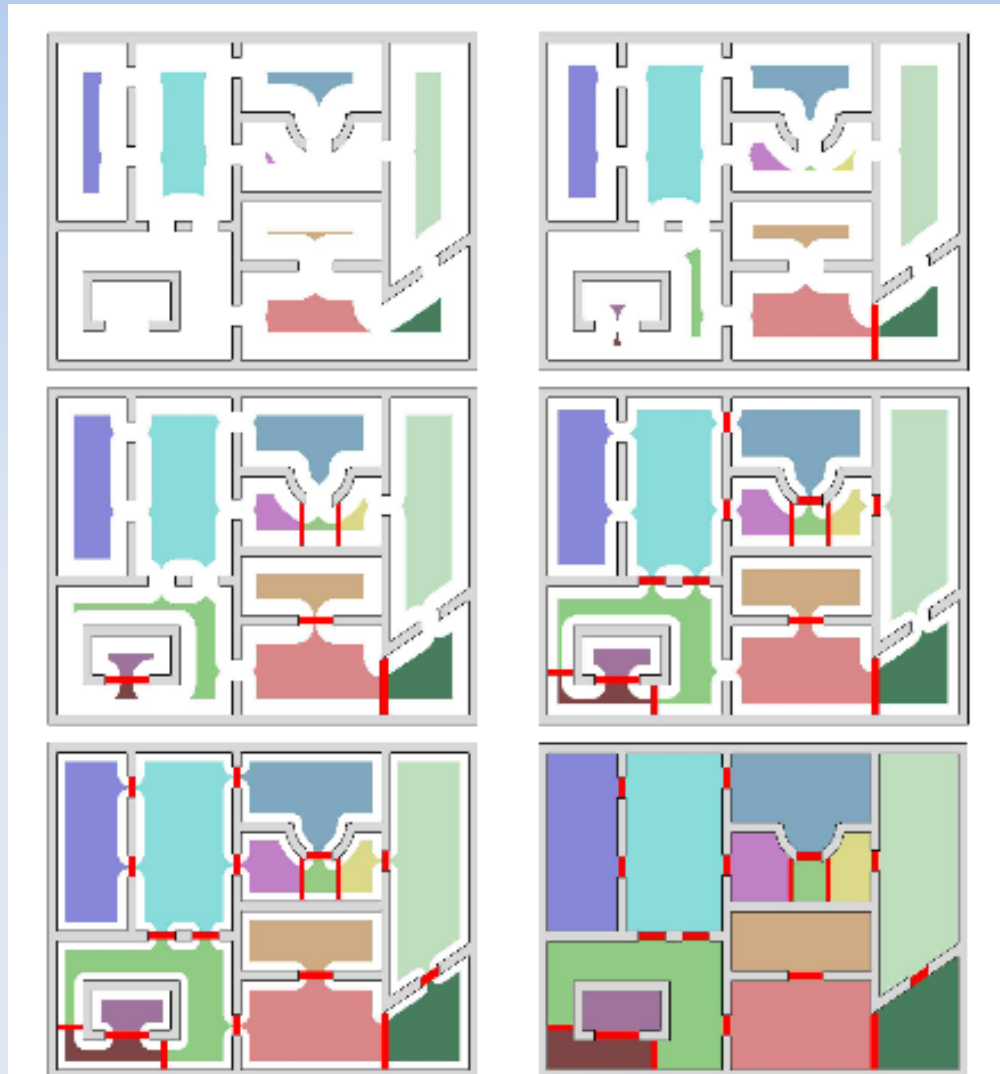


*Niederauer, Houston, Agrawala, Humphreys*  
Non-Invasive Interactive Visualization of Dynamic Architectural Environments

# Technical Challenges

Finding the optimal path between rooms

Identify rooms and connections between them.



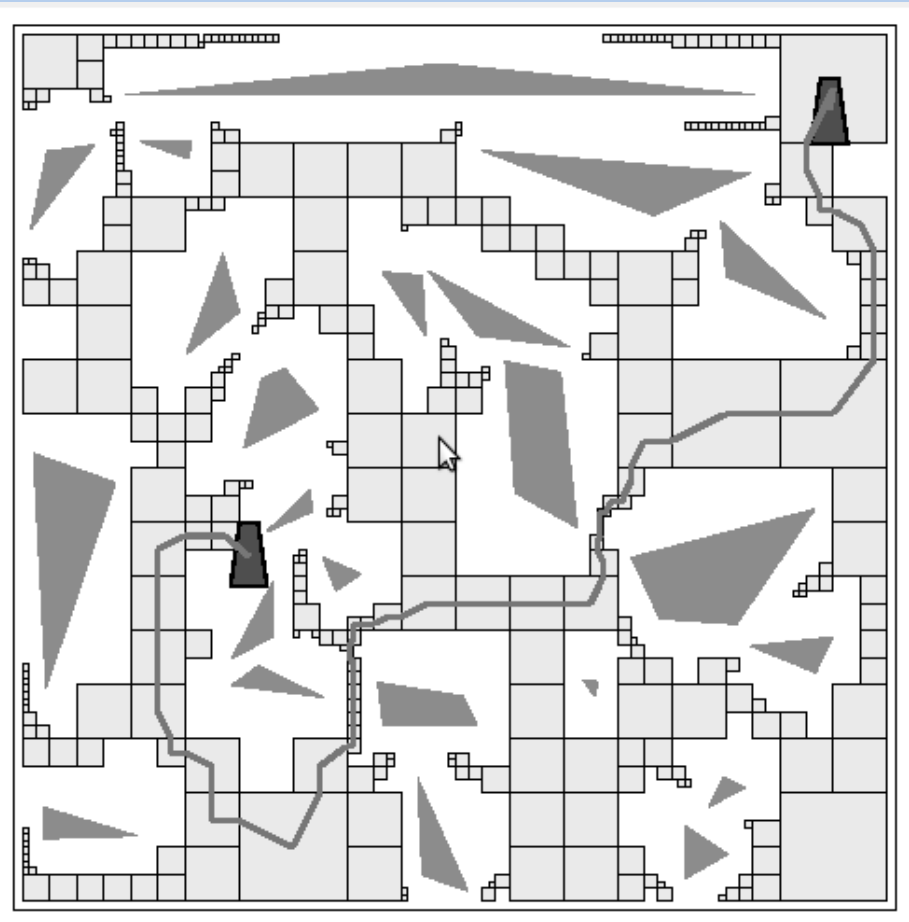
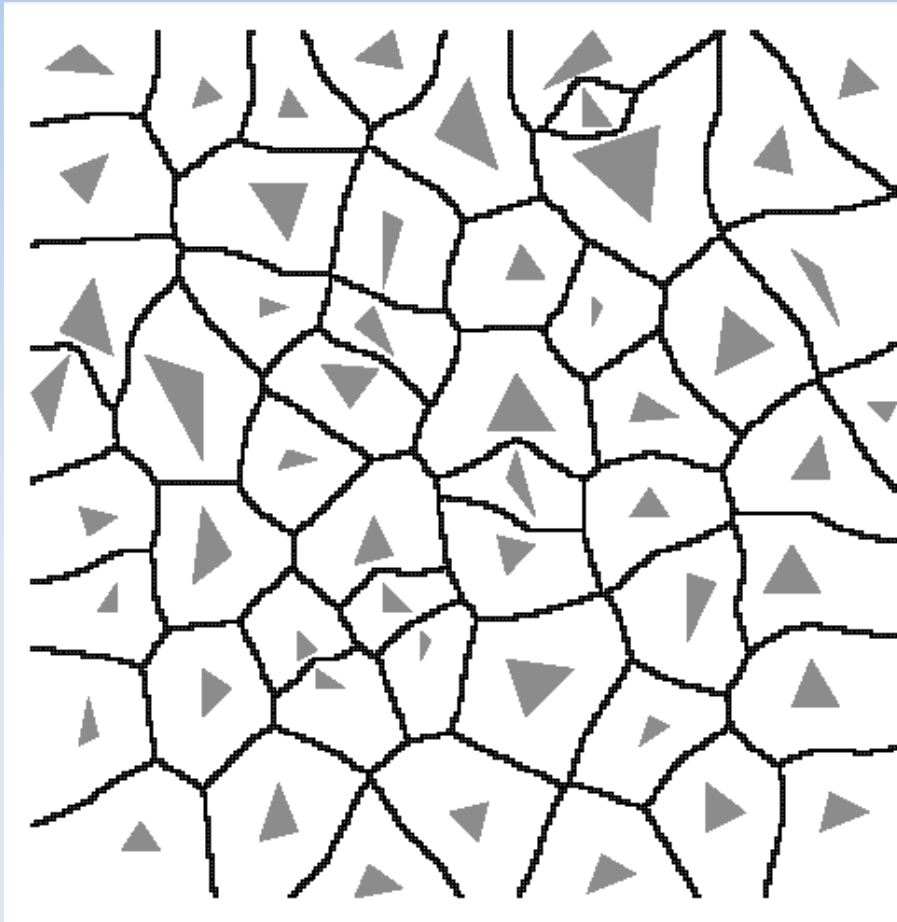
[D. Haumont, O.  
Debeir, F. Sillion]



# Technical Challenges

Finding the optimal path between rooms

Construct a 'nice' graph for creating roadmaps.



[Overmars et al.]

# Technical Challenges

Displaying the building and path in a single view such that the entire path is visible.

- Optimal camera placement
- Optimal explosion distance
- Good use of transparency
- Different line styles for a partially occluded path or for certain actions required at a point along the path.

# Technical Challenges

Finding the right combination of camera angle and visibility techniques

- Employ an optimization technique
  - Minimize path self-intersections in the 2D projection
  - Make sure direction changes in 3D are mapped to similar angles in 2D.
  - Minimize path occlusion.
  - Minimize area of the whole visualization.

# Progress

- Geometric analysis
  - Room segmentation
  - Road map extraction
- Display
  - Floor segmentation
  - Drawing style
  - Optimization:
    - Floor separation, camera placement, transparency

# Q&A

