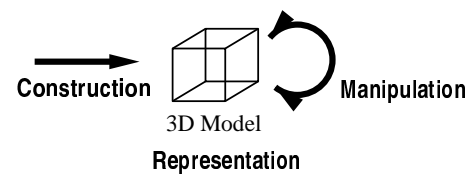


## Mesh Construction

Thomas A. Funkhouser

## 3D Modeling

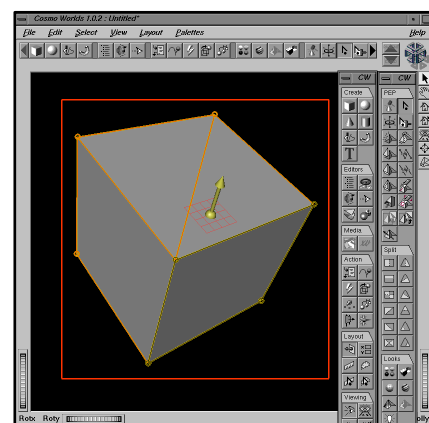
- ◆ **How do we ...**
  - represent 3D objects in a computer?
  - **construct 3D representations quickly and/or automatically with a computer?**
  - manipulate 3D objects with a computer?



## Mesh Construction

- ◆ **Interactive tools**
  - CAD programs
  - VRML modelers
  - etc.
- ◆ **Model Acquisition**
  - Laser scanning
  - Magnetic scanning
  - Robotic arm digitizing
  - Computer vision
- ◆ **Procedural Generation**
  - Sweeps
  - Fractals
  - Grammars
  - etc.

## Interactive Modeling



Cosmo Worlds

## Model Acquisition

### ◆ Basic idea:

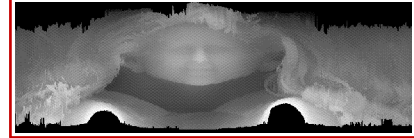
- Use sensors to determine vertex positions and mesh topologies for real-world objects

### ◆ Methods

- Laser scanning
- Magnetic scanning
- Robotic arm digitizing
- Computer vision

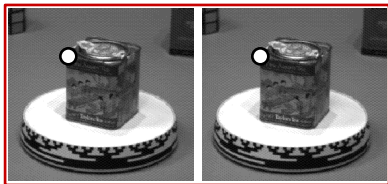
## Laser Scanning

Panoramic Color Image

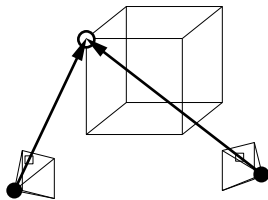


Panoramic Depth Image

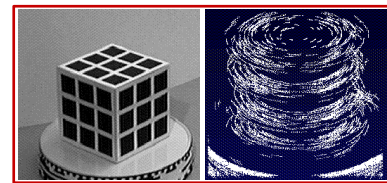
## Computer Vision



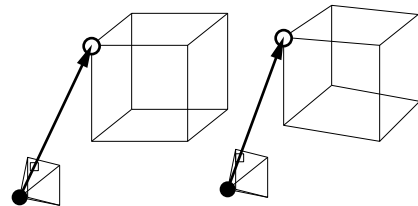
Stereo Matching



## Computer Vision



Structure From Motion

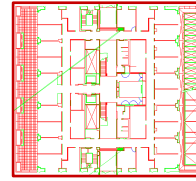


## Computer Vision

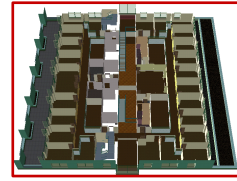


Constrained Optimization

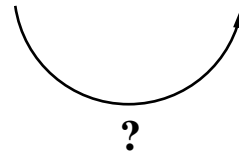
## Mesh Derivation



2D Floorplan



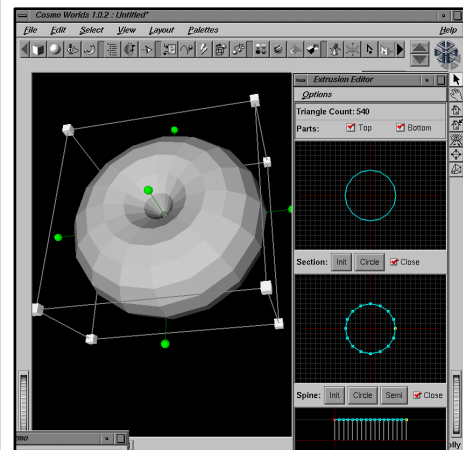
3D Model



## Procedural Generation

- ◆ **Basic idea:**
  - Use algorithm to generate vertex positions and mesh topology
- ◆ **Methods:**
  - Sweeps
  - Fractals
  - Grammars
  - etc.

## Surfaces of Revolution



Cosmo Worlds