

Technology and Data of the Living Environments Laboratory

**Ross Tredinnick
Systems Programmer**

**2012-2013 Rebecca J. Holz Series in
Research Data Management**

April 16, 2013



**Wisconsin
Institute for
Discovery**
AT THE UNIVERSITY OF WISCONSIN-MADISON

Outline

What is the LEL?

My Background / Role

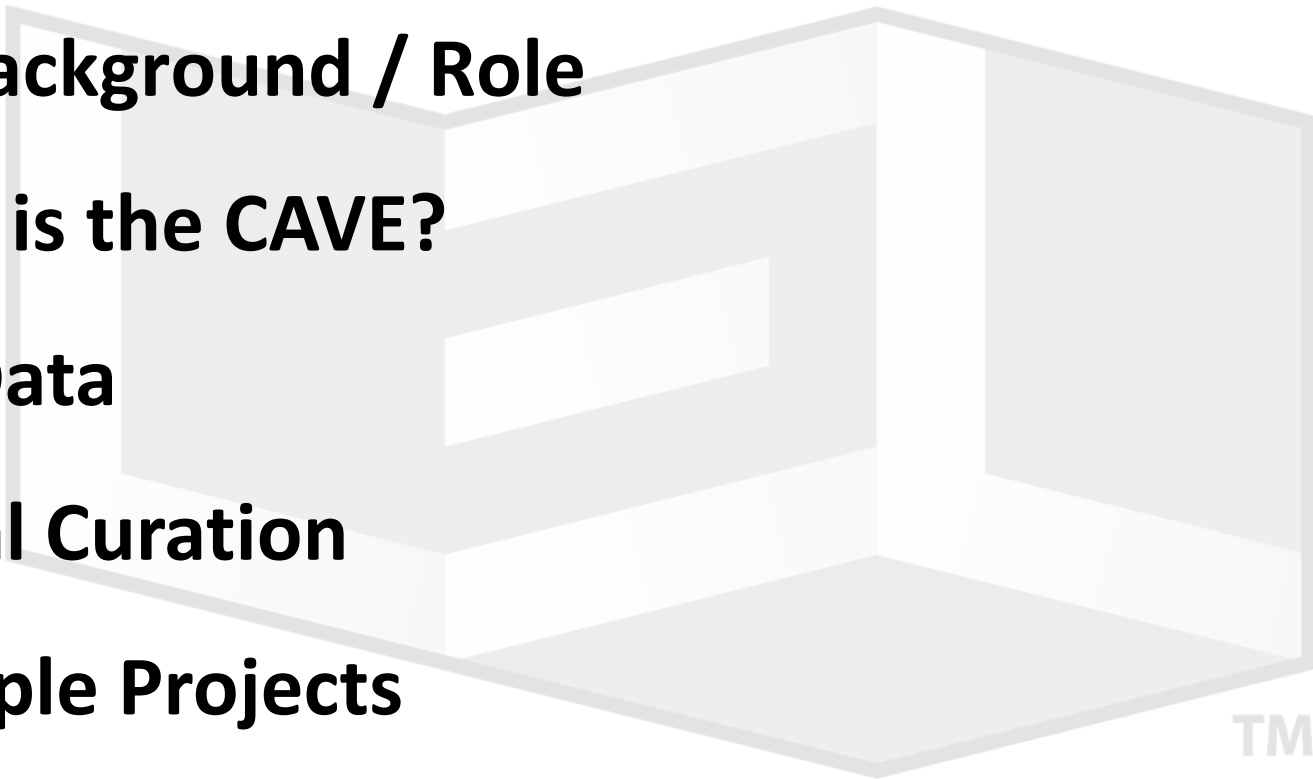
What is the CAVE?

Our Data

Digital Curation

Example Projects

Conclusions / Questions?



Faculty



Kevin Ponto
Assistant Professor,
Design Studies



**Patricia Flatley
Brennan**
Theme Leader,
Professor of Nursing
and Industrial
Engineering



Robert Radwin
Discovery Fellow,
Professor of Biomedical
Engineering and
Industrial and Systems
Engineering



Catherine Arnott-Smith
Discovery Fellow, Associate
Professor-Library and
Information Studies



Kevin Eliceiri
Discovery Fellow and
Director, Laboratory for
Optical and Computational
Instrumentation



Michael Gleicher
Professor of
Computer Sciences



Meg Mitchell
Assistant Professor,
Art

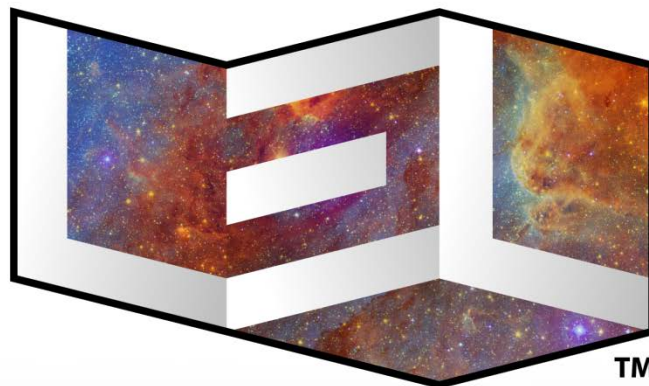
Staff



Kendra Kreutz
Associate Lab Director



Ross Tredinnick
System Programmer



Living Environments Laboratory

 WISCONSIN INSTITUTES FOR
DISCOVERY

Collaborators



Dana Paz



Megan Kinneberg



Vito Freese



Andrew Morland

Graduate Students



Aaron Barthlomew



F. Daniel Nicolalde



Karen Chen



Edmond Ramly



Carrie Roy

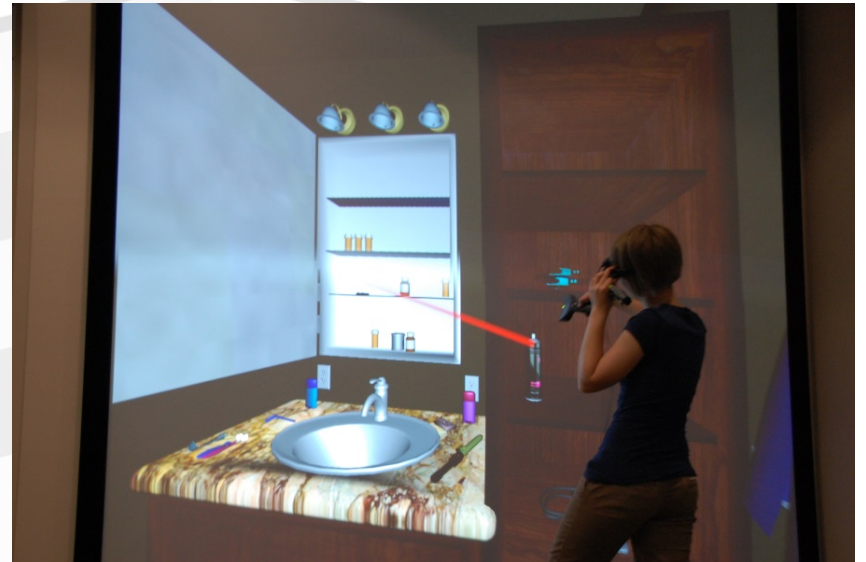


Dan Nathan-Roberts
AHRQ Postdoctoral Fellow

Post Docs

Goals

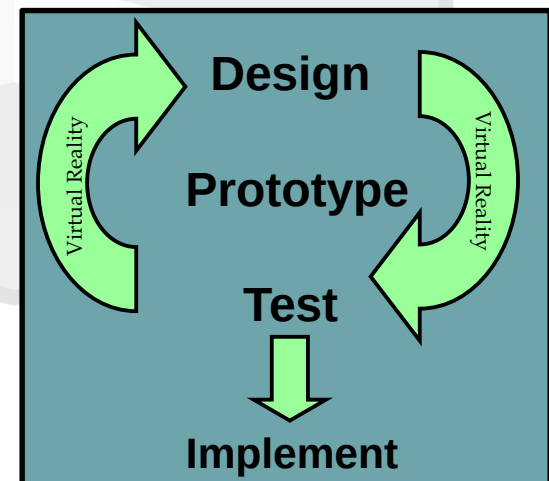
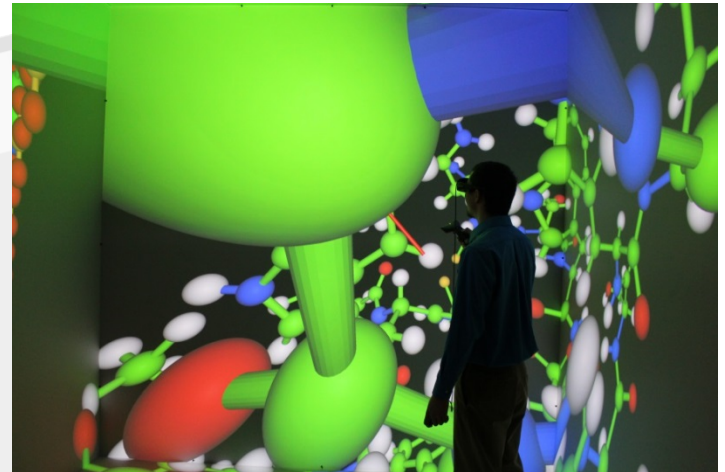
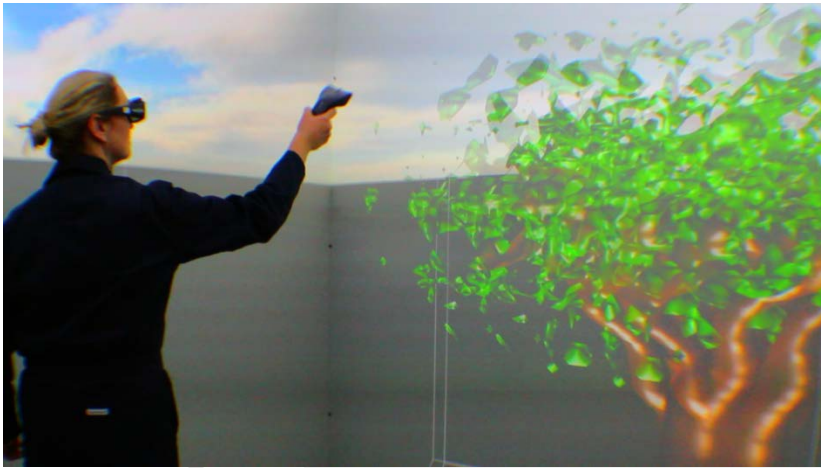
Create Innovative Home Care Technology



TM

Goals

Advance the Art and Science of Design



Goals

Advance the Science of Virtual Reality



TM

Collaboration

Research Interest / Projects with UW:

Art

Art History

Biology

Biomedical Engineering

Chemistry

Classics

Surgery

Industrial and Systems Engineering

Library and Information Sciences

Mechanical Engineering

Physical Therapy . . . And more



Industry Partnerships with:

Manufacturing

Construction / BIM

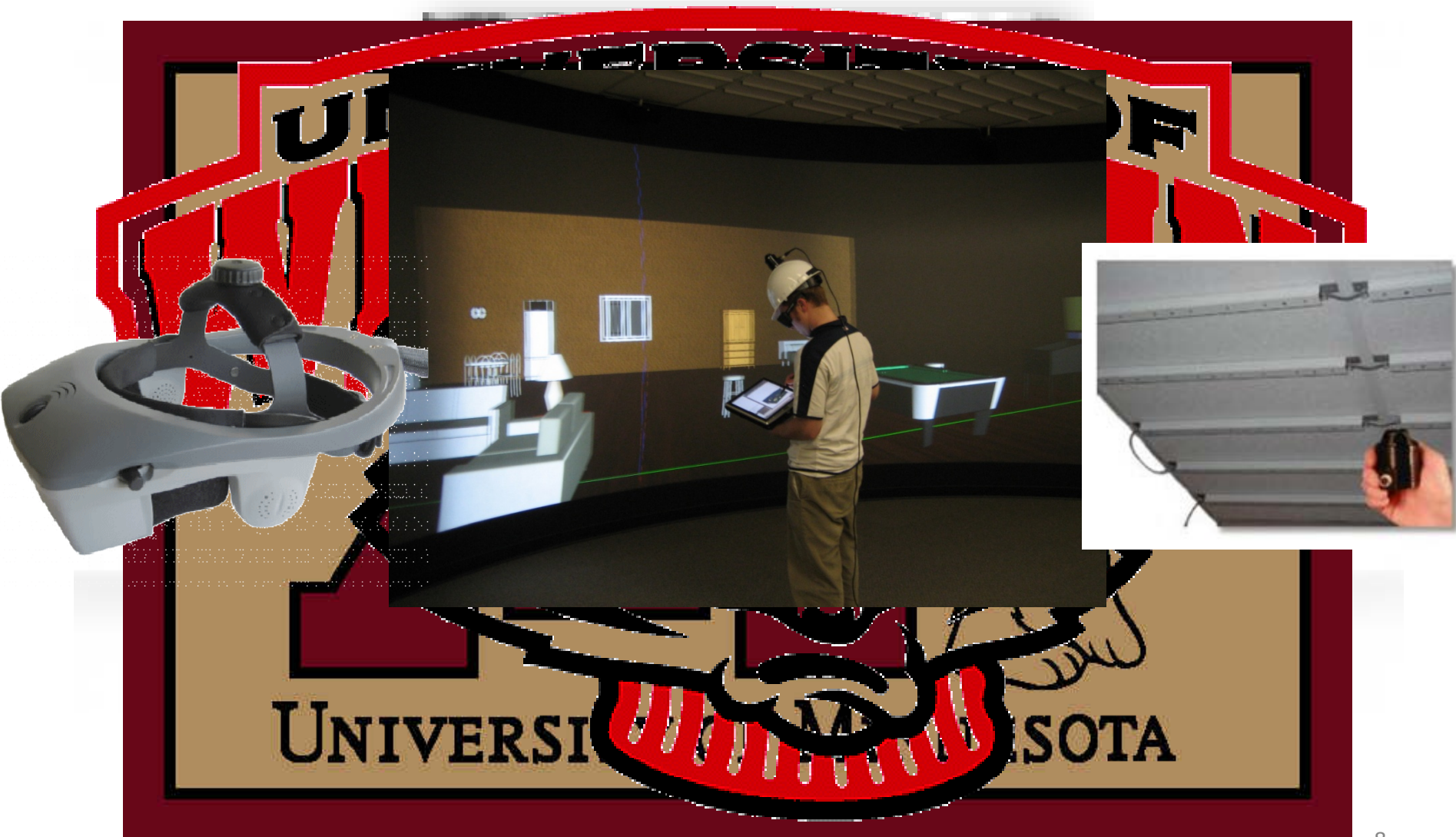
Biotech

Design

TM

Through Immersive Visualization

Background



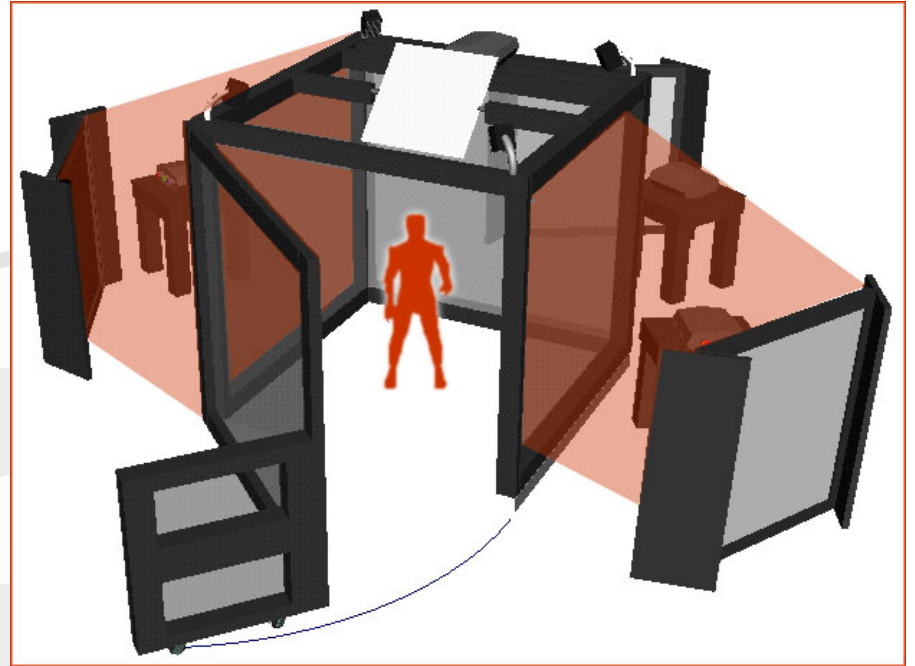
My Role

“Systems Programmer”

- **Aid researchers by designing and implementing 3D scenarios to help in answering their research questions**
- **Write software to help visualize new types of research data across different disciplines**
- **Adapt existing VR frameworks to collaborate with other universities**
- **Help publish new findings**
- **Help with Lab Tours**
- **Handle industry work (visualization of data / models)**
- **Maintain lab hardware and software**

What is a CAVE?

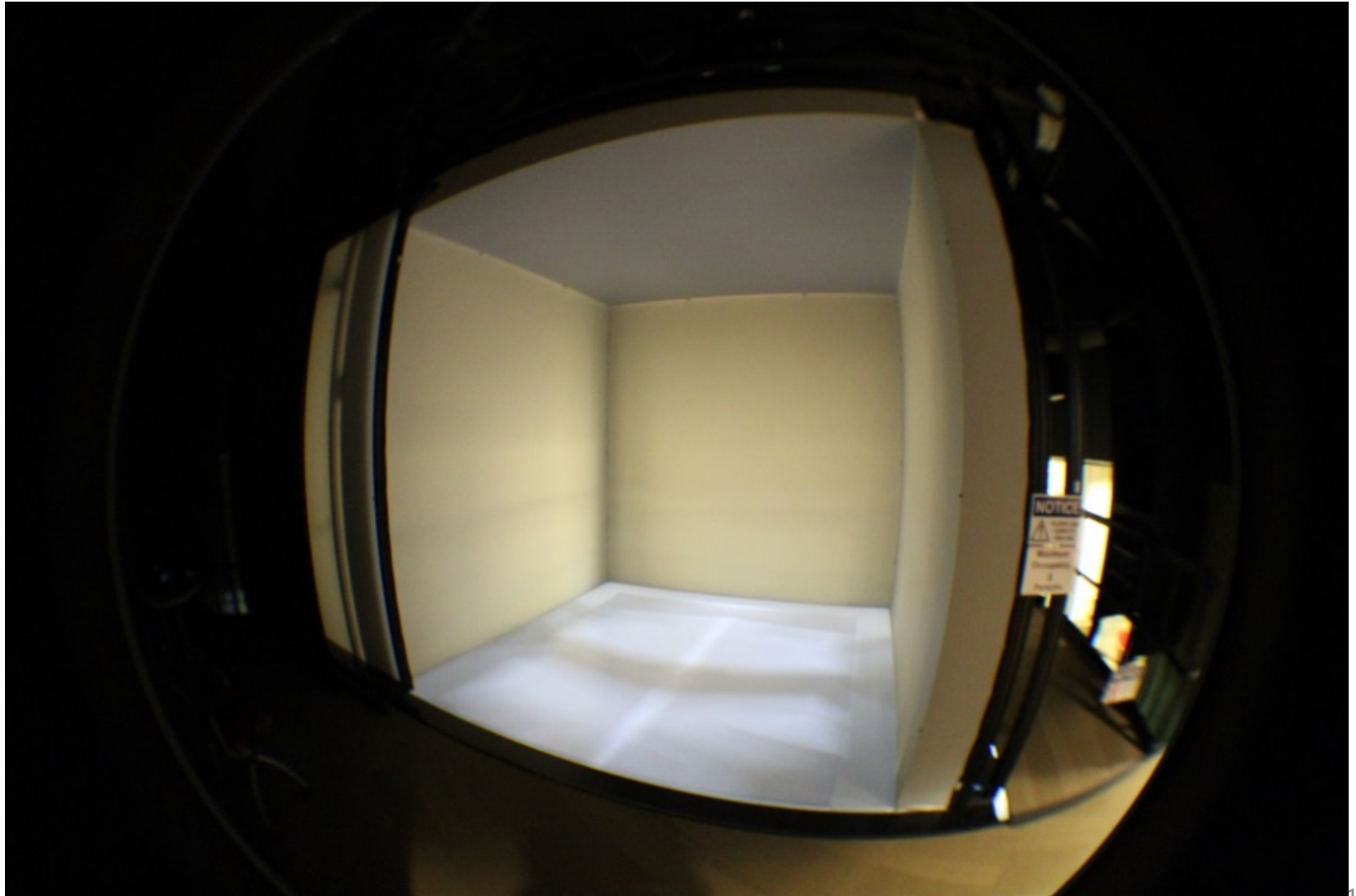
Cave
Automatic
Virtual
Environment



A “Virtual Reality Theater”
Invented 1992



LEL CAVE



LEL CAVE

Intersense IS900

Head Tracking

3D Active Stereo Glasses

12 HD 3D Projectors

Wands (3D Input Device)

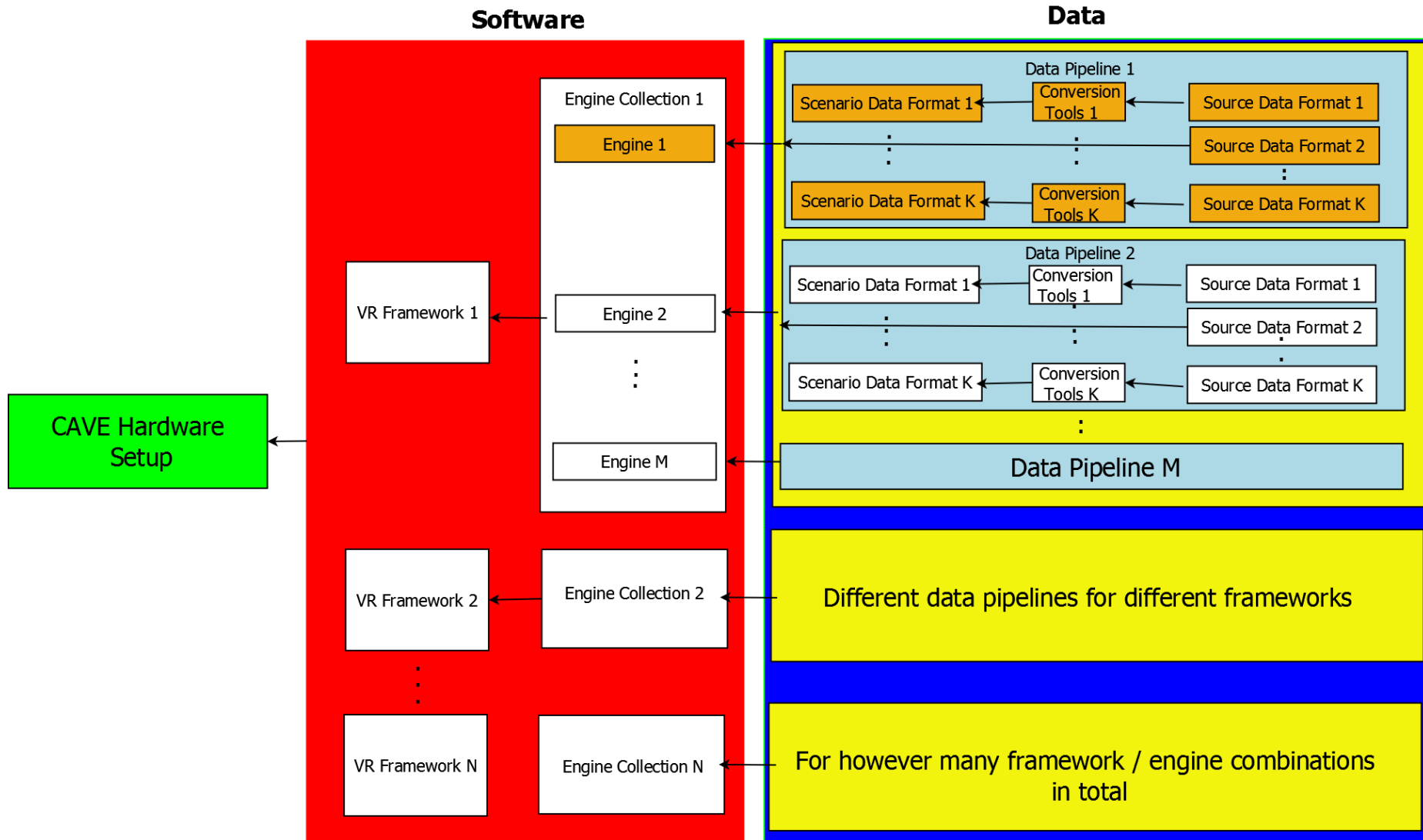
Dual View capability

8 PCs

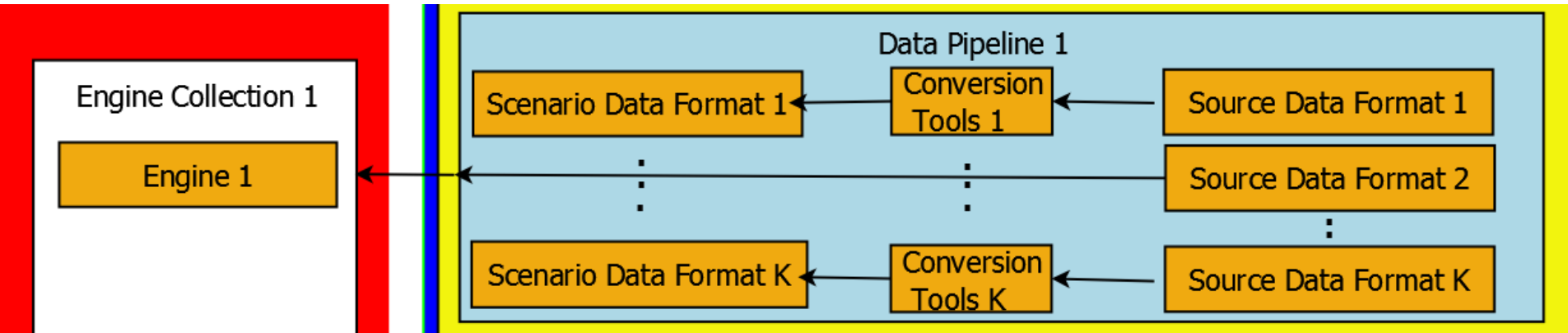
Software!



Software



Data Pipelines



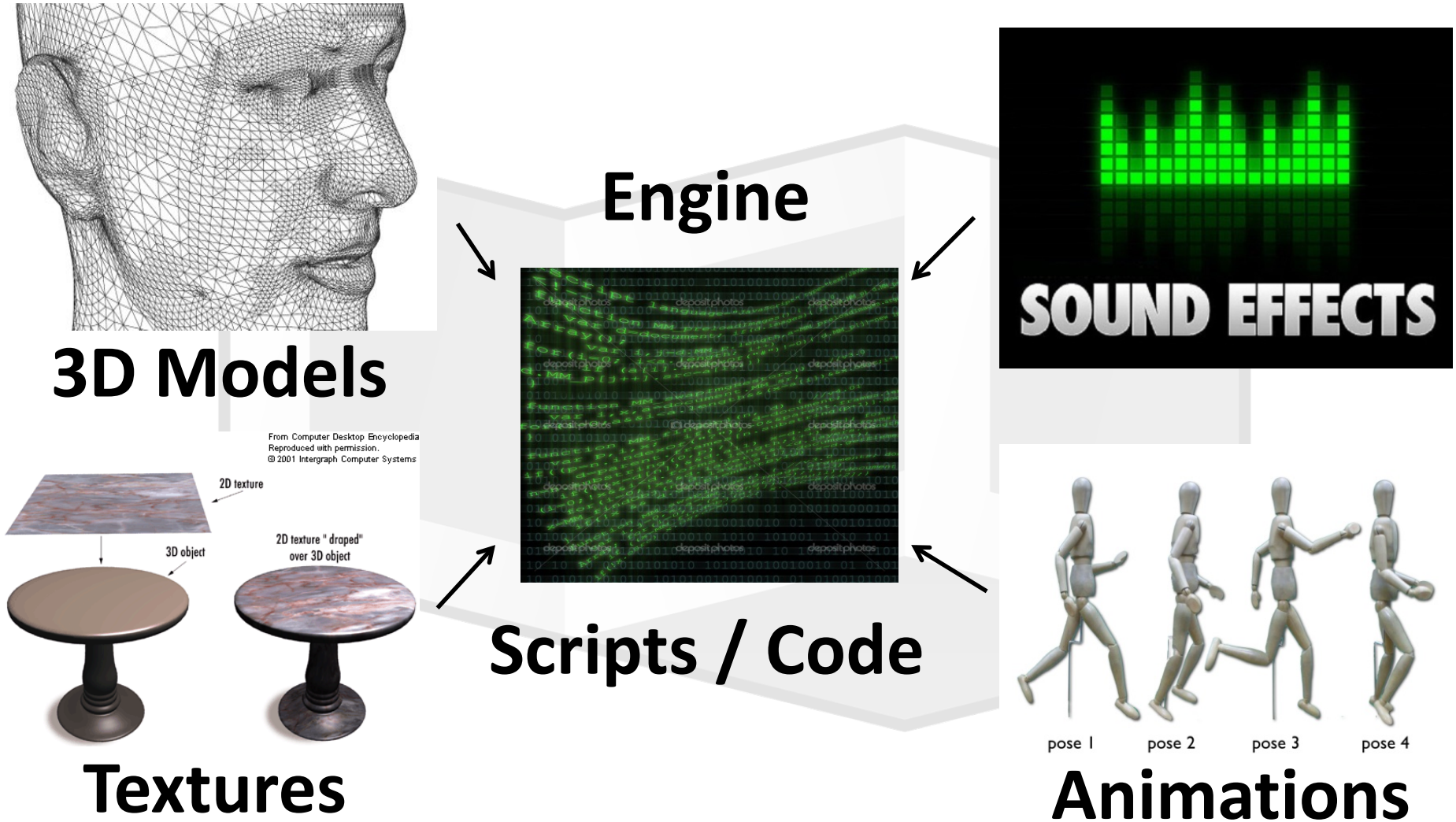
Example Conversion:

Source Data = SketchUp file (.skp) ->

Conversion Tool: Usage of SkpToOSG exporter

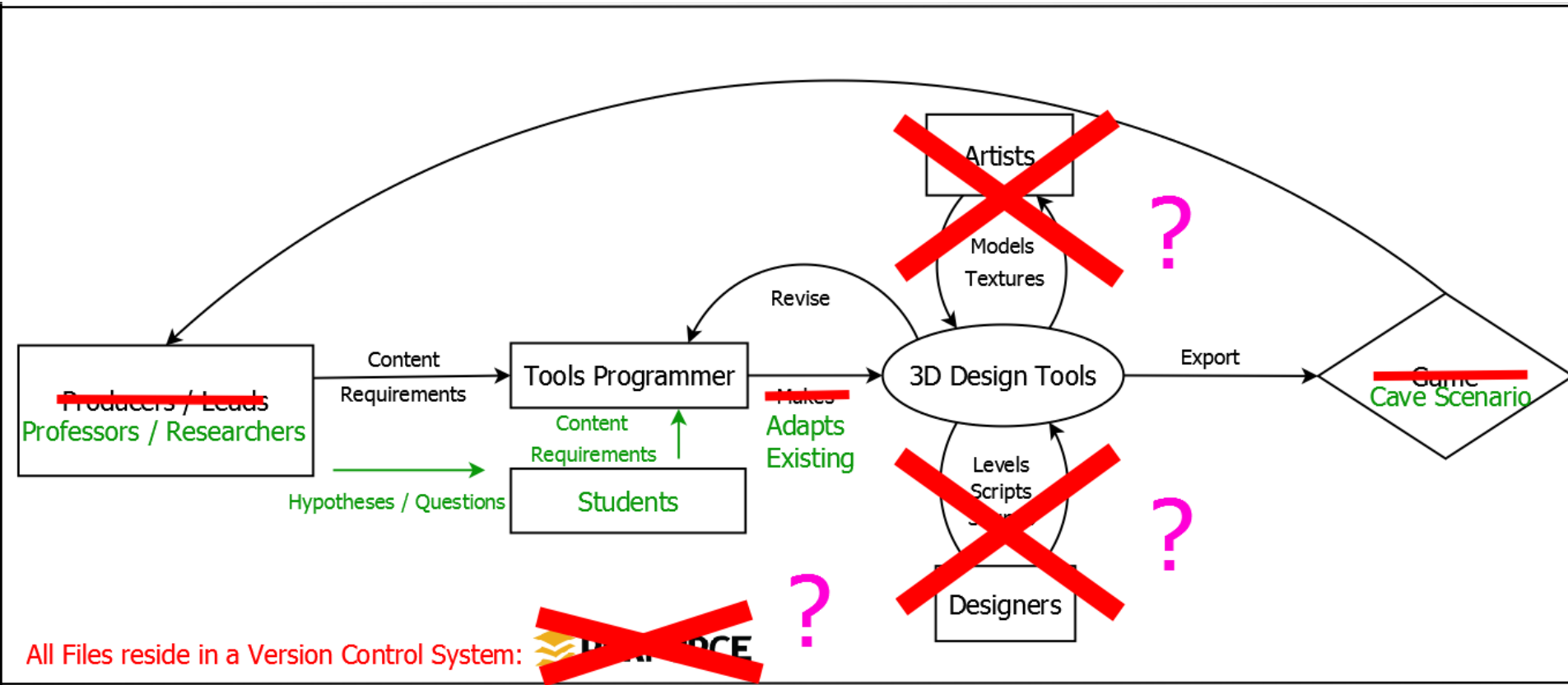
Scenario Data = model in OpenSceneGraph

Scenario Data



Scenario Pipeline

Game Industry → LEL



3D Models

Photographs + Basic Modeling



3D Scanned using Depth Camera



Online Digital Curation Systems!!!!



<http://sketchup.google.com/3dwarehouse/>

<http://www.3dvia.com/search/> TM

<http://archive3d.net/>



Audio

**Online Sound
Curation Sites**



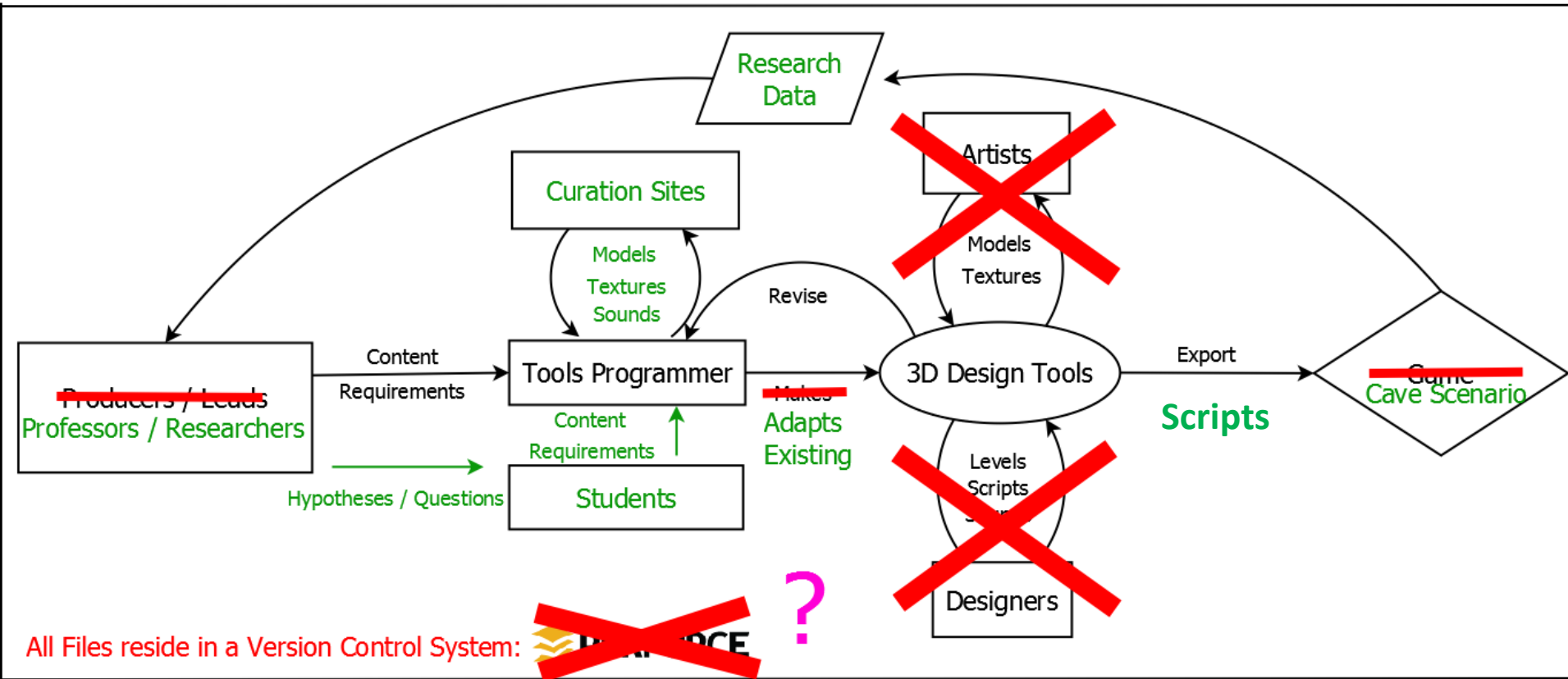
<http://www.soundboard.com/>

**Online
“Text-To-Speech”**



http://www.oddcast.com/home/demos/tts/tts_example.php

Scenario Pipeline



Research Data

Research Data

- Type / Amount = dependent on project
- 2D Traditional (txt, csv, excel)
- 3D Movement
- Video (FRAPS, CAVE Web Cam)
- Data stored on server, in future:



LabKey Software™
PARTNERS IN SCIENCE

*** Research Data is generated by the Scenario ***

Our Digital Curation

Spring 2012 - Project started with Prof Dorothea Salo's Digital Curation Class (LIS 855)

- Katherine Hill, Lisa Abler, Kristin Briney, Ashley Guy, Molly Khan, Sarah Leeman and Brittany Sheveland
- Initial design and implementation via Drupal
- Functions – search, organization, preservation, editing via VCS integration
- Suggested Git VCS system
- Licensing and Reuse

LEL Project and Object Metadata Map

Developer

Create GIT repository

Project Manager

1. Create project in Drupal
2. Create Scenario/Project Taxonomy
3. Complete required project metadata fields:

Project Title

- Example: Cave Automatic Virtual Environment (CAVE)

Scenario/Project*

- Controlled Vocabulary
- Example: Kitchen

GIT Repository URI

- <http://yourserver.com/~you/proj.git>

4. Create known non-required project metadata fields.

Project Start Date, Project Approval Date, Funding Approval Date

- YYYY-MM-DD
- 2013-12-07

Licensing & Reuse Stipulation*

- Controlled Vocabulary
- Free to Reuse Without Permission

Company Affiliation*

- Controlled Vocabulary
- ABC Architecture

Grant/Funder

- Use entity name with abbreviation in parentheses
- National Institute of Health (NIH)

Link to Project URL

- URL
- <http://...edu>

5. Save

Developer

1. Create object in Drupal
- 2..Complete required object metadata fields:

Object Name

- Example: Computer chair

Object Category*

- Controlled Vocabulary
- Example: Furniture

File Name

- Example: chair_v07_2007_02_21.jpeg

Scenario/Project*

- Controlled Vocabulary
- Example: Kitchen

GIT Repository URI

- <http://yourserver.com/~you/proj.git>

Date Last Modified

- YYYY-MM-DD
- 2012-03-24

3. Create known non-required object metadata fields.

Object Description

- Example: Black computer chair, swivels

Type of Object

- Free text tags
- Example: Chair, stool

Object Creator

- Last name, first name, or full organization name with abbreviation in parentheses
- Example: Google Images or Smith, Joe

Object Contributor

- Last name, first name, or full organization name with abbreviation in parentheses
- Example: Google Images or Smith, Joe

File Type

- .xxx
- Example .doc

Creation Software*

- Controlled Vocabulary
- Example: Google SketchUp

Compatible Software*

- Controlled Vocabulary
- Example: Virtual Lab

Licensing & Reuse*

- Controlled Vocabulary
- Example: Free to reuse without restrictions

Notes

- Example: Object had x issue during testing

4. Save

Using the Metadata Map

- Follow the map to complete all metadata fields in Drupal.
- For definitions of metadata fields, see the Data Dictionary.
- Refer to the Training Manual for further instructions.

Developer

Add Object in GIT

*Controlled Vocabulary/Taxonomy

To create, edit, or delete a term:

- 1.Click "Structure" in the Admin menu
- 2.Select "Taxonomy"
- 3.Select "list terms" located on the right of the particular taxonomic term to be changed
- 4.Select "+ Add term" to create a new term
- 5.Select "edit" next to a term to rename or delete it
- 6.Click "Save" to finish

Final Stage: All project and object metadata should be completed at this time.

Our Digital Curation

Summer 2012 - Joe Kohlmann continued work

- Git VCS Integration custom module
- Downloadable zip-files of entries

Summer 2012 – Joe, Prof Smith, Simon Smith

- Improved Taxonomy + entry of data
- User Definable Tags + Categories from:
 - Art & Architecture Thesaurus
 - <http://www.getty.edu/research/tools/vocabularies/aat/>
 - Library of Congress Subject Headings
 - <http://authorities.loc.gov/>

[\[all items\]](#)

Current Search

Search found 98 items

- [\[all items\]](#)

Filter by Category

- [\(none\) \(27\)](#)
- [Hygiene Equipment \(22\)](#)
- [Medical Equipment \(19\)](#)
- [Vessels \(11\)](#)
- [Appliances \(10\)](#)
- [Interior Decorations \(5\)](#)
- [Seating Furniture \(4\)](#)
- [Built Environments \(3\)](#)
 - [Single Buildings \(6\)](#)
 - [Architected Open Spaces \(1\)](#)
- [Surface Furniture \(3\)](#)
- [Components \(2\)](#)
- [Personal Electronics \(2\)](#)
- [Waste \(2\)](#)
- [Celestial Bodies \(1\)](#)
- [Clothing \(1\)](#)
- [Culinary Equipment \(1\)](#)
- [Living Organisms \(1\)](#)
- [Visualizations \(1\)](#)

Search

Sort By

Date Modified

Order

Descending

Items per page

20 [Clear](#)

Title	Categories & Tags	Contributors	Edit	Git Actions
walle	Celestial Bodies Robots	rtredinnick		Git Clone Download Zipball
medicalboon	Medical Equipment Boon	rtredinnick		Git Clone Download Zipball
Newfangled Object	<i>No Categories</i> Test	admin		Git Clone Download Zipball
Simple Table	Surface Furniture Tables	John Boktor, admin		Git Clone Download Zipball
Test 2012-08-27	<i>No Categories</i> Test	admin		Git Clone Download Zipball
Microwave	Appliances, Culinary Equipment microwave, Appliances, Kitchen, Oven, Interactive	Mechdyne, spsmith5		Git Clone Download Zipball
Kitchen	Single Buildings, Seating Furniture, Surface Furniture Kitchen, Environment, Condo, Apartment	Mechdyne, spsmith5		Git Clone Download Zipball

Our Digital Curation

Spring 2013 – Project continues with Prof Dorothea Salo's Digital Curation Class

- Learning about other 3D digital curation sites and improving our site's taxonomy

Spring 2013 – Ross

- SketchUp direct to Curation export
- Screenshots of models

Future: More users, make public facing?™

Digital Curation

walle

Submitted by rtredinnick on Thu, 03/14/2013 - 10:12

walle!

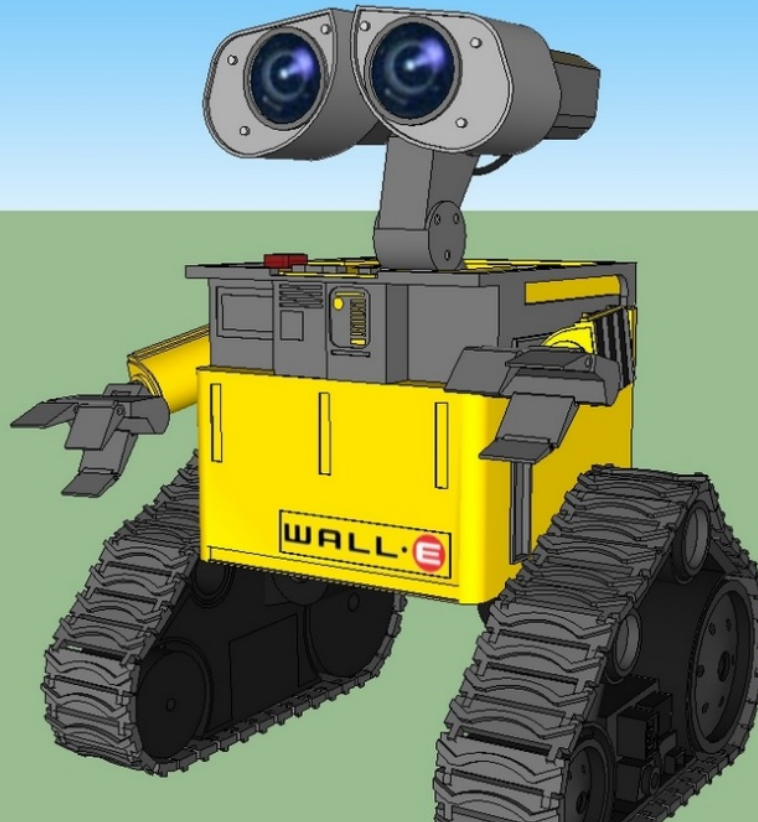
Object Category: [Celestial Bodies](#)

Notes:

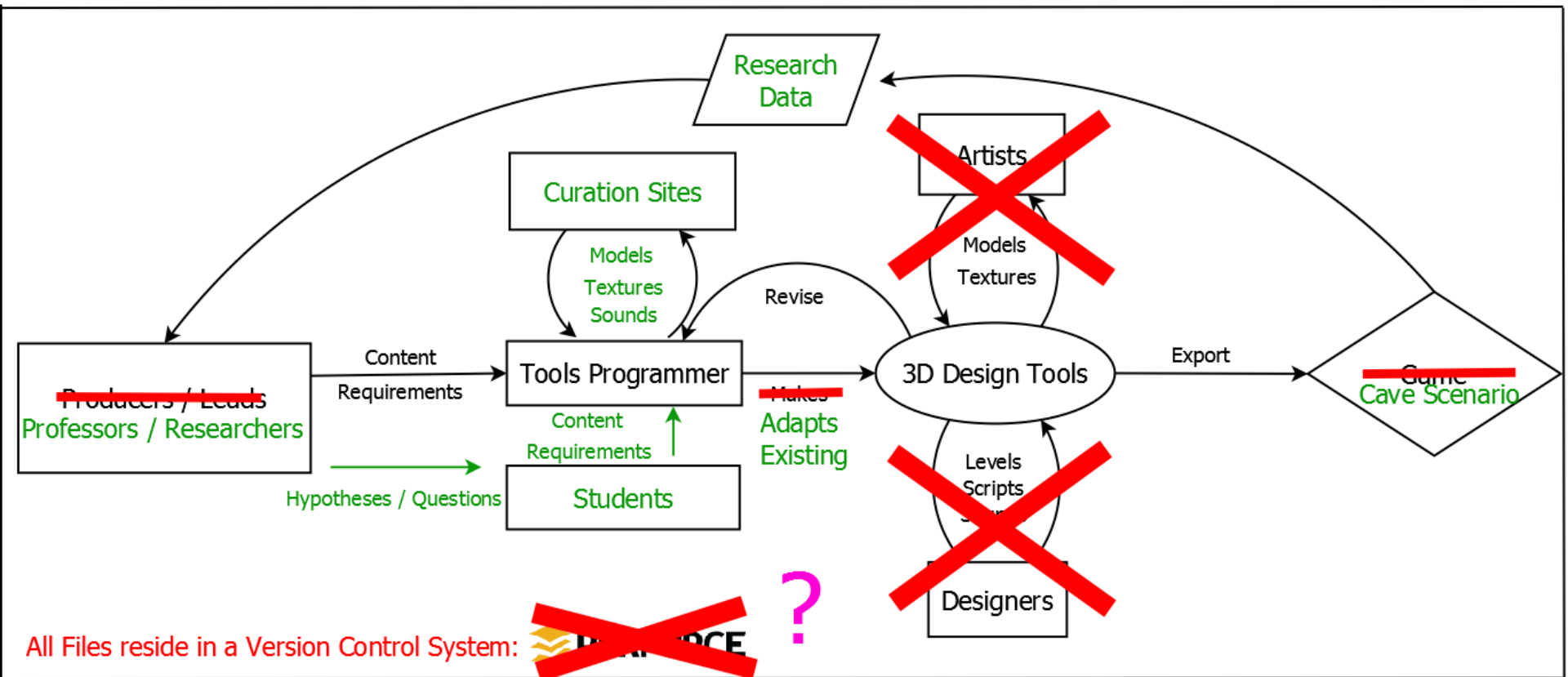
Test object for new curation system additions. It's freakin Wall e!!

Object Tags: [Robots](#)

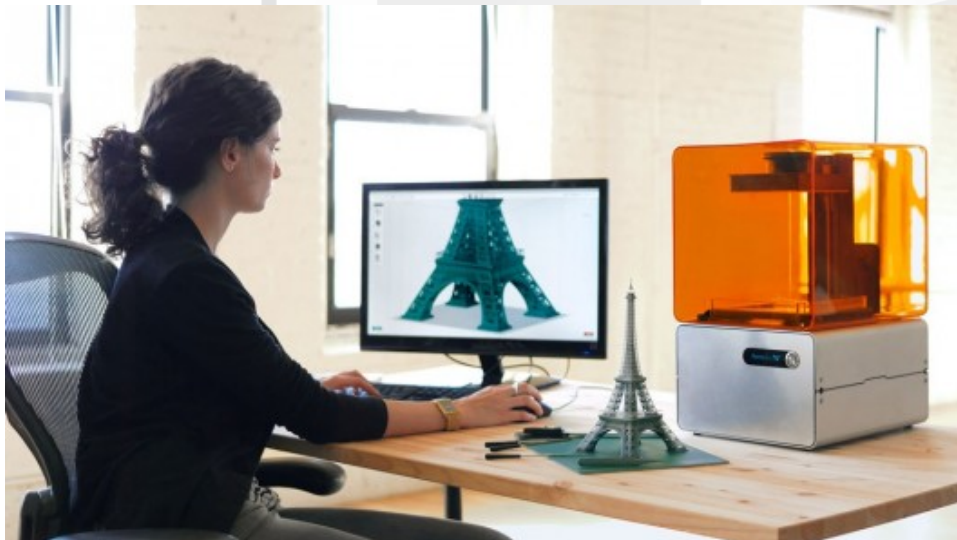
Preview Image:



Scenario Pipeline



Why Needed?



Other 3D Data

Volumes (“Image Stacks”) :

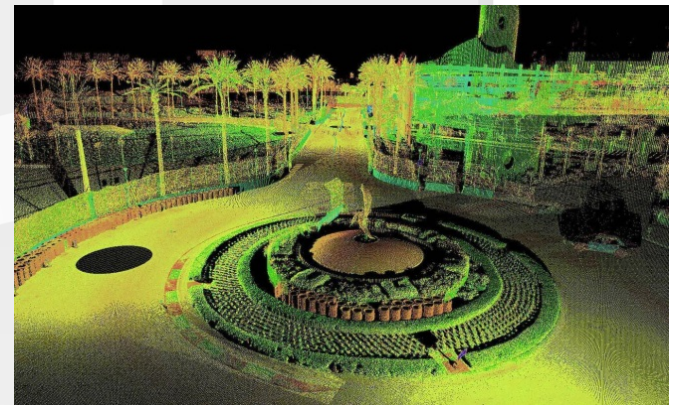
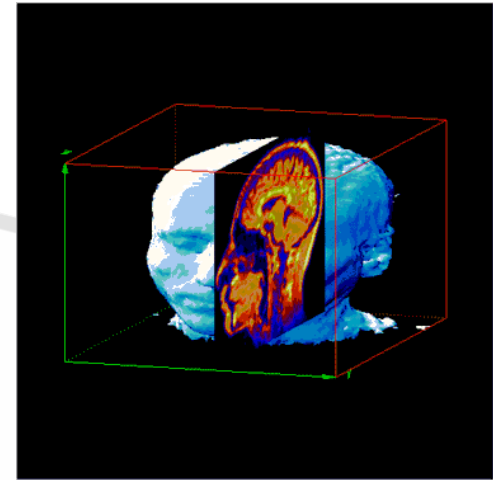
Medical Applications

Scientific Visualization

Point Clouds: Color &

Distance information

**Millions of points acquired
via laser scanners**



Any format a researcher may be working with!

Example Projects

Say It To See It

How and when will the web truly come to 3D?

What will it look like?

Or will 3D come to the web? Or both?

Word Cake

Humanities Collaboration

Visualizing sequences of text

TM

Conclusions

LEL = A collaborative research lab!

- **2 Categories of Data**
 - Scenario creation data (lots of variety)
 - Research data from scenarios
- **Digital Curation helps manage all of this.**
- **The future of VR and its applications is once again on the rise!**

TM

Conclusions

Researchers Open House - 3rd Monday of each month: 11 am to 12 pm

- **May 13th 10:30 – 12 pm**

Public tours: 1st Saturday of each month

- **Noon-1 pm Science Saturday at WID**

Let us know if you have data / collaboration / research ideas!

rdtredinnick@wisc.edu

TM

Questions?



wid.wisc.edu/research/lcl

www.youtube.com/user/LivEnvLab