

X3D Applications @ HLRS

Dr. Uwe Wössner

VR Hardware

- CAVE
- Tiled Display

Engineering

- RECOM Services
- Optima Pharma

Architecture BIM

- ADIDAS
- Thyssen
- FENDI
- City Planning

CSI

- 3D Reconstruction
- Blood Pattern Analysis

Paraglider

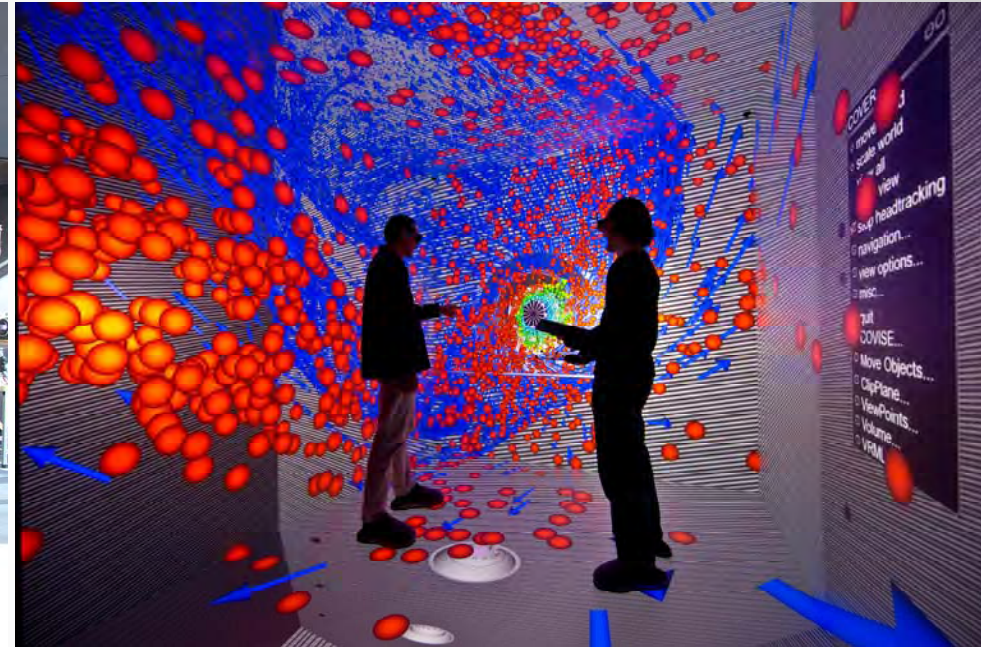


X3D Tutorial

Projection based VR-Environments



Five sided CAVE @ HLRS



- 5 ProjectionDesign F35 AS3D 1920x1200
- 11 P6000 GPUs
- Single chip DLP
- 0.8/1 wide angle lens

X3D Tutorial

Visualization Hardware

CAVE Cluster

- 22 Nodes + 8 Nodes
- 2 Intel Sandybridge CPUs/Node
- NVIDIA P6000 / NVIDIA K6000 GPUs
- Quadro-Sync II board
- 256 GB, 128 GB Head nodes/Render nodes
- QDR Infiniband
- External NICs: 14 x 25GigE
- Closed loop water cooled rack by Schäfer/Stulz
- 1LNET Router to Cray fs



3D Tiled Display

- 9 UE 55A 3D LCD Displays
- 1920x1080 Full HD 3D (HDMI 1.4a)
- 11 K6000 GPUs



X3D Tutorial

CAVE2@CaIT²

- 70 4k TVs
- Running COVISE
- And CAL-VR

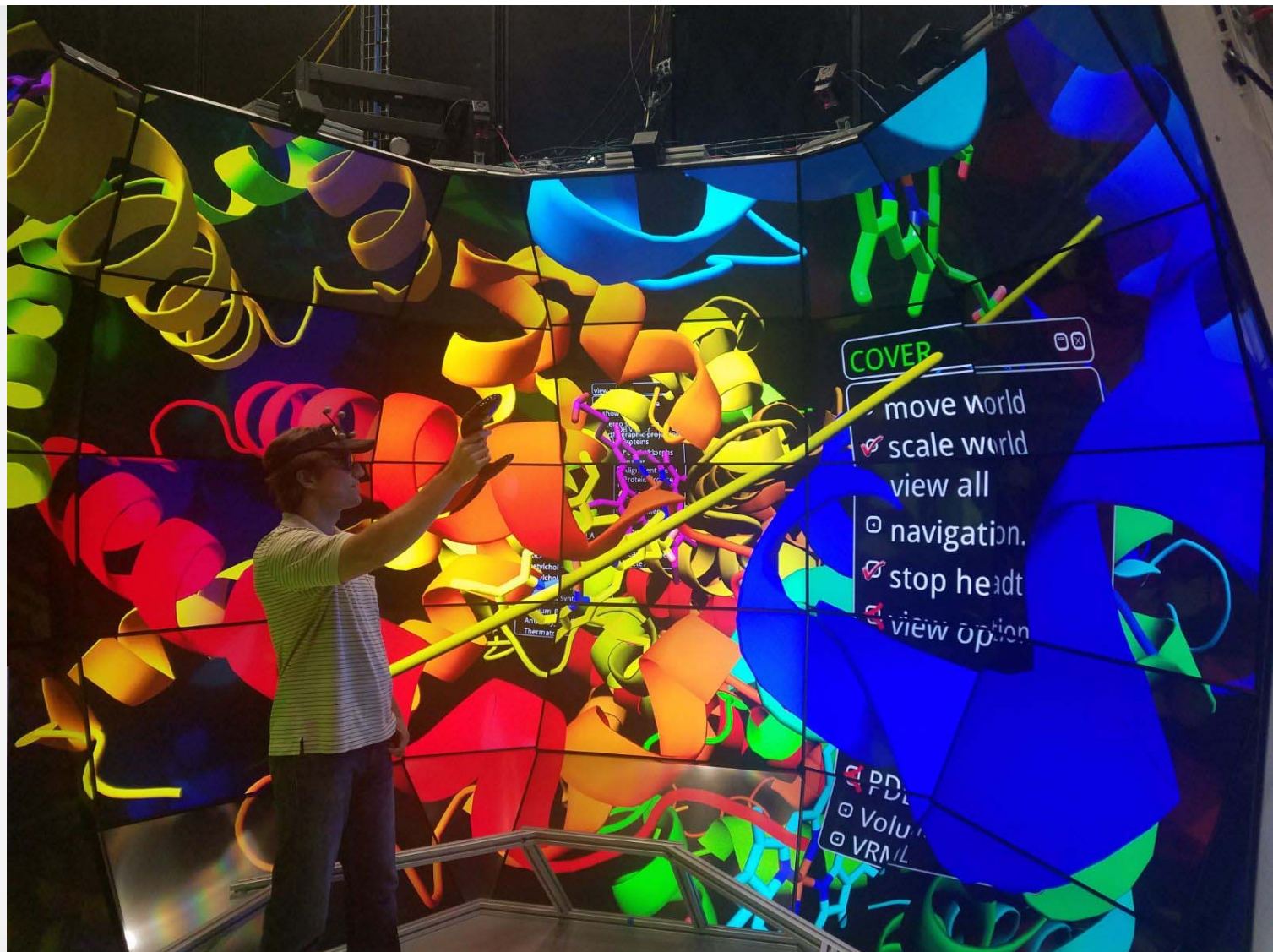
PDB-Plugin

PDB

PyMOL

VRML97

OpenCOVER



Engineering

RECOM Services

Combustion Modelling



Combustion Modelling
in Power Plants
RECOM Services



X3D Tutorial

RECOM Services

Stadtwerke Augsburg

3D Scan

Surface Reconstruction

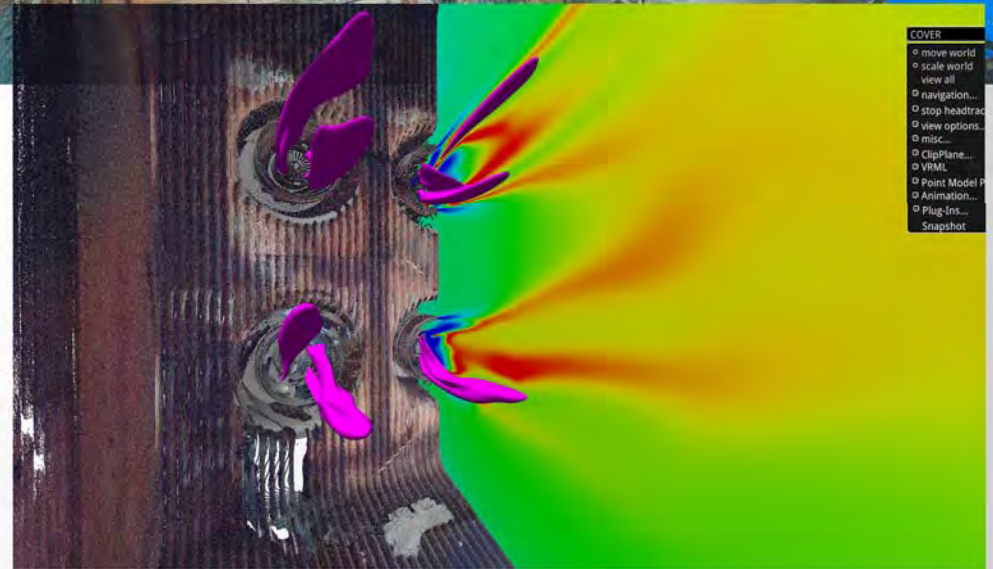
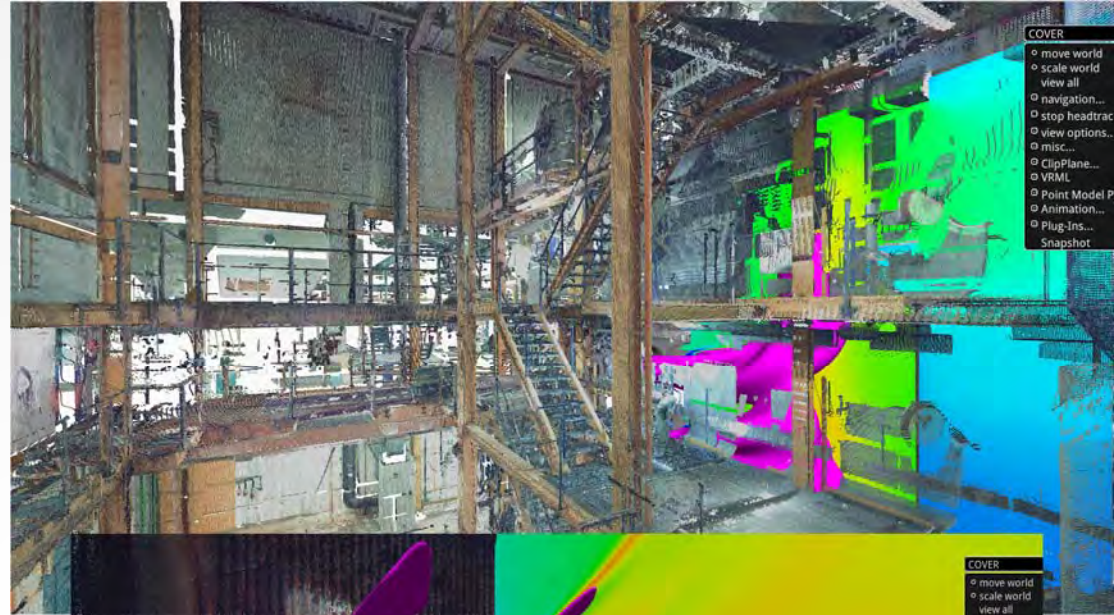
Mesh Generation

Simulation

OpenDX

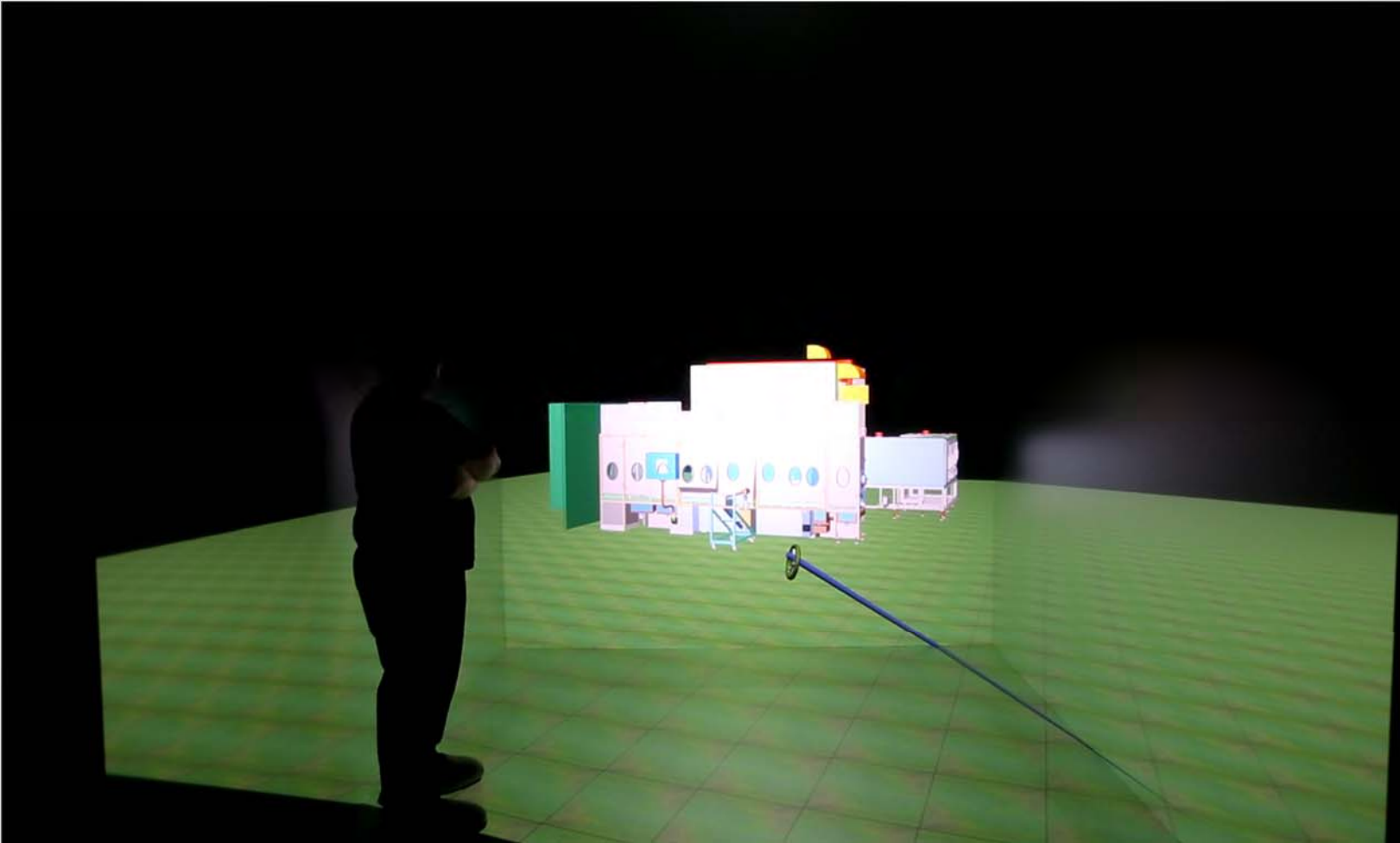
3DS-Max

VRML/X3D



X3D Tutorial

Optima Pharma

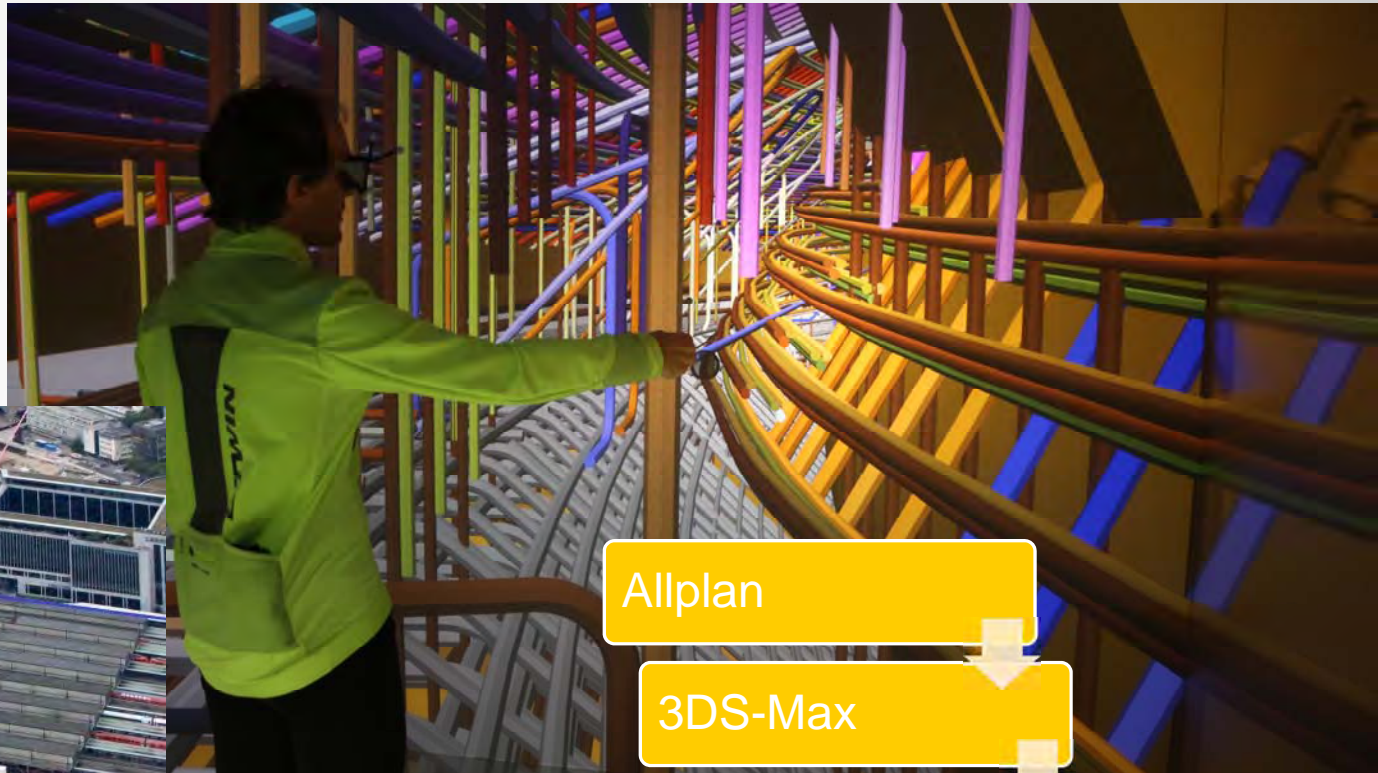


X3D Tutorial

Building Information Modelling

Stuttgart21

- Reinforcement planning
- Constructability
- safety



Allplan

3DS-Max

X3D

OpenCOVER

X3D Tutorial

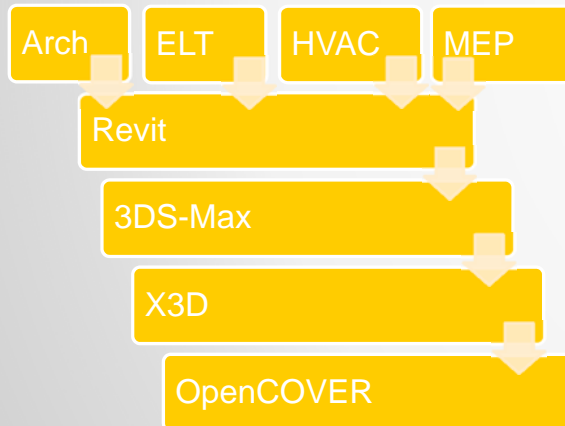
Architecture BIM

Adidas

New office building at Herzogenaurach

Architect: Behnisch Architects

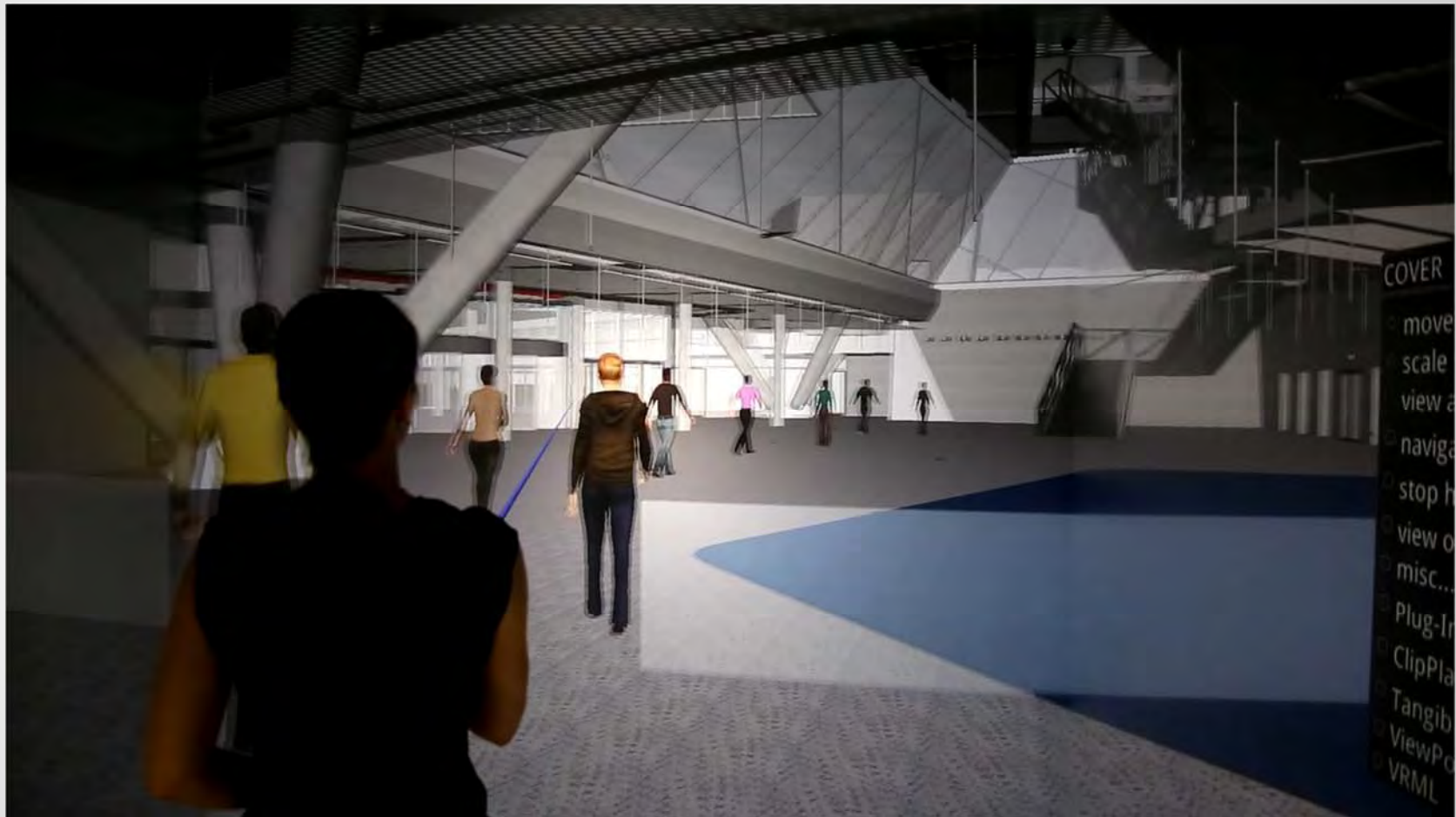
Construction: Ed. Züblin AG



X3D Tutorial

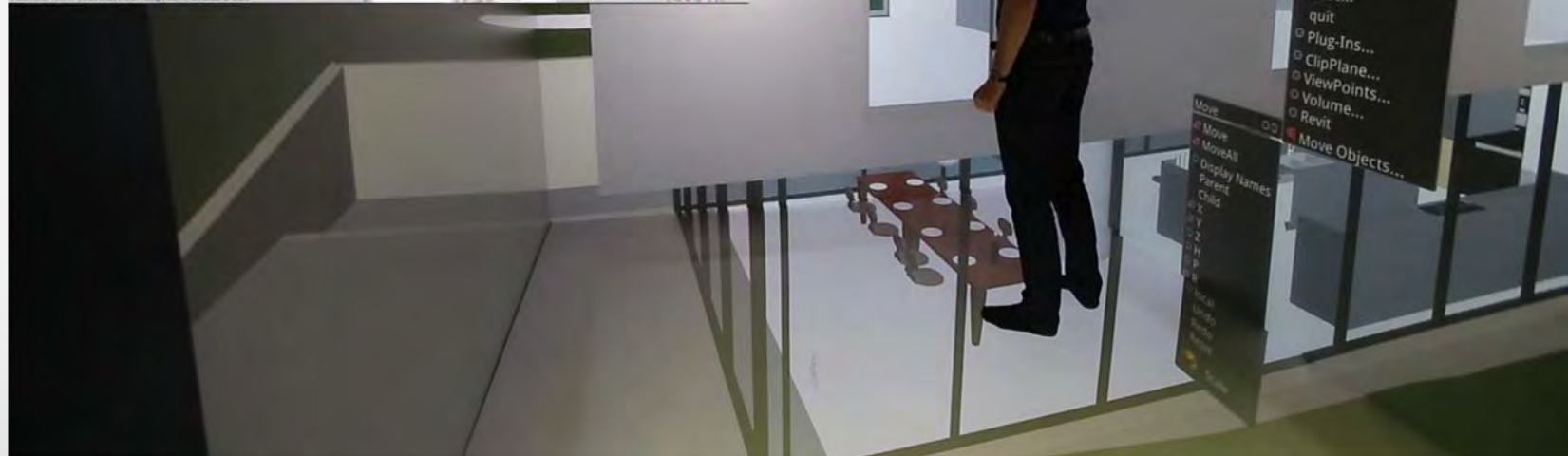
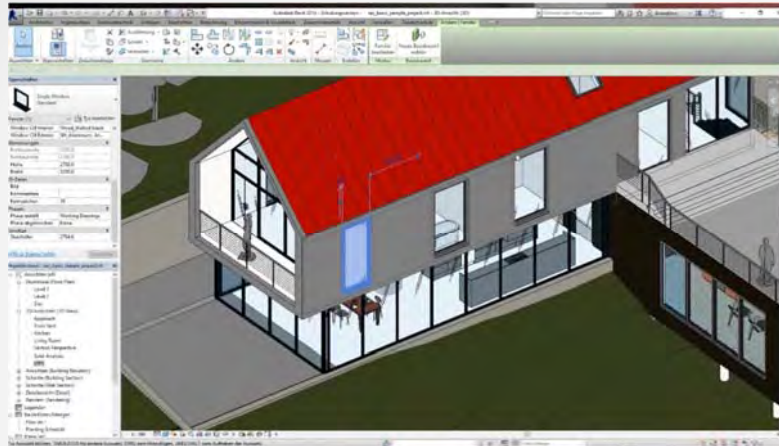
Architecture BIM

Adidas



X3D Tutorial

BIM Interaction

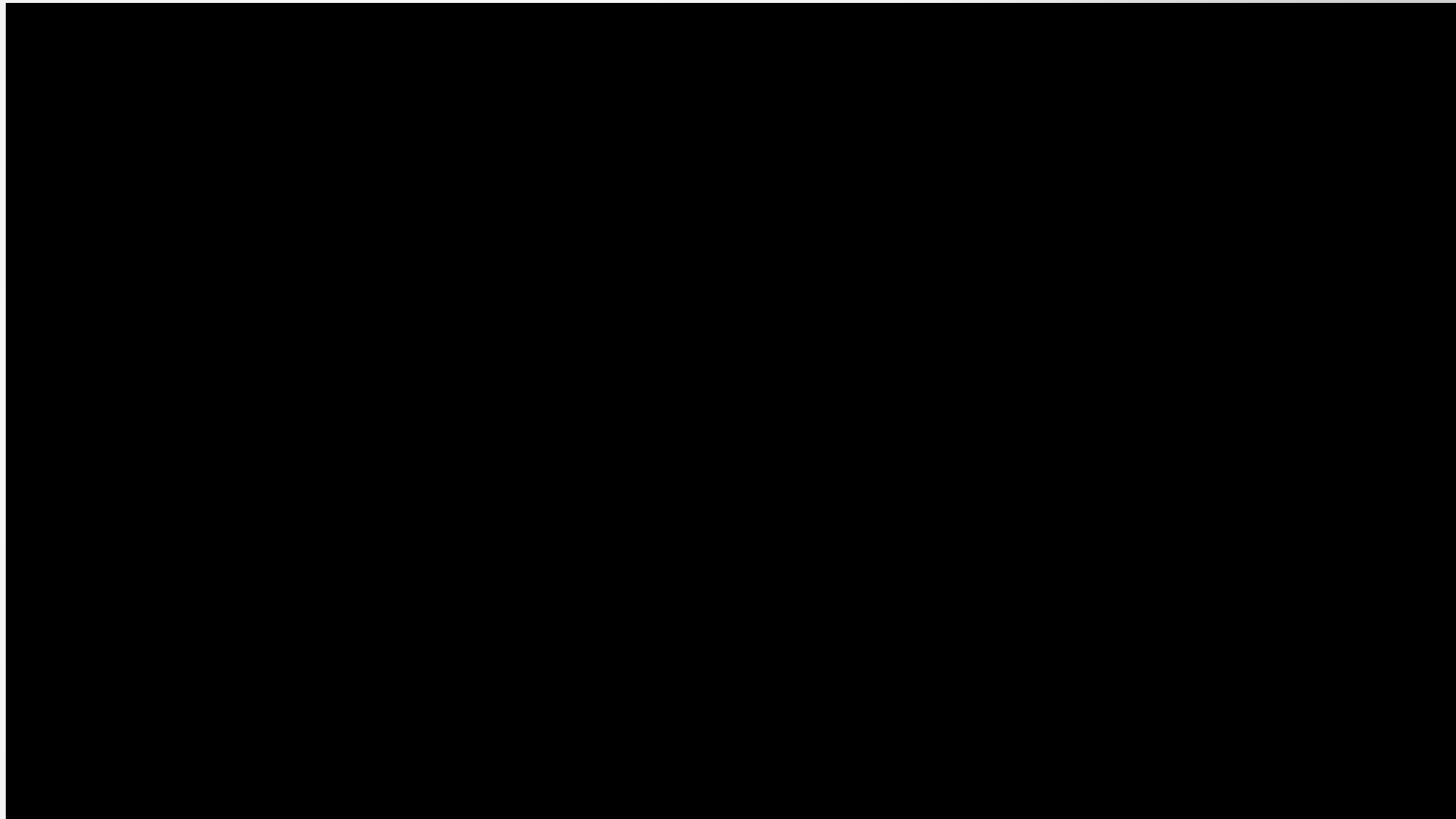


X3D Tutorial

Thyssen Multi

Project:
Thyssen-Krupp Elevators/Multi

- Direkt linear drives
- Horizontal movement
- Multiple cabins in one shaft
- Circular movement
- Flexible dispatch
- High throughput
- Minimal space requirements



Video: Thyssen-Krupp Elevators
X3D Tutorial

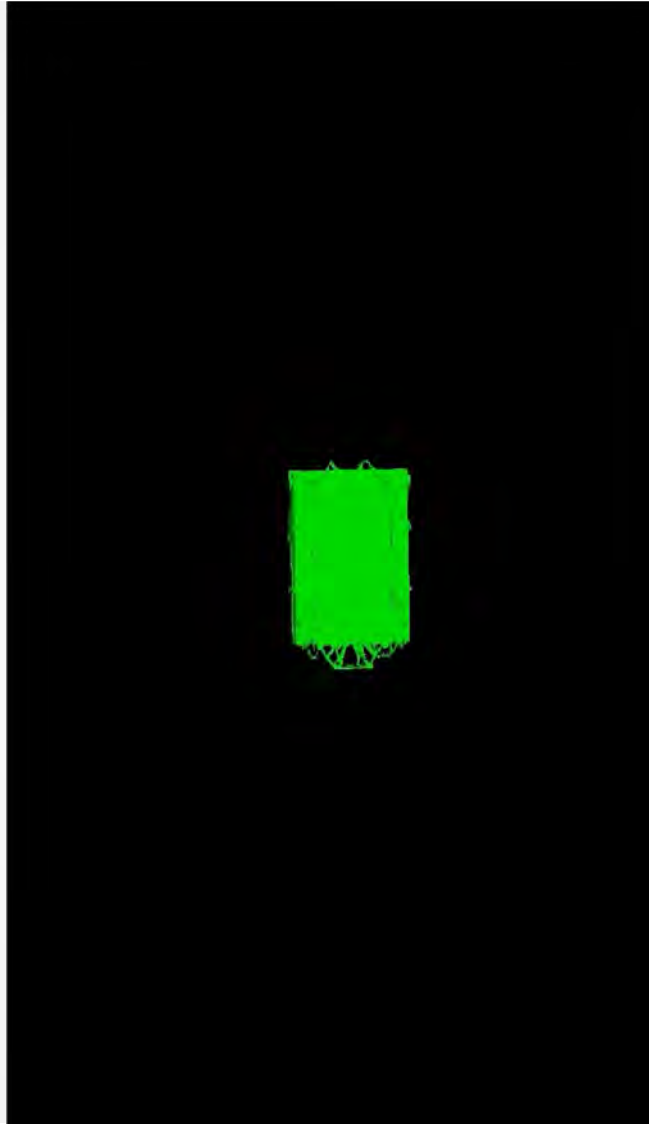
Thyssen Multi

Goals

- Travel comfort
- Safety

Methods

- Computational fluid dynamics
- Structural mechanics
- Vibration analysis
- Multi body simulations



X3D Tutorial

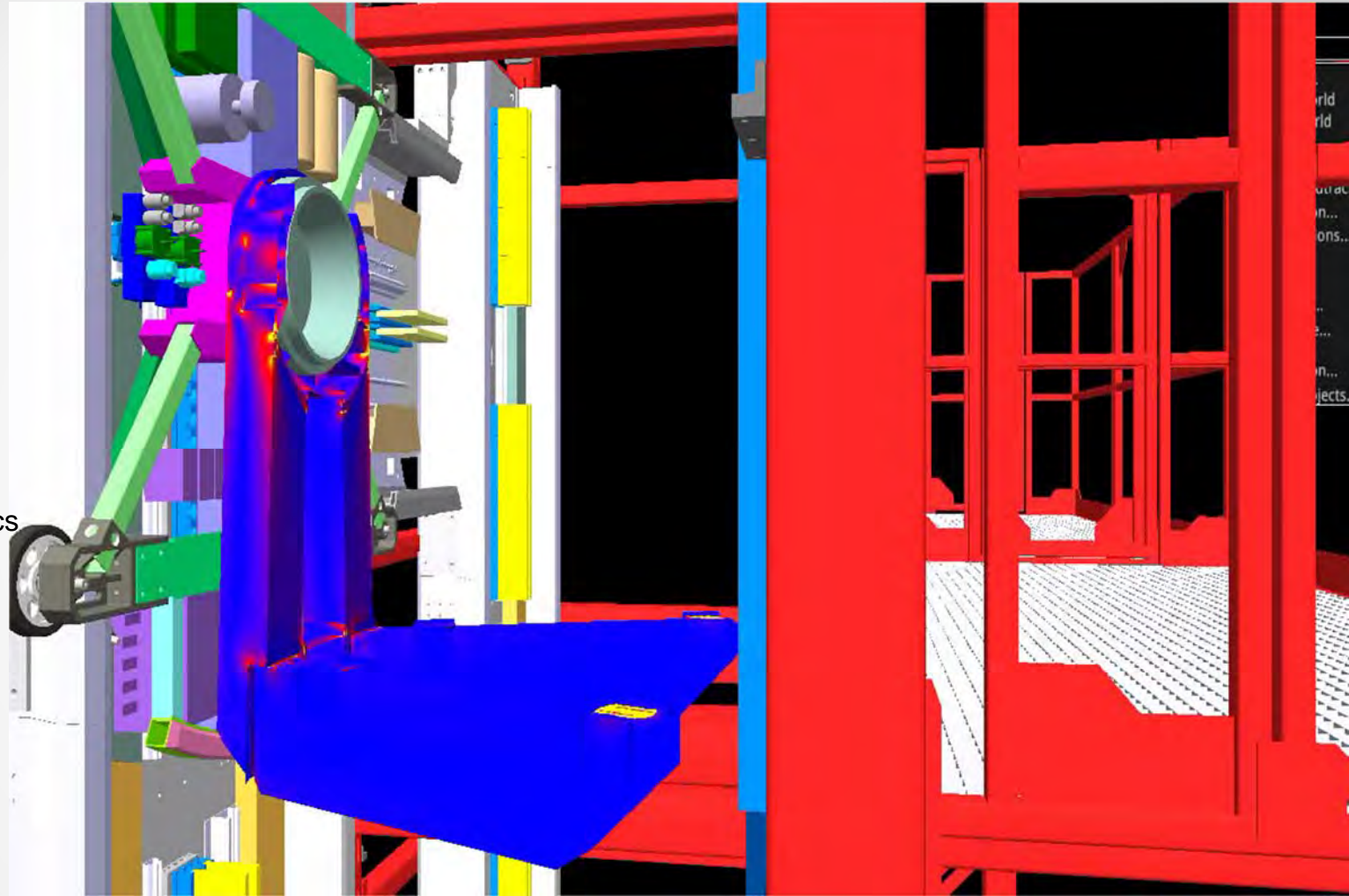
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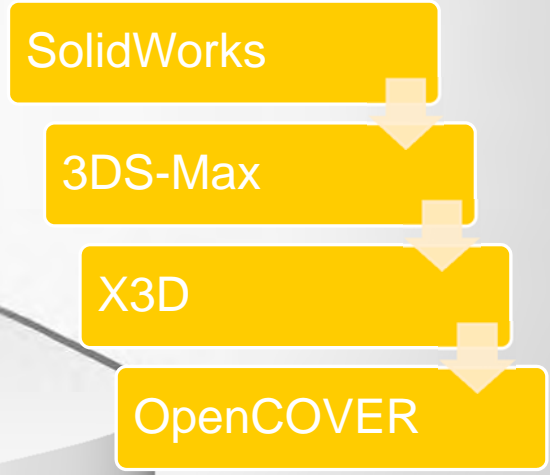
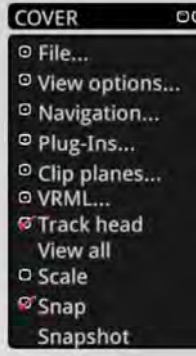
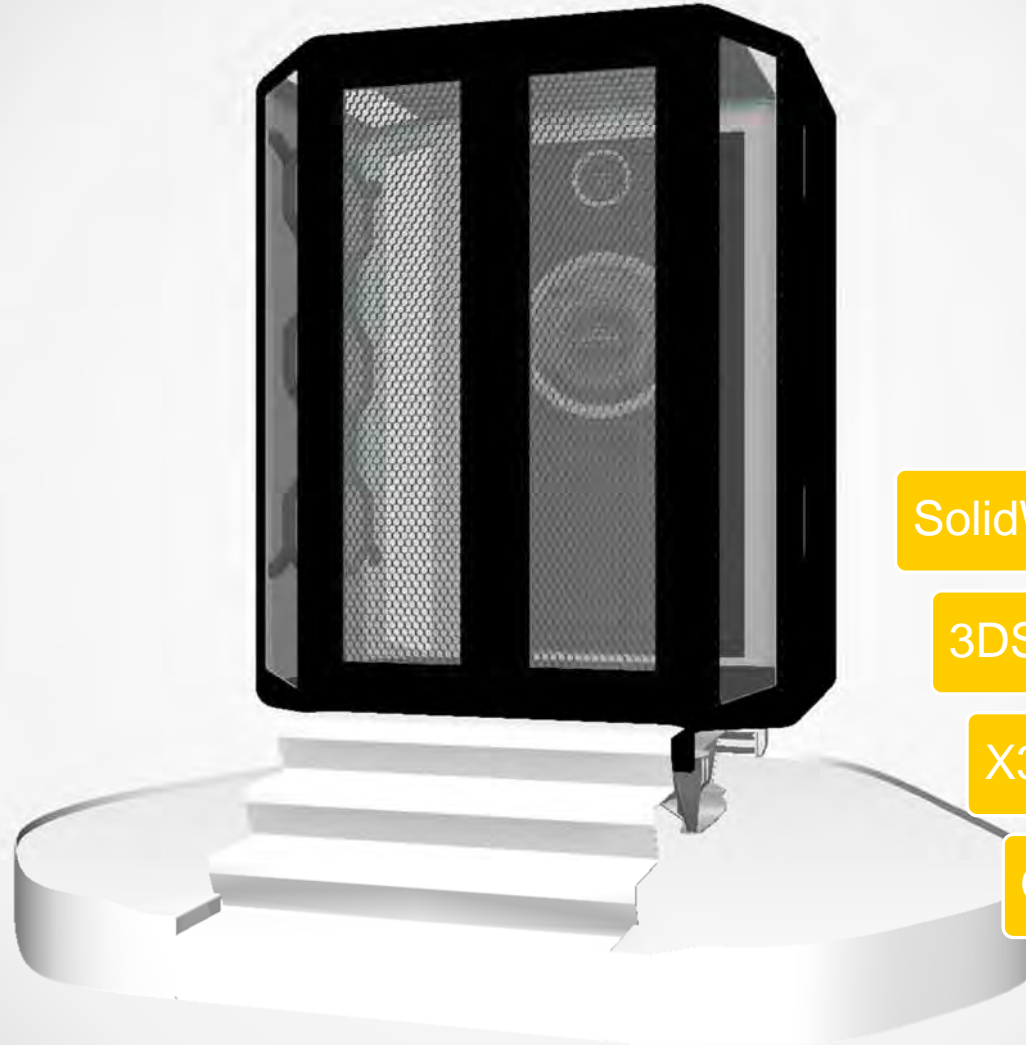


X3D Tutorial

Thyssen Multi

New Cabin Design

- Lightweight
- Carbon fibre body
- User interface



X3D Tutorial

DSA - Digital Support for Art

Armando Trento, Joachim Kieferle, Uwe Wössner



FENDI

Data Acquisition:
3D scanning in
Rome (Italy)

Via dei Condotti
from
Spanish steps
to
Largo Carlo Goldoni Square



X3D Tutorial

FENDI

Method:

3D point cloud scanning
[Faro Focus
3D Laser Scanner]

Scan duration:

3-6 mins at every position
(depending on resolution)

Problem:

Crowded situation
(Tourists and traffic)

Solutions:

Manual optimization
Scan from different positions
Night time scans



X3D Tutorial

Pietrasanta

Method:

3D point cloud scanning
[Faro Focus
3D Laser Scanner]

Scan duration:

3-6 mins at every position
(depending on resolution)

Problem:

Unsorted pieces of the tree
Many pieces

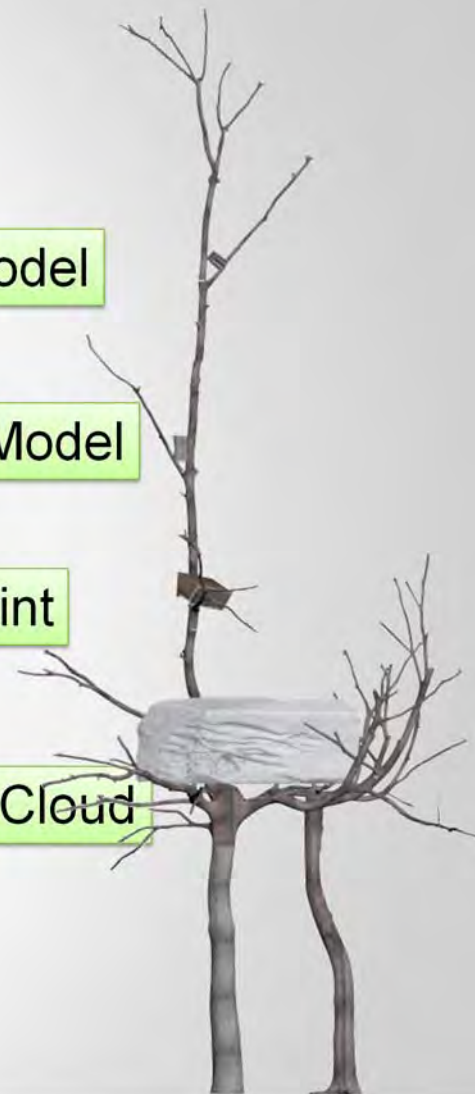
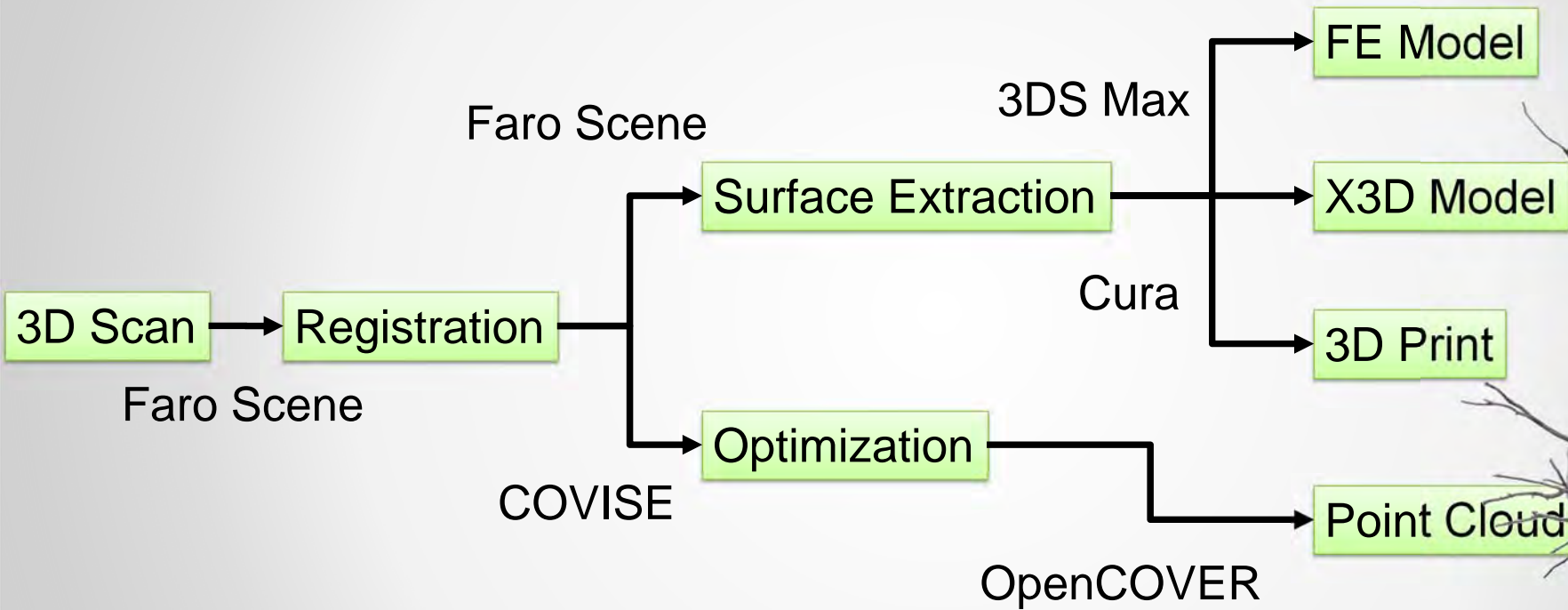
Solutions:

Scanning of groups of
branches



X3D Tutorial

3D Workflow



CAVE Workshop

Participants:

Giuseppe Penone

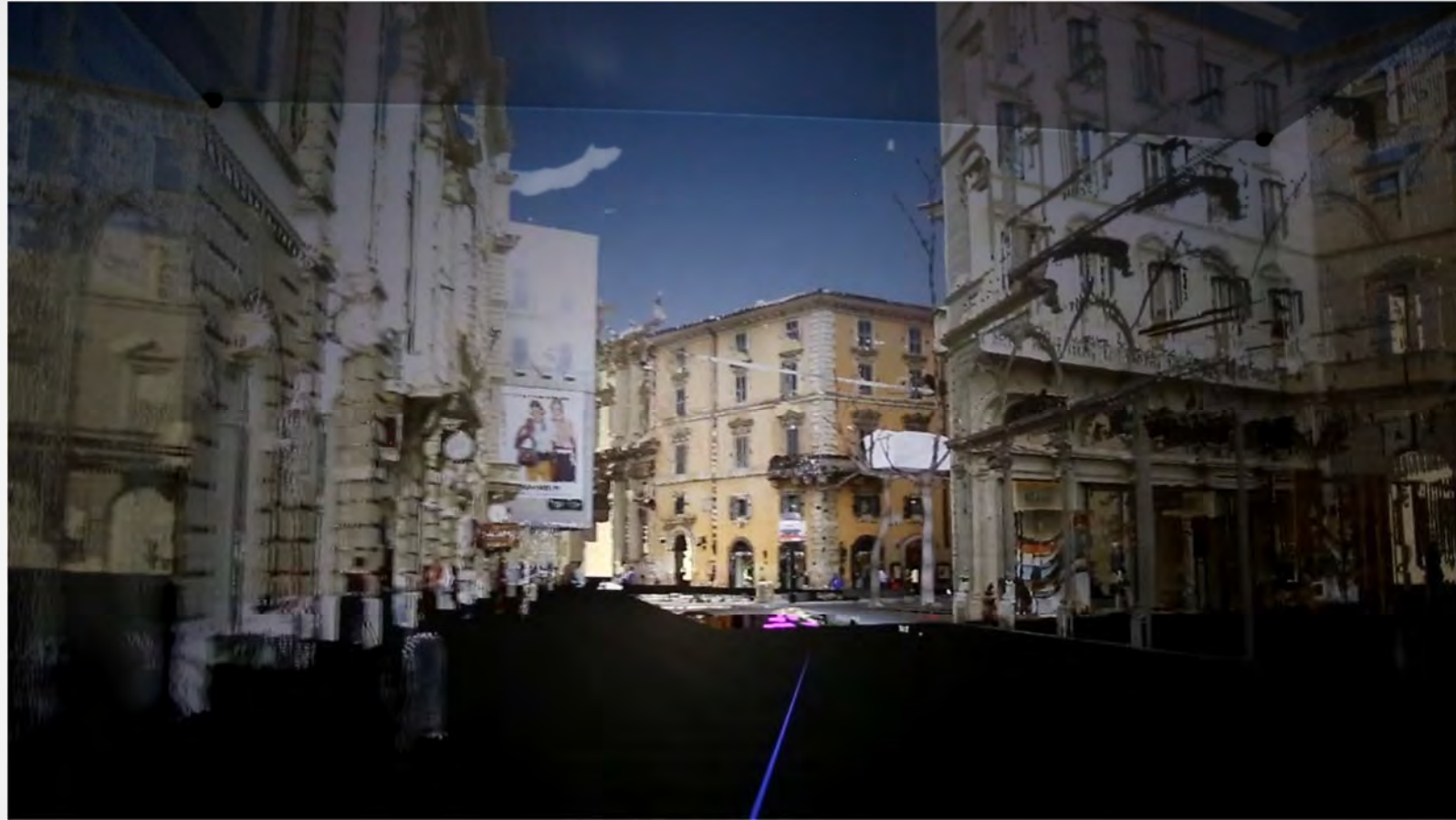
Andrea Cataldo

Massimo Fabbri

Joachim B. Kiefe

Eugenio. F. Mancinelli

Armando Trento



X3D Tutorial

City Planning/Public Participation

URBAN LAB CITY QUARTER 4.0

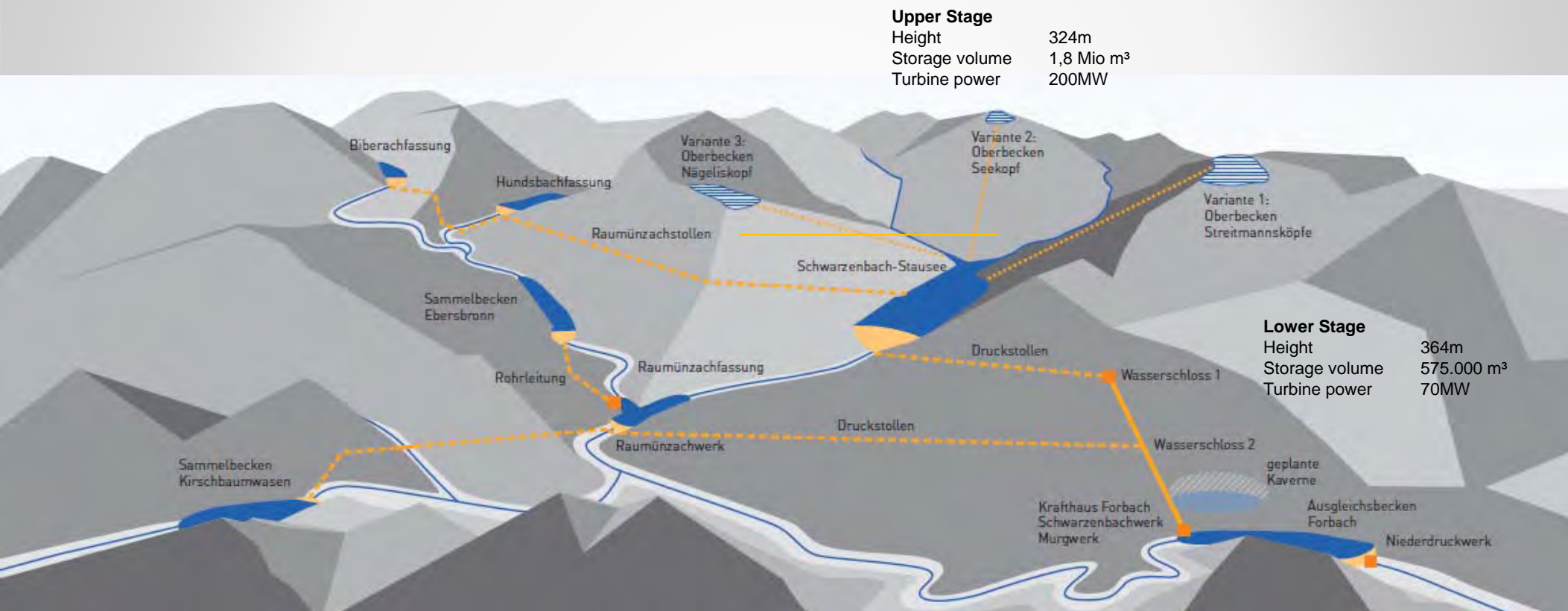
Spring Fair Stuttgart & Science Day 2017

- exemplary prototype with planning table „Playground“ (Tangible User Interface, different scales)
- First tests of the virtual city models with the general public at different age



Pumped power station Forbach

Civic participation



X3D Tutorial

Project:
Pumped power station Forbach
Civic participation

Rudolf Fettweis Power Station,
Forbach, Black Forest

Constructed 1914 to 1926

4 Individual Power Stations
6 Francis Turbines
2 Pelton Turbines
2 Kaplan Turbines

Schwarzenbach Dam Capacity:
14 Million Cubic Metre

105 Million kWh per Year,
Energy for 65000 People



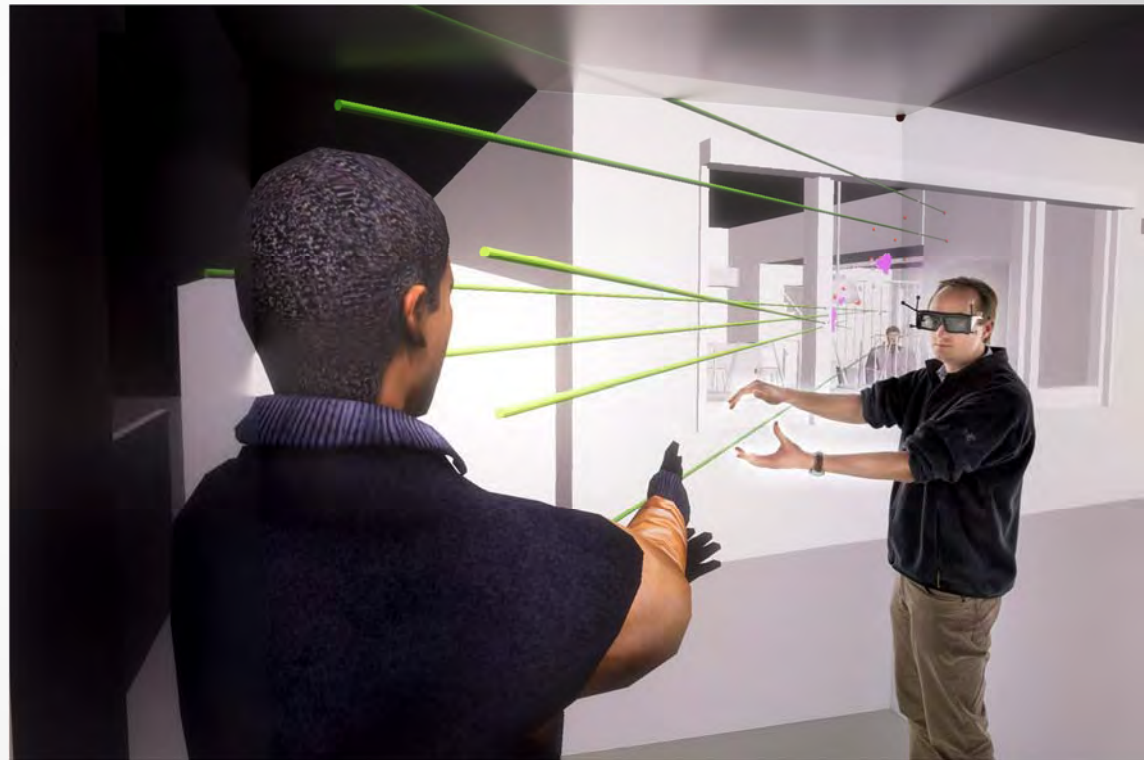
CSI @ HLRS

Crime Scene Reconstruction

Manual Reconstruction

3D Scan → VR

[PointCloud > 3DS-Max > VRML > OpenCOVER]



X3D Tutorial

Crime Scene Reconstruction

Direct Point cloud rendering

3D Scan → VR

[PointCloud > Sorting/Optimizing > OpenCOVER]



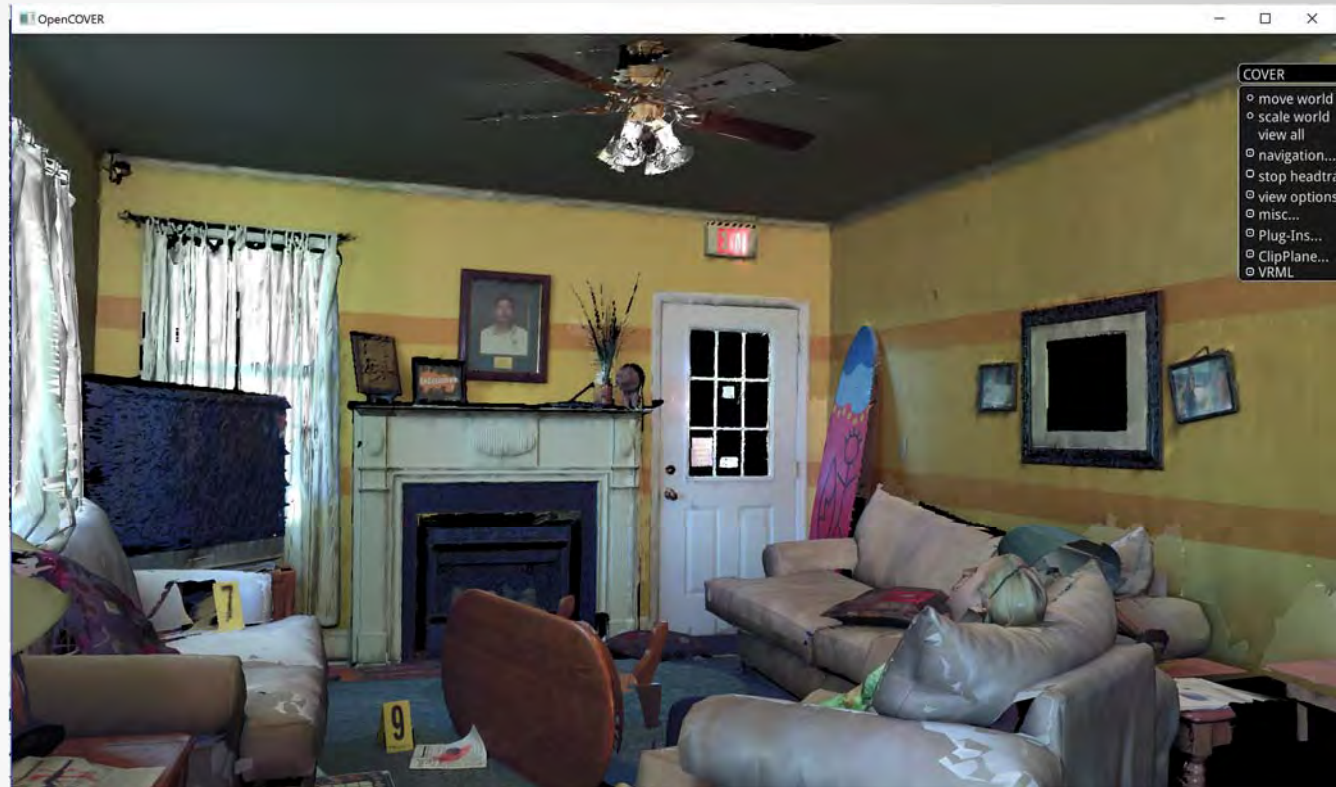
X3D Tutorial

Crime Scene Reconstruction

Tesselated point cloud

3D Scan → VR

[PointCloud > Tessellation > Texturing > VRML]



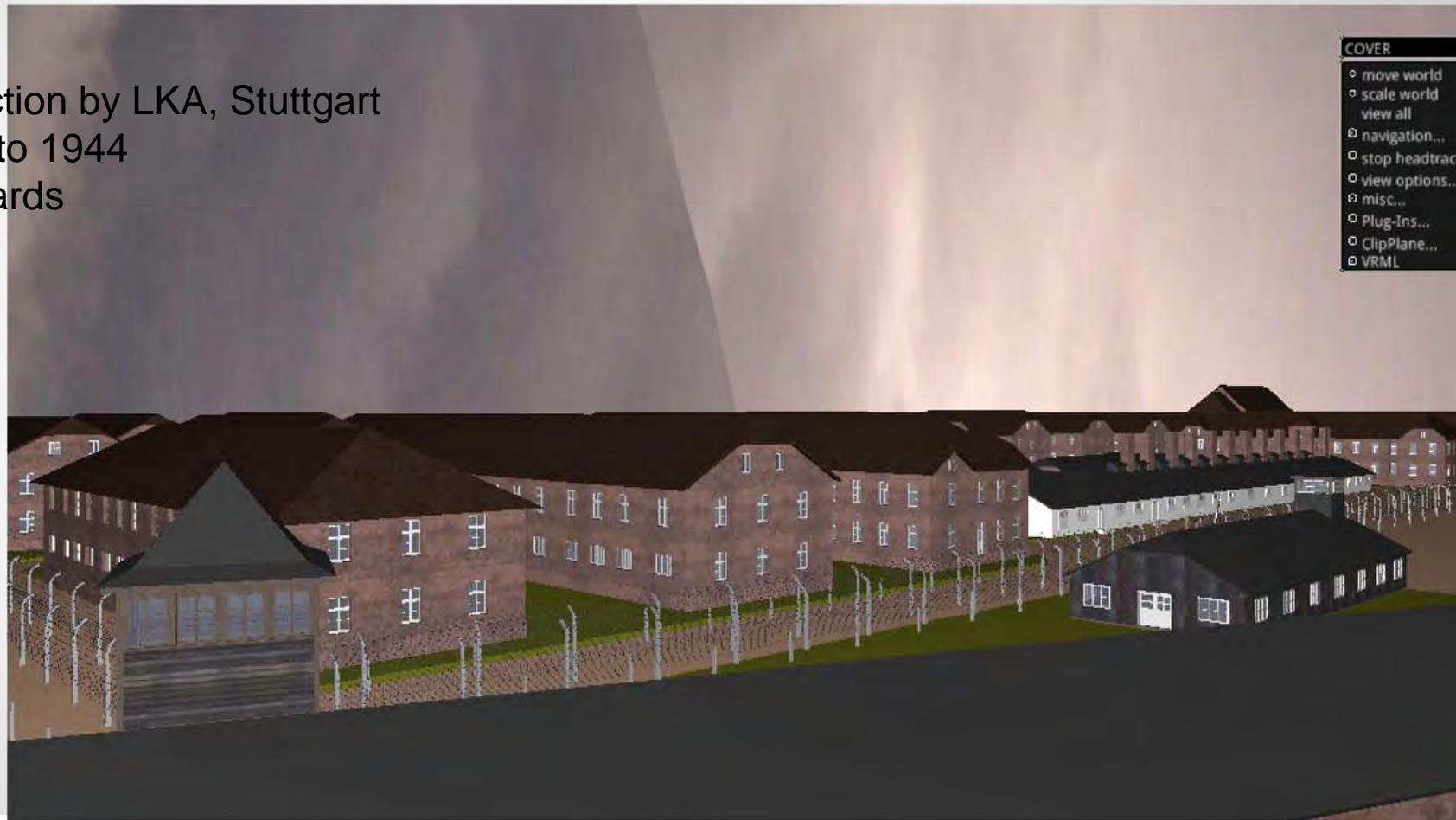
Data: 3rdTech Inc., Durham, NC, USA

X3D Tutorial

Auschwitz concentration camp

3D Reconstruction by LKA, Stuttgart

- From 1940 to 1944
- Trials of guards



- COVER
- move world
- scale world
- view all
- navigation...
- stop headtrac
- view options.
- misc...
- Plug-Ins...
- ClipPlane...
- VRML

X3D Tutorial

H L R I S

Crime Scene Reconstruction

Tangible interfaces



X3D Tutorial

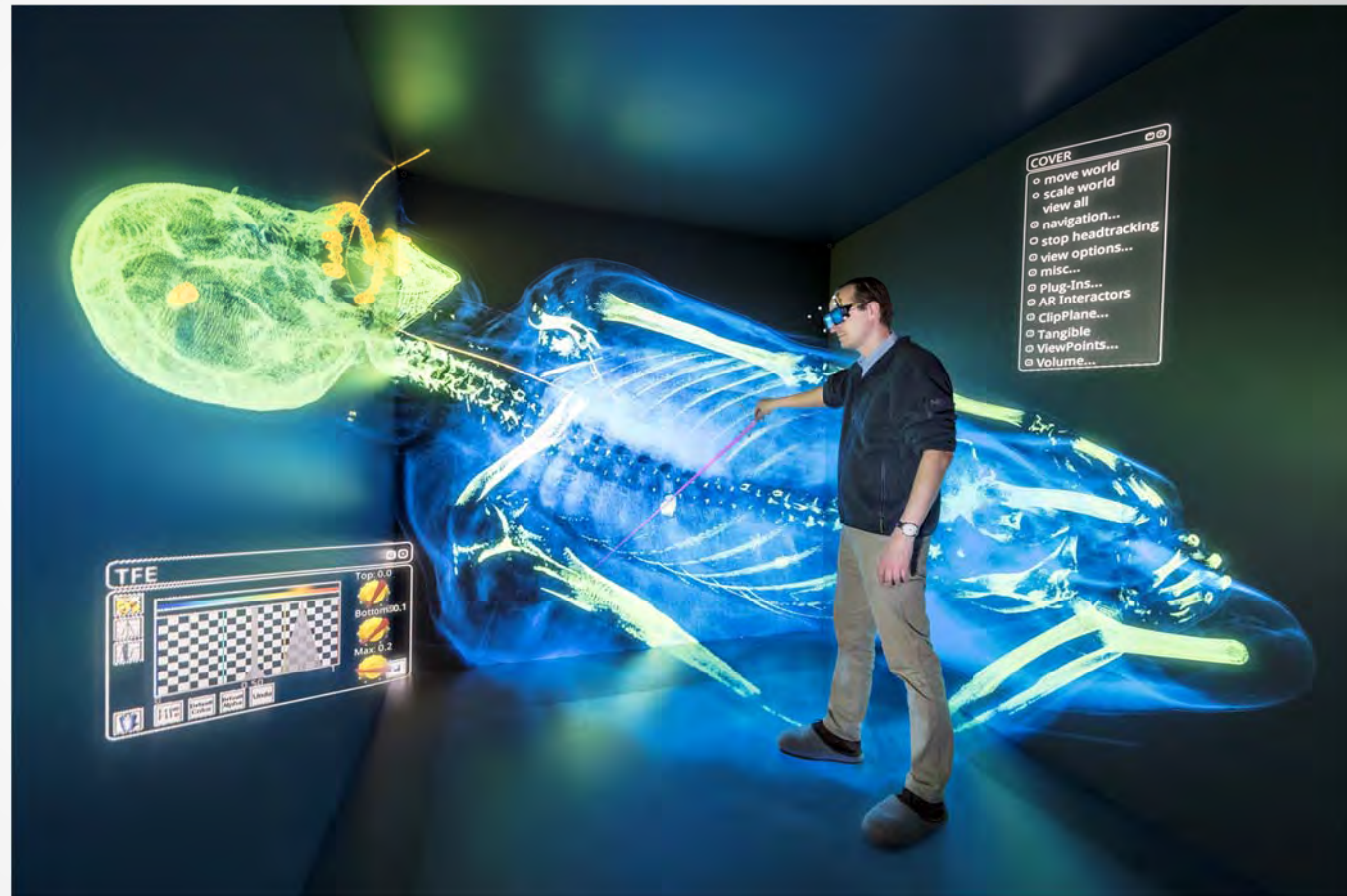
Virtual Autopsy

Direct Volume Rendering

- CT
- MRI
- Image Stacks
- Light Sheet Microscopy

Rendering techniques

- 3D Textures
- Pre integration
- Lighting
- ShearWarp
- 1 and 2D Transferfunctions



X3D Tutorial

Blood Pattern Analysis

State of the art

- Stick markers
- Take Picture
- Measure position
- Import in Hemospat
- Ellipse fitting
- Determine angle
- Create CAD model
- Draw line



X3D Tutorial

Blood Pattern Analysis

State of the art



X3D Tutorial

Blood Pattern Analysis

Variable velocity

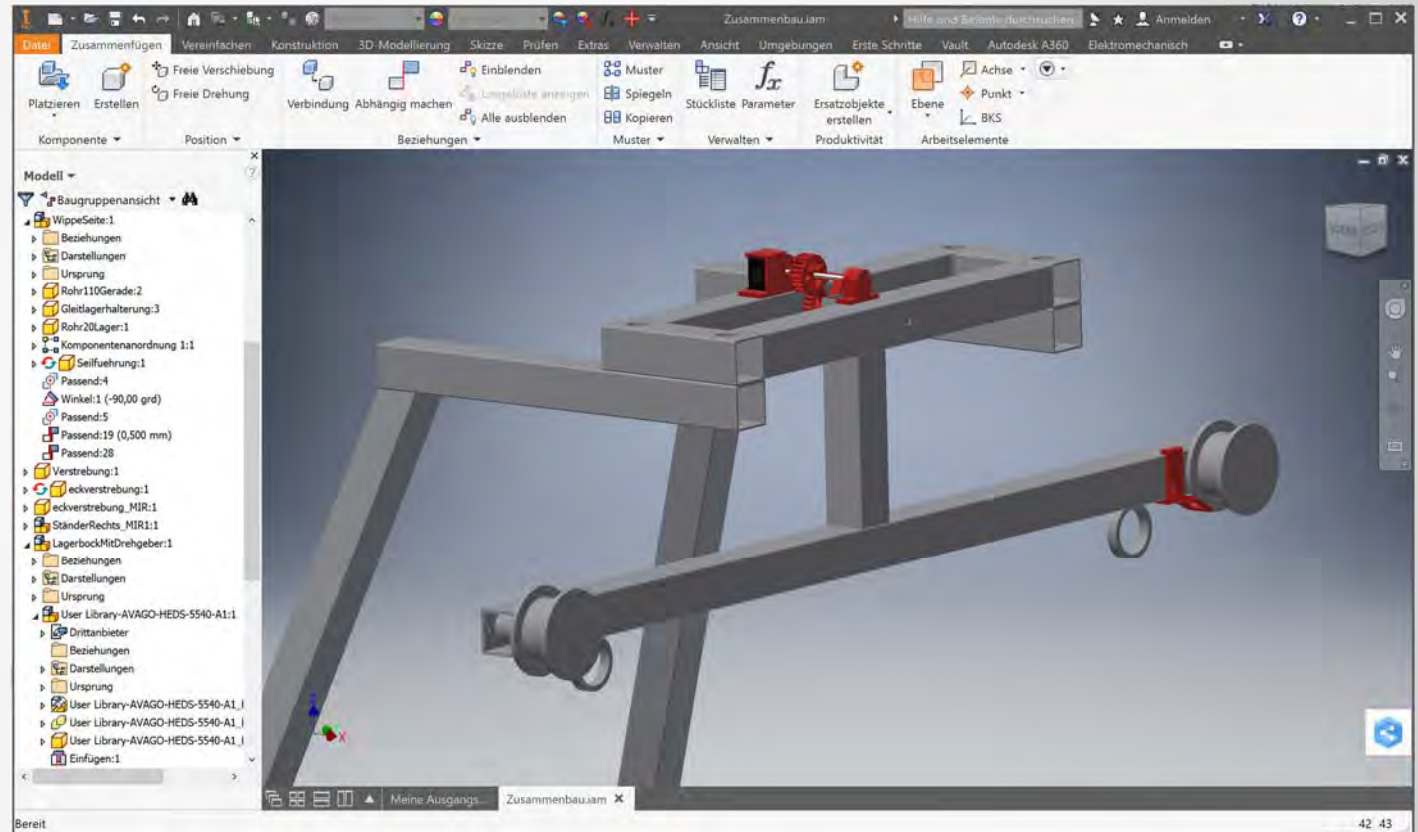


X3D Tutorial

Glider Simulator

Paraglider

- Three encoders
- Raspberry PI
- Allows steering of paraglider with two brake lines and body balance



Paraglider

- Three encoders
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