

# Virtual Reality til visualisering af CFD-resultater

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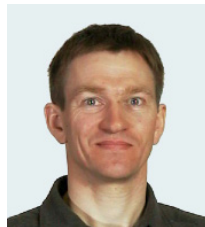


# Faggruppen Bygningsinformatik

## - Institut for Byggeri og Anlæg



Prof. Per  
Christiansson



Lektor Kjeld Svidt



ErhvervsPhD stud.  
Kristian Birch Sørensen

## Seneste projekter

**Digital kobling af virtuelle 3D modeller til den fysiske verden** (Kristian Birch Sørensen). Projektet er et ErhvervsPhD samarbejde med Rambøll

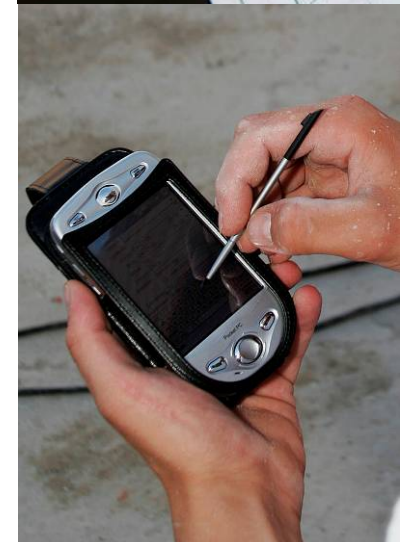
**IT in Collaborative Building Design** (Yoke Chin Lai). Semantic Web støttet projektsamarbejde, PhD maj 2006

**Det Digitale Byggeri - DDB** (Erhvervs- og Byggestyrelsen)  
[www.detdigitalebyggeri.dk](http://www.detdigitalebyggeri.dk)

- **Digital aflevering – DACaPo**, Krav til aflevering af digitale modeller og dokumenter til drift og vedligehold.
- **3D Modeller - B3D**, Krav til digitale 3D modeller i bygningsprojektering
- **3D arbejdsmetoder** under Det Digitale Fundament

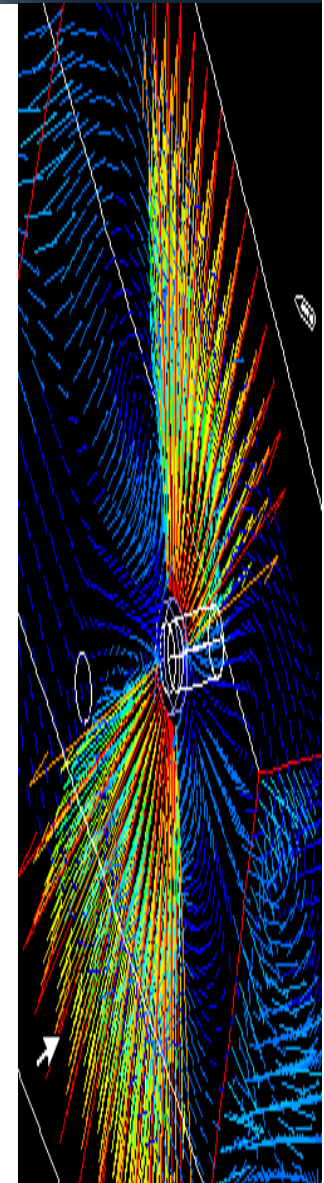
**IT og ressourcestyring på byggepladsen** (Ministeriet for Videnskab Teknologi og Udvikling)

**IFC-Modelserver**. IT-plattform til integreret informationshåndtering i byggebranchen. (Ministeriet for Videnskab Teknologi og Udvikling)



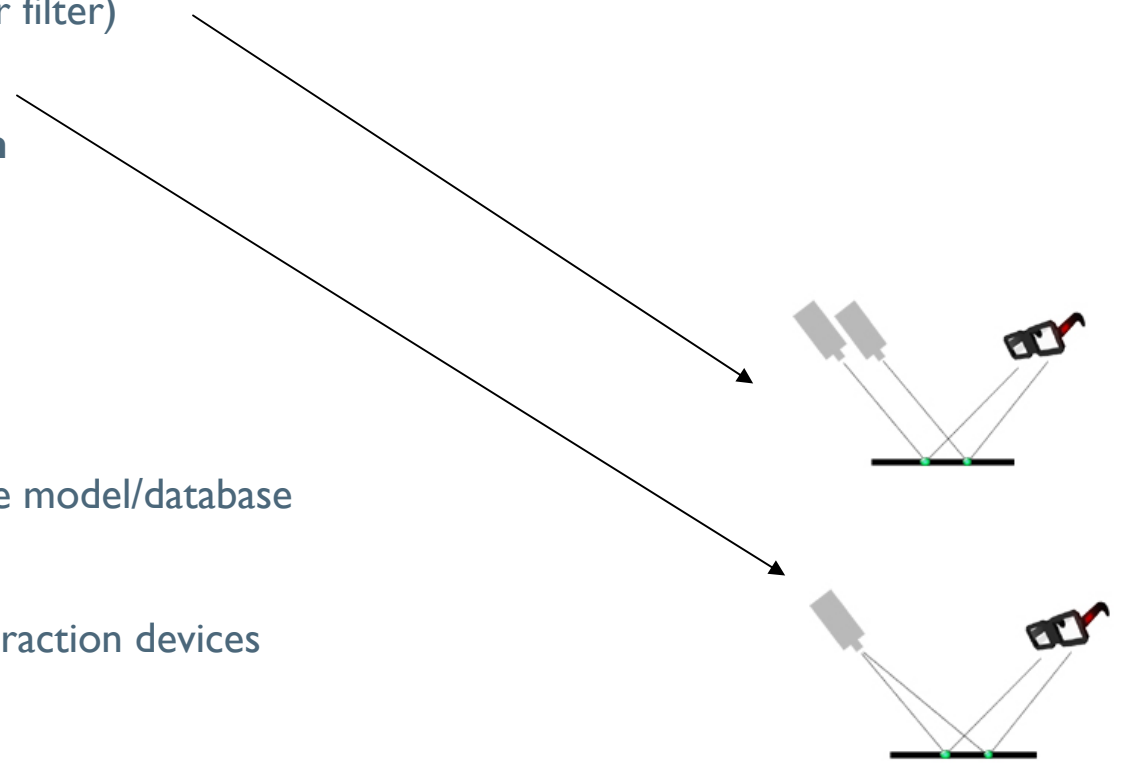
# What is Virtual Reality?

- Presentations that take place at the VR-Centre ?
- Convincing your senses that something virtual is real
- Realistic visualisation of phenomena which are difficult to see in reality (e.g. airflow)
  
- The term “Virtual Reality” (VR) was initially introduced by Jaron Lanier in 1989, while the ideas of such a display system originate from Ivan Sutherland 1965. Today, there exist many different views of its meaning depending on which context it is used in.



# Virtual Reality can include

- **Stereo viewing** (different pictures for right and left eye)
  - Passive (polarized or colour filter)
  - Active (shutter glasses)
- A certain degree of **immersion**
  - Wide screens, power walls
  - Large curved screens
  - CAVE
  - Head mounted displays
- **Realtime interaction** with the model/database
  - Mouse or keyboard
  - Tracking of persons or interaction devices
  - Haptic devices

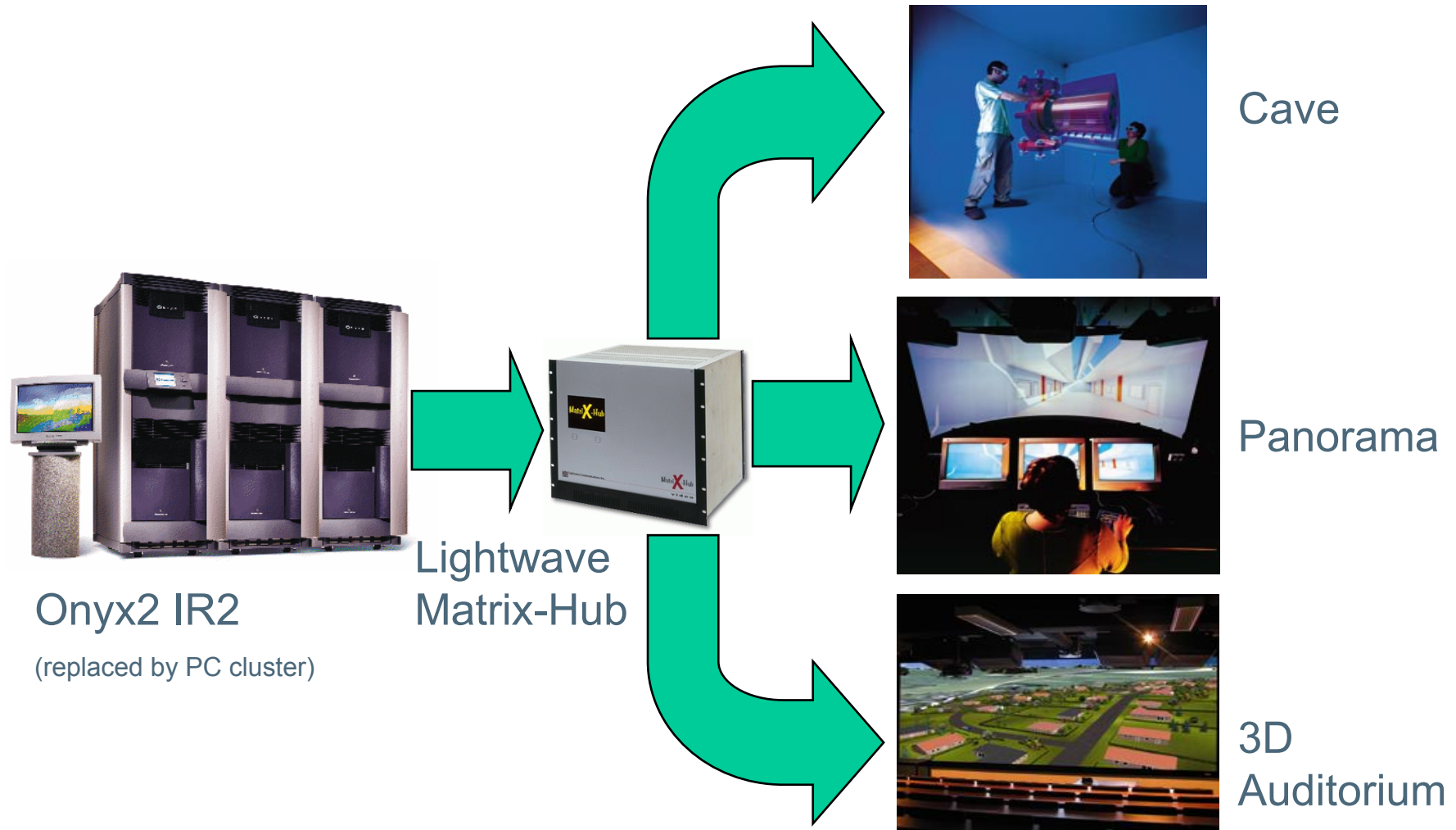




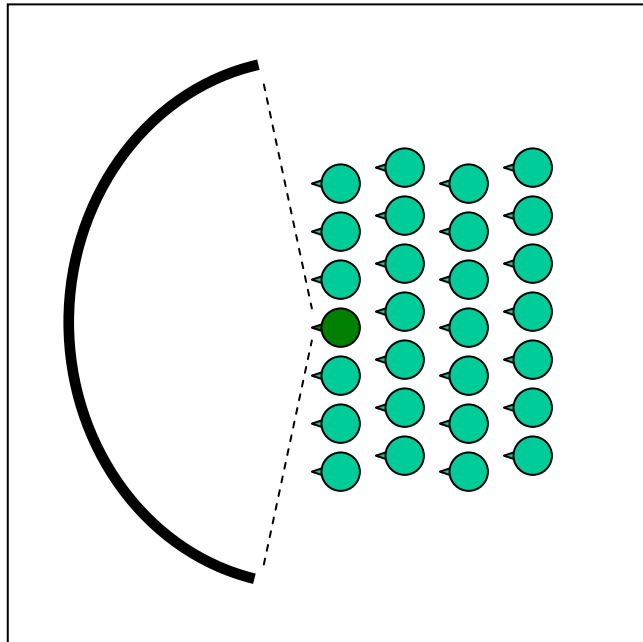
## Passive stereo and optical tracking equipment



# VR facilities at Aalborg University (I)



## VR facilities at Aalborg University (2)

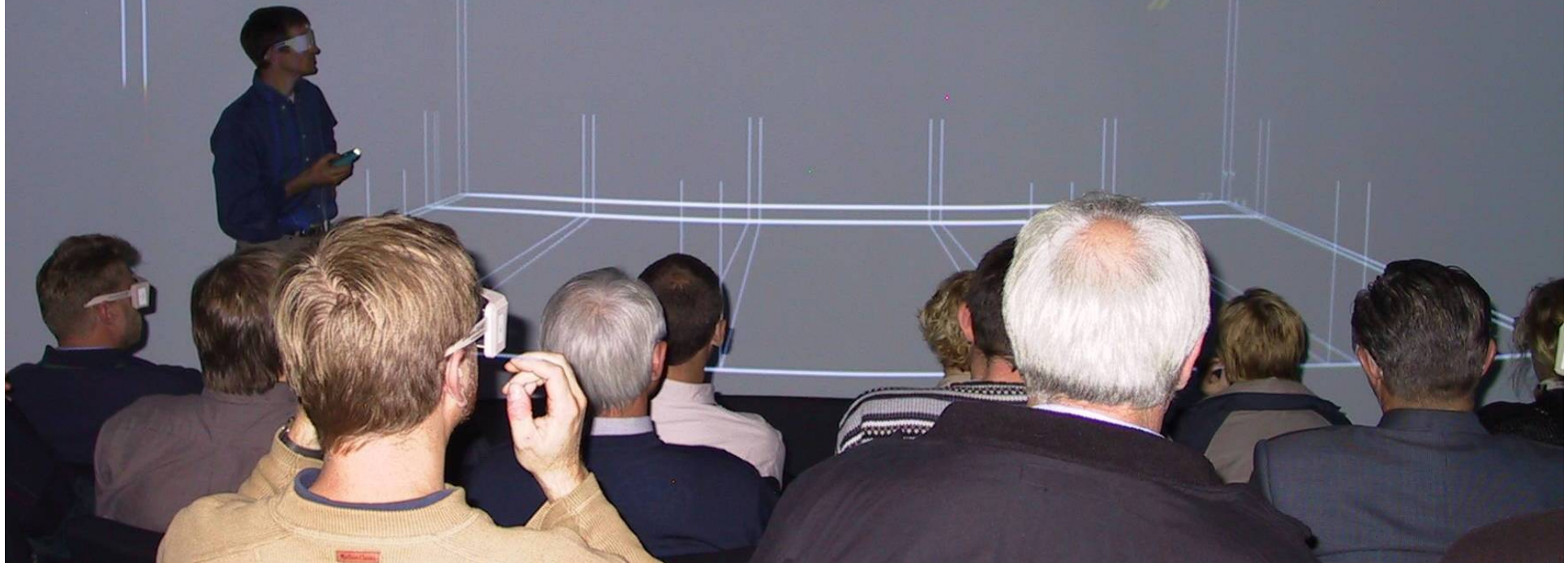


### Panorama

- Ø 7.1m, 160°, H 3.5m
- Mono & *aktive* stereo
- 28 persons
- Tracking



# Panorama

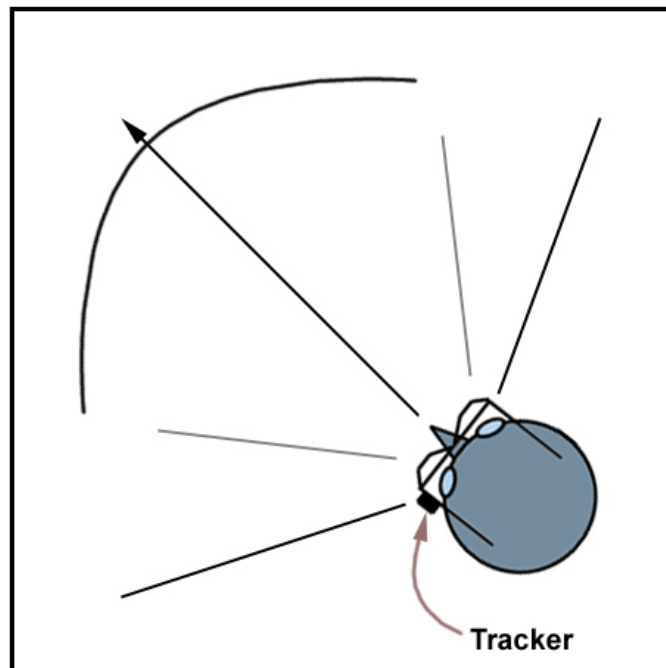


# Panorama





## VR facilities at Aalborg University (3)



### 6-sided CAVE

- 2.5m x 2.5m x 2.5m
- Back projektion
- *Aktive stereo*
- 1 person ***with tracking***,  
+ a few observers ***without tracking***

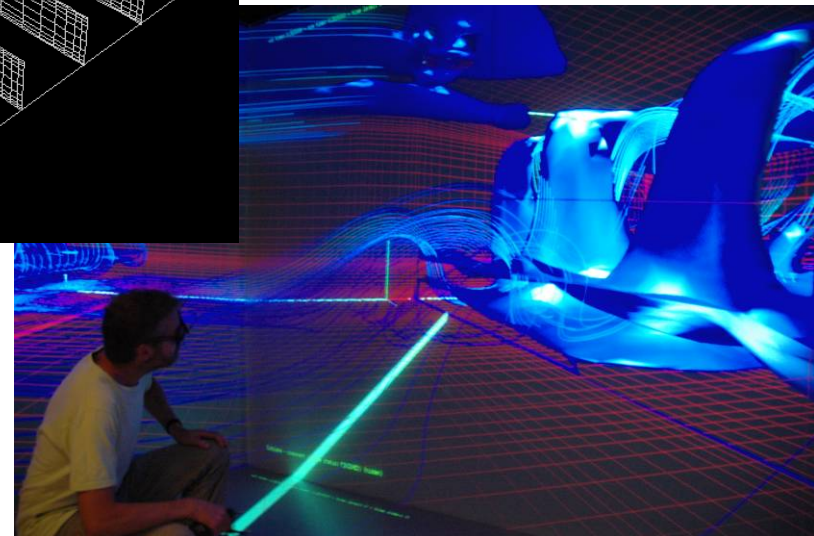
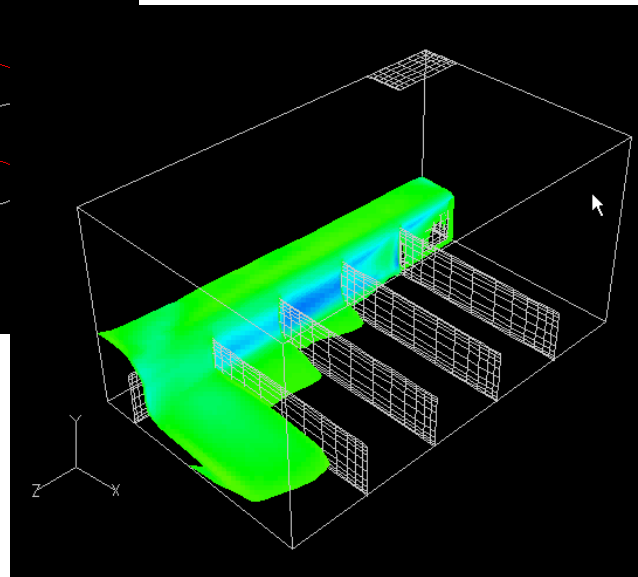
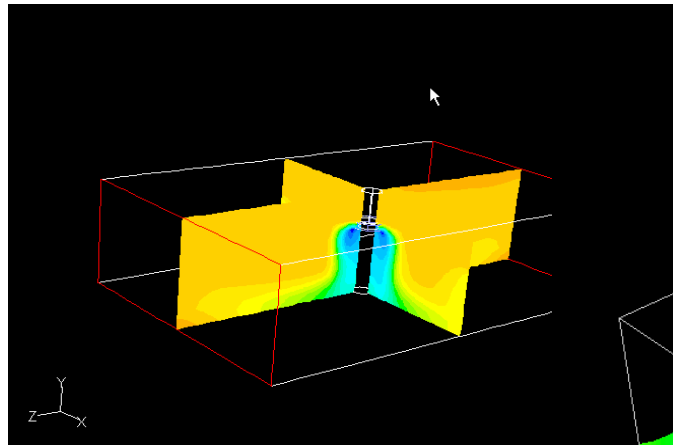
## VR facilities at Aalborg University (4)

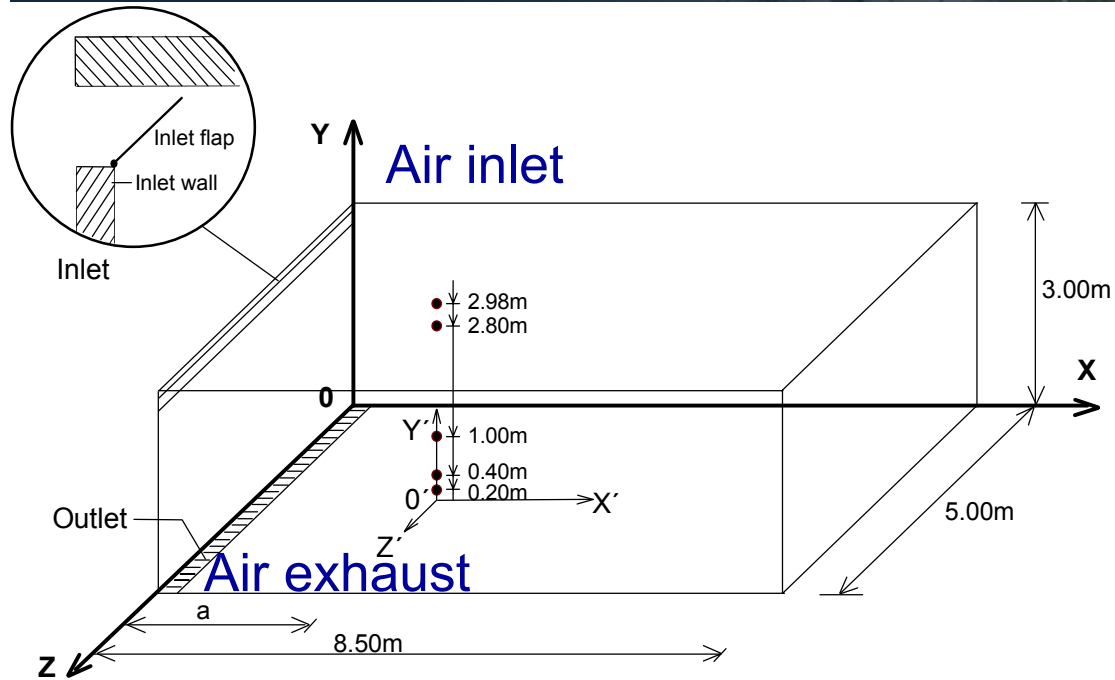
### Portable equipment

- 2.5m x 3.5m
- Portable projector and PC
- *Passive* stereo
- 30 persons +



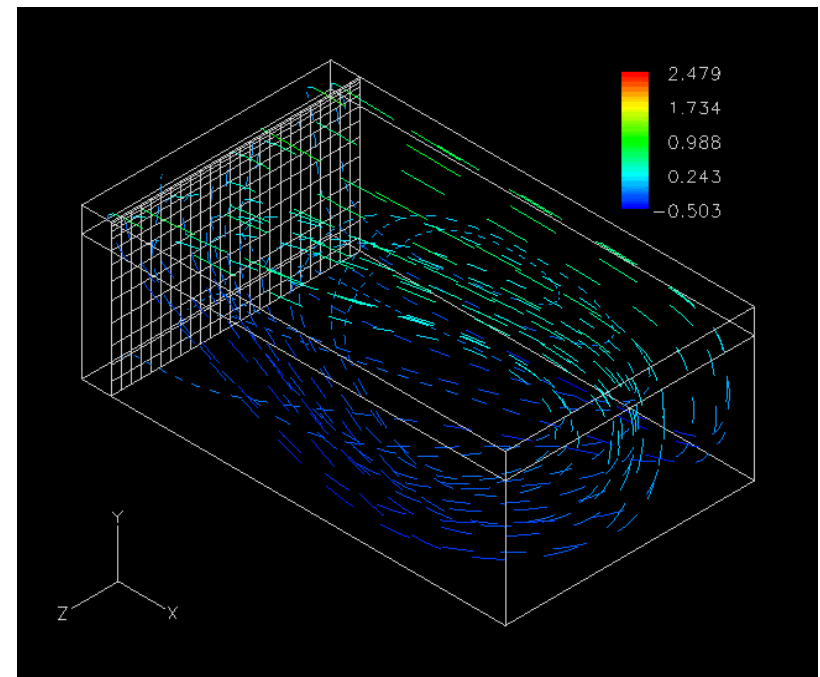
## Project examples

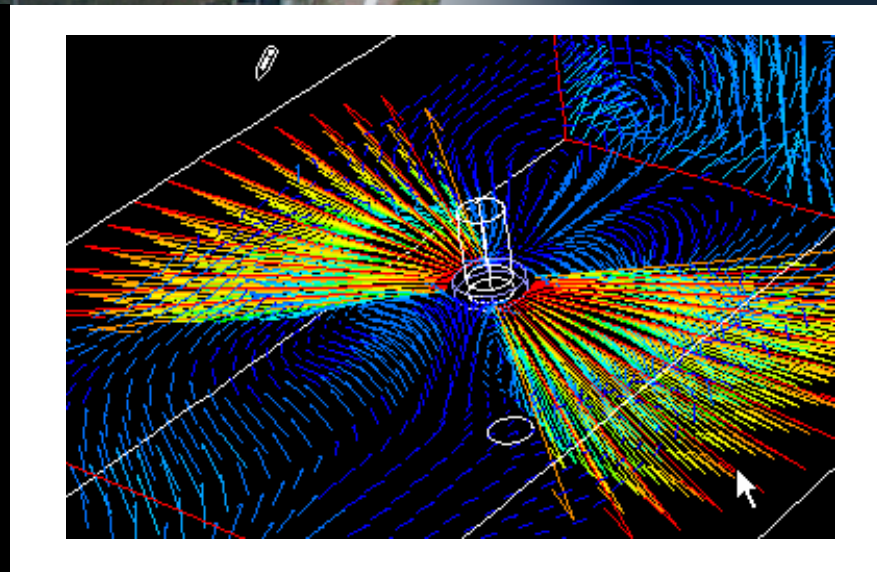
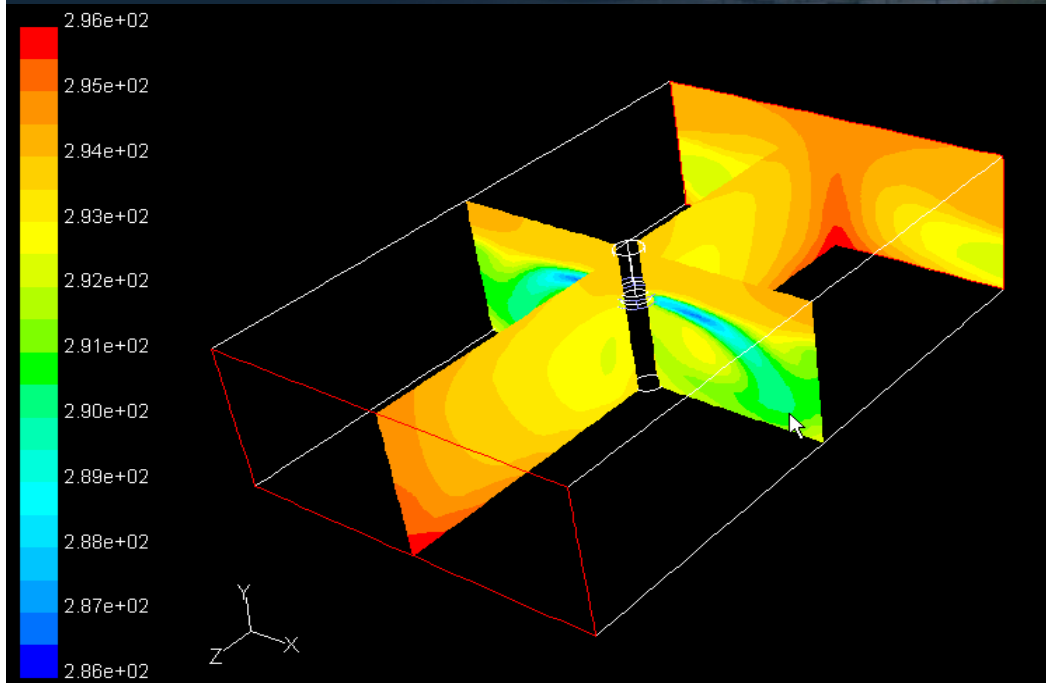




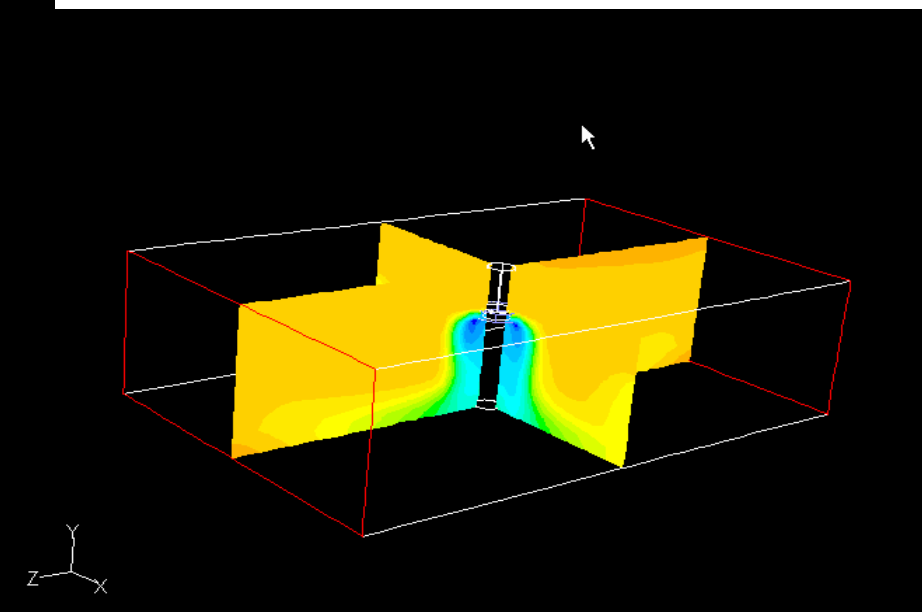
## Airflow in livestock buildings

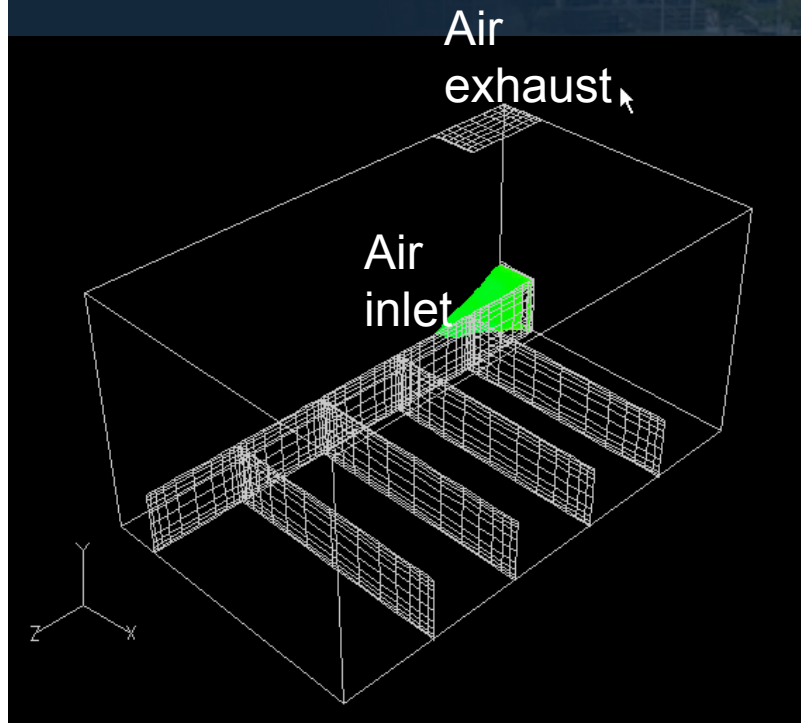
### 3D airflow in a laboratory set-up with an isothermal slot inlet





## Airflow in a room with a radial inlet device

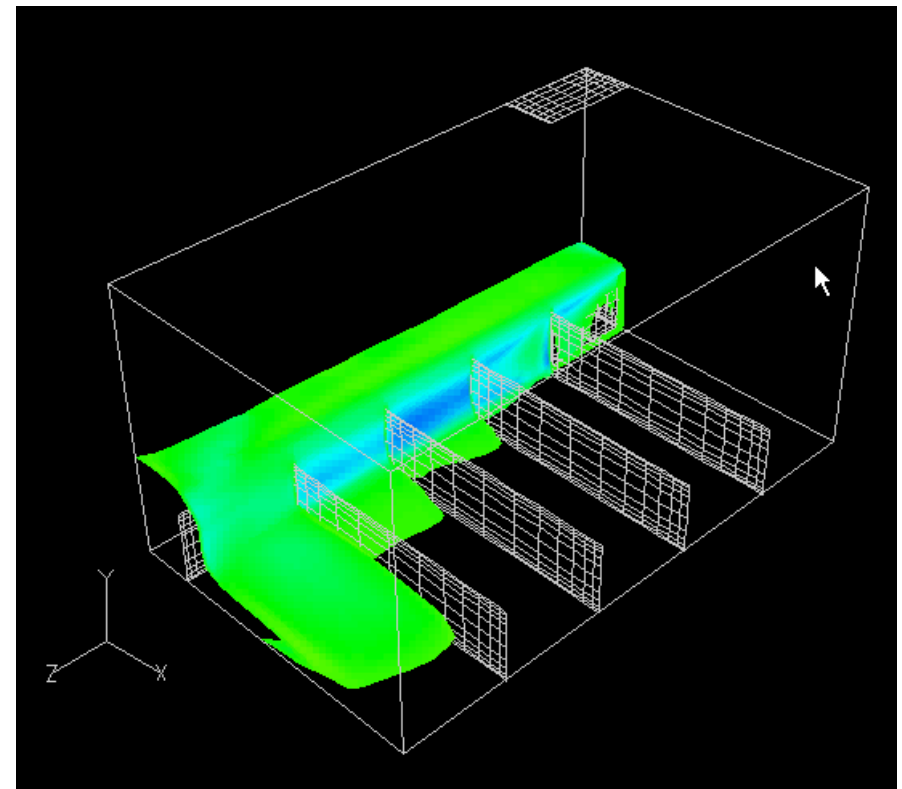




## Airflow in livestock buildings

### Airflow in a room with closed pen partitions and displacement ventilation

CFD simulation by  
Bjarne Bjerg, KVL



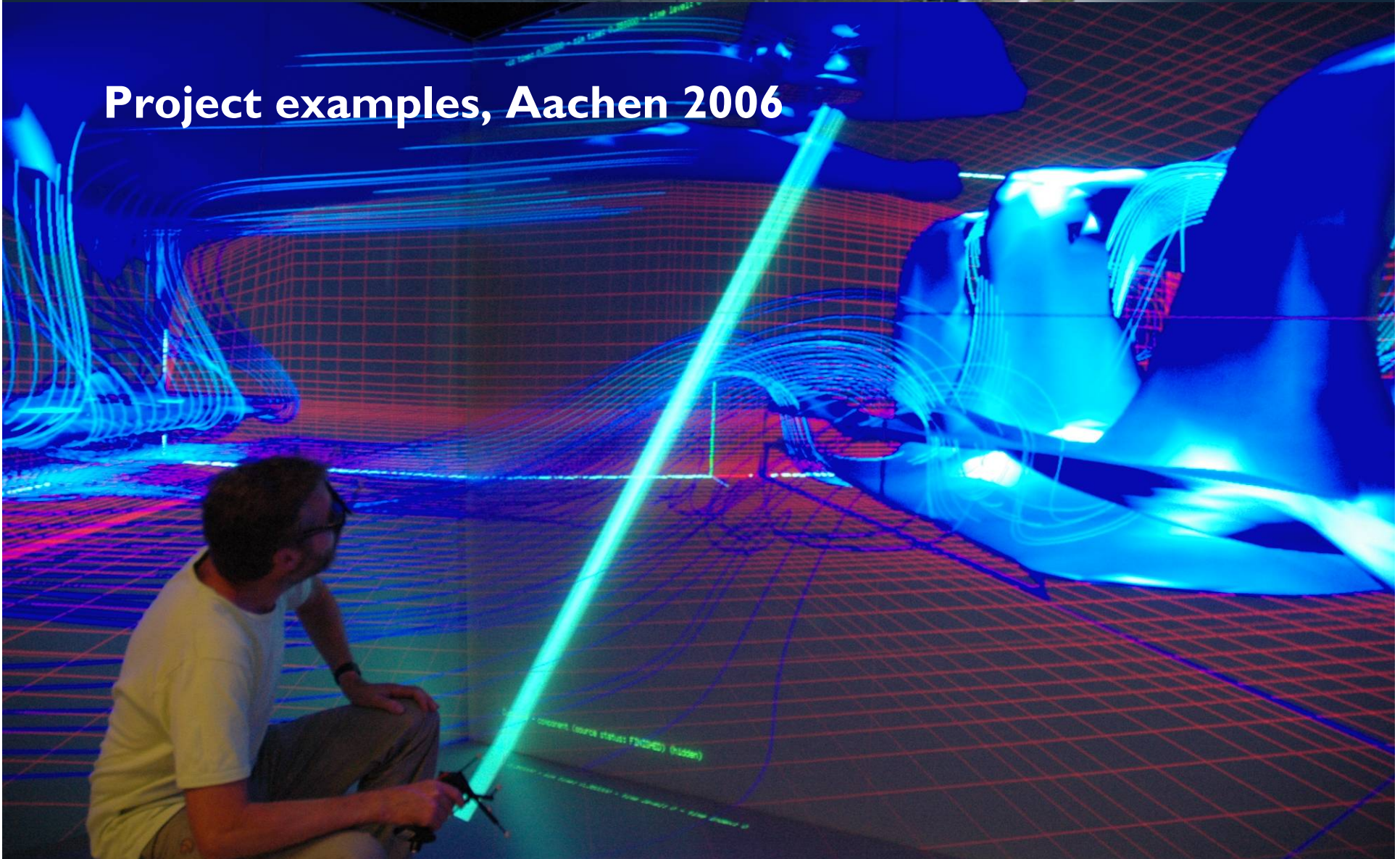


## Project examples, Aachen 2006



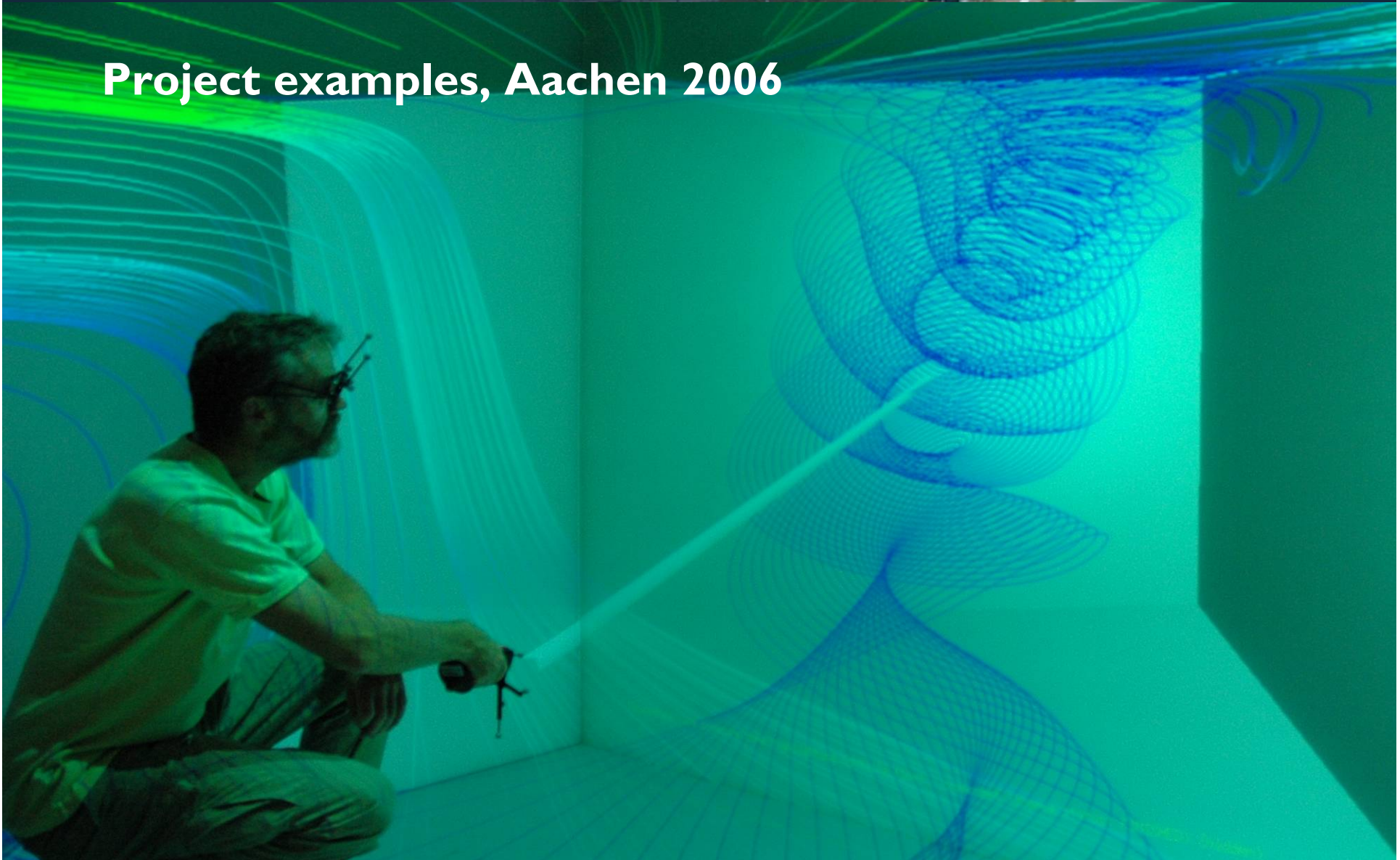


# Project examples, Aachen 2006





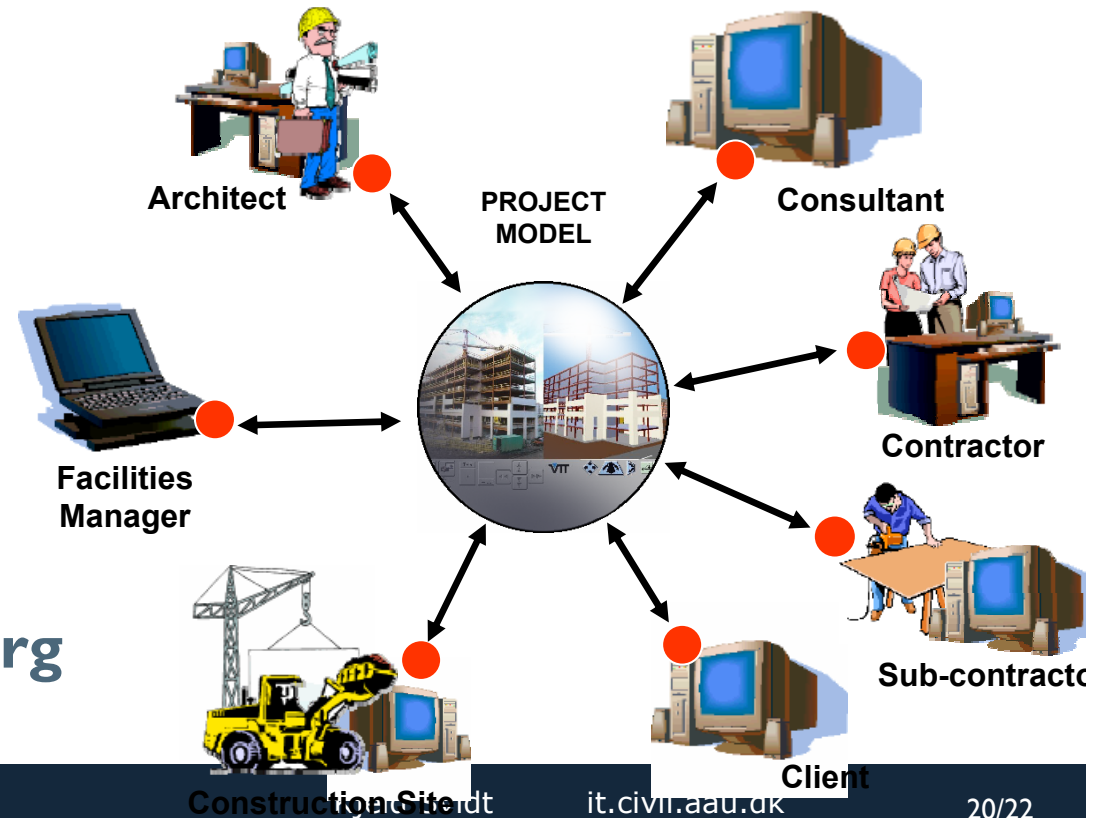
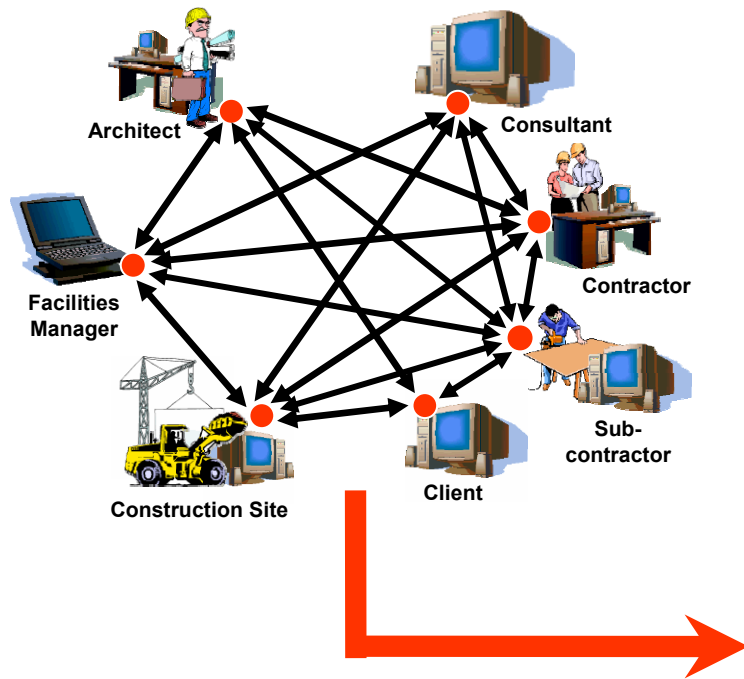
## Project examples, Aachen 2006



# VR for the AEC Sector



Integrated Virtual Prototyping tools can improve communication between stakeholders



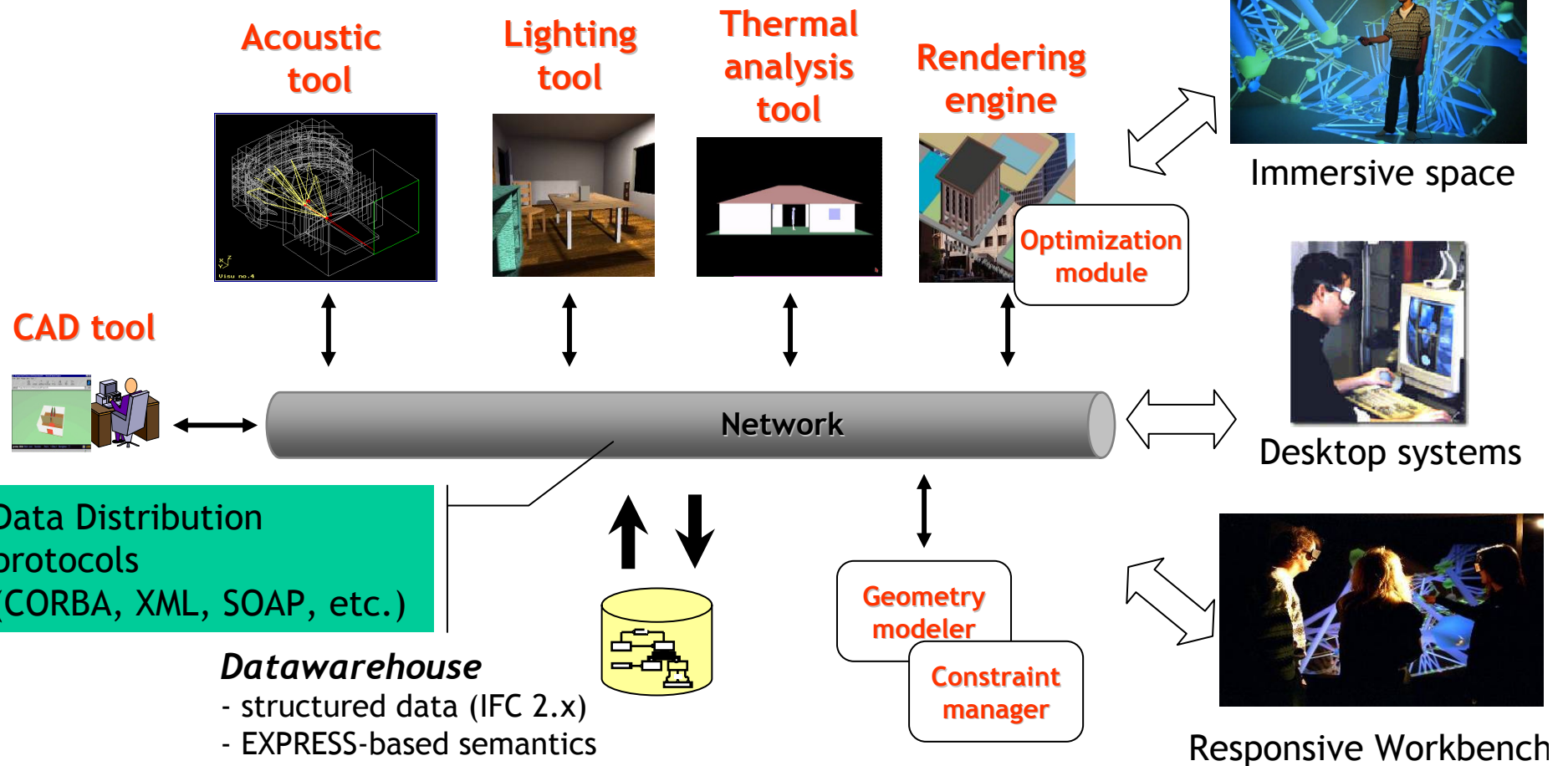
Project examples Aalborg



# Integrate Components



information  
society  
technologies



## References

- Bjarne Bjerg, KVL, [www.iph.life.ku.dk/](http://www.iph.life.ku.dk/)
- VR MediaLab, Aalborg University, [www.vrmedialab.dk](http://www.vrmedialab.dk)
- RWTH, Aachen, <http://www.rz.rwth-aachen.de/vr/>