



# Fire research group

LTH - LUND UNIVERSITY



# The FSE group

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- Part of the Department of Building and Environmental Technology of LTH, Lund University
- 7 members of research staff and 17 PhD (6 internal and 11 industrial at the moment)
- More than 25 years of experience
  - One of the firsts to start FSE education in Europe
- Strategic positions in IAFSS and ISO/TC92 Fire safety



# Educational involvement

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## BSc. FSE

- Responsible for education
- ~50 students/year
- Swedish program

## MSc. Risk Management

- Course participation
- 20-30 students/year
- Swedish

## International Master of Science in FSE

- Erasmus mundus
- Edinburgh and Ghent
- ~20 students/year
- International background
- English



# Research in FSE at LTH

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- Several national and international projects



# Research area: PBD

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- Performance based engineering both probabilistic and analytical based:
  - Risk based design of structures
  - Design of buildings, high rise, schools, nuclear power plants
  - Methodology for multifunctional buildings against antagonistic attacks
  - Arson fires in schools
  - Role of fire rescue services
  - Role of active/passive systems



# PBD in multifunctional buildings

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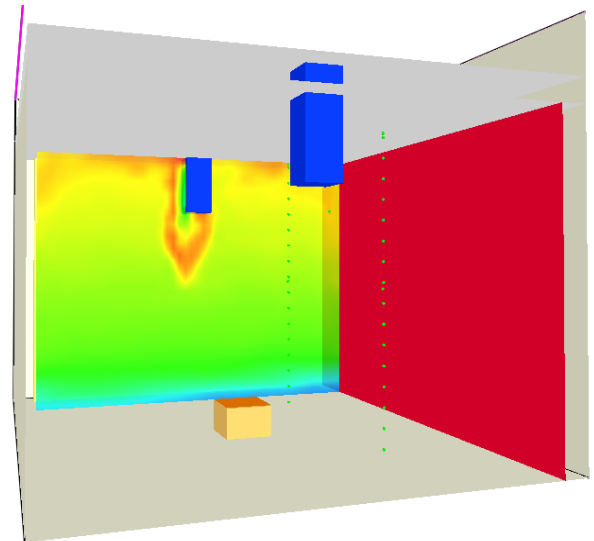
- Complex buildings – more than one societal function
- Risk for antagonistic attack is high
  - Shopping malls, offices, apartments, hotels
  - More than one mean of transportation e.g. underground, railway, bus station, airport



# Research area: Modelling

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- Validation and development of advanced (CFD) and empirical models for PBD:
  - Simple engineering models
  - Sub models for ventilation in FDS (CFD)
  - Pyrolysis models for pool fires
  - Evaluation and validation of FireFoam
  - Design fires for cables
    - » John Barton



# Research area modelling: pool fires for nuclear power plants

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- Interaction pool fire - room environment in CFD and tests
  - Hot layers influence
  - Ventilation effects
- Part of PhD project and international OECD project





# Research area: Fire development

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- Modelling of buildings products, content and barriers (EU Marie Curie project – FireTools)
- Fires in construction elements
- Industrial fires
- Large national project on residential fires
- Hypoxic air systems
  - John Barton
- International project on self ignition/glowing





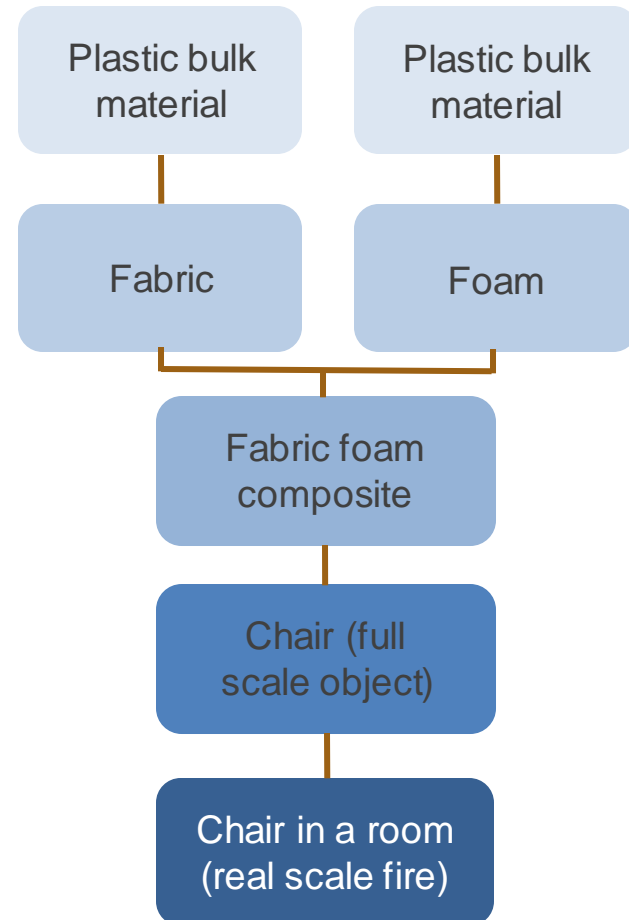
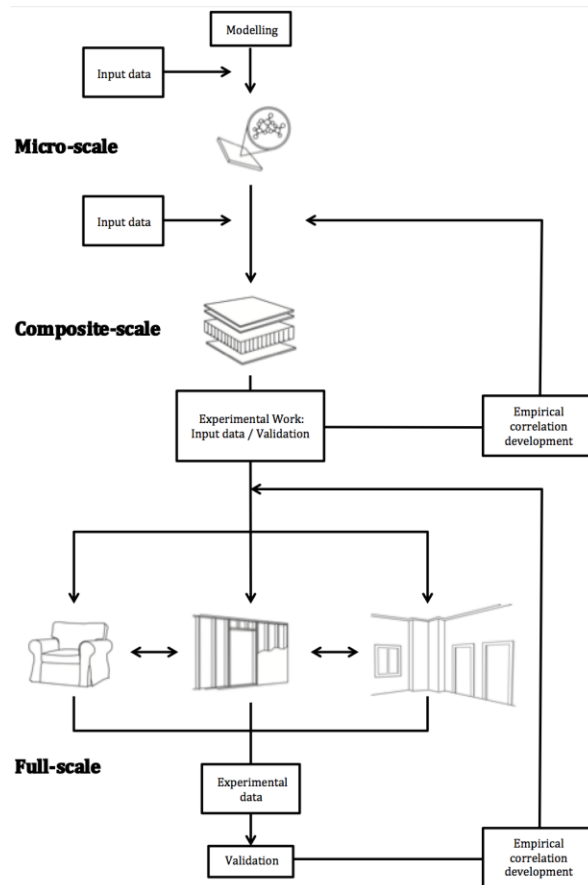
# FireTools – PhD project

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- Marie Curie programme EU
- Five industrial PhD students
- Project with DBI Denmark
- Overall objective:
  - provide tools to obtain fire properties of products and construction elements on a continuous scale by means of material data of which they are composed off
- Areas: linings, cables, furniture, fire walls



# FireTools – PhD project



# Research area: Human behavior in fire

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- Methods in research
  - Hypothetical scenario experiments
  - Laboratory experiments
  - Field experiments
  - Modelling (see also Enrico)
  - Evaluation of data
    - » Equipment and methods



# Research area: Human behavior in fire

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- Stair evacuation
- Evacuation in tunnels
- Evacuation in high-rise buildings
  - Elevators
  - Refuge areas
- Evacuation in multifunctional buildings (MSB)
- Experimental activities both real and virtual environment
- Modelling of evacuation



# Ascending evacuation in long stairs

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- Effect of fatigue
- Multidisciplinary approach
- Trafikverket
- Up to 30 floors



# Ascending evacuation in long stairs



- Ideon Gateway
- Lund
  - 74 m tall
  - 13 floors

Ideon Gateway



- Kista Tower
- Stockholm
  - 117 m tall
  - 30 floors

Kista Tower



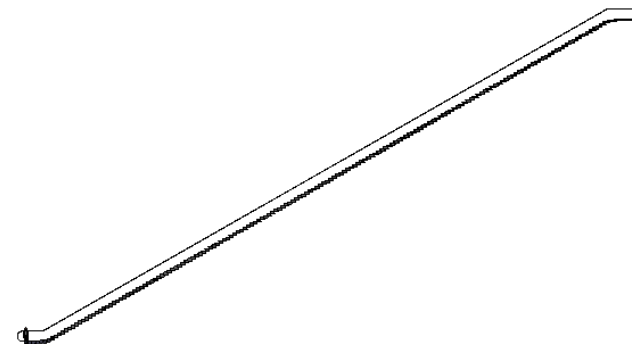
- Västra Skogen
- Stockholm
  - 33 m tall
  - ~10 floors

Västra Skogen



- Laboratory
- Lund
  - Different speeds

Laboratory



# New areas of research

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- Research as support to fire rescue services
  - IR camera
- Research in active systems
  - Water mist, sprinkler





# Conclusion

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- Vast and long experience
- One of the most complete areas of research disciplines in FSE
- Visit our website!
  - [www.brand.lth.se](http://www.brand.lth.se)



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