



## Fire Risk Evaluation and Defence-in-Depth (FIRED)



Aalto University

**SAFIR2018 INTERIM SEMINAR**  
**23.-24.3.2017**

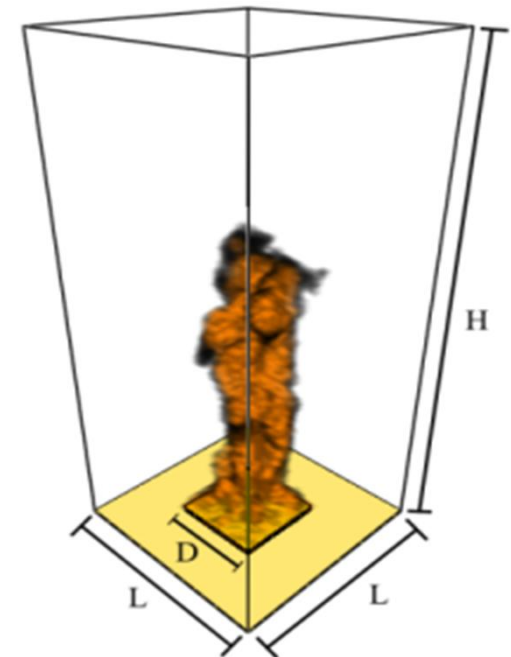
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# FIRED

The main objective of the FIRED project is to develop tools for fire risk evaluation and create a new methodology for assessing the defense-in-depth in the context of fire safety.

The research concentrates on four main topics:

1. Cable fire risks during plant life cycle,
2. Performance of the fire-barriers,
3. Tool development, maintenance and validation, and
4. Participation and utilization of OECD/NEA PRISME2 and PRISME3 projects.



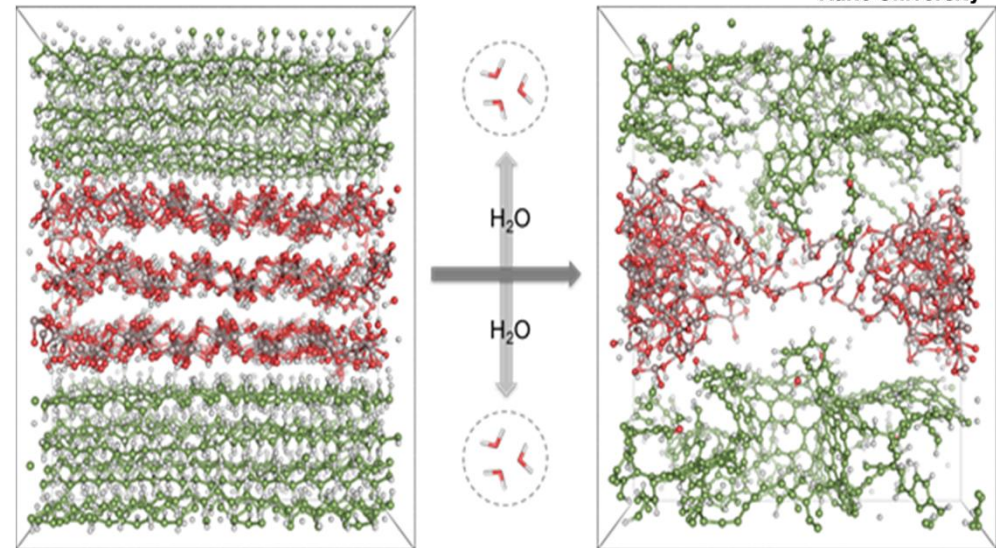
# FIRED highlights 2015-2016: Reactive molecular dynamics for studying flame retardants in cables

First stage: Proof-of-concept.

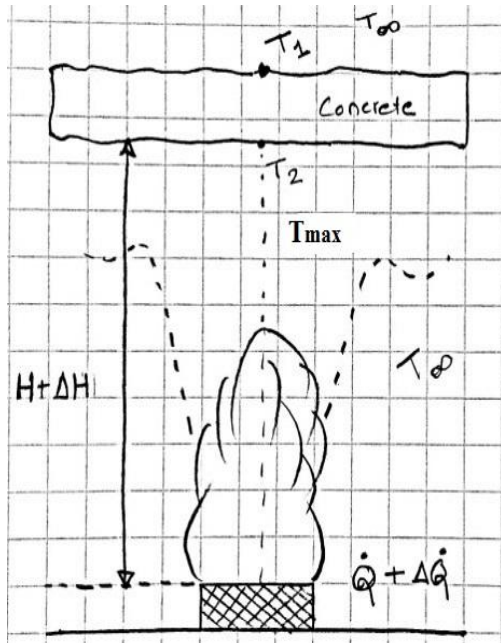
- We were able to reproduce the known mechanism of ATH flame retardant using RMD.

The long-term objectives:

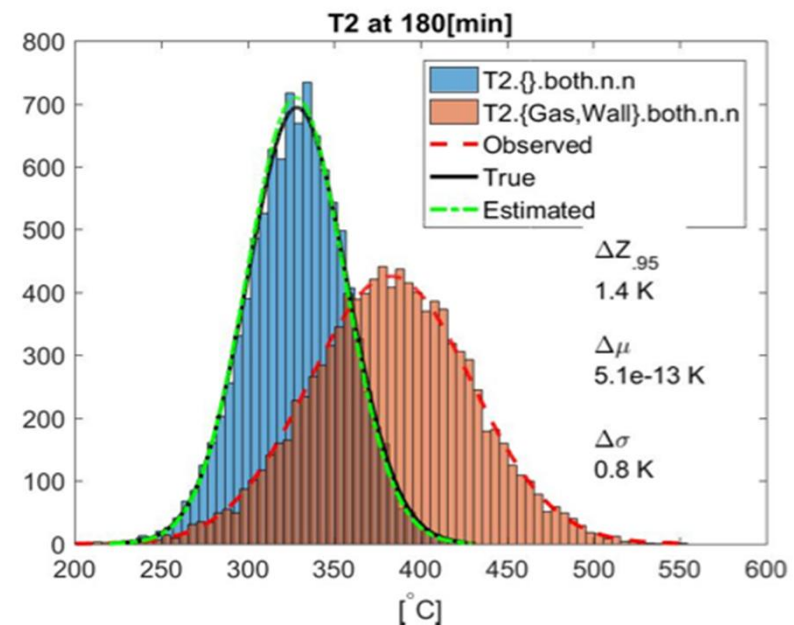
- using RMD to predict pyrolysis pathways of polymers relevant for NPP cable applications, both with and without the presence of flame retardant agents,
- complementing the predicted pathways with experimental information, thus creating kinetic pyrolysis models for practical fire dynamics simulations,
- using RMD to predict both the rate-determining reactions and their associated kinetics, ultimately, for pyrolysis models completely based on theoretical predictions.



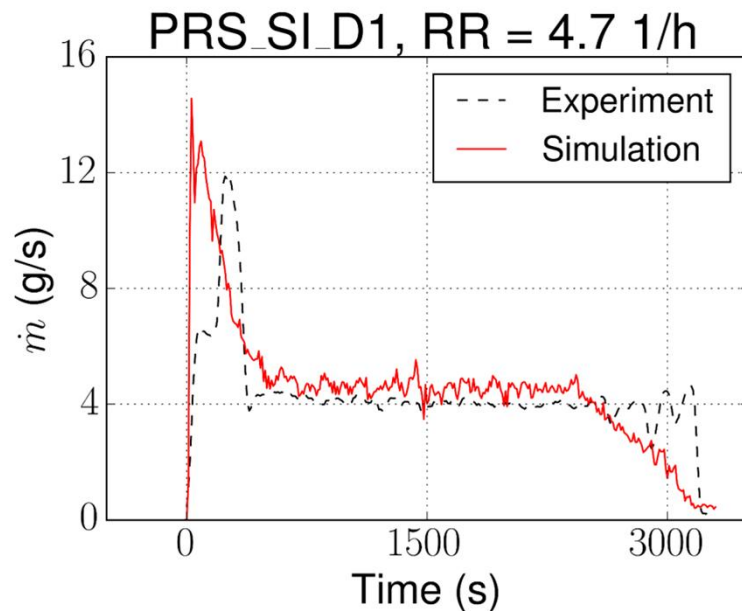
# FIRED highlights 2015-2016: Fire-barrier performance assessment



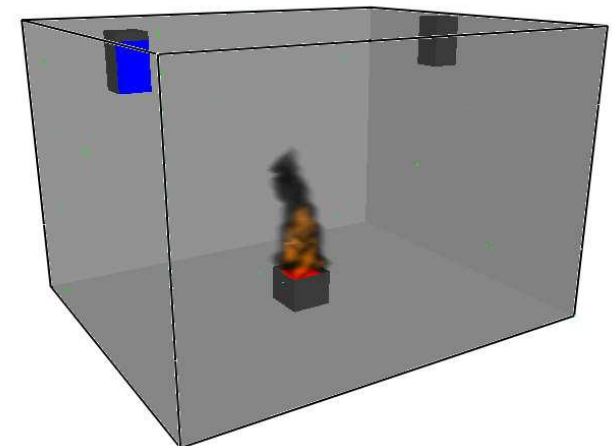
- Study of the uncertainty chain of numerical models, where the output of one model serves as an input to another, and
- Methodology to estimate the true output distribution from the simulated output with a priori knowledge of model uncertainty.



# FIRED highlights 2015-2016: Developing and validating CFD models for liquid pool fires



- We managed to predict the burning rate of a liquid pool fire in a mechanically ventilated compartments (as NPP).
  - Suggests that also solid phase pyrolysis will be possible.
- Challenge: predicting heat feedback from flame (grid sensitivity)







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