



COST Action FP0802

Working group discussion Single fibre testing WG3 - Modelling

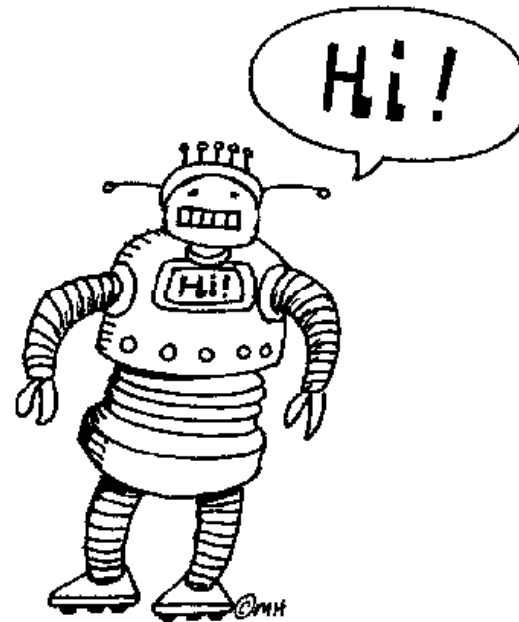
COST = European Cooperation in Science and Technology

Suggested agenda

- Presentation
- General information: COST Action & WG3
- How can modelling be useful?
- Example by Sören Östlund & Mikael Magnusson, KTH
- Contributed slides
- General discussion
- Example by Fredrik Thuvander & Carl-Henrik Ljungqvist, Karlstad
- General assembly STFI lecture hall at 1:00 pm

Brief presentation

- Name
- Function
- Affiliation
- Research interests



COST , cf. www.cost.esf.org:

- **Intergovernmental framework for European Cooperation in Science and Technology**
- **Allow coordination of nationally-funded research on a European level**
- **COST contributes to reducing the fragmentation in European research investments**
- **Opening the European Research Area to cooperation worldwide**



Hundreds of Actions listed on ESF's homepage...

[G7 | Artwork conservation by Laser \(End date: May 2005\)](#)

[IE0601 | Wood Science for Conservation of Cultural Heritage \(WoodCultHer\) \(End date: April 2011\)](#)

[MP0601 | Short Wavelength Laboratory Sources \(End date: April 2011\)](#)

[MP0602 | Advanced Solder Materials for High Temperature Application \(HISOLD\) \(End date: May 2011\)](#)

[MP0603 | Chemical Imaging by Means of CARS-microscopy \(MicroCARS\) \(End date: April 2011\)](#)

[MP0604 | Optical Micro-Manipulation by Nonlinear Nanophotonics \(End date: May 2011\)](#)

[MP0701 | Composites with Novel Functional and Structural Properties by Nanoscale Materials \(Nano Composite Materials-NCM\) \(End date: March 2012\)](#)

[MP0702 | Towards Functional Sub-Wavelength Photonic Structures \(End date: January 2012\)](#)

[MP0801 | Physics of Competition and Conflicts \(End date: June 2012\)](#)

[MP0802 | Self-assembled Guanosine Structures for Molecular Electronic Devices \(End date: June 2012\)](#)

[MP0803 | Plasmonic Components and Devices \(End date: June 2012\)](#)

[MP0804 | Highly Ionised Pulse Plasma Processes \(End date: 25 June 2013\)](#)

[MP0805 | Novel Gain Materials and Devices Based on III-V-N Compounds \(End date: November 2012\)](#)

[MP0806 | Particles in turbulence \(End date: November 2012\)](#)

[MP0901 | Designing Novel Materials for Nanodevices - from Theory to Practice \(NanoTP\) \(End date: May 2013\)](#)

[MP0902 | Composites of Inorganic Nanotubes and Polymers \(COINAPO\) \(End date: May 2013\)](#)

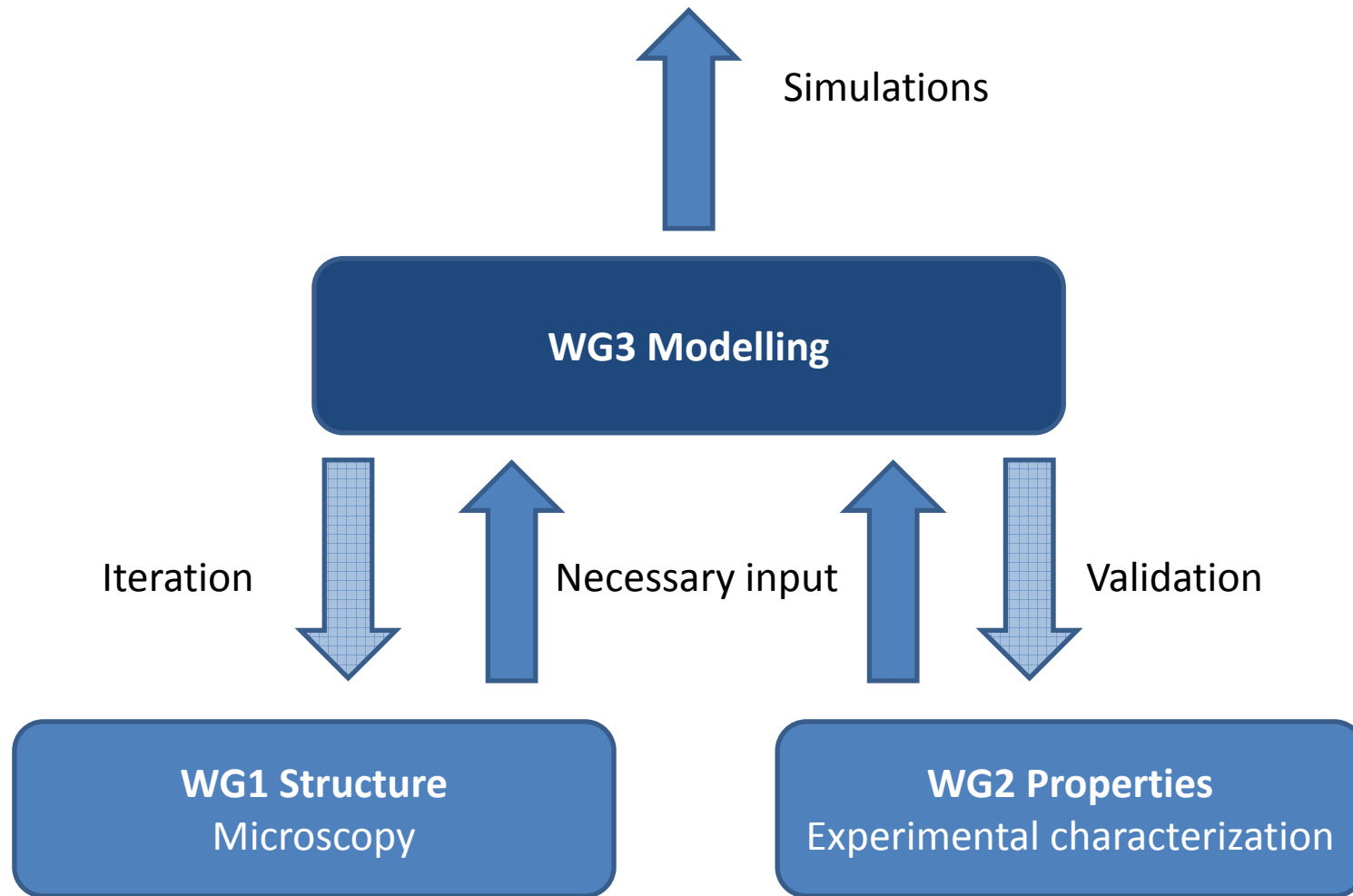
[P10 | Physics of Risk \(End date: June 2008\)](#)

[P11 | Physics of Linear, Non-linear and Active Photonic Crystals \(End date: November 2007\)](#)

[P12 | Structuring of Polymers \(End date: December 2007\)](#)

[P13 | Forging the Missing Link: From Molecular Simulations to Nanoscale Experiments \(End date: June 2008\)](#)

Purpose of WG3



Activities (per year)

- 1 annual meeting (~ conference)
- 1 working group meeting (~ workshop)
- 1 PhD course (ECTS credited)
- Short-term scientific missions
- Young researchers: Conference subsidy

Short-Term Scientific Mission - STSM

- Aims to strengthen the existing network, especially for early stage researchers
- Funding to go to another institution or laboratory in another COST country to foster collaboration, learn new techniques, or to take measurements using instruments not available at home institution or laboratory.
- STSMs should last > 1 week, < 3 months
- Apply at www.cost.esf.org/stsm
- Application: Plan, CV, budget request to Action Chair and host institution
- Reviewed by WG leader, approved by management committee
- All members listed on FP0802 homepage: description of institutes, available infrastructure etc.

JOINT FOCUSED MEETING OF COST ACTIONS:
IE0601 "Wood Science for Cultural Heritage"
FP0801 "Experimental and Computational Micro-Characterisation
Techniques in Wood Mechanics"

Modeling mechanical behaviour of wooden cultural objects
April 12-13, 2010, Krakow, Poland

Organiser: Michal Lukomski, Institute of Catalysis and Surface Chemistry, Polish Academy of Sciences

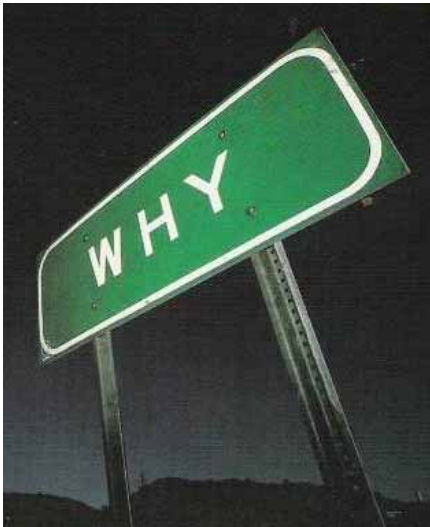


More info: Check out FP0802 or IE0601 homepage

Further plans for 2010:

- Training School: experimental techniques used to measure anatomical and mechanical properties in Potsdam (GE), May2010
- WG3, in cooperation [IE0601](#) ("Wood science for cultural heritage"), Krakow (PL), April 12-13, 2010
- Annual Workshop in Hamburg (GE), October 6-8, 2010
- Google docs – Who is Who, equipment, techniques, etc.

Why model single fibre tests?



How can modelling be of **assistance** in analysis of data from single-fibre tests?

Data reduction from structural behaviour to material (cell wall) properties

Compare bottom-up simulations with experimental results

Micromechanical modeling for single fibers

single fiber testing is helpful for

- **validation** of multiscale micromechanics models for wood

because it helps to understand **effects of**

- moisture content
- microfibril angle
- chemical composition
- boundary conditions (fiber to tissue) **on a lower level of hierarchy**

therefore, it allows to investigate **relevance of microstructural characteristics**

- required detail of modeling
- orientation of constituents
- anisotropy of constituents
- elastic range, onset of failure, ultimate limit

How can the wood modeling community be useful in interpretation and analyses of single-fibers?



- **Input:**
 - What to measure?
 - What to research?
 - How to interpret the results?
- **Output:**
 - Deeper understanding of structure e.g. fibrils
 - Effect of processing
 - Nanocellulose

Where should modeling efforts be made to improve development of single-fiber testing at large?

- **Imaging in nano-scale -->input for modeling**
 - **Verification from experimental point of view**
 - **Structure of fibers = fibrils, surfaces, pores, etc.**
 - **Processing vs. fiber structure**
- **Fiber-fiber interactions**
- **Effect of moisture**
- **Transport properties**

For discussion:

How should we deal with the scale and structure gaps between the sampling and data indications of **wood tissue / fiber bundles** or **multi-layer fibers / single fiber**?

Can any new concept of modelling work on it?

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Summary of discussion

- Modelling can be used in development of improved test methods
- Hierarchical modelling can be used in identifying critical nanoscale features
- Modelling can be used in more efficient and accurate data reduction from single fibre tests
- Top-down modelling starting with engineering properties, down to fibre properties
- Modelling can be used to rank the importance of different properties
- Missing necessary input to models from experimental experts: Transverse properties of wood fibres, suitable test methods are lacking