

GeoDict: ITWM & M2M

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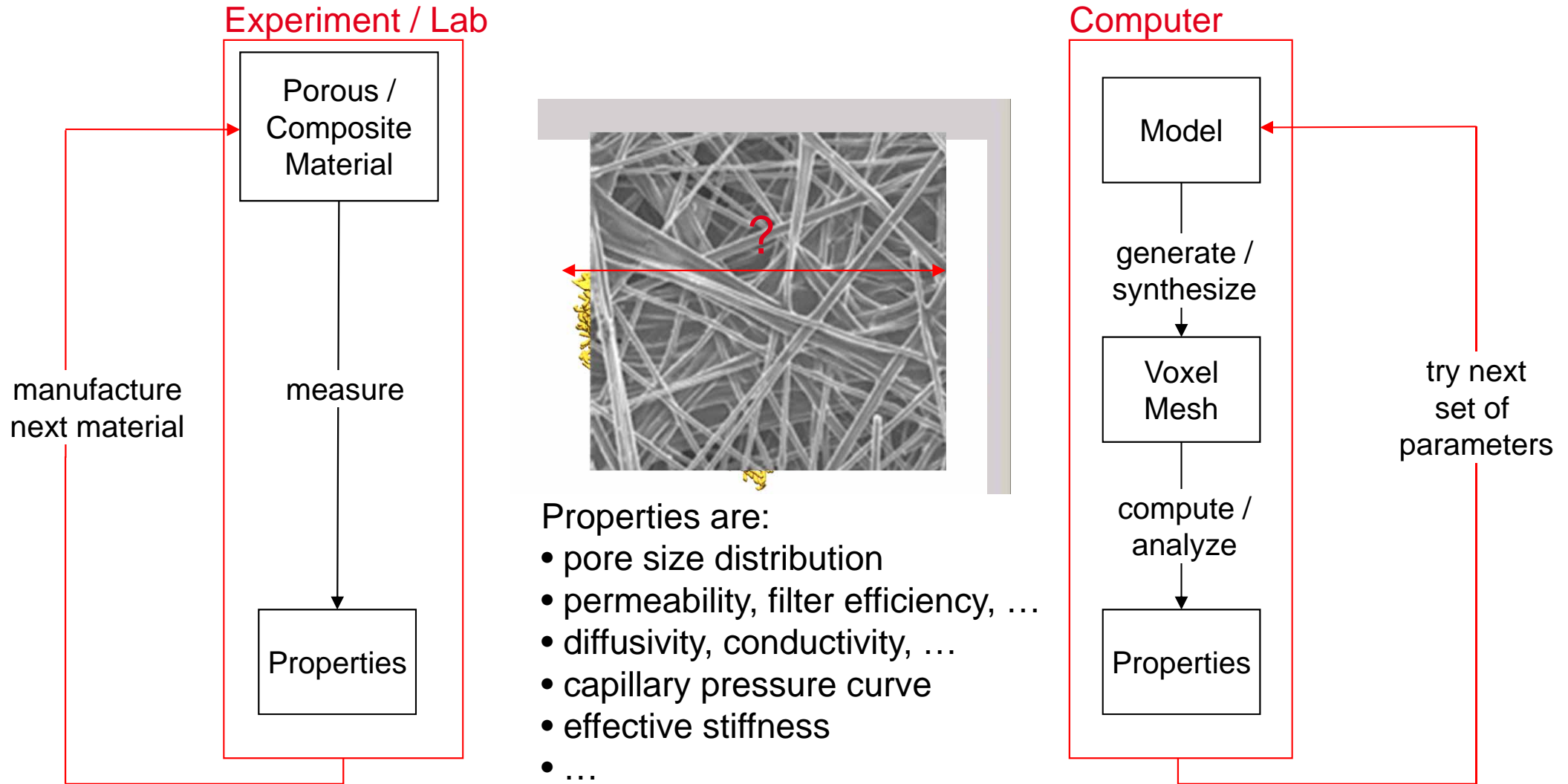
Dr. Konrad Steiner

Department head “Flow & Material Simulation” (SMS)
Fraunhofer Institute for Industrial Mathematics (ITWM)

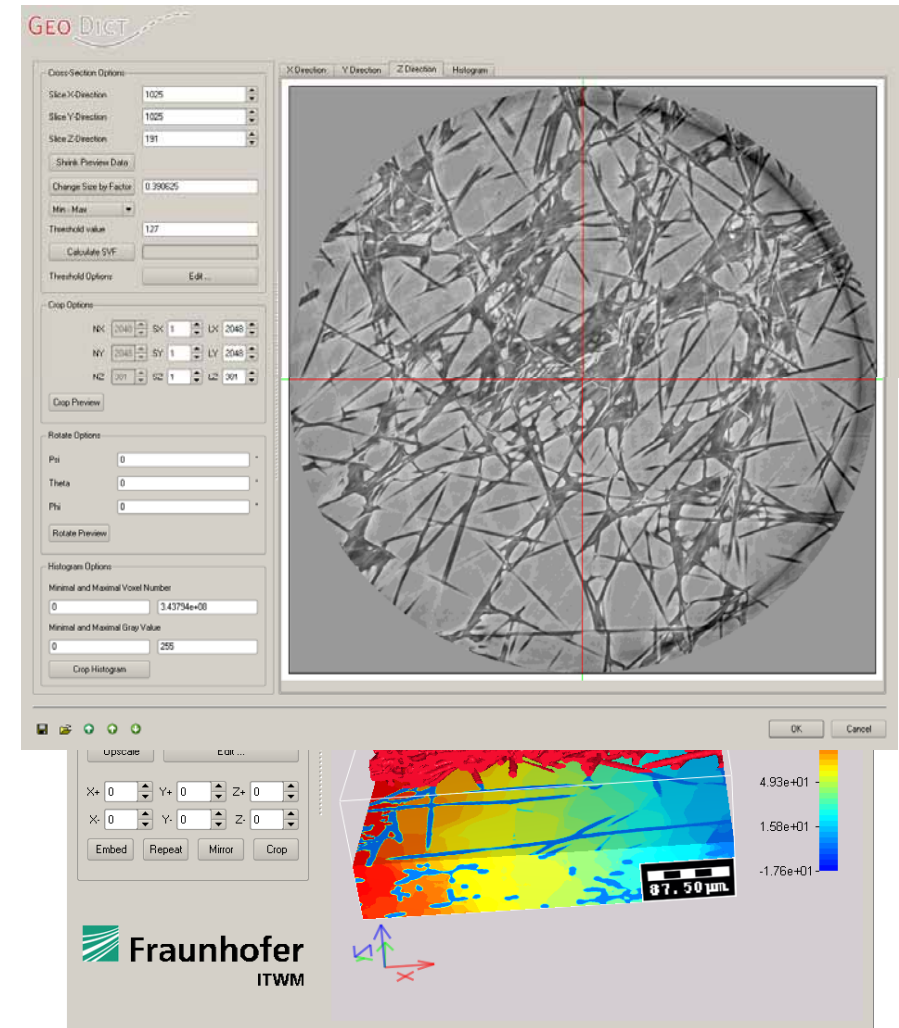
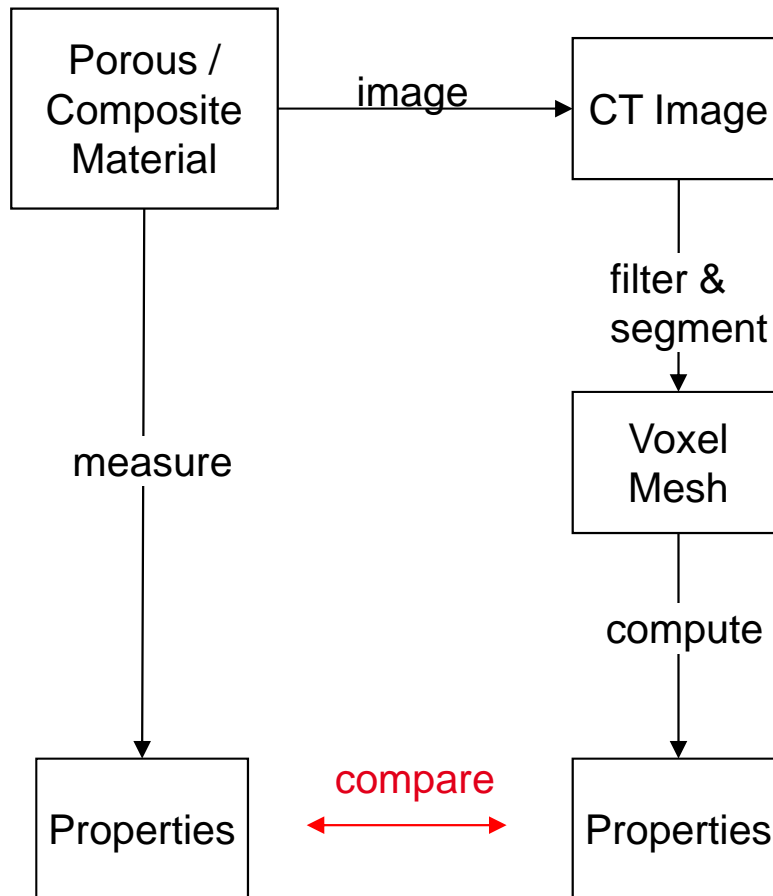
What is GeoDict?

- A graphical user interface to 15 years of project work at ITWM
- A 500,000 lines software engineering project
- A 1,000 page Users Guide
- 50+ publications and presentations
- The livelihood of Math2Market GmbH
- *The virtual material laboratory for analysis & synthesis of materials*

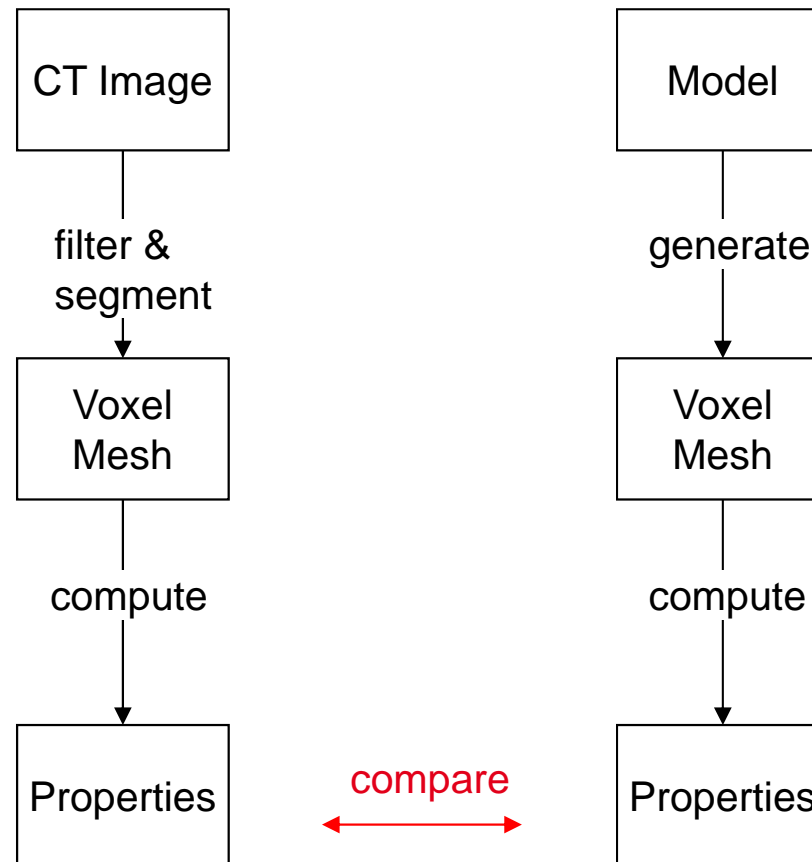
The Virtual Material Lab Approach: Computer Aided Material Engineering



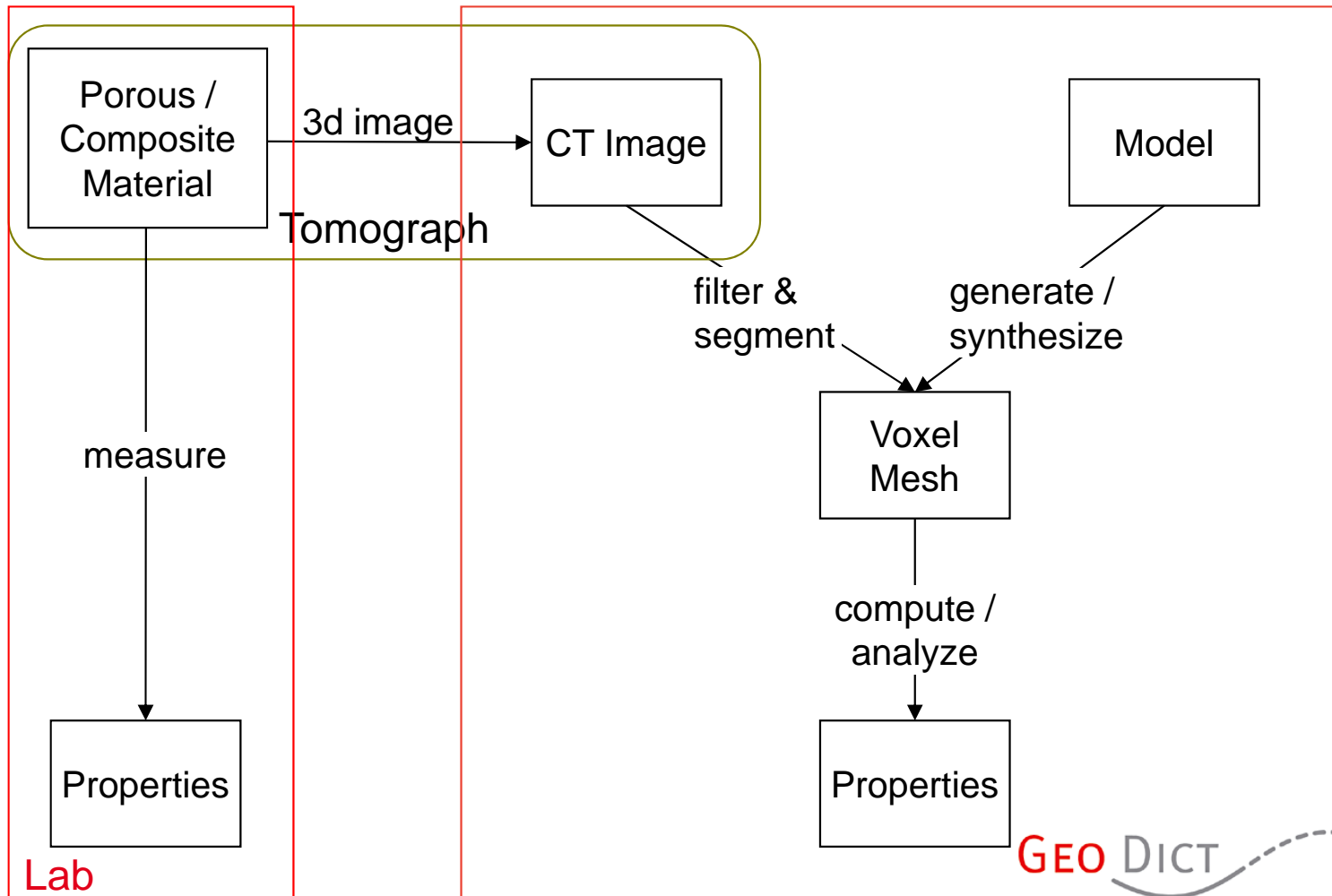
Validation - Step 1: Analysis or Property Computations



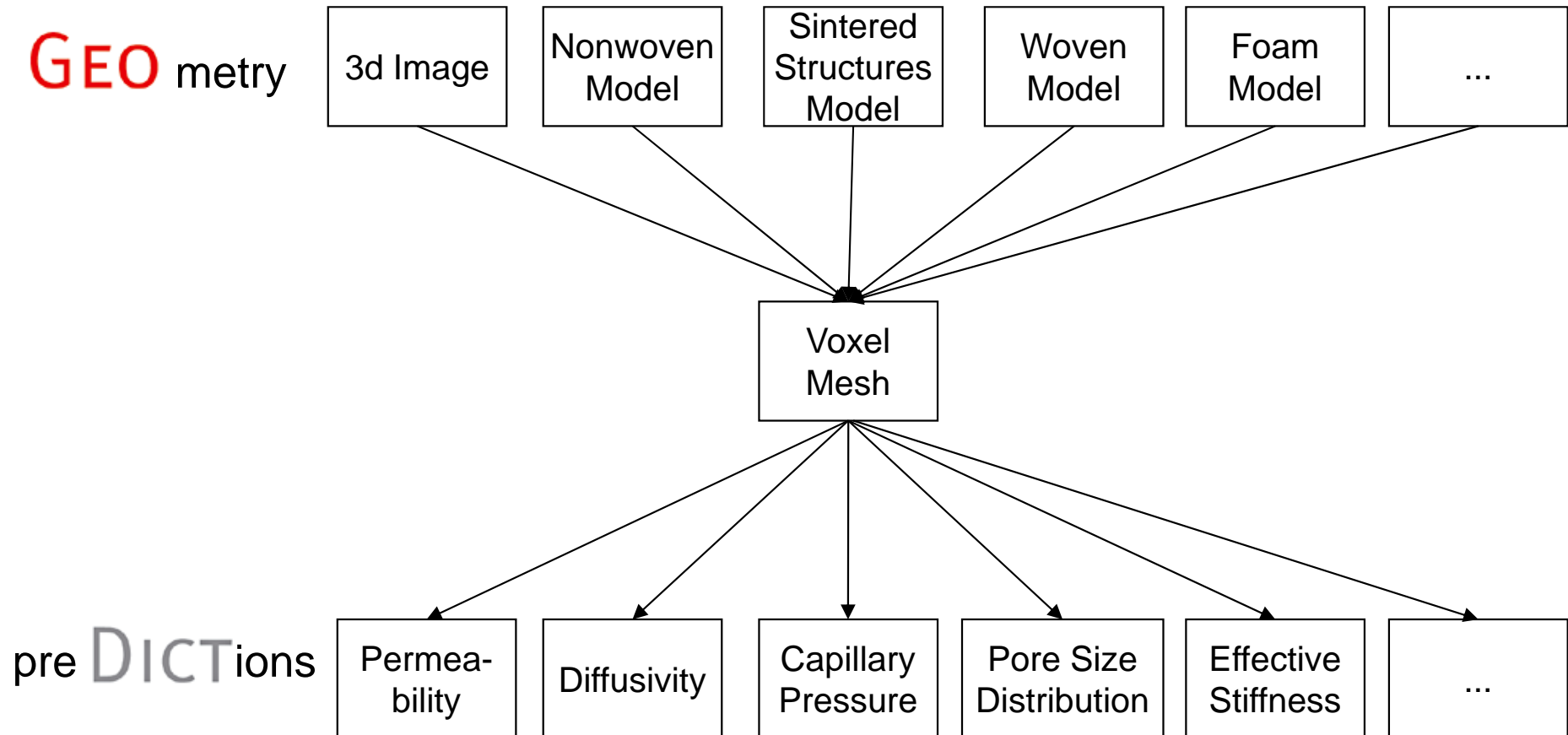
Validation - Step 2: Synthesis or Material Models



The Virtual Material Lab Approach: Computer Aided Material Engineering



The GeoDict Software



The two paths to realism...

Two parallel strategies in Fraunhofer ITWM's SMS department:

Aim at complex processes in complex geometries via

- “Classic”: complex process models in simple geometries
 - a. Focus on understanding mechanisms
 - b. Focus on projects and publications
- “GeoDict”: simpler process models in complex geometries
 - a. Geometry available through SEM and μ CT
 - b. Computational power available through 64 bit technology
 - c. Requires Math, Physics, CS / HPC, process knowledge
 - d. Focus on product and customers

The Situation of ITWM and M2M

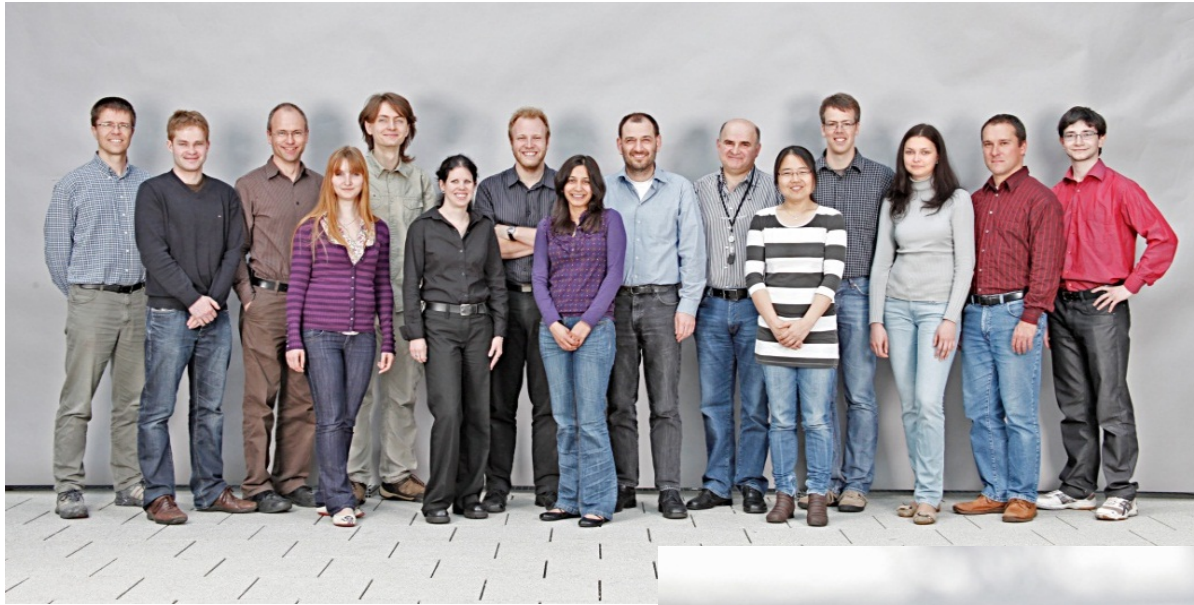
M2M pays license fees to ITWM in order to

- own, market & sell GeoDict
- add modules & features to GeoDict
- provide consulting services based on GeoDict

ITWM collaborates with M2M by

- training and educating personnel
- developing models and algorithms
- mutual customer recommendations
- supplying and supporting codes (FeelMath, ...)
- using GeoDict for public & industrial R&D projects

FLOW AND MATERIAL SIMULATION



Fraunhofer ITWM – Industrial Mathematics



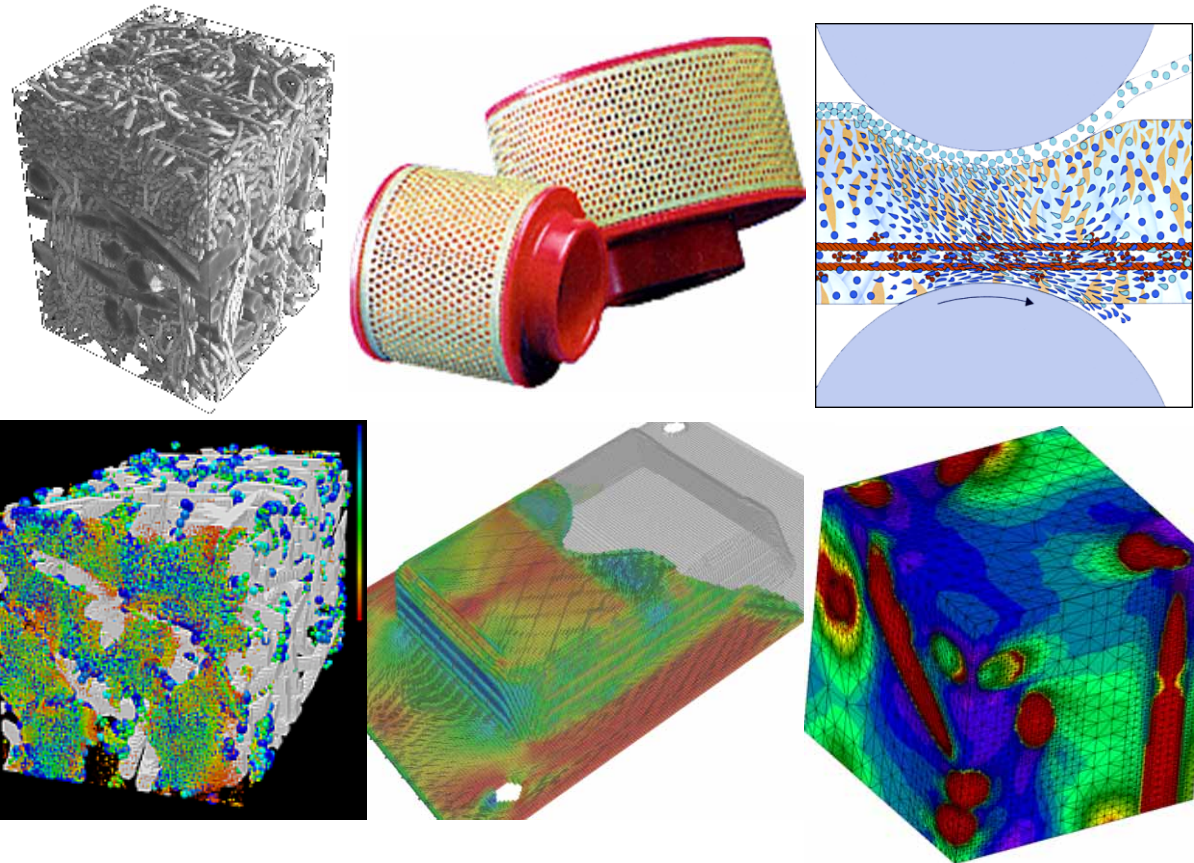
- Founded in November 1995 by Prof. Dr. Helmut Neunzert
- Fraunhofer Institute since 2001 (the first one with focus on mathematics)
- Departments
 - Transport Processes
 - **Flow and Material Simulation**
 - Image Processing
 - System Analysis, Prognosis and Control
 - Mathematical Methods for Dynamics and Durability
 - Optimization
 - Financial Mathematics
 - Competence Center »High Performance Computing«
- 260 employees and PhD students as well as around 200 research assistants
- Located in Kaiserslautern



Flow and Material Simulation

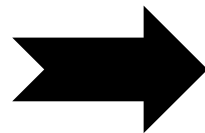
Groups:

- Hydrodynamics and CFD
- Complex Fluids
- Micro-structure simulation and virtual material design
- Mechanics of Materials



Research:

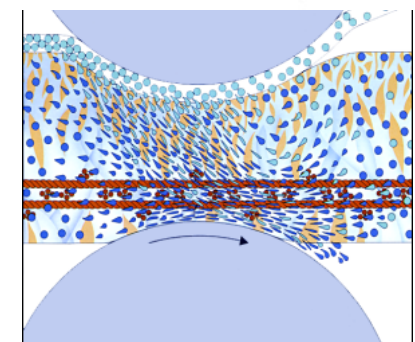
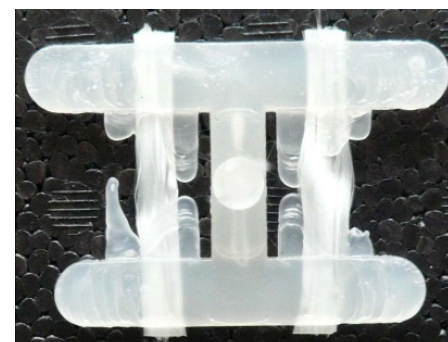
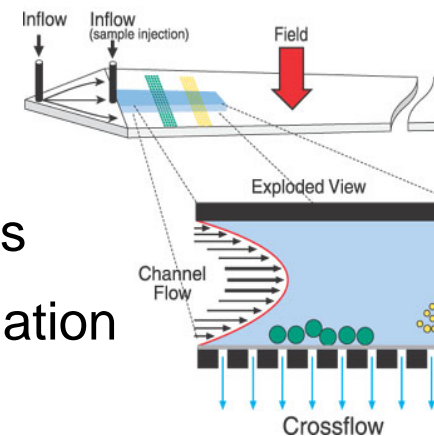
- Modeling complex physics
- Multi-scale simulation
- Efficient numerics for large complex systems



User specific software solutions

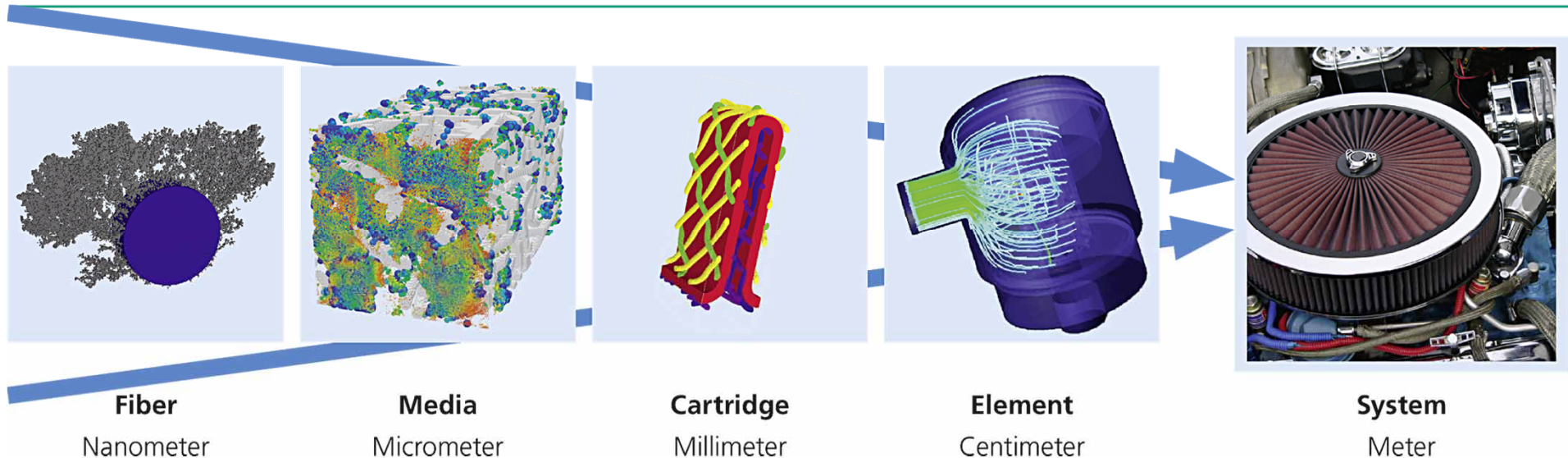
Application areas

- Porous material design (tech. Tex., Paper,...)
- Composite material design (CFK, GFK, MMC)
- Filtration (media design, filter housing)
- Fuel cell and battery performance
- Separation of suspensions, fractionation
- Injection moulding (PIM, RTM, concrete)
- Granular material processing: Silo, Mixer, Mills
- Production of paper/flake/plaster board, insulation material,



FLOW AND MATERIAL SIMULATION

”We do things, which might be available
in commercial software tools in ten years“

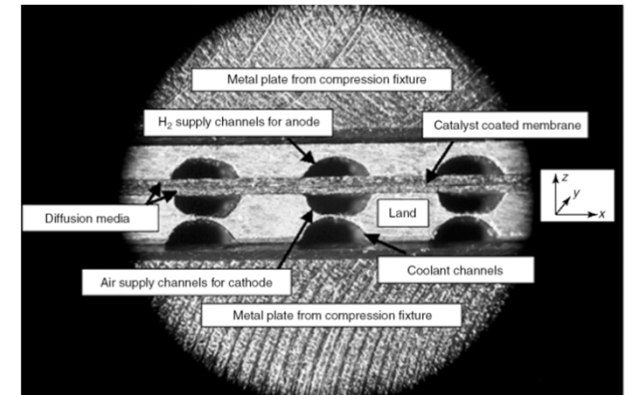


“Together with M2M we will be much faster !!!”

MATH
2 MARKET

ITWM collaborates with M2M by

- Common research and development projects
 - Direct assignment by M2M
 - Common partners in public projects
- training and educating personnel
 - talk by Sven Linden
- developing models and algorithms
 - talks by Liping Cheng, Jürgen Becker, Erik Glatt
- mutual customer recommendation
 - talks by industrial & research partners
- supplying and supporting codes (FeelMath, ...)
 - talk by Matthias Kabel
- using GeoDict for public & industrial R&D projects
 - talk by Zahra Lakdawala



Announcements

- Program is found at the back of the booklet
- WLAN access data are available at the back of the booklet
- If you do not know how to get to the dinner – talk to Cornelia
- If you want to offer a ride to the dinner – talk to Cornelia
- ... and enjoy the meeting together with the M2M* team



Barbara



Andreas



Jürgen*



Erik*



Cornelia



Liping*



Vita



Sven*