ICRI 2012 Energy Systems

Large Facilities

Wolfgang Hoffelner

Systemic and interdisciplinary view on materials. Almost all subjects could make use of large facilities

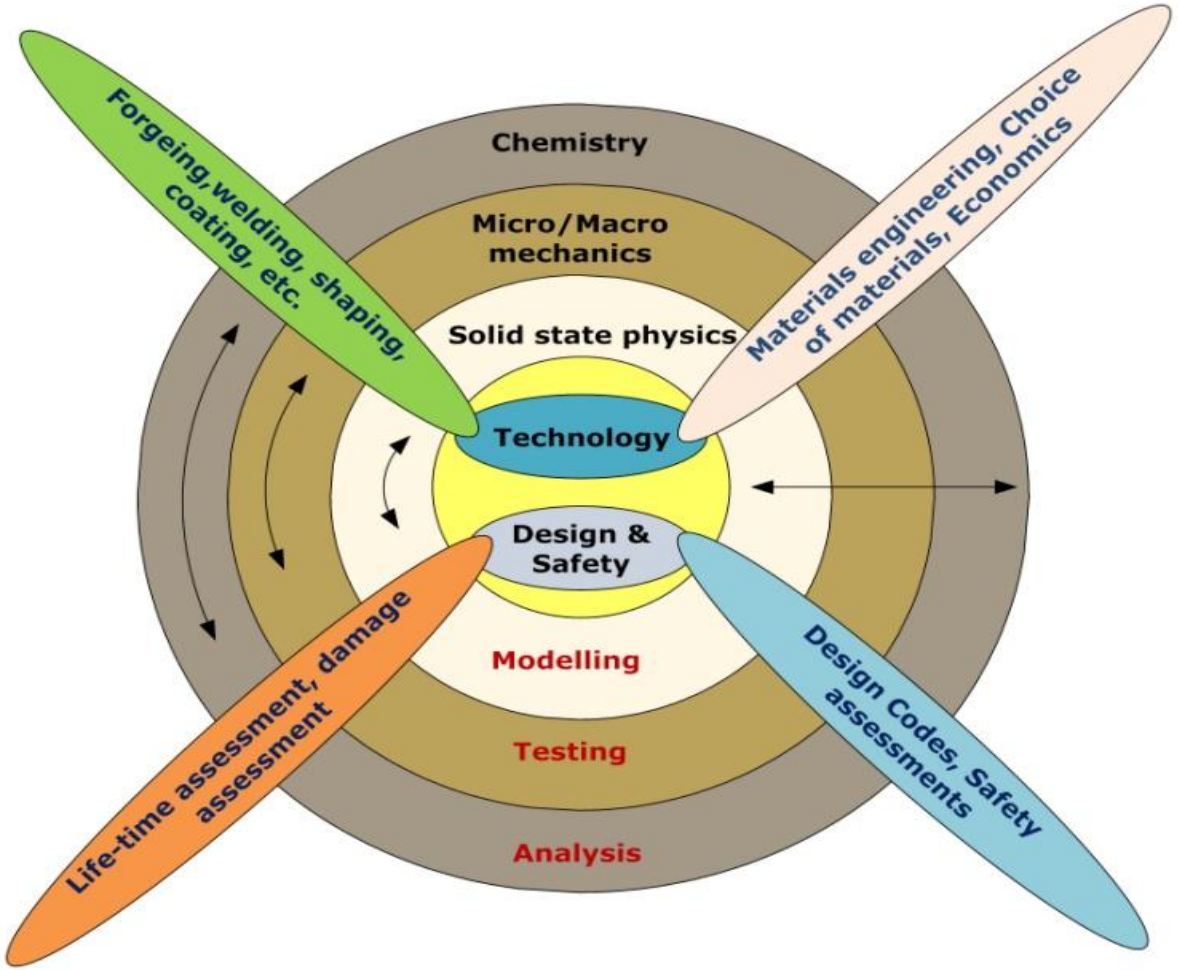
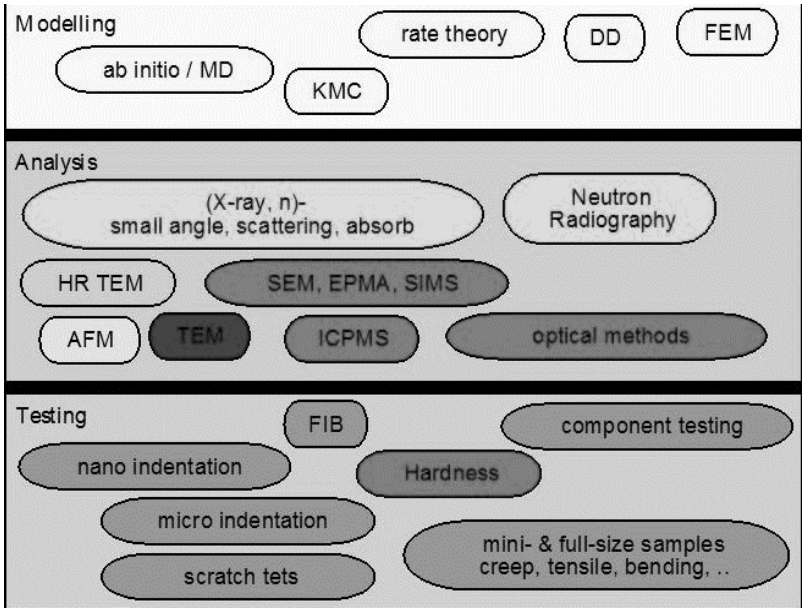


Table 1: Research areas common to several technologies

SET-plan Materials development	Wind energy	Photovoltaic	Concentrated Solar Power	Geothermal energy	Electricity storage	Electricity grids	Bioenergy	Carbon capture and storage	Hydrogen and fuel cells	Nuclear fission	Buildings
Structural materials											
Fibre reinforced materials	X		X			X			X	X	
High temperature, low temperature and corrosion-resistant materials	X		X	X	X		X	X	X	X	
Structural steel components and related joining techniques	X		X	X	X		X	X		X	X
Advanced concretes	X			X			X			X	X
Functional materials											
Separation membranes				X			X	X	X		X
Catalyst and electrolytes					X		X	X	X		
Solid catalyst, sorbents and O2 carriers					X		X	X	X		
High temperature superconducting materials	X					X					
High temperature heat storage materials			X		X				X		
(High temperature) insulating materials			X	X		X		X		X	X
Materials for power electronics	X	X		X		X					
Heat transfer fluids			X	X						X	
Manufacturing techniques											
Coatings and coating techniques	X	X	X	X	X		X	X	X	X	X
Condition monitoring techniques	X	X		X	X		X	X	X	X	

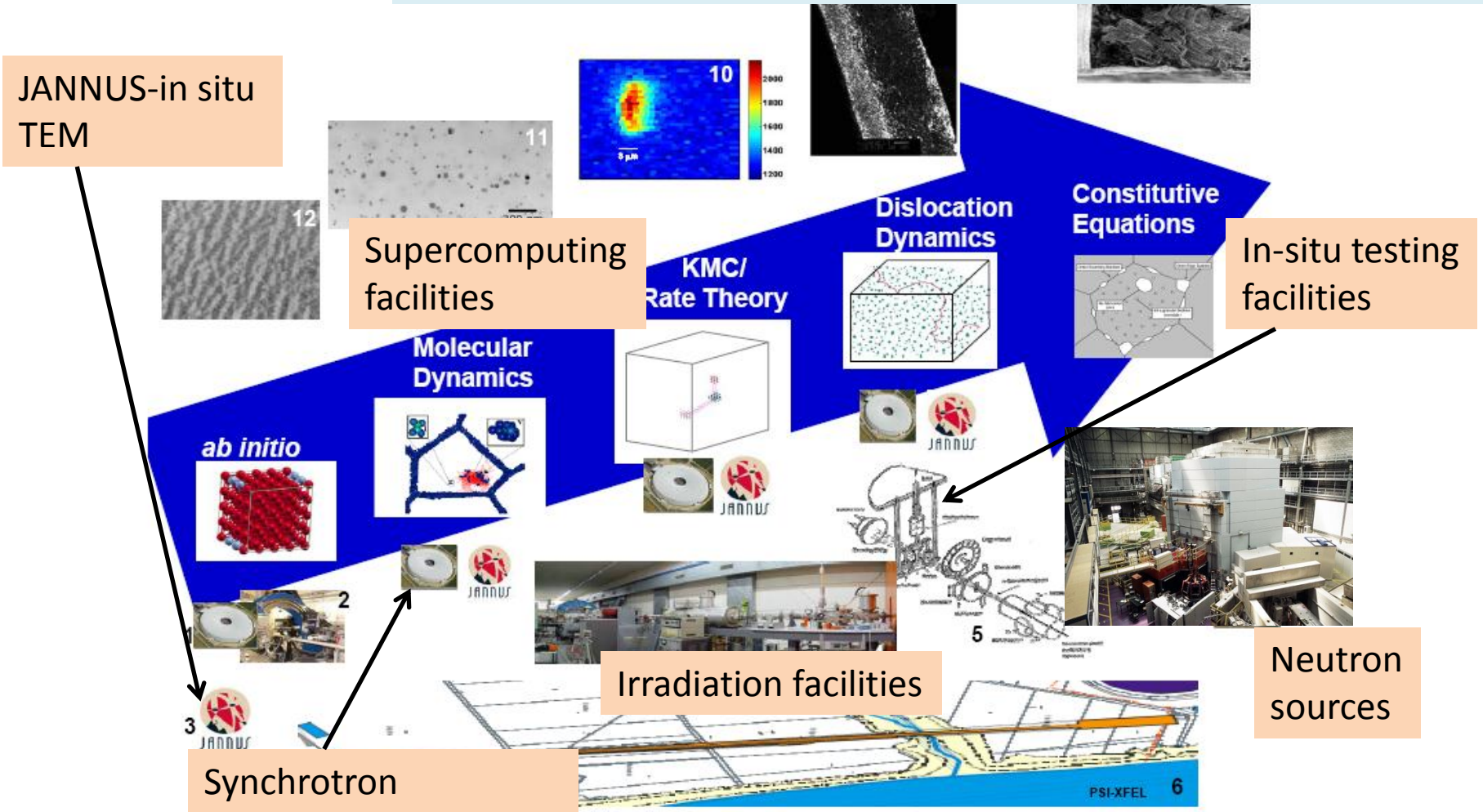


WHAT/WHY?

Development and understanding of advanced materials for future energy plants need an appropriate scale testing-analysis-modeling approach. Quantitative conversion of microstructural features into mechanical response and validation of Materials modeling is an indispensable requirement

WHICH FACILITIES ?

Large facilities to enable a well substantiated, approprite-scale understanding of materials to provide fast implementation of new materials (shorten time to market) and to improve design (shorten time to code)



HOW ?

- Large facilities require high investment and operational cost
- During campaigns 7d/24h work is necessary
- Highly specialized detectors, gages, energies, environments etc. at different locations need high flexibility of users
- Overbooking of facilities cannot be avoided
- Scientifically appealing facility improvements often oversheadow value of existing solutions (e.g. FEL)
- Economic value of results often difficult to convey to industrial users because value of investigations is not visibly communicated.

➔ Provide concepts and means to enable interdisciplinary work in a flexible user community

➔ Develop means to convince industrial end-users from the value of large plant investigations by bridging the gap between «scientific» and «technical» languages (education of both sides, front-end communication platforms, include experienced intersdisciplinary facilitators etc.