

# **IMPROVE, a Large Research Project on Chemical Engineering Design Processes**

**or**

## **Is Joint Research with Engineers Attractive for Computer Scientists?**

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- What is a CRC and a TC?
- IMPROVE: Approach
- IMPROVE: Results
- The Role of Informatics in a Joint Project
- Summary: IMPROVE and Research

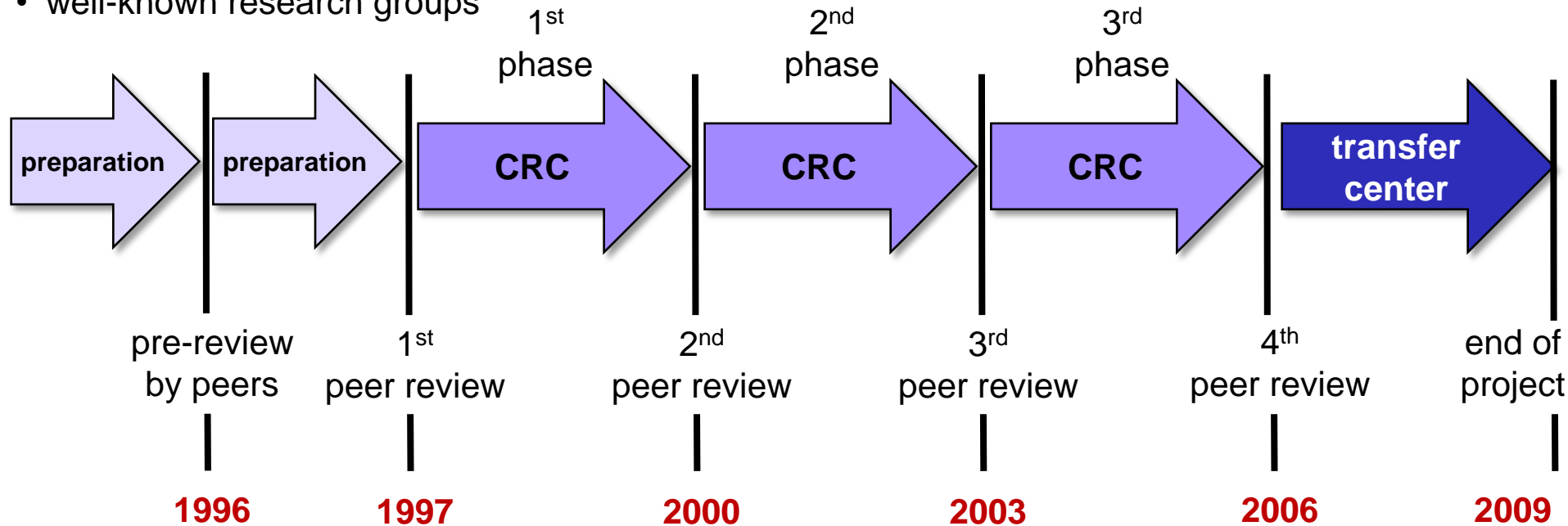
# What is a CRC and a TC?, IMPROVE Figures

CRC 476  
TC 61



financed by "German National Science Foundation" in addition to own money

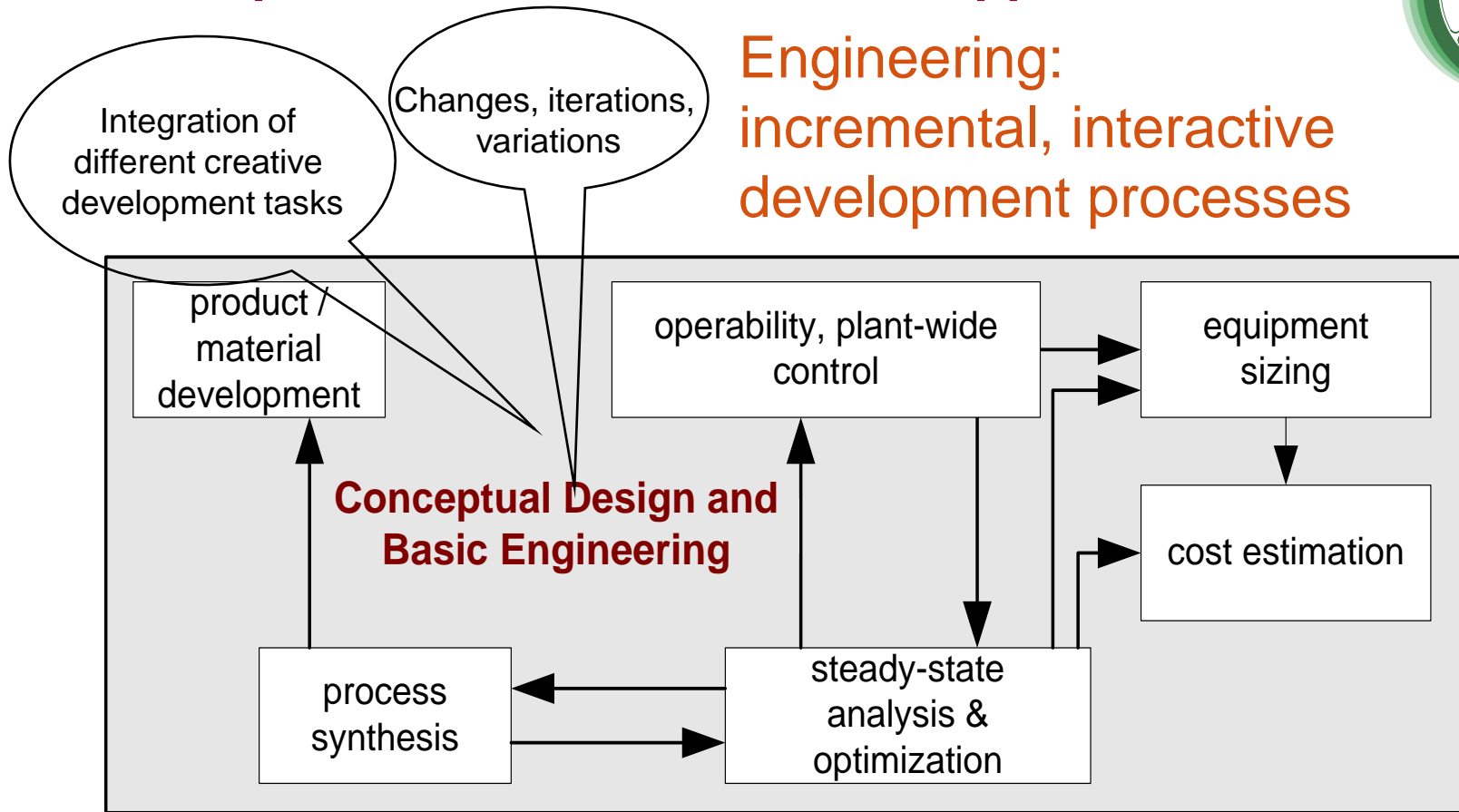
- ambitious research topic
- different faculties
- integration aspect
- well-known research groups



- in total: 11,5 Mio. €, 300 person years
- groups from Mechanical Engineering:  
Chemical Engineering, Plastics Processing, Labor Research
- groups from Informatics:  
Software Engineering, Data Bases, Communiation



Engineering:  
incremental, interactive  
development processes



Direct process support: experience

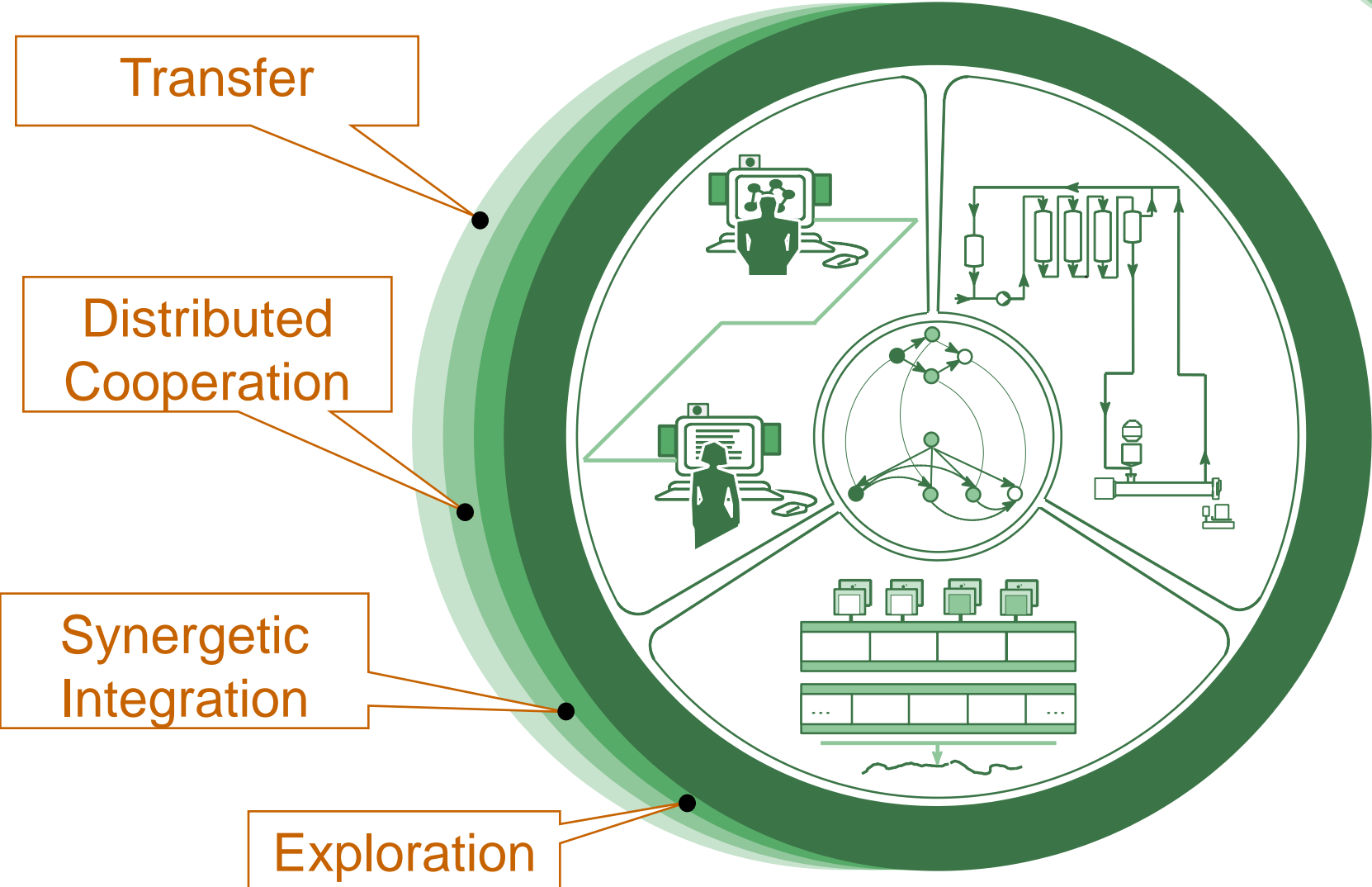
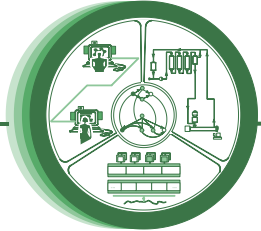
Integrators: fine-grained consistency control

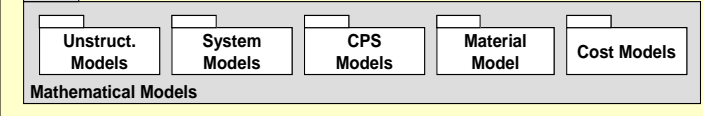
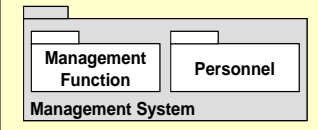
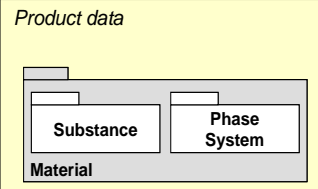
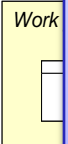
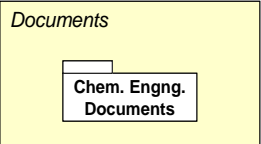
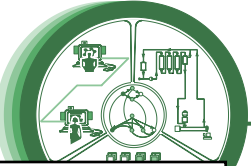
MM Communication: documenting new ideas and decisions

Reactive administration: project state, changes

Computer Science: Novel concepts and synergy

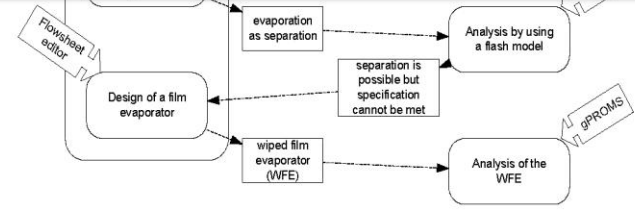
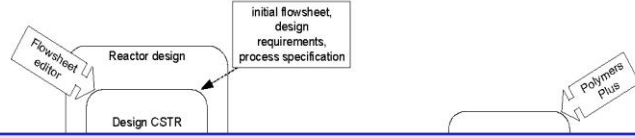
# IMPROVE Approach: Phases and Their Main Topics



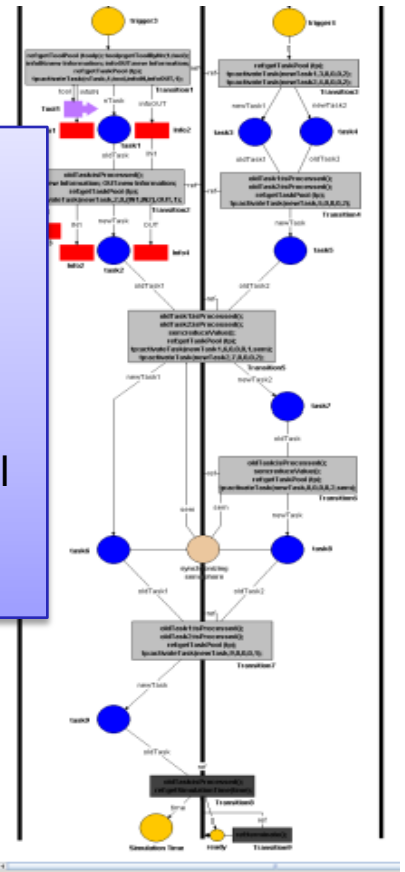


## Achievements

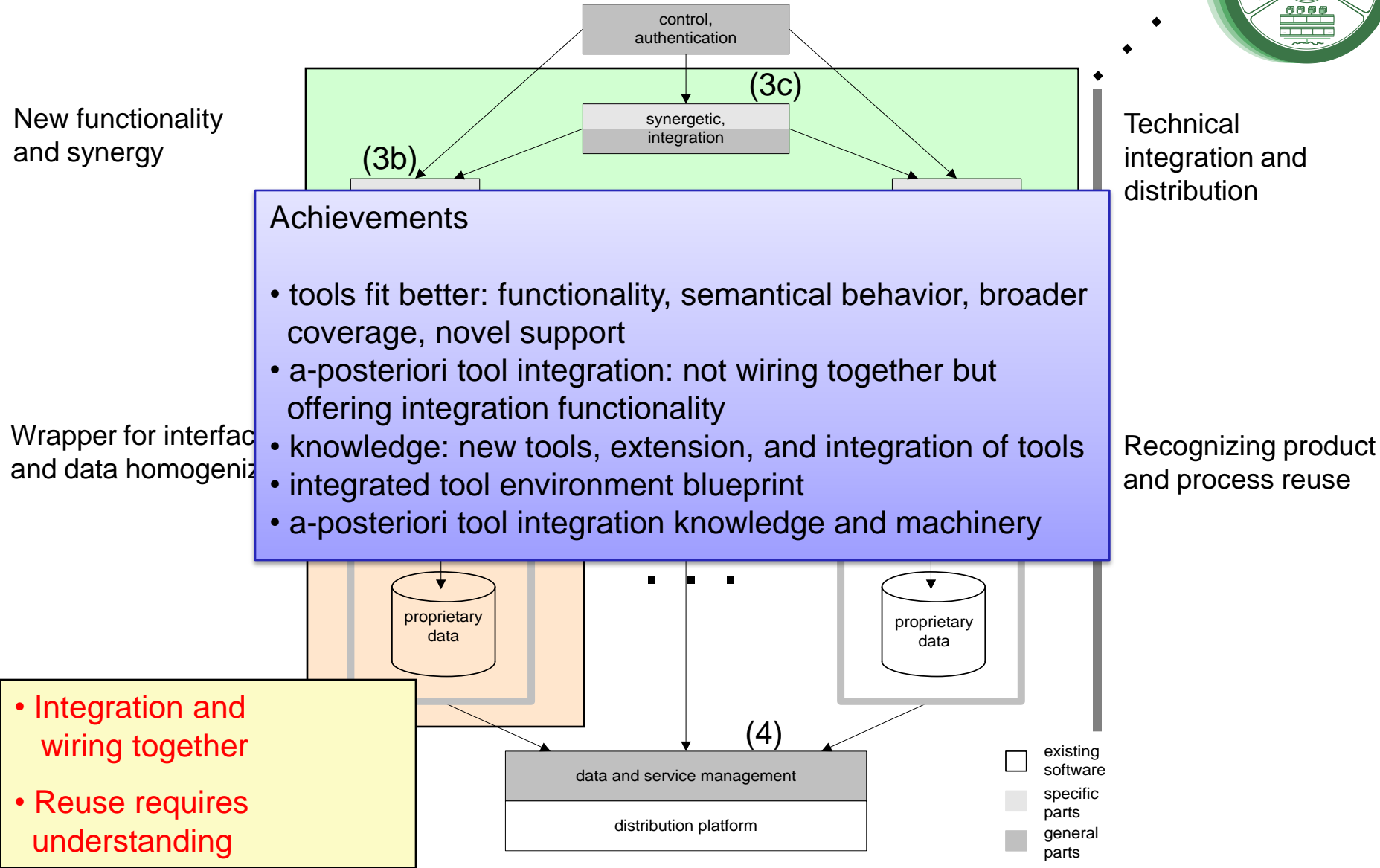
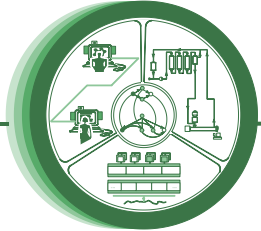
- understand, formalize concrete processes
- learned to model them
- work processes: tasks, decisions, document structure, internals of documents
- framework for modelling: integrated and methodological domain knowledge
- validation of framework and models



## Dynamic Simulation Model



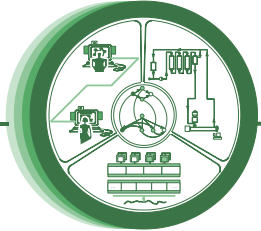
# IMPROVE Results: Tools and Software Reuse Process



- Integration and wiring together
- Reuse requires understanding

# IMPROVE Results

## Product / Process Model and Layers



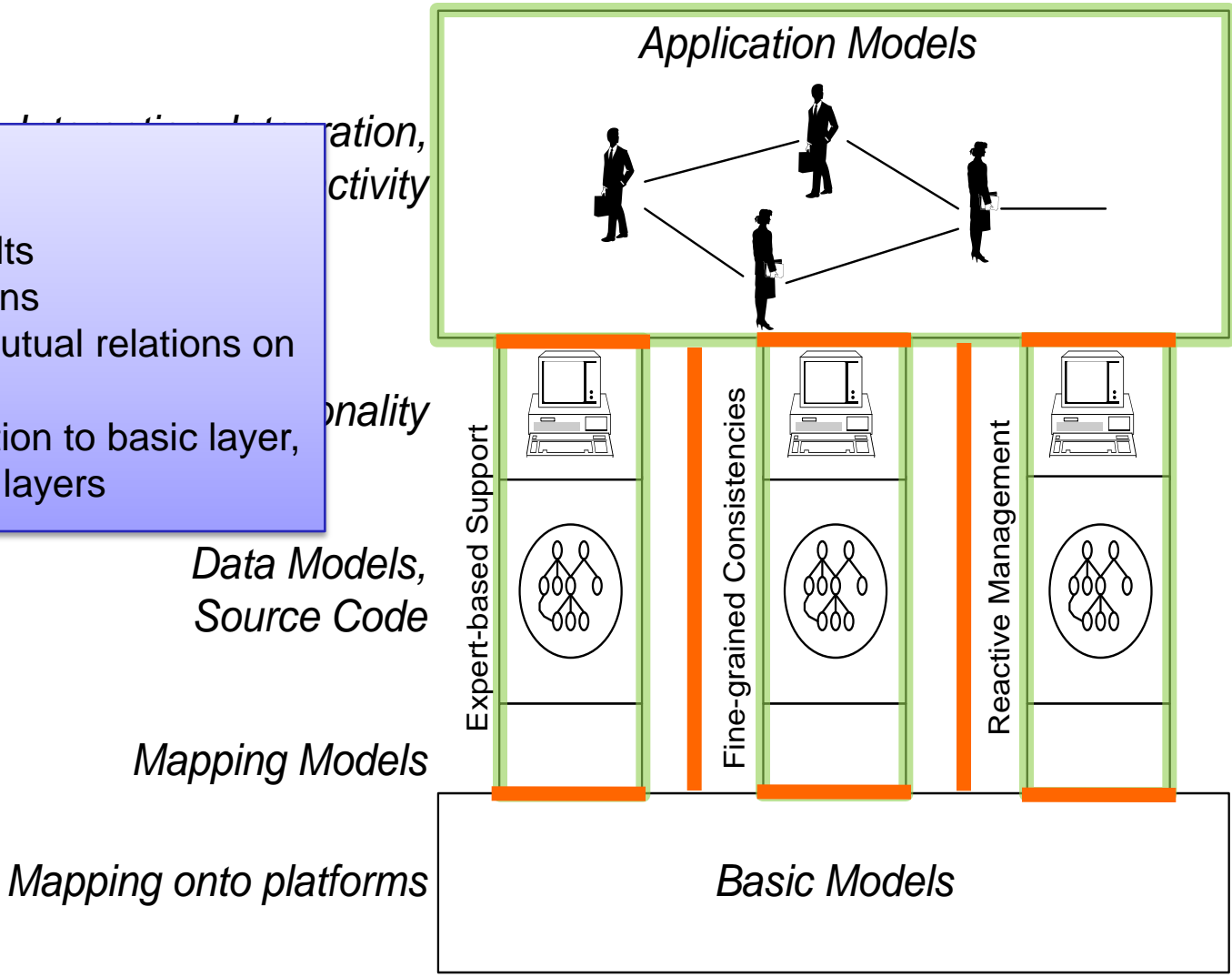
- Different development processes
- Different partial products and processes

**Achievements**

- good intermediate results application layer, columns
- processes, products, mutual relations on different layers
- missing synergy, transition to basic layer, application layer to tool layers

**No standardized models available**

**Parameterization mechanisms**

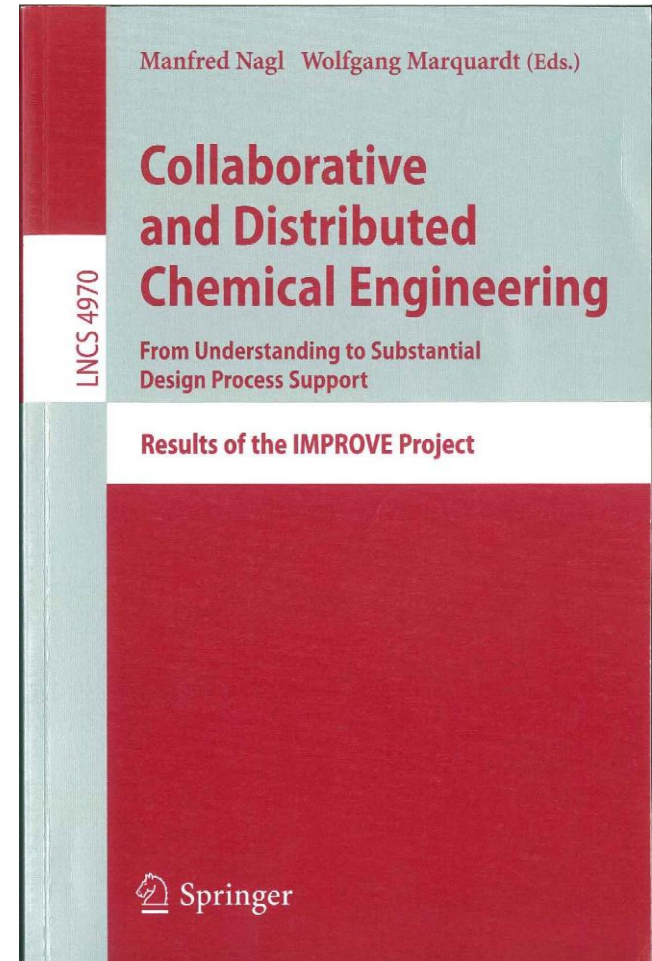






- Academia
  - » 15 books, main results in →
  - » 400 articles
  - » 70 Ph.D. theses
  - » 11 new Associate or Full Professors
- Industry
  - » long lasting cooperations
  - » influence could be stronger

LNCS 4970, 851 pp., 2008





**No!**

- Informatics as a partner

Problem (occurrence) from engineering  
Know how of Informatics necessary

- Challenging problems?

Modeling  
Tool building  
Integrated environments  
Reuse techniques  
A-posteriori integration

Full range of  
Practical Informatics  
in breadth and depth

**Yes!**



- Other focus: A-posteriori approach
- Other scientific culture: Build!
- New challenge: Tight integration and a-posteriori
- Broader scope: Tool building for Informatics & Engineering
- Familiarity with Engineering: A must for the future



## Topic Research Project

- novel forms of design processes
- novel support concepts of Informatics
- PPM as ambitious task
- many tool prototypes and demos

in cooperation with  
various companies

## Challenges

- projects: process, product, relations between parts
- domains: languages, methodologies, ontologies
- tools: basic layer, framework, specifications, code generation
- a-posteriori integration