

# Integrated Control and Optimization for the Process Industry

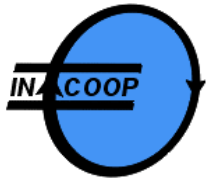
Results of a research project funded by the  
European Commission

**Martin Friedrich**



Bayer Technology Services

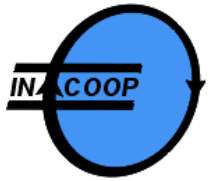
**INCOOP Workshop**  
**Düsseldorf, January 23 -24, 2003**



# Overview



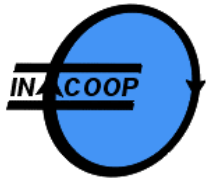
- Welcome
- Workshop goal
- Goal of research project
- Partners and their roles in the project
- Agenda
- Organisational



## Goals for the Workshop



- To present results obtained during the joint research project  
„Integrated Process Control and Plantwide Optimisation“  
funded by the European Commission
- To initiate discussion about current state of the art and future needs
- To encourage future collaboration

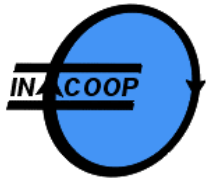


## Goals of joint project



### Integrated process control and plantwide optimisation:

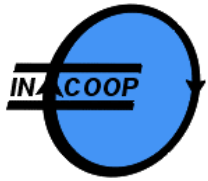
- improve existing control and optimisation technology for process industry
- develop methods and tools for industrial applications of
  - dynamic real time optimisation
  - nonlinear model predictive control
- test developed tools on industrial examples
- evaluate cost-benefit-ratio



# Project Partners



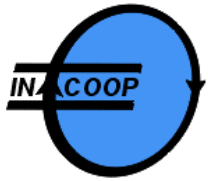
- RWTH Aachen: **W. Marquardt**, M. Schlegel, J. Kadam
  - dynamic real time optimisation
- TU Delft: **O. Bosgra**, **J. Grievink**, A. Huesman, D. v. Hessem, J. v. d. Berg, P. Schmal, R. Tousain, P. Verheijen
  - hybrid modelling, model reduction, state estimation, software environment
- TU Eindhoven: **P. v. d. Bosch**, S. Weiland, A. Tiagounov, M. Balenovic
  - NMPC, software environment
- IPCOS: **T. Backx**, J. Ludlage
  - project management, software architecture / implementation
- MDC Technology: **C. Hawkins**
  - D-RTO tools
- Shell Chemicals: **P. J. Brouwer**, S. de Wolf, C. Colantonio
  - example process I
- Bayer AG: **H. de Meyer**, **M. Friedrich**, G. Dünnebier, K.-U. Klatt
  - project coordination, example process II



# Agenda Jan. 23, 2003



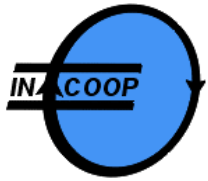
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|-------|--|--|
| 11:00 | Welcome and introduction   | <a href="#">Martin Friedrich</a> , Bayer AG        |
| 11:15 | General scope, goals and overview of INCOOP  | <a href="#">Ton Backx</a> , IPCOS Technology       |
| 12:15 | Lunch  |  |
| 13:30 | Invited lecture:<br>Process modeling and model-based automation                                    | <a href="#">Costas Pantelides</a> , PSE Ltd.       |
| 14:30 | Real time dynamic optimization   | <a href="#">Wolfgang Marquardt</a> , RWTH Aachen   |
| 15:15 | Coffee break   |  |
| 15:30 | State estimation and long horizon MPC for nonlinear industrial applications                        | <a href="#">Siep Weiland</a> , TU Eindhoven        |
| 16:15 | Hybrid modeling and model reduction  | <a href="#">Johan Grievink</a> , TU Delft          |
| 17:00 | Coffee break   |  |
| 17:15 | Industrial challenges and requirements for optimization<br>and control of the Shell case study     | <a href="#">Piet-Jan Brouwer</a> , Shell Chemicals |
| 17:45 | Industrial challenges and requirements for optimization<br>and control of polymerisation processes | <a href="#">Guido Dünnebier</a> , Bayer AG         |
| 19:45 | Dinner   |  |



# Agenda Jan. 24, 2003



- |       |   |  |
|-------|---|--|
| 08:30 | Invited lecture:<br>Plant-wide online dynamic modelling with state estimation | <a href="#">Philippe Hayot</a> , Dow Chemicals   |
| 09:30 | INCOOP software architecture  | <a href="#">Mario Balenovic</a> , TU Eindhoven   |
| 10:00 | Start of software demonstration   | <a href="#">Mario Balenovic</a> , TU Eindhoven   |
| 10:15 | Coffee break  |  |
| 10:30 | INCOOP methodology applied to Shell case                                      | <a href="#">Adrie Huesman</a> , TU Delft<br><a href="#">Peter Verheijen</a> , TU Delft         |
| 11:00 | INCOOP methodology applied to Bayer case                                      | <a href="#">Jitendra V. Kadam</a> , RWTH Aachen  |
| 11:30 | Review of software demonstration  | <a href="#">Mario Balenovic</a> , TU Eindhoven   |
| 12:00 | Final discussion, vendors' and end users' viewpoint, audience feedback        | <a href="#">Ton Backx</a> , IPCOS Technology<br><a href="#">Chris Hawkins</a> , MDC Technology |
| 12:45 | Closing of the workshop   | <a href="#">Ton Backx</a> , IPCOS Technology   |



# Organisation



- bus transfer from venue to hotel: departure 18.45 h
- dinner in Schumacher's Restaurant: 19.45 h (just a few steps from the hotel, meet at 19.30 h in lobby)
- bus transfer from hotel to venue (tomorrow): departure 7.45 h
- in case of problems: contact information desk