

---

# Contents

Preface .....	V
---------------	---

---

## Part I Overview

---

<b>1 Goals, Approach, Functionality of Resulting Tools, and Project Structure .....</b>	<b>1</b>
1.1 A Model-Driven Approach for A-posteriori Tool Integration ..	3
<i>W. Marquardt and M. Nagl</i>	
1.2 A Scenario Demonstrating Design Support in Chemical Engineering .....	39
<i>R. Schneider and B. Westfechtel</i>	
1.3 The Interdisciplinary IMPROVE Project .....	61
<i>M. Nagl</i>	

---

## Part II Technical Results

---

<b>2 Application Domain Modeling .....</b>	<b>81</b>
2.1 An Introduction to Application Domain Modeling .....	83
<i>J. Morbach, M. Theißen, and W. Marquardt</i>	
2.2 Product Data Models .....	93
<i>J. Morbach, B. Bayer, A. Yang, and W. Marquardt</i>	
2.3 Document Models .....	111
<i>J. Morbach, R. Hai, B. Bayer, and W. Marquardt</i>	
2.4 Work Process Models .....	126
<i>M. Eggersmann, B. Kausch, H. Luczak, W. Marquardt, C. Schlick,</i>	
<i>N. Schneider, R. Schneider, and M. Theißen</i>	

2.5	Decision Models .....	153
	<i>M. Theißen and W. Marquardt</i>	
2.6	Integrated Application Domain Models for Chemical Engineering .....	169
	<i>J. Morbach, M. Theißen, and W. Marquardt</i>	
<b>3</b>	<b>New Tool Functionality and Underlying Concepts .....</b>	<b>183</b>
3.1	Using Developers' Experience in Cooperative Design Processes .....	185
	<i>M. Miatidis, M. Jarke, and K. Weidenhaupt</i>	
3.2	Incremental and Interactive Integrator Tools for Design Product Consistency .....	224
	<i>S. Becker, M. Nagl, and B. Westfechtel</i>	
3.3	Multimedia and VR Support for Direct Communication of Designers .....	268
	<i>A. Schüppen, O. Spaniol, D. Thißen, I. Assenmacher, E. Haberstroh, and T. Kuhlen</i>	
3.4	An Adaptive and Reactive Management System for Project Coordination .....	300
	<i>M. Heller, D. Jäger, C.-A. Krapp, M. Nagl, A. Schleicher, B. Westfechtel, and R. Wörzberger</i>	
<b>4</b>	<b>Platform Functionality .....</b>	<b>367</b>
4.1	Goal-Oriented Information Flow Management in Development Processes .....	369
	<i>S.C. Brandt, O. Fritzen, M. Jarke, and T. List</i>	
4.2	Service Management for Development Tools .....	401
	<i>Y. Babich, O. Spaniol, and D. Thißen</i>	
<b>5</b>	<b>Integration Aspects .....</b>	<b>431</b>
5.1	Scenario-Based Analysis of Industrial Work Processes .....	433
	<i>M. Theißen, R. Hai, J. Morbach, R. Schneider, and W. Marquardt</i>	
5.2	Integrative Simulation of Work Processes .....	451
	<i>B. Kausch, N. Schneider, S. Tackenberg, C. Schlick, and H. Luczak</i>	
5.3	An Integrated Environment for Heterogeneous Process Modeling and Simulation .....	477
	<i>L. von Wedel, V. Kulikov, and W. Marquardt</i>	

5.4	Design Support of Reaction and Compounding Extruders . . . .	493
	<i>M. Schlüter, J. Stewering, E. Haberstroh, I. Assenmacher, and T. Kuhlen</i>	
5.5	Synergy by Integrating New Functionality . . . . .	519
	<i>S. Becker, M. Heller, M. Jarke, W. Marquardt, M. Nagl, O. Spaniol, and D. Thißen</i>	
5.6	Usability Engineering . . . . .	527
	<i>C. Foltz, N. Schneider, B. Kausch, M. Wolf, C. Schlick, and H. Luczak</i>	
5.7	Software Integration and Framework Development . . . . .	555
	<i>Th. Haase, P. Klein, and M. Nagl</i>	
<b>6</b>	<b>Steps Towards a Formal Process/Product Model . . . . .</b>	<b>591</b>
6.1	From Application Domain Models to Tools: The Sketch of a Layered Process/Product Model . . . . .	593
	<i>M. Nagl</i>	
6.2	Work Processes and Process-Centered Models and Tools . . . .	605
	<i>M. Miatidis, M. Theißen, M. Jarke, and W. Marquardt</i>	
6.3	Model Dependencies, Fine-Grained Relations, and Integrator Tools . . . . .	612
	<i>S. Becker, W. Marquardt, J. Morbach, and M. Nagl</i>	
6.4	Administration Models and Management Tools . . . . .	621
	<i>R. Hai, T. Heer, M. Heller, M. Nagl, R. Schneider, B. Westfechtel, and R. Wörzberger</i>	
6.5	Process/Product Model: Status and Open Problems . . . . .	629
	<i>M. Nagl</i>	
<hr/> <b>Part III Transfer and Evaluation</b> <hr/>		
<b>7</b>	<b>Transfer to Practice . . . . .</b>	<b>641</b>
7.1	Industrial Cooperation Resulting in Transfer . . . . .	643
	<i>R. Schneider, L. von Wedel, and W. Marquardt</i>	
7.2	Ontology-Based Integration and Management of Distributed Design Data . . . . .	647
	<i>J. Morbach and W. Marquardt</i>	
7.3	Computer-Assisted Work Process Modeling in Chemical Engineering . . . . .	656
	<i>M. Theißen, R. Hai, and W. Marquardt</i>	

7.4	Simulation-Supported Workflow Optimization in Process Engineering .....	666
	<i>B. Kausch, N. Schneider, C. Schlick, and H. Luczak</i>	
7.5	Management and Reuse of Experience Knowledge in Extrusion Processes .....	675
	<i>S.C. Brandt, M. Jarke, M. Miatidis, M. Raddatz, and M. Schlüter</i>	
7.6	Tools for Consistency Management between Design Products ..	696
	<i>S. Becker, A. Körtgen, and M. Nagl</i>	
7.7	Dynamic Process Management Based upon Existing Systems ..	711
	<i>M. Heller, M. Nagl, R. Wörzberger, and T. Heer</i>	
7.8	Service-Oriented Architectures and Application Integration ..	727
	<i>Th. Haase and M. Nagl</i>	
<b>8</b>	<b>Evaluation .....</b>	<b>741</b>
8.1	Review from a Design Process Perspective .....	743
	<i>W. Marquardt</i>	
8.2	Review from a Tools' Perspective .....	753
	<i>M. Nagl</i>	
8.3	Review from an Industrial Perspective .....	764
	<i>W. Marquardt and M. Nagl</i>	
8.4	Review from Academic Success Perspective .....	774
	<i>M. Nagl</i>	
<hr/>		
<b>Part IV Appendices, References</b>		
<hr/>		
<b>Appendices .....</b>		<b>781</b>
A.1	Addresses of Involved Research Institutions .....	781
A.2	A.2 Members of the CRC 476 and TC 61 .....	783
<b>References .....</b>		<b>785</b>
R.1	Publications of the IMPROVE Groups .....	785
R.2	External Literature .....	817
<b>Author Index .....</b>		<b>851</b>

<http://www.springer.com/978-3-540-70551-2>

Collaborative and Distributed Chemical Engineering.  
From Understanding to Substantial Design Process  
Support

Results of the IMPROVE Project

Nagl, M.; Marquardt, W. (Eds.)

2008, XII, 851 p., Softcover

ISBN: 978-3-540-70551-2