



***Logistics, Operations, and  
Supply Chain Management***

***Prof. Dr. Paul Schönsleben  
and Prof. Markus Baertschi***

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## HIGHLIGHTS

**Our Team:** I am pleased to present this summary of some of the highlights of my career at the ETH. Firstly I want to present my team, which has always been one of the most important assets of the chair's activities. During this period, my colleague Prof. Markus Baertschi and I have had the honor of working with close to 60 doctoral students. Of these, 50 left ETH with a doctoral degree. I have also had the support of six technical-administrative personnel. With their support, we were part of the BWI Center for Industrial Management (Betriebswissenschaftliches Zentrum). In particular, we were active in research, teaching, and knowledge transfer in the areas of operations, logistics, and supply chain management, global service management, and service innovation. These areas also included information management, configuration and modeling of supply chains with multiple variant products and processes, and TQM and process management.

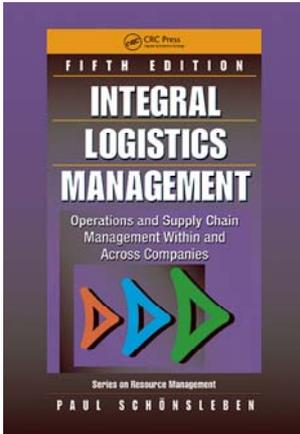
**Research projects:** Our research focuses on technology-intensive companies. We address questions and challenges regarding value-added through technological change, particularly through information technologies. The aim of the applied research is to garner generalizable recommendations for action for corporate decision-making based on problems relevant to practice.

Our Research strategy is based on three domains that can be categorized along the product life cycle. Firstly, Production and Logistics Management; Secondly, Supply Chain Management; Thirdly, Services.

To further enable particularly our doctoral students (who generally stem from the D-A-CH countries) to successfully cope with the challenges of a globalized yet sustainable industrial value-adding, nearly all our projects involved horizontal themes such as lean and green production as well as cooperation with partners in Far East countries like Japan and China.

**Publications:** During the years, the kind of our publications has changed. At the beginning, publications were aimed mainly to readers from industry. Thus, the objective was the application of our findings by practitioners – that finally pay our research directly or by taxes. With the increased value given also at ETH to the academic use of publications – hopefully paid by citations by other academic people – we also published much more through market channels that are of mainly academic interest. My primary book remained "Integrales Logistikmanagement — Operations und Supply Chain Management innerhalb von Unternehmen und unternehmensübergreifend" (actually in its 7<sup>th</sup> edition, ISBN 978-3-662-48333-6) as well as "Integral Logistics Management — Operations and Supply Chain Management Within and Across Companies" (actually in its 5<sup>th</sup> edition, ISBN



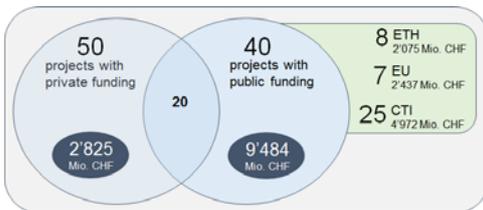


978-1-4987-5053-0). Below, you will find a representative graph of all the publications realized in the period of my chair.

**Teaching and Education:** During the time of my professorship, I had the honor to work with numerous students of different levels of study. As it can be seen on the following graph, we have coached hundreds of Master and Bachelor thesis and student papers.

It was our objective to fully equip our graduates for the employment market under attractive terms. This is in accordance with the mission of BWI to strive towards the qualitative improvement of the use of work and technology as well as towards the ethically responsible management of businesses and enterprises. Considering their future contribution to our society, it was a great joy and privilege for me to contribute to the academic development of this important group of people.

**Project Funding:** During my chair's period (1991 to 2016) the acquisition of research projects can be qualified as enormously successful. Besides the satisfaction of realizing scientific activities, it has meant the acquisition of 12.309 m CHF as third party research money. Of a total of 70 projects, 40 were financed, fully or partly, by the public sector, and 50 projects were financed, fully or partly, by our industrial partners.



Public financing came from ETH (2.075 m CHF), from the EU (via various framework programs, partly funded via SNF, 2.437 m CHF), and from CTI, the Swiss Commission of Technology and Innovation (4.972 m CHF). 2.825 m CHF came directly from industrial partners.

**Thanks and Acknowledgements:** With the nomination of Prof. Torbjörn Netland as a successor of the Professorship, the continuation of the field of activity of Production and Operations Management (POMS) is guaranteed. I'm pleased to introduce him to you, and I wish him all the necessary success both within ETH Zurich and in cooperation with the industry.

My sincere thanks go to my two colleagues Markus Baertschi and Hugo Tschirky at the BWI for their ongoing support during all these years, as well as to the colleagues and to the staff of the departments D-MTEC and D-MAVT. I would also extend my thanks to many members of the board and administration of the ETH. Moreover, I would like to thank the numerous and valued partners from the industry and universities, as well as all of our customers in the economy and sponsors.

I hope you enjoyed reading this report. As always, you will find more information on the Internet at [www.lim.ethz.ch](http://www.lim.ethz.ch).

Zurich, Mai 2017

Prof. Dr. Paul Schönsleben

# 1 CHAIR OF LOGISTICS, OPERATIONS, AND SUPPLY CHAIN MANAGEMENT (PROF. DR. PAUL SCHÖNSLEBEN AND PROF. MARKUS BAERTSCHI)

## 1.1 Our Team

Research fellows and doctoral students strengthen our team. This concept allows us to benefit both from people's experience and from the new ideas and viewpoints of young

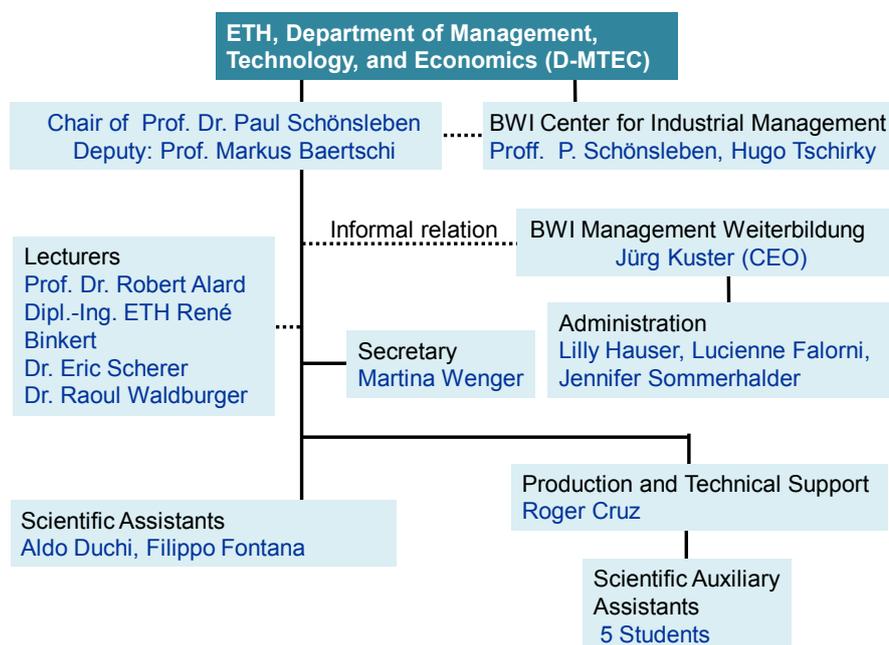
researchers. The main goal of assistants is to support the professors in teaching, research, and industry projects.



Front, from left: Lilly Hauser, Markus Baertschi, Paul Schönsleben, Martina Wenger, Jürg Kuster, Lucienne Falorni.

Rear, from left: Roger Cruz, Alexander Sproedt (left during 2015), Matthias Baldinger (left during 2016), Aldo Duchi, Manuel Rippel (left during 2016), Elsy Bütler (left during 2015), Matthias Wandfluh (left during 2015), Olga Willner (left during 2016), Felix Friemann (left during 2016).

## 1.2 Organizational Structure, as of December 31<sup>st</sup>, 2016



## 2 TEACHING

### 2.1 Teaching Strategy

The following illustration describes the teaching strategy of the chair for Logistics, Operations and Supply Chain Management at the BWI Center for Industrial Management at D-MTEC at ETH Zurich.

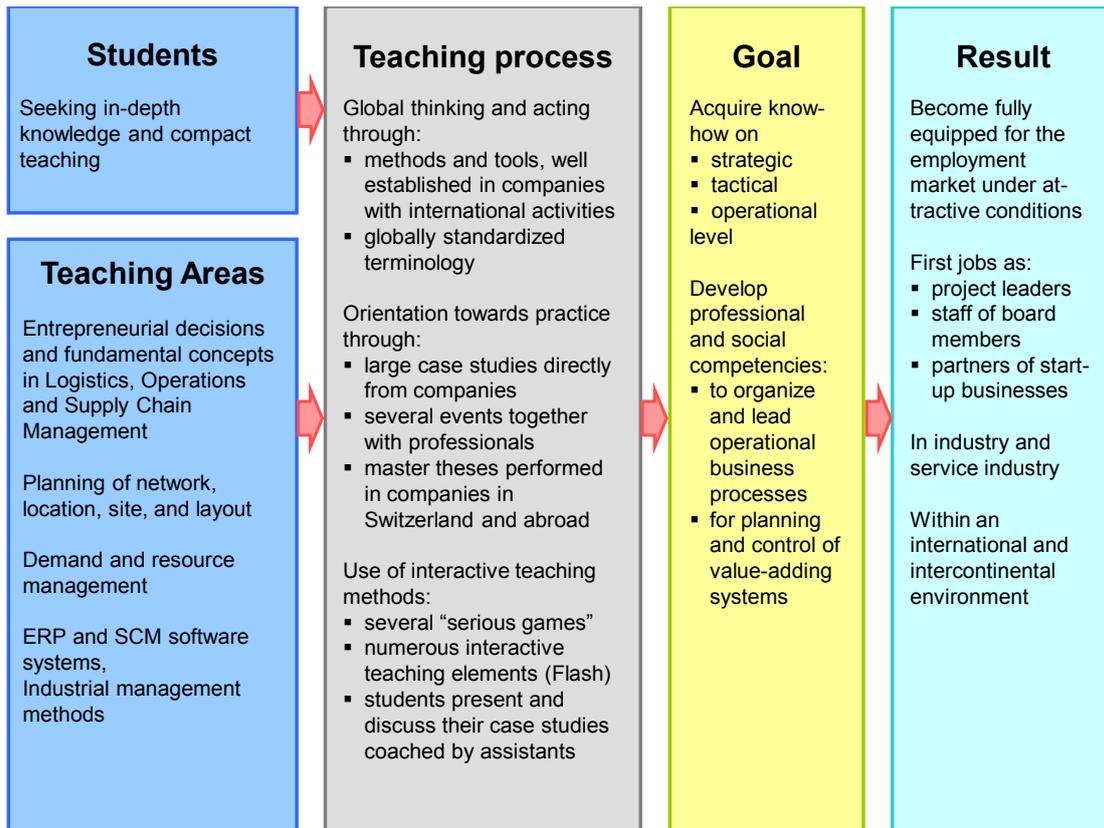


Figure 2.1: Teaching Strategy

Our strategy leaves our graduates fully equipped for the employment market under attractive terms. This is in accordance with the mission of BWI to strive towards the qualitative

improvement of the use of work and technology as well as towards the ethically responsible management of businesses and enterprises.

## 2.2 Overview of Courses and Lectures

### Spring Term 2016

Course	Lecturers
LOSII: Manufacturing Strategies – from Supply Chain Design to Factory Planning	Prof. P. Schönsleben, Prof. M. Baertschi, Dipl. Ing. ETH R. Binkert
Lecture Series: Logistics Management	Prof. M. Baertschi, Prof. H. Dietl (University of Zurich), Prof. P. Schönsleben
Industrial Engineering and Management Methodology for Theses in Companies	Prof. R. Alard
Executive MBA ETH SCM, Block “Supply Chain Planning”	Prof. P. Schönsleben
Executive MBA, University of Zurich, Module “Operations and Logistics”	Prof. P. Schönsleben, Prof. H. Dietl (University of Zurich)

### Fall Term 2016

Course	Lecturers
No lectures	

## 2.3 Visiting Lecturers for the Course LOS I and LOS II

Lecturer	Company	Topics
Dr. Raoul Waldburger, Jens Diebold	Holcim Group Support AG	Linking Strategy and Sustainability / Location Planning in the Process Industries
Dr. Thomas Sommer- Dittrich, Franz Homburger	Daimler AG, Ulm	Production Network Optimization at Daimler
Dr. Bernd Korves	Siemens AG	Factory Planning @ SIEMENS – Innovative Methods & Approaches
Dr. Jan Spies	Volkswagen AG	Global Factory Planning – Challenges and Best Practices

## 2.4 Lecture Series

### Lecture Series – Logistics Management (Spring Term)

Together with Prof. H. Dietl from the University of Zurich, Prof. M. Baertschi and Prof. P. Schönsleben held the lecture series on logistics management in 2016, with even greater success than in previous years. This year’s topic: «Make or Buy»

Lecturer	Company, Place
Bruno Simma	SIMMA Management Consultants, Pfäffikon
Dr. Han des.Zheng	Asia Research Centre, Universität St. Gallen
FrancoMonti	PriceWaterhouseCoopers, Zürich
Dario Bernasconi	AgieCharmilles GF
Paul Glutz	EDS (Schweiz) AG
Prof. Helmut Dietl	Universität Zürich
David Barret	Arvato Mobile GmbH, Hamburg
Norbert Raschle	PriceWaterhouseCoopers, Zürich
Dirk Zimanky	Enics AG, Baden
Jörg Wiederkehr	V-Zug AG, Zug
U. Akermann	Gallus Gruppe, St. Gallen
Prof. Robert Alard	Fachhochschule Nordwestschweiz, Olten

## 2.5 Collaboration in Teaching

### Universities and Education Centers

**D-MAVT / ETH Zurich** – Prof. Schönsleben is an accredited professor and tutor at D-MAVT. Together with Prof. Baertschi, he actively supports the specialization “Manufacturing and Industrial Management” (“Produktions- und Betriebswissenschaften”) of the D-MAVT Master’s Program in Mechanical Engineering. During 2015, our cooperation with Prof. Konrad Wegener and his IWF-Team in the domain of Eco-Factory continued. Moreover, we had an intensive cooperation with the team of Prof. Mirko Meboldt in the domain of additive manufacturing / 3D-printing.

**University of Zurich** – Prof. Schönsleben was again a lecturer for the Executive MBA of the University of Zurich, responsible for the domain of operations management. In addition, in cooperation with Prof. H. Dietl and Prof. M. Baertschi, he held a series of lectures

on «Logistics Management» within the university’s interdepartmental lecture series.

**Keio University, Tokyo** – In December 2015, Prof. P. Schönsleben, Dr. O. Willner and F. Fontana gave a block lecture at the Graduate School of System Design and Management at Keio University, Tokyo (Prof. Masaru Nakano).

**University of Stuttgart** – Prof. P. Schönsleben and Dipl.-Ing. R. Cruz are participating in the “Master: Online Logistikmanagement”, with the module “Supply Chain Management”.

### Universities of Applied Sciences (FH)

**Univ. of Applied Sciences of Northwestern Switzerland** – Prof. Markus Baertschi is Titular Professor at the University of Applied Sciences of Northwestern Switzerland. Furthermore, we cooperate with Prof. Robert Alard and Prof. Raoul Waldburger.

## 3 RESEARCH ACTIVITIES

Our research is centered on technology-intensive companies, and addresses questions and challenges regarding value added through technological change.

The aim of the applied research at BWI is to garner generalizable recommendations for action for corporate decision-making on the basis of problems relevant to practice. What we offer:

- Due to our project history and contacts with the industry, we have well-grounded experience in our research domains ([www.lim.ethz.ch/en/research/research\\_areas.html](http://www.lim.ethz.ch/en/research/research_areas.html)) and can provide you with competent support in research and the implementation of projects ([www.lim.ethz.ch/en/research/projects.html](http://www.lim.ethz.ch/en/research/projects.html)).
- In the course of dynamic globalization, the cooperation with, in part, globally distributed partners of Swiss companies offers ever increasing advantages. Moreover, you can benefit from our worldwide cooperation ([www.lim.ethz.ch/en/research.html](http://www.lim.ethz.ch/en/research.html)) with other academic institutions (e.g. in China, Japan) and industry partners.
- Finally, we offer regular meetings in industry work groups on relevant topics. In addition, the BWI Management Weiterbildung ([www.bwi.ch](http://www.bwi.ch)) offers numerous seminars and trainings as well as customer-specific workshops.

### 3.1 Research Strategy and Research Domains

The following Fig. 3.1 shows three different research domains that can be categorized along the product life cycle. They will be explained in more detail below. Obviously, these three areas overlap to a certain extent.

#### Production & Logistics Management

The research domain of *Production & Logistics Management* consists of the management and optimization of all processes from product development to the planning and control of production, as well as quality management and internal logistics support.

Mastering internal processes is a prerequisite for a successful collaboration in production and logistics networks. Only through lean processes, while at the same time minimizing emerging risks, can companies remain competitive in today's climate.

Through the close collaboration with industry and research partners, we endeavor to identify existing research gaps in the area of production management and develop innovative solutions (e.g. modularization, management of product variety).

#### Supply Chain Management

In the domain of *Supply Chain Management (SCM)*, we focus on the creation of efficient and effective value-added networks spanning across companies, particularly in terms of global procurement and production.

As the arrangement and governance of collaboration brings with it new challenges, SCM represents an important research discipline for the preservation and strengthening of Switzerland as a seat of industry and science.

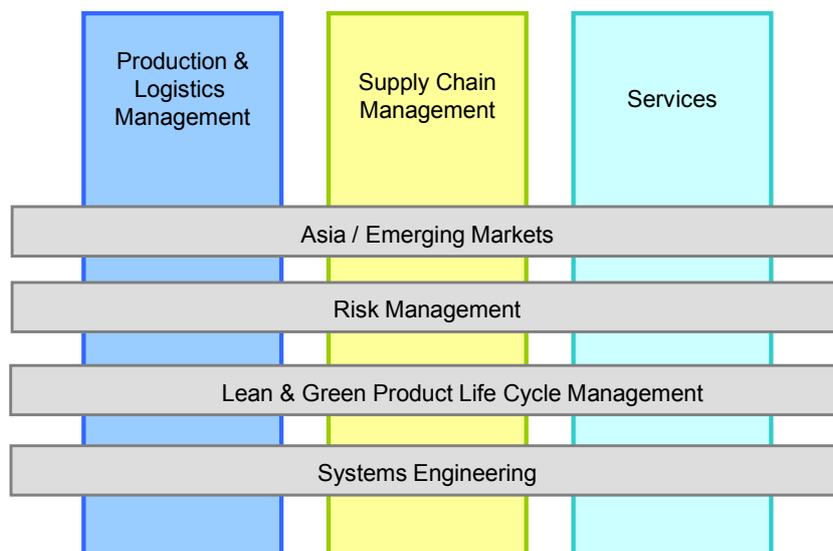


Figure 3.1 Research domains and cross-sectional areas

The goals of the SCM research include:

- Optimizing existing processes and structures
- Designing supply chains
- Highlighting opportunities with regard to the further internationalization of development and production
- Knowledge transfer of the current state of research – in particular for SMEs

In the framework of an intensive collaboration with our partners from research and industry, we can support you in terms of process analysis, designing solutions, and the development of recommendations for action in terms of the creation and control of your cross-company supply chain.

### Services

In this domain, we examine the production of downstream supporting processes in the capital goods industry, also called After-Sales Services. In the industrial environment, services enable a differentiation of suppliers, e.g. as a “hybrid product”. In this way, higher margins can be achieved than with the item of capital expenditure itself, and consequently they represent a substantial source of income for manufacturing companies.

We develop methods and concepts for the design and control of individual services as well as comprehensive networks for providing these offers. Within this process, we take into account the specific demands that result from the intangible nature of the services.

Fig. 3.1 also shows four areas which we call cross-sectional areas. These will also be explained in more detail below. Ideally, each conducted research project should touch on as many of these areas as possible. On the one hand, they form foundations, but on the other hand, they also represent general research interests at the BWI.

### Asia and Emerging Market Countries

In the area of *Asia and Emerging Markets*, we are concerned with logistical questions regarding China, India, and Southeast Asia. As part of our research work, we develop concepts to support Swiss companies in order to enable them to apply manufacturing and procurement advantages, while exploring the

sales markets of these regions in a sustainable manner.

Current research projects are looking at the demands that result from the internationalization of companies, performance measurement as well as information management in this environment.

### Risk Management

*Risk Management* deals with the identification, evaluation, and control of risks in operations and supply chain management. Due to globalization and cost pressure, an increasing number of Swiss companies are being forced to or are interested in relocating their procurement, production, sales, and service activities to emerging market countries.

Risk management has become increasingly important with the progressive globalization of operations and supply chain management processes. This increases the complexity, amount, types, and severity of risks to which companies and supply chains are exposed.

The aim of our research is to develop innovative risk management processes for a broad range of industries and markets. We support our industry partners in the development and implementation of bespoke and optimized risk management processes, from risk identification to early warning systems. We offer risk management workshops and training courses for experts and managers from the area of operations and supply chain management.

### Lean & Green Product Life Cycle Management

*Lean* is a synonym for the elimination of waste (Jap. “muda”) in value-added processes. This is one of the main issues in our research domain, with the aim of becoming and remaining effective and efficient in product development, manufacturing, service and disposal/recycling, i.e. along the comprehensive product life cycle. In recent years, the growing awareness of sustainability has strengthened the readiness to act in society, the economy, and politics. Therefore, lean processes also have to be *green* processes, respecting the current issues of greenhouse gas emissions (CO<sub>2</sub>) and global warming.

The aim of research in this area is to simultaneously achieve the economic, societal, and ecological improvement of logistic activities, also known as the “triple bottom line”. Companies can ensure their long-term competitiveness if they prepare themselves today for customer wishes and regulations of the future.

### Systems Engineering

*Systems Engineering (SE)* is a methodology, developed at the BWI Center for Industrial Management, for the goal-oriented, targeted design of complex systems. Central to the SE

methodology is the problem-solving process, which links a process model for system analysis and conception with guidance for project management. In this way, tried and trusted techniques are integrated with procedures for dealing with problems. SE is seen as the methodological foundation of our applied research and practice-based projects. In this sense, the methodology is being continuously updated and developed. Interested business partners are given access to systems engineering in the framework of our projects as well as training opportunities.

## 3.2 Research Projects

Figure 3.2 cites the current projects in which our employees are involved. Each research project is listed by title only; detailed descrip-

tions of the projects can be found in Appendix D.

Projects	Production & Logistics Management	Supply Chain Management Services	Asia / Emerging Markets	Risk Management	Lean & Green	Systems Engineering
<b>FastETO – Methods and tools that support a fast and efficient engineer-to-order process (ETO) for parameterized product families</b> (CTI No. 15021.1 PFES-ES) 	X	X	X			X
<b>Additively – Connect &amp; Manufacture – Web-based procurement processes for additive manufacturing</b> 	X	X		X		X
<b>Global field service network design: a simulation-based decision support system for industrial SME's</b> ( <i>diss.</i> )	X	X				X
<b>Models and practices of cooperation between R&amp;D and Engineering in an ETO operations environment– Supporting product development and order-specification processes</b> ( <i>diss.</i> )	X	X				X
<b>UPOPESS (sucessor of OPESS) – Web-Based Training in Operations Management, ERP, and SCM Systems</b>	X	X				X

Figure 3.2: Research Projects

Diploma and Master's theses are not cited here, although most of them also constitute projects. We distinguish between three types of research activities:

- The first type of research activity mostly concerns projects in cooperation with companies and/or other research teams. Here, the main interest is to achieve the common goals set by the project partners. Dissertations may be completed in connection with these projects, especially during final project stages, and will generally not be listed separately in this report. Within this category, there are projects that are «normal» in size, with financing from one to four person-years, and «large» projects, with financing from six to eight person-years.
- A second type of research activity concerns projects conducted in connection with doctoral work. Here, the main interest is in the achievement of the individual goals of a research collaborator, which may be a scientific degree. These projects are labelled «*(diss.)*» for dissertation.
- A third type of research activity concerns mostly smaller projects that, as a rule, are conducted within a short time frame. Here, the main interest is to give young researchers the opportunity to gain experience and knowledge in a company setting to enable them to conduct better research or to establish mutual trust between our group and companies. This can pave the way for

future, larger joint research projects. These projects are indicated by «*(small)*».

As the chair entered into its final phase, active project acquisition as project leader has been stopped since 2013. Emphasis was given to the execution of the five projects acquired during the years 2012 and 2013.

In many projects, our research team has been supported by the EU, IMS, or CTI.

- IST is the thematic priority «Information Society Technologies»; NMP is the thematic priority «Nanosciences, Nanotechnologies, Materials and new Production Technologies», both under the European Commission's 7th Framework Program (FP7) for EU research.
- IMS «Intelligent Manufacturing Systems» is an industry-led, international research and development (R&D) program, a worldwide network of research cooperation between companies and research institutions, each financed by its own zone but working within a project consortium.
- CTI is the Innovation Promotion Agency of the Swiss Federal Office for Professional Education and Technology. This government agency provides funding for many of our projects. In shared research activities with companies, the company invests a certain amount, mostly financing their own staff. Generally, the CTI then gives the same amount of funding to us in order to finance our own research staff.

### 3.3 Cooperation with other Research Groups

#### Universities

**RWTH Aachen, IFA Hannover, Politecnico di Milano, Keio University (Tokyo)** – We continued our intensive cooperation with the Research Institute for Industrial Management (Forschungsinstitut für Rationalisierung; FIR) and the Laboratory for Machine Tools (WZL) at RWTH Aachen (Proff. G. Schuh, V. Stich), the IFA Institute for “Fabrikanlagen und Logistik” of the Leibniz University of Hannover (Prof. P. Nyhuis), the Department of Management, Economics and Industrial Engineering at Politecnico di Milano (Proff. M. Taisch, M. Garetti), and the Graduate School of System Design and Management at Keio (Prof. M. Nakano).

**HKUST (Hong Kong University of Science and Technology)** – The cooperation with the Advanced Manufacturing Institute (AMI) and the Zhejiang Advanced Manufacturing Institute (ZAMI) with Prof. Mitchell M. Tseng continued.

**Tongji University, Shanghai** – School of Economics & Management, Chinese Academy of Science & Technology Management, Shanghai. We cooperate with Proff. Yanxin You, Yanmei Zhu.

**MIT** – We continued our cooperation with Prof. Y. Sheffi, Prof. O. de Weck and their teams.

**Hosei University, Tokyo, and University of Windsor, Ontario** – We cooperate with Proff. F. Kimura and Y. Fukuda), and Prof. H. and W. ElMaraghy on CIRP-related themes.

**DTU, Technical University of Denmark** – We cooperate with Prof. Josef Oehmen on Operations and Supply Chain Management

**Munich University of Technology** – We cooperate with the IWB (Institute for Machine Tools and Industrial Management, Proff. G.

Reinhart, M. Zäh) on domains of the CARV conference.

Within larger research projects, e.g. GALA, Prof. P. Schönsleben and his assistants cooperate with chairs of various universities, e.g. **EPFL Lausanne** (Proff. P. Xirouchakis, D. Kiritsis), **NTNU Norway** (Prof. A. Rolstadås), **Aalto University Finland** (Prof. R. Smeets), **Aalborg University, Denmark** (Proff. Riis, Johanssen).

## 4 DISSERTATIONS

The following Ph.D. dissertations were presented or co-presented in 2016:

Doctoral Student	Topic of the Thesis	Thesis Supervisors
Matthias Baldinger	Supply chain management für additive manufacturing: Konzepte, Werkzeuge und Prozesse für die Zusammenarbeit mit Dienstleistern zur Reduktion der Risiken beim Einstieg in additive Manufacturing.	Examiner: Prof. Paul Schönsleben Co-Examiner: Prof. Mirko Meboldt
Beat Fuchs	Global field service network design: a simulation-based decision support system for industrial SME's.	Examiner: Prof. Paul Schönsleben Co-Examiner: Prof. Stephan Wagner
Stephan Baur	Risk-Sharing Partnership with Suppliers in the Aerospace Industry	Examiner: Prof. Stephan Wagner Co-Examiner: Prof. Paul Schönsleben
Denis Hübner	Managing risk and conflict in buyer-supplier relationships	Examiner: Prof. Stephan Wagner Co-Examiner: Prof. Paul Schönsleben

Appendix C shows the development of the number of dissertations over the last ten years. Appendix E lists this year's publications by members of the Center.

## 5 OUTREACH ACTIVITIES

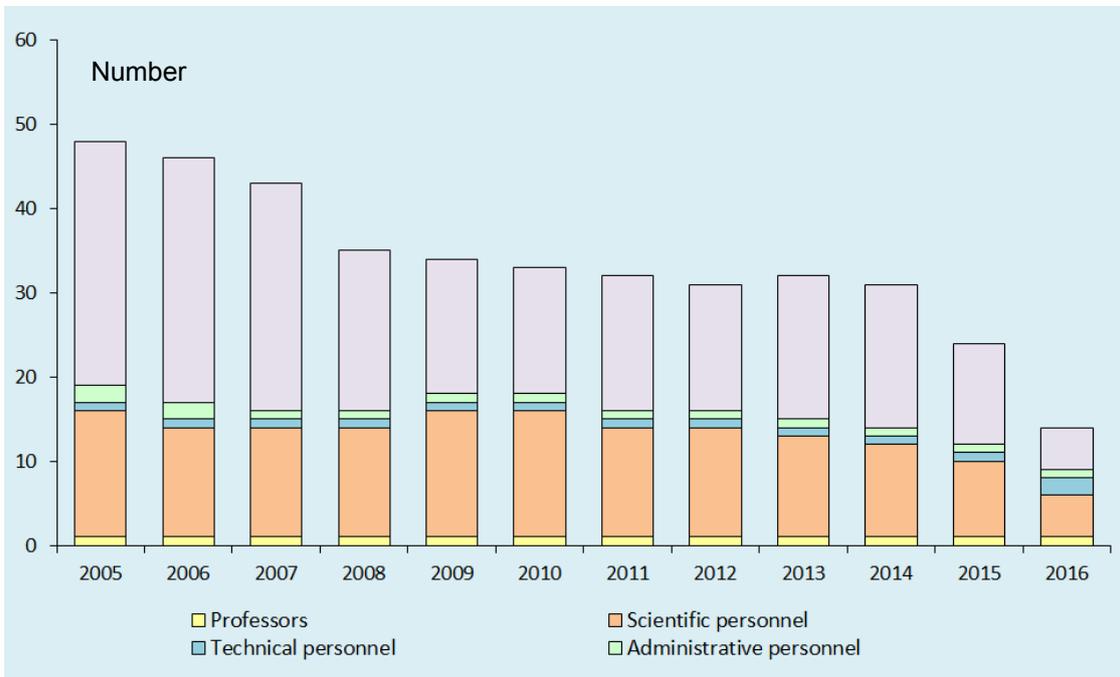
### 5.1 ETH Committees, Related Organizations, and National and International Organizations

## Paul Schönsleben

	Function	Duration
Membership of Prize, Peer Review, or Nomination Committees	Member of the Award Committee of the Fraunhofer Research Prizes of the Fraunhofer-Gesellschaft, Munich (Germany). These prizes amount to approx. 150'000 €.	2001 – present
	Member of the Peer Review Committee of the Department of Management, Economy and Industrial Engineering (DIG) of the Politecnico di Milano (Italy)	2007
	Member of the Referees for the Nomination Committee of the Professorship in Technical Production Management, TU Hamburg-Harburg (Germany)	2008 – 2008
	Appraiser for a Professorship in «Modeling and Planning of Production and Logistic Networks», University of Paderborn (Germany)	2005 - 2005
Membership of Editorial Boards	Editor of the management journal “io Management Zeitschrift” (formerly “Industrielle Organisation”), Switzerland	1996 – 2013
	Member of the editorial board of the “IM+io” management journal, Germany	2013 – present
	Editorial board member of the journal “Production Planning and Control”	1997 – present
	Regular referee for the journal “Computers in Industry”	1997 – present
	Regular referee for the journal “International Journal of Production Economics”	2003 – present
Membership of International Panels	Member of IFIP (International Federation of Information Processing), Working Group 5.7 «Production Management»	1992 – present
	Associate Member of CIRP (Collège International pour la Recherche en Productique), the international Academy for Production Engineering	2009 – present
	Member of various CPIM Committees of the APICS Curricula and Certification Council, Chicago (USA)	1997 – 2009
	Member of the HAB, “Hochschulgruppe Arbeits- und Betriebsorganisation”, a group of professors in these areas from Germany, Switzerland, and Austria	2005 – present
	Member of the International Supply Chain Risk Management Network (ISCRIM)	2006 – present
Responsibilities at ETH	Founding Head of the Department of Management, Technology, and Economics (D-MTEC)	2005 – 2005
	Study Delegate, Deputy Head, and Head of the Department of Industrial Management and Manufacturing Sciences (D-BEPR)	2001 – 2004
	Academic Director of the MBA ETH SCM program (an executive MBA in Supply Chain Management).	2004 – 2009
	Academic Director of BWI Management Weiterbildung (Continuing Education) at the Department MTEC. Average annual turnover: 2.1 Mio. CHF	2009 – 2013
	Member of the ETH's planning committee	1995 – 2000
Membership of National Panels	Member of the Lateral Think Tank of the Swiss Academy of Engineering Sciences	2007 – 2010
	Member of the advisory council of GS1 Switzerland, the “competence center of the economy for standards, logistics, supply and demand management”	2005 – present
	Advisory board member of the postgraduate «Master’s Degree in Ingegneria Gestionale» at the SUPSI, University of Applied Sciences of Southern Switzerland	2000 – 2009

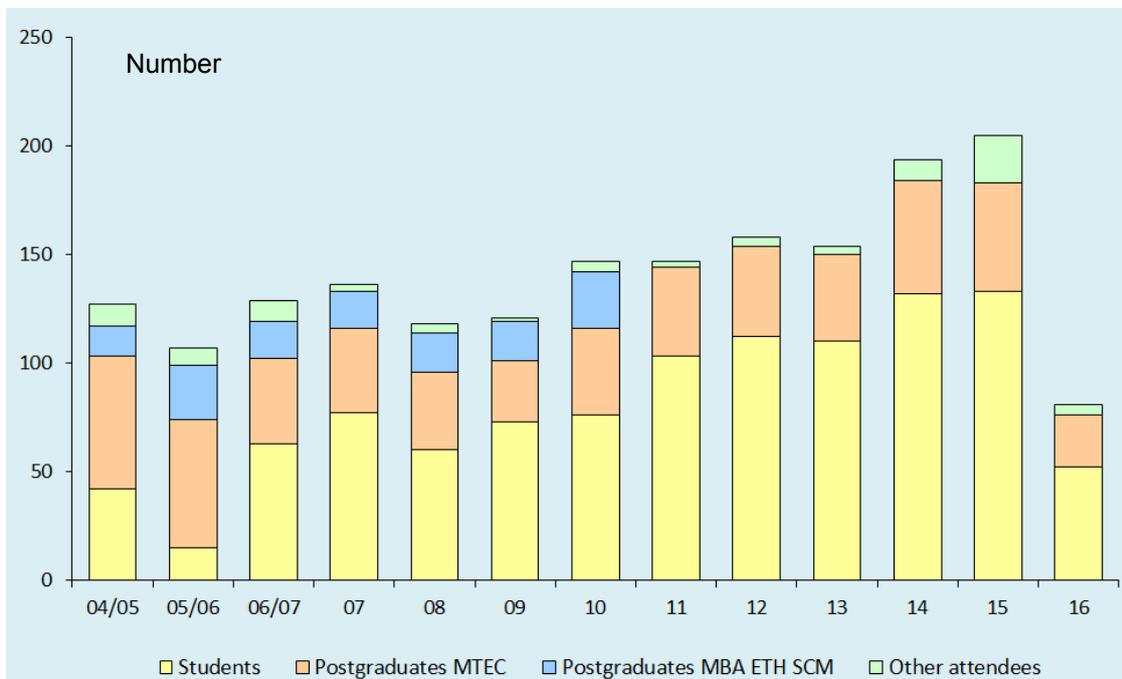
## Appendix A: Statistics on Staff Levels

	05	06	07	08	09	10	11	12	13	14	15	16
Professors	1	1	1	1	1	1	1	1	1	1	1	1
Scientific personnel	15	13	13	13	15	15	13	13	12	11	9	5
Technical personnel	1	1	1	1	1	1	1	1	1	1	1	2
Administrative personnel	2	2	1	1	1	1	1	1	1	1	1	1
Scientific auxiliary assistants	29	29	27	19	16	15	16	15	17	17	12	5



## Appendix B: Statistics on Students

Spring Term / Fall Term	Students BSc and MSc	Postgraduate MTEC	Postgraduates MBA ETH SCM	Other attendees (estimated)	Total
03/04	62	60		4	126
04/05	42	61	14	10	127
05/06	15	59	25	8	107
06 /07	63	39	17	10	129
2007	77	39	14	3	136
2008	60	36	18	4	118
2009	78	35	18	2	133
2010	76	40	26	5	147
2011	103	41		3	147
2012	112	42		4	158
2013	110	40		4	154
2014	132	52		10	194
2015	133	50		22	205
2016	52	24		5	81

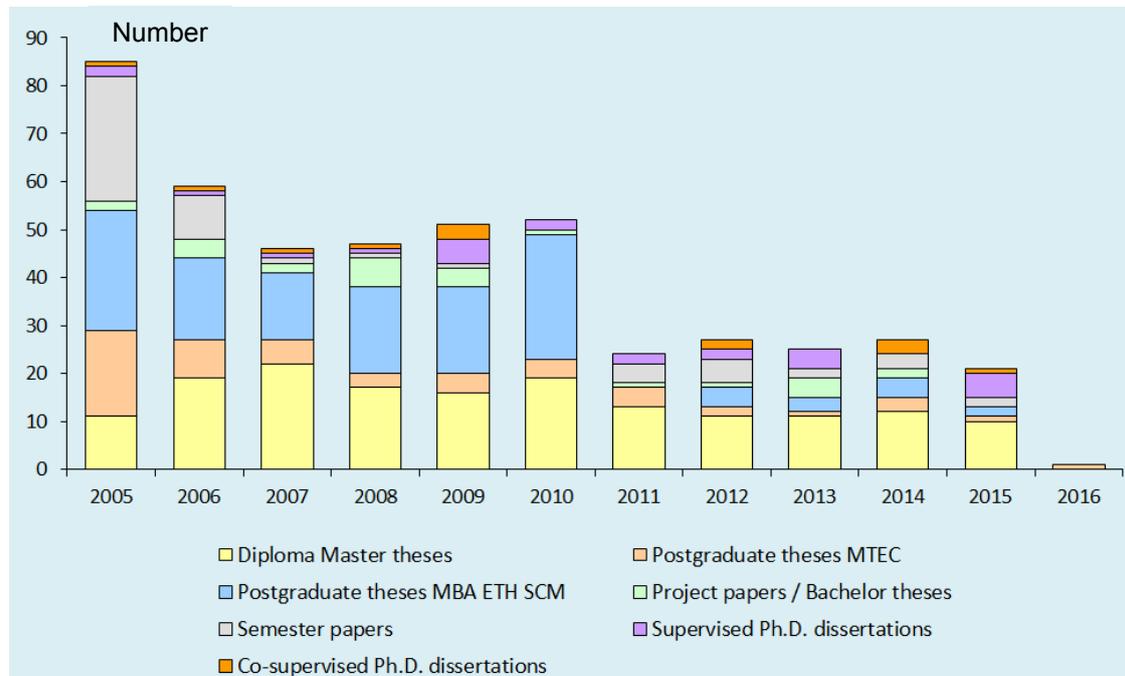


## Appendix C: Statistics on Student Papers and Ph.D. Dissertations

### Student Papers

Type (duration in months)	04	05	06	07	08	09	10	11	12	13	14	15	16
Diploma Master theses (6)	7	11	19	22	17	16	19	13	11	11	12	10	
Postgrad. theses MTEC (3)	13	18	8	5	3	4	4	4	2	1	3	1	1
Postgrad. theses MBA ETH SCM	14	25	17	14	18	18	26		4	3	4	2	
Project papers (2.5) / Bachelor theses (2.5)	10	2	4	2	6	4	1	1	1	4	2	0	
Semester papers (1)*	19	26	9	1	1	1	0	4	5	2	3	2	
Supervised Ph.D. dissertations	3	2	1	1	1	5	2	2	2	4	0	5	
Co-supervised Ph.D. dissertations	0	1	1	1	1	3	0	0	2	0	3	1	
<b>Total</b>	<b>66</b>	<b>85</b>	<b>59</b>	<b>46</b>	<b>47</b>	<b>51</b>	<b>52</b>	<b>24</b>	<b>27</b>	<b>25</b>	<b>27</b>	<b>21</b>	<b>1</b>
<b>Number of students supervised</b>	<b>67</b>	<b>85</b>	<b>59</b>	<b>46</b>	<b>47</b>	<b>51</b>	<b>52</b>	<b>24</b>	<b>27</b>	<b>25</b>	<b>27</b>	<b>21</b>	<b>1</b>

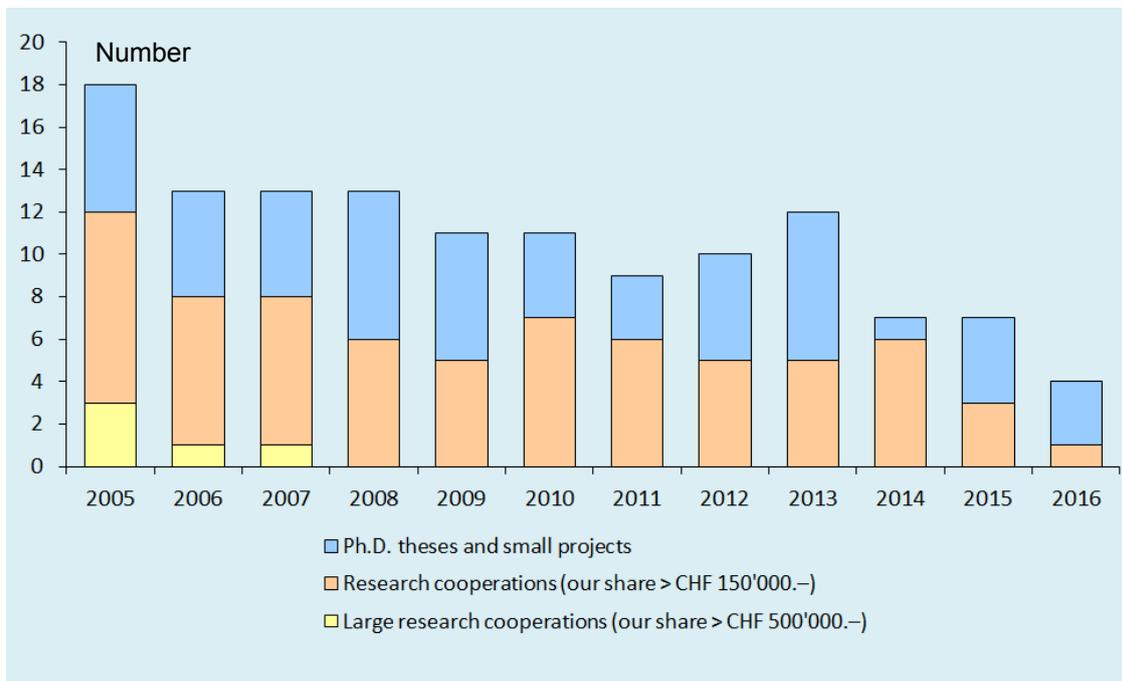
\* Papers by BWI students in advanced studies block courses and by students in subsidiary subjects at the BWI with a duration of 150 hours, mostly internal.



## Appendix D: Research Projects

### Ongoing Projects

	05	06	07	08	09	10	11	12	13	14	15	16
Large research cooperation	3	1	1									
Research cooperation	9	7	7	6	5	7	6	5	5	6	3	1
Ph.D. dissertations and small projects	6	5	5	7	6	4	3	5	7	1	4	4
<b>Total</b>	<b>18</b>	<b>13</b>	<b>13</b>	<b>13</b>	<b>11</b>	<b>11</b>	<b>9</b>	<b>10</b>	<b>12</b>	<b>7</b>	<b>7</b>	<b>5</b>



## Abstracts of Research Projects

### **Project 1: FastETO – Methods and tools that support a fast and efficient engineer-to-order process (ETO) for parameterized product families (CTI No. 15021.1 PFES-ES)**

Researcher: Prof. Dr. P. Schönsleben, Prof. M. Baertschi, A. Duchi, O. Willner

Partners:

Scientific: BWI Center for Industrial Management

Industrial: Schindler Aufzüge AG

Ammann Schweiz AG

Alstom (Switzerland) Ltd

Dissemination: intelligent systems solutions GmbH

EAS Engineering Automation Systems GmbH

BWI Management Weiterbildung

Swiss Center for Mechanical and Electrical Engineering Companies (SWISSMEM)

Financed by: CTI (Commission for Technology and Innovation)

Website: [www.fasteto.ethz.ch](http://www.fasteto.ethz.ch)

#### *Background:*

The development of the first product and process configurators dates back to the 1980s. The full potential, however, was achieved later on in the 1990s through the integration of the parameterization into CAD and CAM software. This made it possible to show the customer the final product already in the bidding phase and to rapidly program the CNC machines. Many companies that maintain this technology as one of their core competencies see configured products, although they might have diverse characteristics, as standard products that are produced in a so-called MTO process (make-to-order). The terms “nonstandard” or “customized” describe products that cannot be completely configured and manual work-arounds are needed. In general, such companies try to configure as far as possible and use an ETO process (engineer-to-order) to finalize the constructions.

#### *Motivation:*

Recently, growing global competition has increased the requirements on ETO processes. Today, the customer is no longer willing to pay an additional premium – both in terms of time and costs – for technical and administrative preparations in sales, construction and production planning when producing ETO products that differ only slightly from configurable products. This is especially the case for simple machines and equipment. Although the premium is still paid for complex

products such as for entire plants, it is getting smaller. Thus, a reconsideration of existing ETO processes is necessary.

#### *Objectives:*

The aim of a joint project between the ETH and industry is to make the ETO process for parameterized product families faster and more efficient. This requires the consideration of a large number of organizational and technical challenges. Issues such as design of ETO processes related to product, process, quotation or order structures, knowledge management – especially in global organizations – as well as the selection of appropriate IT tools are addressed in this project. The establishment of organizational requirements and the development of technical tools should support participating companies to improve their competitiveness in today’s global market.

#### *Activities in 2016:*

The project FastETO is finished in 2016. Until then, the implementation of solutions, such as IT tools or newly defined processes, continued. Beyond that, various dissemination activities took place; e.g. project results were discussed to an industry audience at the Smart Variant.Con and presented to a scientific audience at several international conferences (EUROMA, MCPC).

### **Project 2: Additively – Connect & Manufacture – Web-based procurement processes for additive manufacturing**

Researcher: M. Baldinger, Prof. Dr. Gideon Levy (Ipleiria SA, formerly IRPD St. Gallen), Prof. Dr. P. Schönsleben  
 Partners: Additively AG  
 Financed by: Partially financed by Additively AG  
 The Professorship's own resources

#### *Background:*

Additive manufacturing, often called 3D printing, comprises processes that produce parts and products directly from digital files by adding layer by layer. They offer substantial advantages compared to traditional production methods, such as the possibility to create more complex geometries, the integration of more functionality in fewer parts, new ways of customization down to one and feasibility of on-demand production. Many companies are interested in using these technologies in order to realize innovative new products and solutions to differentiate themselves in the market.

#### *Motivation:*

Industrial additive manufacturing equipment is expensive, which is why many companies choose to buy additively manufactured parts from service providers rather than investing themselves. However, several challenges exist. First, companies lack the knowledge to choose the right additive manufacturing

technology for their application. Second, they do not know which providers have the capabilities to produce their parts. Third, there are large price differences for the same services without an indication of the quality of providers. Thus, companies end up not knowing where they can get the parts they need and at what price. This is slowing down the more widespread adoption of additive manufacturing.

#### *Objective:*

The project is investigating how companies can be supported in order to overcome the above-mentioned challenges. Thereby, the emphasis lies on the development of:

- New procurement processes specifically tailored to additive manufacturing
- A web-based procurement platform enabling the execution of these procurement processes.

### **Project 3: Global field service network design: a simulation-based decision support system for industrial SME's. (diss.)**

Researcher: B. Fuchs  
 Financed by: The Professorship's own resources

Globalisation leads to increasing international trade for industrial goods. Distribution to remote markets, international environment and raising customer demands puts new challenges to technical service departments of small and medium sized enterprises.

Regulatory requirements, as they occur in medical and other industries, can amplify such challenges. Reactive service delivery, optimal integration and good coordination can often only be achieved by local resources or with remote support functions. To gain customer proximity in a geographical but also cultural sense, SMEs establish global field service

networks. The design of such networks depends on various general and company specific factors: business environment, strategies, planned performance or service offers amongst others. A common understanding of the terms environment, strategy and performance related to field services are preconditions for the global field service network design process and are therefore discussed. Six basic constitutive criteria for global field service networks are identified and qualitatively researched on. The criteria are: network structure; service locations; districts; organisational forms; role

assignments and financial models of collaboration (i.e. warranty reimbursement). The six criteria build a global field service network design scenario that is further evaluated with strategic resource planning. A simulation tool GlobSim is presented, which supports strategic planning based on product lifecycles. The data model for the simulation is based on regular corporate data, such as customer master data, equipment files or service level agreements. Data is enriched with expert know-how and statistical values.

The simulation's result is a statement for service demand, service location's required capacities and cash flows created from either the sale of services or service execution. The cash flows are aggregated to a service business case, which allows for the financial evaluation of different global field service network design scenarios. The qualitative and the quantitative results are merged into a procedure which allows SMEs to better master the service challenges caused by global product sale and dispersed installed bases

**Project 4: Models and practices of cooperation between R&D and Engineering in an ETO operations environment – Supporting product development and order-specification processes. *(diss.)***

Researcher: A. Duchi

Financed by: The Professorship's own resources

Product-variety management in today's market is, most of the time no longer an order-winning choice, but an order qualifier. This means that in turbulent market conditions, customers seek out companies that offer shorter delivery times within a customers' price tolerance. In this context, engineer-to-order (ETO) is defined as an operations strategy that is oriented around a high degree of product customization and associated engineering processes for quickly fulfilling customer specifications.

The focus of this thesis lies in the design and engineering activities of companies adopting an ETO strategy. This encompasses product development processes – usually managed by the Research and Development (R&D) department – and order-specification processes – usually managed by the Engineering department. These processes have a significant impact on the value chain's downstream material processes, like manufacturing, and therefore significantly impact the company's overall performance. A literature review confirms that limited advice has been provided on how ETO companies should manage distinct product development and order-specification challenges and opportunities. Discussions with company representatives further confirm the potential effectiveness and efficiency improvements

that could be achieved by implementing new organizational practices and IT tools.

The primary objective of this thesis is therefore to develop models and practices of cooperation between R&D and Engineering that contribute to effective and efficient product-development and order-specification processes in ETO companies.

Methodologically, a case-research strategy is adopted in this thesis. The results presented are based on two series of multiple case studies of eight companies from within the mechanical engineering sector.

The main contributions of this thesis are as follows. (I) A three-step methodological approach to assess the ETO environment is presented: Assessment of product variety and customization, modelling of the ETO process, and measurement of operational performance. (II) Four interaction models between R&D and Engineering are examined, contingent variables influencing the development and specification of ETO products are identified, and their influence on the interaction models is discussed. (III) An information and knowledge-reuse situations framework is introduced; a two-horizon, short- and long-term ETO-enabling process is presented; and ETO-enabling organizational practices and IT tools are summarized.

### **Project 5: UPOPESS (sucessor of OPESS) – Web-Based Training in Operations Management, ERP, and SCM Systems**

Researcher: G. Figueiro, R. Cruz, Prof. Dr. P. Schönsleben

Financed by: The Professorship's own resources

Web site: [www.upopess.ethz.ch](http://www.upopess.ethz.ch)

#### *Motivation:*

UPOPESS is, with regards to technology and content, an update of the original OPESS Project. From the technical point of view, modern web techniques, like HTML6, CMS wordpress, and vector imaging software for all graphics, have been used for its development. UPOPESS can be visualized from any modern type of hardware, such as mobiles, tablets, notebooks and all major known browsers.

The content has been actualized and enhanced, taking as a basis the 5<sup>th</sup> edition of the book "Integral Logistics Management — Operations and Supply Chain Management Within and Across Companies".

The original OPESS concept is to achieve an integrated approach to Web-based training in the field of Operations Management. Special consideration is given to technical and managerial concepts and to related software solutions that have gained great significance worldwide as Enterprise Resource Planning (ERP) and Supply Chain Management (SCM) systems. New developments in the direction of E-business are also included. In addition, the

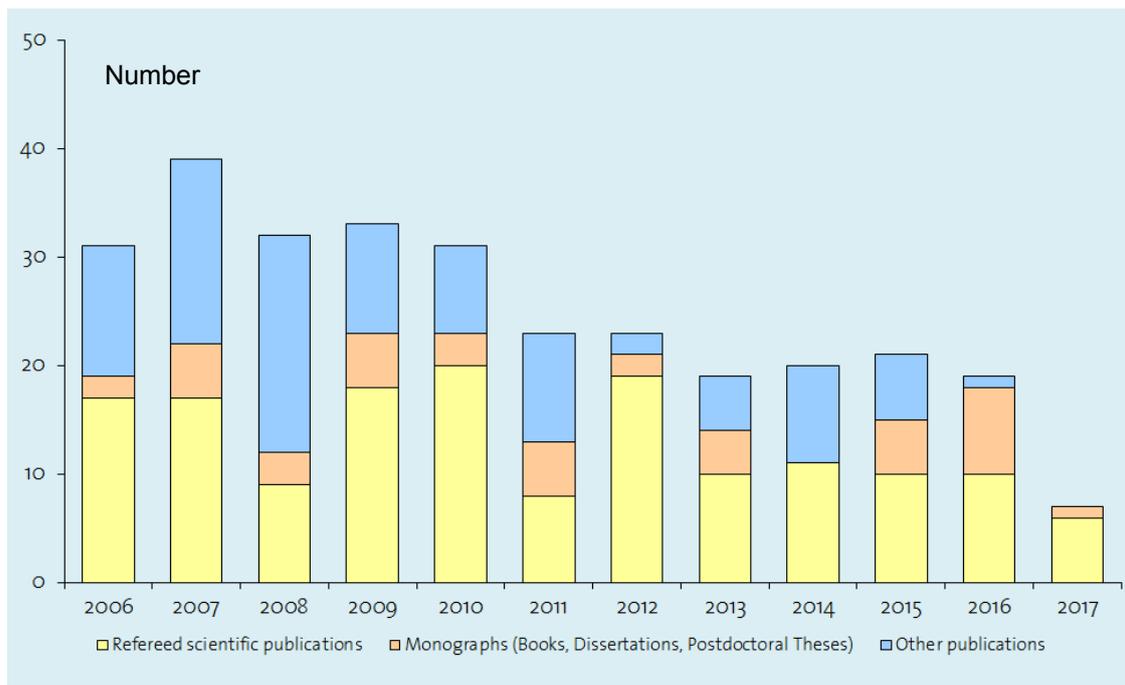
project contributes to a coordination of the syllabuses used in German and French-speaking universities in Switzerland.

#### *Objectives:*

The main goals of the project are: to illustrate more clearly complex technical systems on the Web through the use of advanced multimedia techniques; to obtain knowledge regarding the application of quantitative methods on the Web and controlling the related interaction processes; to integrate software tools, especially to optimize and simulate logistical problems in Web-based learning platforms; to visualize and animate the use of planning and scheduling procedures available in academic prototypes and, in part, already available in packaged software solutions; to use Web-based learning platforms as access or analysis tools for sophisticated software solutions; to integrate the vast amount of information available on the Web about ERP and SCM systems in Web-based learning platforms by providing direct access to relevant sites and checking students' understanding of the referenced knowledge.

## Appendix E: Publications

	06	07	08	09	10	11	12	13	14	15	16	17
Refereed Scientific publications	17	17	9	18	20	8	19	10	11	10	10	6
Books	2	5	3	5	3	5	2	4		5	8	1
Other publications	12	17	20	10	8	10	2	5	9	6	1	
<b>Total</b>	<b>31</b>	<b>39</b>	<b>32</b>	<b>33</b>	<b>31</b>	<b>23</b>	<b>23</b>	<b>19</b>	<b>20</b>	<b>21</b>	<b>19</b>	<b>7</b>



## Refereed Publications

### ISI Journals

- Baldinger, M.; Levy, G.; Schönsleben, P.; Wandfluh, M.: Additive manufacturing cost estimation for buy scenarios, *Rapid Prototyping Journal* 22 (6), p. 871-877, 2016.
- Friemann, F.; Schönsleben, P.: Reducing Global Supply Chain Risk Exposure of Pharmaceutical Companies by Further Incorporating Warehouse Capacity Planning into the Strategic Supply Chain Planning Process, *Journal of Pharmaceutical Innovation*, 11 (2), p. 162-176, 2016.
- Rippel, M.; Schmiester, J.; Wandfluh, M.; Schönsleben, P.: Building blocks for volume-oriented changeability of assets in production plants. *Procedia CIRP*, 41, pp. 15-20, 2015.
- Wandfluh, M.; Hofmann, E.; Schönsleben, P.: Financing buyer-supplier dyads: an empirical analysis on financial collaboration in the supply chain. *International Journal of Logistics Research*, 19 (3), p. 200-217, 2016
- Willner, O.; Powell, D.; Gerschberger, M.; Schönsleben, P., Exploring the Archetypes of Engineer-to-Order: An Empirical Analysis. *International Journal of Operations and Production Management*, 36 (3), p. 242-264, 2016.
- Willner, O.; Gosling, J.; Schönsleben, P.: Establishing a maturity model for design automation in sales-delivery processes of ETO products. *Computers in Industry* 82, p. 57-68, 2016
- Sutherland, J.; Richter, J.; Hutchins, M.; Dornfeld, D.; Dzombak, R.; Mangold, J.; Robinson, R. Hauschild, M.; Bonou, A.; Schönsleben, P.; Friemann, F.: The role of manufacturing in affecting the social dimension of sustainability, *CIRP Annals-Manufacturing Technology*, 65 (2), p. 689-712, 2016.

To be published in 2017:

- Schönsleben, P.; Rippel, M.: Strategic Portfolios for the Integral Design of Value-added Networks. In: Nääs, I., et al., eds. *IFIP Advances in Production and Management Systems: Production Management Initiatives for a Sustainable World*. Springer Berlin Heidelberg, 2017.
- Schönsleben, P.; Friemann, F.; Rippel, M.: Approaches for the Integration of the Social and Environmental Dimensions of Sustainability in Manufacturing Companies. In: Nääs, I., et al., eds. *IFIP Advances in Production and Management Systems: Production Management Initiatives for a Sustainable World*. Springer Berlin Heidelberg, 2017.
- Schönsleben, P.; Friemann, F.; Rippel, M.: Managing the Socially Sustainable Global Manufacturing Network. In: Nääs, I., et al., eds. *IFIP Advances in Production and Management Systems: Production Management Initiatives for a Sustainable World*. Springer Berlin Heidelberg, 2017.
- Schönsleben, P.; Fontana, F., Duchi, A.: What benefits do initiatives such as Industry 4.0 offer for production locations in high-wage countries? *Procedia CIRP*, 2017.
- Schönsleben, P.; Weber, S.; Koenigs, S.; Duchi, A.: Different types of cooperation between the R&D and Engineering departments in companies with a design-to-order production environment. *CIRP Annals - Manufacturing Technology*, 2017.
- Duchi, A., Schönsleben, P.: A three steps methodological approach to assess the engineer-to-order operations environment. In: Lödding, H., et al., eds. *IFIP Advances in Production and Management Systems*. Springer Berlin Heidelberg, 2018.

## *Monographs (Books, Dissertations, Postdoctoral Theses)*

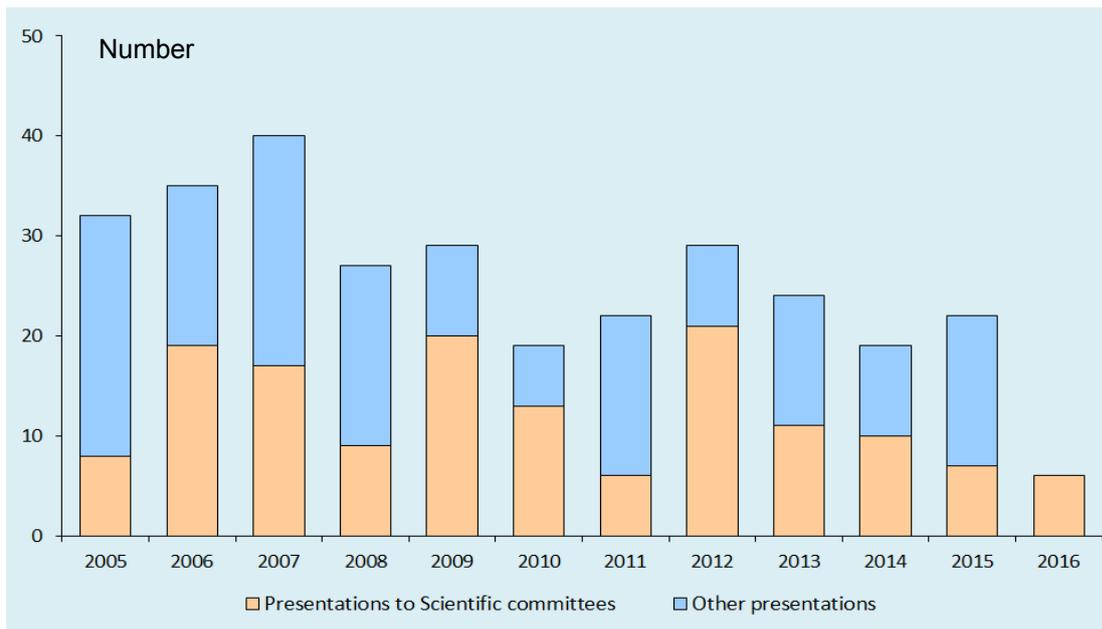
- Schönsleben, P.: Integral logistics management: Operations and supply chain management within and across companies, fifth edition, CRC Press, 2016
- Schönsleben, P.: Integrales Logistikmanagement: Operations und Supply Chain Management innerhalb des Unternehmens und unternehmensübergreifend, 7. Auflage, Springer Berlin, 2016
- Duchi, A.; Tamburini, F.; Parisi, D.; Maghazei, O.; Schönsleben, P.: From ETO to Mass Customization: A Two-Horizon ETO Enabling Process\*. In Bellemare, J.; Carrier, S.; Nielsen, K.; Piller, F.: *Managing Complexity*, pages 99-113, Springer International Publishing 2017 (published in November 2016)
- Fuchs, B.: Global field service network design: a simulation-based decision support system for industrial SME's. ETH Zürich, 2016. (Dissertation)
- Baldinger, M.: Supply chain management für additive manufacturing: Konzepte, Werkzeuge und Prozesse für die Zusammenarbeit mit Dienstleistern zur Reduktion der Risiken beim Einstieg in additive Manufacturing. ETH Zürich, 2016. (Dissertation)
- Fuchs, B.: Global field service network design: a simulation-based decision support system for industrial SME's. ETH Zürich, 2016. (Dissertation)
- Rippel, M.: Strategieentwicklung von Produktionswerken bei Volatilität und Ungewissheit: Herausforderungen, Lösungsansätze, Schlüsselfaktoren. ETH Zürich, 2016. (Dissertation)
- Wille, T.: Konzeption eines Bezugssystems zur Bewertung des Einführungsfortschritts von „Lean Thinking“ in produzierenden Unternehmen. ETH Zürich, 2016. (Dissertation)
- To be published in 2017:
- Duchi, A.: Models and practices of cooperation between R&D and Engineering in an ETO operations environment: Supporting product development and order-specification processes. ETH Zürich, 2017. (Dissertation)

## *Other publications*

- Schönsleben, P.: Welchen Beitrag liefern Initiativen wie Industrie 4.0 – Produktionsstandort Hochlohnländer. *IM+io Fachzeitschrift für Innovation, Organisation und Management*, Heft 3, p. 24-27, September 2016.

## Appendix F: Lectures and Presentations

	05	06	07	08	09	10	11	12	13	14	15	16
Scientific committees	8	19	17	9	20	13	6	21	11	10	7	6
Other presentations	24	16	23	18	9	6	16	8	13	9	15	0
<b>Total</b>	<b>32</b>	<b>35</b>	<b>40</b>	<b>27</b>	<b>29</b>	<b>19</b>	<b>22</b>	<b>29</b>	<b>24</b>	<b>19</b>	<b>22</b>	<b>6</b>



### *Presentations to Scientific Committees*

Friemann, F.: Approaches for the Integration of the Social and Environmental Dimensions of Sustainability in Manufacturing Companies. The Advances in Production Management Systems International Conference (APMS), Iguassu Falls, Brazil, 03.-07.09.2016.

Rippel, M.: Strategic Portfolios for the Integral Design of Value-added Networks. The Advances in Production Management Systems International Conference (APMS), Iguassu Falls, Brazil, 03.-07.09.2016.

Rippel, M.: Managing the Socially Sustainable Global Manufacturing Network. The Advances in Production Management Systems International Conference (APMS), Iguassu Falls, Brazil, 03.-07.09.2016.

Forgotten in 2015

Duchi, A.: Proposing a comprehensive Framework to improve Engineer-to-Order Processes through Integrating Engineering. 22<sup>nd</sup> International Annual EurOMA Conference 2015, Neuchâtel, Switzerland, 26.06-01.07.2015.

Duchi, A.: Engineer-to-Order Enabling Process: An Empirical Analysis. Advances in Production Management Systems International Conference (APMS), Tokyo, Japan, 05.-09.09.2015.

Duchi, A.: From ETO to Mass Customization: the ETO enabling process. 8<sup>th</sup> World Conference on Mass Customization, Personalization, and Co-Creation (MCPC 2015), Montreal, Canada, 20.-22.10.2015.

## 6 DEVELOPMENT AND STRUCTURE OF BWI – MILESTONES

- 1929 The founding convention of the “Gesellschaft zur Förderung des (Association for the Promotion of the) Betriebswissenschaftlichen Instituts (BWI)” of the Swiss Federal Institute of Technology (ETH Zurich) is held on June 26<sup>th</sup> with the participation of several well-known exponents of Swiss industries. Prof. Dr. A. Rohn, president of the “Schweizerischer Schulrat” (today ETH-Rat), becomes president of the association.
- 1929 The BWI opens on October 1st with four employees under the direction of Prof. Dr. Eugen Böhler. The focus of activities lies on general enterprise research. At the same time, a specialized library is set up.
- 1931 Prof. René de Vallière is named professor for industrial engineering and management and takes over the direction of the BWI. Initial (further education) courses are offered on work physiology, production management, and company organization.
- 1932 The first issue of the management journal “Industrielle Organisation” is published.
- 1933 Official teaching activities begin in the winter term.
- 1936 Courses in Industrial Engineering and Management become part of the curricula of Department of Mechanical Engineering.
- 1950 Prof. Eberhard Schmidt is appointed as professor for industrial management and production techniques and becomes director of the Institute.
- 1951 The SKU (“Schweizerische Kurse für Unternehmensführung”) is founded.
- 1954 Prof. Dr. h.c. Walter Daenzer is appointed as professor for industrial management and manufacturing techniques and becomes director of the Institute. The work of Prof. Daenzer and his researchers formed the core of the development of the problem solving methodology of “Systems Engineering” (SE) at the BWI.
- 1959 The Institute and its 40 employees move to new quarters at Zürichbergstrasse 18.
- 1961 The “Schweizerische Gesellschaft für Betriebswissenschaften”, today the Swiss Association of Management (“Schweizerische Management Gesellschaft”) is founded.
- 1968 A new curriculum no longer binds industrial management to manufacturing techniques, and the course offerings in specialized areas are expanded.
- 1970 Prof. Dr. A. Büchel is appointed professor to fill the new second chair at the Institute.
- 1974 A postgraduate study, called “Nachdiplomstudium in Betriebswissenschaften” is introduced on a provisional basis. In 1980, it becomes officially established.
- 1975 Prof. Ernst Brem is appointed to succeed Prof. Dr. h.c. W. Daenzer.
- 1982 The Institute is granted a third chair, for the field of enterprise management, and Prof. Dr. Dr. Hugo Tschirky is appointed.
- 1983 Prof. Dr. Armin Seiler is appointed to the fourth chair for the field of enterprise economics and stays until 1987, at which time he founds his own professorship outside the BWI.
- 1984 Launch of the “Stiftung für Forschung und Beratung am BWI” (foundation for research and consulting at the BWI), or – simply – BWI foundation. Its board of trustees is appointed from representatives of the “Gesellschaft zur Förderung des BWI” and the Executive Board of the ETH Zurich. The (unique) director of the foundation is Prof. E. Brem.
- From its profits, the foundation finances research projects as well as the public BWI library. The following areas are commercially run:
- Publishing house and management journal io (“Industrielle Organisation”)
  - Consultancy in leadership and organization, logistics and factory planning, business administration, information management
  - “Stiftung BWI Management Weiterbildung” (Foundation BWI Further Education)

- The leadership of the BWI *institute* is henceforth assumed by the three professors together, with the board of directors changing on a rotating basis.
- 1987 Prof. Fritz Huber is elected to succeed Prof. E. Brem in the field of product and production process (Produkt und Produktionsprozess) and to direct the BWI foundation.
- 1989 The course offerings at the BWI are expanded and integrated into the newly founded "Department for Industrial Management and Manufacturing Sciences" (IIIE, D-BEPR).
- 1991 Prof. Dr. Paul Schönsleben succeeds Prof. Dr. Alfred Büchel in the areas of Logistics, Planning and Control, and Information Management.
- 1993 Dr. Paul Frauenfelder and Dr. Rainer Züst are appointed as assistant professors at the BWI institute. Dipl. Ing. ETH Markus Baertschi becomes a regular guest lecturer.
- 1996 The BWI *foundation* forgoes its consulting activities. Ownership of the io-Fachverlag is handed over to Orell-Füssli publishing company. The BWI institute becomes editor of the io management journal, while HandelsZeitung Fachverlag AG becomes its new publisher.
- 1999 The "ETH Center for Enterprise Sciences (BWI)" is launched on Oct. 1<sup>st</sup> through a metamorphosis of the BWI *institute*. The new center is under the direction of Prof. Dr. Dr. Hugo Tschirky and Prof. Dr. Paul Schönsleben.
- 2000 The curriculum is reconsidered. Major changes point towards an introduction of a M.Sc. (master's degree) at the graduate level, and an engineering-oriented MAS (Master of Advanced Sciences) at the postgraduate level (succeeding the "Nachdiplomstudium in Betriebswissenschaften").
- 2000 The "Gesellschaft zur Förderung des BWI" changes its name to the "Association for the promotion of research and training in enterprise sciences at the ETH Zurich". Priority is given to support measures oriented towards enabling young people to assume corporate responsibility in technology-intensive companies.
- 2004 Prof. Dr. Dr. Hugo Tschirky becomes Professor Emeritus. The new Department D-MTEC (Management, Technology, and Economics) replaces the former D-BEPR. Together with others of the established and some of the newly founded chairs of D-MTEC, the Center for Enterprise Sciences BWI moves on to D-MTEC's new premises at Kreuzplatz 5.
- 2005 The second course of the Executive MBA-SCM (Supply Chain Management) starts within the D-MTEC, under the direction of Prof. Paul Schönsleben of the BWI.
- 2005 The BWI *foundation* and the D-MTEC decide upon a partnership. Since this time, the foundation has been concentrating its activities on supporting research at the D-MTEC and sees itself as the "MTEC Foundation". It's board of trustees consists of three representatives from industry (one of whom is the President of the board of trustees), a representative of the Executive Board of the ETH Zurich and the head of the D-MTEC.
- 2008 The Executive Board of ETH Zurich approves a fusion of the two seminar organizers "BWI Seminars" and "Foundation BWI Further Education". The "BWI Management Weiterbildung" is launched on Jan. 1<sup>st</sup> under unified direction and responsibility of the BWI.
- 2009 Change of name to BWI Center for Industrial Management ("BWI Betriebswissenschaftliches Zentrum"). This is due to the fact, that one of the aims of the former BWI Center for Enterprise Sciences, that is to indicate a more comprehensive concept of management, is fulfilled by D-MTEC. Hence, BWI is brought back closer to its original denomination.
- 2013 The io management journal and the journal "Informationsmanagement" become "IM+io – the journal for innovation, organization and management". IMC, "information multimedia communication AG", Saarbrücken, owned by Prof. August Wilhelm Scheer, is the new publisher. The professors of D-MTEC play an important role in the editorial committee.
- 2014 The BWI MWB, Management Weiterbildung BWI AG, is launched on Jan. 1<sup>st</sup> as an independent company, maintaining its strong link to the BWI Center for Industrial Management. BWI-MWB continues to offer, in the four subject areas of project management, leadership, supply chain management and management techniques, around 150 events with approximately fifty different titles, both publicly and within companies.