

ETH

Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

D Departement
Management, Technology,
and Economics
MTEC



Annual Report 2014

BWI Center for Industrial Management

Logistics, Operations, and Supply Chain Management

BWI Center for Industrial Management

Vision

*Through teaching and research,
we strive towards qualitative improvement
of the use of work and technology;*

to this end,

*we endeavor to promote the sociotechnical
design of work, the development and utilization of
product and process technologies
that are beneficial to both
businesses and society,*

*and ethically responsible management of
businesses and enterprises – and thus,*

*to exert influence on social values and social
change.*



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

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

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HIGHLIGHTS

People and Organization: Our group at the BWI Center for Industrial Management (BWI Betriebswissenschaftliches Zentrum) is 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 include information management, configuration and modeling of supply chains with multiple variant products and processes, and TQM and process management. We are pleased to present this report of some of the highlights of our activities in 2014.

As indicated in our report of the previous year, my chair entered into its final phase. Therefore, with effect from June 2013, researchers who were leaving were not any longer replaced. Our group currently has 12 members, including four administrative employees. There are also 11 student assistants, bringing the total to 23. We are extremely pleased that Dr. Johannes Plehn, who gained his Ph.D. degree in 2013, was awarded with the prestigious “ZURICH *Dissertation Prize*” for his dissertation. We extend our warmest congratulations to him.



Research projects: As indicated in our report of the previous year, as my chair entered into its final phase, active project acquisition as project leader is stopped since 2013. Emphasis was placed on the execution of the five projects acquired in 2012 and 2013. However, with regard to the succession of the professorship, we participated as followers at various research proposals.

Publications: Compared to the previous year, the number of scientific publications continued to decrease. We are particularly pleased that two papers were published in so-called A journals, while we continued to publish in major important professional business journals.

Teaching and Continuing Education: In total, 194 students were registered on our courses at ETHZ. In addition, we coached 24 Master or Bachelor theses, or student papers. Furthermore, we again gave a three-day block lecture at the Graduate School of System Design and Management at Keio University, Tokyo. As a consequence of the reduced number of assistants in the team, we considerably reduced our teaching effort during the year 2014.

Starting from January 1st, 2014, the BWI Management Weiterbildung (BWI MWB) continued to offer the same services, under the name of “Management Weiterbildung BWI AG”, thus as an independent company, maintaining its strong link to the BWI Center for Industrial Management at D-MTEC. During 2014, it achieved a good turnover, combined with a good bottom line result, particularly in the field of project management, where the BWI MWB is the leading supplier in Switzerland.



In total, 69 public seminars and 91 company-internal seminars were held. Hence, it was possible to invest in a new CRM-Software, which not only is visible at the website www.bwi.ch but also has a huge impact on efficiency on the back-office administration.



Knowledge Transfer: With the Erfa group «Production and Information Management», we conducted one evening symposium on the topic «Kundenindividuelle Produkte als Chance für den Hochlohnstandort Schweiz» [Customer-specific products as opportunity for the high-wage country Switzerland]. Over 65 participants attended the event. Furthermore, we organized two company seminars on the topics of sustainability and implementation of ERP systems.

Perspectives and Acknowledgements: Unfortunately, the search for a successor of the Professorship was not successful up to date. We sincerely hope that the domain of industrial management (“Betriebswissenschaften”) with its accentuated engineering approach and its strong focus on cooperation with industry will not be replaced by a Professorship that de facto will primarily contribute to ivory-tower research in management.

My sincere thanks go to all of my colleagues at the BWI for their effective and efficient work in the past year. Again, I owe particular gratitude to my two colleagues Markus Baertschi and Hugo Tschirky at the BWI, but also to the whole D-MTEC department. Moreover, I would like to thank the numerous and valued partners from industry and universities, as well as all of our customers in the economy and sponsors. We are looking forward to an intensive collaboration in the actual year, which should be my last full year at ETH. As from Feb 1st, my engagement at ETH is reduced. With this reduction I also fulfill a condition set by the ETH Schulleitung. Otherwise I would not be allowed to continue to serve as president of the Verwaltungsrat of a medium-sized group of companies, i.e. in a quality I have served now for more than 10 years.

I hope you enjoy reading this report. As always, you will find more information on the Internet at www.lim.ethz.ch.

A handwritten signature in black ink, appearing to read 'Paul Schönsleben', is centered on the page.

Zurich, March 2015

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

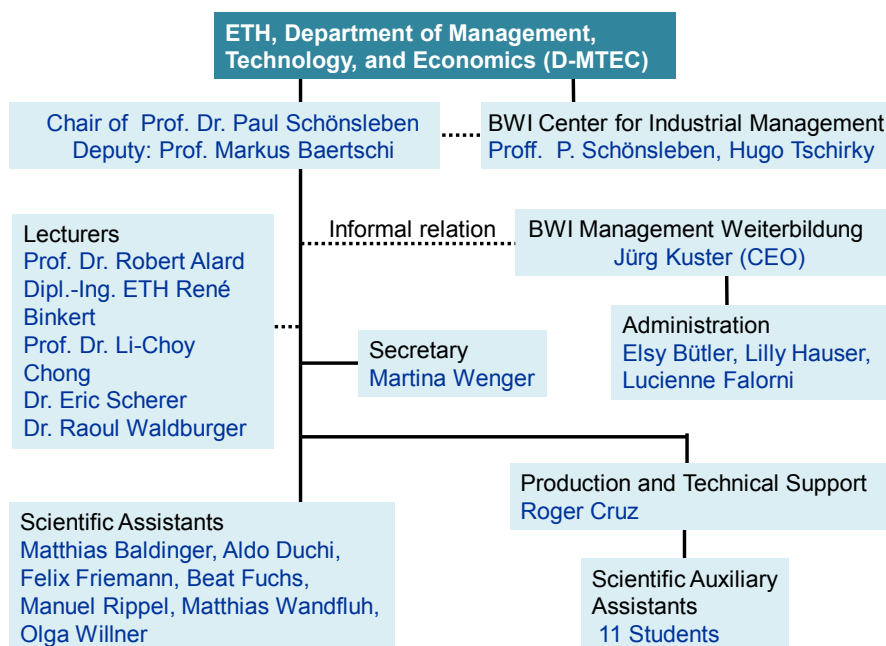
researchers. The main goal of assistants is to support the professors in teaching, research, and industry projects.



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

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

1.2 Organizational Structure, as of December 31st, 2014



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.

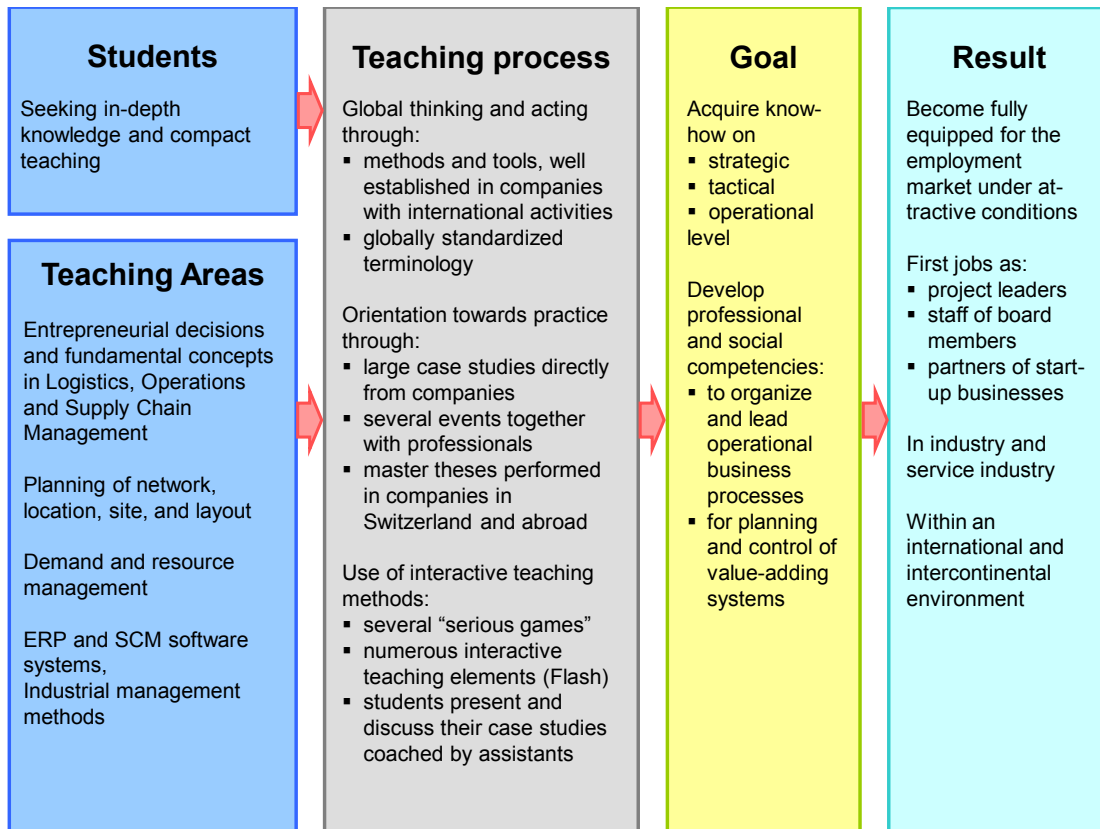


Figure 2.1: Teaching Strategy

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 2014

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
International Management Asia	Prof. Li Choy Chong
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 2014

Course	Lecturers
Logistics, Operations, and Supply Chain Management I	Prof. P. Schönsleben
Industrial Engineering and Management for Theses in Companies	Prof. R. Alard

2.3 Visiting Lecturers for the Course LOS I and LOS II

Lecturer	Company	Topics
Dr. Raul Waldburger, Jens Diebold	Holcim Group Support AG	Linking Strategy and Sustainability / Location Planning in the Process Industries
Dr. Thomas Sommer-Dittrich, Franz Homberger	Daimler AG, Ulm	Production Network Optimization at Daimler
Dr. Lutz Gottschalk	M+W Group	Concepts for the process industry
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 2014, with even greater success than in previous years. This year’s topic: «Make or Buy»

Lecturer	Company, Place
Bruno Simma	SIMMA Management Consultants, Pfäffikon
Gregor von Cieminski	ZF Friedrichshafen, Friedrichshafen
Franco Monti. Nic Bosshard, Markus Koch	Deloitte Consulting AG, Zürich
Markus Burri	Go China Management Services, Wädenswil
Oliver Flückiger	Rayneer.tv, Zürich
Thomas Zellweger	Zellweger Management Consultants AG, Pfäffikon
Prof. Robert Alard	Fachhochschule Nordwestschweiz, Olten
Markus Lang	Universität Zürich, Zürich
Dr. Axel Goth	Bertrams Chemical Plants Ltd., Muttenz
Thomas Dalla Vecchia	Obal AG, Bern
Matthias Hanke	Roland Berger AG, Zürich

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 2014, 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 – In 2014, Prof. P. 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 2014, Prof. P. Schönsleben, M. Baldinger, A. Duchi, and O. Willner gave a three-day 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.

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/forschung/Strategie/Forschungsbereiche_EN) and can provide you with competent support in research and the implementation of projects (www.lim.ethz.ch/forschung/projekte/index_EN).
- 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/forschung/Strategie) 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) 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.

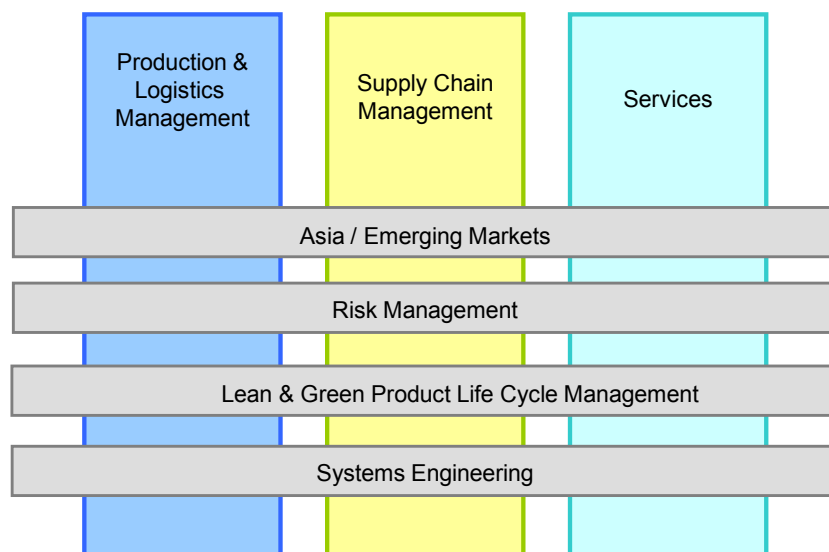


Figure 3.1 Research domains and cross-sectional areas

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 is becoming 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 (CO₂) 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
C-FISH – Collaborative Financial Supply Chain Management (CTI No. 13857.2 PFES-ES) 	x	x		x	x		x
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) 	x	x		x			x
GaLA – Game and Learning Alliance (EU-IST-ICT 258169) 	x	x					x
Long-Range planning of Logistics capacities in the process industry	x	x		x			x
Developing a global manufacturing footprint corresponding to volatile environments	x	x		x	x		x
Additively – Connect & Manufacture – Platform supporting companies interested in additive manufacturing 	x	x					x
Decision-support for Eco-efficiency Improvements in Production Systems Based on Discrete-event Simulation (diss.)	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 year 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 Leibnitz 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, Dr. M. Singh (Malaysia), and Dr. J. Oehmen on various themes.

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.

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. Smeeds), **Aalborg University, Denmark** (Proff. Riis, Johanssen).

4 DISSERTATIONS

The following Ph.D. dissertations were presented or co-presented in 2014:

Doctoral Student	Topic of the Thesis	Thesis Supervisors
Moritz A. Peter	Counterparty risk in procurement transactions: Contractual, financial, operational, and strategic risk mitigation	Examiner: Prof. Stephan M. Wagner Co-Examiner: Prof. Paul Schönsleben
Mohammed Saif Al-Saidi	A Model Formulation Approach for System Support Engineering	Examiner: Prof. John Mo (RMIT Melbourne, Australia) Co-Examiner: Prof. Paul Schönsleben

The following Habilitation thesis (second Ph.D. dissertation) was presented or co-presented in 2014:

Candidate	Topic of the Thesis	Thesis Experts
Christoph Bode	Perspectives on the Management of Risk, Innovation, and Relationships in Supply Chains and Networks	Main expert: Prof. Stephan M. Wagner Second expert: 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 CONTINUING EDUCATION AND KNOWLEDGE TRANSFER

5.1 BWI Management Weiterbildung

With the year under review, the 1st business year of BWI Management Weiterbildung after the spin-off from the ETH Zurich comes to a close. With the company name "Management Weiterbildung BWI AG" the continuing education vessel was continued with some organizational adaptations.

In the first half of the year a distinct reduction in seminar requests was observable. Due to the still very good order situation in Switzerland many customers did not find the time for their own continuing education because of the high workload. In the second half of the year this slump nearly has been compensated, especially due to a very good 4th quarter.

Market Situation

The themes of "project management" and "leadership" continued to be the main source of revenue, and in comparison to the other themes, showed a clearly smaller slump. Compared to the year before an above-average amount of customers booked company-internal continuing education courses. In addition also this year, a few new companies have again chosen the BWI Management Weiterbildung as a strategic partner for company-internal continuing education programs.

Market presence

An important date this year was 19.09.2014 when the "go-live" of the completely new

website took place. The feedbacks from our customers have been very positive from the beginning. The planned extensions for customers (personal BWI-History, recommendations, myBWI, etc.) and for the BWI-back office should be finished until the middle of 2015.

In the print media, the established daily and weekly newspapers in the Greater Zurich Area were primarily used, as well as several renowned specialist journals for the themes of logistics, supply chain management, organization, leadership & management etc.

The annual program in its familiar format was again supplemented by four quarterly flyers with the same appearance, which described in detail the events planned for the next quarter.

Finally, in the months of March to May 2014, the transport services of the City of Zurich also carried window advertising for the BWI Management Weiterbildung through the city, with the advertising slogan "Are you fit enough for the world?".

This year, the traditional spring conference "Project management" took place on 21st May 2014 and, as usual, was carried out in collaboration with the Swiss Society for Project Management at the Technopark Zurich. The title was "Me and You and the others – self-

and relationship-management in projects" and again saw a gratifying attendance of over 200 people.

The BWI Management Weiterbildung was present at the following events as organizer, sponsor, exhibitor and with specialist lectures:

- Zurich Continuing Education Fair, March 2014, HB Zurich
- Personal Swiss, April 2014, Messe Zürich

Public seminars

The 2014 public seminars offer comprised a total of 49 themes in the seven thematic areas of project management (14), leadership (14), communication (4), process management (5), creativity & innovation (6), management techniques (4), and logistics and supply chain management (2). A total of 40 trainers were available for these seminars.

Company-specific seminars

In a total of 45 companies, company-internal seminars and workshops were conducted. The theme of "project management" again made up the greatest share of these seminars. Further requested themes were leadership, product management, communication, negotiation techniques, presentation techniques, time management and much more.

The following table provides information about the events conducted in 2014 in comparison to previous years:

Range of Seminars offered	09	10	11	12	13	14
Number of Public Seminars Held	61	71	83	77	76	69
Number of Public Seminar Days Held	142	159	183	181	178	168
Number of Company-Internal Seminars Held	92	84	99	81	69	91
Number of Company-Internal Seminar Days Held	220	203	264	183	138	218

A large amount of further information can be found online: www.bwi.ch

5.2 Erfa Group «Production and Information Management» (PIM)

ERFA stands for exchange of experiences (in German: *Erfahrungsaustausch*). The know-how group on «Production and Information Management», or Erfa Group PIM, is a working group made up of participants from industry and the university, which addresses issues in production, logistics, and information management. The Erfa Group PIM aims to provide its members (currently approx. 65 companies) with current information on new trends in these areas, to present new concepts, and to promote the exchange of experience among its members.

To this end, the Erfa Group organizes seminars, conferences, and lectures for its

members. These are usually complemented by in-depth discussion sessions. Members and other interested parties can find further information on past and future events as well as on Erfa membership at the Erfa Group PIM website

(www.erfa-pim.ethz.ch). A member list that is only accessible to members provides the opportunity to share experiences directly and independently of official Erfa Group events. During 2014, the Erfa Group PIM organized an evening symposium and one company seminar. Altogether, approx. 140 persons participated in the events.

Company seminar «Managing the Triple Bottom Line», Hilti AG in Thüringen, Vorarlberg

On September 3rd, the company seminar “Managing the Triple Bottom Line” took place at Hilti AG in Thüringen, Vorarlberg. Altogether, 31 people attended the seminar. Among them were production managers and CEOs from Swiss companies. Lectures on

sustainability in leadership, product development and production were held. Furthermore, a factory tour was conducted to undermine the sustainability concepts that had been previously presented with practical examples.

Lecturer	Function	Topic
Stefan Nöken	Member of the Board	Sustainable Leadership
Arno Mathias	HSE Project and Process Manager	Sustainable Product Development
Peter Bühl	Head of Global Manufacturing Electric Tools & Accessories, Head of Plant Thüringen	Sustainable Production

Evening symposium «Kundenindividuelle Produkte als Chance für den Hochlohnstandort Schweiz» [Customer-specific products as opportunity for the high-wage country Switzerland], ETH Zurich

The yearly evening symposium of the Erfa Group PIM took place on November 13th. The topic of the evening was «Kundenindividuelle Produkte als Chance für den Hochlohnstandort Schweiz» [Customer-specific products as opportunity for the high-wage country Switzerland]. Over 65 participants attended the event. Speakers from industry and academia presented insights into the opportunities that customer-specific products

provide for Swiss manufacturers. Experiences from both asphalt mixing and bicycle industry were introduced. Beyond that, a service provider presented different product technologies that can be applied for the manufacturing of customer-specific products. A lively discussion and exchange of experiences between the audience and the speakers rounded off the evening.

Lecturer	Function	Topic
Prof. Dr. Mirko Meboldt	Chair of Product Development and Engineering, ETH Zurich	Product Development: cost responsibility vs. customer benefits
Dr. Anton Demarmels	Head of Technology Management, Ammann Schweiz AG	Being competitive in emerging markets: asphalt mixing plants with Swiss core parts
Michael von Allmen	CEO, Von Allmen AG	Realizing ideas with old and new technologies
Thomas Binggeli	President of the Board of Directors, BMC Group / Thömus Veloshop	High-tech bicycles from the farm

Company seminar «Opportunities and restrictions of ERP-systems in the context of shop floor management», Huber + Suhner AG in Herisau

On November 28th, the company seminar “Opportunities and restrictions of ERP-systems in the context of shop floor management” took place at Huber + Suhner AG in Herisau. Altogether, 45 people attended the seminar. Lectures on the implementation of a new ERP system and MES-system as well as the introduction of various additional IT

solutions in the context of shop floor management were held in order to provide an overview on the IT landscape of Huber+Suhner. During the factory tour the participant had the possibility learn more about the factory in Herisau and to see the application of the discussed IT solutions in practice.

Lecturer	Company Division	Topic
Dr. Ulrich Schaumann	Manager Corporate Operations	Greeting of the participants, Introduction to Huber + Suhner
Hans-Jörg Neureiter	Program Manager ERP	Introduction of an integrated ERP-system in a globally acting company
Thomas Schubiger	Program Manager Lean Production	MES-system for supporting lean manufacturing initiatives
Christian Svendsen	Project Manager and Process Owner Reliability	Efficiency in logistics: Mobile dialogues and label management
Makrus Greber	Manager Operations	KPI-systems based on a database solution: simple, pragmatic and effective

2. Circle of Experts «Gemeinsam(e) Probleme lösen!» [Solving mutual problems together], ETH Zurich

To support companies facing challenges of the current business environment in an even more collaborative manner, the Erfa Group PIM decided to continue the event series of the “Circle of Experts” (CoE). The CoE’s target is to enable an extensive exchange of information and experience among the participants within the specific field of “Service Management”.

Companies with similar problems get in touch with one another and form a group over a period of 8 months. In this way, the isolated knowledge of a single firm can be expanded by a variety of proven new solutions. The workshop provides an organized and structured framework within which to deal with the challenges of the individual company. The participants broaden their business perspec-

tive, gain insights into new approaches and learn to transfer new impulses back to their own firms.

The participants benefit from:

- Intensive exchange of information and experience between practitioners
- Professional input on current issues
- Thematic impulses for practice
- Specific feedback on one's own problems and potential solutions
- Personal network of experts

The first CoE "Global Sourcing" was launched in 2012. The valuable experience exchange in

five workshops and the positive feedback from the participants motivated us to continue this event series.

The second CoE "Service Management" started in 2013 and was continued in 2014. Eleven decision makers from the service departments of six companies participated. In total, five events took place, covering different aspects of service management in a globalized environment. As for the first CoE, the BWI Center for Industrial Management (Prof. P. Schönsleben, F. Friemann, M. Rippel) supported the Erfa Group PIM in the organization of this event.

Keynote speaker	Company	Topic	Date
Arndt Paul	HILTI AG	Business Inspiration - Hilti Service Management	13.02.2014
Peter Brück	KOMATSU Mining Germany GmbH	Business Inspiration - KOMATSU Mining Service Management	13.02.2014
Niko Hossain	Lufthansa Cargo AG	Einsatz von IuK-Systemen im Service - Strukturierte Gestaltung von value added services an einem Beispiel der Lufthansa Cargo AG	10.04.2014
Dr. Bernd Bienzeisler	Fraunhofer-Institut für Arbeitswirtschaft und Organisation (IAO)	Kundeninteraktion im technischen Service – Trends und Entwicklungen	10.04.2014
Dr. Gerhard Gudergan	FIR e. V. an der RWTH Aachen	Service Life Cycle Management / Zukunftsstudie "Datenbasierte Dienstleistungen"	12.06.2014

6 OUTREACH ACTIVITIES

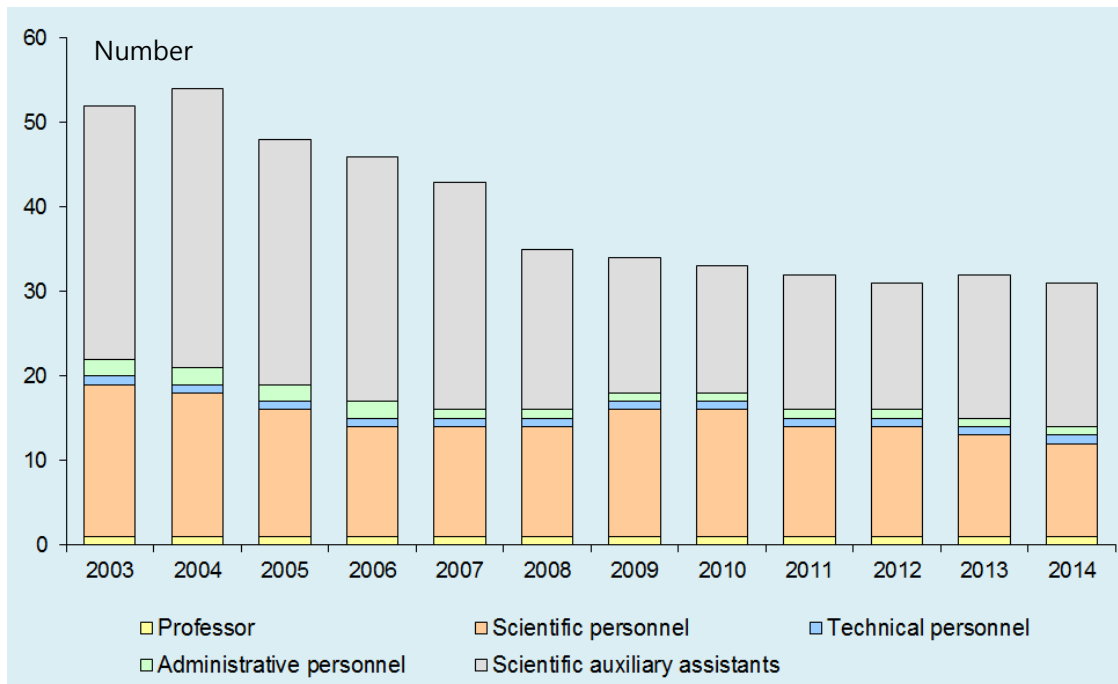
6.1 ETH Committees, Related Organizations, and National and International Organizations

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

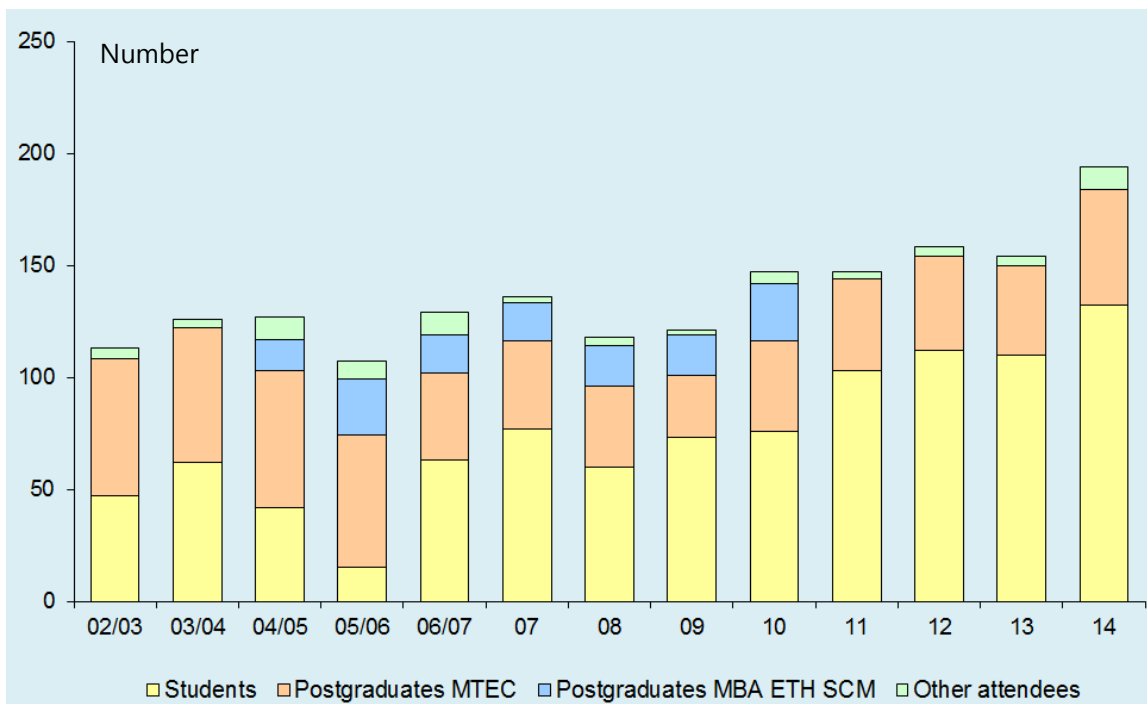
Appendix A: Statistics on Staff Levels

	03	04	05	06	07	08	09	10	11	12	13	14
Professors	1	1	1	1	1	1	1	1	1	1	1	1
Scientific personnel	18	17	15	13	13	13	15	15	13	13	12	11
Technical personnel	1	1	1	1	1	1	1	1	1	1	1	1
Administrative personnel	2	2	2	2	1	1	1	1	1	1	1	1
Scientific auxiliary assistants	30	33	29	29	27	19	16	15	16	15	17	17



Appendix B: Statistics on Students

Spring Term / Fall Term	Students BSc and MSc	Postgraduate MTEC	Postgraduates MBA ETH SCM	Other attendees (estimated)	Total
02/03	47	61		5	113
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

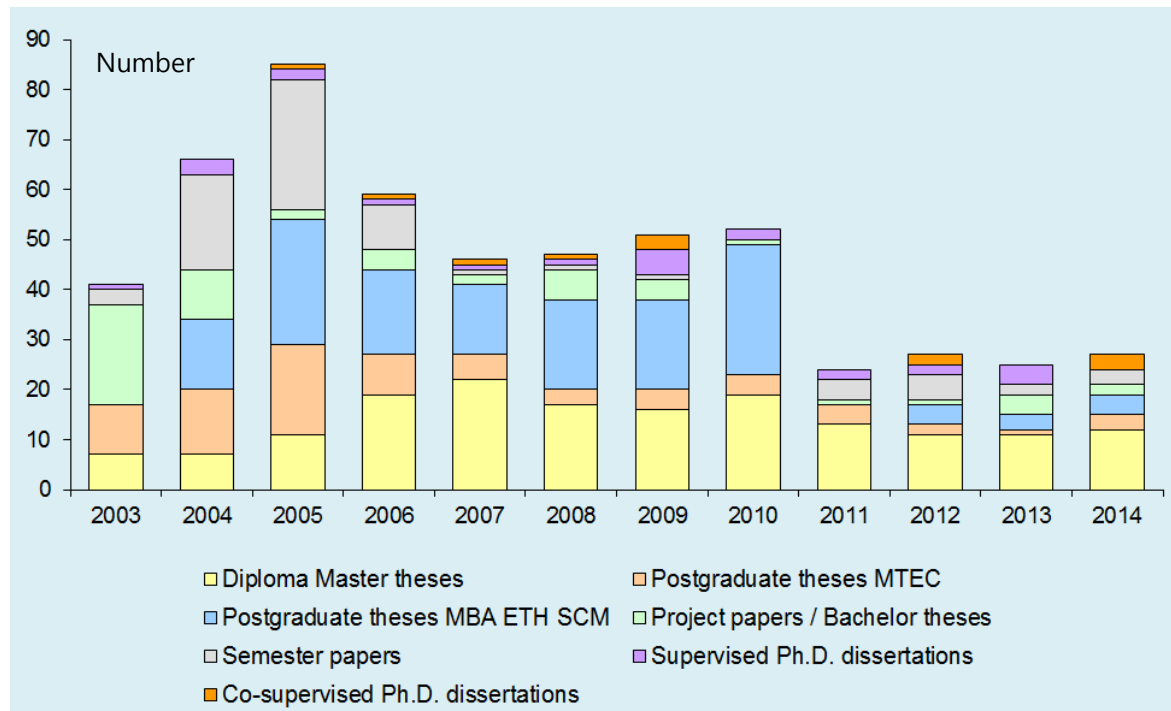


Appendix C: Statistics on Student Papers and Ph.D. Dissertations

Student Papers

Type (duration in months)	03	04	05	06	07	08	09	10	11	12	13	14
Diploma Master theses (6)	7	7	11	19	22	17	16	19	13	11	11	12
Postgrad. theses MTEC (3)	10	13	18	8	5	3	4	4	4	2	1	3
Postgrad. theses MBA ETH SCM		14	25	17	14	18	18	26		4	3	4
Project papers (2.5) / Bachelor theses (2.5)	20	10	2	4	2	6	4	1	1	1	4	2
Semester papers (1)*	3	19	26	9	1	1	1	0	4	5	2	3
Supervised Ph.D. dissertations	1	3	2	1	1	1	5	2	2	2	4	0
Co-supervised Ph.D. dissertations	0	0	1	1	1	1	3	0	0	2	0	3
Total	41	66	85	59	46	47	51	52	24	27	25	27
Number of students supervised	42	67	85	59	46	47	51	52	24	27	25	27

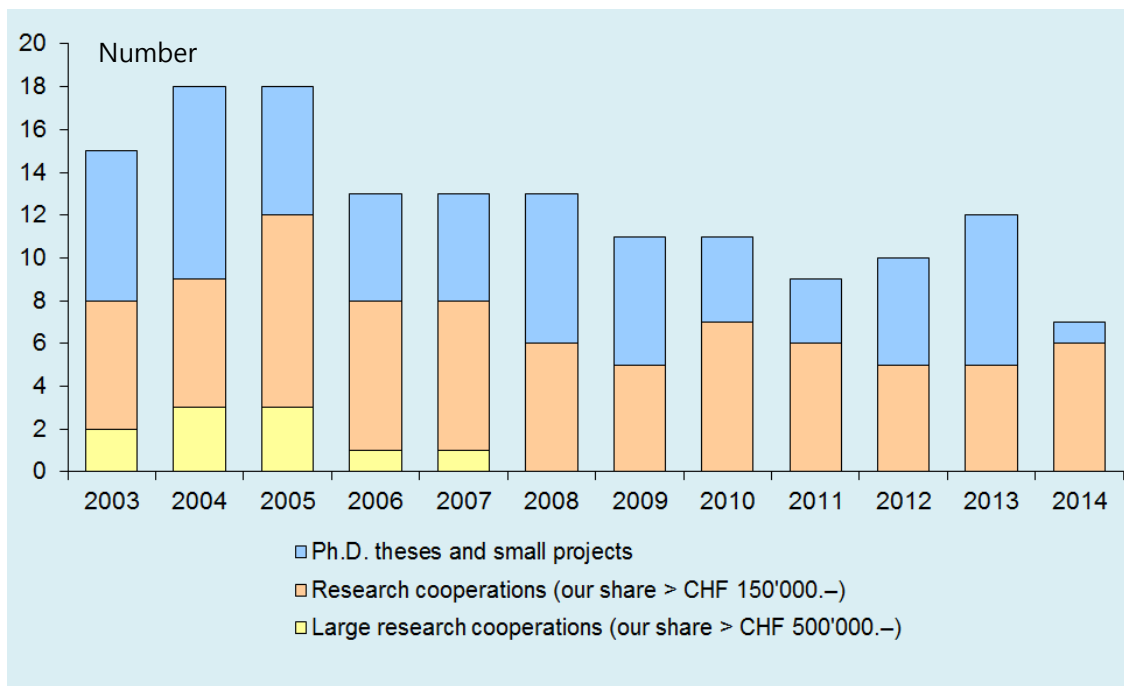
* Papers by BWI students in advanced studies block courses and by students in subsidiary subjects at the BWI with a duration of 150 hours, mostly internal.



Appendix D: Research Projects

Ongoing Projects

	03	04	05	06	07	08	09	10	11	12	13	14
Large research cooperation	2	3	3	1	1							
Research cooperation	6	6	9	7	7	6	5	7	6	5	5	6
Ph.D. dissertations and small projects	7	9	6	5	5	7	6	4	3	5	7	1
Total	15	18	18	13	13	13	11	11	9	10	12	7



Abstracts of Research Projects

Project 1: C-FISH – Collaborative Financial Supply Chain Management (CTI No. 13857.2 PFES-ES)

Researcher: Prof. Dr. P. Schönsleben, Prof. M. Baertschi, M. Wandfluh
Partners:
Scientific: BWI Center for Industrial Management
 University of Applied Sciences and Arts Northwestern Switzerland (FHNW)
Industrial: Brugg Kabel AG
 Hocoma AG
 Manor AG
 Rieter Maschinenfabrik AG
Dissemination: Soltar AG
Financed by: CTI (Commission for Technology and Innovation)
Website: www.cfish.ethz.ch

Background:

Increasing volatility of global markets and currencies, increasing regulations and growing complexity of supply chains are all challenges of today's business environment. While previous research activities mainly focused on optimizing material and information flows, increasingly, financial aspects and risks also need to be considered in order to optimally deploy the supply chain structure.

Motivation:

Recent studies have shown that up to now, many companies, especially SMEs, have struggled to apply new financial supply chain management (FSCM) concepts due to a lack of knowledge and difficulties in estimating the potential benefits. Thus, companies need guidance and tools in order to identify the promising supply chains, to select the right concepts and to improve the overall supply chain performance and risk exposure in a sustainable manner.

Objectives:

The aim of the project C-FISH is to improve the transparency of financial flows within the supply chain and to support globally operating companies to select the right FSCM concepts.

On the one hand, a toolbox will provide quick access to existing concepts, reveal potential concept improvements and facilitate new concept developments, while on the other hand, an evaluation tool will enable companies to easily analyze the impact of an implementation of FSCM concepts ex ante and ex post.

Activities in 2014:

The activities in the second year of the research project focused primarily on advanced processing of previously started projects at participating companies. The results of these sub-projects built the basis for the development of a methodology including supporting tools that supports companies in selecting the right instruments in order to reduce financing costs along the supply chain and to avoid unnecessary financial risks. Besides various publications and the further cooperation with the international research network "Supply Chain Finance Community", the dissemination activities also included an event in collaboration with procure.ch and UBS on the topic "financial orientation in purchasing", that was visited by more than 70 Swiss purchasers.

Project 2: 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

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 2014:

The implementation of solutions, such as IT tools or newly defined processes, that were developed as part of the project was continued. Beyond that, various dissemination activities took place; e.g. project results were presented to an industry audience at the V-Research seminar “Design Automation” and to a scientific audience at several international conferences (CIRP CMS, APMS, IEEM).

Project 3: GaLA – Game and Learning Alliance (EU-IST-ICT 258169)

Researcher: O. Willner, M. Wandfluh, A. Sproedt, A. Duchi, M. Baldinger
 Partners: 31 partners from Europe (see website for a detailed list of the partners)
 Financed by: EU IST ICT, Technology-Enhanced Learning (Seventh Framework Program)
 Contract No.: Grant Agreement Number 258169
 Website: www.galanoe.eu

Motivation:

Drawing inspiration from military training and business simulations, serious games technologies and applications have become more widespread in school education and in corporate training. Currently, they are deemed as very promising thanks to their appeal to new generations and their ability to provide multimedia knowledge acquisition tools that are compelling and personalizable.

However, there is still a lot of research work to be conducted in order to single out both the best mechanisms through which games can support instruction and the most appropriate modalities through which students and educators can use games to support balanced personal growth. Therefore, it is now time to study in greater depth how technologies can respond to such requirements and to steer serious game development towards ever better tools and results.

The technological, scientific and humanist fields with an interest in the research on serious games are broad, and range from pedagogy to psychology, from health to engineering, from virtual reality to artificial intelligence, from networking to computer graphics. To this end, the EU has launched an international, multidisciplinary network of excellence on serious games. The network, coordinated by the DIBE (Dept. of Biophysical and Electronic Engineering - DIBE) of the University of Genoa covers all of the scientific and

application fields of serious games, and involves 31 partners including universities, research centers and leading industries at the EU level. There are 13 countries represented, mostly from Western Europe.

Objectives:

The GaLA work plan is organized over 4 years, during which the main objective will be the constitution of a European virtual research center in order to integrate and coordinate research on serious games and promote dissemination of the related knowledge, best practices and tools. The project will also promote industrial innovation through business-academy dialogue and the development of high-quality didactics on serious games, through the setup of specialized MSc and Ph.D. courses.

Activities completed:

In October 2014, the fourth and last year of GaLA was completed. The fourth quarter of the project was marked by the continuation of community building and dissemination activities inside and outside of the network. Highlights included the General Assembly in Rome (February 3-4) as well as the 2nd GaLA Summer School in Pori (July 21-25). ETH Zurich (represented by BWI) was active within the work packages 3 (serious games application fields), 4 (industry and stakeholder engagement), and 7 (integration in corporate training).

Project 4: Long-Range planning of Logistics capacities in the process industry

Researcher: F. Friemann
 Partners:
 Scientific: BWI Center for Industrial Management
 Industrial: F. Hoffmann-La Roche, Basel
 Financed by: F. Hoffmann-La Roche

Background:

The pharmaceutical industry has to tackle several challenges: A high service level has utmost priority and therefore a high reliability is of crucial importance. At the same time, process changes require a great deal of time,

due, for instance, to regulatory requirements or Good Manufacturing Practices. In addition, uncertainties hamper a reliable forecasting. Such uncertainty is influenced by the maturity of the product: It is difficult to estimate the capacities of a drug which is in the R&D stage,

while this becomes easier when dealing with a more mature product with a stable demand.

Motivation:

Consequently, planning of logistics capacities in the pharmaceutical industry is faced with several conflicting goals and constraints: Providing reliable capacities has the highest priority and at the same time, changes in capacities might take several years and are difficult to forecast. The use of a systematic

and holistic procedure is expected to improve the current situation considerably.

Objectives:

The aim of this research project is to develop a holistic procedure for reliable capacity planning in the process industry addressing the aforementioned challenges. Requirements for a tool which enhances the transparency throughout the network will also be developed. The work will be verified and validated within a case study for a pharmaceutical company.

Project 5: Developing a global manufacturing footprint corresponding to volatile environments

Researcher: M. Rippel
Partners: Hilti Corporation, Schaan
Financed by: Hilti Corporation

Background:

In today's business environment, the market is characterized by increasing volatility in demand volumes and types and simultaneously by decreasing customer tolerance in terms of time. Manufacturing companies have to tackle these challenges in particular by enhancing flexibility of the production capacities and reducing the burden of fixed costs. As a consequence, an adaptation of the manufacturing strategy is essential.

Motivation:

When facing the aforementioned challenges, globally operating companies have to review their value adding architecture and their control processes and align them in an integrative and comprehensive manufacturing strategy in order to remain competitive. Associated problems arise:

Which footprint is required for the flexible global allocation of production capacities? How can the manufacturing assets in the production network be optimally utilized? Which concepts and measures are required to enable higher flexibility and responsiveness on the plant and network level?

Objectives:

The project has two main objectives: First, the project analyses existing concepts for aligning production networks regarding production footprint, make-or-buy decision, as well as flexibility measures. Second, the project outcome encompasses a methodology which supports manufacturing companies to implement measures for systematically enhancing agility in the global business environment.

Project 6: 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 7: Decision-support for Eco-efficiency Improvements in Production Systems Based on Discrete-event Simulation *(diss.)*

Researcher: A. Sproedt
 Financed by: Partially funded by CTI No. 12402.1 PFES-ES
 The professorship's own resources

Motivation:

Complex interrelations between the environmental and economic performance aspects of a production system represent a high non-transparency for decision makers in manufacturing, hindering them to seize the existing potential for eco-efficiency improvements. Manufacturing companies thus struggle to translate strategic eco-efficiency targets into concrete improvement measures on an operational shop-floor level.

Results:

This dissertation describes a decision support for manufacturing companies to improve the eco-efficiency of their production systems based on two main elements:

1. A sophisticated simulation approach is proposed based on discrete-event simulation, which integrates the environmental and economic performance dimensions in one model to enable a holistic, system-oriented evaluation of potential improvement measures. The simulation approach integrates the Ecoinvent Life Cycle Inventory database, allowing for an unprecedented degree of flexibility and a seamless integration of Life Cycle Assessment evaluations into the simulation.
2. A structured system analysis and modeling procedure is described, which serves as

methodological guidance for the application of the simulation approach. The procedure helps decision makers to analyze their production systems, identify relevant improvement measures and gather the data necessary for their evaluation.

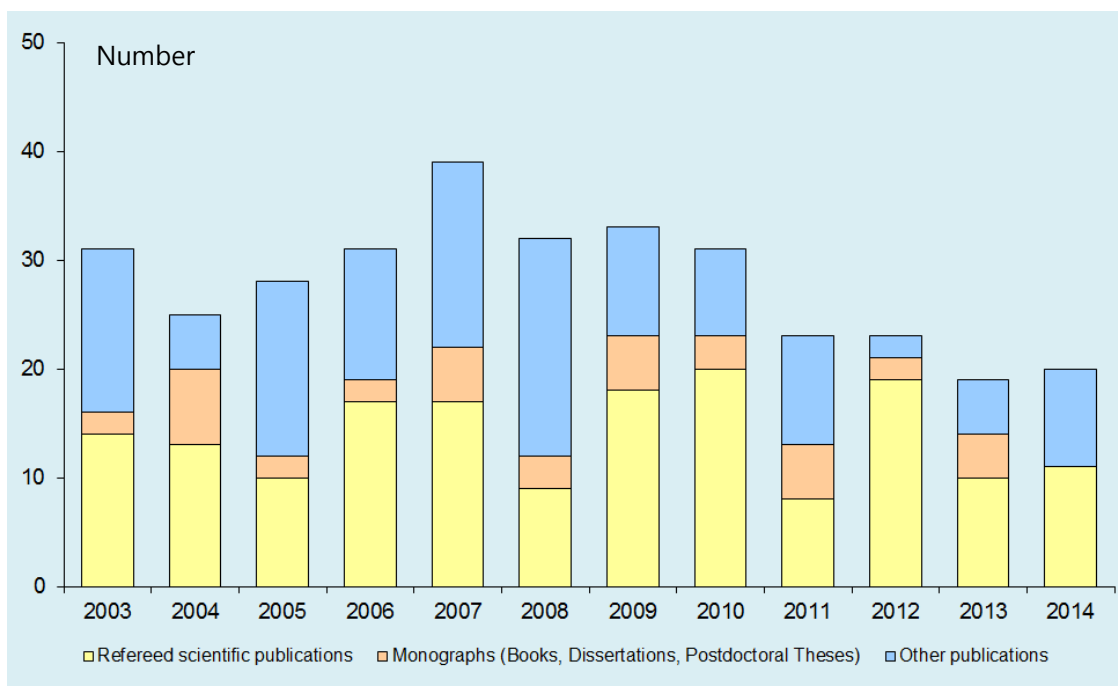
The developed simulation approach and the system analysis and modeling procedure represent a significant step beyond the state of the art. The results will enable practitioners to identify and evaluate the appropriate measures to increase the eco-efficiency of their production systems and hence contribute to an improved environmental and economic performance of manufacturing companies.

The results presented in this dissertation were summarized in a paper accepted for publication by the Journal of Cleaner Production (unedited accepted manuscript available online since January 2nd, 2015; DOI: 10.1016/j.jclepro.2014.12.082.)

This dissertation also refers to material that has been elaborated by A. Sproedt and his colleagues within the CTI-funded project EcoFactory – Eco-Efficiency Optimization of Production Processes (CTI No. 13857.2 PFES-ES). See www.ecofactory.ethz.ch.

Appendix E: Publications

	03	04	05	06	07	08	09	10	11	12	13	14
Refereed Scientific publications	14	13	10	17	17	9	18	20	8	19	10	11
Books	2	7	1	2	5	3	5	3	5	2	4	
Other publications	15	5	16	12	17	20	10	8	10	2	5	9
Total	31	25	28	31	39	32	33	31	23	23	19	20



Refereed Publications

ISI Journals

Hertz, P.; Cavaliere, S.; Finke, R.; Duchi, A.; Schönsleben, P.: A simulation-based decision support system for industrial field service network planning. In: SIMULATION, Vol. 90, Issue 1, 2014, pp. 69-84.

Rippel, M.; Lübke, J.; Nyhuis, P.; Schönsleben, P.: Profiling as a means of implementing volume-oriented changeability in the context of strategic production management. In: CIRP Annals – Manufacturing Technology, Vol. 62, Issue 1, 2014, pp. 445-448.

Willner, O.; Powell, D.; Duchi, A.; Schönsleben, P.: Globally Distributed Engineering Processes: Making the Distinction between Engineer-to-Order and Make-to-Order. In: Procedia CIRP 47th CIRP Conference on Manufacturing Systems 2014, pp. 663-668.

Non-ISI Publications (Refereed Conference Proceedings etc.)

Baldinger, M.: Digitales Ersatzteilmanagement mittels 3D-Druck, In: Biedermann, H.: Instandhaltung im Wandel, TÜV Verlag GmbH, Köln. 2014. pp. 97 – 109.

Duchi, A.; Pourabdollahian, G.; Sili, D.; Cioffi, M.; Taisch, M.; Schönsleben, P.: Motivations and Challenges for Engineer-to-Order Companies Moving toward Mass Customization. In:

Advances in Production Management Systems. Innovative and Knowledge-Based Production Management in a Global-Local World, 2014, pp. 320-327, Springer Berlin Heidelberg.

- Duchi, A.; Pourabdollahian, G.; Sili, D.; Cioffi, M.; Taisch, M.: Proposal of a Decision Making Model to Select the Best Fitting Cost Estimation Technique in an ETO – MC Environment. In: 2014 IEEE International Conference on Industrial Engineering and Engineering Management (6 p.). Selangor, Malaysia: IEEE.
- Fischl, M.; Wandfluh, M.; Faix, A.; Friedli, T: Towards financial resilience in manufacturing companies: A toolbox for the mitigation of consumption factors' market price risks. In: Proceedings of the 21st European Operations Management Organization (EurOMA) Conference (Palermo, Italy), pp. 1-10, 2014.
- Friemann, F.; Rippel, M.; Schönsleben, P.: Warehouse capacities in the pharmaceutical industry – Plan or outsource?. In: Grabot, B.; Vallespir, B.; Gomes, S.; Bouras, A.; Kiritsis, D. (Eds.): IFIP Advances in Information and Communication Technology, 438th ed., Vol. 438, pp. 427–434. Springer, Berlin - Heidelberg. doi:10.1007/978-3-662-44739-0.
- Friemann, F.; Gerschberger, M.; Reitner, K.; Schönsleben, P.: SCM trends and challenges – Implications from a cross-industry analysis. In: 2014 IEEE International Conference on Industrial Engineering and Engineering Management (6 p.). Selangor, Malaysia: IEEE.
- Rippel, M.; Budde, J.-W.; Friemann, F.; Schönsleben, P.: Building Blocks for Volume-Oriented Changeability in Personnel Cost Structure of Manufacturing Companies. In: Grabot, B. et al. (Eds.): APMS 2014, Part III, IFIP AICT 440, pp. 463–470, 2014.
- Wandfluh, M.; Fischl, M.; Alard, R.; Schönsleben, P.: Supply Chain Finance – A Risk Perspective. In: 23rd Annual IPSERA Conference Proceedings, pp. 569-583, South Africa 2014.

Monographs (Books, Dissertations, Postdoctoral Theses)

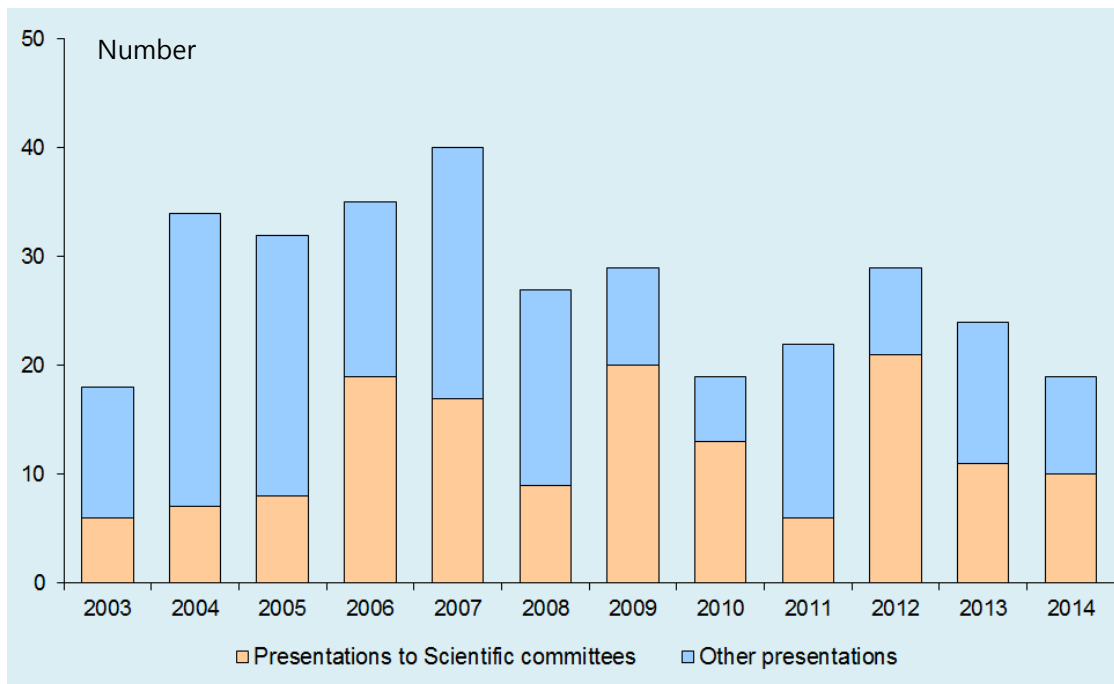
None in this reporting year.

Other publications

- Schönsleben, P.: Leit-Interview zur Service-Innovation: Wir konzentrieren uns auf die technologische Innovationskraft, dürfen aber nicht vergessen, auch verbesserte Services zu erbringen!, In: IM+io, 2/2014, p. 7-15.
- Baldinger, M.: 3D-Drucker revolutionieren die Supply Chain. In: GS1 Network 2/2014. p. 21-24.
- Baldinger, M.: Best Practice beim Kauf von Bauteilen aus dem 3D-Drucker. In: Maschinenmarkt 14 / 2014. p. 62-63.
- Baldinger, M.; Levy, G.; Schönsleben, P.: Was steckt hinter dem Schlagwort 3D-Druck?. In: IM+io 2/2014. p. 71-77.
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Appendix F: Lectures and Presentations

	03	04	05	06	07	08	09	10	11	12	13	14
Scientific committees	6	7	8	19	17	9	20	13	6	21	11	10
Other presentations	12	27	24	16	23	18	9	6	16	8	13	9
Total	18	34	32	35	40	27	29	19	22	29	24	19



Presentations to Scientific Committees

Duchi, A.: Motivations and Challenges for Engineer-to-Order Companies Moving toward Mass Customization. Advances in Production Management Systems Conference (APMS) 2014 International Conference, Ajaccio, Corsica, France, 22.09.2014.

Duchi, A.: Proposal of a Decision Making Model to Select the Best Fitting Cost Estimation Technique in an ETO – MC Environment. IEEM2014. Selangor, Malaysia, 11.12.2014.

Friemann, F.: Warehouse capacities in the pharmaceutical industry – Plan or outsource?. Advances in Production Management Systems Conference (APMS) 2014 International Conference, Ajaccio, Corsica, France, 22.09.2014.

Friemann, F.: SCM trends and challenges – Implications from a cross-industry analysis. IEEM2014. Selangor, Malaysia, 11.12.2014.

Rippel, M.: Profiling as a means of implementing volume-oriented changeability in the context of strategic production management. 64th CIRP General Assembly 2014, Nantes, France, 26.08.2014.

- Rippel, M.: Building Blocks for Volume-Oriented Changeability in Personnel Cost Structure of Manufacturing Companies. Advances in Production Management Systems Conference (APMS) 2014 International Conference, Ajaccio, Corsica, France, 24.09.2014.
- Rippel, M.: Profiling as a means of implementing volume-oriented changeability in the context of strategic production management. Research seminar at the Institute of Industrial Management and Innovation Research (IBL), University of Technology Graz, Austria. 21.10.2014.
- Wandfluh, M.: Supply Chain Finance – A Risk Perspective. 23rd Annual IPSERA Conference in South Africa, 15.4.2014.
- Willner, O.: Success Practices for Global Engineering in an ETO Setting. In: Presentation at CIRP January Meeting, Paris, France, 22.-24.01.2014.
- Willner, O.: Globally Distributed Engineering Processes: Making the Distinction between Engineer-to-Order and Make-to-Order. 47th CIRP Conference on Manufacturing Systems, Windsor, Canada, 28.-30.04.2014.

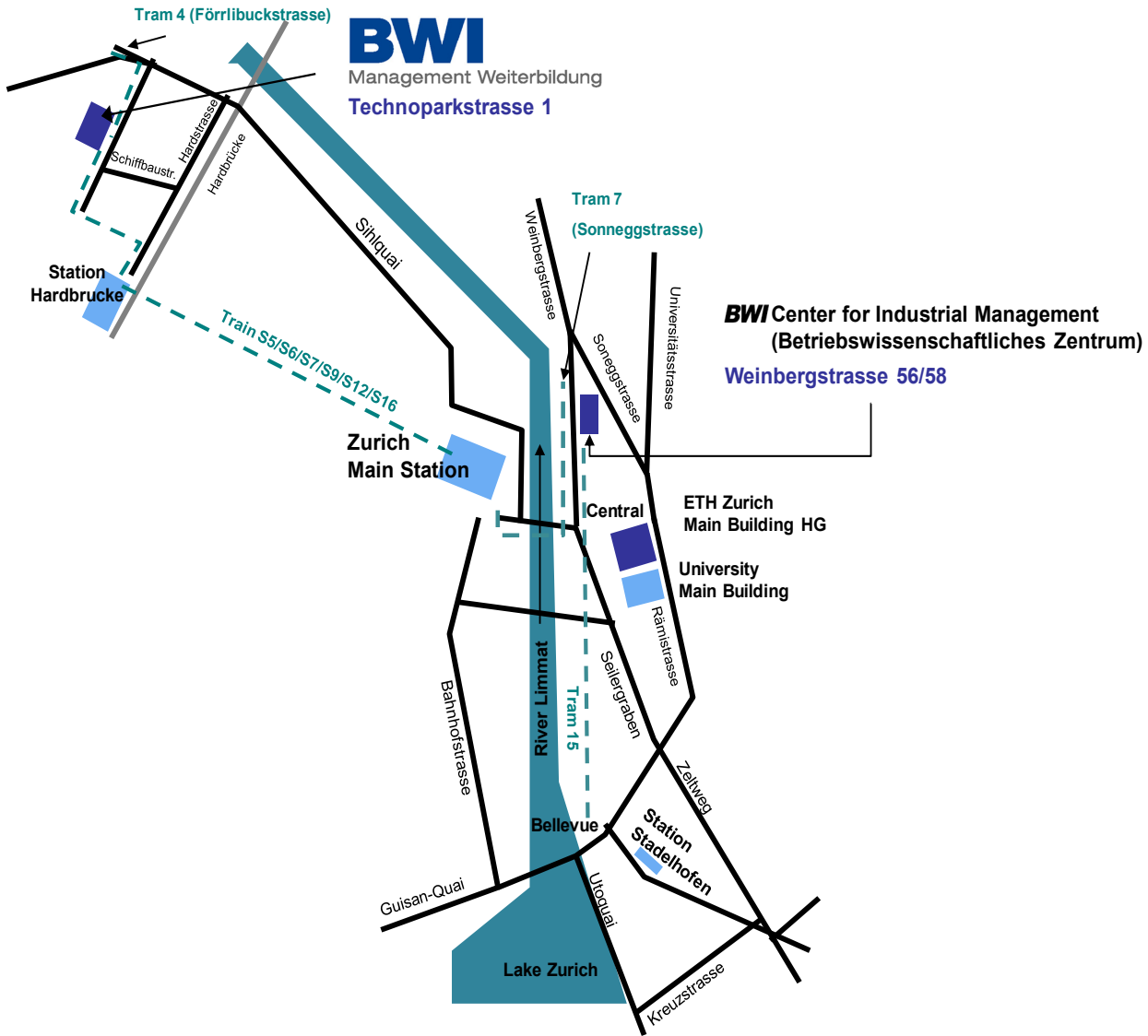
Other Presentations

- Schönsleben, P.: Stammdatenmanagement als notwendige Voraussetzung für funktionierende ERP- und SCM-Systeme. Fachtagung, Itelligence AG, Regensburg, 3.6.2014.
- Alard, R.; Friemann, F.; Rippel, M.: Systems Engineering. Lecture on “Industrial Engineering and Management Methodology for Thesis in Companies”, Zürich, Switzerland, 14.02.2014.
- Alard, R.; Friemann, F.; Rippel, M.: Systems Engineering. In: lecture on “Industrial Engineering and Management Methodology for Thesis in Companies”, Zürich, Switzerland, 12.09.2014.
- Baldinger, M.: Additively – die 3D-Druck Plattform. Posterpräsentation auf der RapidTech, 14.–15.05.2014, Erfurt, Germany.
- Baldinger, M.: Digitales Ersatzteilmanagement mittels 3D-Druck. 28. Internationales Forum für industrielle Instandhaltung, ÖVIA Kongress 2014, Bad Erlach, Austria, 8.-9.10.2014.
- Baldinger, M.: 3D-Lohnfertiger in der EU: Worauf muss ich achten?. 3D-Forum der Technischen Rundschau auf der Prodex/Swisstech, Basel, Switzerland, 18./20.11.2014.
- Wandfluh, M.; Alard, R.: Herausforderungen und aktuelle Praxis des Einsatzes von Financial Supply Chain Konzepten. Procure.ch Seminar über „Finanzorientierung im Einkauf“, Zürich, 26.03.2014.
- Willner, O.; Greter, T.: Grenzenlose Automatisierung? Herausforderung Kundenindividuelle Produkte. Expert Seminar Design Automation, Feldkirch, Austria, 15.-16.04.2014.
- Willner, O.: Automation and Engineer-to-Order: A Paradox?. Innovative Smart Systems Networking Conference, Neuchâtel, Switzerland, 01.04.2014.

7 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 26th 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. 1st 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. 1st 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. 1st 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.



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