ETH
Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

Departement
Management, Technology,
and Economics
D MTEC

Annual Report 2013

BWI Center for Industrial Management

Logistics, Operations, and Supply Chain Management

BWI

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

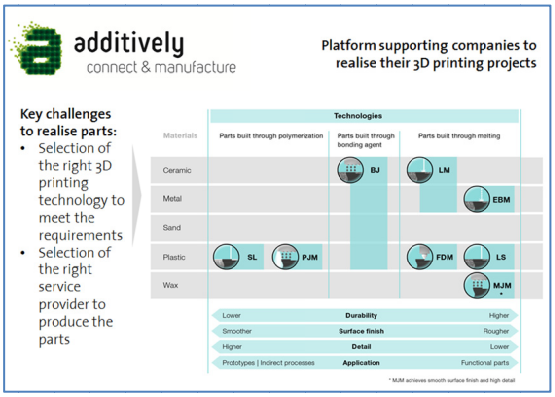
Contents

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 2013.

As indicated in our report of the previous year, my chair entered into its final phase. Therefore, with effect from June 2013, I began not to replace researchers who were leaving. Our group currently has 15 members, including four administrative employees. There are also 10 student assistants, bringing the total to 25. Last year, Gandolf Finke, Johannes Plehn, Philipp Hertz and Alexander Sproedt completed their dissertations. Furthermore, we are extremely pleased that Dr. Josef Oehmen, who gained his Ph.D. degree in 2009, became Associated Professor for production and service management at DTU, Danish Technical University, with effect of October 1st, 2013. We extend our warmest congratulations to them all.

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 was stopped. Emphasis was placed on the execution of the four projects acquired in 2012 and to the completion of projects that began in 2010 and 2011. However, with regard to the succession of the professorship, we participated as followers at various research proposals.



During 2013, Matthias Baldinger launched an ETH-Spin-off that aims to facilitate the buyer-supplier relationship in the domain of additive manufacturing / 3D-printing.

Publications: Compared to the previous year, the number of scientific publications is now starting to decrease. We are particularly pleased that three 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, 154 students were registered on our courses at ETHZ. In addition, we coached 25 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 will have to considerably reduce our teaching effort during the year 2014.

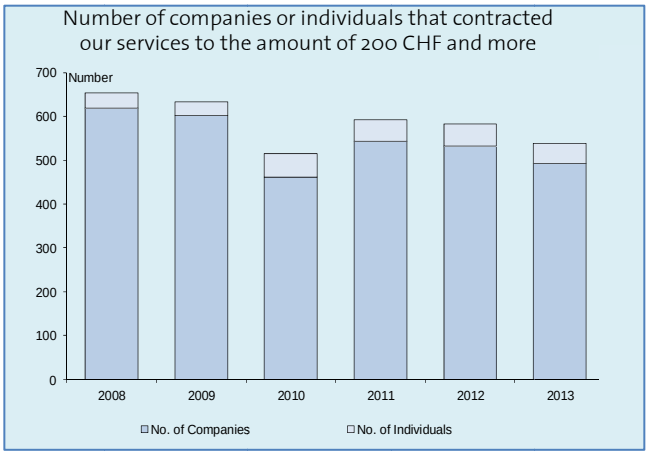
During 2013, the BWI Management Weiterbildung achieved a good turnover, combined with a good bottom line result. In total, 76 public seminars and 69 company-internal seminars were held. Hence, it was possible to increase investment in the development of courses, especially in the field of project management, where the BWI-MWB is the leading supplier in Switzerland. This solid situation allows the unit to spin off from ETH. Starting from January 1st, 2014, it will continue 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.

Knowledge Transfer: Our conference "Service 2013" was a success. The event was attended by 95 participants.

With the Erfa group «Production and Information Management», we conducted one evening symposium on the topic «BRICS-Staaten als Zukunftsmärkte für Schweizer KMUs» [BRICS countries as growth markets for Swiss SMEs]. Over 60 participants attended the event. Furthermore, we organized one company seminar. The response, this year on the topic of "Operational excellence in the paper industry" was again strong (53 participants).

As indicated in the previous report, the print media are faced with serious difficulties concerning their business model. This was also the case for the journal "io management". As a consequence, the io management journal and the journal "Informationsmanagement" become "IM+io – the journal for innovation, organization and management". IMC, "information multimedia communication AG" in Saarbrücken, owned by Prof. August Wilhelm Scheer, became the new publisher. The professors of D-MTEC play an important role in the advisory committee of "IM+io". Ms. Charlotte Pauk continues as a member of the editorial staff. For working through this difficult transition, I would like to extend my great appreciation to all of the persons involved from the old and the new publisher, in particular to my two colleagues on the Editors' Council of the former "io management", Prof. Hugo Tschirky and Prof. Georg von Krogh.

Our impact on the industry in sum: In all of the areas outlined above (research, teaching, and knowledge transfer), we are working effectively in the economy, particularly in companies in industry and services. As in previous years, the bar chart shows the considerable number of companies – most of them Swiss and SME-sized – that have contracted our services to the amount of 200 CHF and more in recent years.



Perspectives and Acknowledgements: The search for a successor of the Professorship in Operations and Production Management is ongoing. 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 coming year.

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

Zurich, March 2014

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

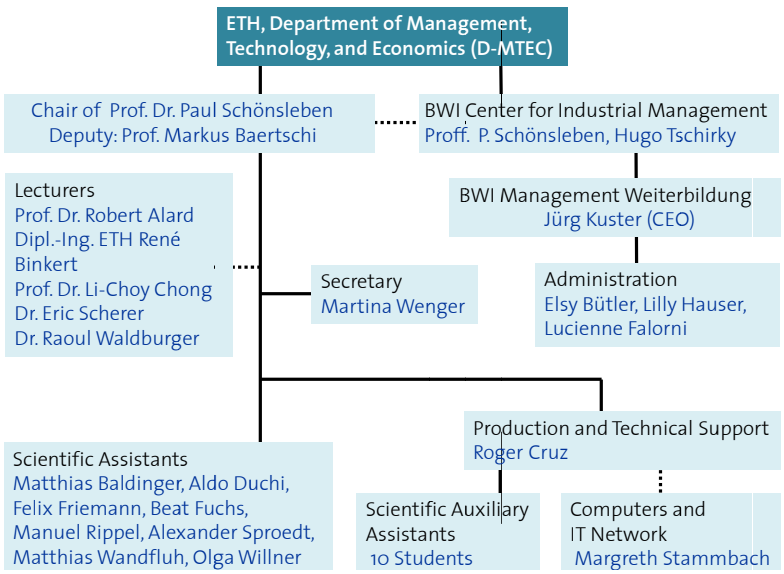
Research fellows and doctoral students strengthen our team. This concept allows us to benefit both from people's experience and from the new ideas and viewpoints of young researchers.

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, 2013



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.

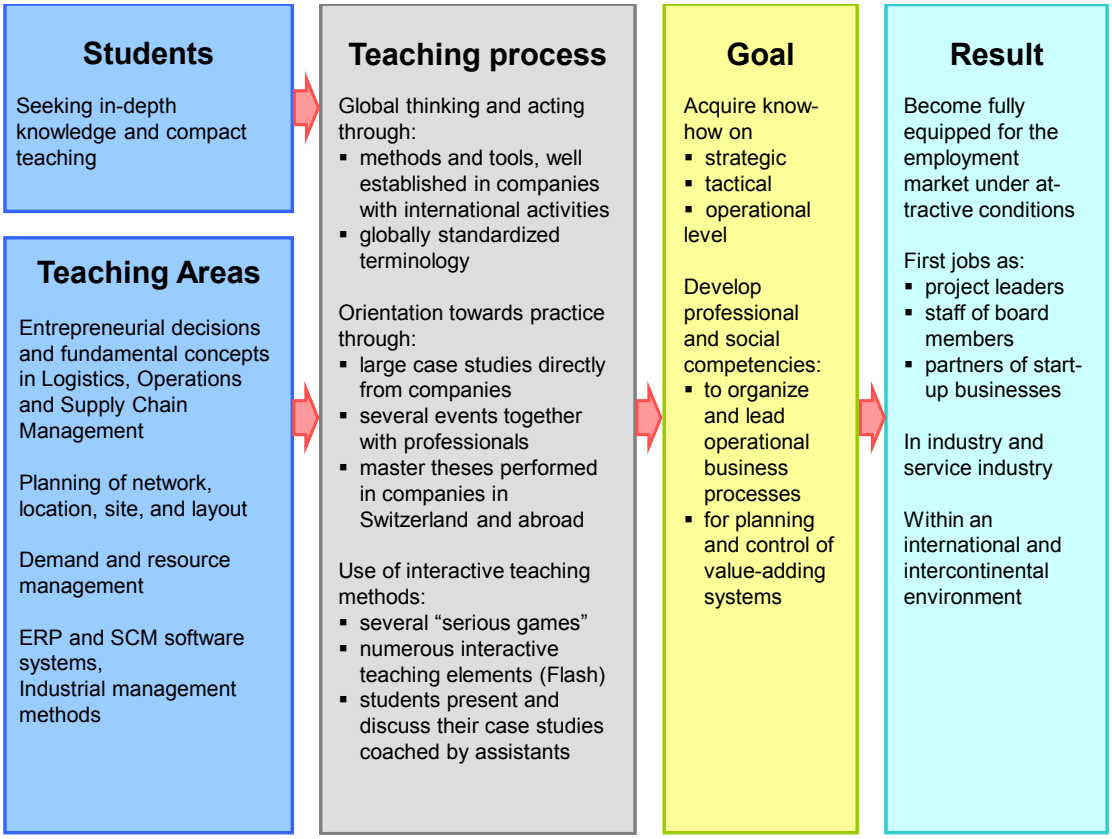


Figure 2.1: Teaching Strategy

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 2013

Course	Lecturers
LOSII: Facility Location, Demand and Resource Planning	Prof. P. Schönsleben
Lecture Series: Logistics Management	Prof. M. Baertschi, Prof. H. Dietl (University of Zurich), Prof. P. Schönsleben
Factory Planning	Prof. M. Baertschi, Dr. M. Möser, R. Binkert
International Management Asia	Prof. Li Choy Chong
Industrial Engineering and Management Methodology for Theses in Companies	Prof. R. Alard, F. Friemann, O. Willner
Exec. MBA ETH SCM, Block "Supply Chain Planning"	Prof. P. Schönsleben
Exec. MBA, University of Zurich "Operations and Logistics"	Prof. P. Schönsleben, Prof. H. Dietl (University of Zurich)

Fall Term 2013

Course	Lecturers
Logistics, Operations, and Supply Chain Management I	Prof. P. Schönsleben
ERP and SCM Software Systems	Prof. P. Schönsleben, Dr. E. Scherer
Logistics in Practical Implementation	Prof. M. Baertschi
International Management Eastern Europe	Dr. R. M. Waldburger
Methodology in Management Science for Theses in Companies	Prof. R. Alard, F. Friemann, O. Willner

2.3 Visiting Lecturers for the Course LOS I and LOS II

Lecturer	Company	Topics
U. Fankhauser, J.Diebold	Holcim Group Support AG	Linking Strategy and Sustainability / Location Planning in the Process Industries
Dr. Th. Sommer-Dittrich, F. Homberger	Daimler AG, Ulm	Production Network Optimization at Daimler
Dr. L. Gottschalk	M+W Group	Concepts for the process industry

2.4 Visiting Lecturers for the Course Factory Planning

Lecturer	Company	Topics
Dr. Bernd Korves	Siemens AG	Factory Planning @ SIEMENS – Innovative Methods & Approaches
Dr. Jan Spies	Volkswagen AG	Global Factory Planning – Challenges and Best Practices

2.5 *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 2013, with even greater success than in previous years. This year's topic: «Make or Buy»

Lecturer	Company, Place
Bruno Simma	SIMMA Management Consultants, Pfäffikon
Ulrich Bühlmann	BCDS projects GmbH, Klosterneuburg
Georg Burkhardt	Miebach Consulting AG, Zug
Markus Koch	Deloitte Consulting AG, Zürich
Stephan Bürgin	Elma Group, Wetzikon
Gregor von Cieminski	ZF Friedrichshafen, Friedrichshafen
Prof. Robert Alard	Fachhochschule Nordwestschweiz, Brugg
Franco Monti	Deloitte Consulting AG, Zürich
Matthias Hanke	Roland Berger AG, Zürich
Thomas Zellweger	Zellweger Management Consultants AG, Pfäffikon
Dr. Axel Goth	Bertrams Chemical Plants Ltd., Muttenz

Lecture Series – Logistics in Practical Applications (Fall Term)

Prof. M. Baertschi also held the lecture series on logistics in practical applications in 2013, with the same great success as in recent years. Some 18 people from industry and 27 students attended the various presentations held by the following lecturers.

Lecturer	Company, Place
Reinhard Meier	Kardex Remstar, Volketswil
Philippe Huwyler	Coop@home, Spreitenbach
Simon Eggerschwiler	SFS Unimarket, Zug
Daniel Hauser	Swisslog, Buchs
Peter Spycher	Dematic, Urdorf
René Holzer	Gilgen Logistics, Oberwangen
Kurt Ellenberger	Agiplan, Rapperswil-Jona
Peter Härdi	Nilo Nights Logistics, Egerkingen
Peter Riesterer	Stöcklin Logistik, Dornach
Thomas Bürgisser	Jungheinrich, Hirschtal

2.6 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 2013, 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 Mehboldt in the domain of additive manufacturing / 3D-printing.

University of Zurich – In 2013, 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 early January 2014, Prof. P. Schönsleben, F. Friemann, M. Rippel and M. Wandfluh 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", managing the module "Supply Chain Management".

Universities of Applied Sciences (FH)

University 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 numerous contacts with the production industry, we have well-grounded experience in our research areas (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, Hong Kong, Japan) and industry partners.
- Finally, we offer regular meetings in industry work groups on relevant topics, and numerous seminars in the framework of our education and training offers (www.bwi.ch) 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, variant management).

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.

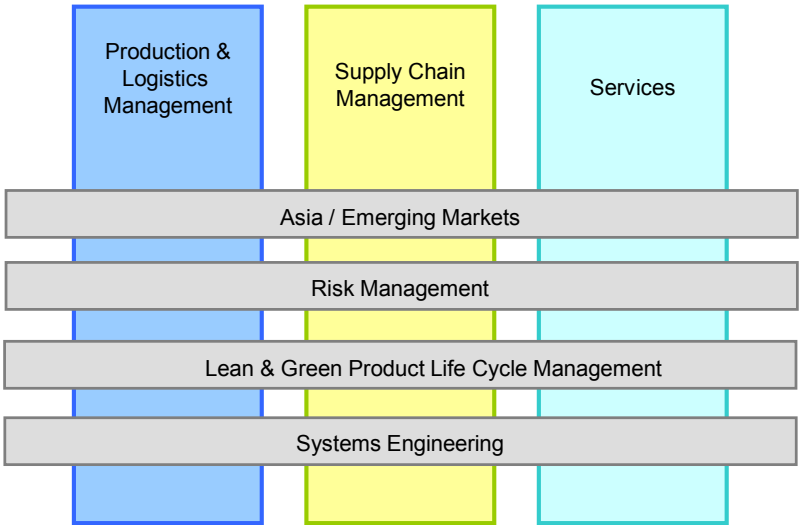


Figure 3.1 Research domains and cross-sectional areas

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 the domain of *Services*, 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, servicing 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_2) 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 descriptions 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
AsPlanned - Robust planning of after-sales field service networks in the machinery and equipment industry (CTI No. 12164.1 PFES-ES)	x	x	x	x	x		x
EcoFactory – Simultaneous ecological and economical optimization of production systems (CTI No. 13857.2 PFES-ES)	x			x		x	x
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 *new*	x	x					x
Industrial Field Service Network Conceptualization *(diss.) new*			x		x		x
Industrial Field Service Network Planning *(diss.) new*			x		x		x
Eco-Efficiency Performance Measurement System *(diss.) new*	x					x	x
Decision-support for Eco-efficiency Improvements in Production Systems Based on Discrete-event Simulation *(diss.) new*	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 or a publication. These projects are labeled «***(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. Emphasis was given to the execution of the four projects acquired during the year 2012 and to the completion of projects that started in 2010 and 2011. Nevertheless, Matthias Baldinger launched a new project activity, finally as an ETH-Spin-off, wich aims to facilitate the buyer-supplier relationship in the domain of additive manufacturing / 3D-printing. In addition, with regard of the succession of the professorship, we participated as followers at various research proposals.

In many projects, our research team is 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 Seventh 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 promotion 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, 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 Department of Management, Economics and Industrial Engineering at PoliMi (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), **Clemson University** (Prof. T. Kurfess), **KAIST Korea** (Prof. N. Suh), **HUT Finland** (Prof. R. Smeeds), **Aalborg University, Denmark** (Proff. Riis, Johanssen).

4 Dissertations

The following Ph.D. dissertations were presented or co-presented in 2013:

Doctoral Student	Topic of the Thesis	Thesis Supervisors
Gandolf Finke	Industrial Field Service Networks - Conceptualization, Performance Measurement and Risk Management	Examiner: Prof. Paul Schönsleben Co-Examiner: Prof. Stephan M. Wagner
Johannes Plehn	Ein Leistungsmesssystem zur integrierten Bewertung der Öko-Effizienz von Produktionsunternehmen – Reduktion der Unsicherheit bei der Kennzahlenauswahl und -interpretation	Examiner: Prof. Paul Schönsleben Co-Examiner: Prof. Konrad Wegener
Philipp Hertz	Industrial field service network planning – A formal conceptual model for planning and support system for decision making	Examiner: Prof. Paul Schönsleben Co-Examiner: Prof. Stephan M. Wagner
Alexander Sproedt	Decision-Support for Eco-efficiency Improvements in Production Systems Based on Discrete-Event Simulation	Examiner: Prof. Paul Schönsleben Co-Examiner: Prof. Christoph Herrmann, TU Braunschweig

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 6th and at the same time final business year of BWI Management Weiterbildung at the Department MTEC of the ETH Zurich comes to a close. In view of the retirement in emeritus status of Prof. Dr. Schönsleben in 2015, a new solution for the continuance at the ETH was sought. In the framework of this discussion, the ETH decided to spin off the continuing education vessel into an independent company, which will take over the whole business from 1st January 2014.

Compared to previous years, the year under review was marked by a generally somewhat declining interest both in public and above all company-internal events. Accordingly, the annual result will also fall clearly below that of the previous year.

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. An above-average amount of requests for quotes from new customers at the beginning of the year gave grounds for hope for a successful course of company-internal continuing education courses. Unfortunately, the number of cancellations or events postponed until the coming year was unexpectedly high.

Nevertheless, 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

Once again, the realization was confirmed that a permanent presence of the "BWI" brand in the Swiss continuing education market is necessary to achieve the desired volume of registrations. Therefore, the marketing and advertising concept was also attuned to the latest trends and insights and the marketing mix was shifted somewhat more in favor of online advertising. The optimization of our own web

presence in terms of search algorithms as well as the cultivation of all important continuing education portals, product-specific mailings and monthly mail newsletters was again attributed with a high level of importance.

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 2013, the transport services of the City of Zurich also carried window advertising for the BWI Management Weiterbildung through the city, with the advertising slogan "because the best seats are quickly filled".

This year, the traditional spring conference "Project management" took place on 23rd May 2013 and, as usual, was carried out in collaboration with the Swiss Society for Project Management at the Technopark Zurich. The title was "Project Management – Out of the Box" 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 2013, HB Zurich
- Personal Swiss, April 2013, Messe Zürich
- East Switzerland Education Fair, OBA, Sept. 2013, St. Gallen

Public seminars

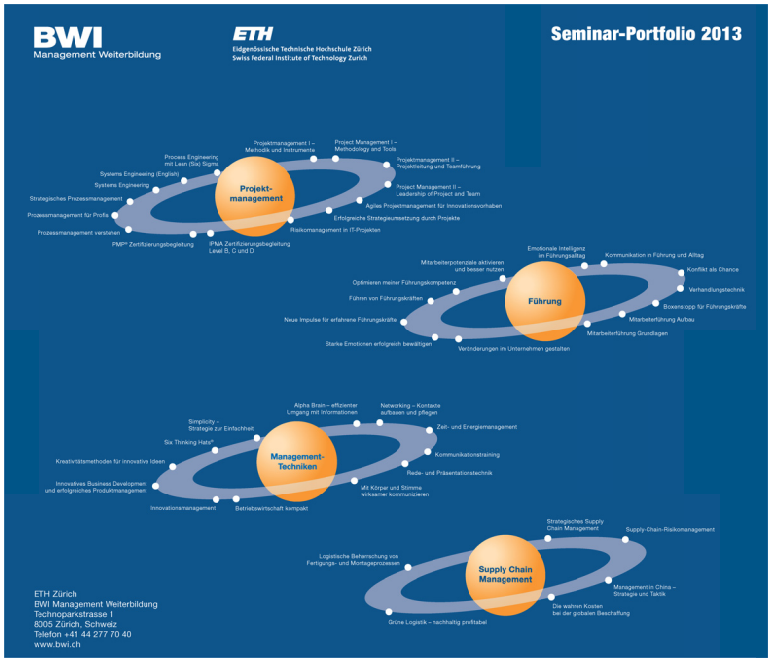
The 2013 public seminars offer comprised a total of 47 themes in the four thematic areas of project management (15), leadership (14), management techniques (12), and logistics and supply chain management (6). A total of 40 trainers were available for these seminars.

Company-specific seminars

In a total of 41 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.

BWI Management Weiterbildung

ETH Eidgenössische Technische Hochschule Zürich Swiss Federal Institute of Technology Zurich



The following table provides information about the events conducted in 2013 in comparison to previous years:

Range of Seminars offered	08	09	10	11	12	13
Number of Public Seminars Held	74	61	71	83	77	76
Number of Public Seminar Days Held	166	142	159	183	181	178
Number of Company-Internal Seminars Held	83	92	84	99	81	69
Number of Company-Internal Seminar Days Held	212	220	203	264	183	138

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

5.2 IM+io Fachmagazin

2013 was a year of change for the io management journal. Eighty years after io management was founded by the BWI of the ETH Zurich under its former title "Industrielle Organisation", in July, it was merged with the journal IM, a journal for Information, Management and Consulting.

Over the years, io management published articles on many different topics; each time successfully transferring new knowledge from scientific research and economic use. Offering the readers important scientific results in an attractive format was one of the main goals of the journal. With the three last editions having the main topics "Komplexität", "Selbstmanagement" and "Standort", io management was communicating challenges faced by leaders of both large and smaller companies.

As financial goals were not being met, last year's publisher Axel Springer decided at the end of 2012 to halt publishing of io management. ETH Zurich's council of editors stood up for preserving io management and started to search for a potential buyer for the publication. It was found in IM. The publisher of IM was looking to add management topics to the journal and wanted to expand from Germany into Switzerland. The acquisition of io management turned out to be a win-win situation. The fusion of the two journals took place in a very effective and efficient manner, since all partners were interested in closing the deal quickly and providing a smooth transition.

Since mid-2013, two editions of IM+io have already been published. First critiques from readers and authors have been very positive. The high-level content on the one hand and the practical presentation of the articles on the other have been maintained and will be continued. The two publishing teams will merge and collaborate as one team. Working together and the integration of the two teams has been constructive, with both parties respecting the traditions of the other, and the new team is open-minded with regard to new solutions.

Charlotte Pauk
Chief Editor io management

5.3 Service-Tagung 2013

Date	Title	Presenters, Participants	Place, Organizer
May 30th 2013	Operational Excellence im Service als Wettbewerbsvorteil in der Investitionsgüterindustrie [Operational Excellence in service as a competitive advantage in the capital goods industry]	Over 95 participants from industry, speakers listed below	ETH, Audimax, BWI, Group of Prof. P. Schönsleben

The BWI service conference in 2013 entitled "Operational Excellence in service as a competitive advantage in the capital goods industry" was a resounding success . About 95 participants followed the eight exciting presentations from industry and science on May 30th.

Industrial services have been gaining importance for years in western manufacturing companies and have become a profitable and sometimes decisive competitive business unit. However, many companies struggle with historical structures, high transparency and rising costs. Global competition for high-technology products, the associated costs and the pressure from customers to offer new, more complex service offerings forces manufacturing companies to professionalize their service business. In addition to the classical supply chain networks, these companies now have to organize and manage field service networks to provide services for the installed base globally and locally. Therefore, both the spare parts business and the technical service in the form of field technicians need to develop new organizational and physical structures and business processes.

During the service conference 2013, practical experiences and methods as well as scientific findings were presented in this context. The conference was divided into two sessions, which were introduced and moderated by Prof. Schönsleben.

The first session dealt with the opportunities and challenges of industrial services. A good example of this session was the presentation by Prof. Dr. Günther Schuh, director of the FIR at RWTH Aachen, the WZL at RWTH Aachen and the Fraunhofer IPT. He described the fourth industrial revolution, which is characterized by a collaboration of cyber-physical systems and new services playing an increasing role. Subsequently, he presented a holistic approach to dealing with complexity in the service environment and offered practical approaches for the audience, such as the 15 lean service principles.

The focus of the second session was operational excellence in service provision. In his presentation, Ronny Weinig revealed Service Excellence at Siemens and how the human factor affects the customer satisfaction. He presented 10 focus areas which encourage innovation and help to build a robust foundation for a profitable service business.

At the end, everybody agreed that the service conference 2013 was again a successful event and supported the exchange of information and the collaboration of industry and science.

Keynote speaker	Company	Topic
Prof. Dr. Günther Schuh	FIR und WZL der RWTH Aachen, Fraunhofer IPT	Ansätze zur Reduktion und Beherrschung von Komplexität bei industriellen Dienstleistungen
Sven Wilkens	DHL Logistik Schweiz AG	After Sales Service als USP in transparenten Märkten und harmonisierten Produktwelten
Andreas Wiesmann	Wärtsilä Services	Differenzierte Kundendienstleistungen in einem globalen Servicegeschäft
Stephan März	Bobst Group SA	High Added Value Services als neues Wachstumsfeld
Jürg Frefel	Antalis International	Mit attraktiven Dienstleistungen und Best Practice Marktanteile gewinnen
Ronny Weinig	Siemens Schweiz AG	From Service Excellence to Customer Delight – Der Balanceakt zwischen operationeller Qualität und Kundenbegeisterung
Thorsten Waldner	e-switch Solutions AG	Mobile Lösung für Service und Instandhaltung – Erfassung und Optimierung von Leistungen im Service
Philipp Hertz/ Gandolf Finke	BWI, ETH Zürich	Field Service Network Planning: Herausforderungen und Ansätze für das Design komplexer Service Supply Chains

5.4 *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 2013, the Erfa Group PIM organized an evening symposium and one company seminar. Altogether, approx. 120 persons participated in the events.

Company seminar «Operational excellence in the paper industry», Perlen Papier AG in Perlen

On April 10th, the company seminar "Operational excellence in the paper industry" took place at Perlen Papier AG in Perlen. Altogether, 53 people attended the seminar. Among them were production managers and CEOs from Swiss companies. Lectures on operational excellence and continuous improvement process were held in order to answer the question "are we fit for the future?". The company provided interesting insights into various strategies for achieving operational excellence and their application in a mostly unknown business environment. In addition, Perlen Papier AG offered the participants an extensive factory tour, which provided them with the opportunity to deepen the theoretical contents of the presentations and to see the impressive equipment needed to produce paper.

Lecturer	Company Division	Topic
Peter Schildknecht	CEO CPH Chemie + Papier Holding	Greeting of the participants, Introduction to CPH
Klemens Gottstein	CEO Perlen Papier AG	Introduction to Perlen Papier AG, Where are we now? – Are we fit for the future?
Peter Henz	Head of HR, Coach CIP	Continuous improvement process
Jörg Michel	Board Member Renergia	Industrial symbiosis – using waste heat for economical and ecological sustainability
Jürgen Stokowy	Head of Logistics	Efficient logistics

Evening symposium «BRICS-Staaten als Zukunftsmärkte für Schweizer KMUs» [BRICS-countries as growth markets for Swiss SMEs], ETH Zurich

The yearly evening symposium of the Erfa Group PIM took place on November 6th. The topic of the evening was «BRICS-Staaten als Zukunftsmärkte für Schweizer KMUs» [BRICS-countries as growth markets for Swiss SMEs]. Over 60 participants attended the event. Speakers from industry and academia gave insights into the challenges with which Swiss companies are confronted in BRICS-countries and approaches they apply to cope with these. A key learning point from the presentations was that production costs are becoming an increasingly smaller reason for a relocation of production activities. Instead, producing "in the market for the market" is gaining relevance. A lively discussion and exchange of experiences between the audience and the speakers rounded off the evening.

Lecturer	Company Divisin	Topic
Prof. Dr. Steffen Kinkel	Professor for International and Networked Business, Hochschule Karlsruhe – Technik und Wirtschaft	Opportunities and risks of relocation and expansion strategies into BRICS-markets
Marco Steg	Chief Executive Officer, Romay AG	China: A large step for an SME
Bernhard Iseli	Managing Director Milling Division, Mikron Agie Charmilles AG	Setting up a new production site in China
Kurt Haerri	Head Global Marketing & Sales, Schindler Management Ltd President of the Swiss-Chinese Chamber of Commerce	Dimensions and dynamics in growth markets – What does this signify for a Swiss company?

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 start a new event series called "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 (1) "Global Sourcing" and (2) "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 work-

shop provides an organized and structured framework within which to deal with the challenges of the individual company. The participants broaden their business perspective, 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

Outlook recent and upcoming activities:

The first CoE "Global Sourcing" was launched in 2012 and continued in 2013 (see table below). The valuable experience exchange in five workshops and the positive feedback from the participants motivated us to continue this event series.

On 10th October 2013, the 2nd CoE "Service Management" was launched, with the first workshop dealing with "From Service strategy to service portfolio". Eleven decision makers from the service departments of six companies participated. In total, five events will take place, covering different aspects of service management in a globalized environment.

Keynote speaker	Company	Topic	Topic / Date
Prof. Dr. Robert Alard	FHNW	Global Sourcing – eine besondere Herausforderung für die Beschaffung	Global Sourcing 15.11.2012
Prof. Dr. Erik Hofmann	Universität St. Gallen	Working Capital Management, Supply Chain Finance – Platforms and Natural Hedging	Global Sourcing 17.01.2013
Prof. Dr. Zheng Han	Tongji University Shanghai	Global Sourcing – The case of China	Global Sourcing 21.03.2013
Marcel Thoutberger, Christoph Wilhelm	Global Sourcing Services AG	Global Sourcing Strategies in Challenging Markets	Global Sourcing 16.05.2013
Prof. Dr. Paul Schönsleben, Dr. Gandolf Finke	BWI, ETH Zurich	Supply Chain Risk Management in KMU und Massnahmen der Risikosteuerung	Global Sourcing 18.07.2013
Dr. Markus Knoche	Hilti AG	Supply Chain Risk Management @ Hilti Corporation - Key Elements for Successful and Sustainable Implementation	Global Sourcing 18.07.2013
PD. Dr. Heiko Gebauer	Eawag	Von der Service Strategie zum Service Portfolio – Wie definiere ich mein Leistungsspektrum und vermarkte es produktgerecht?	Service Management 10.10.2013
Prof. Dr. Lennart Brumby	DHBW Mannheim	Handlungsfelder, Methoden und Werkzeuge für ein Wissensmanagement im Service	Service Mangement 12.12.2013

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. Current annual turnover: 2.1 Mio. CHF	2009 - present
	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

6.2 Spin-offs

During 2013, we had two spin-offs:

- Additively AG, active in the domain of additive manufacturing (Matthias Baldinger). Stemming from a research activity, this company started on Dec. 1st, 2013, and is qualified to be an official ETH-Spin-off. See also the respective project in the Appendix D on research projects.
- Management Weiterbildung BWI AG (BWI-MWB, Jürg Kuster, Markus Baertschi). After 6 years at ETH, this unit is being launched on January 1st 2014 as an independent company, maintaining its strong link to the BWI Center for Industrial Management at D-MTEC. 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. See also Section 5.1

6.3 Our impact on the industry in Sum

In all of our application areas (research, teaching, continuing education, and knowledge trans¬fer), we work effectively in the economy, particularly in companies in industry and services. The bar chart shows our impact on the industry in sum, i.e. the considerable number of companies – many of them Swiss and SME-sized companies – that have contracted services to the amount of 200 CHF and more in recent years.

Our impact on the industry in sum	07	08	09	10	11	12	13
Total Projects (KCHF)	494	248	969	178	885	309	222
Total Continuing Education (KCHF)	980	3'665	2'326	2'260	2'832	2'363	2'114
Total other Transfers (KCHF)	78	67	71	58	46	668	112
Number of Companies	243	619	601	462	544	533	493
Number of Individuals		35	32	53	49	50	45

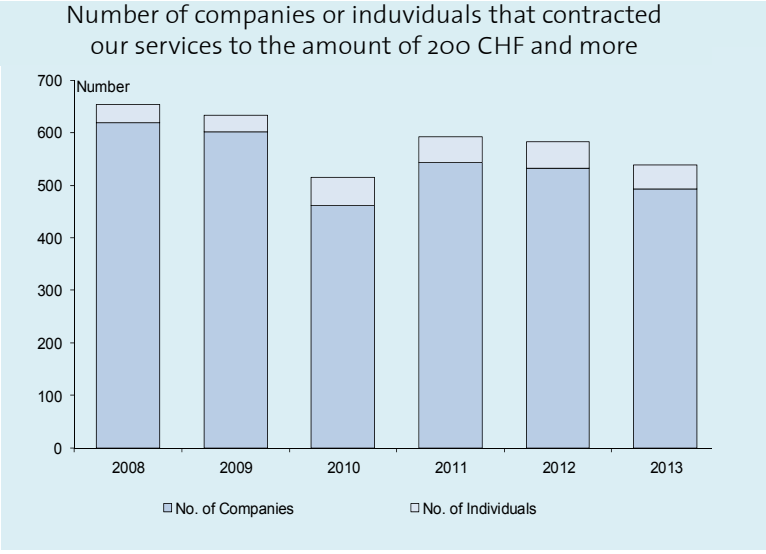
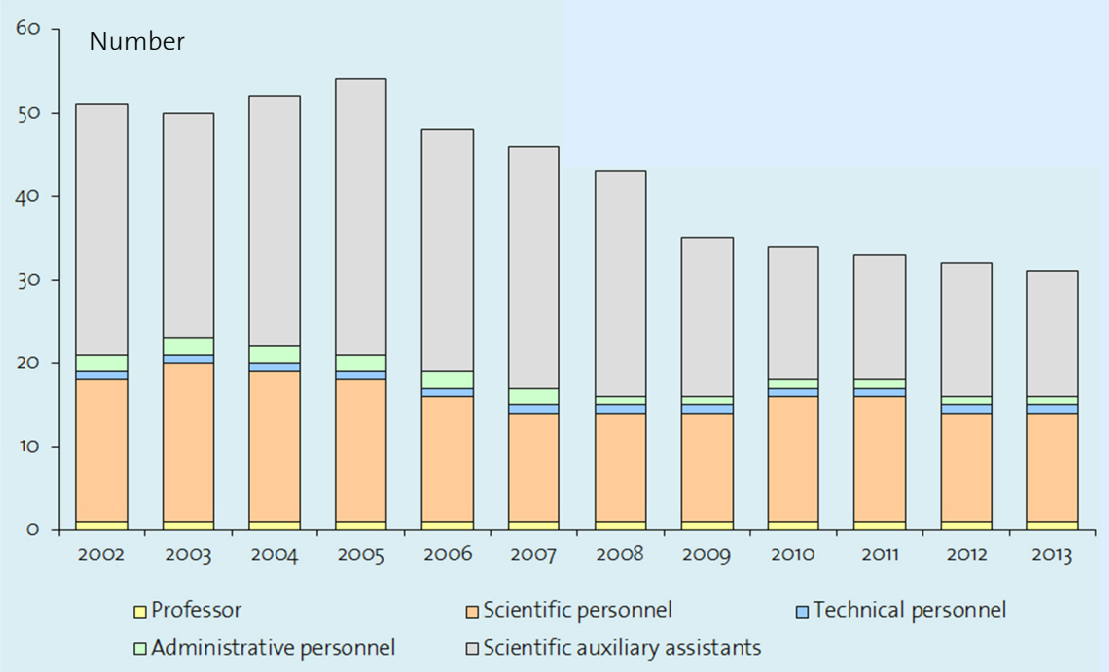


Figure 5.1: Our impact on the industry in sum

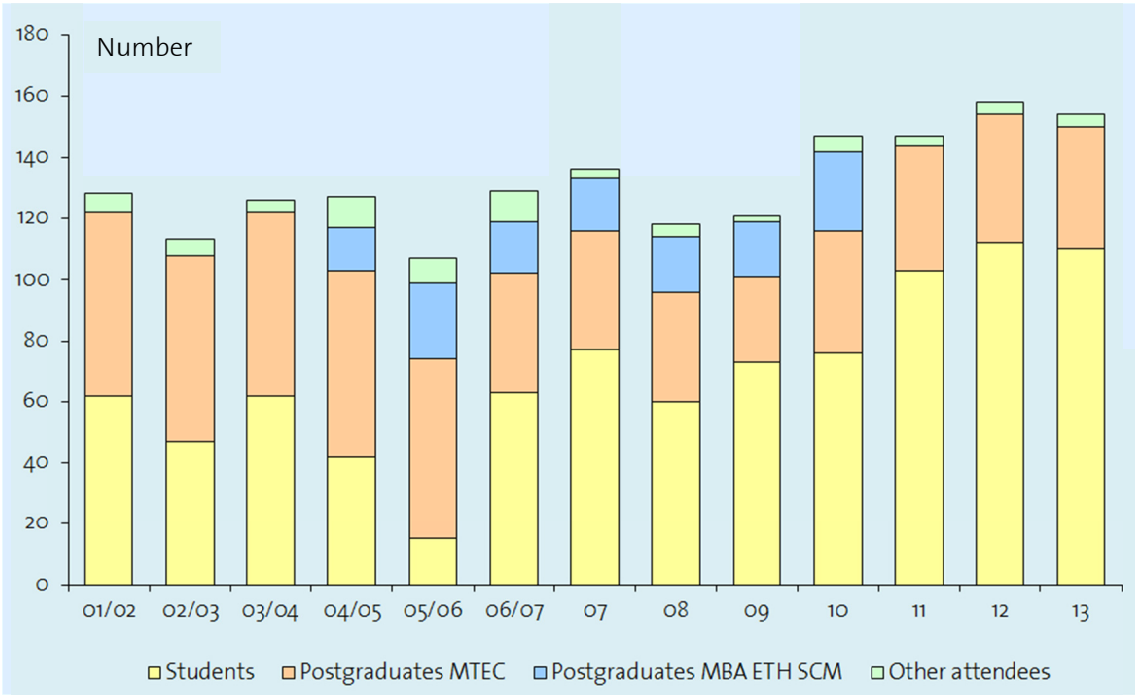
Appendix A: Statistics on Staff Levels

	02	03	04	05	06	07	08	09	10	11	12	13
Professors	1	1	1	1	1	1	1	1	1	1	1	1
Scientific personnel	19	18	17	15	13	13	13	15	15	13	13	12
Technical personnel	1	1	1	1	1	1	1	1	1	1	1	1
Administrative personnel	2	2	2	2	2	1	1	1	1	1	1	1
Scientific auxiliary assistants	27	30	33	29	29	27	19	16	15	16	15	17



Appendix B: Statistics on Students

Spring Term / Fall Term	Students BSc and MSc	Postgraduate MTEC	Postgraduates MBA ETH SCM	Other attendees (estimated)	Total
00 / 01	66	60		5	131
01 / 02	62	60		6	128
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

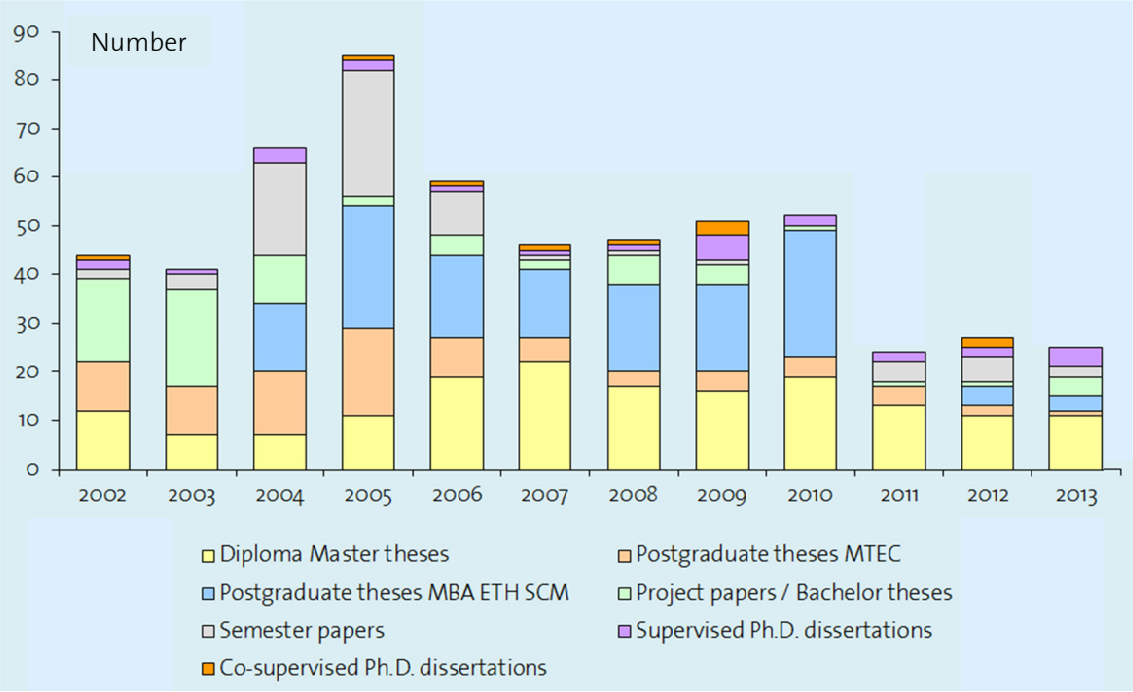


Appendix C: Statistics on Student Papers and Ph.D. Dissertations

Student Papers

Type (duration in months)	02	03	04	05	06	07	08	09	10	11	12	13
Diploma Master theses (6)	12	7	7	11	19	22	17	16	19	13	11	11
Postgrad. theses MTEC (3)	10	10	13	18	8	5	3	4	4	4	2	1
Postgrad. theses MBA ETH SCM			14	25	17	14	18	18	26		4	3
Project papers (2.5) / Bachelor theses (2.5)	17	20	10	2	4	2	6	4	1	1	1	4
Semester papers (1)*	2	3	19	26	9	1	1	1	0	4	5	2
Supervised Ph.D. dissertations	2	1	3	2	1	1	1	5	2	2	2	4
Co-supervised Ph.D. dissertations	1	0	0	1	1	1	1	3	0	0	2	0
Total	**44**	**41**	**66**	**85**	**59**	**46**	**47**	**51**	**52**	**24**	**27**	**25**
Number of students supervised	**46**	**42**	**67**	**85**	**59**	**46**	**47**	**51**	**52**	**24**	**27**	**25**

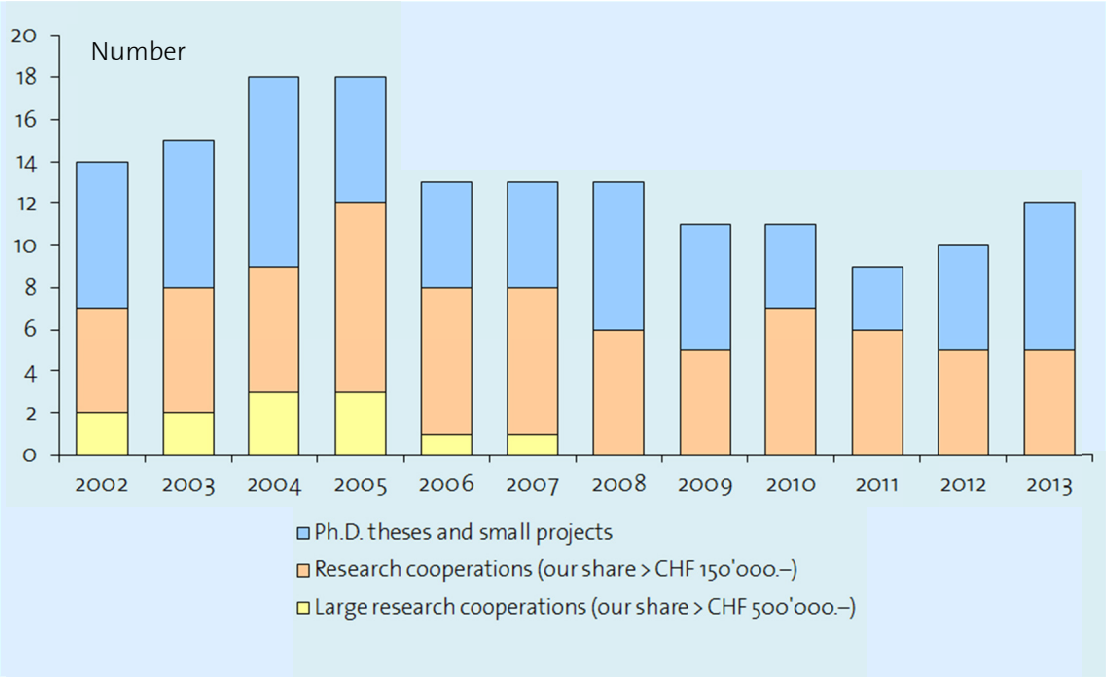
** Papers by BWI students in advanced studies block courses and by students in subsidiary subjects at the BWI with a duration of 150 hours, mostly internal.*



Appendix D: Research Projects

Ongoing Projects

	02	03	04	05	06	07	08	09	10	11	12	13
Large research cooperation	2	2	3	3	1	1						
Research cooperation	5	6	6	9	7	7	6	5	7	6	5	5
Ph.D. dissertations and small projects	7	7	9	6	5	5	7	6	4	3	5	7
Total	**14**	**15**	**18**	**18**	**13**	**13**	**13**	**11**	**11**	**9**	**10**	**12**



Abstracts of Research Projects

Project 1: AsPlanned - Robust planning of after-sales field service networks in the machinery and equipment industry (CTI No. 12164.1 PFES-ES)

Researcher: Prof. P. Schönsleben, Prof. Markus Baertschi, G. Finke, P. Hertz.
Partners:
Scientific: BWI Center for Industrial Management
Industrial: e-switch Solutions AG
Feintool AG
GF AgieCharmilles
Hocoma AG
Schindler Aufzüge AG
Siemens Schweiz AG
Dissemination: Association for Services Management International (AFSMI) Chapter Switzerland, Zellweger Management Consultants AG, BWI Management Weiterbildung
Financed by: CTI (Commission for Technology and Innovation)
Website: www.asplanned.ethz.ch

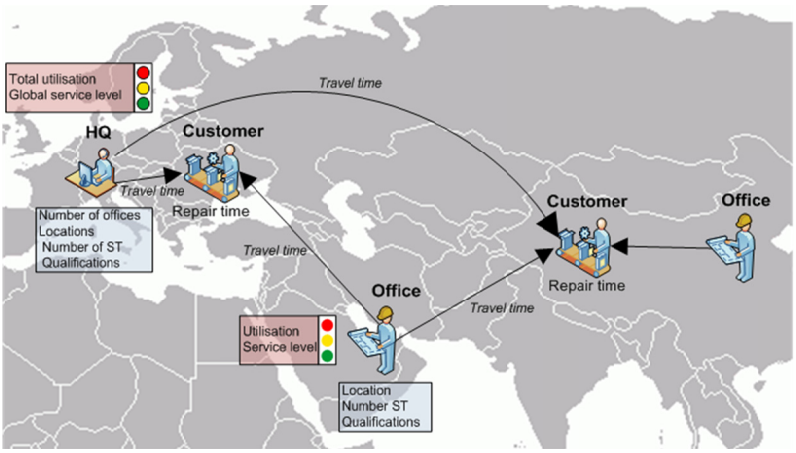


Fig. 1: Exemplary after-sales field service network

AsPlanned is a CTI-funded research project led by the BWI at ETH Zurich with the aim of developing a holistic planning methodology and software tool for the effective and efficient design of field service networks.

Over the past few decades, manufacturers of capital goods have shown a growing interest in offering industrial (field) services (IFS) such as maintenance services for shop floor machines. In order to position themselves in a highly profitable market niche and gain a competitive advantage, many Swiss companies are expanding their capabilities to provide IFS with the aim of achieving higher profitability, greater customer satisfaction and stronger customer loyalty. Nevertheless, companies are sometimes unable to cope with the complexity of the service business, specifically regarding decision-making in the setup of service resources and infrastructure as well as the definition of business processes and guidelines to perform service operations (e.g. staffing decisions, training decisions, job allocation strategy).

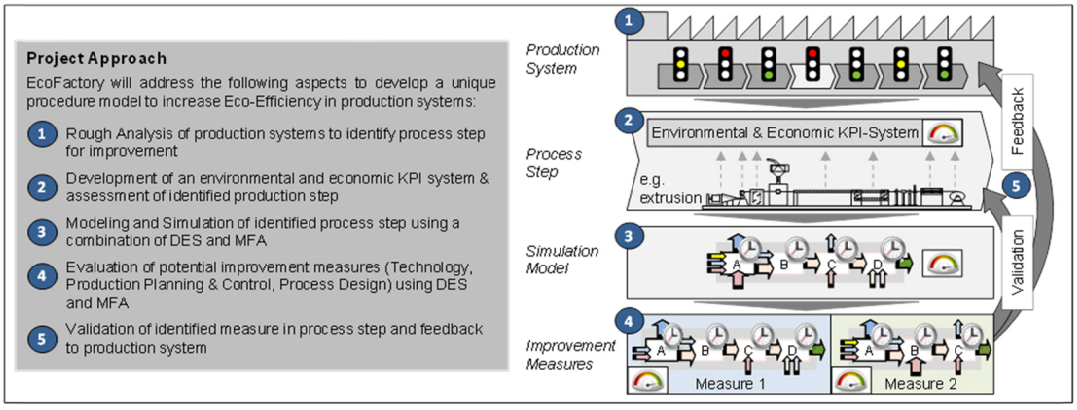
International studies suggest that the service business accounts for 25% of the sales and 40-50% of the profit of industrial enterprises and will become even more important in the future (Wagner, Zellweger et al. 2007). In Switzerland, the IFS business for machinery and plants has become increasingly important, amounting to 699'000 employees and a share of around 20% of the Swiss gross domestic product (Haddock, Hoppe et al. 2010).
The growth of service departments, revenue contribution and the variety of service products offered increases the complexity of the planning of IFS networks. The quality of IFS

network design and planning is a key lever to achieve efficient resource utilization while maximizing customer satisfaction. However, industry still relies on rules of thumb for decision making and lacks a solid quantitative approach. In order to enable practitioners to predetermine the impact of different configurations of the service network on different performance dimensions, the aim of the project is to develop a solution to support strategic decision-making in IFS network design. This solution is based on simulating the actual operational processes in these networks (see figure 1).

At the beginning of 2013, the development of the technical prototype and the analysis of the five different industrial cases was completed. After a training session, the software was handed over to the project partners. Current activities focus on the application of the software in new industrial cases in collaboration with Zellweger Management Consulting.

Project 2: EcoFactory – Eco-Efficiency Optimization of Production Processes (CTI No. 13857.2 PFES-ES)

Researcher:	Prof. Dr. P. Schönsleben, Prof. M. Baertschi, J. Plehn, A. Sproedt
Partners:	
Scientific:	BWI Center for Industrial Management
	Swiss Federal Laboratories for Material Science and Technology (EMPA)
	University of Applied Sciences Berlin (HTW)
Industrial:	Chocolat Frey AG
	HUBER+SUHNER AG
	Knecht & Müller AG
	Taracell Schweiz, R. Meier & Söhne AG
Dissemination:	Effizienzagentur Schweiz AG
	Swiss Center for Mechanical and Electrical Engineering Companies (SWISSMEM)
	Sustainable Engineering Network Switzerland (SEN)
	BWI Management Weiterbildung
Financed by:	CTI (Commission for Technology and Innovation)
Website:	www.ecofactory.ethz.ch



Background:
In past approaches, when trying to optimize the environmental performance of a company's Supply Chain, the focus was often placed on the intercompany logistics processes, e.g. the choice of the means of transport. Manufacturing companies, especially SMEs, are increasingly beginning to notice that the degrees of freedom to optimize their logistics processes are very limited as opposed to their own production processes. Furthermore, recent studies have shown that not only transport, but especially manufacturing companies' own production facilities account for a large amount of their environmental impact.

Motivation:
Therefore, the environmental perspective on production processes is gaining in importance for manufacturing companies. While in the

past, companies focused only on the economic performance when planning their production processes, e.g. costs, delivery, quality or flexibility, they are now increasingly taking into account environmental implications such as emissions, energy consumption, water and material use. Nevertheless, companies need guidance and tools in order to holistically assess what improvement measures will result in the optimal environmental and economic performance of their production processes, i.e. the optimal eco-efficiency.

Objectives:
The aim of the project EcoFactory is to develop a holistic procedure model that enables manufacturing companies to improve the eco-efficiency of their production processes. The procedure will integrate a software tool, which is based on a novel approach combining Discrete Event Simulation and Material Flow Analysis. The software will enable manufacturing companies to perform detailed analyses of different improvement measures in order to achieve the optimal eco-efficiency of their production processes.

Activities in 2013:
The activities in the final stage of the research focused primarily on refining previously developed elements and implementing them within the case companies. As such, elements of the developed procedure were redesigned, which significantly improved its applicability and integration in an industrial environment. The software tool, wich had primarily been developed in 2012, was further refined by developing additional important functionality and eliminating bugs as well as improving its practicability. The finalized project results were then successfully applied at the four case companies. The application and the results achieved within the case studies led to interesting results and important impulses to improve the eco-efficiency of the production systems under analysis. The project was finalized at the end of June 2013 to the full satisfaction of all project members.
In order to further develop and commercially exploit the project results, EMPA (now spun off into the Swiss representation of Quantis), HTW and Effizienzagentur Schweiz are currently embarking on a joint venture, in wich BWI will play an advisory role.

Project 3: 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 2013:
The project began in March 2013 by identifying different approaches for managing the financial supply chain in literature and industry. In collaboration with the four industrial project partners, the specific problems related to the research topic were elaborated and subprojects formulated. Various support tools were developed for increasing financial transparency of the involved companies and to identify the corresponding financial supply chain risks. Furthermore, various dissemination activities, such as an article series on financial supply chain management and involvement in the foundation of the "Supply Chain Finance Community", took place.

Project 4: 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 workarounds 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 tech-

nical 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 2013:
In the beginnings of the project, Objective Catalogues for the three industry partner were developed. Subsequently, in-depth analyses of processes and data, including a deep dive at a Schindler site in China, were executed jointly with the industry partners to develop a thorough understanding of the challenges in the area of FastETO with which they have to deal. In the second half of 2013, solutions variants suitable to tackle the challenges were identified and evaluated. The implementation of the selected solutions, such as IT tools or newly defined processes, was initiated. First dissemination activities, such as the presentation of FastETO at an industry seminar, took place.

Project 5: 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 gen-erations and their ability to provide multime-dia knowledge acquisition tools that are com-pelling 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 set-up of specialized MSc and Ph.D. courses.

Activities completed:
In October 2013, the third year of GaLA was completed. The third quarter of the project was marked by the continuation of community building and dissemination activities inside and outside of the network. Highlights included the 1st IFIP WG5.7 Spring School for doctoral students on Serious Games in Bremen (March 22-23), the plenary meeting in Madrid (April 15-17), as well as the 1st GaLA Summer School in Gratz (September 2-6). ETH Zurich (represented by BWI) is active within the work packages 3 (serious games application fields), 4 (industry and stakeholder engagement), and 7 (integration in corporate training).

Project 6: 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: The service level in terms of the patient has the 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 7: 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 8: Additively – Connect & Manufacture – Platform supporting companies interested in additive manufacturing *(new)*

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 a feeling for the cost of additively manufactured parts, preventing them from choosing to use the technologies in the first place. 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. A variety of tools are developed to:

- Enable a high-level cost estimation for additively manufactured parts in a buy scenario
- Identify the right service providers
- Facilitate the sourcing processes between companies and service providers

Project 9: Industrial Field Service Network Conceptualization *(diss.)(new)*

Researcher: G.R. Finke
Financed by: The Professorship's own resources

Motivation:
This thesis on "Industrial Field Service Networks - Conceptualization, Performance Measurement and Risk Management" introduces a reference model, a performance measurement system and a risk management framework for industrial field services. Initially, the necessity for these models is derived from the undisputed increasing importance of industrial field services, the little attention in academic literature and the lack of managerial concepts supporting decision-making in practice. The relevant literature bodies are analyzed before research questions are formulated in the three core areas and an appropriate methodology for addressing these questions is laid out. A novel reference model is then introduced, which maps elements and resource in the service network to each instance of a single step in the service delivery process and thus enhances the transparency over the whole network. Based on this reference model, a system for performance measurement and a framework for risk management are proposed, which consider the specific aspects of industrial field services and are therefore superior to existing concepts. An exemplary application in

an industrial case shows the applicability of the developed concepts. The thesis closes with a summary of the results and an outlook for further research.

Project 10: Industrial Field Service Network Planning *(diss.)(new)*

Researcher: Ph. Hertz
Financed by: The Professorship's own resources

Motivation:
This thesis has its focus in service operations management for industrial field services. More specifically, if focuses on the formality of planning and decision support with regard to field service networks, which represent a special type of service delivery system. In the introduction, the fundamental concepts that are relevant for this contribution are introduced, before the challenges which service managers face and the lack of methods and tools in this area are highlighted. Based on an extensive review of the literature and industrial practices, the requirements are evaluated before the research questions, the applied research methodologies and research designs are introduced in detail.

In the results section, a formal conceptual model is introduced that provides a guideline and best practices to service managers for optimizing different aspects of a field service network, such as the physical structure of its resources or its service delivery process. For each planning task, detailed in- and outputs which should be considered are provided. The second contribution of this thesis is represented by a decision support system, which has been implemented as a technical software prototype, and enables service managers to conduct detailed and quantitative analyses of "what-if" scenarios. By way of example, two industrial cases reveal the applicability of the developed concepts.
The thesis closes with a summary of the results and an outlook for future research.

Project 11: Eco-Efficiency Performance Measurement System *(diss.)(new)*

Researcher: J. Plehn
Financed by: The professorship's own resources

Motivation:
Stakeholders are increasingly sensitive to the environmental performance of manufacturing companies. According to scientific studies, companies should use this trend to gain a competitive advantage. Many companies are willing to exploit this potential, but face a major challenge in terms of the evaluation of feasible benefits in their specific case. To reduce the prevailing uncertainty of manufacturing companies in the integrated assessment of environmental and economic performance (eco-efficiency), a performance measurement system is needed to support decision makers in selecting and interpreting appropriate indicators on a sound data basis.
In this thesis, a performance measurement system is developed to assess and improve eco-efficiency in the domain of manufacturing.

Results:
The results are based on four exploratory case studies from the Swiss industry. Based on a comprehensive literature analysis, the specific elements of the performance measurement system are elaborated. In this context, research gaps in the field of integrated eco-efficiency assessment, indicator selection and definition of reference values are identified.
The definition of a utility function and the evaluation of the cost-effective environmental impact based on a combination of environmental management accounting (EMA) guidelines and monetized Life Cycle Assessment (LCA) indicators are used to fill the research gap related to the integrated eco-efficiency assessment. Furthermore, a procedural framework is presented, providing the required decision support concerning a company-specific selection of indicators. The framework

guides decision makers in defining the area of investigation within their respective domain based on an analysis of external stakeholder requirements, as well as internal production processes.

This thesis is written as a cumulative dissertation. It is based on seven publications as first author and nine publications as co-author.

Project 12: Decision-support for Eco-efficiency Improvements in Production Systems Based on Discrete-event Simulation *(diss.)(new)*

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

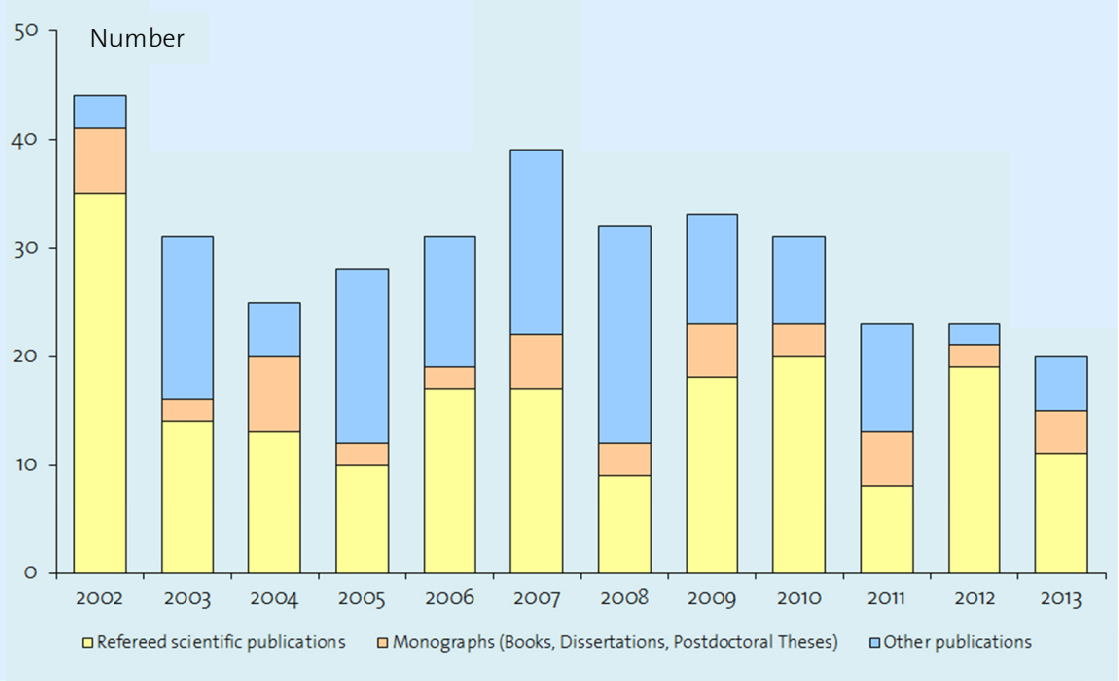
Summary:
Complex interrelations between the environmental and economic performance aspects of a production system represent a high non-transparency for decision makers in manufacturing, hindering them to seize the existing potential for eco-efficiency improvements. Manufacturing companies thus struggle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

Appendix E: Publications

	02	03	04	05	06	07	08	09	10	11	12	13
Refereed Scientific publications	35	14	13	10	17	17	9	18	20	8	19	11
Books	6	2	7	1	2	5	3	5	3	5	2	4
Other publications	3	15	5	16	12	17	20	10	8	10	2	5
Total	**44**	**31**	**25**	**28**	**31**	**39**	**32**	**33**	**31**	**23**	**23**	**20**



Refereed Publications

ISI Journals

ElMaraghy, H.; Schuh, G.; ElMaraghy, W.; Schönsleben, P. et al.: Product variety management, CIRP annals – manufacturing technology, Vol. 62, Issue 2, pp. 629-652

Hertz, P.; Cavalieri, 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, pp. 69-84, (2014).

Schneider, C.; Bremen, P.; Schönsleben, P.; Alard, R.: Transaction cost economics in global sourcing: Assessing regional differences and implications for performance. In: International Journal of Production Economics, Vol. 141, Issue 1, pp. 243-254, (2013).

Non-ISI Publications (Refereed Conference Proceedings etc.)

Cavalieri, S.; Romero, D.; Strandhagen. J.O.; Schönsleben, P.: Interactive Business Models to deliver Product-Services to Global Markets. In: Proceedings of the APMS 2013 International Conference - Advances in Production Management Systems, Penn State, United States of America, 09.-12.09.2013.

Baldinger, M.; Duchi, A.: Price benchmark of laser sintering service providers. In: High Value Manufacturing - Advance research in virtual and rapid prototyping, p. 37-42, 2013.

Friemann, F.; Wandfluh, M.; Schönsleben, P.; Alard, R.: Improving the Application of Financial Measures in Supply Chain Management. In: IFIP WG 5.7 International Conference, APMS 2012, Revised Selected Papers, Part II, ISBN: 978-3-642-40360-6 (Print), 978-3-642-40361-3 (Online), Rhodes, Greece, 24.-26. 09. 2012.

Hertz, P.; Sproedt, A.: Service supply chain planning for industrial services – design and application of a decision support tool. In: Proceedings of the APMS 2013 International Conference - Advances in Production Management Systems, Penn State, United States of America, 09.-12.09.2013.

Rippel, M.; Willner, O.; Plehn, J.; Schönsleben, P.: Bridging the gap between energy management systems and machine tools – Embedded energy efficiency in production planning and control. In: IFIP WG 5.7 International Conference, APMS 2012, Revised Selected Papers, Part II, ISBN: 978-3-642-40360-6 (Print), 978-3-642-40361-3 (Online), Rhodes, Greece, 24-26.09.2012.

Sproedt, A; Plehn, J.; Hertz, P.: A Simulation Enabled Procedure for Eco-efficiency Optimization in Production Systems. In: Proceedings of the APMS 2013 International Conference - Advances in Production Management Systems, Penn State, United States of America, 09.-12.09.2013.

Wandfluh, M.; Schneider, C.; Schönsleben, P.: Chinese SME's Sourcing Practices and their Impact on Western Suppliers. In: IFIP WG 5.7 International Conference, APMS 2012, Revised Selected Papers, Part II, ISBN: 978-3-642-40360-6 (Print), 978-3-642-40361-3 (Online), Rhodes, Greece, 24.-26.09.2012.

Willner, O.; Rippel, M.; Wandfluh, M.; Schönsleben, P.: Development of a Business Process Matrix for Structuring the Implications of Using Configurators in an Engineer-To-Order Environment. In: IFIP WG 5.7 International Conference, APMS 2012, Revised Selected Papers, Part II, ISBN: 978-3-642-40360-6 (Print), 978-3-642-40361-3 (Online), Rhodes, Greece, 24-26.09.2012.

Monographs (Books, Dissertations, Postdoctoral Theses)

Finke, G.R.: Industrial Field Service Networks - Conceptualization, Performance Measurement and Risk Management. Dissertation, ETH Zürich, 2013.

Hertz, P.N.: Industrial field service network planning - A formal conceptual model for planning and support system for decision making, Dissertation, ETH Zürich, 2013.

Plehn, J.F.: Ein Leistungsmesssystem zur integrierten Bewertung der Öko-Effizienz von Produktionsunternehmen – Reduktion der Unsicherheit bei der Kennzahlenauswahl und –interpretation. Dissertation, ETH Zürich, 2013.

Sproedt, A.S.: Decision-support for Eco-efficiency Improvements in Production Systems based on Discrete-Event Simulation. Dissertation, ETH Zürich, 2013.

Other publications

Baldinger, M.; Leutenecker, B.; Rippel, M.: Strategic Relevance of Additive Manufacturing. In: Industriemanagement 2. 2013. p. 11-14

Finke, G.R.; Wandfluh, M.R.; Hertz, P. (2013): Leistungsmessung industrieller Services. In: Industriemanagement, 01/2013.

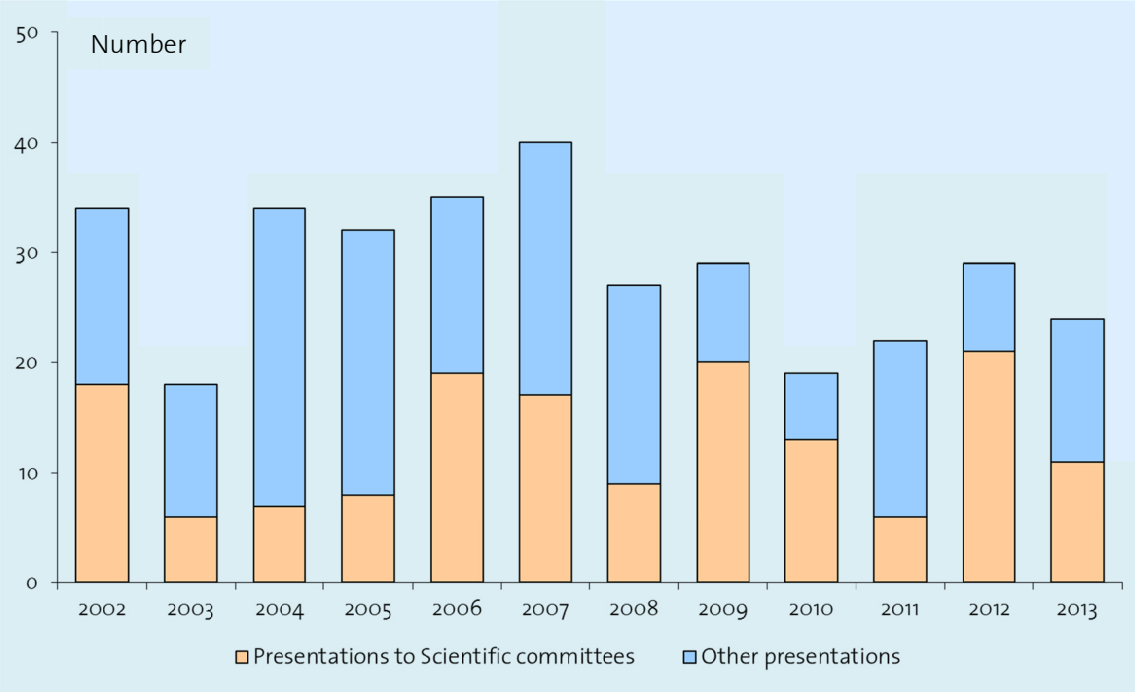
Plehn, J.; Reinhard, J.; Baldinger, M.; Sproedt, A. (2013): Integrierte Bewertung der Öko-Effizienz in produzierenden Unternehmen. In: Industrie Management, 05/2013.

Wandfluh, M.; Locker, A. 2013: Bestandsfinanzierung in Supply Chains, Beschaffungsmanagement-Revue de l'acheteur, 10/2013

Wandfluh, M.; Fischl, M. 2013: Finanzielle Risiken der Lagerhaltung – Eine Supply Chain Perspektive, Zeitschrift für wirtschaftlichen Fabrikbetrieb (ZWF), 108(12)

Appendix F: Lectures and Presentations

	02	03	04	05	06	07	08	09	10	11	12	13
Scientific committees	18	6	7	8	19	17	9	20	13	6	21	11
Other presentations	16	12	27	24	16	23	18	9	6	16	8	13
Total	**34**	**18**	**34**	**32**	**35**	**40**	**27**	**29**	**19**	**22**	**29**	**24**



Presentations to Scientific Committees

Schönsleben, P.: Supply Chain Risk Management in Small and Medium Enterprises. ETH-Risk-Center workshop on "Vulnerability and Resilience of Supply Chains". Zurich Corporate Center, 12.09.2013.

Finke, G.R.: Simulation-based Risk Assessment. ETH-Risk-Center workshop on "Vulnerability and Resilience of Supply Chains". Zurich Corporate Center, 13.09.2013.

Friemann, F.; Rippel, M.: Long-Range logistics capacity planning - Facing future challenges in the pharmaceutical industry. NOFOMA 2013 Conference, Gotenborg, Sweden, 04.06.2013.

Friemann, F.: Long-Range logistics capacity planning within the pharmaceutical industry, In: Presentation at 20th IfM Research Methodology Workshop, Cambridge, United Kingdom, 04.-05.04.2013.

Hertz, P.: Service supply chain planning for industrial services – design and application of a decision support tool. APMS 2013 International Conference - Advances in Production Management Systems, Penn State, United States of America, 10.09.2013.

Plehn, J.: EcoFactory – Softwaretool zur Steigerung der Ökoeffizienz in Produktionssystemen. Fertigungstechnisches Kolloquium zu "Energieeffizienz in der Produktion". ETH Zürich, 14.11.2013.

Sproedt, A.: A Simulation Enabled Procedure for Eco-efficiency Optimization in Production Systems. APMS 2013 International Conference - Advances in Production Management Systems, Penn State, United States of America, 11.09.2013.

Wandfluh, M.: Improving the Financial Supply Chain Performance by Collaborative Inventory Management. NOFOMA 2013 Conference, Gotenborg, Sweden, 04.06.2013.

Wandfluh, M.: Collaborative Financial Supply Chain Management, In: Presentation at 20th IfM Research Methodology Workshop, Cambridge, United Kingdom, 04.-05.04.2013.

Willner, O.: FastETO - Methods and tools that support a fast and efficient engineer-to-order process for parameterized product families. In: Presentation at Milano Mass Customization Workshop, Milan, Italy, 05.-06.02.2013.

Willner, O.: FastETO. In: Presentation at 20th IfM Research Methodology Workshop, Cambridge, United Kingdom, 04.-05.04.2013.

Other Presentations

Schönsleben, P.: Die Herstellung von hochwertigen Gütern und Dienstleistungen – Ein Streifzug durch unsere aktuelle industrielle Projektlandschaft. Tagung der Gesellschaft zur Förderung der Unternehmenswissenschaften, ETH Zürich, 25.05.2013.

Schönsleben, P.: Produktionsstandort Westeuropa 2020 – Chancen und Gefahren: Aktuelle Herausforderungen, Servicetagung 2013, BWI, ETH Zürich, 30.05.2013.

Schönsleben, P.: Supply Chain Risk Management in KMU, Circle of Experts, 18.07.2013.

Schönsleben, P.: Stammdatenmanagement als notwendige Voraussetzung für funktionierende ERP- und SCM-Systeme. Fachtagung, Itelligence AG, Regensdorf, 14.11.2013.

Alard, R.; Friemann, F.; Willner, O.: Systems Engineering. In: one-day seminar with BWI Management professional training, Chur, 30.08.2013.

Alard, R.; Friemann, F.; Willner, O.: Systems Engineering. In: lecture on "Industrial Engineering and Management Methodology for Thesis in Companies", Zürich, Switzerland, 15.02.2013.

Alard, R.; Friemann, F.; Willner, O.: Systems Engineering. In: lecture on "Industrial Engineering and Management Methodology for Thesis in Companies", Zürich, Switzerland, 13.09.2013.

Baldinger, M.; Finke, G.; Friemann, F.; Willner, O.: The logistics game. In: Roche, Basel, Germany, 18.12.2013.

Finke, G.R.: Massnahmen der Risikosteuerung, Circle of Experts, 18.7.2013.

Hertz, P.; Finke, G.R.: Field Service Network Planning: Herausforderungen und Ansätze für das Design komplexer Service Supply Chains. In: "ETH Service Tagung 2013", Zürich, Switzerland, 30.05.2013.

Sproedt, A.: EcoFactory: Optimierung der Öko-Effizienz der Produktion. 43. IST Technologie-Apéro, in Schaffhausen, Switzerland.

Sproedt, A.: EcoFactory: Procedure and Simulation Software for Improving the Eco-efficiency of Production Systems. Swissmem information event, in Zurich, Switzerland.

Willner, O.; Grosse Wienker, R.: Best Practice beim Einsatz von Konfiguratoren im Engineer-to-order-Prozess - Erste Ergebnisse aus dem KTI-Projekt "FastETO". In: Presentation at i2s seminar "Best Practices in ERP", Zurich, Switzerland, 17.09.2013

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 the 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 of Management, Technology, and Economics (D-MTEC)" is replacing 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 on 1st Dec.

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.

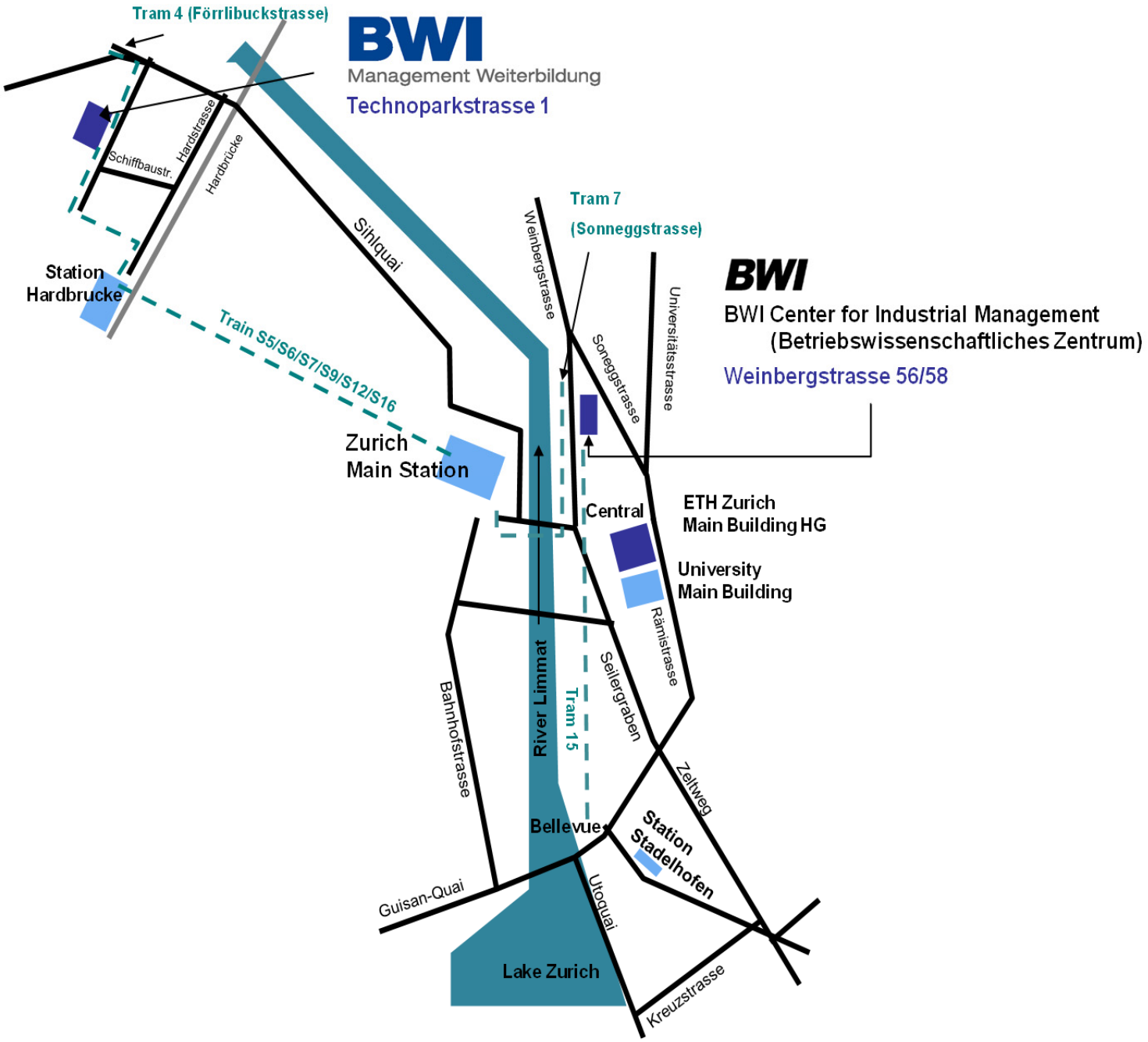
2005 The BWI *foundation* and the D-MTEC decide upon a partnership. Since this time, the foundation has been concentrating its activities on supporting research at the D-MTEC and sees itself as the "MTEC Foundation". It's board of trustees consists of three representatives from industry (one of whom 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" in Saarbrücken, owned by Prof. August Wilhelm Scheer, becomes 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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