Hasso Plattner Design Thinking Research Program
Research Proposal

Design Loupes

A bifocal study to improve the management of engineering design by co-evaluation of the design process and information sharing activity.

Submitted to: Larry Leifer (leifer@cdr.stanford.edu)
Christoph Meinel (meinel@hpi.uni-potsdam.de)

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1. PROJECT ABSTRACT

The objective of this exploratory study is to gain a better understanding of the determining characteristics of high-performance engineering design communities in order to foster the generation of innovative output. Centered on a rich data set collected over multiple years, the researchers plan to validate a proposed design process model and use this to explain performance differences between design teams. Combination of this model with an analysis of the communication and information sharing behavior of the members of a design community is expected to allow the isolation of certain team characteristics that can be demonstrated as instrumental to high performance. Based on the findings, the researchers will investigate methods for the real-time assessment of team communication signatures over multiple communication channels and their ability to predict performance. During a second phase, these methods will be developed into a tool, which should provide early insight into performance-relevant characteristics of design teams and thus allow for the improvement and correction of the design process.

The study will performed jointly by researchers at Stanford's Center for Design Research (CDR) and the Hasso Plattner Institut (HPI). The two research groups will collaborate on the analysis of the data from different vantage points corresponding to their respective areas of study. This will allow each group to substantiate its claims assisted by findings from the counterpart group, and to provide a model for how CDR and HPI can both benefit from collaboration as a part of the Hasso Plattner Design Thinking Research Program.

2. PROJECT DESCRIPTION

2.1. Research Process

The proposed research project is the continuation of a joint study by researchers from Stanford's Center for Design Research (CDR) and the Hasso Plattner Institut (HPI). To date, the researchers have collaboratively collected data and developed hypotheses in accordance with each institution's point-of-view and area of expertise. The focus of the research team at CDR is on understanding and improving the design process as a socio-technical activity. Similarly, the interest of the researchers at HPI is the development of IT-based tools to support design teams and to analyze their performance. Both sides share the ultimate goal of increasing the performance of design teams.

In order to accomplish this goal, the two teams have jointly collected multiple data streams from team-based design activities and created hypotheses based on an initial evaluation of this and prior data. The next step is to analyze the data and to test the hypotheses developed by each side. Researchers at CDR and HPI are actively working together to support their differing points-of-view with insights gleaned from analysis through their counterpart's lens. At the end of year one of this proposed project, the research teams plan to present a recommendation for the management of design teams. This recommendation will integrate techniques and complementary tools as shown in Figure 1.

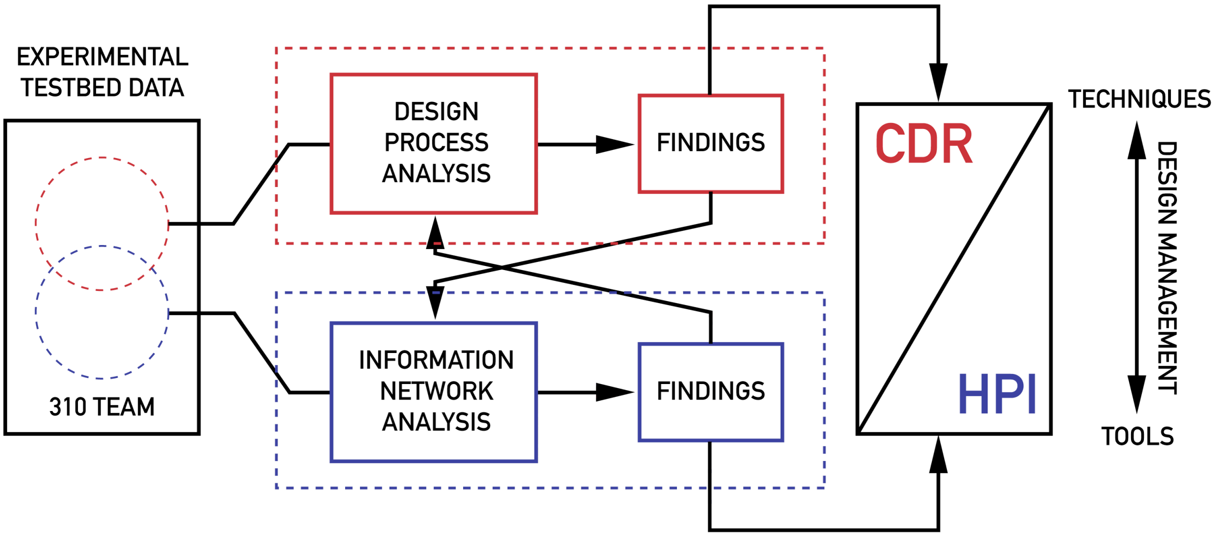

Figure 1. Project Setup / Collaboration between CDR and HPI

2.2. Experiment Design

Stanford University's "Engineering 310 – Engineering Design Entrepreneurship" graduate level project-based course is a living laboratory from which most of the data for this study was collected. In this course, Stanford students collaborate with students at other universities around the world to develop innovative solutions to open-ended problems posed by industry partners over the course of eight months. The nature of the projects and the structure of the teams closely resemble the typical working mode of start-ups and "tiger teams" (Clark & Wheelwright, 1992) in industry. Unlike industry design teams, however, Engineering 310 is uniquely suitable for research studies due to the common milestones, deadlines, and project breadth & depth expectations between all of its participant teams. This commonality ensures that differences in design process performance can be largely attributed to disparities in team dynamics, rather than to factors intrinsic to each of the projects.

Using the course as a test-bed, the research team has collected data on each team over several years. This data set includes an extensive archive of email correspondence and shared document and Wiki server usage during academic years 2003/4 through 2007/8, the respective years' final documentation and grades, and a set of questionnaires administered during academic year 2007/8 investigating the teams' organizational energy level (based on Bruch, 2005). These measures are complemented by semi-structured interviews and ethnographic observations from all years. All in all, the data set paints an accurate picture of the design process of over 50 unique, yet comparable, projects spread over five years. This data set also grows in breadth and depth every year as new projects are completed in Engineering 310, and as more metrics are gathered pursuant to various research projects. The combination of these data streams allows for analysis from multiple points-of-view. Communication and process flow of the design teams can also be reconstructed to a large extent from this data set. A data set of this magnitude would be near-impossible to gather in any other industry or academic setting.

The data collection and observation of course projects will continue throughout the academic year 2008/09, which will allow the research team to test early prototypes of the tools developed in this study during project runtime.

2.3. Design Process Component of Study (CDR)

2.3.1 Addressed Need

Today, industry and academia alike manage engineering design teams by the "seat of their pants" based on personal and organizational experience and with little understanding of the design process itself, in particular at the "fuzzy front-end" (Kim & Wilemon, 2002). This leads to an underutilization of the human and financial resource investment. The goal of this study is to explain how individuals involved in a design process contribute to its outcome, whether positively or negatively. The resulting improved understanding of their duty in, and contribution to, the design process should allow design teams' members, instructors, and managers to modulate their behavior and, when applied in practice, enhance the performance of design teams.

2.3.2 Analysis Methods

The researchers at CDR have developed a theoretical model, which suggests that every design process can be broken universally into three core activities – Planning, Execution, and Integration. These three activities occur during all phases of the design process and can be observed both at the macro (project) level and at the micro (implementation detail) level. Using this forward path model, the researchers looked at where feedback occurs, who provides this feedback, and whether it comes from within or outside of the design team. With the model forming a basis for analyzing the design process, it is hypothesized that only an outside expert or reviewer can prevent progress into the execution phase (see Figure 2). This hampers the design process, for one can only learn and discover, and thus innovate by executing, rather than by planning. As Peter Drucker has already stated, "unexpected occurrences [or discoveries are] the easiest and simplest source of innovation opportunity" (Drucker, 2002). It is therefore suggested that outside reviewers, which normally take the form of managers or experts, can censor an idea and by doing so prevent progress into what the research team believes to be the vital execution phase. In effect, this turns the design process into an infinite loop around planning and makes progress impossible. Based on this model, one might be able to explain the famous innovation success of companies like 3M or Google; both companies let their employees spend a portion of their salaried time pursuing their own ideas without needing to justify them to management prior to prototyping.

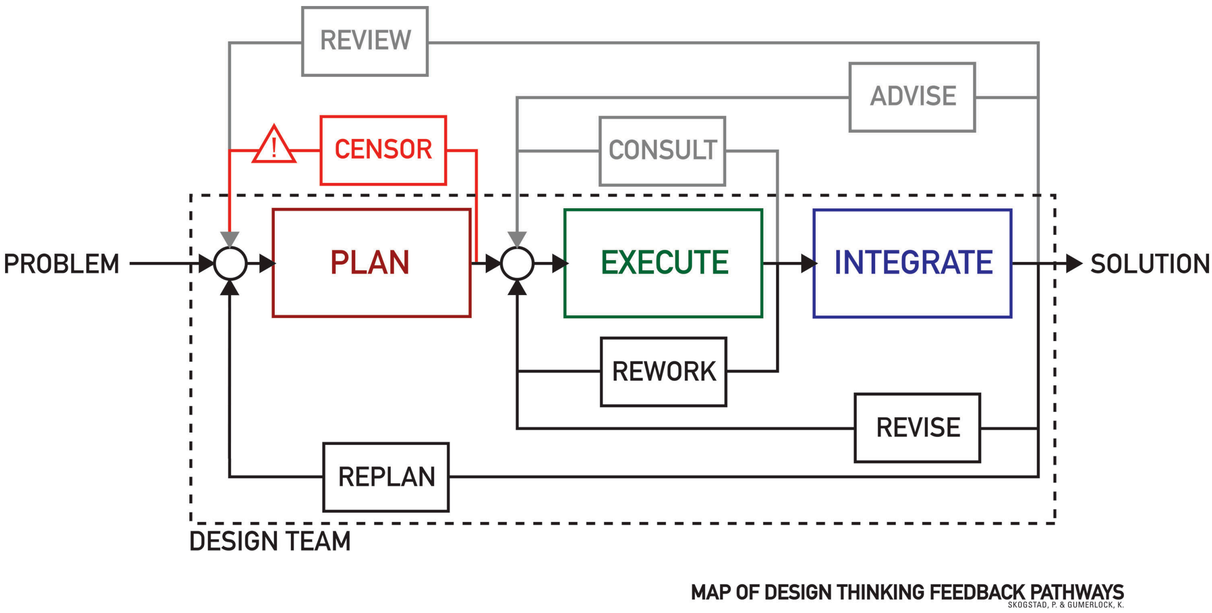

Figure 2: Model of feedback in design process showing the danger of a reviewer preventing progress to the "execution activity" which allows for actual learning and therefore innovation to happen.

Building on this model, the following hypotheses are made:

a) *High-performance design teams move more rapidly and frequently from planning to execution than lower-performance teams.*
b) *Feedback from outsiders before movement into the execution phase can act as a creativity censor, stifling innovation.*

Until now, the model and the hypotheses about its impact have been based on the personal experience and observations of the research team and have not been validated with actual data or design process theory. In order to validate the model, the research team will compare it with established models and theories from the literature and ethnographic studies performed in industry by other researchers in addition to contrasting it with the observations and interviews from the Engineering 310 course.

Once the model has been validated, the hypotheses will be tested using the data from the Engineering 310 course. This will be done by comparing the performance of design teams in the course, measured as described in section 2.3.3, with the activities of the design teams. Hypothesis a) will be tested by counting the number of prototypes constructed by the team based on the written documentation and contrasting it with the performance of the teams. Similarly, hypothesis b) will be tested by counting the number of ideas "successfully killed" by outside reviewers (the teaching team, coaches and company liaisons) as indicated by ethnographic observations, interviews, emails and the written documentation

Finally, the result will be put in the context of prior studies by the research team that have demonstrated the effect of connection between team and community members and the effect of the interplay between physical and cognitive space on performance in prior studies (Skogstad, Currano & Leifer, 2007; Karanian, Skogstad & Taylor, 2008).

2.3.3 Design Performance Measurements

Similar to the adage, "beauty is in the eye of the beholder," design team performance is difficult to measure objectively, because solutions that might seem trivial to one person could appear highly innovative to another. To further complicate matters, performance not only relates to the outcome of the design process, but also to the process itself. It can look drastically different from the perspective of a team member vis-à-vis that of a manager. It is the goal of this study to measure performance from the perspectives of different design process stakeholders, as all of them have an effect on its outcome.

The outcome quality will be measured based on the final design using an independent panel of judges who are given a summary of each project outcome and they will be asked to rank them into three categories: a) highly innovative, b) nice development work, c) disappointing. Perspectives of the team members will be evaluated using the questionnaires and interviews, which measure their perception and satisfaction at different points in time during the design process. For the perspective of the manager, the number of technical and team dynamic problems that required managerial attention are an important qualifier in design process performance. These obstacles will be measured based on a count of complaints and emails from the teaching team that were necessary to help keep a project team on track. These three perspectives and metrics are expected to objectify and normalize the otherwise subjective traits of design performance.

Final course grades awarded by the course's teaching team will be used as a baseline measure for comparison against the new outcome metrics devised by the research team.

2.4 Study of Team Communication Signatures (HPI)

2.4.1 Addressed Need

It is incontrovertible that communication plays a central role in collaborative activities such as engineering and design (Minnemann, 1991; Poltrock et al., 2003; Maier, Eckert & Clarkson, 2006). The success or failure of complex projects is considerably determined by how design teams communicate and interact to request information, negotiate, generate ideas, make decisions, or resolve conflicts (Hales, 2000; Eckert & Stacey, 2001; Liston, Fischer & Winograd, 2001). A strong need therefore exists for design teams and researchers alike to be able to inspect and observe team communication early and at project runtime. Considering communication to be an influential factor in determining team performance, communication behavior should be made measurable in order to establish better insight into the structure and relationships forming a team's information space. With the right instruments at hand, team communication characteristics can be assessed over time and certain signatures can potentially be identified as relevant to team performance and quality of design output.

2.4.2 Analysis Methods

The research team at HPI will develop IT-based solutions that are appropriate for capturing, formalizing, and interpreting multi-modal team communication over digital channels. Ultimately, this solution will be able to identify those communication activity signatures that are characteristic of high- or low-performance design teams.

From this software point-of-view, the research team at HPI will test the following hypothesis:

Communication activity signatures of high-performance design teams are significantly different than those of low-performance teams.

A question underlying this hypothesis is whether digital traces of communication activities alone are sufficient to be combined and catalyzed into a meaningful model of digital team information spaces. The study begins with processing traces of digital communication (e.g. email archives, server log files) and instantly, unobtrusively, and automatically constructs a consolidated network of multi-modal information and related individuals. Requiring no additional interaction from participating communication partners, the resulting network model serves as a basis for the formal analysis of communication activity signatures during and after project runtime. Communication activity signatures are characterized in this study by quantitative measures of different network (node) properties and their temporal variation. For example, an increase of inclusive participation towards the end of project deadlines represents a communication signature, the impact of which on team performance is to be tested in this study.

As previously mentioned, team information spaces are represented and analyzed with the help of formal graph representations that explicitly mark the heterogeneous relationships between information objects and involved persons. It will be investigated how digital traces of communication and information sharing activities in design teams can be combined and catalyzed to form a network model of digital team information spaces. This enables the application of graph-based algorithms and methods borrowed from the domain of social network analysis to assess signatures in team information spaces. A high-level delineation of a service platform to support this research is shown in Figure 3.

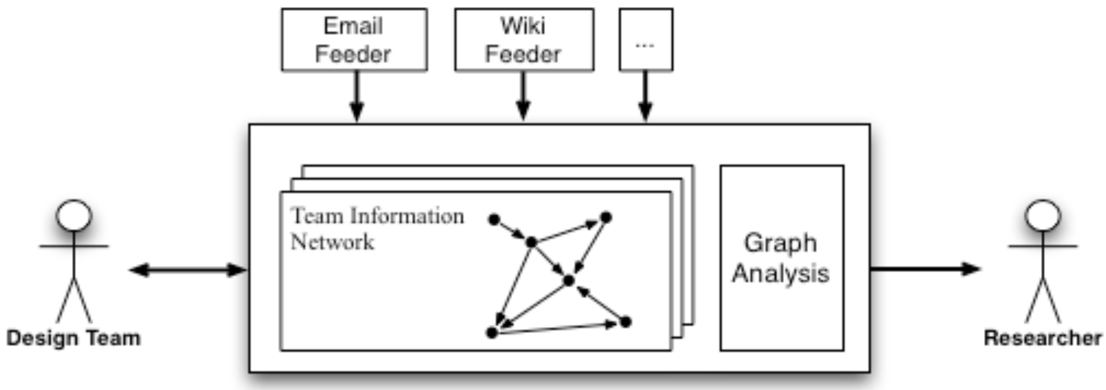

Figure 3: Design of a graph-based software platform to capture and analyze associations in multi-modal team communication

The data captured on different digital communication channels, such as emails and project Wikis, of Engineering 310 will be imported to start with the identification of dependencies and variables in communication behavior. Whereas most previous work has been limited to only one channel, this structural analysis of relationships between multi-modal information and participants is expected to allow for the creation of a single and coherent history of the design process. This will be used to explore to what extent digitally shared information can be automatically consolidated, classified, and rated based on the information content and its associations.

2.4.3 Design Performance Measurements

Evaluation of the potential relevance of interesting communication activity signatures in design teams with regard to their performance and the quality of their outcome faces similar challenges as those facing the CDR research team. Beginning with course grades as a relatively low-contrast indicator for team performance, the study will incorporate additional measurements to normalize the objective performance evaluation of observed design teams. Hence, the evaluations of the findings of the two research teams will complement one another by drawing on collectively compiled evidence of design team performance.

2.5. Expected Impact

The results of this joint study are expected to impact the management, review, and interaction of design teams. Being able to predict a negative impact of specific activities or conditions on the performance and innovation capabilities of design teams, management can react early to correct flaws in the design process. Furthermore, if it can be shown that performance can be predicted using electronic traces of design activity, a powerful tool can be developed to monitor and adjust the design process based on previous experience and best practices. This tool could follow a non-intrusive approach to capture and analyze design activities and assess determinants for team performance at project runtime without any changes in the working behavior of the designers required.

This study could therefore lead to a complete change in innovation practice and assessment, which would result in increased tapping of innovative potential and savings of human and financial resources.

Upon completion of this study after 12 months, we expect to be able to use the results to launch a second phase. In this phase, the predictive (real-time) measures of performance identified in the first phase could be applied to running projects and used to intervene in the design flow. The second phase can be used to test that these interventions have a positive impact on the team performance.

We finally expect a beneficial impact of this study on design research in general, by bringing competences in engineering design and software engineering closer together.

APPENDIX

3. REFERENCES

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4. TIMELINE

Milestones:

- 18 July 2008 — Energy Data Analysis Complete (Skogstad, Gumerlock)
- 15 August 2008 — All Interview Transcription Complete (Skogstad & Uflacker)
- 3 October 2008 — Thesis Draft (Skogstad)
- 17 October 2008 — Management Journal Paper Submission (Skogstad & Gumerlock)
- 30 November 2008 — Thesis Draft (Uflacker)
- 1 December 2008 — Thesis Defense (Skogstad)
- 15 January 2009 — ICED'09 Conference Paper Submission (Skogstad & Gumerlock)
- 15 January 2009 — ICED'09 Conference Paper Submission (Uflacker & Skogstad)
- 27 February 2009 — Thesis Submission (Skogstad)
- 31 March 2009 — Thesis Submission (Uflacker)

Year-end deliverables:

- Two PhD Dissertations (Skogstad, Uflacker)
- Plans for continued study & proposal for phase two
- Two conference contributions (full paper)
- One journal submission (e.g. Review of Engineering Design)

5. BUDGET

The expected expenses during the first 12 months (phase one) of this joint research project are summarized in the following sections 5.1 (CDR) and 5.2 (HPI). Equivalent funding would be required for another 12 months in order to build upon the findings of this study and to quantify the effects during a second phase as described in the timeline,

All amounts are stated in USD ($).

5.1. Center for Design Research, Stanford University (Leifer / Skogstad / Gumerlock)

	Effort Level	Cost p.a.	Justification
Salaries & Benefits			
Principal Investigator	1 month	20,720	Senior faculty involvement in project
Senior Research Assistant	50% during academic year, 100% summer	47,930	Senior research assistant (more than 3 years in PhD program) involvement in project
Junior Research Assistant	50% academic year	39,070	Junior research assistant (less than 3 years) involvement in project
Total Salaries & Benefits		107,720	
Additional Costs			
Germany Travel		18,000	2 Trips for each assistant to collaborate with partners at HPI as part of the project. (Costs include airfare, lodging and per diem)
Technical Expenses		12,000	Technical Support of IT Service Center for collection and analysis of data and in preparation of documentation.
Stanford Overhead		9,121	Indirect Overhead cost of 8% as per Stanford rules. Tuition benefits are exempt.
Total Amount Requested		146,841	

5.2. Hasso Plattner Institute, Potsdam (Zeier / Uflacker)

	Effort Level	Cost p.a.	Justification
Salaries			
Research assistant	12 month, full time	90,000	New research position for additional faculty involvement in project
Student assistants	3x 10h/week	13.500	Student assistant involvement in the project
Total Salaries		103,500	
Additional Costs			
Stanford Travel		18,000	2 Trips for each research assistant to collaborate with partners at CDR as part of the project. Costs include airfare, lodging and per diem.
Conference Travel		20,000	2 Trips for each research assistant to conference venues, including airfare, conference fees, lodging and per diem.
Total Amount Requested		141,500	

6. RESUMES ON FOLLOWING PAGES

a. **Resume** of Prof. Larry Leifer (CDR)

b. **Resume** of Dr. Alexander Zeier (HPI)

c. **Resume** of Philipp Skogstad, M.B.A. (CDR)

d. **Resume** of Matthias Uflacker (HPI)

e. **Resume** of Karl Gumerlock (CDR)

LARRY JOHN LEIFER

Professor, Engineering Design (Mechanical), Stanford University
Director, Stanford Center for Design Research, http://cdr.stanford.edu;

FORMAL EDUCATION

1958-62 B.S., General Engineering Science, Stanford University
1962-64 M.S., Mechanical Engineering, Product Design, Stanford University
1964-69 Ph.D., Biomedical Engineering (Neurosciences), Stanford University

BIOGRAPHICAL SKETCH

Larry Leifer is Professor of Mechanical Engineering Design and founding Director of the Center for Design Research (CDR) at Stanford University. A member of the Stanford faculty since 1976, he spearheads the flagship industry-sponsored graudate-level course ME 310, "Engineering Design Entrepreneurship;" a thesis seminar titled, "Design Theory and Methodology Forum;" and a freshman seminar on, "Designing the Human Experience." Research themes include: 1) creating collaborative engineering environments for distributed product innovation teams; 2) instrumentating that environment for design knowledge capture, indexing, reuse, and performance assessment; and 3), design-for-wellbeing, socially responsible and sustainable engineering. Regarding what's hot, his top priority is launching the Hasso Plattner Design Thinking Research Program and continued development of the d.school at Stanford.

RECENT PUBLICATIONS RELEVANT TO THIS PROGRAM

Baya, V. and Leifer, L.J. (1996) "Understanding Information Management in Conceptual Design," in Dorst, K., H.Christiaans and N. Cross (Eds.), Analyzing Design Activity, Wiley, Chichester, UK

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Business Experience

Hasso Plattner Institute (HPI) at the University of Potsdam

Since April 06

Deputy Professor of Prof. Hasso Plattner

Group Enterprise Platform and Integration Concepts

Hasso Plattner Institute at the University of Potsdam.

Focusing on Enterprise Platforms, RFID Technologies, and Supply Chain Management.

Since May 06

Executive Director of the European Section of the MIT Forum for Supply Chain Innovation as Part of the Cooperation of the MIT (Massachusetts Institute of Technology) and the HPI.

September '02 – March 06

SAP AG

Firstly assigned as Product Manager for the overall Supply Chain Management solution and responsibility for the patent processes in the area mySAP SCM reporting to the Senior Vice President mySAP SCM.

Since October '03 Director Business Development and Strategic Projects directly reporting to a member of the executive board of SAP AG with the following tasks:

- Patent manager of the Business Solution Group (BSG) Manufacturing
- Member of the SAP delegates in a circle of Thought Leaders from different
- Cooperation, Research and Development with the MIT in the areas RFID, Benchmarking, Supply Chain Management, and collaboration on publications of the MIT and SAP AG.

June '98 - February '02

Bavarian Research Center for Knowledge-based Systems (FORWISS)

- Leader of the team „SAP Education“, responsible for the design and lectures of the SAP courses for four different faculties of the Friedrich-Alexander University Erlangen-Nuremberg.
- Co-author of the German book „Supply Chain Management auf Basis von SAP-Systemen“, published in 2000 and the extended updated edition for the US market with the same English title „Supply Chain Management Based on SAP Systems“ published in '02.
- Current Statements on research requests and appraisals of articles e. g. for the business information and technology journal "Wirtschaftsinformatik" since October '99.

August '96 - May '98

GMO Professional Services GmbH

- Assignment in management consultancy and self dependent execution including managerial responsibilities for five SAP implementation projects in financials and logistics.
- Developing business concepts with subsequent implementation, customizing of the SAP applications up to the integration of existing IT systems.

Academic Experience

since March '05

Technical University Darmstadt

Associate lecturer at the business school, domain of information systems / commercial information technology.

since October '02

University of Applied Sciences Ingolstadt

Associate lecturer at the business school, domain of commercial information technology with the main focus on e-business.

Education and Qualifications

June '98 - February '02

Friedrich-Alexander University Erlangen-Nuremberg

Doctorate at the business school, department for information systems, chaired by Prof. Dr. Dr. h. c. mult. Peter Mertens

October '97 - February '00

Technical University Chemnitz

Studies of Information and Communication Systems at faculty of computer sciences under the executive study scheme parallel to professional work.

November '90 - May '96

Julius-Maximilians University Wuerzburg

Studies of business management; practical diploma about the implementation of SAP at the university clinical center in Wuerzburg.

PHILIPP LEO STEFAN SKOGSTAD

Ph.D. Candidate, Engineering Design (Mechanical), Stanford University
Conference Manager, International Conference on Engineering Design 2009

FORMAL EDUCATION

1999 International Baccalaureate with Honors, Munich International School, Germany
2002 Certificate in Business Administration, St. Louis University, Missouri, USA
2003 B.S. in Mechanical Engineering, Parks College of St. Louis University, Missouri, USA
2003 Minor in Electrical Engineering, Parks College of St. Louis University, Missouri, USA
2005 M.S. in Mechanical Engineering (Eng. Design), Stanford University, California, USA
2006 MBA, University of St. Gallen, Switzerland

BIOGRAPHICAL SKETCH

Philipp Skogstad is a Ph.D. Candidate at the Center for Design Research. His interests are the management of high-performance engineering design teams and the bridging of cultural differences in engineering. A native of Germany, he has academic and industry experience from both sides of the Atlantic: He has worked at BMW AG, Germany; Systems & Electronics Inc. (SEI), USA; Webasto Vehicle Systems International AG, Germany and with the Toyota Motor Corporation in USA and Japan. In addition, he has been a student and teaching assistant in the Engineering 310 course at Stanford, subsequently built up and taught a similar course in Switzerland and has been the Executive Director of the Engineering 310 Program centered at Stanford since 2007, which uniquely positions him to perform a multi-perspective study around the program.

PUBLICATIONS RELEVANT TO THIS PROGRAM

Skogstad, P (2006): “Understanding and Learning the Innovation Approach of Sillicon Valley: Findings from Transfering the Stanford University Design Methodology to the University of St. Gallen“; Master of Business Administration Thesis, University of St. Gallen, Switzerland.

Skogstad, P., Currano, R., and Leifer, L. (2007). "An Experiment in Design Pedagogy Transfer Across Cultures and Disciplines"; Proceedings of the MUDD Design Workshop VI, Lee Harvey Mudd College, Claremont, California; May 23 - May 25.

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Karanian, B., Skogstad, P. & Taylor, S. (2008): “Engineer as Entrepreneurial Leader: An artistic balancing act”. Proceedings of the Annual Conference of the America Society for Engineering Education (ASEE), Pittsburgh, Pennsylvania, June 22-25.

AWARDS

Phil Barkan Award for Best in Design for Manufacturability at Stanford University (2005)
USAA National Collegiate Engineering Award (2003)
Alpha Sigma Nu (Jesuit Honors Society, 2002)
Alpha Chi (National Honors Society, 2002)
Golden Key (International Honors Society, 2001)
Alpha Delta Gamma Fraternity:
- Scholastic Award (2000)
- Social Award (2003)
- President’s Award (2003)

Matthias Uflacker

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EDUCATION AND QUALIFICATIONS

Since 2005	Ph.D. research school "Service-oriented Systems Engineering" Hasso Plattner Institut, Potsdam Doctoral graduation planned for June 2009
2005	Master of Science in Computer Science University of Oldenburg, Germany
2003	Bachelor of Science in Computer Science Monash University, Melbourne, Australia
1998	General qualification for university entrance (Abitur) Gymnasium Brake

WORK EXPERIENCE

Since 2005	Ph.D. Student / Research Assistant Research School „Service-oriented Systems Engineering" Research Group "Enterprise Platforms and Integration Concepts" Prof. Dr. Hasso Plattner / Dr. Alexander Zeier Hasso Plattner Institute, Potsdam
2006	SAP AG, Walldorf / SAP Labs, Palo Alto, CA Internship with Design Services Team (DST) Contributed in design and implementation of an end-user research support system Presentation to head of department and board member
2004	University of Oldenburg, CS Department Research Group on Component-based Software Development Student Assistant
2004	BMW CarIT, Munich, Germany Internship in Human-Machine Interface group Prototype development and service framework evaluation

BIOGRAPHICAL SKETCH

Matthias Uflacker is a Ph.D. Candidate in the 'Enterprise Platform and Integration Concepts' research group at the Hasso Plattner Institute for Software Systems Engineering. Having a pronounced background in computer science and software design, he is now concentrating on design theories and how they can be transferred to and supported by the software engineering discipline. Matthias has gained experience in user-centered design and software tools to support design processes in several different projects at HPI and SAP. Since 2007 he is responsible for the operational part of the Engineering 310 partnership at HPI.

KARL LIU GUMERLOCK

Ph.D. Candidate, Engineering Design (Mechanical), Stanford University

FORMAL EDUCATION

2008 B.S., Mechanical Engineering, Stanford University, Stanford, CA, USA
2008 Minor, Computer Science, Stanford University, Stanford, CA, USA
2009 M.S. Candidate, Mechanical Engineering, Stanford University, Stanford, CA, USA

BIOGRAPHICAL SKETCH

Karl Gumerlock is a recent Ph.D. Candidate inductee at the Center for Design Research at Stanford University in California. Having grown up all across the globe, Karl is glad to finally have found a steady home in Silicon Valley, studying mechanical engineering at Stanford after a brief dot-com-induced stint in the computer science department. Karl's primary interests lie in the synthesis of his two primary bodies of knowledge, the world of mechanical systems and the world of computer technology. Having specialized in mechatronic systems for his Master's degree, Karl is now looking to further bridge ideas between the two halves of his brain, in particular looking at bringing the "magic" of the open source movement and the Creative Commons to engineering design.

WORK EXPERIENCE

2008- Principal Designer, International Conference on Engineering Design (ICED) 2009, Stanford, CA, USA
2007-2008 Teaching Assistant, Smart Product Design Laboratory, Stanford University, Stanford, CA USA
2006 Web Designer/Engineer, Stanford Institute for Creativity and the Arts (SICA), Stanford, CA USA