ANNUAL REPORT

June 2019 No. 3

SFB-TRR 161
Quantitative Methods for Visual Computing
Transregional Collaborative Research Center

Beginning of the 2nd funding period ■ Overview of the research activities of the last two years ■ Science for the Public ■ Activities by our young academics

SFB/TRANSREGIO 161 PARTNERS

Universität Stuttgart
Universität Konstanz
ulm university
universität ulm
LMU LUDWIG-MAXIMILIANS-UNIVERSITÄT MÜNCHEN

FUNDING BY

DFG

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The SFB-TRR 161 "Quantitative Methods for Visual Computing"

is a Transregional Collaborative Research Center. Partner institutions are the universities of Stuttgart, Konstanz, Ulm, LMU Munich, and the Max Planck Institute for Biological Cybernetics in Tübingen in the first funding period.

In this project, about 40 scientists are working together to establish quantification as a key factor of visual computing research. They see quantification as a cornerstone to further advance visual computing as an established and mature research field.

EDITORIAL

Dear readers,

The first funding period is nearly over, and we are very pleased that we have been able to leave a very successful decade behind us. Without any doubts, as a consequence of the valuable results, we are very proud to announce the approval for the financial support for the next four years by the German Research Foundation (DFG).

Within the last two years, SFB/Transregio 161 researchers achieved excellent results within their scientific work. They published more than 160 publications and presented their results at almost all important conferences in the research fields of our collaborative research project. Our members contributed to IEEE VIS, CHI, SIGGRAPH Asia, EuroVIS, EuroVA, MUM, EMMCVPR, PacificVis, Provenance Week, VSMM, AutomotiveUI, VISIGRAPP, ICPE, and others.

We should also mention the engagement in the organization of conferences at our SFB/Transregio 161 partners. In Stuttgart, we hosted the 1st International Conference on Quantification in Visual
Computing (QiVC) with more than 60 participants. Also, VMV 2018, GCPR 2018, and BDVA 2018 were organized by project leaders of the SFB-TRR 161.

Professors and doctoral researchers also arranged several scientific workshops dealing with the topics of quantification and visual computing. Remember the two-day workshop "Visualization for the Web" in Konstanz by Jochen Görtler, the "C#, Unity, and maybe HoloLens Programming" course by Michael Sedlmair in Stuttgart, or the "Crowdsourcing Visual Quality" workshop by Franz Götz-Hahn and Vlad Hosu – SFB/Transregio 161 members made great efforts to share their knowledge and insights with others. Besides, we could award doctor degrees to 14 SFB/Transregio 161 members during the last four years.

Another aspect that should not be forgotten is that the SFB-TRR 161 was constantly making efforts to communicate our research work to children, school students, and other interested people. There had been many activities especially addressing the general public – our exhibit for the MS Wissenschaft Tour 2018, the 18 BOGY internships within the last two years, the participation in the University's Open House Days, the "Lange Nacht der Wissenschaft" in Konstanz, and many others.

For now, just enjoy this Annual Report No. 3 that gives you an overview of our activities within the last two years.

Since our SFB/Transregio 161 project will go on in July for another four years of research, we wish you a successful start into the second research phase with new excellent results, a lot of new ideas, and great collaboration!

Best regards
Leonel Merino, Manager of the SFB-TRR 161

READY FOR THE 2ND FUNDING PERIOD

What a wonderful message for all project leaders, scientists, and members of the SFB-TRR 161 – the Grants Committee of the DFG made a positive decision during their meeting at 22nd May about the further funding for the Transregional Collaborative Research Center 161. With this decision, the universities of Stuttgart, Konstanz, LMU Munich, and Ulm will receive more than 8 Million Euro for the next four years for their research activities in the field of "Quantification in Visual Computing".

Accordingly, 18 projects have obtained support to start their research work within the SFB-TRR 161 as planned in the 400-pages funding proposal. They are all positioned to handle some of the biggest challenges that come with digitization: making use of huge amounts of data, identifying relevant information, and communicating it effectively. While computer science has developed many general methods to store, transmit, and analyze data in order to extract information, visual representations require as well specialized methods that are emerging from the growing field of visual computing.

> ***"If you can't measure it, you can't improve it"***
>
> *Lord Kelvin*

As already stated in the initial proposal of the SFB-TRR 161, there is no overarching tradition of quantitative methods for visual computing. Often, the results of visual computing, such as graphs, diagrams, and photorealistic renderings, are evaluated in a purely qualitative manner. Our long-term goal is therefore to establish a scientific culture of quantification that will help reproduce, compare, and predict visual artifacts.

In the first funding period, we began research in four areas: quantitative models and measures, adaptive algorithms, interaction, and applications. The second funding period will continue and extend these areas, but will also involve new topics such as machine learning to improve measures and derive new models; algorithms for real-time and dynamic adaptations; quantitative and qualitative evaluation methods; and immersive environments to display visual analytics. While most evaluations in the first funding phase were studies conducted in the lab, the second phase will address studies in the wild.

All members of the SFB/Transregio 161 support specific facets of the visual computing field that are relevant for the proposed research. The members are led by a team of project leaders who are a well-connected and dynamic group of internationally visible researchers.

We appreciate the decision of the DFG and look forward to the next four years with valuable insights and fundamental results!

tb

NEW FOCUS OF THE SFB-TRR 161

In the second funding period, we will continue to pursue the goals of the SFB-TRR 161: to develop quantitative models and algorithms that promote reproducibility and replicability. We also identify some new key research topics that will play an important role during the new funding period:

1. **Bridging quantitative and qualitative evaluation methods**, i.e., in some use cases, we do not want to replace qualitative methods but complement them with quantitative methods.
2. **Immersion and its quantification**, e.g., evaluations of visual computing approaches in immersive environments of AR/VR systems. AR/VR is a trending topic that might enable important usage scenarios for visual computing.
3. **In-the-wild evaluations**: moving studies from the lab to real-world scenarios is important to test our methods.

Besides these new research topics, **machine learning** will also play an important role in many of the projects. While we do not plan to develop new machine learning approaches, machine learning will be an important building block used in our research, e.g., in adaptive algorithms.

Since the overall goals of the SFB/Transregio 161 project have not changed, the project structure remains the same. The four project groups – models and measures, adaptive algorithms, user interaction, and applications – remain, and the number of projects inside each project group is only slightly different to the previous period.

Larger changes occur in the task forces – while the task force on user studies remains, the other two task forces (i.e., quality, generative data models) are replaced by a new task force on datasets, benchmarks, and replication. The reason for this change is the increasing importance of open science and open data in research.

mh

SIX NEW PROJECTS

We selected a number of new projects for the second funding period to compensate for completed projects and to further strengthen the SFB-TRR 161 by pursuing new research directions.

Project C05 "Quantifying Interactions with Adaptable multisensory systems"

To strengthen our psychology expertise, we integrated project C05 by Marc Ernst, a professor of Applied Cognitive Psychology at the University of Ulm. His group already started in 2017 with a twofold goal: to gain a better understanding of the human sensorimotor learning processes, and to provide guidelines, evaluation criteria, and recommendations for the design of adaptable multimedia systems.

What are the determinants of mutual adaptation between an adaptable user and a user adaptive system? How does mutual adaptation change based on the sensory modalities involved? Can mutual adaptation enhance immersion in an interactive virtual environment? These are some of the scientific questions addressed by this project.

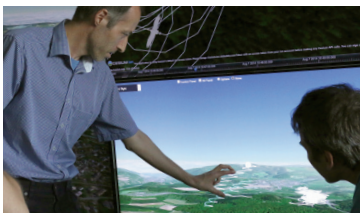
Project C06 "User-Adaptive Mixed Reality"

Lewis Chuang will continue contributing his expertise in psychology as a project leader. Now he will lead the new project C06 at LMU Munich together with Albrecht Schmidt who is an expert on human-computer interaction.

Preliminary work by project C06: Example of a Mixed Reality workspace enabling gradual blending between a physical and virtual environments

They will investigate the feasibility and usefulness using Mixed Reality to blend virtual and physical elements based on physiological responses of a user. In particular, project C06 plans to investigate how inferred states of user arousal and attention can be leveraged for creating Mixed Reality experiences that improve the user's ability to process information. They will also target haptic assembly, automated vehicle cockpits, and teamwork analyses of neuroscience and biochemistry datasets.

Project D04 "Quantitative Aspects of Immersive Analytics for the Life Sciences"



Preliminary work by project D04: Web-based visualization of bird movement data displayed on a large monitor

To strengthen our research in using immersive environments, project D04 is led by Falk Schreiber who is an international expert in the field of immersive analytics. His project already started within the first funding period.

On the one hand, this project will develop immersive analytics methods. On the other hand, the project will investigate the applicability of immersive analytics approaches to particular tasks in the life sciences.

Project A07 "Visual Attention Modeling for Optimization of Information Visualization"

Another emerging research trend is the use of machine learning for visual computing. In this context, we will benefit from project A07 led by Andreas Bulling. He is an expert in using machine learning for gaze sensing, computational user behavior modeling, and intelligent human-computer interfaces. The project further strengthens our high-impact research in eye-tracking. The main goals of the project are to integrate automatic quantification of spatio-temporal human visual attention directly into the visualization design process without the need for special-purpose eye-tracking equipment.

Project A08 "A Learning-Based Research Methodology for Visualization"

Michael Sedlmair will lead the project A08 that deals with machine learning in interactive visualization. He investigates how machine learning can support visualization research and practice. In particular, this project will leverage machine learning to build and evaluate a new generation of models for visual perception and design.

Project B06 "Adaptive Algorithms for Graph Views and View Transitions"

To benefit from approaches of theoretical computer science that can complement the methodological basis of our research, we integrated project B06 led by Sabine Storandt. This project addresses algorithms for graph and network visualization similarly to Ulrik Brandes' completed project B02. The main goal of this project is to fuse techniques from the areas of combinatorial optimization, spatial data structure design, computational geometry, and graph drawing. To this end, the project plans to develop a framework that significantly improves the user's grasp of the graph and its structure, and that allows users to interactively guide their graph view experience. In addition, user studies are expected to shed light on the granularity of our designed quantification measures for graph view compatibility, and the usefulness of smooth transitions between different views. Furthermore, the outcome of this research is expected to provide new insights regarding the perception of graphs and the level on which user preferences differ.

Project B07 "Computational Uncertainty Quantification"

Another perspective on a theoretical underpinning is included in the new project B07 led by Andrea Barth who investigates numerical mathematics methods. This project aims to contribute to research in problem domains such as sampling techniques for unknown distributions, non-linear transformations and risk measures, and inverse problems. These problem domains require the development of efficient and hardware-dependent algorithms and may only be answered partially for particular models in the next years. Together with collaborators with a visualization background, this project plans to address these challenges.

Extracts from the SFB-TRR 161 funding proposal

COMPUTER SCIENCE CONFERENCE WEEK IN STUTTGART

In October 2018, the 1st International Conference on Quantification in Visual Computing (QiVC) took place. The conference was co-located with the 23rd International Symposium on Vision, Modelling, and Visualization (VMV), and the 40th German Conference on Pattern Recognition (GCPR) at the University of Stuttgart.

The SFB-TRR 161 presented an extensive program of international keynote speakers, such as Wendy Mackay (INRIA), Markus Gross (Disney Research), Weisi Lin (Nanyang Technological University), Joachim Weickert (Saarland University), Tamara Munzner (University of British Columbia), and Michael Cohen (Facebook Research Center). Additional, talks by SFB-TRR 161´s project leaders: Harald Reiterer, Dieter Fritsch, Daniel A. Keim, Lewis L. Chuang, and Melanie Herschel, who provided an overview of the insights of our entire project.

More than 60 participants attended, who benefited from the rich program. A poster session allowed the doctoral researchers of the SFB-TRR 161 to present and discuss their ongoing work with other researchers. *CW*

At the registration desk

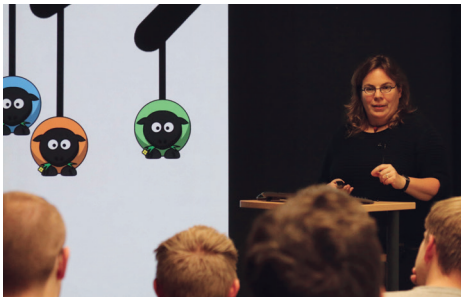
Discussions during the poster session

Listening to Michael Cohen´s keynote talk

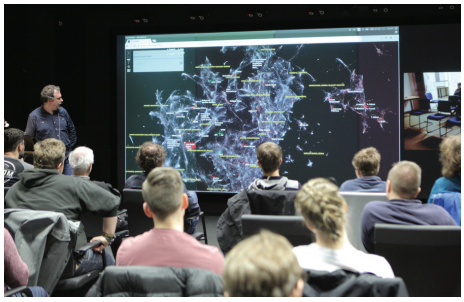
Weisi Lin

Tamara Munzner

IT'S ALL ABOUT QUANTIFICATION AND VISUAL COMPUTING



Geometric Algorithms – topics of Bettina Speckmann



Daniel Fekete visiting VISUS in March 2019

Niki Popper talking about the visualization of health data

Science is a dialogue. That's why our scientists continuously invite renowned colleagues in the field of Quantification in Visual Computing in order to exchange knowledge and research insights.

In the winter term 2017/18, our Lecture Series "Visual Computing" engaged several international speakers: Ashley Colley (University of Lapland), Uta Hinrichs (University of St. Andrews), Kasper Hornbæk (University of Copenhagen), Clemens N. Klokmose (University of Aarhus), Bettina Speckmann (University of Eindhoven), Katarzyna Budzynska, and Chris Reed (University of Dundee), as well as Vinit Jakhetiya from India (Bennett University) who gave a lecture during his research visit at the University of Konstanz.

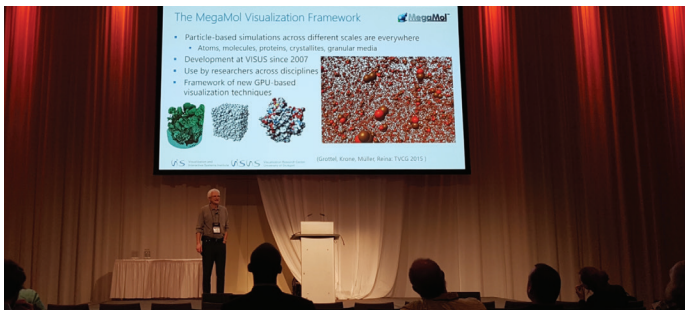
We also invited some speakers from Germany: Nils Thuerey (University of Munich), Karol Myszkowski (Saarland University), and Jürgen Bernard (TU Darmstadt). Further talks beyond the lecture series were given by Michael Klein (CTO of 7reasons GmbH, Vienna), Petra Isenberg (INRIA), Ross Maciejewski (Arizona State University), Eduard Gröller (TU Vienna), Rory Duthie (University of Dundee), Marius Pedersen (Norwegian University of Science and Technology), Amit Bermano (Tel Aviv University), and Weisi Lin (Nanyang Technological University) who also was one of the keynote speakers at the QIVC 2018 conference.

In winter term 2018/19, Eugene Zhang (Oregon State University), Davide Anguita (University of Genova), Miriah Meyer (University of Utah), Daniel Fekete (INRIA), and Niki Popper (TU Vienna) gave talks in the Lecture Series. *CW*

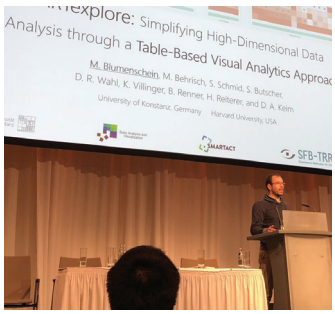
SFB/TRANSREGIO 161 SCIENTISTS AT INTERNATIONAL CONFERENCES

The results of the SFB-TRR 161 research were presented at the main conferences in the research fields involved in visual computing.

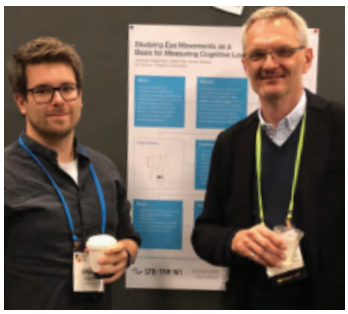
Our visualization researchers visited the **IEEE VIS 2017 and 2018** in Berlin and Phoenix (USA). The Human Computer Interaction experts were part of **CHI 2018** in Montreal (Canada) and **CHI 2019** in Glasgow (UK). Results of our research in computer graphics were presented at the **SIGGRAPH Asia 2017** to the Computer Graphics community.



Thomas Ertl during his keynote at LDAV 2018 (co-located with IEEE VIS 2018)



Michael Blumenschein at IEEE VIS 2018



Johannes Zagermann together with Harald Reiterer at CHI 2018

Lewis Chuang and Daniel Weiskopf organized a four-day **Dagstuhl Seminar** with the topic "Ubiquitous Gaze Sensing and Interaction". The seminar was attended by 29 researchers from several other institutions.

Photo: Schloss Dagstuhl, CC BY-NC-ND

Lewis Chuang and Daniel Weiskopf with the participants of the Dagstuhl Seminar in June 2018

Important efforts of our scientists have been devoted to organizing international conferences at the SFB/Transregio 161 partner universities. Falk Schreiber hosted the **BDVA 2018** conference in Konstanz as general chair. Daniel Weiskopf was the general chair of the **VMV 2018** conference in Stuttgart. Similarly, Andrés Bruhn was the general chair of the **GCPR 2018** conference in Stuttgart.

In October 2018, Andrés Bruhn and Daniel Weiskopf organized the joint conference GCPR / VMV 2018 at the University of Stuttgart

Finally, SFB-TRR 161 scientists hosted several international workshops at renowned scientific forums.

The **2nd Sino-Germany Visualization Workshop** was co-located with IEEE VIS 2018, and co-organized by Oliver Deussen and Prof. Yunhai Wang (Shandong University, China). At CHI 2018, Lewis Chuang and Ulrike Pfeil offered a **Special Interest Group** titled "Transparency and Openness Promotion Guidelines in HCI".

Miriam Butt, Melanie Herschel, and Christin Schätzle organized a **Workshop on Data Provenance and Annotation in Computational Linguistics** in Prague co-located with the **TLT 2018** conference. The workshop featured a poster session, in which several of our researchers presented their results to the international community.

Michael Aichem organized a **Doctoral Workshop**, co-located with **BDVA 2018**, titled "Visualizations + Interactions + Workflows = Data Science for Everyone – An Introduction to Orange".

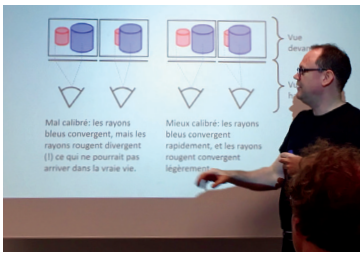
The 23 participants who participated in the Sino-Germany Visualization Workshop organized among others by Oliver Deussen

Blaž Zupan (University of Ljubljana) at the doctoral workshop of BDVA 2018

Our researchers also contributed to EuroVis, EuroVA, MUM, EMMCVPR, IEEE PacificVis, Provenance Week, VSMM, AutomotiveUI, CVPR, VISIGRAPP, ICPE, among others.

We consider all these activities to be very successful for disseminating the results of our research. *tb*

6 WORKSHOPS & 50 PARTICIPANTS



Michael McGuffin in November 2018 during the research workshop organized by Michael Sedlmair in Stuttgart

Six scientific workshops that gathered more than 50 participants, have been organized by SFB-TRR 161 members and associated scientists since September 2017.

The Human-Computer-Interaction group at the University of Konstanz organized the **Webstrates Workshop** in November 2017. The workshop included an introduction to the technologies Webstrates and Codestrates, and a hands-on session and discussion on how to use these technologies in research. Furthermore, Clemens Nylandsted Klokmose and Roman Rädle from Aarhus University (Denmark) gave a talk about "Shareable Dynamic Media: A revisit of the fundamentals of interactive computing".

Three further events were organized in 2018. In summer, Jochen Görtler organized the two-day workshop **Visualization for the Web: Front & Backends (WIP)** in Konstanz. A visualization framework developed by Dietmar Saupe's group was introduced, which communicates the front-end and back-end of applications developed with D3.js. Hendrik Strobelt (MIT-IBM Watson AI Lab) and Josua Krause (Accern previously NYU Tandon School of Engineering) were involved in this event.

A workshop titled **Crowdsourcing Visual Quality** was organized by Vlad Hosu and Franz Götz-Hahn in Konstanz. Together with Matthias Hirth (Julius-Maximilians-Universität Würzburg), they presented guidelines to efficiently conduct crowdsourcing studies.

In Stuttgart, Michael Sedlmair organized a workshop titled **C#, Unity, and maybe HoloLens Programming**. In it, Michael McGuffin (École de Technologie Supérieure, Montréal, Canada) presented his work on 3D user interfaces. The workshop also included a hands-on session of C# and Unity for programming 3D graphics.

The last workshop was organized by Harald Reiterer's research group in May 2019. **Vistrates and Ubiquitous Analytics** was the title of this event located at the University of Konstanz. In it, the developers of the Vistrates framework – Niklas Elmqvist and Clemens Klokmose – presented their component model and platform for developing, assembling, and sharing visualization components. *tb*

Projects A01, A05, A08, C01 *Stuttgart, Konstanz*

GUESTS AT SFB-TRR 161

George Grinstein during his talk in Konstanz

One of our focus was to attract renowned researchers to come for short or long stays, working as guest scientists with the doctoral researchers.

In June 2017, the research group of Daniel Keim benefited from the visit of **Georges Grinstein**, who was a Professor from the University of Massachusetts and expert on data visualization and visual analytics.

Uta Hinrichs is a Lecturer at the University of St. Andrews and visited Daniel Keim and Harald Reiterer in October 2017 to discuss possibilities for further collaborations.

In December 2017, **Vinit Jakhetiya**, Assistant Professor at Bennett University, India, visited the Multimedia Signal Processing Group of Dietmar Saupe in Konstanz for joint research activities on image quality assessment of differently distorted images.

Jürgen Bernard, a Postdoctoral Researcher at TU Darmstadt spent two weeks in July 2018 collaborating with Daniel Keim's group. *cw*

Projects A03, A05, C01 *Konstanz*

COOPERATIONS WITH SCIENTISTS IN AUSTRALIA, DENMARK, AND CANADA

Harald Reiterer (left) and Clemens Nylandsted Klokmose (right) in the Master Thesis defence of Marcel Borowski (middle) at the Aarhus University during Marcel´s research stay in Denmark

Science is benefited from the exchange of ideas and cooperation! That is why the SFB-TRR 161 focuses on international teamwork within the communities of the multiple subfields of our research project.

In the last year, three project leaders traveled abroad to collaborate with their colleagues at their research institutions. During that time, they could foster and expand their scientific network, exchange knowledge, and develop other research activities.

Dietmar Saupe visited the School of Computer Science of the University of Adelaide in Australia from November 2018 to March 2019. **Harald Reiterer** visited the Center for Digital Creativity and CAVI at the Aarhus University in Denmark from October to December 2018. During his visit, he engaged in a collaboration with Clemens Nylandsted Klokmose, Peter Dalsgaard, Roman Rädle and Kim Halskov.

RESEARCH

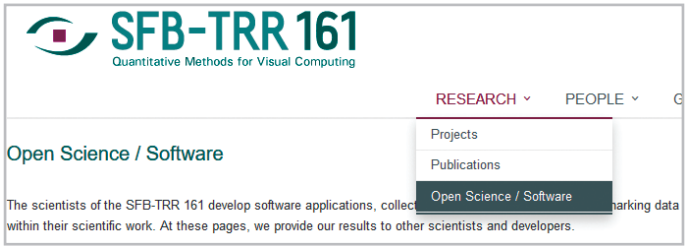
The Scientific Computing and Imaging Institute (SCI) at the University of Utah in USA was the destination of **Daniel Weiskopf**. This institute is one of the most renowned research institutions in the field of visualization. From March to September 2018, the spokesman of the SFB-TRR 161 visited the groups of Christopher Johnson, Charles Hansen, Mike Kirby, Alexander Lex, Miriah Meyer, Valerio Pascucci and Ross Whitaker. This research stay allowed him to work on more efficient methods in uncertainty visualization.

These guest research stays will have a positive mid-term influence on the entire project of the SFB/Transregio 161.

cw, tb

Projects A01, B01, A05, C01 *Stuttgart, Konstanz*

OPEN SCIENCE



Our visual computing scientists develop software applications, collect research data, and create benchmarking data sets within their scientific work. In February 2019, the management team created a new page at the SFB/Transregio 161 website titled "Open Science/Software" to share our research results with other scientists and developers.

So far, two contributions have been made. The first one is **TRRojan**, an extensible cross-platform benchmarking framework for visual computing applications that was developed by Valentin Bruder in Thomas Ertl's project A02. The second one is named **Visual Quality Databases** and was developed by Dietmar Saupe's research group in project A05. It covers prediction algorithms for the visual quality of images and videos, with respect to technical and perceptual aspects.

In future, the Open Science list will continuously grow. *tb*

Projects A02, A05 *Stuttgart, Konstanz*

BOOKS BY SFB-TRR 161 SCIENTISTS

SFB/Transregio 161 vice spokesman and project leader Oliver Deussen, and Thomas Ningelgen, retired teacher of computer science, co-published the book "Programmieren lernen mit Computergrafik".

The book is intended to be an inspiring introduction to the Java programming language and the Processing programming environment for computer graphics. Through graphical examples the reader learns how to create simple games, animations, fractals and simulations; thus learning the basics of computer programming in an entertaining way.

cw

Projects A01, A04 *Konstanz*

NEW TRACKING SYSTEM FOR THE POWERWALL IN STUTTGART

The VISUS Powerwall in Stuttgart was improved with a new tracking system. This feature was installed early in 2017 thanks to funding of 12,000 Euro by the SFB-TRR 161 and 4,000 Euro by the University of Stuttgart.

The new tracking system enables an increased coverage for tracking rigid bodies in the surroundings of the Powerwall.

The Powerwall system in Stuttgart was improved with new cameras for tracking user interaction

Currently, the tracking system is used by MegaMol projects. Project INF is continuously working on a full integration that will enable that every program that runs on the Powerwall can use the tracking system.

The plan is to finish the integration before the end of the first funding period. *tb, ff*

Project INF *Stuttgart*

NEW SFB/TRANSREGIO 161 PROJECT LEADERS

In 2017, two new project groups joined the SFB-TRR 161. The two project leaders who joined our community are: Marc Ernst and Falk Schreiber.

In July 2017, the SFB-TRR 161 engaged with the University of Ulm. "Quantifying interactions with adaptable multisensory systems" is the title of Marc O. Ernst's project, who investigates on Cognitive Psychology. How does learning depend on statistical parameters such as precision, accuracy? How do humans handle instabilities in this learning context? How does learning depend on reliability, and predictability? These are some of the questions, his research group concentrates on.

Falk Schreiber joined the SFB-TRR 161 in October 2017, as project leader of project D04 "Quantitative Aspects of Immersive Analytics for the Life Sciences" at the University of Konstanz. Immersion is a new research theme, which aligns with emerging trends in Augmented and Virtual reality.

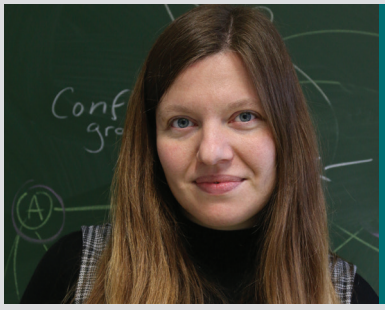
For the second funding period, the SFB-TRR 161 welcomes five new project leaders in four new projects.

Andrea Barth leads project B07 "Computational Uncertainty Quantification" that focuses on a theoretical underpinning and investigates methods from numerical mathematics. She is a Professor of Computational Methods for Uncertainty Quantification at the University of Stuttgart since 2017.

Andreas Bulling is a Professor of Human-Computer Interaction and Cognitive Systems at the University of Stuttgart. He will focus on Visual Attention Modeling for Optimization of Information Visualizations in project A07. His main goals are to integrate automatic quantification of spatio-temporal human visual attention directly into the visualization design process without the need for special-purpose eye-tracking equipment.

Steffen Frey is a Postdoctoral Researcher at the Visualization Research Center in the University of Stuttgart who joins Thomas Ertl´s project A02 "Quantifying Visual Computing Systems" as a second project leader. He has an extensive expertise in machine learning and visualization.

Michael Sedlmair is a Professor of Augmented Reality and Virtual Reality in the University of Stuttgart. His project A08 does research on "A Learning-Based Research Methodology for Visualization". This project plans to investigate how machine learning can support visualization research and practice. In particular, his team will leverage machine learning to build and evaluate a new generation of models for visual perception and design.



"Adaptive Algorithms for Graph Views and View Transitions" is the title of the new project B06 led by **Sabine Storandt.** She is a newly appointed Professor for Algorithmics at the University of Konstanz. Her project addresses algorithms for graph and network visualization similar to Ulrik Brandes' completed project B02.

cw

PEOPLE

NIELS HENZE IN REGENSBURG

Niels Henze led project C04 in the first funding period. In May 2018, he left the University of Stuttgart to become a Professor of Media Informatics at the University of Regensburg. His SFB/Transregio 161 project ends in June 2019. *cw*

SUSANNE BECKER LEFT THE SFB-TRR 161

Susanne Becker, the project leader of project D01 "Perception-Guided Adaptive Modeling of 3D Virtual Cities Based on Probabilistic Grammars" left the University of Stuttgart to accept a position in industry. *cw*

ALBRECHT SCHMIDT AND LEWIS CHUANG MOVE TO MUNICH

Albrecht Schmidt, the project leader of the completed SFB/Transregio 161 project C02 "Physiologically Based Interaction and Adaptive Visualization", accepted the chair in Human Centered Ubiquitous Media in the Computer Science department of the Ludwig-Maximilians-Universität (LMU) in October 2017.

Another SFB/Transregio 161 scientist moved to Munich – Lewis L. Chuang, one of the two project leaders of the completed project C03 "Immersive Virtual Environments". He left the Max Planck Institute for Biological Cybernetics to become "Akademischer Rat" at the LMU in June 2018.

Both scientists will continue their research in the new project C06 "User-Adaptive Mixed Reality". *cw*

EMERITUS STATUS FOR HEINRICH BÜLTHOFF AND DIETER FRITSCH

Heinrich Bülthoff and Dieter Fritsch, the project leaders of SFB/Transregio 161 projects C03 and D01, left the SFB-TRR 161 because of retirement. Both projects were completed at the end of the first funding period. *cw*

PERSONNEL CHANGES

Since October 2017 PL - Project Leader

NEW PEOPLE

- Michael Aichem (Konstanz, D04)
- Priscilla Balestrucci (Ulm, C05)
- Andrea Barth (PL, Stuttgart, B07)
- Tobias Benz (LMU, C03)
- Andreas Bulling (PL, Stuttgart, A07)
- Karsten Klein (PL, Konstanz, D04)
- Leonel Merino (Stuttgart, MGK)
- Cristina Morariu (Stuttgart, A08)
- Michael Sedlmair (PL, Stuttgart, A08)
- Sabine Storandt (PL, Konstanz, B06)
- Patrick Tutzauer (Stuttgart,D01)
- Oliver Wiedemann (Konstanz, A05)

ALUMNI

- Tina Barthelmes (Stuttgart, Ö)
- Susanne Becker (PL, Stuttgart, D01)
- Ulrik Brandes (PL, Konstanz, B02)
- Heinrich Bülthoff (PL, Tübingen, C03)
- Nina Flad (Tübingen, C03)
- Dieter Fritsch (PL, Stuttgart, B01)
- Martin Fuchs (PL, Stuttgart, A06)
- Christiane Glatz (Tübingen, C03)
- Johannes Häußler (Konstanz, INF)
- Niels Henze (PL, Regensburg, C04)
- Marcel Hlawatsch (Stuttgart, MGK)
- Kuno Kurzhals (Stuttgart, B01)
- Nico Marniok (Konstanz, B05)
- Rudolf Netzel (Stuttgart, B01)
- Valentin Schwind (Regensburg, C04)

The community of the SFB-TRR 161 during the Status Seminar 2017 in Blaubeuren

ERC STARTING GRANT FOR ANDREAS BULLING

August 2018 | Andreas Bulling, Professor of Human-Computer Interaction and Cognitive Systems in Stuttgart and project leader of the new SFB/Transregio 161 project A07, receives an ERC Starting Grant from the European Research Council (ERC) as one of 403 talented young researchers.

The grant represents funding of 1.5 million euros over the next five years. The funding will allow him to establish the foundations for a new generation of user interfaces that pro-actively adapt to users' future input actions by monitoring their attention and predicting their interaction intentions – thereby significantly improving the naturalness, efficiency, and user experience of the interactions. *tb*

New Project A07 *Stuttgart*

ALBRECHT SCHMIDT NOW IN SIGCHI ACADEMY

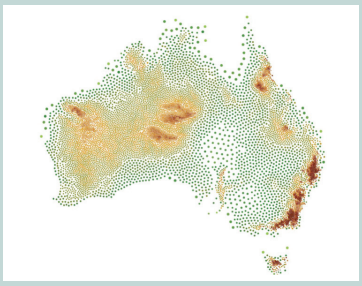
Photo: Jerome Wiesner

April 2018 | Albrecht Schmidt, Professor of Human-Centered Ubiquitous Media at the LMU Munich, was elected into the SIGCHI Academy!

He received this award during CHI 2018 in Montreal, Canada. This is a great honor and shows the leadership and enduring service of Albrecht Schmidt within his research community. *tb*

Project C02 *Munich*

BEST PAPER AWARD AT PACIFICVIS 2019



April 2019 | At PacificVis 2019 in Bangkok the SFB/Transregio 161 paper "Stippling of 2D Scalar Fields" by Jochen Görtler, Marc Spicker, Christoph Schulz, Daniel Weiskopf, and Oliver Deussen received a Best Paper Award.

In this paper, the scientists proposed a method to abstract continuous and discrete 2D scalar fields using stipples. Using this method users not only obtain an overview when viewing the representation from a distance, but they also can compare local differences when they get closer. This method works by resampling the scalar field in the image space. The method can also be used to avoid overplotting in scatterplots. Hidden clusters become visible in the lower regions of the stippled scatterplot – but the overall shape of the data remains intact. *tb*

Project A01, A04 *Konstanz, Stuttgart*

KUNO KURZHALS RECEIVED THE BEST DISSERATION AWARD 2018 IN COMPUTER SCIENCE IN STUTTGART

Photo: Informatik Forum

Kuno Kurzhals, scientist in project B01 at the University of Stuttgart, finished his doctoral thesis with the title "Visual analytics of eye-tracking and video data".

During the annual graduation ceremony for the computer science programs in Stuttgart in **April 2019**, his thesis was awarded as Best Dissertation at the University of Stuttgart in 2018. *tb*

Project B01 *Stuttgart*

DANIEL MAURER RECEIVED RUNNER-UP AWARD

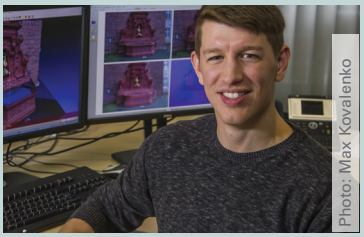


Photo: Max Kovalenko

Daniel Maurer is a doctoral researcher at the University of Stuttgart. In **June 2018**, he took part in the Robust Vision Challenge with a recently developed algorithm and achieved an outstanding second place in the field of motion estimation. For that, he was awarded the CVPR 2018 Robust Vision Challenge Runner-Up Award.

This challenge was organized by leading academic institutions (Stanford University, ETH Zurich, Max-Planck Institute for Intelligent Systems in Tubingen, University of Heidelberg) to identify the world's most accurate algorithms for solving various tasks in the area of computer vision.

Daniel Maurer received this award during the CVPR 2018 – one of the three premier international conferences in the field of pattern recognition and computer vision – in Salt Lake City, USA. *tb*

Project B04 *Stuttgart*

AWARDS

HONORABLE MENTION AWARD FOR KUNO KURZHALS AT EUROVIS 2018

June 2018 | "Exploring the Visualization Design Space with Repertory Grids" is the title of the paper by Kuno Kurzhals, that received an Honorable Mention Award at EuroVis 2018 in Brno.

Kuno Kurzhals is a scientist at the Institute for Visualization and Interactive Systems in Stuttgart and associated with the SFB/Transregio 161 project. *tb*

Project B01 *Stuttgart*

BEST PAPER AWARD AT IV 2018

July 2018 | The conference paper "Volume-Based Large Dynamic Graph Analytics" was honored with a Best Paper Award at IV 2018 in Salerno, Italy.

Congratulations to Valentin Bruder, Marcel Hlawatsch, Steffen Frey, Michael Burch, Daniel Weiskopf, and Thomas Ertl – the authors of this SFB/Transregio 161 paper! *tb*

Project A02 *Stuttgart*

BEST PAPER AWARD AT EXPRESSIVE 2017

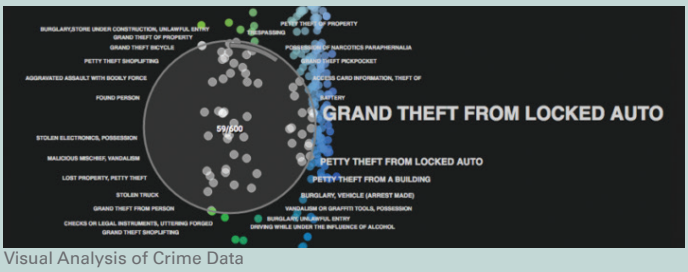
July 2017 | Marc Spicker, Franz Hahn, Thomas Lindemeier, Dietmar Saupe, and Oliver Deussen received a Best Paper Award for their paper titled "Quantifying Visual Abstraction Quality for Stipple Drawings" at Expressive 2017 in California.

Teaser image of the awarded paper: Comparing the abstraction quality of two stipple illustrations (left and right) to an input imagetaken from our user study

In their SFB/Transregio 161 paper, the scientists modeled perceived abstraction quality of stipple illustrations with respect to the number of points used to create them. They performed a paired comparison of various abstractions of stimuli and gathered subjective data in the crowd. Their study shows that it is possible to predict the perceived quality of stippled representations based on the properties of an input image. *tb*

Project A04, A05 *Konstanz*

BEST STUDENT PAPER AWARD AT VISIGRAPP 2017



Visual Analysis of Crime Data

March 2017 | The SFB/Transregio 161 paper "Interpretation of Dimensionally-Reduced Crime Data: A Study with Untrained Domain Experts" by Dominik Jäckle, Florian Stoffel, Sebastian Mittelstädt, Daniel Keim, and Harald Reiterer received a Best Student Paper Award at VISIGRAPP 2017 in Portugal. *tb*

Project A03, C01 *Konstanz*

STUDY RECEIVED THE BEST PAPER AWARD AT AUTOMOTIVEUI 2017

September 2017 | Lewis Chuang and Christiane Glatz from the Max Planck Institute for Biological Cognition, and Stas Krupenia from Scania won the Best Paper Award at the AutomotiveUI 2017 in Oldenburg!

Lewis Chuang and Christiane Glatz received the Best Paper Award of the AutomotiveUI 2017. Alexandra Sipatchin, Sarah Faltaous, Lewis Chuang, Shadan Sadeghian Borojeni, Christiane Glatz and Susanne Boll (from left to right).

In the study they used electroencephalography (EEG) to understand differences in user behavior of auditory in-vehicle notifications across test environments. *tb*

Project C03 *Tübingen / Munich*

FIFTEEN DISSERTATIONS WITHIN FOUR YEARS

The SFB-TRR 161 has been successful supporting young academics who pursue a doctoral degree in the field of Quantification in Visual Computing. During the first funding period, fifteen doctoral researchers received a PhD degree. Some of them have accepted positions in industry, whereas some other have continued their scientific activities at collaborating universities, and some have stayed in their SFB/Transregio 161 project as postdoctoral researchers. Congratulations!

From 2015 to 2017, four doctoral researchers of the SFB-TRR 161 completed their doctoral studies. Arlind Nocaj (project B02, Konstanz) was the first in 2015, followed by Igor Zingman (project A05, Konstanz) in 2016, Menja Scheer (project C03, Tübingen) and Michael Behrisch (project A03, Konstanz) in 2017.

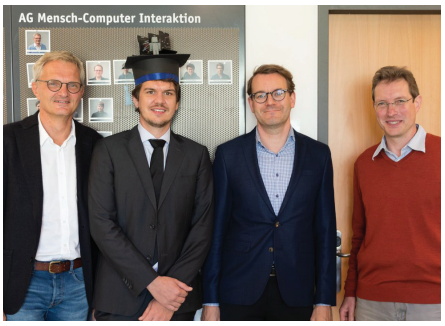
In 2018, another eleven doctoral researchers of the SFB-TRR 161 finished their PhD thesis: Kuno Kurzhals (project B01, Stuttgart), Mereke van Garderen (project B02, Konstanz), Rudolf Netzel (project B01, Stuttgart), Lars Lischke (project C02, Stuttgart), Christiane Glatz (project C03, Tübingen), Valentin Schwind (project C04, Stuttgart), Simon Butscher (project C01, Konstanz), Jens Müller (project C01, Konstanz), Mohsen Jenadeleh (project A05, Konstanz), Marc Spicker (project A04, Konstanz), and Christin Schätzle (project D02, Konstanz).

The next student who plans to finish his doctoral studies is Daniel Maurer (project B04, Stuttgart). *cw*

Stuttgart, Konstanz, Tübingen

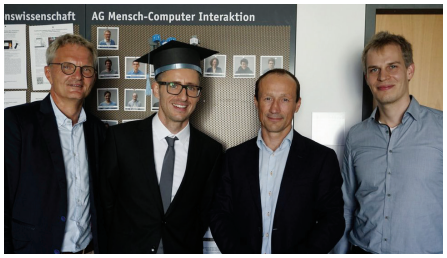
Rudolf Netzel, Stuttgart

Marc Spicker, Konstanz



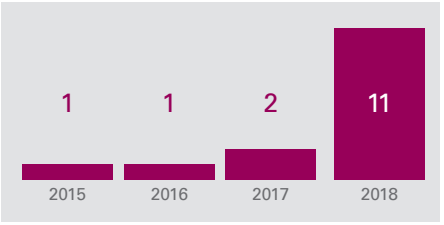
Simon Butcher, Konstanz

Mereke van Garderen, Konstanz



Jens Müller, Konstanz

Christiane Glatz, Tübingen



Number of dissertations within the SFB-TRR 161

An Overview of the Dissertations supported by the SFB-TRR 161

Kuno Kurzhals *Visual Analytics of Eye-tracking and Video Data* – Christin Schätzle *Dative Subjects: Historical Change Visualized* – Anna Alperovich *Vision-based Methods for Evaluating Visualizations* – Marc Spicker *Quantitative Methods for Visual Abstraction* – Mohsen Jenadeleh *Blind Image Quality Assessment* – Jens Müller *Collaborative Augmented Reality* – Simon Butscher *Reality-based Idioms* – Valentin Schwind *Implications of the Uncanny Valley of Avatars and Virtual Characters for Human-computer Interaction* – Lars Lischke *Interacting with Large High-Resolution Display Workplaces* – Rudolf Netzel *Vision-based Methods for Evaluating Visualizations* – Christiane Glatz *Auditory Cues for Attention Management* – Mereke van Garderen *Pictures of the Past* – Menja Scheer *Auditory Distraction during Visuomotor Steering* – Igor Zingman *Semi-Automated Detection of Fragmented Rectangular Structures in High Resolution Remote Sensing Images with Application in Archaeology* – Arlind Nocaj *Untangling Networks: Focus on Less to See More* – Michael Behrisch *Visual Analytic Methods for Exploring Large Amounts of Relational Data with Matrix-based Representations* – Tina Bögel *The Syntax-Prosody Interface in Lexical Functional Grammar*

YOUNG ACADEMICS

SPEAKERS OF THE DOCTORAL RESEARCHERS

Since September 2017, Michael Blumenschein and Franz Götz-Hahn from the University of Konstanz have held the function of the doctoral speakers of the SFB-TRR 161.

The speakers represent the doctoral researchers. They also have organized doctoral retreats and workshops, and built up a tight team of young scientists who have played their role in an exemplary manner. Thanks a lot for their engagement!

tb

YOUNG ACADEMICS IN FREUDENSTADT

In April 2018, the third doctoral retreat took place in the middle of the Black Forest, at the Waldhotel Zollernblick in Freudenstadt.

The retreat was organized by Michael Blumenschein and Franz Götz-Hahn – the doctoral speakers of the SFB-TRR 161. Two workshops had been organized, so the doctoral students could benefit from the experience of their peers. One workshop focused on machine learning, whereas the other one tackled visualization methods and tools to explore data.

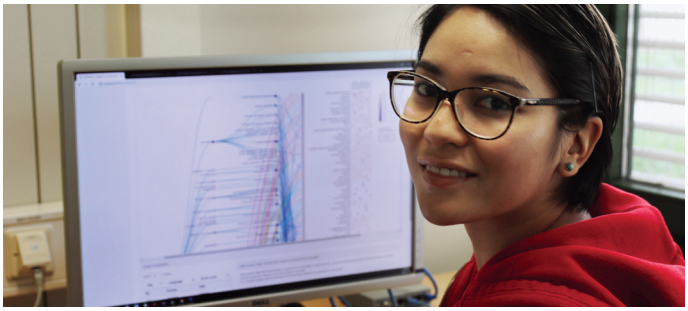
Using a speed dating dynamic, new and existing doctoral students from the universities of Stuttgart, Konstanz, Tübingen, and LMU in Munich were brought together. In it, students exchanged the status of their research and developed ideas for collaborations.

In the evening, they socialized in a relaxed atmosphere, in which they had the chance to play board games, and go out to have dinner in a small restaurant surrounded by the impressive Black Forest. *tb*

NINE GUEST RESEARCHERS

Our collaborative project continuously offers the chance for a research stay to students as well as doctoral researchers from other institutions. The targeted fellow guest researchers mostly work on research projects in visualization, computer graphics, computer vision, 3D reconstruction, or human-computer interaction and have a high reputation in their respective community. They come to exchange knowledge, to learn from our work, and to further develop their projects.

During the last two years, the SFB-TRR 161 welcomed Chunling Fan (Shenzhen University, China), and Mohsen Jenadeleh (Shahid Beheshti University, Teheran, Iran) at Dietmar Saupe´s group at the University of Konstanz. Mariana Akemi Shimabukuro (Vialab, University of Ontario, Canada) visited Daniel Keim's and Miriam Butt's projects. Fearn Bishop (School of Computer Science, Scotland, UK) came to Harald Reiterer's, and Zhexiao Guo (Shenzhen University, China) in Oliver Deussen's team.



"I was able to work on a data analytics tool to help Linguists who work with Second Language Acquisition and English Transfer Effects", said Mariana Akemi Shimabukoro about her research stay in Konstanz

Four further guests visited researchers in Stuttgart. Yuri Miyagi (Ochanomizu Tokyo University, Japan) worked together with Nils Rodrigues in Daniel Weiskopf's group. Jelke Brighten visited Niels Henze's project via the DAAD Rise program. In April, Boris Sotomayor (Universidad Austral de Chile, Laboratorio de Ecoinformática) came to work together with Leonel Merino in Daniel Weiskopf's project B01. Shortly after that, Melanie Herschel welcomed Seok Ki Lee (Illinois Institute of Technology) in her Data Provenance group.

Since the start of the SFB/Transregio 161, 25 young academics have already visited our SFB-TRR 161 partners. *tb*

Stuttgart, Konstanz

TRAVELING BROADENS HORIZONS

That also applies to our research program. Some doctoral candidates obtained support from the SFB/Transregio 161 to spend time abroad, and to benefit from other research groups in the broad field of visual computing.

From April to July 2018, Valentin Bruder stayed in Eugene (USA). At the University of Oregon he joined the group on Computing and Data Understanding at eXtreme Scale (CDUX) led by Hank Childs. In the collaborative project, he worked on performance prediction in hybrid in-situ environments.

Jochen Görtler from Konstanz plans to visit the Scientific Computing and Imaging Institute (SCI) of the University of Utah in June 2019 for four months. During his stay, he will collaborate with Alexander Lex. Together with his group, he will work on graph visualizations with the focus on data and structural uncertainties. Through their joint work, Jochen Görtler plans to generalize his findings to data afflicted with uncertainties. *cw*

Projects A01, A02 *Stuttgart, Konstanz*

EXHIBIT ON TOUR WITH THE MS WISSENSCHAFT

Computer science can be seen as too complex and difficult to grasp by many people. Especially, presenting and explaining "Quantification in Visual Computing" can be challenging. We addressed this challenge, and created a cost efficient exhibit on topics of the SFB/Transregio 161 research projects.

To create the exhibit, we used a prototype developed by Harald Reiterer´s research group, initially used for a user study conducted in Konstanz. The existing software was redesigned and rebuilt to obtain an interactive touch table solution that can be used to browse information about our collaborative research project, such as articles, images and videos that show the activities and ideas of our SFB-TRR 161 scientists.

Playing an interactive game, a user selects a research question and obtains information, images, and a video or audio interview of a scientist explaining the state of the art, the challenges, and the future usage of the respective topic.

Why do we need further research in computational linguistics? What do the scientists exactly do? How will we profit from todays' research insights in 20 years? These are some of the questions, Miriam Butt answered. Harald Reiterer, Bastian Goldlücke, Christoph Müller, Valentin Schwind, Niels Henze, and Jochen Görtler were giving insights into the activities within their SFB/Transregio 161 projects.

As part of the MS Wissenschaft Tour 2018 titled "Arbeitswelten der Zukunft", the SFB-TRR 161 touch table started its journey in Berlin and was visited by many interested people in Germany and Austria.

A second instance of our exhibit became part of an exhibition within the Federal Ministry of Education and Research (BMBF) in Berlin. This was a further chance to present our research to the public.

tb

The **MS Wissenschaft** started its tour in May 2018 in Berlin. Until the beginning of October, the ship stopped at 34 cities in Deutschland and Austria. In September the MS Wissenschaft berthed in Stuttgart for 4 days.

About 62.000 visitors came into the exhibition at the MS Wissenschaft 2018, among them more than 580 school classes.


Photo: MSW / Ilja Händel


Photo: MSW / Ilja Händel


Photo: Daniel Fink

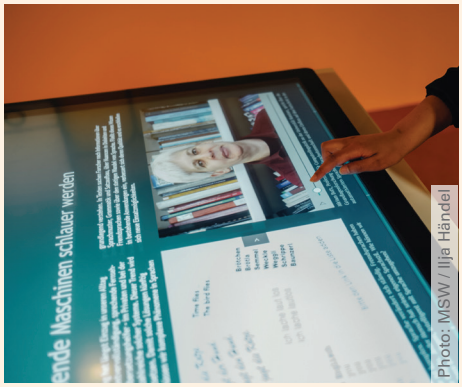


Photo: MSW / Ilja Händel

GREAT TEAMWORK – THE PEOPLE BEHIND THE EXHIBIT

The exhibit was designed and organized by Tina Barthelmes and Claudia Widmann, who developed the idea and the concept for the touch table.

Johannes Zagermann and Daniel Fink made a major contribution to the software development, the purchase of the required infrastructure and the transport of the exhibit.

Thanks to the people, who took part in the video and audio productions: Miriam Butt, Bastian Goldlücke, Jochen Görtler, Niels Henze, Christian Holm, Christoph Müller, Harald Reiterer, and Valentin Schwind who invested time and effort in the interview production. Wyld Motion and Davor Bakara took great care for the films and illustrations that became part of the exhibit.

Projects A01, B05, C01, C04, D02, Ö
Stuttgart, Konstanz

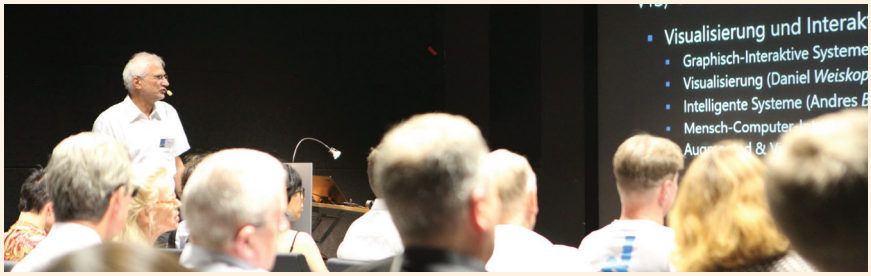
SCIENCE GOES PUBLIC

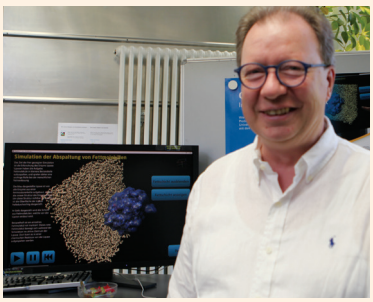
OPENER OF THE „TAG DER WISSENSCHAFT“ 2018 IN STUTTGART

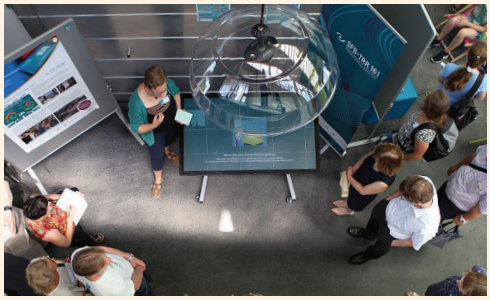
Since the start of the SFB-TRR 161, we gave demonstrations of our scientific work during the “Tag der Wissenschaft”. This open house day of the University of Stuttgart is organized at the end of the summer term. Each year, more than 10.000 people come to visit over 120 institutes und laboratories at the Campus Vaihingen. In 2018, the SFB/Transregio 161 presentations were even part of the rector’s official opening.

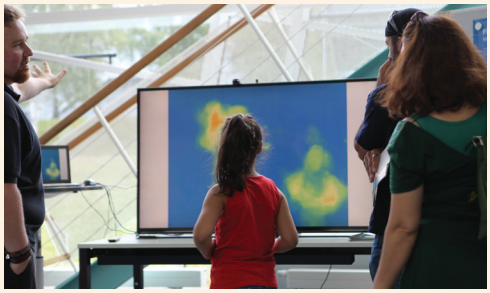
The SFB-TRR 161 is permanently present within the building of the Visualization Research Center (VISUS) in Stuttgart. So far, we have organized the following demonstrations:

- Visual Computing research topics using the Powerwall
- FlowBrush – an optical flow solution developed by Daniel Weiskopf’s and Andrés Bruhn’s projects
- Eye tracking computer games
- Mixed Reality used for scientific visualization
- Virtual hairdresser – a mathematical model that allows users to try to fit different haircuts using virtual reality and a photo of the visitor’s head.









In 2018, Wolfram Ressel, rector of the University of Stuttgart, visited the VISUS together with a group of politicians, economists, university staff, representatives of civil society, and journalists to the official opening of the “Tag der Wissenschaft”.

In this event, the Powerwall capabilities were demonstrated by the director Thomas Ertl. This event was a good chance to show our exhibit “Digital-reale Arbeitswelt” to the general public in Stuttgart, which has become an integral part of our open house program.

The next “Tag der Wissenschaft” will be on 29th of June 2019. For that, project Ö plans to install a Junior Coding Lab – a special offer for younger children. They can built-up a Lego robot and teach it to see. We are looking forward to observe the results of this activity. *tb*

Various research projects, Ö *Stuttgart*

PART OF THE „KONSTANZER LANGE NACHT DER WISSENSCHAFT“

The „Lange Nacht der Wissenschaft“ covers a number of scientific topics with over 150 events at various locations in Konstanz. In 2018, the event attracted about 6,000 visitors. Two events at the University of Konstanz were presented by SFB/Transregio 161 scientists.

Jonathan Wieland and Daniel Klinkhammer presented virtual reality applications to support exploration of migratory and collective behavior of birds (image on the left). The visitors could experience the flight of Bubble the stork from Lake Constance to Africa through six large scale displays and by looking through VR-binoculars.

Michael Blumenschein gave an engaging lecture on analysis and visualization methods for big data using the Powerwall lab (image on the right). He demonstrated the possibilities and challenges of big data analysis visualizing the data of a life-study on nutrition by the University of Konstanz. *cw*

Projects A03, C01, D04 *Konstanz*

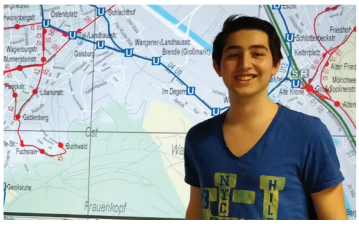
RISING DEMAND FOR BOGY INTERNSHIPS

One of the SFB-TRR 161´s goal is to support school children to get an insight into our research. That's why we offer BOGY internships for school students of the 9th and 10th grade. The students spend one week at a project group to learn of the academic life and of the work of our doctoral researchers. Besides, they learn what visual computing and quantification is and have the opportunity to code in a small project.

In 2017 and 2018, we welcomed six students in Konstanz and seven in Stuttgart. In 2019, two further students completed their BOGY internship in Konstanz and three in Stuttgart until now. The number of applications is continuously rising. We are already receiving requests for the winter term 2019/2020, so we plan to continue offering more BOGY internships in the SFB-TRR-161. *cw*

Stuttgart, Konstanz

WHAT DID OUR GUESTS SAY?



"Ich bin der Meinung, dass dieses Praktikum mir sehr viel gebracht hat, da ich bestätigt wurde, daß ich in der Welt der Informatik gut aufgehoben bin. Obwohl ich zuvor nur in ganz anderen Gebieten der Informatik tätig war, hat mein Betreuer mich super in das Thema einlernen können. Vielen Dank für die tolle Woche!"
(Carlo, visited Matthias Maier in Konstanz)

"Das Praktikum hat uns gezeigt, wie Forschung in der Visualisierung in der Praxis abläuft und wie wichtig Teamwork und andere Soft Skills in diesem Beruf sind. Die Woche hat uns geholfen, unsere Fragen über die Arbeit eines Forschers zu beantworten, einem Beruf, dessen konkrete Arbeitsweise nach außen hin oftmals mysteriös wirken kann. Wir waren beeindruckt von den Technikdemonstrationen und begeistert von den interessanten Erklärungen konkreter Forschungsprojekte. Die positive Gruppenatmosphäre zeigte sich beispielsweise in interessanten Tischgesprächen beim Mittagessen und hat uns geholfen, uns vom ersten Tag an hier willkommen zu fühlen."
(Timo, Jonas & Stephan visited Mereke van Garderen in Stuttgart)

ANNA CHRISTMANN INFORMS HERSELF ABOUT SFB-TRR 161 ACTIVITIES

In July 2018, Anna Christmann was welcomed at the Visualization Research Center of the University of Stuttgart by Thomas Ertl, professor of computer science and project leader of SFB-TRR 161 projects A02 and INF.

Anna Christmann is an Alliance 90/The Greens member of the German parliament. Special focus of her activities are innovation and technology policy. She is a full member of the commitee "Digitale Agenda", which discusses topics of education, research, and technology assessment. She is also member of the Enquete Commission "Artificial Intelligence".

The politician was aware of our research activities due to our exhibit at the MS Wissenschaft. The aim of her visit was to collect information about our educational and research activities with a special focus on digitalization trends, artificial intelligence, and computer science in general.

Thomas Ertl elaborated on the strategies of the University of Stuttgart and the opportunities of the department of computer science in Stuttgart to ensure excellent research results, and outstanding working and learning opportunities to professors, doctoral researchers and students. He also discussed his current research activities. The consistent amount of women in computer science and the potential of start-ups were a topic of this conversation.

Demonstrations using the Powerwall of VISUS, which

was complemented with a presentation of the technique that supports the projection wall, showed the complexity of the existing infrastructure and its potential as a visualization laboratory. *tb*

Projects A02, INF *Stuttgart*

SCIENCE GOES PUBLIC

EVENTS FOR YOUNG COMPUTER SCIENTISTS

The SFB-TRR 161 is a source of motivation for scholars in computer science, programming, and especially visual computing. We frequently organize workshops, demonstrations, and public talks. Here we present results of our latest activities.

GIRL'S DAY IN STUTTGART AND KONSTANZ

In 2018 and 2019, we organized three Girl's Day workshops with over 30 participants in Stuttgart and Konstanz. Nils Rodrigues, Tanja Munz, Mereke van Garderen, and Oliver Fernandes were the instructors. They taught the girls to code, answered questions about studies in Stuttgart, and about their research in the field of visual computing.

'INFORMATIKTAG' IN STUTTGART

About 50 school students visited our workshops at the 'Informatiktag' in Stuttgart. The visual computing lab tour was guided in 2018 by Valentin Bruder and in 2019 by Stefan Schneller. Florian Frieß complemented the guided tour showing the technical rooms of the visualization laboratory.

In 2018, we additionally offered a coding workshop of Processing in Stuttgart for six participants, supervised by Rebecca Kehlbeck from Konstanz.

CODING COURSES FOR GIRLS

In 2017, we offered two programming courses for school students in Stuttgart and Konstanz. Another instance of this course was offered in May 2019, eventually only in Konstanz.

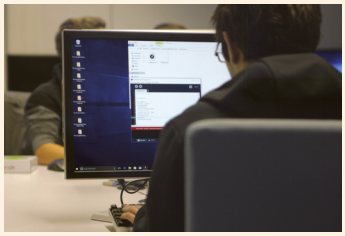
Special focus of these workshops is the development of computer graphics. Accompanying to the hands-on sessions, the girls learn about the research activities within the SFB-TRR 161. An excursion to our laboratories is part of the course.

BASTIAN GOLDLÜCKE AT KINDER-UNI

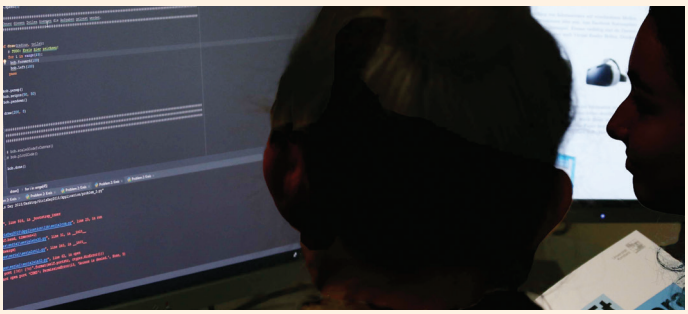
"How can we teach a computer to see?" was the question Bastian Goldlücke addressed during his Kinder-Uni lecture in September 2017. About 150 children came to the University of Konstanz to listen to the SFB/Transregio 161 project leader, who works in the field of 3D reconstruction and aims to develop digital models on the basis of video and image recordings. *tb*

Project A01, A02, B01, B05, C02, INF, Ö *Stuttgart, Konstanz*

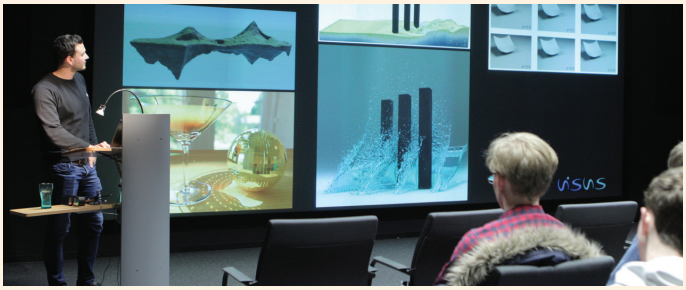
Girls Day 2019 in Stuttgart, Workshop "Programmier' dir deinen eigenen Bildschirmschoner"



Informatiktag in Stuttgart: Processing workshop with Rebecca Kehlbeck, February 2018



Konstanz, Girl's Day workshop "Wie programmiert man eine Schneeflocke?", 2018



Informatiktag in Stuttgart: Valentin Bruder during his talk about Visual Computing research, and Florian Frieß explaining the projection technique of the VISUS Powerwall

SHORT NEWS

VIDEOS ABOUT OUR RESEARCH VISIONS

After the end of the MS Wissenschaft tour 2018 and the return of our exhibit to Konstanz, the SFB-TRR 161 published the multimedia material, which was part of the touch table, in our YouTube channel.

Five videos tell stories about the aims, challenges, and future usages of the scientific work of Harald Reiterer, Bastian Goldlücke, Niels Henze, Christoph Müller, and Valentin Schwind. Besides, three audio podcasts with visions by Miram Butt, Jochen Görtler, and Christian Holm (a guest scientist) are available online.

In May 2019, we could finished editing another video titled "Digitale Zukunft gestalten" about our SFB/Transregio 161 project. This video story is also published in our YouTube channel.

Excerpts from the imagevideo about the SFB-TRR 161 that was published on YouTube in May 2019

Project Ö, Various research projects
Stuttgart, Konstanz

HOW CAN WOMEN HAVE SUCCESS IN THE COMPUTER SCIENCE WORLD?

To answer this question, the SFB-TRR 161 invited Aya Jaff and Anja Ziemer to the universities of Stuttgart and Konstanz in 2017. Both women do successful work in the field of computer science.

Aya Jaff is currently one of the most famous young coding women in Germany. She says about herself: "I am a woman in tech. I give workshops, hold keynotes, and write articles. With Codesign factory I help businesses become more digital and innovative".

Anja Ziemer studied computational linguistics at the University of Konstanz. Today, she is an engineer in the field of language processing and artificial intelligence.

Aya Jaff after her talk in the SimTech building at the University of Stuttgart

Both women spoke about their individual way, the experiences and obstacles they had to overcome.

More than 80 young students attended the talks in Stuttgart and Konstanz, which were organized in cooperation with the departments of gender consulting at both SFB/Transregio 161 partners. *tb*

Project Ö, Gender Consulting *Stuttgart, Konstanz*

PRESS COMMENTS (SELECTION)

May 2019 | "Forschung Leben" (a magazine of the University of Stuttgart) introduced the research interests of Andreas Bulling and Michael Sedlmair as new professors in Stuttgart.

June 2018 | Local newspapers and the Stuttgart University media report about the "Tag der Wissenschaft" in Stuttgart, and highlight the activities of the SFB-TRR 161.

"Am Visualisierungsinstitut erwarten Besucher einen Touch-Tisch, der im Rahmen eines Sonderforschungsprojektes von Wissenschaftlerinnen und Wissenschaftlern der Universitäten Stuttgart und Konstanz entwickelt wurde, und seit Mai an Bord des Ausstellungsschiffes MS Wissenschaft durch Deutschland tourt. Interaktiv und spielerisch wird in die aktuelle Grundlagenforschung rund um mögliche Arbeitswerkzeuge der Zukunft eingeführt, etwa Virtual- und Mixed-Reality-Brillen oder Großprojektionsdisplays."
(Stuttgarter Zeitung, Sonderveröffentlichung, June 27, 2018)

"Wie das Virtual Computing, also vom Computer generierte interaktive Bilder, die Arbeit des Menschen beeinflussen, und mit welchen neuen, dafür entwickelten Werkzeugen er in der Zukunft arbeiten wird, zeigt am Tag der Wissenschaft das Visualisierungsinstitut der Universität Stuttgart mit dem Touch-Tisch – Berühren ausdrücklich erwünscht!"
(Newstream of the University of Stuttgart, June2018)

Sept 2018 | innovations-report.de and juraforum.de report about Lewis Chuang's research on user interfaces for autonomous driving.

Dec 2017 | Eva Wolfangel writes an article in the Stuttgarter Zeitung titled "Miss Code liebt Shopping und Netflix" about Aya Jaff as a woman in the field of computer science.

Project Ö *Stuttgart, Konstanz*

OUTLOOK

STATUS SEMINAR 2019 - NEXT FUNDING PERIOD

Please mark your calendars for the 1st Status Seminar of the 2nd SFB/Transregio 161 funding period.

The SFB-TRR 161 community will meet from 16 to 18 September 2019 in Waldachtal, nearby Freudenstadt, in the Black Forest.

Further information will be send per email.

IMPRINT

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SFB-TRR 161, VISUS. Otherwise noted.