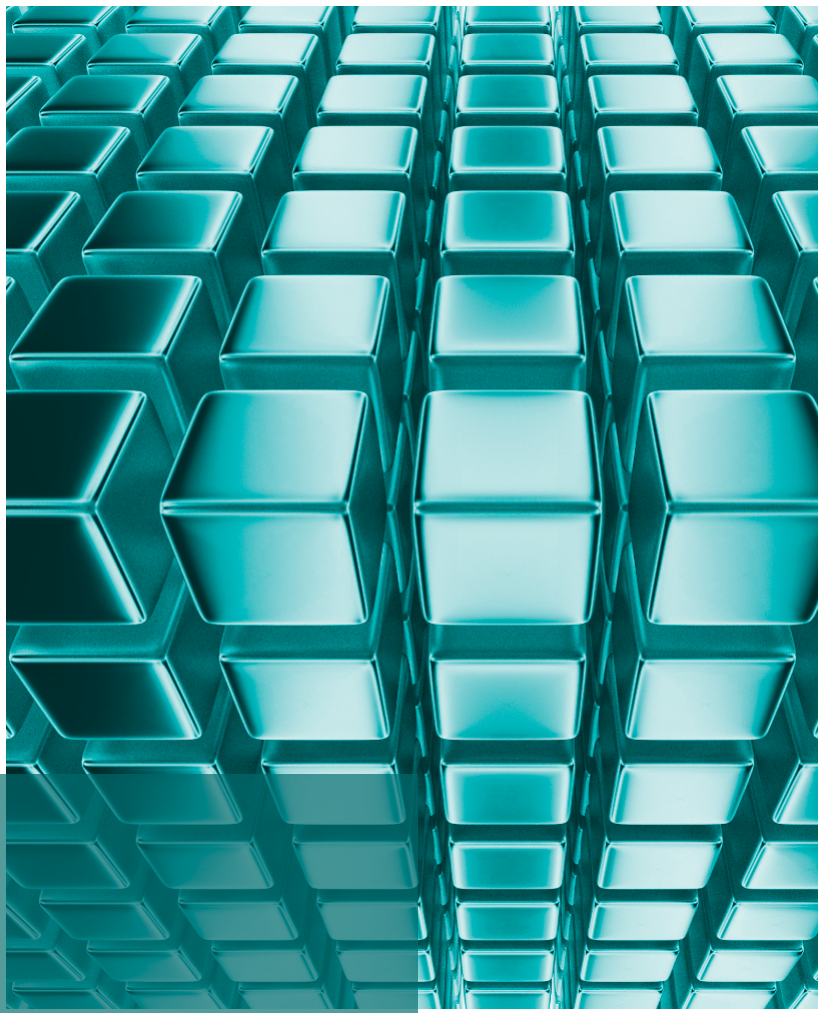
ANNUAL REPORT

SFB-TRR 161
Quantitative Methods for Visual Computing

2025



SFB-TRR 161

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ABOUT THE SFB-TRR 161

The **SFB-TRR 161 "Quantitative Methods for Visual Computing"** is a Transregional Collaborative Research Center. Partner institutions are the University of Stuttgart, University of Konstanz, Ulm University, and LMU Munich.

In this interdisciplinary research center, around 50 scientists in the fields of visualization, computer vision, computer graphics, human-computer interaction, linguistics, and applied psychology are working together to establish quantification as a key ingredient of visual computing research.

We see quantification as a cornerstone to further advance visual computing as an established and maturing research field.

Dear readers, dear members and friends of the SFB-TRR 161,

Since the last status seminar and annual report in spring 2024, we can reflect on a long and highly productive phase in our Collaborative Research Center.

The new projects in the third funding period have integrated excellently into our research structure. They have generated numerous fresh insights, which are also evident in the internal and external collaborations of the SFB-TRR 161. This also benefits the ongoing projects, which have been refined to achieve the mission of Funding Period 3, namely to increase real-world impact.

Milestones of our scientists in reaching their specific research goals are highlighted by an impressive total of nearly 60 new publications, which are listed on pages 20 to 22 of this report.

Besides our research efforts, we are committed to enhancing our scientific outreach, as demonstrated by the numerous conference contributions made by SFB-TRR 161 scientists during this reporting period. The high level of participation at more than 50 national and international conferences and workshops (see p. 12/13) was also accompanied by 9 awards received by our scientists at these events. For more details, please refer to pages 14 and 15.

Already in Funding Period 2, early career scientists of the SFB-TRR 161 launched some very successful networking events. Due to the great interest, they were held again, co-organized and supported by the SFB-TRR 161. One prominent example is the research hackathon „Multimodal and Collaborative Data in HCI" held in Stuttgart this year (see p. 4). Other examples are the third and fourth workshop "Women in Computing" (see p. 9), which help strengthen a network of women in computing. For more information about this focus of our research network, please refer to pages 8 and 9 in the section "Gender & Diversity."

We look forward to discussing these and other activities related to the SFB-TRR 161 topics at the upcoming status seminar. Until then, we hope you enjoy reading the Annual Report 2025!

Heike Lehmann
Daniel Weiskopf

Dr. Heike Lehmann
SFB-TRR 161 Manager

Prof. Dr. Daniel Weiskopf
SFB-TRR 161 Spokesperson

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OUR SECOND RESEARCH HACKATHON

MULTIMODAL AND COLLABORATIVE DATA IN HCI

On February 20 and 21, 2025, we held our second SFB-TRR 161 research hackathon at VDI-Haus, Stuttgart. Last year, our first hackathon took place under the title "DR4ET," which stands for dimension reduction for eye tracking. To broaden the scope, this time we went beyond eye tracking. As devices like mobile phones and wearable eye trackers become more powerful and widespread, it is now possible to collect multimodal data—such as visual, audio, and biometric information—as well as data from multiple users. Therefore, we named this year's hackathon "Multimodal and Collaborative Data in HCI."

We spent a lot of effort preparing a variety of hackathon proposals and ended up with four exciting topics: (1) BodySplay – On-body Cross-device Interaction (Christian Krauter), (2) Visualization and Analysis of GPS, IMU, Video, and Gaze Data of Paragliders (Patrick Paetzold), (3) Enhancing Collaborative Work in Augmented Environments using Gaze Feedback Projection (Maurice Koch, Seyda Öney, and Kuno Kurzhals), and (4) Gaze-based Task Evaluation in Immersive Analytics (Yao Wang, Ying Zhang, and Karsten Klein).

Twenty-two participants joined us for the hackathon, with three from the University of Konstanz and one from LMU Munich. After a warm welcome from co-organizer Quynh Quang Ngo on behalf of our speaker Daniel Weiskopf, we had about 36 hours to form ideas, write our code, and prepare a demo or prototype for the final presentation.

Things got exciting when the four teams presented their work in front of the jury consisting of Andreas Bulling (A07), Marina Evers (A01), and Daniel Weiskopf (A01, B01, INF, MGK, Z, Ö). In the end, four certificates were granted to the teams. "The Longest Code Award" went to Team 4, "The Out-of-the-box Award" to Team 1, "The Aesthetic Design Award" to Team 3, and "The Honorable Mention Award" to Team 2.

Organizing a research hackathon is hard work. Still, we are convinced that we all benefitted from the event. For instance, the hackathon was a great boost for collaboration within the SFB-TRR 161. Team 1 consisted of researchers from Stuttgart and Munich, while Team 2 had researchers from both Stuttgart and Konstanz, including three different projects (A01, A03, A08).

Last but not least, the hackathon also directly contributes to a productive process of publishing papers. The paper "Group Gaze-Sharing with Projection Displays" by Team 3 was accepted at ETVIS 2025, where it won an Honorable Mention Award (cf. p. 15). Other teams are still busy working on their publications and we keep our fingers crossed for more accepted papers in the near future.

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Team 2 (Visualization and Analysis of GPS, IMU, Video, and Gaze Data of Paragliders) won the Honorable Mention Award.

Participants of the Hackathon at VDI-Haus Stuttgart.

Background image © 2025 by SFB-TRR 161 is licensed under CC BY 4.0

B04 RESEARCH RESULTS IN NEW SPIN-OFF DFG PROJECT

On December 1, 2024, Katrin Bauer (University of Stuttgart) started to work on a three year spin-off DFG project related to the topic of the SFB-TRR 161, named "Robust Optical Flow". It was inspired by the work of B04 on the quantification of the robustness of methods for 2D motion estimation (optical flow) during FP2. The project deals with the evaluation of existing methods with respect to different types of robustness (robustness to image corruptions, adversarial robustness and robustness against dataset shift) as well as with rendering optical flow methods more robust by improving both architecture and training.

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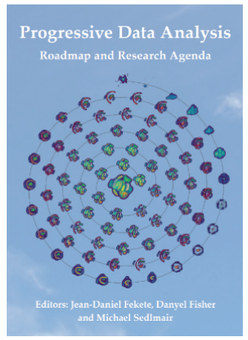
NEW BOOK: PROGRESSIVE DATA ANALYSIS



Michael Sedlmair (A08) co-edited *Progressive Data Analysis*. The book addresses the benefits and challenges of dealing with growing datasets and the resulting complex computations by splitting long computations into a series of approximate results that improve over time.

The rapid growth of data demands systems that can handle large-scale, complex datasets. While current hardware and software systems are designed for extensive storage, they often lack the responsiveness needed for effective exploratory data analysis (EDA). EDA, crucial in many application domains from network security to medicine, requires near-instant feedback to maintain analysts' engagement. Progressive Data Analysis (PDA) addresses this by breaking down complex computations into quick, iterative approximations. This new paradigm lets users interact with evolving insights rapidly and fluidly. However, it also presents challenges, such as determining the optimal waiting time between first partial results and decision making or stabilizing the visualizations of the approximate results.

The book *Progressive Data Analysis* introduces PDA, discussing its technical and scientific benefits. By also examining the challenges posed by PDA, the book outlines a roadmap to make PDA a standard in big data exploration.

The digital version of the book is available online: https://doi.org/10.2312/pda.20242707

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RESEARCH SEMINAR: HCI RESEARCH ETHICS AND ETHICS OF TECHNOLOGY

On April 2 and April 3, 2025, we had the pleasure of hosting Mikael Laaksoharju from Uppsala University for a two-day seminar on research ethics. While the group of attendees—consisting of doctoral and postdoctoral researchers—was small, the conversations were anything but. The intimate setting created space for engaging discussions and critical reflection.

On day one of our seminar at the Visualization Research Center in Stuttgart, we dove into research integrity and ethical principles in academia. Day two shifted the focus to the ethics of technology. Mikael led the sessions with an engaging mix of lectures, open discussions, and hands-on exercises that challenged us to think deeply about our roles as researchers.

One of the highlights was an exercise where we were asked to create a "provocatype" of a visualization. A "provocatype" is a design artifact that aims to provoke discussions and reflections by, for example, highlighting the tension between competing values. While the exercise was not easy, it was certainly an enlightening way to examine the moral dimensions of our work.

What struck me most during all our discussions on research ethics was a simple yet powerful idea: ethics is about responsibility. While research might seem a lonely endeavor at times, it is not if you consider everyone who makes your research possible. From the feedback, ideas, and support you might get from your colleagues and thesis advisor to the reviewers who voluntarily scrutinize your work. And we cannot forget that research funds are often made possible by tax payers. Since my work is not possible without all these actors, I have a responsibility towards all of them to do honest, transparent research and ask research questions that benefit the public. This seminar was a reminder that ethics is not just a checkbox—it is one of the foundations of good science.

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Michael Sedlmair, project leader of SFB-TRR 161 Project A08, has been elected as a member of the VIS Steering Committee (VSC) by the VIS community. As such, he will partake in the scientific and organizational oversight of the IEEE VIS conference as well as its reviewing process.

The VSC has nine members, each of which serves a 4-year term. Every year, the VIS community elects one new member to the steering committee. Michael Sedlmair was one of six nominees for the 2024 election, which ran from September 15 to October 15, 2024.

Andreas Bulling (A07), has been appointed as Henriette Herz Scout by the Alexander von Humboldt Foundation. As such, he is eligible to nominate three international young researchers, who will receive a two-year research grant by the Humboldt Foundation. In Stuttgart, the Humboldt Fellows will be integrated into Andreas Bulling's research group. In particular, they will be involved in the field of cognitive modeling. The research group is currently conducting extensive research to enable intelligent agents to develop a theory of mind. If successful, this would make it possible for the first time to develop assistance systems that can perform actions proactively.

In comparison to other funding opportunities, the Humboldt fellowship is less bureaucratic and thus provides a unique possibility to attract young international talent to the University of Stuttgart.

As of January 01, 2025, **Andreas Bulling** has been a member of the IEEE Transactions on Visualization and Computer Graphics (TVCG) Editorial Board. In his new role as an Associate Editor, he supports the Editorial Board in its aim to publish papers that present important research results and state-of-the-art seminal papers in the areas computer graphics, visualization, and virtual reality.

Considered the top-tier journal in the field of visualization, TVCG publishes papers on subjects related to information and scientific visualization, visual analytics, virtual and augmented reality, and computer graphics, covering theory, algorithms, methodologies, human-computer interaction techniques, systems, software, hardware, and applications in these areas.

Albrecht Schmidt (C06) won an ERC Advanced Grant for the project "AI-Twins of Human Experience: Towards Personal Generative AI-Systems for Amplifying Human Cognition (AI-twin)." With funding of 2.5 Million Euros over a period of five years—the maximum sum awarded for ERC Advanced Grants—he and his team intend to establish a scientific basis for AI twins of human experience. By continuously collecting data from wearable devices, they aim to develop AI twins—sophisticated personal systems designed to store and process human experiences while seamlessly augmenting human cognitive and creative functions.

ERC Advanced Grants are designed for established researchers with a proven track record of significant research achievements and are highly competitive. In the latest round of competitions, a total sum of 721 Million Euros was awarded to 281 leading researchers all across Europe for groundbreaking, ambitious research projects in a variety of fields.

SFB-TRR 161 ALUMNI

- Mihai Bace, A07
- Francesco Chiossi, C06
- Fiona Draxler, C06
- Marina Evers, A01
- Rebecca Kehlbeck, A01
- Naomi Reichmann, D02

VISITING SCHOLARS

Our researchers work together with both national and international colleagues on a regular basis. In 2024 and 2025, collaboration visits to our research sites included:

- Giulio Biondi (University of Perugia) (Konstanz, D04)
- Franz Brandenburg (University of Passau) (Konstanz, D04)
- Ulrik Brandes (ETH Zürich) (Konstanz, D04)
- Tim Dwyer (Monash University) (Konstanz, D04 & C07; Stuttgart, A01)
- Parvin Emami (University of Luxembourg) (Stuttgart, A07)
- Mikael Laaksoharju (Uppsala University) (Stuttgart, A01)
- Guiseppe Liotta (University of Perugia) (Konstanz, D04)
- Henry Förster & Jacob Miller (TU Munich) (Konstanz, D04 & A09)
- Sarah Goodwin (Monash University) (Stuttgart, A01 & A08)
- Michael Haller (Freie Universität Bozen) (Konstanz, C01 & C07)
- Laurence Harris (York University) (Ulm, C05)
- Ronald Kaplan (Stanford University) (Konstanz, D02)
- Simon Kimmel & Jonah-Noel Kaiser (OFFIS) (Konstanz, C01 & C07)
- Florian Michahelles (TU Wien) (Konstanz, C01 & C07)
- Cameron Phan (Sydney University) (Ulm, C05)
- Massimo Poesio (Utrecht University) (Stuttgart, A01)
- Nina Tahmasebi (University of Gothenburg) (Konstanz, D02)
- Bruce Thomas (University of South Australia) (Konstanz D04, A09)
- Melanie Tory (Northeastern University) (Stuttgart, A01 & A08)
- Anna Vitale (IIT, Genova) (Ulm, C05)

For more visiting scholars, see our "Talks & Lectures" section (pp. 10–11).

NEW SFB-TRR 161 MEMBERS

- Lukas Beiske, D02
- Noah Berenguel Senn, B04
- Nicola Domenici, C05
- Sergej Geringer, INF
- Patrick Gralka, MGK
- Timo Oess, C05
- Anke Reinschlüssel, C07
- Kathrin Schnizer, C06
- Michael Stroh, A01
- Mark-Matthias Zymla, D02

INTERVIEW WITH BRUCE THOMAS

Image: cwi

Why is research in the field of interactive and virtual environments so important?
Virtual simulators have been with us for decades. Flight simulators [...] have increased safety in flying, have increased the ability for pilots to train longer and in more difficult situations. This is being extended into simulation for medical training. So we can train doctors better now [...] in surgery and how to interact with patients. But we can also simulate how buildings are. So before we build the buildings, we can [...] see what they're going to look like and how you're going to use them. So over time, this is just going to slowly but surely improve our lives.

Can you outline the impact of your research on our life 15 years from now?
One of the areas that I've worked in [is] how do you use augmented reality outside? And with the advent of Google and Meta making a glasses form factor head-mounted display that will look like just normal glasses that you can take outside... I think in 15 years, not everybody will have this, but many people will have these glasses. And so the work we did to show how you can present information safely, so you make sure you don't walk in front of a bus or something like this, I think is going to have a large impact.

Bruce Thomas from the University of South Australia visited some of our projects in Konstanz in June and July 2025. Listen to the full interview on our YouTube channel: www.youtube.com/@sfbtrr161

KONSTANZIA FELLOWSHIP FOR ANKE REINSCHLÜSSEL

Image: Ute Sommer

In April 2025, Anke Reinschlüssel, postdoctoral researcher in Project C07 "Optimization for Dynamic Mixed Reality User Interfaces," was awarded a Konstanzia Fellowship. She is now one of currently eleven recipients of the fellowship, which supports female researchers during the postdoctoral phase and on their path towards a professorship. The fellowship is awarded in cooperation between the University of Konstanz Equal Opportunities Council, the Cluster "Collective Behaviour" and the Cluster "The Politics of Inequality."

For the next two years, Anke Reinschlüssel will benefit from the program's coaching, training, and funding opportunities. She will also receive additional mentoring by Albrecht Schmidt, professor at LMU Munich and leader of Project C06 within the SFB-TRR 161.

Since April 2024, Christin Beck, who is a postdoctoral researcher in Project D02 "Visual Analytics for Linguistic Representations," has also been part of the Konstanzia fellowship program.

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Image: Phil Degas

From October 2024 to September 2025, Marina Evers (A01) participated in the Zia Fellowship Program of the ZEIT Verlag. The program's aim is to create more visibility for young female scientists and their research. Supported by the gender and diversity funds of the SFB-TRR 161 and the Pooling "Synergies for equal opportunities in collaborative research networks" of the University of Stuttgart, Marina Evers' participation in the program provided her with access to many networking opportunities, mentoring through role models, as well as offers by the initiative's partners in science, industry, and the public sector. One such opportunity was a ZEIT networking event within the framework of the Berlin Science Week in November 2024, where all the new fellows, but also former fellows and role models got together. The following day, the fellows had the chance to visit the Falling Walls Science Summit and connect with internationally renowned experts from academia, business, politics and civil society.

The most recent cohort of Zia fellows at the ZEIT networking event in Berlin. Image: Phil Degas

Marina Evers (2nd from the left) and other Zia fellows at the Falling Walls Science Summit. Image: Marina Evers

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WOMEN* IN COMPUTING 2024 & 2025

TWO MORE YEARS OF STRENGTHENING A NETWORK OF WOMEN IN COMPUTING

We look back on not only one but two highly successful editions of the Women* in Computing Workshop. In July 2024, the event took place in Munich while the 4th edition in 2025 was held in Ulm, thereby completing the cycle of all four SFB-TRR 161 partner universities as a location for the event.

Participants of the 3rd Workshop on Women in Computing in Munich.*

In 2024, the workshop was held under the motto "Let's talk about money - What are you worth, what job pays off, and how can you fund your dreams?" In talks and group activities, the participants dove into the financial aspects that play a role during a career in computing, including reflections on gender equality and diversity.

Geraldine Fitzpatrick from TU Wien, Kathrin Gerling from Karlsruhe Institute of Technology, Jie Lie from EPAM Systems, and Franziska Hämmerle from Google Zürich gave many personal insights into their careers and academic journeys, focusing on topics such as the role of funding, starting your own business, and their own experiences with 'talking about money'.

The event was completed by a visit and lab tour organized by the Human-Centered Ubiquitous Media group of Albrecht Schmid (C06) at LMU Munich, which provided further room for exchange, networking, and discussions.

The focus of the 4th Women* in Computing Workshop in July 2025 lay on "Building Bridges and Breaking Borders: Networking & Moving in the International Career Landscape." Our speakers Sofía Seinfeld from Universitat Oberta de Catalunya, Anicia Peters from NCRST Namibia, Roswitha Gostner from ZEISS Digital Innovation, and Susanne Boll from OFFIS reflected on their personal journeys, moving between countries, building their networks and shaping the future for other female researchers in this world.

The workshop finished with a visit and lab tour with impressive research demos at the Human-Computer Interaction research group of Enrico Rukzio at the Institute of Media Informatics.

A fifth edition of the Women* in Computing Workshop is planned for 2026.

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Like all editions of the event, the 4th Women in Computing Workshop in Ulm saw strong attendance.*

THE WOMEN* IN COMPUTING WORKSHOP SERIES

Held for the first time in October 2022 at the University of Stuttgart, the Women* in Computing Workshop has been raising topics that greatly impact women's careers in computing and providing a valuable platform to exchange ideas and connect with each other for four consecutive years now. Every year, the workshop features guests that are themselves successful researchers from both industry and academia, providing participants with valuable insights and new impulses for their own careers in computing.

LECTURE SERIES 2024/2025

Between November 2024 and February 2025, eight renowned experts shared their insights and research findings from a variety of fields related to Visual Computing in the most recent edition of our lecture series:

Nov 4, 2024: Niklas Elmqvist (Aarhus University): "Harder, Better, Faster, Stronger: Visualization for Human-Centered AI Tools"

Nov 25, 2024: Bahador Bahrami (LMU Munich): "Gaze Scan-path Similarity in Mobile Eye Tracking"

Dec 9, 2024: Margret Keuper (Universität Mannheim): "Towards Robust and Reliable Predictions in Convolutional Neural Networks"

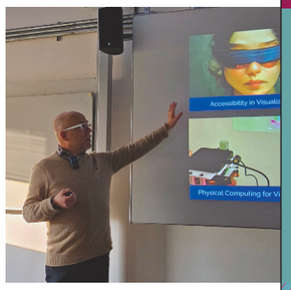
Jan 13, 2025: Kenan Bektas (Universität St. Gallen): "Pervasive Eye Tracking in the Context of Human Augmentation"

Jan 20, 2025: Thomas Kosch (HU Berlin): "AI in Research: Speeding Ahead or Losing Ground on Scientific Integrity?"

Jan 27, 2025: Felix Putze (University of Bremen): "Cognitive Modeling for Mixed Reality"

Feb 3, 2025: Jürgen Bernard (Universität Zürich): "Human Knowledge and Preference Externalization for Personalized Visual Analytics"

Feb 10, 2025: Vladimir Molchanov (Universität Münster): "De-cluttering Scatterplots with Integral Images"



Lecture Series with Niklas Elmqvist in November.

Cindy Xiong Bearfield during her talk "Designs to Support Better Visual Data Communication."

Elias Elmquist gave a talk on "Human-Centered Integration of Sonification and Visualization."

Meinard Müller and Michael Sedlmair (A08) at the talk "Learning with Music Signals: Technology Meets Education" in January 2025.

Jürgen Bernard gave a lecture on "Human Knowledge and Preference Externalization for Personalized Visual Analytics."

Kenan Bektas talked about "Pervasive Eye Tracking in the Context of Human Augmentation" in his lecture.

Alice Thudt gave a talk on "A Process for Creating Custom Web-based Visualizations."

TALKS IN 2024 & 2025

May 6, 2024: Robert S. Laramee (University of Nottingham): "The Value of Overviews"

Jun 12, 2024: Wolfgang Aigner (St. Pölten University of Applied Sciences): "Visualization and Multimodal Exploration of Time-Oriented Data"

Jun 24, 2024: Bruce Thomas (University of South Australia): "The Future of User Interfaces for AR/VR/XR"

Jul 18, 2024: Bei Wang Phillips (University of Utah): "New Perspectives on Hypergraph Analysis and Visualization"

Jul 25, 2024: Liang Zhou (Peking University): "Trustworthy Health Data Visualization"

Sep 30, 2024: Cindy Xiong Bearfield (Georgia Institute of Technology): "Designs to Support Better Visual Data Communication"

Oct 25, 2024: Jinman Kim (University of Sidney): "A Mixed Reality System for Rib Fracture Localization in Surgery"

Nov 6, 2024: Ken Pfeuffer (Aarhus University): "Eye-Hand Symbiosis as a New Interaction Paradigm in HCI"

Dec 12, 2024: Markus Hadwiger (KAUST, Saudi Arabia): "Data Structures and Feature-Based Visualization for Volume and Flow Data"

Jan 24, 2025: Meinard Müller (International Audio Laboratories Erlangen): "Learning with Music Signals: Technology Meets Education"

Jan 30, 2025: Michael Burch (FH Graubünden): "Visualization Projects in Switzerland: Avalanches, Ice Hockey, and the Number Pi"

Feb 7, 2025: Elias Elmquist (Linköping University): "Sensibly Sound: Human-Centered Integration of Sonification and Visualization"

Feb 13, 2025: Petra Isenberg (Inria Saclay Centre at Université Paris-Saclay): "Building Effective Scales for Evaluating Subjective Experience in Data Visualization"

May 22, 2025: Kai Xu (University of Nottingham): "Human-Centered Machine Learning: Sensemaking, Provenance, and Human-AI Collaboration"

Jun 5, 2025: Hanhe Lin (University of Dundee): "Quality Assessment on Medical Images: Progress, Challenges, and Future Applications"

Jun 5, 2025: Raouf Hamzaoui (De Montfort University): "Optimizing Video-based Point Cloud Compression"

Jun 27, 2025: Dominikus Baur (Data Visualization Designer and Developer): "Generative Minus AI"

Jun 27, 2025: Alice Thudt (Data Visualization and Interface Designer): "A Process for Creating Custom Web-based Visualizations"

CONFERENCES

In 2024 and 2025, members of the SFB-TRR 161 presented their research at a large number of national and international conferences and workshops. For their outstanding work, they won several conference awards (cf. Awards, pp. 14–15). Several workshops and conference workshops were supported by the SFB-TRR 161 (*).

SELECTED CONFERENCE HIGHLIGHTS IN 2024 & 2025

May 2024: CHI 2024 Honorable Mention Award for "A Systematic Review of Ability-diverse Collaboration through Ability-based Lens in HCI" (cf. p. 14) **June 2024:** ETRA 2024 Short Paper Honorable Mention for "How Deep Is Your Gaze? Leveraging Distance in Image-Based Gaze Analysis" (cf. p. 14) +++ QoMEX 2024 Best Reviewer Awards for Dietmar Saupe & Mohsen Jenadeleh (A05) (cf. p. 15) **July 2024:** 3rd Workshop on Women* in Computing co-organized by SFB-TRR 161 researchers Katrin Angerbauer (A08), Nina Dörr (A08), Fiona Draxler (C06), Marina Evers (A01), Tiare Feuchtner (C07), Anke Reinschlüssel (C07), and Sita Vriend (A01) **September 2024**: ECCV Outstanding Area Chair Award for Andrés Bruhn (B04) (cf. p. 15) **October 2024:** IEEE VIS Test of Time Award for "Knowledge Generation Model for Visual Analytics" (cf. p. 14) +++ Bio+MedVis Challenge 2024 Best Challenge Entry Award for "Visual Compositional Data Analytics for Spatial Transcriptomics" (cf. p. 14) +++ 1st IEEE VIS PDAV Workshop supported by SFB-TRR 161 and co-chaired by Michael Sedlmair (A08) +++ Keynote "Uncertainty Visualization: The Importance of Quantification" by Daniel Weiskopf (A01, B01, INF, MGK, Z, Ö) at IEEE Workshop on Uncertainty Visualization +++ 2nd Joint Workshop on Cross Reality co-organized by Francesco Chiossi (C06) and supported by SFB-TRR 161 **May 2025:** Daniel Keim (A03) invited panelist for the panel discussion "Visual Analytics at a Crossroads: Who Are We, and Where Are We Going?" at ETRA 2025 +++ Yao Wang (A07) served as Workshop & Tutorial Chair for ETRA 2025 +++ Two Honorable Mention Awards at ETVIS 2025 (cf. p. 15) **June 2025**: Outstanding Reviewer Award for Jenny Schmalfuss (B04) at CVPR 2025 **July 2025**: 4th Workshop on Women* in Computing co-organized by SFB-TRR 161 researchers Tiare Feuchtner (C07), Anke Reinschlüssel (C07), and Marina Evers (A01)

2024

MAY

Unfold.jl Workshop
online

CHI 2024
ACM CHI Conference on Human Factors in Computing Systems, Honolulu, HI, USA

ESCAN 2024
European Society for Cognitive and Affective Neuroscience Meeting, Ghent, Belgium

EuroVis 2024
26th Eurographics Conference on Visualization, Odense, Denmark

EuroVA 2024
15th International EuroVis Workshop on Visual Analytics, co-located with EuroVis 2024, Odense, Denmark

JUN

MOBI 2024
Mobile Brain/Body Imaging Conference, Piran, Slovenia

ETRA 2024
ACM Symposium on Eye Tracking Research & Applications, Glasgow, UK

Dagstuhl 24232
Designing Computers' Control Over Our Bodies, Schloss Dagstuhl, Germany

ETVIS 2024*
8th Workshop on Eye Tracking and Visualization, co-located with ETRA 2024, Glasgow, UK

ICMR '24
ACM International Conference on Multimedia Retrieval, Phuket, Thailand

QoMEX 2024
16th International Conference on Quality of Multimedia Experience, Karlshamm, Sweden

Shonan No. 213
Augmented Multimodal Interaction for Synchronous Presentation, Collaboration, and Education with Remote Audiences, Shonan, Japan

JUL

WiC 2024*
3rd Workshop on Women in Computing*, Munich, Germany

AUG

IJCAI 2024
33rd International Joint Conference on Artificial Intelligence, Jeju, Korea

SEP

Dagstuhl 24371
Extended Reality Accessibility, Schloss Dagstuhl, Germany

IB 2024
18th International Symposium on Integrative Bioinformatics, Zurich, Switzerland

GD 2024
32nd International Symposium on Graph Drawing and Network Visualization, Vienna, Austria

ECCV 2024
European Conference on Computer Vision, Milano, Italy

OCT

SUI '24
ACM Symposium on Spatial User Interaction, Trier, Germany

UIST '24
37th Annual ACM Symposium on User Interface Software and Technology, Pittsburgh, PA, USA

VIS 2024
IEEE Visualization and Visual Analytics, online

PDAV 2024*
IEEE VIS Workshop on Progressive Data Analysis and Visualization, held in conjunction with VIS 2024, online

IEEE Workshop on Uncertainty Visualization
Held in conjunction with VIS 2024, online

BELIV 2024
Evaluation and Beyond: Methodological Approaches for Visualization, held in conjunction with VIS 2024, online

CHI Play 2024
Annual Symposium on Computer-Human Interaction in Play, Tampere, Finland

Ethics & Transparency in Game Data
Workshop held at CHI Play 2024, Tampere, Finland

MODeM 2024
Multi-Objective Decision Making Workshop, held at ECAI 2024, Santiago de Compostela, Spain

ISMAR 2024
International Symposium on Mixed and Augmented Reality, Seattle, USA

2nd Joint Workshop on Cross Reality*
Held in conjunction with ISMAR 2024, Seattle, USA

ASSETS '24
ACM SIGACCESS Conference on computing for people with disabilities and older adults, St. John's, Canada

CuttingEEGX
R/Evolutions in MEEG reseach practices, Nijmegen, Netherlands

NOV

VQEG 2024
Meeting of the Video Quality Experts Group, online

2025

FEB

Dagstuhl 25063
Extended Reality in the Operating Room (XR4OR), Schloss Dagstuhl, Germany

GRAPP 2025
International Conference on Computer Graphics Theory and Applications, Porto, Portugal

MAR

IEEE VR 2025
32nd IEEE Conference on Virtual Reality and 3D User Interfaces, Saint-Malo, France

XRaccess
1st Workshop on XR Accessibilty, held at IEEE VR 2025, Saint-Malo, France

APR

CHI 2025
ACM CHI Conference on Human Factors in Computing Systems, Yokohama, Japan

Envisioning the Future of Interactive Health
Workshop held in conjunction with CHI 2025, Yokohama, Japan

Everyday XR through AI-in-the-Loop
Workshop held in conjunction with CHI 2025, Yokohama, Japan

MAY

CAA 2025
52nd CAA International Conference, Athens, Greece

VSS 2025
25th Annual Meeting of the Vision Sciences Society, St. Pete Beach, FL, USA

ETRA 2025
ACM Symposium on Eye Tracking Research & Applications, Tokyo, Japan

ETVIS 2025*
9th Workshop on Eye Tracking and Visualization, co-located with ETRA 2025, Tokyo, Japan

JUN

EuroVis 2025
27th Eurographics Conference on Visualization, Luxembourg City, Luxembourg

EuroVA 2025
16th International EuroVis Workshop on Visual Analytics, co-located with EuroVis 2025, Luxembourg City, Luxembourg

CVPR 2025
IEEE/CVF Computer Vision and Pattern Recognition Conference, Nashville, TN, USA

CARS 2025
Computer Assisted Radiology and Surgery, Berlin, Germany

Shonan No. 216
Human-Computer-Interfaces x Neuroscience, Shonan, Japan

JUL

JapanVis 2025
2nd Japan Visualization Symposium, Tokyo, Japan

WiC 2025*
4th Workshop on Women in Computing*, Ulm, Germany

IMRF 2025
International Multisensory Research Forum, Durham, UK

108th JPEG Meeting
Daejeon, Korea

AUG

ECVP 2025
47th European Conference on Visual Perception, Mainz, Germany

Aarhus 2025 Conference
6th Decennial Aarhus Conference, Aarhus, Denmark

SEP

ICIP 2025
IEEE International Conference on Image Processing, Anchorage, AK, USA

Background image: Shubham Dhage, Unsplash

Image: Alejandro Barba, Unsplash

BIO+MEDVIS CHALLENGE 2024 BEST CHALLENGE ENTRY

For their challenge entry to the Bio+MedVis Challenge at IEEE VIS 2024, David Hägele (A01), Yuxuan Tang, and Daniel Weiskopf (A01, B01, INF, MGK, Z, Ö) received an award for the Best Challenge Entry in the category Visual Analytics. In their submission "Visual Compositional Data Analytics for Spatial Transcriptomics," they propose a visual analytics system with three linked views as an alternative for pie chart glyphs that are superimposed on a histological image of tissue. Their system allows analysts to explore and uncover patterns in the displayed cell type mixtures and to relate them to their spatial locations on the cellular tissue more effectively and more thoroughly than the existing visualization given for the challenge.

- Project A01
- Stuttgart

ETRA BEST SHORT PAPER HONORABLE MENTION

Maurice Koch (B01), Nelusa Pathmanathan, Daniel Weiskopf (A01, B01, INF, MGK, Z, Ö), and Kuno Kurzhals received a Best Short Paper Honorable Mention Award at the ACM Symposium on Eye Tracking Research & Applications (ETRA 2024) for their publication "How Deep Is Your Gaze? Leveraging Distance in Image-Based Gaze Analysis." The paper proposes depth-adaptive thumbnails as an alternative to thumbnails with a constant size for the analysis and visualization of eye tracking data.

- Project B01
- Stuttgart

CHI 2024 HONORABLE MENTION

For their paper "A Systematic Review of Ability-diverse Collaboration through Ability-based Lens in HCI" the authors Lan Xiao, Maryam Bandukda, Katrin Angerbauer (A08), Weiyue Lin, Tigmanshu Bhatnagar, Michael Sedlmair (A08), and Catherine Holloway received an Honorable Mention Award at the ACM Conference on Human Factors in Computing Systems (CHI 2024). For their review, they analyzed 117 HCI papers sourced from the ACM Digital Library spanning the last two decades.

- Project A08
- Stuttgart

IEEE VIS TEST OF TIME AWARD

Together with his co-authors Dominik Sacha, Andreas Stoffel, Florian Stoffel, Bum Chul Kwon, and Geoffrey P. Ellis, Daniel Keim (A03) won the IEEE VIS Test of Time Award (10 Year) for "Knowledge Generation Model for Visual Analytics" (IEEE VAST 2014) at IEEE VIS 2024. With the award, IEEE VIS recognizes publications that were published at previous conferences, but continue to be highly relevant and have had a major impact within and beyond the visualization community.

- Project A03
- Konstanz

ECCV 2024 OUTSTANDING AREA CHAIR

At the 2024 European Conference on Computer Vision (ECCV), SFB-TRR 161 project leader Andrés Bruhn (B04) received an outstanding area chair award for his efforts in overseeing and coordinating the reviewing process in his area of research. In total, only 12 out of 469 area chairs were selected for this honor (2,6%).

- Project B04
- Stuttgart

QoMEX 2024 BEST REVIEWER AWARD

At the 16th International Conference on Quality of Multimedia Experience (QoMEX'24), Dietmar Saupe and Mohsen Jenadeleh (A05) each won a Best Reviewer Award. With the award, the award committee recognized them for their valuable and constructive feedback provided during the rigorous paper review process.

- Project A05
- Konstanz

GRENZSTEIN AWARD FOR "ARRIVING?"

The concept for the exhibition "Arriving? Migration, Faith and Identity" (cf. p. 19) won the Grenzstein Award of the ArchitekturFORUM Konstanz-Kreuzlingen in the category "Transboundary Work." The exhibition was curated by students and is the result of the teaching module Media Exhibition Design, in which Harald Reiterer and Jonathan Wieland (C01) were involved (cf. p. 19).

- Project C01
- Konstanz

TWO HONORABLE MENTION AWARDS AT ETVIS 2025

Maurice Koch (B01) accepting an Honorable Mention Award. Image: Maurice Koch

At the 9th Workshop on Eye Tracking and Visualization (ETVIS 2025), two SFB-TRR 161 publications won an Honorable Mention Award: "Uncertainty-Aware Scarf Plots" (Nelusa Pathmanathan, Seyda Öney, Maurice Koch (B01), Daniel Weiskopf (A01, B01, INF, MGK, Z, Ö), and Kuno Kurzhals) investigates how analysts can be made aware of the inaccuracies in gaze data and automated detection of areas of interest. "Group Gaze-Sharing with Projection Displays" (Maurice Koch (B01), Tobias Rau, Vladimir Mikheev (D05), Seyda Öney, Michael Becher, Xiangyu Wang, Nelusa Pathmanathan, Patrick Gralka (MGK), Daniel Weiskopf (A01, B01, INF, MGK, Z, Ö), and Kuno Kurzhals) introduces a new technique to communicate gaze between groups in tabletop workshop scenarios.

- Projects A01, B01, D05, MGK
- Stuttgart

CVPR 2025 OUTSTANDING REVIEWER AWARD

At the IEEE/CVF Computer Vision and Pattern Recognition Conference (CVPR 2025) in Nashville, Tennessee, USA, Jenny Schmalfuss (B04) was selected as an Outstanding Reviewer. With this designation, CVPR honors reviewers who provided exceptionally helpful feedback on submitted papers, thereby highlighting the importance of high-quality peer review in the field. Only the top 6% of CVPR reviewers from a reviewer pool of over 12,000 experts received an Outstanding Reviewer Award.

- Project B04
- Stuttgart

SFB-TRR 161 DOCTORAL STUDENTS ON LAB VISITS

In 2024 and 2025, SFB-TRR 161 doctoral students spent time in international labs as their research stay abroad. Supported by our Integrated Research Training Program, they were able to form valuable contacts and advance their own projects.

Between November 2024 and January 2025, **Lucas Joos** (A03) worked with the Embodied Visualisation group at Monash University in Melbourne, Australia. Led by Tim Dwyer, the research group investigates how new display and interaction technologies can be used to facilitate data analysis and to improve informed decision-making. An ideal match for Lucas, whose research centers around the use of immersive technology to improve the visual analysis of network data. For Lucas, his stay at Monash was highly productive: "I established new collaborations and paper ideas, which will be beneficial for the remaining time of my PhD and beyond." The dynamic work environment and constant feedback from his co-authors allowed Lucas to complete a survey paper on "Visual Network Analysis in Immersive Environments," thereby filling a large gap in the landscape of immersive analytics and literature surveys.

Jonathan Wieland (C01) spent six months at Carnegie Mellon University's (CMU's) Human-Computer Interaction Institute (HCII) in Pittsburgh, USA. As part of David Lindlbauer's Augmented Perception Lab, Jonathan formed many new connections to researchers in the HCI community and contributed to several conference papers as well as ongoing research collaborations. Jonathan's main focus during his stay was the project Push2AR. The novel interaction method lets users push list items from their phone into the surrounding AR space for easy comparison and bookmarking. "Weekly meetings with David helped refine the project, address challenges, and improve our approach," says Jonathan about the project phase. A user study, which was conducted during Jonathan's time in Pittsburgh, showed that Push2AR improves user experiences and reduces subjective workload. The corresponding paper was accepted at ISMAR 2024.

For the full reports, visit our blog: www. visual-computing.org

DISSERTATIONS

Since May 2024, nine candidates completed their doctoral projects and successfully defended their dissertations:

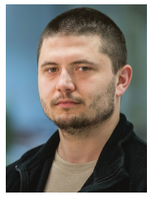
- Lukas Mehl (B04), Stereoscopic Videos: Data Generation, Image Synthesis and Motion Analysis
- Francesco Chiossi (C06), Physiologically Adaptive Systems Across the Mixed Reality Continuum
- Yao Wang (A07), Analysis and Modelling of Visual Attention on Information Visualisations
- Tim Krake (B01), Matrix Methods in Visualization
- Cedric Beschle (B07), Quasi Continuous Level Monte Carlo Method
- Frederik Dennig (A03), Measure-Driven Visual Analytics of Categorical Data
- Johannes Zagermann (C01), Evaluating Complementary Interfaces as a Design-Informing Activity*
- Peter Schäfer (B06), Polyline Simplification Using the Fréchet Distance – Algorithms and Engineering
- Rebecca Kehlbeck (A01), Visualization and Semantic Analysis of Relations in Textual Data

Congratulations!

* nominated for the "Dissertationspreis der Gesellschaft für Informatik"

DOCTORAL SPEAKERS 2024/2025

Elected at the status seminar in 2024, **Wilhelm Kerle-Malcharek** (D04) and **Noah Berenguel Senn** (B04) have served as doctoral speakers for 2024 and 2025. As such, they represented the interests of the doctoral students and organized events such as doctoral retreats and workshops.



Left: Wilhelm Kerle-Malcharek, Right: Noah Berenguel Senn

DOCTORAL RETREAT

As part of our SFB TRR 161, we, the doctoral students, have the opportunity to organize and attend a yearly PhD retreat. In 2025, we were lucky enough to be welcomed by the Humboldt-Haus Achberg at the beautiful Lake Constance.

The location offered us a fantastic venue for presenting and discussing our respective areas of research and strengthening the connections inside the TRR. Be it the view from the lunch room, the surrounding area or the conference hall.

Image: Noah Berenguel Senn

Our retreat lasted from the 26th to the 28th of May. On the evening of our arrival, we began with the typical procedure—saying hi, coffee, and room distribution. After that, I had the pleasure to officially welcome everyone with my presentation, which we spontaneously (and not all that seriously) declared to be a keynote talk.

After dinner, we came together for a board game night. While our group frantically tried to outplay each other in our game of cards, the other group piled new rules towards how to actually play theirs.

On the second day, we started with exhaustively discussing our areas of science as well as our experiences with networking, traveling, and more that are important for PhD students in different stages of their studies.

In the late afternoon, we revisited an activity which we already tried last year: archery. While we did not have an instructor this time, we did have a ranking! And I would like to eternalize our top three in order: Patrick, Michael, and Frederik. Congratulations!

On the last day, we went for a small hike towards the castle in Achberg. We actually expected it to be closed, but for some magical reason, we were able to take a peek. So: good for us.

Our way back was not only marked by great conversations, but also by quite a bit of rain. Fitting, since we were all getting ready to get home after an interesting, productive, and fun doctoral retreat 2025.

wk

Image: Noah Berenguel Senn

NEW DOCTORAL RESEARCHERS

- Noah Berenguel Senn, B04, Stuttgart
- Lukas Beiske, D02, Konstanz
- Kathrin Schnizer, C06, Munich
- Michael Stroh, A01, Konstanz

A warm welcome to all new doctoral researchers!

VISUAL COMPUTING FOR SCHOOL STUDENTS

PROGRAMMING SKILLS & MUCH MORE

GIRLS' DAY 2025

In 2025, the SFB-TRR 161 contributed two workshop offers to the Girls' Day, which took place on April 3rd. In both Stuttgart and Konstanz, we invited girls between the ages of 14 and 16 to learn more about the work of visualization researchers and to put their own programming skills to the test.

In Konstanz, two girls joined the Visual Computing group for a day. Tutored by Rebecca Kehlbeck (A01), they learned how to program their own computer game using the programming language processing. Their goal: teaching Pac-Man how to walk through a maze and eat little squares.

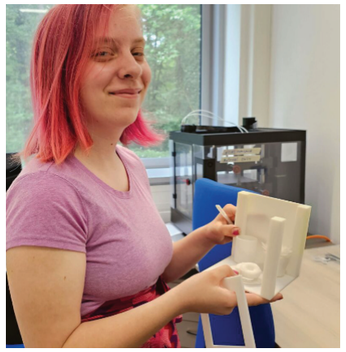
Programming and testing virtual environments in Unity at the Girls' Day Workshop in Stuttgart.

For the eight girls participating in the Girls' Day workshop at the University of Stuttgart, the motto of the day was virtual and augmented reality. In different demos, they were able to do some archery practice, go on an immersive tour, and even met life-size dinosaurs. Motivated by those exciting examples, they went on to program their own VR environment using Unity.

INTERNSHIPS

In 2024 and 2025, eight school students discovered the world of visual computing during internships. In both Stuttgart and Konstanz, they worked with and visited several of our projects.

Between July and September 2024, our projects in Konstanz welcomed three individual students. From testing flight simulators, walking around a virtual version of ancient Rome to working on their own 3D models, they got to know many practical applications of visual computing. Among the students was also one familiar face: Virginia, who already interned with us in July 2023, once again visited our projects D04 and A09 to continue working on her 3D modeling skills.



Virginia working on her 3D model during her second internship in Konstanz.

In Stuttgart, we offered a BOGY Week for a group of five interns in February 2025. They got to deepen their programming skills and knowledge about visualization in several smaller projects. Their highlight: learning how music data can be transformed into visualizations and creating their own examples.

PROGRAMMING COURSE FOR GIRLS

In July 2024, the SFB-TRR 161 organized a three-day programming course for teenage girls at the University of Konstanz.

Creating graphics with Processing.

Led by the former teacher Thomas Ningelgen, the course introduced the four participants to programming with Processing. By creating increasingly complex, interactive graphics, the girls deepened their programming skills and got an idea of how creative working on computer graphics can be.

In a motivating presentation by master's student Lisa-Maria Reutlinger, the girls learned more about studying Computer Science and career opportunities.

Thank you to all staff who contributed to our offers for school students!

cwr

"ARRIVING?": SFB-TRR 161 SUPPORTS INTERACTIVE EXHIBITION

How do migration and faith shape the lives of individuals? How do they influence and change a cityscape such as that of the city of Konstanz, which people have been migrating to and from since ancient times? The new exhibition "Arriving? Migration, Faith and Identity" investigates these questions, using interactive technologies as well as artificial intelligence to allow visitors an immersive experience of the topic.

The exhibition was curated by students from the University of Konstanz, the HTWG Konstanz, and the HFM Trossingen as their final project for the teaching module Media Exhibition Design. The teaching module is being taught in Konstanz since 2013 and was originally designed by SFB-TRR 161 project leader Harald Reiterer (C01) and his colleague Eberhard Schlag from the architecture and design faculty at the HTWG Konstanz. Harald Reiterer's expertise on multimodal interaction concepts for mobile computing as well as mixed reality are an integral part of the teaching concept. For the 2025 exhibition, the teaching team was also joined by Jonathan Wieland, doctoral researcher in Project C01. The SFB-TRR 161 additionally supports the exhibition with funds from Project Ö "Public Relations."

Opening vernissage in Konstanz on July 18, 2025.

The exhibition opened on July 18, 2025, at the Turm zur Katz, Konstanz and runs until October 23, 2025.

cwr

BEYOND THE THESIS: FIRESIDE CHAT WITH MELANIE TORY

Melanie Tory (left) during the panel discussion.

On July 1, 2024, the SFB-TRR 161, the Cluster of Excellence Integrative Computational Design and Construction for Architecture (IntCDC), and the Cluster of Excellence SimTech jointly hosted a special edition of the SimTech event series "Beyond the Thesis." At the "Fireside Chat – Female* Researchers Edition," female researchers from various academic career stages got together to discuss different career paths and the challenges and opportunities that come with them.

Among the panelists was Melanie Tory, Director of Human Data Interaction Research at the Roux Institute at Northeastern University, who was a visiting researcher in Stuttgart at the time. Together with the other panelists, she discussed and answered questions on balancing family and career, navigating career opportunities in industry and science, and the transitions between different career stages.

cwr

SFB-TRR 161 ON SOCIAL MEDIA

The SFB-TRR 161 is now also active on the social media platforms Bluesky and Mastodon. Find our new profiles here:

BLUESKY

https://bsky.app/profile/sfbtrr161.bsky.social

MASTODON

https://bawü.social/@sfbtrr161

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14. P. Gralka, C. Müller, S. Geringer, G. Reina, and D. Weiskopf, "Quantifying Energy Reduction of Foveated Volume Visualization," in *Proceedings of the 2025 Symposium on Eye Tracking Research and Applications (ETRA)*, New York, NY, USA: ACM, 2025, pp. 1–7, doi: 10.1145/3715669.3725881.
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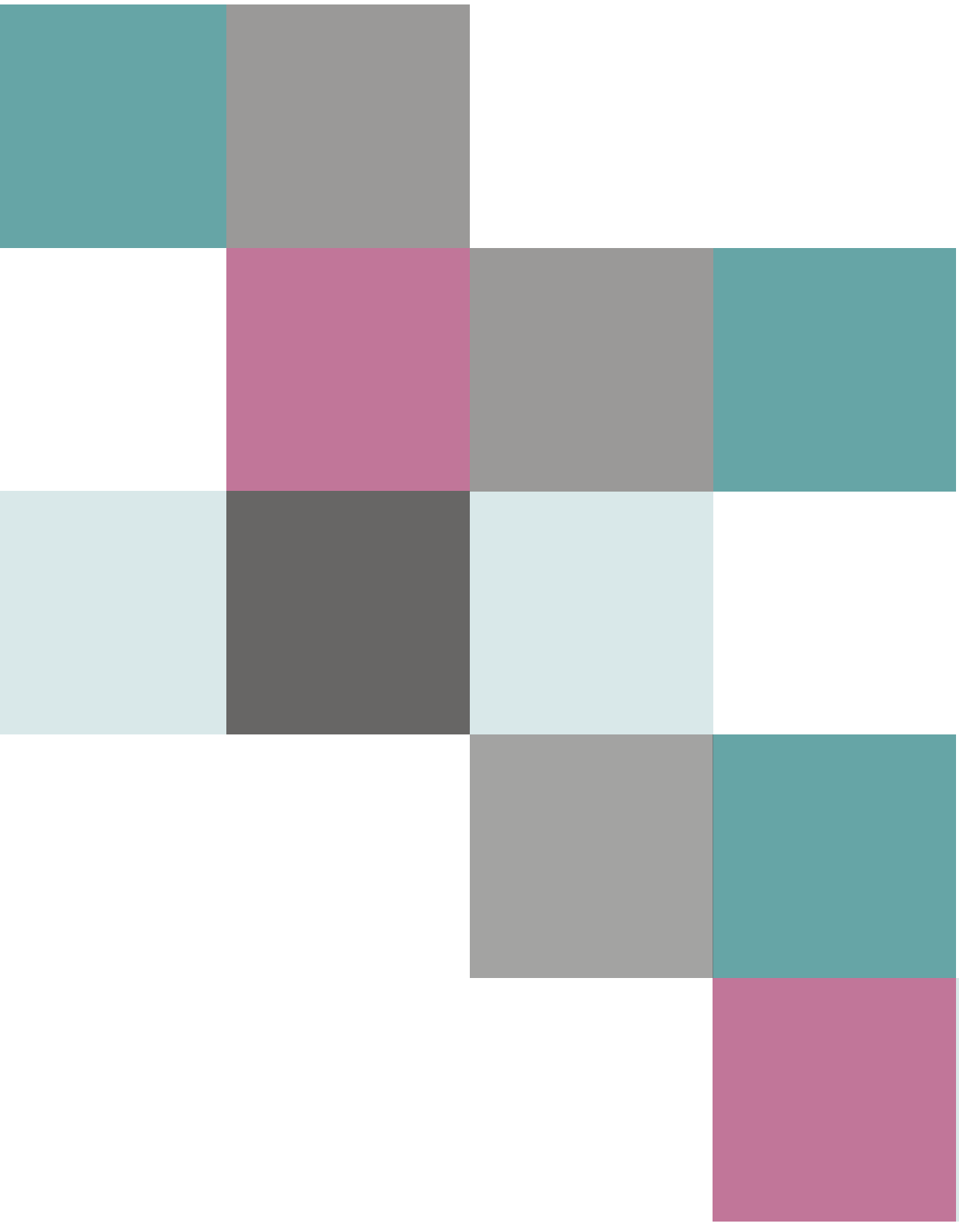

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