

2nd IEEE VIS Workshop on Data Vis Activities to Facilitate Learning, Reflecting, Discussing and Designing

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ABSTRACT

This Data Vis Activities workshop is a sequel to our successful workshop at IEEE VIS 2020 [7], focusing on methods and challenges for teaching and engaging with data visualization concepts, knowledge, and practices. Examples of such activities include sketching for design, constructing to learn, user interviews to elicit impressions and discussions to help developers understand requirements. Recent years have seen the emergence of such data visualization activities and associated research in different contexts, including education, visualization design, activism, self-reflection, and interdisciplinary collaboration. While our 2020 half-day workshop focused on providing activity research a dedicated platform and on start building a community, this workshop will focus on *i*) creating, running, and reflecting on activities especially in online settings, *ii*) discussing higher-level issues in regards to activities, visualization education, and engagement, as well as *iii*) discussing concrete future steps to build a permanent forum and community around these topics. Given that IEEE VIS 2021 is likely to run online, we design our workshop activities with an online setting in mind.

1 MOTIVATION

A data visualization activity is a *hands-on engagement with data visualization with the goal of learning, reflecting, discussing, or designing* [7] visualizations and visualization knowledge in education, design, and collaboration. In recent years, we have seen an increase of different visualization activities created by visualization researchers and designers, and applied to a broad range of contexts, and for different audiences. Examples include the five design-sheet methodology for visualization design [18], workshops for data comics and storytelling [2], methods for design immersion [5], design spaces and patterns to practice visualization design [11], tangible visualization with physical tokens [8], sketching exercises for visualizing two quantities [13], methods for eliciting self-reflection on personal data [21], critical thinking sheets [19], engaging people with physicalization [9], and activities to improve data literacy [4,6].

Such hands-on visualization activities typically involve a series of steps both for participants and for instructors. Activities can involve analogue tools such as pen and paper [22], everyday physical materials [9], or digital visualization tools (Tableau Desktop, D3.js, etc.), and the duration of activities can vary from a few minutes to

several weeks. While many of these activities would naturally take place in a group setting, the social distancing measures during the **Covid-19 pandemic forced many visualization scholars, teachers and practitioners to move their activities online**. Switching from co-located and synchronous activities to remote and sometimes asynchronous activities, changed the way we teach or design data visualization. This required teachers to reinvent activities, adapt materials to be suitable for online delivery, reorganise procedures, replace physical tools with virtual, re-think collaboration and engagement, restructure or invent new activities. At the same time, moving activities online opens new possibilities to involve people across the world and in turn increase diversity and access.

In summary, as the visualization community grows, more scholars teach visualization, practitioners and users of visualization increase, diversity increases, all with more remote teaching and learner, many challenges, opportunities and questions arise. *How to adapt the activity we are using? How (not) to teach online? Which teaching activities work well remotely?* Especially reflecting on changes achieved this past year: *What are the teaching or activity experience we had during the last year? What tools to use remotely? How do audiences differ and what are the implications for our teaching content and styles?*

2 PREVIOUS WORKSHOPS AND DISCUSSIONS

Previous workshops and seminars that inspired our workshop focused on teaching data visualization, such as the discussion group at Dagstuhl seminar on Information Visualization-Human-Centered Issues in Visual Representation, Interaction, and Evaluation; *Pedagogy of Visualization* 2016 [1] and 2017 [10] workshops at IEEE VIS; or the Slack channel run by The Data Visualization Society on teaching education and education material. We believe strongly in ongoing high-level discussion about visualization teaching, literacy, and education must continue in 2021 and beyond, but should include more practical and applicable activities. Our vision is that education and vis activities should become a permanent and integrated part of the VIS conference.

This 2021 workshop follows from our IEEE VIS 2020 Vis-activities workshop [7].¹ The first highly successful workshop included ten short papers by 17 authors, available online. Among them we list a visualization design sprint [3], methods to teach data-viz to kids [20], an approach to understand the diversity of visualization tools [17], and a visualization critique to deconstruct misconceptions [16]. At the peak of the event we had 98 viewers on the live streams and an overall total of 210 unique viewers. During the workshop we have been able to discuss results, identify multiple challenges and brainstorm different types of activities using a miro board.² Some of the members of the workshop expressed their interest to renew the experience next years. The first workshop led to the acceptance of a CG&A Special Issue on Visualization Education

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¹<https://visactivities.github.io>

²https://miro.com/app/board/o9J_kjeyW0k=/

and Teaching Visualization, Literacy,³ with a deadline in April 2021 and a publication date late 2021.

This year's workshop will follow up where the last workshop left us. In particular, last year's workshop got cut to a half-day workshop. This and the fact that the workshop had to run online significantly reduced the discussions and activities we had envisioned (see Section 4). This year, we aim for a full-day workshop and to include extensive space for planning and running data-vis activities, discussing higher-level research questions related to education, design, and engagement, as well as plan for structured community building that includes: planning future workshops and collecting activities.

3 WORKSHOP GOALS

In this workshop, we will facilitate:

1. creating, running, and reflecting on **activities** especially in online settings. We aim to start synthesizing current and visualization activities and, in this way, to inform future visualization activities. Despite the increasing number of data activities that have been produced we have a limited understanding of the domain of data-vis activities. This raises many questions, such as: what is the design space of data-vis activities? What are the criteria to evaluate a successful activity? Can we define guidelines for designing data-vis activities?
2. Discussing **higher-level issues** in regards to activities, visualization education, and engagement. This will include learning and teaching approaches, materials, goals, challenges, and experiences, in educational contexts and beyond, with a specific focus on online and distant settings.
3. Discussing **specific future steps** to build a permanent forum and community around these topics.

Given that IEEE VIS 2021 is likely to run online, we design our workshop activities with an online setting in mind.

4 CALL FOR SUBMISSIONS

This workshop will accept short paper submissions up to 4 pages long, excluding references. All submissions will be peer-reviewed, providing constructive feedback for the camera-ready version. All submissions will be published on our website while authors can decide whether their paper will become published through the IEEE Digital Library.

Papers have to include a scientific contribution in theory, reflection, application, evaluation, design, or implementation. Page length will be limited to 4 pages, using the standard IEEE style. Contributions can include: *activities, learning material (see below), learning goals, taxonomies, visualization guidelines, critical reflections on conducting visualization activities (teaching experience), evaluation strategies for activities, teaching approaches, ethical and critical considerations on activities and teaching.*

Reports on activities should include procedures, reports and experiences about one or many teaching activities, including a protocol and material of activities including results and reflections. Materials should include new teaching material that supports teaching in general and which is ready for application (slides, visualizations of schema/diagrams/design spaces, cheat sheets [24], teaching tools), or targeted to support specific activities (physical visualization, sketching templates, programming tutorials). We strongly encourage evaluations for both activities and materials. Our call from the 2020 workshop can be found online.⁴

³<https://www.computer.org/digital-library/magazines/cg/call-for-papers-special-issue-on-visualization-education-and-teaching-visualization-literacy>

⁴<https://visactivities.github.io>

5 SCHEDULE AND PLANNED ACTIVITIES

We envision this workshop as a full-day workshop which will combine paper presentations, discussions and hands-on activities. The workshop will be split into three parts, (i) a *paper presentation and discussion* session, (ii) an *activity* session, and (iii) a session for *discussion and community building*. The first session will focus on sharing research, presenting workshop papers and discussing advances and questions in visualization activities for teaching, reflecting and designing within different contexts. The activity phase will focus on a hands-on activities to categorize, create, and discuss data-vis activities methods.

5.1 Introduction

After the organizer welcome, we will run an ice breaker activity, asking people about their best and worst experience in teaching and/or running visualization activities over the past year during Covid-19. We will create breakout groups of around 5 participants.

5.2 Paper Presentations & Discussion

Each accepted paper will be given 5min to present, with a general Q&A session after each five presentations. After all accepted submissions have been presented, we leave space for another open discussion on challenges and directions related to the topic of the workshop. Participants who presented will be part of a panel for the discussions. We plan to accept around 10 submissions.

5.3 Activity session

The activity session will provide space for workshop participants to invent and test new activities in a structured way. The goal of this second part of the workshop is to create, experiment, and bring people together. In case the workshop will take place in an online or hybrid setting, we plan to use the tool *Miro* for the collaborative work. First, participants will identify challenges and settings (e.g., teaching visualization flaws, describing a domain problem) they want to ideate activities for. We will then open the afternoon session with a short, warm data visualization activity. For timings, see the schedule, Section 6.

Identifying activity challenges—This phase will ask participants to identify challenges in teaching, contexts, scenarios or teaching goals to which they want to design activities. This could include any problems during their data vis work (teaching, on-boarding data experts, designing a visualization, collectively analyzing data, etc.). Each of these activity challenges should be defined and written down on *challenges-template cards*. The cards will include fields such as name, challenge, context, task, audience, data types and will be hung on the wall or placed into the Miro board (if run online).

Voting on challenges and forming groups—During this phase participants are invited to present their challenges cards and merge overlapping challenges. Then, dot-voting will be used to select a favorite challenge. Based on their votes participants group themselves into teams whose size will depend on the number of participants.

Creating and discussing activities—Each team will work on ideating and designing activities for the chosen challenge(s). Activity templates, the same as for Activity-submissions, will be distributed among the teams to help them define and formalize their activity. The template contains fields such as a timeline, a step by step description, a material list, the overall goals, data, list of shareholders, roles, etc.

Testing the activities—Each team will divide in half: people instructing other groups in their activity (at least 2 group members), and people experiencing other group's activities. Depending on the time remaining at this stage, roles of instructors and participants may be flipped during several iterations so that every participant has the chance to participate in at least one other activity.

Reflection and discussion—After the testing phase, all groups join and discuss three aspects: *i*) observations on the activities run by their own team and how it can be improved; *ii*) observations

and impressions on the activities run by others teams for feedback; and *iii*) discussion, critique and feedback for improving the data-vis activities template.

5.4 Research Discussion and Community Building

To end the workshop, we will convene a structured discussion about ways forward for both research in the area of visualization activities, education, and engagement, as well as in building a sustainable community in these areas. To that end, we plan for discussion sessions and aim to discuss challenges, research roadmaps, and gather opinions and volunteers for follow-up workshops, collecting vis activities, and publishing them on the web in a unique format. Similar to the activities session, we will start with a challenge planning and then break out into groups of around 5 participants. Several challenges might have multiple break out groups but we want to keep the number of participants in each group deliberately low to facilitate online discussions. In case, we end up with over 10 groups, we will convert to a parallel discussion model, e.g. where only matching groups (e.g. community building, activity gathering, education research) share their discussion with some of the organizers, while the organizers are spread across groups. Discussion protocols will be made public after the workshop. In case the workshop can take place in New Orleans, a voluntary workshop dinner is planned to encourage the community building.

6 INTENDED SCHEDULE

In the following we have outlined a tentative schedule for this full-day workshop.

- 09:00 —09:10 (10 m.) **Opening and outline**
- 09:10 —09:25 (15 m.) **Ice breaker: Fast forward testimony of best teaching moment of the year**
- 09:25 —10:00 (35 m.) **Paper presentations I**
- 10:00 —10:20 **Coffee Break**
- 10:20 —11:10 (50 m.) **Paper presentations II**
- 11:10 —11:30 **Coffee Break**
- 11:30 —12:30 (60 m.) **Identifying activity challenges**
- 12:30 —14:20 **Lunch Break**
- 14:20 —14:25 (5 m.) **Afternoon opening**
- 14:25 —14:35 **Warm up Data Vis activity** (see Section 4.2)
- 14:35 —15:20 (45 m.) **Groups: creating & discussing**
- 15:20 —15:50 (30 m.) **Groups: running & testing.**
- 15:50 —16:10 **Coffee Break**
- 16:10 —16:30 (20 m.) **Groups: reflection time & discussion**
- 16:30 —17:30 (60 m.) **Structured discussion & community building**
- 17:30 —17:45 (15 m.) **Wrap-up discussion**
- 19:00 **Voluntary Workshop Dinner**

7 PRE-WORKSHOP ORGANIZATION TIMELINE

The timeline for the workshop organization is as follows:

- April 4, 2021: **Call for Participation**
- July 4, 2021: **Submission Deadline**
- July 25, 2021: **Reviews Collected**
- August 3, 2021: **Author Notification**
- August 17, 2021: **Submission Camera Ready Deadline**

We plan to advertise on the respective mailing lists for ACM CHI, IEEE VIS, DRS, ACM DIS, Digital Humanities, Art+Design, Tableau, advertise on social media (Twitter, FB etc.) and invite last year's participants.

8 INTENDED OUTCOMES & CONTRIBUTIONS

This workshop will provide participants with a unique experience to lay out the challenges they have with data-vis activities, sketch a

research agenda, and highlight the opportunities of data-vis activities for the community. It will contribute to the wider visualization community, literacy and education agenda. During paper submissions and activity creation we collect activities and a corresponding activity template for describing and sharing visualization activities. We plan to develop a website summarizing data-vis activities teaching material and pointers to external teaching material.

9 TENTATIVE PC LIST

1. Jan Aerts, UHasselt
2. Lyn Bartram, Simon Frazer University
3. Enrico Bertini, New York University
4. Anastasia Bezerianos, Inria
5. Rahul Bhargava, MIT Medialab
6. Fanny Chevalier, University of Toronto
7. Marian Dörk, University of Applied Sciences Potsdam
8. Jason Dykes, City, University of London
9. Niklas Elmqvist, University of Maryland
10. Yuri Engelhart, Twente University
11. Sarah Goodwin, Monash University
12. Kyll Hall, Temple University
13. Uta Hinrichs PhD University of St Andrews
14. Petra Isenberg, Inria
15. Daniel Keefe, University of Minnesota
16. Isabelle Mireilles, Northeastern University
17. Bettina Nissen, University of Edinburgh
18. Charles Perin, University of Victoria
19. Nathalie Henry Riche, Microsoft Research
20. Jon Schwabish, Urban Institute
21. Melanie Tory, Tableau Research
22. Romain Vuillemot, École Centrale de Lyon
23. Jagoda Walny, National Energy Board Canada
24. Wesley Willett, University of Calgary

10 ORGANIZER BIOS

Samuel Huron, samuel.huron@cybunk.com (<https://perso.telecom-paristech.fr/shuron/>)
Samuel Huron is an associate professor in Design and ICT at Telecom Paris Tech. His research focuses on creating and studying new tools to democratize dynamic information visualization authoring and by studying design methods apply to research. For his work on “Constructive Visualization” he received the 2015 best doctoral dissertation award from IEEE VGTC Pioneer Group. He designed and conducted many different workshops focus on visualization and physicalization during the last 5 years [8, 9]. Before, he was the lead designer of the Institute of Research and Innovation of the Pompidou Center.

Benjamin Bach, bbach@ed.ac.uk (<http://benjbach.me>)

Benjamin is a Lecturer (Assistant Prof.) in Design Informatics and Visualization at the University of Edinburgh. His research designs and investigates interactive information visualization interfaces to help people explore, communicate, and understand data across media such as screens, mixed reality, paper, and physicalizations. Benjamin is involved in teaching four courses on data visualizations at the University of Edinburgh, targeting different audiences and levels, including one online course for professional development for which is co-leading (together with Uta Hinrichs) funding of more than £160k, including the creation of activities and material. In the past, Benjamin has been working on Cheatsheets [24], visualization tools [17], data comics [2], and data comic workshops [23] for data visualization and is currently working on understanding users and support them in learning interactive tools.

Georgia Panagiotidou, georgia.panagiotidou@kuleuven.be ([KULeuven-homepage])

Georgia Panagiotidou is a PhD researcher in the Research[x]Design Group in KU Leuven University, Belgium. Her work focuses on how to make visualization more inclusive by understanding how people handle data issues such as biases, uncertainties and frictions. She approaches data visualization as both a process and an outcome and has prepared and deployed data visualization activities using storytelling, gamification [14] and physicalisation [15] among others.

Mandy Keck, mandy.keck@fh-hagenberg.at (<http://www.visual-search.org>)

Mandy Keck is a professor in UX and Interaction Design at the University of Applied Sciences Upper Austria. Her research interests include Information Visualization and Design Methodology with the goal of supporting students and interdisciplinary teams in creating information visualizations. Prior to 2021, she was a research associate at TU Dresden, where she designed and conducted several hands-on workshops dealing with the creation of interface metaphors [12] and the construction and deconstruction of information visualizations [11].

Jonathan C. Roberts, j.c.roberts@bangor.ac.uk ([click-for-homepage])

Jonathan is a professor in Visualization at Bangor University. He is the creator of the Five Design-Sheet method [18], and lead author of the book *Five Design-Sheets: Creative Design and Sketching for Computing and Visualization*, Springer Nature, June 2017. His research spans heritage, archaeology, oceanography, pedagogy, lexicography, and social networking domains, and for many years has encouraged researchers to develop multiple coordinated view systems. He is a keen advocate of sketching and low-fidelity design [18, 19], and promotes more design thinking in teaching.

Sheelagh Carpendale, sheelagh@sfu.ca (<https://www.cs.sfu.ca/sheelagh/>)

Sheelagh Carpendale is a Professor and Canada Research Chair in Information Visualization in the School of Computing Science at Simon Fraser University. She has been inducted into the both IEEE Visualization Academy and the ACM CHI Academy and has received many awards including the IEEE Visualization Career Award, an NSERC STEACIE (a top science award in Canada); a BAFTA (the British equivalent to an Oscar); an ASTech Award Innovations in Technology; two Best Supervision Awards; and the Canadian CHCCS Achievement Award. She leads the Innovations in Visualization (InnoVis) Research Group and has newly established the Interactive Experiences Lab (ixLab).

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