
This is an electronic reprint of the original article.
This reprint may differ from the original in pagination and typographic detail.

Masoodian, Masood; Luz, Saturnino
MAPII - Map-based Interfaces and Interactions

Published in:
Proceedings of the 2024 International Conference on Advanced Visual Interfaces, AVI 2024

DOI:
[10.1145/3656650.3660534](https://doi.org/10.1145/3656650.3660534)

Published: 03/06/2024

Document Version
Peer-reviewed accepted author manuscript, also known as Final accepted manuscript or Post-print

Please cite the original version:
Masoodian, M., & Luz, S. (2024). MAPII - Map-based Interfaces and Interactions. In C. Conati, I. Torre, & G. Volpe (Eds.), *Proceedings of the 2024 International Conference on Advanced Visual Interfaces, AVI 2024* (pp. 1-4). Article 119 ACM. <https://doi.org/10.1145/3656650.3660534>

This material is protected by copyright and other intellectual property rights, and duplication or sale of all or part of any of the repository collections is not permitted, except that material may be duplicated by you for your research use or educational purposes in electronic or print form. You must obtain permission for any other use. Electronic or print copies may not be offered, whether for sale or otherwise to anyone who is not an authorised user.

MAPII – Map-based Interfaces and Interactions

MASOOD MASOODIAN, School of Arts, Design and Architecture Aalto University, Finland

SATURNINO LUZ, Usher Institute, Edinburgh Medical School University of Edinburgh, United Kingdom

Maps have been used for centuries as tools for exploring the real and the imagined, the physical and the metaphysical worlds. Today, in the world of technology, maps also play an important role as underlying representation tools, forming the basis of a wide range of digital devices, applications, and services. Despite this, there are hardly any venues for sharing of research and design expertise, learnings, practices, and experiences of the use of maps and map-like visualizations in the context of visual interfaces and interactions. This workshop aims to fill this gap by providing a much-needed interdisciplinary forum focusing on map-based interfaces and interactions.

CCS Concepts: • **Human-centered computing** → **Interaction design; Visualization; Human computer interaction (HCI)**; • **Applied computing** → *Arts and humanities*.

Additional Key Words and Phrases: Maps, map visualizations, map-like visualizations, visualizations, interface design, interaction design, visual design, cartography.

ACM Reference Format:

Masood Masoodian and Saturnino Luz. 2024. MAPII – Map-based Interfaces and Interactions. 1, 1 (June 2024), 6 pages. <https://doi.org/10.1145/nnnnnnn.nnnnnnn>

1 INTRODUCTION

Maps have, at least for the past few centuries, played many “pre-eminent” roles in human history and human development, as perhaps the first “intellectual tool” [2].

Although the primary role of maps has often been to help humans navigate and find their way through foreign lands and seas, increasingly maps have proved to be indispensable tools for organising and visualising knowledge. Maps have supported their users in considering different possibilities, asking a wide range of questions, and suggesting potential explanations [9]. This is particularly true for interactive maps [10] that enable their users to perform interactive “exploratory” tasks [8].

Beyond their utilitarian roles as functional tools, maps have also played, and continue to play, many other roles in our lives as a medium of representation and visualization to support imagination and creativity. Examples of these include the use of maps in literary works [4], video games [3], and comics [7] as an element of their visual narratives [1].

Despite their far-reaching influence and importance, there are hardly any transdisciplinary venues which bring together design, research, and practical expertise from across all the fields contributing to the design, development,

Authors’ Contact Information: Masood Masoodian, masood.masoodian@aalto.fi, School of Arts, Design and Architecture and Aalto University, Espoo, Finland; Saturnino Luz, s.luz@ed.ac.uk, Usher Institute, Edinburgh Medical School and University of Edinburgh, Edinburgh, United Kingdom.

Permission to make digital or hard copies of all or part of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and the full citation on the first page. Copyrights for components of this work owned by others than the author(s) must be honored. Abstracting with credit is permitted. To copy otherwise, or republish, to post on servers or to redistribute to lists, requires prior specific permission and/or a fee. Request permissions from permissions@acm.org.

© 2024 Copyright held by the owner/author(s). Publication rights licensed to ACM.

Manuscript submitted to ACM

Manuscript submitted to ACM

1

deployment and evaluation of map-based interfaces and interactions. This workshop attempts to bridge this gap by providing a much needed venue for sharing and exchange of relevant expertise.

MAPII 2024 follows on from two successful previous workshops held as part of the International Conference on Advanced Visual Interfaces (AVI 2022) [5], and the IFIP TC13 Conference on Human-Computer Interaction (INTERACT 2023) [6].

2 AIMS AND TOPICS

The main objective of this workshop is to create an interdisciplinary forum for sharing of research, design, and practical expertise, practices, and experiences that are currently dispersed across different disciplines. Therefore, this workshop aims to bring together participants from all the related disciplines, including visualization, visual design, interaction design, user interface design, and cartography. By doing so, this workshop supports its participants' research and design work in creating novel future map-based interfaces and interactions across a wide range of application areas.

In addition this workshop aims to cover a wide range of topics, some of which include, but are not limited to, the following:

- research and design foundations of map-based interfaces and interactions,
- theories, principles, and practices guiding the design of map-based interfaces and interactions,
- applications of map-based interfaces and interactions, in areas such environment, sustainability, epidemiology, healthcare, education, games and entertainment,
- user evaluations and usability studies of map-based interfaces and interactions, and
- the use of map-based interfaces and interactions for addressing societal issues and challenges.

3 ACCEPTED CONTRIBUTIONS

Prospective workshop participants were invited to submit their contributions, either as short papers or extended abstracts, describing their interests and work related to the topics of the workshop. In total, seven contributions were selected for presentation at the workshop. These contributions are briefly summarised below:

(1) **Zones of Conflict – Maps in News Reporting**

Jöns Mellgren

“Maps are a staple of infographic reporting around wars and conflict zones. They are used to convey different facts on the ground – casualties, territorial control, ethnic makeup and so on. Maps in news reports are generally presented as neutral and objective – as tools for reporting “just the facts”. In actuality, “war maps” are almost universally presented with clear borders – a complete lack of fuzziness – reducing geopolitical complexity and thus representing a fantasy of objective knowledge. This presentation takes an artistic research project as a point of departure and explores how various conflicts have been presented visually. The work is based on a collecting hundreds of maps – reporting on the wars in Iraq, Syria, Afghanistan, Ukraine and Gaza. Using various forms of visualisation methods this work presents the indexes of maps as images – a sort of “meta practice” or “mapping of the maps”. The aim is to highlight the subjectivity inherent in map-based reporting, and show how differently various wars have been represented cartographically.”

(2) **Making Maps with Gaps: Questioning Standardized Maps through Participatory Map-making Workshops**

Adelaida Avila, Nicola Cerioli and Rupesh Vyas

“Maps are widespread communication artefacts that convey visual narratives, wielding significant power in shaping our understanding of space. However, their apparent objectivity often belies underlying biases, subtly ingrained within the very fabric of their design. This issue has been brought to the forefront by research conducted in the fields of Critical Cartography and Data Feminism, which have highlighted the inherent problems stemming from biases and power dynamics within the realm of geographical data representation. Central to the inquiry presented here is the question of how participatory map-making workshops can effectively address the gaps in information present in conventional maps, thereby empowering individuals to engage in critical analysis of the traditional, standardized views of urban landscapes. We argue that collaborative environments, that encourage users to actively contribute to the generation of maps can foster awareness of the presence and nature of information gaps.”

(3) **Affective Cartography in Global Health Discourse**

Shane Sheehan

“In recent years the encoding of emotion in visualisation has received increasing attention. This often underused aspect of visualisation design is undervalued in scientific visualisation, where clarity, accuracy, and minimalism are at the core of modern design paradigms. Affective encoding in map design is not uncommon. Modern participatory mapping techniques use emotional encoding and design to understand spatiotemporal human factors. Pre-enlightenment maps often used emotional encoding and decorative visual elements to encode information. While propaganda maps harness the rhetorical power of emotional appeals in an attempt to shape opinions and beliefs. Global and population health discourse makes extensive use of maps to communicate spatial health information to the reader. This presentation evaluates affective map visualisation in the global and population health discourse in the Sustainability and Health Corpus (SHE). The SHE corpus is designed to feature various discourses on global and public health, both mainstream and non-mainstream, allowing scholars to conduct studies on official and grass-roots discourses. The corpus is focused on discourse on Pandemics/Epidemics; Health and Environmental Sustainability; Sexual and Reproductive Health Rights; Adolescent and Young People’s Health; and Knowledge Translation. This bimodal corpora contains text documents and images. These images are indexed and annotated, making them retrievable as part of a text search, or as a collection of images from a sub-corpus selection. To evaluate affective map visualisation in the SHE corpus, we collected all images annotated as maps in the corpus and identified in each the affective visualisation tasks and design techniques used. We found little evidence of affective map encoding in global health mapping in the SHE corpus. This contrasts starkly with the topics and images discussed, which are often quite emotive. This suggests that affective maps could be better used to influence discourse and enhance the emotional impact of global health reporting.”

(4) **A Flexible Approach to Redesigning Pedestrian Route Customisation**

Jonas Hermann and Gian-Luca Savino

“When pedestrians embark on a journey from their starting point to their destination, they consider factors such as safety, familiarity, or scenicness for route selection, not just distance or time. Existing pedestrian navigation systems, however, are often limited to a single or a few criteria, lacking flexibility and customisation. To address this, we have developed FlexRoute, a novel system that allows for the customisation of route optimisation criteria using OpenStreetMap data. Users can select from various labelled entities like restaurants or natural features, tailoring the route to their preferences. This work presents FlexRoute as a solution providing enhanced navigation by considering diverse user preferences.”

(5) Development and Usability of a Location-based Game

Faraz Badali Naghadeh and Kursat Cagiltay

“Location-based games (LBG) incorporate players’ location as their main game element. Therefore, they are played in the physical world by turning every place into a playground. Due to the pervasive nature of LBGs, usability evaluation can differ from the other game genres. This study aims to develop an LBG based on a university campus by implementing a criteria-based method to populate the map and distribute points of interest. Ten participants tested the developed game, and a qualitative analysis was conducted via holding interviews with each participant to evaluate the game’s usability and identify usability issues specific to the developed LBG, and LBGs in general. The findings show that participants showed a positive attitude towards the game. However, multiple issues were identified regarding the LBGs. These usability issues are the inaccuracy of the map in representing the points, the radius of interaction, and location update delay.”

(6) Uncertainty Visualization for Railway Planning

Rebecca Nowak, Alexander Meierhofer, Christoph Traxler
and Johanna Schmidt

“Decision-making under uncertainty is a pervasive challenge in critical applications, recognizing the pivotal role of incomplete information, risk assessment, and cognitive biases in practical domains like business and technical systems. The importance of uncertainty has already been addressed in several visualization and Visual Analytics applications, leading to a vast availability of uncertainty visualization techniques in different domains. Acknowledging these theoretical foundations, this work contributes empirical insights by presenting a real-world decision-making use case and conducting user interviews to gauge the impact of uncertainty visualization on different user types. Additionally, it evaluates existing uncertainty propagation approaches within the context of the real-world use case and user feedback.”

(7) Towards a Design Space to Support the Interactive Visualization of Dynamic Spaces Allocation

Paolo Buono, Aline Menin and Marco Winckler

“Resource allocation has been faced in the past in many domains. Operation research has provided several solutions to optimize resources but humans pose unpredictable reasons that can make the optimal solution sub-optimal. Although algorithmic approaches are widely explored in the literature to solve the problem of resource optimization and have shown promising results, data presentation has not been well addressed yet. This work presents several case studies that report different domain-specific characteristics to propose cross-domain features that may help designers and developers in dynamic resource allocation.”

4 PROGRAMME

This half-day workshop is planned to be informal and interactive, combining short presentations of the above mentioned selected workshop contributions with group discussions, aimed at assisting the authors and other participants with developing their future research and design ideas. The workshop also includes a short hands-on group activity in which the participants work in small groups to perform map-based design tasks. The main components of this workshop are:

- short presentations of the selected workshop contributions,
- group discussion to guide future related research and design,
- a hands-on map-based group activity, facilitated by the workshop organizers, and
- group discussion on future collaborations and outcomes.

Further details on the workshop program are available at the workshop website (<https://avcd.aalto.fi/mapii2024/>).

5 DISSEMINATION

The selected workshop contributions will be shared with the participants. The authors will be invited to contribute an extended version of their submission to a special issue of **Interaction Design & Architecture(s) Journal** (<https://ixdea.org/>) to be published during Spring/Summer 2025. In addition, the workshop includes a discussion session on future publications in, for instance, a co-authored report or journal article for dissemination of the workshop findings.

6 ORGANIZERS

Masood Masoodian (PhD) is a Professor of Visual Communication Design in the School of Arts, Design and Architecture at Aalto University. He leads the Aalto Visual Communication Design (<https://avcd.aalto.fi/>) research group in the Department of Art and Media. His research interests include visual design, interaction design and visualization. He often uses maps as the basis for the design of visualizations and user interactions in a wide range of application areas, including health, tourism, environment, and sustainability. He has served as an organiser, programme chair, programme committee member, and reviewer for numerous international conferences and workshops, including the co-organisation of the previous two MAPII workshops at AVI 2022, and INTERACT 2023.

Saturnino Luz (PhD) is a Professor of Digital Biomarkers and Precision Medicine at the Usher Institute, Edinburgh Medical School, The University of Edinburgh. His research interests include digital biomarkers for neurodegenerative diseases, precision medicine, and inference in high dimensional data sets and graphical models. His work on map-based interfaces includes visualization of human and environmental variables for modelling of infectious disease spread, and other applications in health care. He has organised, chaired, and participated in the programme committees of several conferences, and served as associate editor in several journals. He was also a co-organiser of the previous MAPII workshops at AVI 2022, and INTERACT 2023.

7 PROGRAMME COMMITTEE

Saturnino Luz, *The University of Edinburgh* (United Kingdom)

Masood Masoodian, *Aalto University* (Finland)

Shane Sheehan, *The University of Edinburgh* (United Kingdom)

Artemis Skarlatidou, *University College London* (United Kingdom)

Thomas Rist, *Augsburg University of Applied Sciences* (Germany)

ACKNOWLEDGMENTS

This workshop is supported by the IFIP TC-13 Working Group on Human-Centred Technology for Sustainability (WG 13.10). For more information about WG 13.10 see its website (<http://it4se.hs-augsburg.de/wg13-10/>).

REFERENCES

- [1] Sébastien Caquard. 2013. Cartography I: Mapping narrative cartography. *Progress in Human Geography* 37, 1 (2013), 135–144. <https://doi.org/10.1177/0309132511423796>
- [2] David Greenhood. 1964. *Mapping*. University of Chicago Press, Chicago and London.
- [3] Tymoteusz Horbiński and Krzysztof Zagata. 2022. View of Cartography in Video Games: Literature Review and Examples of Specific Solutions. *KN - Journal of Cartography and Geographic Information* 72, 2 (2022), 117–128. <https://doi.org/10.1007/s42489-022-00104-8>
- [4] Huw Lewis-Jones. 2018. *The Writer's Map: An Atlas of Imaginary Lands*. University of Chicago Press, Chicago and London.

- [5] Masood Masoodian and Saturnino Luz. 2022. Map-Based Interfaces and Interactions. In *Proceedings of the International Conference on Advanced Visual Interfaces* (Frascati, Rome, Italy) (*AVI 2022*). Association for Computing Machinery, New York, NY, USA, 88:1–88:4. <https://doi.org/10.1145/3531073.3535258>
- [6] Masood Masoodian and Saturnino Luz. 2023. Designing for Map-Based Interfaces and Interactions. In *Proceedings of the 19th IFIP TC13 Conference on Human-Computer Interaction* (York, UK) (*INTERACT 2023, Vol. LNCS 14145*), José AbdeInour Nocera, Marta Kristín Lárusdóttir, Helen Petrie, Antonio Piccinno, and Marco Winckler (Eds.). Springer Nature Switzerland, Cham, 616–620. https://doi.org/10.1007/978-3-031-42293-5_82
- [7] Giada Peterle. 2021. *Comics as a Research Practice: Drawing Narrative Geographies Beyond the Frame*. Routledge, New York and London.
- [8] Thomas Rist and Masood Masoodian. 2022. Interactive Map Visualizations for Supporting Environmental Sustainable Development Goals. In *Sense, Feel, Design*, Carmelo Ardito, Rosa Lanzilotti, Alessio Malizia, Marta Larusdottir, Lucio Davide Spano, José Campos, Morten Hertzum, Tilo Mentler, José AbdeInour Nocera, Lara Piccolo, Stefan Sauer, and Gerrit van der Veer (Eds.). Springer International Publishing, Cham, 36–46. https://doi.org/10.1007/978-3-030-98388-8_4
- [9] Peter Turchi. 2007. *Maps of the Imagination: The Writer as Cartographer*. Trinity University Press, San Antonio, Texas.
- [10] Judith A. Tyner. 2014. *Principles of Map Design*. Guilford Press, New York and London.