ICC 2017
WASHINGTON
JULY 02-07, 2017

User Studies in Cartography: A Collaborative Research Agenda

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Abstract*:* The possibility of digital interactivity requires us to reenvision the map *reader* as the map *user*, and to address the new perceptual, cognitive, cultural, and practical considerations that now influence the user's experience with interactive maps and visualizations. Here, we present an agenda for empirical research on these users and the interactive designs they employ. This is one of several research agendas resulting from a multi-stage discussion among international scholars facilitated by the International Cartographic Association, which included an early round of position papers and two subsequent workshops to narrow into pressing themes and important research opportunities. The focus of this agenda is epistemological and reflects the wide interdisciplinary influences on user studies in cartography. The opportunities are presented as imperatives that cross basic research and user-centered design studies, and include practical impediments to empirical research, emerging interdisciplinary recommendations to improve user studies, and key research needs regarding the specific study of interactive maps and visualizations. This presentation is based on the article available at http://dx.doi.org/10.1080/23729333.2017.1288534.

Keywords: user studies, interactive maps, usability evaluation

1. Introduction

The possibility of digital interactivity requires cartographers to reenvision the map *reader* as the map *user*, and to address the new perceptual, cognitive, cultural, and practical considerations that now influence the user's experience with interactive maps and visualizations. Here, we present an agenda for empirical research on these users and the interactive designs they employ. The focus of our discussion is epistemological and reflects the wide interdisciplinary influences on user studies in cartography. The opportunities are presented as imperatives that cross basic research and user-centered design studies, and include practical impediments to empirical research, emerging interdisciplinary recommendations to improve user studies, and key research needs regarding the specific study of interactive maps and visualizations.

2. Process

This is one of several research agendas resulting from a multi-stage discussion among dozens of international scholars facilitated by the International Cartographic Association. We began by soliciting ICA commissions for “big problems” facing the future of interactive cartography and sorted member input into a subset of research themes,

with issues around user studies in cartography emerging as one such theme. We then organized a pair of ICA workshops: the first held prior to ICC 2015 in Curitiba, Brazil, to discuss an early round of position papers on the identified research themes and the second prior to the 2015 AAG in San Francisco, USA, to focus discussion into a targeted set of topics. We present our opportunities for user studies in cartography as one of five cartographic research agendas emerging from this process.

3. Influences

Our discussion on opportunities for user studies in cartography drew from a range of domains, including psychology, geography, human-computer interaction, usability engineering, information visualization, and scientific visualization. From this discussion, we identified several gaps or trends in user studies with incomplete or unclear connection to interactive cartography, such as improving of ecological validity, hybridizing theoretical influences, mixing methods, promoting user-centered design studies, and focusing on transferable and contextual insights in addition to those that are generalizable and reproducible.

4. Opportunities

Our recommendations for user studies in cartography coalesced around three topics: opportunities for basic research on interactive maps and visualizations, opportunities for adapting methods for user-centered design studies, and opportunities for key methodological needs for studying interactive maps and visualizations. Opportunities include:

Basic Research on Interactive Cartography:

1. Expand qualitative and mixed-method research to confirm and enrich quantitative research in cartography.
2. Improve consistency and detail in the reporting of method designs.
3. Promote purposeful sampling of study participants and limit convenience sampling.
4. Adopt new approaches to treat interactive, online, and mobile maps and visualizations as a unique study material.
5. Define and assess high-level, insight-based tasks to complement benchmark tasks in user studies.
6. Complement laboratory and online studies with field studies.

User-centered Design Studies:

1. Establish gold standards for administering and assessing user-centered design studies on interactive maps and visualizations.
2. Streamline and contextualize the user-centered design process for interactive cartography and visualization.
3. Promote comprehensive user-centered design case studies.
4. Leverage user-centered design studies for participatory action research.
5. Conduct user-centered studies on the political economy of interactive cartography and visualization.

Methodological Needs for Interactive Cartography

1. Develop strategies to compare static and interactive maps.
2. Articulate dimensions of interface complexity in user studies.
3. Investigate the value of interactivity in new map use situations.
4. Evaluate mobile interactions.
5. Develop and integrate design guidelines for interaction and representation in cartography.

5. Conclusion

In the presentation, we articulate the current gaps facing interactive cartography, walkthrough each of the listed opportunities, and discuss the range of contributions needed to meet the methodological needs of interactive cartography. This presentation is based on the article available at: http://dx.doi.org/10.1080/23729333.2017.1288534.

References

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