# User Experience Design for Mobile Cartography:
# Update on a ICA Joint Commission Research Agenda

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**Introduction:** Since their first description in the literature (Zipf 2002; Reichenbacher 2001; Reichenbacher 2004; Meng, Zipf, and Reichenbacher 2005; Gartner, Bennett, and Morita 2007), interactive mapping applications drawing on location-based services and mobile technologies have fundamentally transformed the way that people experience place. Energy is surging around mobile in cartography and related fields (Huang et al. 2018), with extant research covering egocentric design (Van Elzakker, Delikostidis, and van Oosterom 2008), mobile icon design (Stevens, Robinson, and MacEachren 2013), adaptive and responsive design (Griffin et al. 2017; Bartling et al. 2022), situated learning (Roth et al. 2018), citizen science (Haklay 2013), and mobile design ethics (Wilson 2012), among others. Recent work also includes new educational materials on mobile cartography for classroom instruction (e.g., Muehlenhaus 2013; Huang and Gao 2018; Ricker and Roth 2018; Kraak et al. 2020). Map users are increasingly likely to be accessing maps of all types through a mobile device, thus a mobile-first design strategy is important to adopt. Accordingly, established tenets of cartography need to be updated for the mobile platform. Further, new cartographic design strategies are needed for mobile maps to ensure a productive and satisfying user experience (UX). In this presentation, we provide an update on an ICA joint commission research agenda on UX design for mobile cartography forthcoming in a special issue of the *Journal of Location Based Services*.

**Process:** The topic of mobile-first cartographic design was proposed for discussion at the 2015 ICA joint commission workshop on Big Challenges in Interactive Cartography in Curitiba, Brazil (see Griffin, Robinson, and Roth 2017). While several of the resulting research agendas tangentially approached mobile UX, none systematically treated the mobile platform's implications for cartographic design. As a direct follow-up, a group of 70 scholars from nine countries convened at Beijing Normal University in July 2019 for a two-day workshop ahead of the 29th International Cartography Conference (https://use.icaci.org/user-experience-design-for-mobile-cartography-setting-the-agenda/). The first day focused on student engagement and established common ground on topics related to mobile-first UX as applied in cartography. The second day comprised presentation of 11 two-page position papers on opportunities and challenges for mobile map UX, with all-hands and breakout discussions building towards a preliminary research agenda.
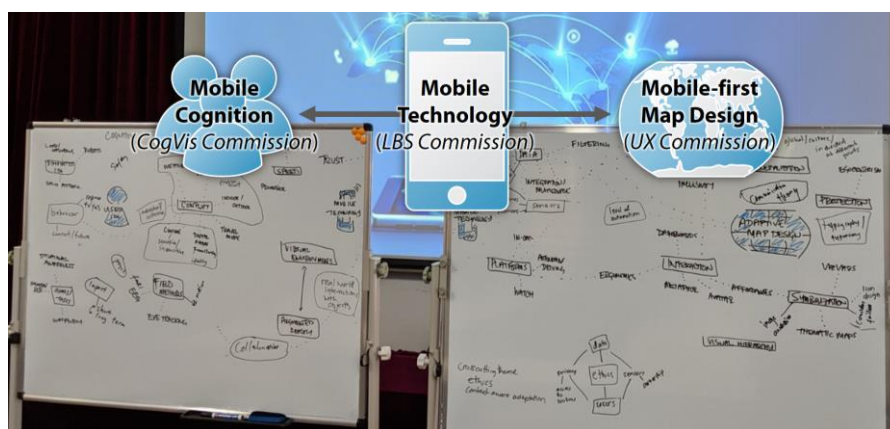


*Figure 1: Concept mapping exercise on UX design for mobile cartography, after Griffin et al. (forthcoming).*

**Outcomes:** The Day 2 concept mapping of research themes resulted in a trilateral plan for developing the research agenda organized loosely by Roth's (2012) definition of cartographic interaction as applied for mobile-first UX (Figure 1): mobile cognition (led by the ICA Commission on Cognitive Visualization, see Griffin et al. forthcoming), mobile technology

(led by the ICA Commission on Location-based Services, see Huang et al. forthcoming), and mobile-first map design (led by the ICA Commission on the User Experience, see Roth et al. forthcoming). We presented the three preliminary research agendas at the 2019 *Location-Based Services* conference in Vienna, Austria in November 2019 for expansion and refinement, before the COVID-19 pandemic imposed an eighteen month pause in development. Group discussions recommenced virtually in Summer 2021. This abstract serves as an introduction to the resulting three research agenda papers forthcoming in a special issue of the *Journal of Location Based Services* on user experience design for mobile cartography, with the special issue planned for release in 2023.

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