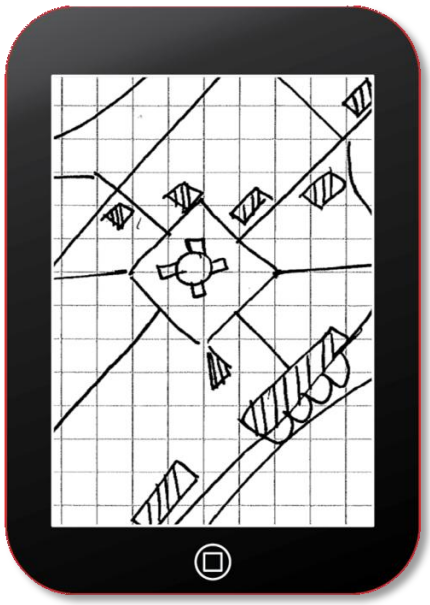
Geography 970

Cartographic Design for Mobile Devices



Instructor:

Robert E. Roth, PhD | reroth@wisc.edu
375 Science Hall
Office Hours: Tuesday/Friday 2:30-3:30pm

Discussion (450 Science Hall):

Monday 2:45-5:15pm

Course Overview

Geographic information are increasingly consumed on mobile devices. This perhaps has resulted in a fundamental change in the relationship between Cartography and Geography, as we now commonly experience maps in the very places they represent; maps today are more than an abstraction of the landscape interpreted from afar, they are interactive information repositories that enrich and contextualize the landscape in which the map user is situated. These maps are often responsive across display devices, having different layout and style rules—and therefore affording different user experiences—between mobile and non-mobile platforms. Further, mobile maps promote the volunteering of geographic information by citizens, resulting in the opportunity of greater public participation in mapping, but also leading to new questions in cartographic ethics. Despite its ubiquity, cartographic design theory has failed to keep pace with technical developments in mobile mapping. In this seminar, we will address the following fundamental research question: *how should age-old, time-tested conventions and recommendations in cartographic design be revised, or completely eliminated, due to advances in mobile technology*?

In taking this seminar, you will participate in the following activities/accomplish the following learning objectives: (1) perform a targeted literature review on topics related to 'mobile' (in Cartography and related fields) to the end of synthesizing the current understanding of mobile mapping and developing a research agenda for mobile cartographic design; (2) design and develop a responsive website supporting situated learning from project conceptualization through deployment; and (3) design and administer an evaluation of the responsive website for reporting in a research paper about cartographic design on mobile maps. Seminar time will be split between discussion of weekly readings and updates about progress on the responsive website. An agenda will be circulated the Sunday before class outlining topics to be covered the following day; you are encouraged to append the agenda each week as necessary.

Course Requirements

The Geography 970 seminar is designed for GIScience graduate students with an interest in cartographic design and web mapping. The seminar assumes familiarity with topics covered in Geography 370, or an equivalent course on reference and thematic mapping. If you have not taken Geography 575, you **must** complete three additional background readings.

Required Text: *Web Cartography: Map Design for Interactive and Mobile Devices* (2013) by Ian Muehlenhaus. Boca Raton, FL: CRC Press. (available new from Amazon for $71.51 with free two-day student shipping and on course reserve in the Geography Library)

Evaluation

Each evaluated item represents a percentage of the total course weight; final grades are assigned according to your composite percentage across all evaluated items.

	Item	Weight	Description
Literature Discussion	**Cart. Design Topic Summary**	10%	Bulleted summary of assigned cartographic design topic (no maximum)
	Annotated Bibliography	10%	Selection/summary of recommended papers regarding assigned mobile influence topic
	Think Piece + Worksheet	10%	Position statement on assigned mobile influence topic (1200 words maximum)
	Mobile Influence Topic Summary	10%	Summary of influence of assigned topic on mobile mapping (400 words maximum)
	Participation	10%	Weekly reading and discussion of assigned papers, including minutes; overall engagement
Project	**Team Responsibilities**	35%	Creative and comprehensive completion of project tasks assigned to team
	Team Presentation	5%	In-class 'pitch' presentation of primary team deliverable
	Team Report	10%	Write-up of team's deliverable for integration into research paper

Literature Discussion (50% of Course Grade)

While graduate seminars vary widely based on the topic under investigation, they are united in their dual emphasis on critical reading/discussion of emerging literature and critical reflection through writing. Being a 'critical thinker' as demonstrated through reading and writing is essential for successful completion of a thesis or dissertation, and may be the most valued skill in academia generally. Reading and writing also are surprisingly important to professional cartography, as positions that allow you to remain on the cutting edge of cartographic design, and to contribute back to the discipline, tend to be the most desirable. *To stay **relevant** in Cartography, a pdf reader, a web browser, and a word processor are equally as important as a graphics design package, a GIS, and coding*.

Half of the course will be dedicated towards the critical reading and discussion of research and technical papers, and towards critical writing about these papers. Rather than preparing an open-ended 'term paper of long length at the end of the semester, writing assignments are structured such that: (1) everyone is writing at different times in the semester, allowing for each of you to 'carry the torch' at some point and (2) they contribute directly towards the literature review of an eventual research paper.

For one week this semester, you will lead discussion on an emerging topic that 'influences' cartographic design on mobile devices (see the composite schedule at the end of the syllabus for a list of topics); I will act as lead the other weeks. The discussion leader is expected to do a much more comprehensive review of the assigned topic and has the liberty to prepare whatever discussion questions he or she sees fit (once clearing it with me). There are five evaluated items associated with literature discussion.

1. Cartographic Design Topic Summary (10%; due Monday, 5/12 @Noon)

We will spend the first three weeks working through the Muehlenhaus text for context. The textbook is the first effort to update cartographic design 'truisms' for web-based and mobile mapping. As part of this discussion, each of you will be assigned to a cartographic design topic (e.g., projections, typography, interaction operators) for which you will be responsible throughout the semester. During discussion, keep track of:

- Design recommendations specific to your topic as described in the literature; maintain the citation in your summary, and perhaps include a quote if relevant.
- Design recommendations specific to your topic as elicited through classroom discussion; report on recommendations that remain strong after discussion.
- Research recommendations specific to your topic that cover viable and timely areas of future investigation (e.g., "We need to know…").

Treat this deliverable as a summary of how cartographic design needs to be responsive between mobile and non-mobile devices. The final week of class is reserved to discuss what we've learned about your cartographic design topics, with final reports due **Monday, 5/12 at Noon**.

2. *Annotated Bibliography (10%; due Monday @Noon week prior to discussion)*

You will be responsible for reviewing key research and technical articles on your assigned topic prior to discussion and for submitting an annotated bibliography to me summarizing these materials. Your annotated bibliography must include at least **6 scholarly articles** and should provide the following information about each article:

- The complete citation (author, year, title, journal/book, volume/issue, pages);
- Purpose of article ("This article approaches the topic of ___ by doing ____");
- Perspective of the author (e.g., Cartography, Information Visualization, Human-Computer Interaction, etc.);
- Method design (if empirical);
- Description of mobile application (if technical);
- Major findings, results, or conclusions (*this should be the **emphasis** of the entry*);

Each article entry should be **~150 words** in length, with particularly interesting or relevant papers receiving slightly longer entries. I will select **~2 articles** from the annotated bibliography for classroom discussion; please submit your own recommendations regarding which two to read as well. You also may assign **one** interesting or relevant blog entry providing important background or technical skills regarding your assigned topic, but this blog entry does **not** count towards your 6 scholarly articles in the annotated bibliography. You **cannot** include articles in your annotated bibliography that already have been reviewed by another student; I anticipate that overlap across influence topics will be minimal.

I will provide a cursory list of readings as a starting point, but these do not need to be included in the subset of articles that we read each week. When searching for articles, please keep the following in mind:

- Is the article explicitly cartographic? Try to review articles in Cartography & GIScience before extending to other fields.
- What is the impact of the article? How often is it being cited (use Google Scholar) and for what reason is it being cited?
- Does the paper present a new theoretical framework, results of an empirical study, or a technical implementation? Emphasize the former two; ideally, we will assign **one** empirical study each week as a way of informing our own method design.
- How relevant is the paper to our research on responsive cartographic design and mobile mapping?

The annotated bibliography is due on **Monday at Noon one week prior** to your assigned discussion period. I will select the articles we will read for the following week and integrate the annotated bibliography into a broader class bibliography by **Tuesday at Noon**. Thus, you should have approximately six days to review the selected articles.

3. Think Piece & Worksheet (10%; due Thursday @Noon week prior to discussion)

After completing the annotated bibliography, you will prepare a 'think piece' for the class to review as a critical introduction to the assigned articles. The think piece should be **1200 words** at maximum and should include the following:

- An introduction to your assigned topic, based on your broader review for the annotated bibliography.
- Identification of key findings that you believe should influence our research on responsive cartographic design and mobile mapping.
- Identification of any points of confusion or disagreement you have with the papers that require in-depth discussion.
- Linkages to other course readings and prior classroom discussions.

You also will prepare a worksheet containing a set of key questions or prompts for discussion the following Monday (*this does **not** count towards your 1200 word limit*). When preparing the worksheet, consider the following template for critically analyzing a research paper. You should not follow this template exactly, but rather use these prompts as a baseline for drawing out discussion on the influence of these articles on our research:

- The main **purpose** of this article is ___.
- The key **research questions** that the author is asking are ___.
- The main **point of view** taken by the author is ___.
- The most important **claims** the author makes are ___
- The key **concepts** we need to understand in this article are ___. By these concepts, the author means ___.
- The main **assumptions** underlying the author's thinking are ___.
- The main **conclusions** of this article are ___.
- If we take this line of reasoning seriously, the **implications** on **our research** are ___.

The think piece and worksheet draft are due on **Thursday at Noon** the week prior to your assigned discussion period. I will give you feedback and suggestions on your worksheet over the weekend. You are **expected** to bring ten copies of the revised worksheet to your assigned discussion period. We will use the first ~10 minutes of every class period to review the worksheet before beginning discussion.

4. Mobile Influence Topic Summary (10%; due Thursday @Noon after discussion)

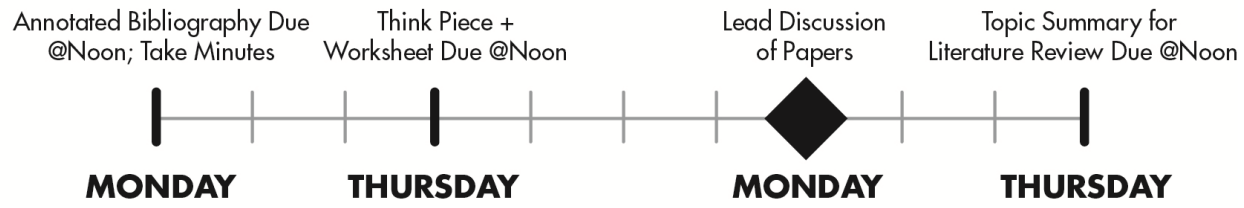
After leading discussion, you will prepare a condensed written summary of your assigned topic as it relates to cartographic design on mobile devices. The summary should be densely cited (e.g., one citation per sentence outside of the topic sentence) and should

cover the key findings—and key gaps in our understanding—identified through your background review and through classroom discussion. This should be prepared as a short (1-2 paragraph) entry into the literature review of a research paper; your influence topic summary cannot exceed **400 words**.

The first draft of the mobile influence topic summary is due on **Thursday at Noon** following your assigned discussion period; please expect one round of revision to the summary based on my comments. The following timeline provides an overview of deliverables centering upon your assigned topic date (shown as a diamond).

I **highly recommend** that you get started on preparing your annotated bibliography as soon as you receive your influence topic assignment. Do not begin the annotated bibliography the weekend before it is due (or especially the morning it is due!). Getting an early start will result in collection of more interesting and relevant papers, as well as a less stressful experience around your assigned discussion date. Treat this series of assignments as your term paper, but one that is due in-term rather than at the end of the term.

DISCUSSION TIMELINE



5. Participation (10%; ongoing)

In the other weeks, you are expected to read the assigned articles and think piece, coming to class prepared to respond to the discussion lead's questions and prompts. The success of the seminar, positive or negative, depends on your dutiful participation; *don't leave your colleagues hanging by failing to read the assigned material carefully!* I will send an email to you within the first five weeks of the class if I feel your participation is lacking in anyway.

Because you are likely to experience a spike in work the two weeks leading up your assigned date, you will be responsible for taking minutes on the Monday prior to your assigned class period and therefore are not expected to participate as fully as the other weeks. Alert me **immediately** if you expect to miss class. Because of the emphasis on classroom discussion, two classroom absences (outside of class periods already canceled) require completion of an additional reading/writing deliverable.

Global Madison Project (50%)

Critical reading, discussion, and writing on literature will be complemented with the design, development, and evaluation of a responsive website supporting International Studies (IS101). IS101, taught by Professor Stephen Young, provides a broad introduction to dimensions of globalization. Discussed topics include the global components of trade, development, security, food, health, and energy, among others. The purpose of the responsive website is to take one of the course's discussion sections 'into the streets' of Madison, with the website organizing interactive, multimedia content (e.g., text, maps, videos) first introducing the location at which discussion is held and then making connections of how that place is related to other places on the planet. Such an educational experience that occurs in the exact place under discussion is described as **situated learning**.

Following discussion at the given place, students will start their assignment for the following week as part of their 'walk home', navigating to a different location of their choosing (from a predetermined list) and attempting to make similar global connections about the selected place. Accordingly, Prof. Young and I have referred this situated learning project as **Global Madison**. The Global Madison project affords the opportunity to explore responsive cartographic design, as students will need both a mobile experience (during discussion) and non-mobile experience (for review following discussion). While there may be an opportunity to collect some volunteered geographic information, the focus of the Global Madison website is on consumption of the learning experience, rather than authoring.

To distribute labor evenly across the seminar group, each student will be assigned to a 'team', with each team responsible for different tasks on the Global Madison project and therefore having different deliverables and deliverable due dates. Project teams will be determined during the first week of the semester. Each project team is responsible for three deliverables as a group:

1. **Team Responsibilities (35% of course grade):** Each team is assigned a different set of responsibilities to complete across the semester. The number of individuals placed on each team is a reflection of the anticipated amount of time needed to complete the team responsibilities.

2. **Team Presentation (5% of course grade):** Each team will complete one formal 'pitch' presentation to ensure that work on team responsibilities moves forward efficiently. The pitch presentation is graded according to progress towards the final team responsibilities.

3. **Team Report (10% of course grade):** Each team is required to submit a team report at some point in the semester. The report represents the contribution of the team to the writing of the research paper and may require multiple drafts before accepted.

1. Visual Storytelling Team (2-3 individuals)

Summary of Responsibilities:

- Interview Prof. Stephen Young and Mario Bruzzone (Project Assistant) about goals of IS101.
- Produce wireframes of different possible situated learning lessons.
- Support Mario Bruzzone in archival research and data compilation.
- Produce a requirements document and storyboard for the responsive website, including a pixel perfect mockup of the interface for implementation by the UI/UX team.
- Support the UI/UX team during development by processing data, creating maps, and generating text and video descriptions.

Pitch Presentation (3/10): Present a final, polished version of the storyboard and interface mockup.

Team Report (3/24): Provide a description of the scenario-of-use (i.e., walk-through the storyboard) of the responsive website that will be included in the research paper as the 'Website Description' section. Relevant citations should be included where appropriate. This description should be illustrated with screenshots, and should not exceed **1000 words**.

You might want to be on this team if you: want to design maps and videos for inclusion in the responsive website, want to learn more about archival research and visual storytelling, want your effort to be front-loaded in the semester, lack coding skills or are not interested in coding generally.

2. UI/UX Team (3-4 individuals)

Summary of Responsibilities:

- Research best practices in responsive design by completing online tutorials and reviewing relevant online blogs.
- Produce a summary of technical best practices in responsive design as relevant to the project.
- Implement the responsive website.
- Debug and stabilize both mobile and non-mobile versions of the responsive website.

Pitch Presentation (4/14): Present a beta version of the responsive website. The presentation should provide a walkthrough of the existing functionality and summarize any to-do items that need to be addressed prior to launching the experiment.

Team Report (5/5): Update the original 'Website Description' with notes on the technical implementation of the responsive website. This description should be illustrated with screenshots from the website itself, and still should not exceed **1000 words**.

You might want to be on this team if you: have existing skills in HTML/CSS/JS and want to expand your coding skills, have taken Geography 575, are excited to learn more about responsive web design and how it is technically implemented, are considering a career as a UI/UX developer.

3. Evaluation Team (2 individuals)

Summary of Responsibilities:

- Prepare the project IRB.
- Formalize the project research goals based on readings and class discussion.
- Produce the experimental protocol for evaluating both the mobile and non-mobile versions of the responsive website.
- Administer the experiment.

Pitch Presentation (4/7): Present the complete experimental protocol. Emphasize any functionality in the responsive website that needs to be updated to conform to the experimental protocol; this is the last opportunity to change the core requirements of the website.

Team Report (4/14): Provide a first draft of the 'Methods' section for the research paper, organized according to four subsections: participants, materials, procedure, and analysis. Relevant citations should be included where appropriate. The description should not exceed **1500 words**.

You might want to be on this team if you: are interested in a career in academia, have not taken Geography 572 or 575, want your effort to be backloaded in the semester, are not graduating this semester and wish to continue with the analysis and write-up over the summer.

Week	Team	Lecture/Lab Topic	
W1	**No Meeting: Martin Luther King Jr. Day**		
W2 (1/27)	**Lead: Rob**	**Course Introduction; Brainstorming Exercise**	Storytelling Phase
	Storytelling	*Submit Team Applications (1/27); Complete CITI Training (1/31)*	
	UI/UX Design	*Submit Team Applications (1/27); Complete CITI Training (1/31)*	
	Evaluation	*Submit Team Applications (1/27); Complete CITI Training (1/31)*	
W3 (2/3)	**Lead: Rob**	**Cartographic Design on Mobile Devices 1: *Web Cartography Chs 1-6***	
	Storytelling	*Report on Interview with Young/Bruzzone; Assign IS101 Textbook Chapters*	
	UI/UX Design	*Research Responsive Design Technical Best Practices*	
	Evaluation	*Prepare IRB*	
W4 (2/10)	**Lead: Rob**	**Cartographic Design on Mobile Devices 2: *Web Cartography Chs 7-12***	
	Storytelling	*Present 2-3 Alternative Wireframes; Archive/Data Research*	
	UI/UX Design	*Research Responsive Design Technical Best Practices*	
	Evaluation	*Submit IRB*	
W5 (2/17)	**Lead: Brian**	**Mobile Mapping: Core Readings**	
	Storytelling	*Present on Requirements Document; Archive/Data Research*	
	UI/UX Design	*Research Responsive Design Technical Best Practices*	
	Evaluation	*Manage IRB Comments*	
W6	**No Meeting: Rob in Czech Republic**		
W7 (3/3)	**Lead: TBD**	**Situated Learning** (*Ian M. Yi-Fu 3/7*)	
	Storytelling	*Update on Data Compilation / Map Design Progress*	
	UI/UX Design	*Present List of Responsive Design Technical Best Practices*	
	Evaluation	*Manage IRB Comments*	
W8 (3/10)	**Lead: TBD**	**Visual Storytelling**	Dev Phase
	Storytelling	***Present Storyboard & Mockup***	
	UI/UX Design	*Begin Development*	
	Evaluation	*Support UI/UX Team with Informal Debugging Across Devices*	
	No Meeting: Spring Break!!!		

W9 (3/24)	**Lead: TBD**	**Responsive Web Design**	Development Phase
	Storytelling	***Report on Storyboard Due***	
	UI/UX Design	*Feedback on Alpha*	
	Evaluation	*Feedback on Research Goals regarding Responsive Cartographic Design*	
W10 (3/31)	**Lead: Eval**	**Research Methods in Cartography**	
	Storytelling	*Support UI/UX Team with Data Processing, Map Design, Text/Video Generation*	
	UI/UX Design	*Feedback on Alpha*	
	Evaluation	*Formalize Research Goals; Discuss Methods*	
W11 (4/7)	**Lead: TBD**	**Location-Based Services**	
	Storytelling	*Support UI/UX Team with Data Processing, Map Design, Text/Video Generation*	
	UI/UX Design	*Feedback on Alpha*	
	Evaluation	***Present Experiment Protocol;*** *Submit IRB Modification (if necessary)*	
W12 (4/14)	**Lead: TBD**	**Volunteered & Contributed Geographic Information**	
	Storytelling	*Support UI/UX Team with Data Processing, Map Design, Text/Video Generation*	
	UI/UX Design	***Present Beta***	
	Evaluation	***Report on Methods Due*** *; Support UI/UX Team with Informal Debugging*	
W13 (4/21)	**No Paper Discussion: Focus on Experiment Launch**		
	Storytelling		
	UI/UX Design	*Debug/Stabilize Experimental Version*	
	Evaluation	*Administer Pilot*	
W14 (4/28)	**Lead: TBD**	**Ethics of Mobile**	Research Phase
	Storytelling		
	UI/UX Design	*Debug/Stabilize Non-Experimental Version*	
	Evaluation	*Administer Experiment*	
W15 (5/5)	**Lead: Rob**	**Cartographic Design on Mobile Devices 3: *What Did We Learn? What's Next?***	
	Storytelling		
	UI/UX Design	***Report on Responsive Functionality Due (as update to Storyboard report)***	
	Evaluation	*Administer Experiment*	
Finals	**Cartographic Design Reports Due; Meet Finals Week to Discuss Preliminary Results**		