
Introduction: Critical GIS

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Does critical theory have a place in GIS? While the answer today is “yes,” and some stable ground around its understanding has been created, “critical GIS” remains an oxymoron for many GIS users and critical social theorists. Since 1968, the year in which Roger Tomlinson for the first time referred to GIS in designating the Canadian Geographic Information System, GIS has become a multi-billion-dollar industry, a key part of military operations, an aid to environmental protection and nature conservation, a key element of government and private management and surveillance, and an invigorating basis for new types of academic research and community activism. These and other developments in GIS technology have been praised by some and discredited by others. Certainly GIS has grown to become one of current society’s most common yet, in many ways, most misunderstood technologies. This special issue presents a collection of articles related to the field of critical GIS and marks a passing point in the development of such scholarship. So, what is “critical GIS,” and how do the authors in this special issue employ its insights to analyse geospatial technologies?

Despite exceptional proliferation of and continued interest in critical GIS, its content remains diverse and it means different things to different people. In general, it includes a growing number of researchers who, in the last 10 years, have attempted to bring social theory concerns into the field of GIS technology. Ten years ago, the publication of the *Ground Truth* (Pickles 1995) became the most coherent and controversial statement about social implications of GIS. The book showed how political and power laden the technology and its use had

been to date. Since then, critical investigations of GIS have evolved into a highly dynamic and diverse field with publications in major geography, GIS, and social science journals. Issues related to public participation GIS (PPGIS) are given thorough consideration in the recent volume *Community Participation and GIS* (Craig, Harris, and Weiner 2002). Thus, critical GIS, a term introduced by Nadine Schuurman (1999), is concerned with various impacts of GIS technologies on people. GIS/2, an attempt at creating a reconstructed GIS, became part of the GIS and Society initiative launched by the National Center for Geospatial Intelligence Standards (NCGIS). Jeremy Crampton (2002) includes anti-essentialist statements to argue that critical GIS seeks a reconstructed GIS that avoids essentializing technology, while John Wing and Kevin St. Martin (2005) talk about a “heterodox GIS” that is already present and embraces alterity relative to the mainstream, orthodox GIS. Today, “critical GIS” crosses many disciplinary and intellectual landscapes of cartography and geography but remains concerned with power embedded in the production and use of technology. It desires a reconstructed GIS that is compatible with the emancipatory scholarship advanced by feminist researchers, post-structuralist scholars, Marxian scientists, and post-colonial thinkers.

An issue for “critical GIS” may be that it lacks a coherent theoretical core that easily positions it in modernist concepts of scientific disciplines, but it is more than a reaction to modernist disciplinary orientation. Its intellectual engagements involve a political engagement with established disciplines. Ultimately, its staying power will arise from the robustness of its engagements.

Critical GIS: Quo Vadis?

While a thorough consideration of critical GIS is yet to come, for readers we hope the articles in this special issue document the ongoing engagement of critical GIS and point out some of the directions in which it is going. The authors are knowledgeable about both the technical side of GIS and critical perspectives, and their approaches are premised on the “care of the subject” (Schuurman and Pratt 2002). Such a fruitful combination of the technical expertise with the interest in social dynamics surrounding the technology has grown considerably over the course of the last decade. This special issue of *Cartographica* also marks a shift in the engagement of critical GIS with the empirical, patriarchal, colonial, and status-quo traditions in geography and other sciences. As Eric Sheppard puts it in the first article, it is the closing of a phase that focused on debate and critique to move toward critical research.

The contributors to this special issue employ a variety of terms to designate various geographic technologies: GIS, GIS technologies, GIScience, geospatial technologies, geographic information technologies. The different terms point to the increasing diversity of GIS and underscore its situatedness in social and political contexts. What a person or group calls GIS technology reflects their positioned epistemology. In the new phase, the diversity of terms reflects the diversity of critical research. The articles collected here exemplify the changing engagement and the diverse epistemologies that now draw on GIS. Some express the critical research into the development and use of GI technologies. Others draw on GIS as a means to enhance their critical research. Demonstrating the current vibrancy of critical GIS, these articles highlight the fact that with each use of GIS the intellectual and political issues of what we represent and how we represent it increase in relevance and importance.

Eric Sheppard’s article sets the stage for considering how critical GIS has changed. Sheppard provides a thoughtful examination of the evolutionary trajectory of critical GIS that draws on the work of Imre Lakatos and Helen Longino in science and technology studies. In Sheppard’s interpretation, which expands his previous work on GIS and society, critical GIS constitutes a new research program with “hard-core” propositions and an agenda setting the problems to be worked on. Yet the development of critical GIS, for Sheppard, is not predetermined but contingent, suggesting that developments in one area occur at “the expense of foreclosing or marginalizing alternatives.” His assessment of critical GIS expounds on the dialectical relationship between GIS and society, calling for a pluralist and social

approach to critical GIS that is also “relentlessly reflective.”

The challenge of advancing our understanding of the dialectical relationship between GIS and society is developed in the following article by Nick Chrisman, one of the first generation of GIS developers who has become active in constructivist studies. Chrisman draws on science and technology studies here to connect social needs that have led to technological advances and the resulting technological issues that then go back to the social realm. His reading of constructivist theory and research warns us to avoid the traps of technological determinism evident in the common disconnect between the technology and its critiques. In Chrisman’s approach, technology and society are never distinct entities but are involved in the mutual constitution of each other. The developments of GIS software, data, and results that he analyses help us to understand that the dialectical relationship between GIS and society is never unidirectional but always circular.

Sara McLafferty addresses some of these relationships from a feminist perspective. Indeed, in recent years feminism has been a key element of reflections on the partiality and situatedness of GIS. McLafferty reflects on the feminization of GIS and its consequences, including the incorporation of new types of data, increased critical self-awareness among GIS researchers, and the development of feminist visualization as a research tool. The gendered construction of GIS makes it both masculinist and feminist, because, through the strong user interaction of the technology, a point echoed in Chrisman’s article, GIS supports “grounded” knowledge. The increasing feminization of GIS creates more opportunities for it to become increasingly feminist. McLafferty warns, however, that the situatedness of GIS is, in any case, complex and often involves conflicting effects.

In her article, Nadine Schuurman takes up the issue of interoperability in GIS. While of the little apparent relevance to policy, interoperability issues ultimately affect all approaches involving data integration. Schuurman examines these issues in relation to using (or trying to use) geographic information on the Internet. While vast data resources are available (and the amounts keep growing), it is often very difficult to use data from different sources. Interoperability is a search for solutions to this problem; as Schuurman explains, it is the pursuit of a common language for computation environments – a digital Esperanto. She discusses research activities from around the world, and more substantial government standardization activities in the United States and Canada, with a focus on the social, political, and economic effects of data integration and the limits imposed by representation in GIS. Such an approach

offers a segue to consider the problems of semantic standardization to assist with integration of data that represent different understandings of, and use different terms to describe, the same phenomena. Schuurman concludes by pointing to the need to stabilize standards based on both social and technical considerations.

Marc Armstrong and Amy Ruggles turn to the important issue of surveillance, which highlights the connections between social and technical considerations. Their article discusses and problematizes the growing use of GIS for surveillance, questioning this increasingly important use of GIS. Drawing on a rich and thorough examination of the sensor technologies, they discuss applications and the problems emerging from the continuous gaze of government and business over the lives of millions. The potential to do reverse address matching, that is, to generate a subject's address from a variety of information sources, which can be then linked to scores of other databases containing information about the person, opens the door to increasingly thorough surveillance. This surveillance has been questioned, but its use has rarely been challenged. Armstrong and Ruggles also point out that geography-based surveillance operations face problems and persistent difficulties, especially in going from abstract spatial data to meaningful geographic information. These problems and difficulties, however, do not decrease the surveillance potential of the continuous gaze of governments and businesses. The dialectic between society and GIS is under continuous tension as people increasingly adopt digital technologies that leave traces of their activities behind.

The article by Stephen Matthews, James Detwiler, and Linda Burton highlights the role of GIS in raising the spatial awareness of researchers studying the effects of welfare reform on low-income women and children. Including the spatial component of people's activities and neighbourhood representations immensely added to the project's ability to document the effort required to maintain both family and work responsibilities. The use of GIS also enabled the researchers to depict this effort, augmenting their understanding of the research results. In addition, increased sensitivity to the nature and quality of the data helped researchers detect incomplete or inaccurate data. This article also emphasizes that GIS and visualization must be used in combination with other approaches, such as ethnography, to produce meaning. Used by only a few of the researchers working on the large project in three metropolitan areas and using multiple methods for more than 2400 households, GIS nevertheless enabled the integration of multiple types of data collected at multiple scales.

The final article in this special issue, by Jon Corbett and Peter Keller, examines the empowerment/marginalization nexus that is an important issue for discussions of participatory GIS. Drawing on their experiences working with two Indonesian communities, the authors set out to define empowerment, drawing on social work literature. They present two definitions of empowerment and empowerment capacity that consider four catalysts of empowerment and two social scales. They argue that discussions of empowerment need to develop a deeper understanding of the processes of empowerment.

These articles mark important changes in the development of GIS and signal that discussions of GIS and society have moved on to develop epistemologies for critical research and development of geographic information technologies. The contributions point to the breadth and depth of critical GIS's engagement with both past developments and future uses. That, we hope, bodes well for the future.

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References

- Craig, William J., Trevor M. Harris, and Daniel Weiner, eds. 2002. *Community Participation and Geographic Information Systems*. London: Taylor & Francis.
- Crampton, Jeremy. 2002. "The Risks of Security." *Environment and Planning D: Society and Space* 20: 621–35.

Pickles, John, ed. 1995. *Ground Truth: The Social Implications of Geographic Information Systems*. New York: Guilford.

Schuurman, Nadine. 1999. "Lessons in Constructing a Science: Promises and Pitfalls of GIS." Paper read at Geographic Information and Society 99 20–22 June, Minneapolis, MN.

Schuurman, Nadine, and Geraldine Pratt. 2002. "Care of the Subject: Feminism and Critiques of GIS." *Gender, Place and Culture: A Journal of Feminist Geography* 9: 291–99.

Wing, John, and Kevin St. Martin. 2005. "The Discourse of GIS and the Potential for Heterodoxy." Paper read at the Annual Meeting of the AAG, 5–9 April, Denver, CO.

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