

GIS as Media?¹

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Abstract:

Geographic Information Systems are frequently thought of as a method to analyze and display spatial phenomena. As a state or military instrument for surveillance and control, or as consumer-oriented technology for navigation and geo-enabled search, GIS technologies have largely been employed to represent the present conditions of the world – whether atmospheric, geopolitical, social and urban, or geophysical. More recent critiques of these technologies have emphasized their societal implications, such as the ways in which spatial representations enable new forms of spatial problem solving. However, the digital landscape is evolving, as information generated by social/spatial media creates uneven topographies and layers of information describing everything from pedestrian landmarks to social relations. Furthermore, as real-time information and surveillance creates an impetus to examine 'big data', renewed interest in Social Network Analysis (SNA) provides a distinct lens on these media geographies. In this chapter, we shall present the history and development of GIS within geography amid the proliferation of digital media to better articulate the relative novelty of spatial/social media – to chart out a renewed understanding of the relationship between the map and the map reader, as a kind of map 2.0 approach that foregrounds map interactivity as the new model of map communication. In other words, we ask what are the affordances of broadening conceptions of GIS as media?

...media are increasingly becoming like GIS. (Sui and Goodchild 2011, p. 1739)

Introduction

In early 2012, Google announced Project Glass, a device worn as glasses that augments the user's vision through communication with the user's mobile device. The glasses display

¹ Here, we continue to think through this question posed by Dan Sui and Mike Goodchild in 2001 and again in 2011.

images for the user's eyes and listens for audible commands. In a promotional video released by Google to announce the device (2012), the user navigates urban spaces augmented by the device, including city streets, the public transportation network, and even the internal, private spaces of a bookstore. While moving around the city, the user takes phone calls and responds to instant messages, taking photos of what he sees and enters into a video chat. The device functions through minimal gestures and human interaction, responding through voice commands and the framing of the user's gaze. Project Glass anticipates a future where the seemingly immaterial online spaces created through the internet are made material through embodied manifestations of the mobile user. In this present future, media are both social and spatial, and understanding the phenomenality of life requires hybrid approaches and new conceptual footings.

While the promotional video displays new forms of device interactivity, the types of technology engaged (SMS, navigation, video phone calls, etc.) are becoming more common forms of mobile device functionality. Here, social and spatial mediation of life is represented as everyday, part of the mundane experience of urban, continuously connected living. In the context of these socio-technological developments, we consider the following question: in the wake of emerging social/spatial analytical tools for the study of this media saturation, how might thinking GIS as media help to better understand the social implications for digital information technologies? Indeed, geographers and sociologists are recognizing the increased importance of online social media in material, everyday relationships. As a result new methods of analysis and representation are emerging to both better understand and visualize patterns of social and spatial interactivity. In this chapter, we examine the reconceptualization of spatial technologies such as GIS *as* media.

To better understand the relationship between GIS and contemporary forms of social media, this chapter proceeds in three sections. First, we trace forward a long-standing debate around the ontological status of GIS as a tool or as a science by suggesting that a third position – GIS as media – might be productive (following Sui and Goodchild 2001, 2011). Second, we discuss the possibilities of bridging GIS and SNA in a study of mediation, although we recognize that a full treatment of these intersections are beyond the scope of this chapter (see Radil et al. 2012). Third, we briefly propose the political implications of such a move, before finally offering some concluding thoughts, to open a discussion of the relationships between GIS and media.

GIS: Science, Tool, Media?

Scholars engaged with GIS are more recently self-identifying in more diverse ways than just a decade ago. Now, with the development of the digital humanities and the solidification of critical GIS as a research and teaching subfield, critical human geographers and scholars within the humanities more generally are joining critical social scientists in the application of GIS toward understanding complex social-spatial relations. For instance, scholars like Franco Moretti and Lev Manovich are mapping literature and creating interactive digital media to better understand cultural artifacts traditionally understood through techniques like close readings (Moretti 2005, Manovich 2002). And geographers are increasingly hailed by the humanities to bring a technical sensibility to the traditional artifacts of the humanities (Bodenhamer et al. 2010, Dear et al. 2011).

But it has been a long, winding road toward transforming multi-disciplinary collaborations and working to create spaces within the academy which foster rigorous, if alternative, imaginations for geographic information technologies. Indeed, the rebranding of

GIS as a science (compare O'Sullivan 2006, Wright et al. 1997, Pickles 1997) further locks-in the notion of geospatial technologies as a tool of the scientific method, carrying with it all sorts of ghosts that have caused the critical humanities and social sciences to stand at a distance. In discussion of the posturing of GIS as a science, Wright et al. argue:

First, the driving technology must be of sufficient significance; second, the issues raised by its development and use must be sufficiently challenging; third, interest in and support for research on those issues must be inadequate in the existing disciplines; and fourth, there must be sufficient commonality among the issues to create a substantial synergy. (1997, p. 357)

Here, the question of 'GIS as a science' is answerable only with regard to the positioning of 'GIS as a tool', instead. In reading Pickles's response to this article, we note the implications of this rub:

The heuristic categorization of tool use, tool making, and science mis-specifies the issue. Modern science is now so thoroughly shot through with technical apparatus and so closely tied to various ways of controlling nature and society that it is thoroughly technological. Such a relation cannot be avoided or overcome by wishing or defining it away, an effort in futility we would have to characterize as idealism. (Pickles 1997, p. 364)

Pickles attempts to establish the grounds necessary to characterize GIS (either tool or science) as a technoscience, thoroughly saturated by technologies. As such, the move to rebrand GIS begs interrogation of the motives of this branding: what work does it enable? what work does it necessarily delegitimize?

Indeed, the struggle over GIS within the discipline is largely centered around the degree to which proponents recognize the epistemological perspectives enabled by the use of the technology, as well as the particular ontological fixes made necessary. The roots of this struggle might be found in the GIS wars of the early 1990s (Schuurman 2000), or even earlier in the late 1960s and early 1970s post-quantitative critiques in the embrace of a rising marxist geography (Wilson and Elwood forthcoming). And, Pickles (1997) suggests that

GIScientists might look toward these debates in the wake of radical geography as a particular continuity.

For instance, Bill Bunge's work in *Fitzgerald* sought to resist the calculating gaze of spatial science, to actually deeply invest in the subjects studied by treating scholarship as action. Bunge sought to understand the everyday lives of those in Detroit, to put a human face on the realities of class and race struggles. Quantitative spatial analysis was a distraction, a disembodied over-simplification of complicated, saturated phenomena. As radical geography created a space in which to launch research programs that interrogated the intersections between political, economic, and social structure in the 1970s and 1980s, geospatial tools became more technically sophisticated, providing visual power to the modeling of physical and human geographies. These developments further entrenched notions that there were disparate and irreducible camps in geography departments that informal chats around the water cooler could not patch over (Taylor 1990, Openshaw 1991, Taylor and Overton 1991, Openshaw 1992, Smith 1992, Lake 1993, Pickles 1993, Sheppard 1993).

Instead, GIScience and critical geography gain significant (if largely separate) ground in the 1990s, but opportunities for cross-pollination (or anything beyond collegiality) was largely hit and miss (however, see Pickles 1995, Sheppard 1995, 2005). GIS & Society gave way to participatory GIS and critical GIS, and later qualitative GIS (Wilson 2009). These permutations found new radical utilizations of GIS (for instance, Pavlovskaya 2002, Elwood 2006, Knigge and Cope 2006), but largely left questions as to the conditions and implications of the emergence and ubiquity of GIS unanswered by GIScientists (although, see Curry 1998, Pickles 2004). Furthermore, the question of how to engage and intervene in GIScience remains (Schuurman and Pratt 2002, Leszczynski 2009a, 2009b, Crampton 2009b).

Regardless of its status as science or tool, these technologies are taking on new relevance in the context of ‘big data’, giving rise to the spatial humanities (Bodenhamer et al. 2010), a resurgence in maps as radical artistic expression (Bhagat and Mogel 2008, Harmon 2004), and the utilization and study of the geoweb (Turner 2006, Crutcher and Zook 2009, Stephens 2013, Zook and Graham 2010, Crampton et al. 2013, also see FloatingSheep.org). However, the *significance* of the questions posed by the GIS & Society movement did not simply evaporate. With these new permutations of geographic information technologies and a proliferation of their uses should come a deepened commitment to understanding their implications and conditions of development (Wilson and Graham 2013). Recognizing GIS as but one technology that mediates social-spatial life is an alternative approach that has been underexplored. Indeed, GIS can be thought as a form of media.

We must also recognize that GIS is enrolled as a tool to study media (e.g. the FloatingSheep.org project). That GIS is both an *object of* and *tool for* study is not new. But the study of social media using GIS places GIS within an established set of practices and technologies that have been utilized to study media (and the networks established by media systems) for decades. Therefore, to understand the implications for thinking GIS as a mediator of social relationships, we turn to the development and contemporary relevance of one such established technique: social network analysis (SNA). SNA represents a significant area of scholarship that underscores the importance of social relations as a key factor in understanding the spatiality of social media.

Mediated Relationships

Online social networking websites like Facebook have undoubtedly altered social relations for some, documented in various ways by scholars in a number of disciplines including the

information sciences, cultural and media studies, anthropology and sociology, as well as geography. Indeed, the ubiquity of online social networking has generated ripples across the web, where many websites are turning to Facebook Connect as a way to personalize experiences of the internet. As a result, unprecedented data are being generated through these networks. And sociologists are enrolling this data, with increased processing power and new analytics, to better understand the complex ways in which social life is organized.

Therefore, if we are to think of GIS as media, how might we study the mediation that occurs through these new forms of social organization? Media evolution is an important hinge in this discussion: media have evolved from a one-way form of communication, from the information source to the audience (e.g. newspaper/television) into a two-way (where the audience communicates directly back to the source through technologies like email/phone). Most recently, internet scholars argue that as media have further evolved into a group dynamic where everybody can be both the source and consumer (prosumer) of media, we need a different way to understand the dissemination of information (Hogan and Quan-Haase 2010, Fuchs 2009, Ritzer and Jurgenson 2010).

These evolving dynamics amid the rise of Internet Communication Technologies (ICTs) have prompted a need to analyze and provide order to large data sets of social information giving rise to big data and general challenges in the study of the internet as a mediator. These analyses included new SNA arguments such as “scale-free networks” (Barabasi 2009) that imply, despite geographic implications, a sense of order to what seems like random social relationships. These new arguments speak back to as well as extend a well-trod argument in geography that implied that “everything is related to everything else, but near things are more related than distant things” (Tobler 1970, 236). Geography used this proposition to inform quantitative techniques that analyze heterogeneity and statistical

relationships, forming one foundation of GIScience today (Goodchild and Haining 2004, Miller 2004).

SNA continues to evolve in multiple fields as anthropologists use SNA to understand kinship structures and sociologists use it to understand social structures (Borgatti et al. 2009). As a result, we have many ways of looking at the connections between entities in both the spatial and social realm. The tools of SNA allow us to understand the structure and constraints present in human interactions as well as the agents that change human interactions (Wellman and Berkowitz 1988).

Meanwhile, scholars within the digital humanities are also noting the ways in which social media is impacting everyday life, albeit using methods less understood as a “science of networks” (Watts 2004). This research examines the ways in which social media is enabling new composition practices (Bono et al. 2012) and constituting notions of place through narration (Ralston 2012) as well as examining identity online, such as transgender performance (Foster 2005) and the ways in which bodily experience is figured through the internet more broadly (White 2006).

Furthermore, the effects of the rise of social media are also felt within the academy, as a reconfiguration of mainstream media outlets impacts the work of scholars both in terms of research and pedagogy (Wilson and Starkweather forthcoming, Campbell 2010). The production of academic research is being pushed to new audiences using social media, as journals and other academic publishers use online social networks to increase readers/clicks/downloads amid increasing competition among a handful of publishing house conglomerates.

Just as social media plays a constitutive role in contemporary society (boyd and Ellison 2007), the rise of spatial media in the form of location-based services and the geoweb

has brought about new questions as to the ways in which digital information technologies condition everyday experiences (Wilson 2012). And while earlier versions of these kinds of questions were central to the GIS & Society movement of the 1990s, they are brought into greater focus given the ubiquity of digital spatial information technologies.

Here, we understand spatial media as technologies that serve to constitute new relations not only to other individual users, but to place as well. Facebook Places, Foursquare, Google Latitude all serve to connect users to each other in place, where place is the driving analytic that enables social relations. Search engines like Bing, Yahoo, and Google use location as a central criteria in the production of search results. This mediatization of space thus draws upon spatial technologies like GIS, without positioning the GIS as a central interface. Therefore, while the GISciences and new spatial media are indeed related and co-implicated, they are not entirely overlapping developments.

While GIScientists are well-versed in the machinations of geospatial data, for instance in terms of ontologies and interoperability (Schuurman 2005, 2006), expertise and decision-making (Nyerges et al. 2006), and spatial analysis, more generally (Goodchild and Haining 2004), they have only recently begun to consider the role of the geospatial web. This has been a slow evolution for GISc, as the central research questions that were considered cutting edge in the early part of the last decade, questions around how to create and study the affordances of web-based GIS (cf. Peng and Tsou 2003), were re-configured by the emergence of mapping APIs and what was generally described by Crampton (2009a) as maps 2.0.

In other words, while entire mapping industries were being reinvented seemingly overnight, the GISciences were stepping carefully, so as to secure their expertise (see Crampton 2010). Meanwhile, the geoweb steadily proliferated alongside much greater

developments in ‘big data’, on the backs of expanding social networking sites such as Facebook and Twitter. Geographers interested in the entrenchment of cyberspace, such as Kitchin (1998), Graham (1998), Dodge (with Kitchin 2001), and Warf (2001), were beginning to be joined by geographers interested in the particular spatial relationships constituted by social and spatial media (Goodchild 2007, Zook and Graham 2007).

As a result, a new specialization of geography scholars was occurring, in the development of methods of qualitative inquiry alongside geoweb data analysis and representation. These geographers, attuned to the social, political, and economic conditions and implications of the internet, created avenues of research that challenged GIScience to better grapple with the diversity of applications and developments around geospatial software, technology and data structures.

The emergence of ‘volunteered geographic information’ therefore marks an emergent area of inquiry within the GISciences, responding to less academic developments within a field of hobbyists and entrepreneurs called ‘neogeography’ (Wilson and Graham 2013). VGI describes an area of GISc that recognizes the opportunities of social and spatial media in producing massive amounts of information that can and should be leveraged to understand human as well as physical geographies. As Sui and Goodchild (2011) document, these developments underscore a blurring of boundaries between GIS and media.

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As an aside, we recognize that some readers will be interested in the possibilities for drawing together SNA and GIS. When using these technologies to map a social network the object of study is the same but the ‘map’ depicts a different relationship. In other words, the use of

GIS prioritizes Cartesian spatiality as a representational frame for the study of relationality, while SNA prioritizes the network. Social networks frequently depict non-spatial relationships, such as friendship through dyadic mobile phone connections (Eagle, Pentland, and Lazer 2009); kinship ties that determine social order (Emirbayer and Goodwin 1994); email networks that increase social capital (Wellman 2001); knowledge clusters that succeed or fail based on structural characteristics (Graf 2011); and the relationships and power dynamics embedded in organizations (Rowley 1997). With statistical techniques to identify and quantify each type of social relationship, it is unsurprising that SNA is more common than GIS as a method to conceptualize online social media.

SNA has also been used to understand social media and to graph the relationships among users (boyd and Heer 2006). The social structures of popular sites, like Facebook have produced a plethora of research across multiple disciplines (Wilson, Gosling, and Graham 2012): for instance, the racial clustering among Facebook users is telling about the impact of social media on xenophobia (Lewis et al. 2008). Unfortunately the integration of SNA and GIS to understand the complex social and spatial relationships of social media is rare.

Nonetheless, the possibilities for integration remain a fruitful area of scholarship. For instance, Steve Radil, et al. (2012) enrolled SNA with GIS to analyze gang relations in Los Angeles, discovering a dynamism in the networks that structure the expression of spatial relationships (such as violence) between gangs. This study highlights that understanding social phenomena as it occurs in specific locations is aided by an understanding of the social relationships that are co-implicated in specific geographic locations. SNA is not an exclusive domain of analysis along these lines, as qualitative methods and analysis have provided

similar contextualizations, but SNA brings a particular computational efficiency to the study of large and dynamic relationships.

Maps as Media: A New Map Politics?

Syria is Iran's only ally in the Arab world. It's their route to the sea.
(Mitt Romney to Barack Obama in the final presidential debate, 22 Oct. 2012)



Social and spatial media are changing the relationship between the map and the map reader, towards a model of map interactivity instead of map communication. These shifts occur as maps are increasingly considered expressions of media. In the above image, a Twitter user named David Shiffman (@WhySharksMatter) reacts during the final presidential debate between Mitt Romney and Barack Obama. Romney argues that Syria is Iran's route to the sea, a comment that quickly trended on Twitter as users slapped together maps to provide an alternative geography to that offered by Romney.

This incident highlights a new relationship surrounding mapping -- where maps are understood as manipulated media for political voice, drawing upon the authority and neutrality of the map (as an object that is undeniable) in order to participate in and intervene in the mediation of everyday life. These map interactions occur in the context of a dominant

conceptualization of the map as a neutral communicative device. The map communication model (MCM), developed by Arthur Robinson in the mid-20th century (as an extension of Claude Shannon's mathematical theory of communicative invariance), rendered cartography as a scientific practice -- dominating the bulk of cartographic scholarship and map design thought (Crampton 2010). The MCM establishes the centrality of the map reader in cartographic design, a recognition of the importance to track how map readers *receive* the messages in the map. This meant a further standardization of map-making practices, through concepts like visual hierarchy and visual variables, a quite literal scientific method of experimentation and observation, to develop the most efficient, invariant, and 'bias-free' method of map-based communication.

New spatial media are reconfiguring this relationship, as is illustrated by the Syria-Iran maps that proliferated during and following the final presidential debate. The reader is no longer (perhaps they were never) a simple percipient of maps. The reader interacts within the map, querying and adjusting the scale and scope of the cartographic representation. In some cases, the map is reconfigured and layered with new meanings (Roth 2012). This emerging map interactivity has been largely described as maps 2.0, with map practices and map products increasingly driven by users -- many are self-identified 'neogeographers'. These neogeographers and neocartographers rework the MCM model.

This reconfiguration from map communication toward map interactivity underscores the mediation that occurs through GIS, and should provide some pause for the map integrations figured by projects like Google's Project Glass. As maps increasingly become the vehicle for a plurality of expression and multiple documentations of 'truth', their embeddedness in everyday life can mean radical interventions in social interaction, in being in place.

And as the implications for these changes in the model of map interactivity are still being examined, we briefly sketch a few implications that might guide further research into the collisions between GIS and social media. First, the map is undergoing a political transformation in that the power of the map is increasingly complicated and no longer (was it ever?) a secured artifact of legitimacy and authority. In other words, the politics of the map that guided participatory GIS in the late 1990s is now being replaced by a politics of the map guided by crowdsourcing, where the map is entirely mutable toward multiple interests, including the underrepresented and dispossessed. Second, the map is increasingly being put into motion. By this we mean that the assumed temporal fixity of the map is giving way to new media interactions with cartography that represent the dynamisms of space and place. Third, the map is but one representation of a whole assembly of spatial and social relations within a complicated media environment. Here, social network analysis is placed alongside GIS as two toolsets for quantifying and visualizing a multiplicity of relationships.

Conclusions

GIS and social media are increasingly co-implicated in their development, marketing, and proliferation. The logics that enable the corporatization of online social media overlap with the logics of GIS as a new spatial media. One can simply observe the rise of location-based services on mobile devices to begin to recognize these overlaps (Kelley 2011, Wilson 2012). However, what is to be gained by conceptualizing GIS as media? There are certainly business logics that drive the thinking of GIS as media, but what are the intellectual impacts of this re-conceptualization?

In this chapter, we have outlined developments that begin to address these questions, particularly by examining, the emergence of GIS and SNA as tools to better

understand, organize, and visualize social-spatial phenomena. As mapping tools like GIS are understood as spatial media, the opportunity to recognize the constraints of GIS is greater. While GIS are excellent for examining the absolute ‘spatialness’ of phenomena, the more relational understanding of the spatiality of everyday life requires different toolsets and, indeed, different epistemologies. SNA is one such toolset that examines relationships, recognizing very simply (and not unproblematically) that social proximity is distinct from spatial proximity. Networks and spaces abound in the combination of these toolsets.

The social and spatial relationships developing through interactions with technology rely neither on a social or a spatial framework alone. Society is increasingly organized and influenced by geolocalized information and networks have become more local and mobile: witness for example the rise of location-based services as a vehicle to refine the granularity of targeted, strategic marketing. As we return to the advertisement for Google Project Glass (2012), we can begin to witness the convergence of spatial and social media, and in its wake, the refashioning of GIS *as* media.

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