

Mapping power:

Ironic effects of spatial information technology

Jefferson Fox ^{*+}, Krisnawati Suryanata ^{**}, Peter Hershock ^{*}, and Albertus Hadi Pramono ^{**}

Abstract

Over the past several decades rural communities have adopted spatial information technology (SIT) for developing management plans, monitoring change, asserting territorial claims, and other purposes. Yet to date few researchers have examined the socio-ethical implications of these technologies, particularly in developing countries. In June 2003, a number of scholars and proponents of participatory mapping met in Chiang Mai, Thailand, to discuss emergent issues surrounding community-adoption of SIT in Asia. This paper synthesizes the themes, questions, and concerns that grew out of the workshop and which we believe scholars, advocates, and donor institutions should consider. We identified several revenge or ironic effects of mapping. These include increased conflict, resource privatization, and loss of common property. Yet we also found intrinsic reasons for communities to work with spatial information, regardless of outcome. These include sharing history of place, enhancing group awareness and identity, and building trust and communication between people.

Key words: spatial information technology; science, technology and society; participatory mapping; community-based resource management; Asia

Introduction

The recent growth in the availability of modern spatial information technology (SIT)—geographic information systems (GIS), low-cost global positioning systems (GPS), remote

* East-West Center

+ Corresponding author: East-West Center, 1601 East-West Road, Honolulu, Hawaii 96848; foxj@eastwestcenter.org

** Department of Geography, University of Hawaii

sensing image analysis software—has begun to make the power that comes from recording and controlling space available not only to state funded mapmakers but also to those who were traditionally disenfranchised by maps. The adoption of scientific cartography as the only valid knowledge and the state's monopoly of its production erased people, especially indigenous peoples, from the map (Brealey 1995; Winnichakul 1994; Escobar 1997). By using scientific maps in communicating with the state, these marginalized peoples are asserting their existence.

Simultaneous with the growth of mapping, community-based resource management initiatives have expanded participatory development agendas at international and national levels. Scholars and activists argue the merit of participatory approaches in enhancing democratic values, regardless of the specific outcomes (Checkoway 1995; Lowry et al. 1997). Participation helps solve problems as it opens new ways for citizens to address issues. These include building capacity, changing relationships with those in power, and promoting learning by bringing in new information and perspectives. Participatory and community-based mapping is viewed as a logical extension in the repertoire of capacity building strategies for empowering local communities.

Spatial information technology enables communities to make maps of their lands and resource uses, and to bolster the legitimacy of their customary claims to resources by appropriating the state's techniques and manner of representation (Peluso 1995). Over the last several decades participatory mapping has led to the successful demarcation of land claims that led to the signing of treaties over land claims (e.g., Nisga'a); compensations for land loss (Native American, Maori); and formation of indigenous territory and government (e.g., Nunavut). Evidence of the perceived power of this technology to counterbalance the authority of government mapping agencies was vividly demonstrated in the Malaysian state of Sarawak

where a bill was recently introduced to the state legislature to regulate the activities of land surveyors and to declare community-mapping initiatives illegal (Urit 2001).

Yet, the impacts of widespread adoption of SIT at the local level are not limited to the intended objectives. Among the unintended consequences of mapping have been increased conflicts between and within communities (Sirait 1994, Poole 1995, Sterrit et al.1998), loss of indigenous conceptions of space and increased privatization of land (Fox 2002), and increased regulation and co-optation by the State (Urit 2001). Consequently, mapping technology is viewed as simultaneously empowering and marginalizing indigenous communities (Harris and Wiener 1998). Researchers working under the umbrella of Research Initiative 19 of NCGIA argue that GIS technology privileges “particular conceptions and forms of knowledge, knowing, and language” and that the historical development of the technology leads to “differential levels of access to information” (Mark et al., n.d.). Rundstrom (1995) suggests that GIS is incompatible with indigenous knowledge systems and can separate the community that has knowledge (an “emergent character” of value-driven human/environment interaction) from information (the “product” of GIS application).

Tensions thus exist between new patterns of empowerment yielded through SIT and broader social, political, economic, and ethical ramifications of the technology. To date, most research on the social and ethical implications of spatial information technology has been conducted in North America. There is an urgent need to examine the implications of this technology in rural settings, particularly in less developed countries as well as among indigenous groups. Because the tools and technologies gathered under the rubric of SIT were not originally developed and produced in developing countries or for marginalized groups, we hypothesize that

it will be in such countries and groups that the tensions associated with SIT are likely to be most apparent and potentially severe.

Tools, Technologies and Ironic Effects

Critically assessing the technological impacts of SIT requires us to clarify the relationship between tools and technologies. *Tools* are products of technological processes. They are used by individual persons, corporations, or nations, and are evaluated based on their task-specific utility. If tools do not work, we exchange them, improve them, cannibalize them, or discard them. In contrast, *technologies* consist of widespread patterns of material and conceptual practices that embody and deploy particular strategic values and meanings (Hershock 1999). Technologies are complex systems promoting and institutionalizing relational patterns aimed at realizing particular ends. Technologies cannot be value neutral, and do not occur in isolation from one another but in families or lineages (Shrader-Frechette and Westra 1997; Hershock 1999).

A hand-held GPS unit, for example, is a tool associated with SIT. Individuals using GPS units assess them in terms of their reliability, ergonomic design, technical specifications and features. By contrast, SIT as a whole consists of a complex system of material and conceptual practices that include: the extraction of raw materials; their manufacture into tools like GPS units, notebook computers, and satellites; the storage of information in massive, internet mediated databases; advertising and marketing these tools, the services associated with them, and the “worlds” to which they provide access; the crafting of industry-specific regulatory and legal institutions; new patterns of expert testimony in legal contests over land-use; and a reframing the politics of development. As technology, SIT transforms the discourse about land and resources,

the meaning of geographic knowledge, the work practices of mapping and legal professionals, and, ultimately, the very meaning of space itself.

Implications of the tool/technology distinction include the fact that while we can refuse to use a tool, there are no clear “*exit rights*” from the effects of heavily deployed technologies, even if individuals elect not to use the tools produced as part of that deployment. The concept of exit rights originated in consent and social contract theory and is based on the recognition that consent implies the possibility of active and meaningful dissent—the existence of viable alternatives. The concept has been extended in discussions of technology and ethics to refer to rights not to be subject to the use or effects of particular technologies and its associated tools.

Serious questions arise, however, regarding the possibility of exit rights for technologies that are deployed at sufficient scale to make viable alternatives practically nonexistent. For example, although one can elect to not own or use a personal computer, computing technology is so widely deployed that it is not possible to avoid its effects. In practical terms we have no exit rights from the computerized world. Similarly, one may prefer not to consume genetically modified food, but if GMO-related technologies became dominant, there would be few practical alternatives available to general consumers.

An implication of the absence of viable exit rights is that technologies cannot be effectively evaluated based on how well the tools they provide serve an individual user, but only in terms of how they transform the quality of relationships constituting our situation as a whole (e.g., the relationships we have with our environment, with one another, with our own bodies, and with our personal, cultural, and social identities). In short, technologies must be evaluated in explicitly ethical terms.

Illich (1973; 1981) suggests that when a technology is deployed at sufficient intensity and scale its use is no longer an option but a necessity, making the dissemination of its core value(s) indispensable. When this happens technologies begin producing conditions (patterns or relationship) that generate problems that can only be addressed through further deployment of the same technology (Hershock 1999). For example, automotive transportation technologies were originally adopted to make transportation faster and easier, and to reduce urban pollution (from horse-drawn carriages). Their widespread adoption, however, transformed the landscape in ways that eventually rendered them and the tools associated with them necessary (society-wide) components of basic subsistence practices, with the “unintended” consequences of massive air pollution and inhospitable urban sprawl. As a technology (or a family of technologies) crosses the threshold of its utility, it thus begins generating ironic (or “revenge”) effects (Tenner 1996).

Ironic effects demonstrate the fallacy in assuming that what is good for each of us will be good for all. The individual user of tools is not, therefore, a suitable unit of analysis in critically assessing technologies. In addition, ironic effects argue for recognizing that the causality of technological impacts is fundamentally non-linear. Although new technologies are practically built from “the ground up,” through bringing together knowledge and materials in novel ways, once they are fully realized, the technology begins exerting “downward causation” (Lemke 2000) on its component systems, bringing them into functional conformity with its own systemic needs. That is, the ironic effects generated by technologies deployed at sufficient scale are not incidental consequences, but are rather systematically conducive to the further deployment of that technology. The problems caused by transportation technology, for example, can only be addressed by the building of more roads and more efficient cars.

The basic hypothesis of this project is that once SIT technologies cross the threshold of their utility they will become practically imperative and will begin generating ironic or revenge effects. The further deployment of these technologies will benefit every individual user in anticipated fashions, but it will also produce inevitable and unpredictable negative consequences for communities. More specifically, we hypothesize that the widespread adoption of this technology will disadvantage small, local communities with limited access to the technologies. SIT will also transform the relationships between human actors and their spatial environments in ways that increasing dependence on SIT will correlate with loss of the indigenous spatial practices that were originally to be conserved through their deployment.

Workshop Findings

This project began with three interlinked and overlapping sets of questions. We first sought to understand the social and political dynamics that result in communities choosing to engage in mapping. Political ecology scholars argue that local processes are interlinked across temporal, spatial, and institutional scales (Blaikie 1985, Blaikie and Brookfield 1987). We hypothesized that local actors may strategically choose to adopt or reject mapping technology and activities, or they may be constrained by their larger political, economic and social relations from doing otherwise. In order to explore the hypothesis we asked questions such as: Why do communities engage in mapping? Who was empowered by SIT adoption? Who was disadvantaged? Who controls the maps? How do various actors decide how maps can be utilized? What are the processes in which empowerment happen?

The second set of questions addressed the impacts of mapping technologies and activities on communities' values. We hypothesized that spatial information technologies have embedded within them values such as "universality", "objectivity", "standardization", "precision", and

“control” that have emerged in systemic relationship within the context of a particular historical/cultural experience. The introduction of these technologies into societies where these values have been neither prominent nor systematically integrated may have unexpectedly disruptive effects. Questions we sought to answer included: Are there any changes in conceptions of space such as boundary and the sense of place? Did maps cause boundary and land-use disputes? Are there any changes in inter-community relationships? Many of these questions require longitudinal studies on what happens after the introduction of SIT into the community.

The last set of questions examined the impacts of SIT on the organizational dynamics of the non-governmental organizations (NGOs) that introduce SIT into rural communities. We hypothesized that the adoption of spatial information technologies by NGOs is problematic because of their social context, the potential for co-optation, and a lack of resources. Questions we sought to answer included: How does an NGO decide to invest in developing an SIT component to their work? How do they sustain operating costs beyond initial investments? Does the adoption or rejection of the technology affect relationships with donors? Does it affect the expectations of community members vis-à-vis NGO partners?

The following sections summarize workshop discussions focused on these questions. The summaries represent the collective vision and experience of workshop participants from eight groups in seven countries (Cambodia, China, Indonesia, Malaysia, the Philippines, Thailand, and the United States) that have used SIT extensively in their work.

Enrollment and Empowerment

Workshop participants agreed that spatial information is useful for a variety of purposes. Communities can better plan the management of their resources, monitor the implementation of

development projects, and resolve resource conflicts within their own communities. The opening of political space due to political shifts such as the introduction of a new decentralization policy in Indonesia and the recognition of indigenous rights in the Philippines provided a context in which mapping became a critical tool for negotiation with other groups, including neighboring communities and the state. Mapping re-inserted user communities existence into “empty” state maps and thus strengthened their claims to lands and other resources. These effects all occurred in the context of increased local activism as a reaction to disenchantment with the state. SIT is thus viewed as a tool of empowerment for local communities.

Participants reached less agreement on the processes by which empowerment occurred and who was empowered. Does mapping have to result in State recognition of territorial claims or is the process of making the map empowering in and of itself? In Sarawak, a court recognized community maps as legal documents for supporting land claims. In response, the Sarawak state legislature passed a law making it illegal to do community mapping without the assistance of a certified cartographer. Rather than seeing this as a defeat, however, the NGO involved saw the court’s recognition of the community maps as empowerment.

Mapping restructures control of knowledge over local resources. Maps give community members more knowledge about their resources. SIT activities also serve as a tool for community capacity building, thus facilitating resource access and claims (e.g., in California engagement in SIT activities improved local people’s access to jobs on public lands). But mapping also facilitates outsiders in gaining knowledge. Workshop participants noted that community-mapping initiatives actually benefited local governments by providing them with free information.

It can be difficult to determine who “owns” the maps. Fox (2002) argues that if local people do not have control of their maps, they may not be any better off than they were before their lands were mapped. Participants noted that the NGOs that make the maps control the SIT databases and hence control who has access to the maps. One participant told the story of an international NGO that sent a representative to the local field office to copy the GIS data layers for the national database. The data, however, contained information on valuable common resources such as birds’ nests and honey trees. The local representative refused to copy the layer containing the information, made a copy of this layer for himself, deleted it from the NGO’s files, and then resigned in protest.

Even if the community can control the maps, it is important to understand the multiple interests and actors within communities, the processes within communities, and the processes between communities and other social actors (cf. Agrawal and Gibson 2001; McDermott 2001). Workshop participants encountered competing local/village institutions that oversee access to the maps and spatial information ranging from formal village governments, to traditional or customary institutions, to functional village committees. Outside facilitators who initiate or sponsor community-mapping projects play key roles in influencing which actors benefit from the adoption of SIT. For example, an NGO in Indonesia chose to revitalize traditional customary institutions (adat), entrusting them with control of the maps, while another Indonesian NGO chose to support a functional committee on forest conservation and to bypass traditional leaders. The implications of these decisions can be far-reaching in the restructuring of power relations and property institutions that govern resource access and utilization.

Mapping can force communities to confront latent issues with regard to the management of natural resources. This can lead to new opportunities for consensus building, but it can also

lead to conflict by making it harder to compromise positions, creating new disagreements within the community, and with other communities. One of the ironic effects of SIT is that mapping efforts initiated to resolve conflicts between local communities and government agencies often result in increased conflict between and within villages. As long as boundaries remain fluid and flexible, defined only in each person's mental image of the landscape, conflicts between competing interests (within villages or between villages) could be minimized. Once boundaries are mapped, however, conflicting images of reality cannot be overlooked any longer and must be addressed.

Impacts on Communities' Values

In Malaysia, Indonesia and Thailand, network members observed that customary boundaries that were traditionally flexible, responding to changes in needs within the community, roads, or uses by other communities, and extending across and overlapping administrative boundaries as well as the boundaries of neighboring communities, are less flexible today and cause disputes when they overlap with the neighbors' boundaries. Participants were aware, however, that changes in the sense of place and boundary conceptions are not exclusively caused by mapping activities, as they are also subject to changes due to roads, markets, land tenure, decentralization initiatives, and other factors.

Maps document current rights and use practices, and therefore enhance a community's claims to lands and resources. Yet, the impacts of these claims on groups that are not represented during the mapping process, such as those that do not claim exclusive territories, are less certain. Mapping also leads to a sense of a fixed identity, enhanced exclusivity of claims, and can make it harder to compromise positions. As a result participants noted a second ironic effect of mapping—mapping does not stop with the delineation of boundaries between villages, but must

be carried to its logical conclusions in the recognition of complex bundles of overlapping, hierarchical rights and claims that define property rights and claims over a variety of resources. Hence mapping efforts initiated to recognize collective rights to land resources can lead to land privatization that excludes others.

Many workshop participants claimed that they had no choice but to map. For them, today's villagers are already "caught up in a mapping world" and do not have an "exit option." They can refuse to map, but they cannot escape the implications of living in a world in which others will eventually map their lands. It is not possible to protect an unmapped area. Within the boundaries of a protected area, such as a Native American reservation, you can have unmapped land uses, but the outer boundaries must be established and recognized.

Furthermore, as SIT becomes practically imperative, it ironically may disadvantage many small communities who do not have access to it. Likewise, resolving the conflicts caused by mapping draws attention to the importance of 'boundary' and 'territory' over other non-spatial aspects. This shift eventually makes SIT indispensable for asserting (and defending) communities' rights. In both Indonesia and Malaysia, many communities have realized "the power of maps" and are anxious to have their resources mapped. Yet the NGOs who assist in participatory mapping are unable to respond to all community requests for mapping. Communities that do not have a map become disadvantaged as 'rights' and 'power' are increasingly framed in spatial terms.

SIT and NGOs

We define non-government organizations (NGO) as organizations that work on a voluntary basis, rely on external funding, work with the poor and marginal members of society, have a small staff, and have a flexible, not-for-profit, independent and non-partisan nature (cf.

Korten 1990). The urban and middle class nature of most NGOs as well as their dependence on funding from outside sources places their independence and performance into doubt.

Participants to the workshop felt that their decisions to adopt SIT varied, but reasons external to the NGOs were at least as important as those from within. Donors have relatively large influence on many NGOs (e.g., the shift from sketch mapping to GIS in Indonesia was driven by donors). Donor's priorities, however, continue to evolve, and an NGO that received donor support to acquire SIT may not receive support to maintain the technology. It can also be difficult for an NGO to meet the timetables imposed by donors.

Success in the use of maps as tools of negotiation for land rights have led to increased demand for mapping by neighboring communities. This has created a shortage of technical capacity among the NGOs. Participants agreed that it can be difficult to acquire and keep trained staff. There is also a gap in expectations and work culture between staff members trained in SIT sciences and staff trained in social sciences. The rudimentary output of field maps often creates a disappointment to both NGOs and communities. Some NGOs speculate that this "non-professional" appearance of community maps gave a reason for government agencies to question the legitimacy of the maps. Yet many also realize that as technology complexity increases, accessibility to community decreases. While paper maps are generally available to all at the local level, digital data has a structural barrier that may prevent a large proportion of community members, as well as some NGO staff, from accessing the spatial data.

Recognizing the potential socio-ethical impacts of SIT, there was a strong consensus among the workshop participants that advocates of participatory mapping need a strong protocol to follow when introducing SIT into a village. This protocol should require outside actors to communicate clearly with each community prior to the mapping project. The NGO must clarify

the purpose/objectives of collecting information, agree with villagers on what information can be mapped, and explain the potential damage of recording the community's spatial information on maps that can then be copied and distributed outside the community. Most importantly, outside facilitators must communicate that villagers *can* agree to or reject the mapping exercise.

Finally, participants felt that unlike in North America, the use of SIT at the community level in Asia has largely been limited to mapping. In many cases, participatory mapping has become more product-oriented; neglecting the reality that working with spatial information is a process requiring revisions and changes. Thus far, we have paid too little attention on building local capacity to revise and re-map as circumstances change. This is a difficult challenge requiring not only transferring or building technical skills, but also the skills to look critically at context and to identify factors needing response, as well as the ethical sensibility to think through how changing practices set different directions for the community and weighing options and their effects.

Summary

This project is not anti-spatial information technology. Rather we seek to understand the social and ethical implications of this technology so that those who chose to use it to meet social objectives can do so wisely with some understanding of the unintended consequences that may accompany its use. We seek to enhance the knowledge of the scientific community regarding the ethical, organizational, and power implications of spatial information technology, as well as to provide social activists with criteria for deciding whether they want to use this technology in their fieldwork.

The Chiang Mai workshop identified several ironic effects of mapping. For many activists mapping is useful for bounding and staking claims to ancestral or traditional territories.

As such mapping seeks to mediate conflict between local villages and government agencies over land claims. Yet, mapping often leads to further conflicts among villages, and within the village. We also map to increase security of land ownership, but once we map, many villagers could only obtain security through land titling, a process that is largely controlled by outside authorities. Mapping (boundaries) seems to drive privatization of resources. Common property resources are managed through rules and practices. One of these practices has been the control of knowledge about the location of valuable resources. By making knowledge accessible to all, mapping breaks down common property systems. The newly acquired authority to define and exert control over the use of space has begun to compromise the customary uses it is intended to protect. Finally, the increasing adoption of SIT by rural communities generally promote practices that shift attention and concern away from qualities of human/environment relationship to quantifiable limits on that relationship implied by boundaries/borders, creating the “ironic” effect of an increased need of further SIT adoption by rural communities.

Yet results from the workshop confirmed that SIT does provide a means for re-inserting local people into “empty” state maps and strengthening their claims to land and other resources. The value of community mapping must be assessed in other than purely territorial terms. Mapping, and working with maps, enhances community capacity to negotiate access to local resources. It develops technical and analytical skills in understanding both the immediate local as a familiar place and its complex relationships to surrounding locales and regions. This wider perspective affords greater insight into currently obtaining and likely patterns of interdependence, enabling better responses by communities to their own problems. As workshop participants concluded, we may have no choice but to map, but we need to map with a clear understanding of both intended and likely unintended consequences of our actions.

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