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The Web, Cartography and Trust

Matthew McGranaghan
Geography Department
University of Hawaii at Manoa
Honolulu, HI 96882
matt@hawaii.edu

The web's facility for sharing maps and digital cartographic data brings to the fore a timeless cartographic question: Why trust maps? The easy exchange, duplication, and modification of digital representations in web-based cartography, coupled with the ephemeral nature of these maps and the generally unknown provenance of maps from this media would seem to make them particularly suspect; yet people seem to be using maps from the internet in great numbers. It is argued here that trusting maps, web-based or other, is a pragmatic response.

The web is an amazing development in human communication. It is at once both a convenient library and a prolific vanity press. It simultaneously increases access to information, and reduces familiarity with it. Web content sometimes seems accessible, uncontrolled, unedited, and idiosyncratic. Anyone with a modicum of technical savvy can "publish" any content they wish on the internet, without the editorial and market constraints which ostensibly encourage accurate, well-crafted content in traditional media.

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Much of the web's content is cartographic and more involved than simple locator maps. Peterson (1997) indicates that 10 million maps a day are delivered via the internet. Libraries and museums have begun to put digital versions of significant historic and archival maps on the web. Government agencies from the US Census Bureau, US Geological Survey, and NIMA down to local planning offices as well as private companies supply a range of spatial data, aerial photographs, satellite imagery, and maps via the web. Microsoft's Terra-Server offers access to several terabytes of imagery and map data. Crampton (1998) notes that MapQuest alone produces more than 1.5 million maps a day without the intervention of trained cartographers.

Digital maps seem different from printed ones. The ease with which digital maps, indeed any digital data, are duplicated, changed, and transmitted is at the heart of the apparent difference. Easy duplication and editing are a great part of why digital media are popular, but at the same time lead to concerns about information verity. Easy duplication allows greater access and redundant storage. Digital data are also malleable. They can be altered to reflect a changed understanding of the world. They also are susceptible to inadvertent mutation and malicious change. Data entropy and version control are problems. Managing distributed, changing data is a daunting task.

But many of these differences from previous technologies are differences in degree rather than in kind. Manuscript maps can be copied by hand; printing allows faster and more faithful reproduction. Digital reproduction permits exact copies of other digital materials, but only approximations to manuscript originals. Concern with changing content and lineage uncertainty are not new. Sixteenth century European cartographers (archetypal early "content providers") compiled from and improved upon each other. Cartographic databases, whether stored on copper plates or optical disks,

evolve as knowledge about the world changes, sometimes incorporating errors but more often (hopefully) incorporating improvements. Keeping track of the changes may not be as important as making more useful maps. There are also similarities too in the permanence of the cartographic record: history is replete with maps that once existed in quantity but of which not a single copy survives, so redundant hardcopy storage does not guarantee a permanent record. Oddly, the very ease of digital duplication-on-demand may discourage redundant stores of cartographic data. It is sobering to speculate that for maps stored centrally and distributed on demand via the web, a single disk failure could be like the burning of the library at Alexandria. Map provenance may not be so different either. While the web permits essentially anonymous distribution of maps, we often have little or no idea which cartographic databases were used, or who compiled, edited, or checked the data, or what processing might have modified the information.

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On the surface, it may seem that current technological capabilities, enthusiasm for convenience, notions about the impossibility of truth, and acceptance of ignorance as inescapable, place the possibility of cartographic (or any other) communication in jeopardy. If there is so little reason to expect that maps reflect the state of geographic space, why would one use them at all? Why would any one ever trust a map? Especially one from an apparently uncontrolled, unstable, and rapidly evolving media such as the web?

The fundamental issue is that we find maps useful. They communicate locations and distributions in geographic space and we believe, that is trust, maps until we have reason not to. We expect that the maps (and for that matter other communications) we receive from others are produced in a good faith effort to communicate accurately even while knowing that they may not be. We do this in other domains — we buy and use software with the hope and expectation that it will function even though software licenses routinely refuse to warrant it to be fit for use. Trusting a map is accepting that the cartographer has tried to communicate accurately and was capable of doing so to some adequate approximation. It may be a leap of faith, but it is not taken blindly: we know that there are problems with communication and have methods of working around them.

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Trust is balanced by rational skepticism and tempered by familiarity. When we can, and especially when the risks associated with miscommunication are high, we check the map for consistency with other knowledge of the world, perhaps gathered through experience or through other maps. In this context, the emergence of a national spatial data infrastructure (NSDI) that can serve as a thoroughly tested and constantly corrected standard is a good idea. Reputation can encourage trust. If others' experiences have been good, we infer that ours stand a good chance of being so. If others have had bad experiences, we infer that ours will be similar. Familiarity encourages trust. Repeated, fruitful map use increases familiarity and adds psychological security, but, of course, this inductive inference is no guarantee that the next use will not reveal flaws. There is always the possibility that inconsistency will arise and require a reassessment of the map, the cartographer's intent, or our understanding of the world.

Crampton calls for cartographers to be internet activists in developing web content. This activism is consistent with the meticulous care and attention to detail in the recording and transmission of cartographic information that have long guided cartographers in the production of useful, accurate and well designed maps. Web-based maps should be no exception. Despite their apparent impermanance, easy accessibility, and

low cost, web-based maps must be made to be trustworthy. In the end, a mixture of initial trust based on necessity and a leap of faith guided by critical assessment is all we have; indeed, it's all we've ever had to establish trust in maps.

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