

Understanding Community Mapping as a Socio-Technical Work Domain

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1. Introduction

In the present paper we discuss the application of Work Domain Analysis methods as a means for understanding the emerging practice of Community Mapping (“local mapping, produced collaboratively, by local people and often incorporating alternative local knowledge”, Perkins 2007) with a view to supporting and improving future efforts in this area. The interdisciplinary Socio-technical Systems approach provides a framework within which to deconstruct and typify community mapping; the surveying, mapping and management of geographic information in developing nations.

1.1 Community mapping in Tandale

The present paper is based on involvement in the Ramani Tandale community mapping project and draws on interviews with community mappers and facilitators, the first author’s own participant research and lessons learned. The purpose of the project was to map and collect geographical information about the Tandale (near Dar Es Salaam, Tanzania), an informal or ‘slum’ development, with a view to identifying sanitation and logistics needs. The data produced can be considered to fall under the term of Volunteered Geographic Information (VGI) (Goodchild, 2007). Eighteen community members assisted by twenty-five Masters students from Ardhi University’s School of Urban and Regional Planning participated in the mapping and were facilitated by an instructor to catalyse the mapping process and advise on Open Street Map (OSM) methodology and editing. Mappers were combined into six groups, each for the six sub wards, and used GPS coordinates to index points of local interest in their home regions, thus drawing substantial local knowledge (Figure 1 shows before and after progress over the mapping effort).

During the mapping, community forums with community and local administrators and leaders were held in communal areas to update on progress, with physical paper maps being distributed. This aided with ensuring the map came from the demos of the community, allowing it to comment and share thoughts then incorporating community views into the map: by democratising the cartography the map can organically grow and incorporate features relevant for the community. Thus, second phase of community mapping included the dissemination of tools to allow further engagement of the community-at-large. Two main tools were used to increase citizen engagement; a blogging platform and an instance of the

open source reporting platform, Ushahidi.



Figure 1. The left-hand panel shows pre-existing information about Tandale; the right-hand panel the information collected over the period of the community mapping project.

2. Assessing and Improving quality in Community Mapping: Product vs. Process

One way to assess (and then hopefully improve) the quality of community mapping is to consider it terms of products and outcomes; comparing the completeness and positional accuracy of data collected through community processes with authoritative datasets collected by national mapping agencies held to reflect ‘ground truth’ (see Haklay, 2010; Girres & Toyua, 2010; Mooney et al., 2011; Zielstra & Zipf, 2010). While this is appropriate where national mapping agencies or significant geospatial private enterprise are present, in settings such as Tandale we have no source for an authoritative comparator dataset (circularly enough, this being the primary motivation for the mapping project itself). Further, because community mapping is both a geographically and socially situated enterprise, we can have no confidence that what is true and workable in one setting will be true of another.

Therefore, an alternative way to understand quality and its improvement in community mapping is to think about it in terms of the ISO 19113 standard which defines quality as “the totality of characteristics of a product that bear on its ability to satisfy stated and implied needs”. This is clearly a very general description couched in notions of fitness-for-purpose but has been expanded by van Oort (2006) to specifically encompass Lineage, Positional Accuracy, Logical consistency, Completeness, Semantic Accuracy, Usage/purpose /constraints, Temporal quality, Variation in quality, Meta-Quality and Resolution (granularity). This suggests that while fidelity to ground truth is important, quality itself is concerned with a useful or fit level of fidelity given needs rather than the absolute level of accuracy.

By deconstructing the field of community mapping using work domain analysis we understand the role of quality in community mapping. Feldman (2011) looks at how the crowd (i.e., the producer of VGI) can be authoritative, challenging the misconception that VGI is of a lesser quality than an authoritative dataset. We further support this notion that VGI can be authoritative, however this is inexorably linked to quality consequently it is hard to understand the interconnectedness of the values and needs of stakeholders. Therefore, the WDA provides a framework to make assertions about the quality of the data and what the venture of community mapping actually consists of; challenging previously held misconceptions and clarifying the domain space.

2.1 Work Domain Analysis

Work domain analysis seeks understand the “functional structure of a socio-technical system” - Lintern (2007) (see also: McIlroy & Stanton, 2011, Rasmussen et. al. 1994). This ranges from specific objects, tools and processes to higher level concepts like aims, goals and values. This Abstraction Hierarchy from the highly abstract to the concrete effectively maps out the geographic environment of a system; the system of community mapping.

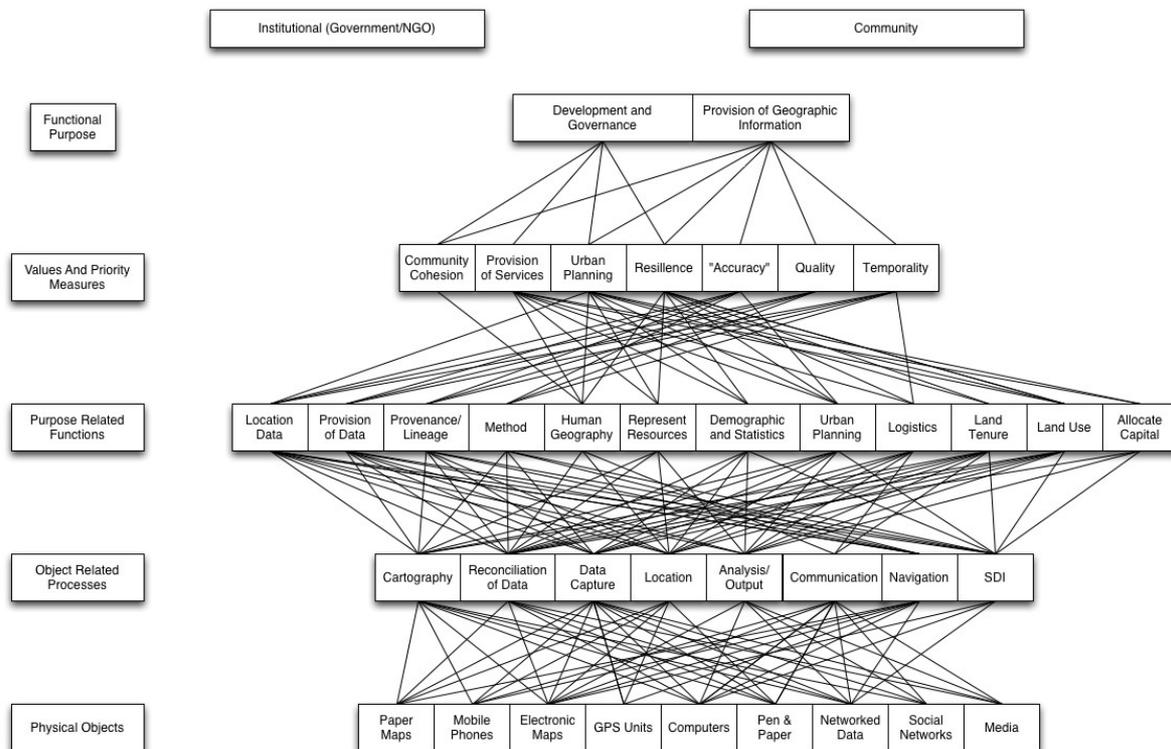


Figure 2. Community mapping Work Domain Analysis.

Figure 2 shows a decomposition of the purposes, values, functions, processes and objects of community mapping. This was compiled as a way of bringing together the interviews, observations and field research carried out to date; the process behind this is outside the scope of the present paper. To ‘read’ the structure consider that if you traverse down the AH you are asking “How?”. For example, how do we get Development and Governance? Through community cohesion, provision of services, urban planning and resilience. How do we get these values? Through human geography, representations of resources, demographics and statistics etc. In traversing upwards through the AH we ask ‘Why?’. Why do we need an SDI? For information on land tenure, land use, provision of data and so on.

The AH analysis links between physical objects being used in the production of data (mobile phones, GPS etc.) to the objects which they serve (cartography, data capture), then the overarching functions (representing resources or data provision). Finally linking the values (urban planning) and purpose (provision of geographic information). This is an example of one potential chain, but demonstrably there are many others. The salient point here is that in this decomposition we fuse the means of collecting the information with the uses and purposes of this data in a common analysis.

3. Conclusions

Parker et al. (2010) discusses stakeholders within VGI building upon from Coote and Rackham (2008) work on stakeholders and motivation of VGI. One of the omissions from the stakeholder analysis is the citizens generating the VGI data; that is, the literature focuses on *Consumers* of the data but not the *Producers* of the data and in order address quality issues in VGI this balance needs to be addressed. The consumer and producer model is part of that, however the wider implication is in the typification of the domain; as well knowing *how* data is produced, we can make assertions about how the data *could* be produced. If the production of VGI data in community mapping varies, it is reasonable to suggest its inherent quality can also be affected.

Our goal is to improve the eventual quality of data produced through community mapping. With the Abstraction Hierarchy, a sub-component of Work Domain Analysis, a lens now exists to view this emergent practice. The continuation of this work will involve further exploration of the uses of WDA in community mapping and its use in understanding different ways in which the enterprise could be carried out in a range of different situations and involve different configurations of stakeholders.

4. Acknowledgements

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Biography

Mark Iliffe is a PhD researcher at the University of Nottingham's Horizon Digital Economy Doctoral Training Centre. His research interests relate to crisis mapping, community mapping and improving the quality of volunteered geographic information.

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