

## **INTRODUCING THE CONDUCTOR APPROACHING VGI FROM THE PERSPECTIVE OF GEOGRAPHIC CONTEXT**

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### **ABSTRACT**

The missing object in the conceptualization of Volunteered Geographic Information (VGI) is location, which is strange as a dominant frame of thought in the GI-Science community is that “location is everything”. VGI is most commonly categorized and conceptualized on the basis of its purpose or provenance, emphasizing the “V”. Possibly because of the ubiquitous or pervasive presence of 'locational thought' in the GI-Science community, geographic content in online volunteered information is however not categorised on the basis of its geographic content or context. It is classified mainly depending on source, purpose and process. Considering the relatively limited amount of social media content containing (reliable) geographic coordinates the actual geographic context of the reported information should receive more attention. Without proper context or geographic references a location description could confuse service providers and emergency responders. This paper is proposing a conceptual approach to analyse VGI on the basis of its geographic content. It introduces three dimensions to categorize VGI and brings forward the concept of the VGI conductor. The conductor is proposed as the actor or actant that allows for the effective analysis and distribution of VGI within the Geoweb.

### **KEY WORDS**

Volunteered Geographic Information, VGI, Location, Context, Geoweb

## THE ISSUE OF GEO-INFORMATION IN VGI

Location oriented thinking in geography is a school of thought that reduces a location to a mere collection of coordinates. Connecting or comparing locations that display similar events or problems with each other is the common way of spatial analysis in applied research.

This paper has an overarching frame: the frame of the geographer “location is everything”, which is of course a frame that has its roots in real estate (Kautt, 2002; Post & Woodrow, 2008)

Besides the argumentation of location, location, location in real-estate, the “location is everything” frame is very much relevant for the GIS community. Be it with regard to locational accuracy or precision of coordinates there are many disciplines in GI Science that see location as the foremost attribute. The online availability of Volunteered Geographic information (VGI), also known as User Generated Geographic Information (UGGI), allows this kind of analysis on a global scale.

Academic debates on VGI are often about the “V” and not so much on the GI. At first sight this makes good sense as the volunteeredness is what makes it distinct from ordinary GI. In the Geoweb however, VGI is more about reuse of information and for that purpose the location information deserves more attention.

Without reusable GI, VGI is “useless”. If the geographic component of the information cannot be used to pinpoint the location the information pertains to, it is nothing more than ordinary User Generated Content. This paper is therefore taking the VGI discussion (initially) away from the V, looking mostly at locational context in VGI from the point of geo-social information, and not so much at “map-makers VGI” as involved in Open Street Map (OSM). VGI for map-making is usually directly uploaded onto a mapping platform (like OSM) and therefore in most cases purposefully or exclusively submitted for map-making.

Geo-social information deals with the Expectations and preconceptions predetermine the context in which we understand what we observe. If we watch an African television commercial which shows an elderly man relating a life lesson to a little boy we are not likely to expect the video to end with the revelation that Grandfather and grandson are using a 3G mobile internet connection to communicate between Lagos and Lusaka. But still it is a current ICT reality. A “Northern world view” requires us to watch it until the end to understand it as meanwhile we might be tempted to switch channels as the African dialogue is to some a bit lengthy and verbose. Context therefore matters. Where we are from and what we have learned influences the way we look at things and how we understand the world around us. It is therefore not likely that we can immediately grasp the content of information that is constructed in a different context than our own.

## THE EXISTENCE OF A CONDUCTOR

Reusability of VGI depends only partly on its “V”. Foremost it depends on the quality and context of the location information. VGI describes an event at a place. The location attributes of the VGI combined with the contextual content indicate this place. Without an identifiable location VGI cannot

be reused as places can be mistaken for other places. How this information was gathered and facilitated before it was transmitted does therefore not have to be an initial step in the assessment of usability of VGI. The starting issue here is locational context and not the origin of information.

VGI is playing a role in providing location and context of problems. Reuse of VGI is a common source of information in disaster response and crowd control (Campbell et al., 2008; Eisenman, 2008; Lane, Eisenman, Musolesi, Miluzzo, & Campbell, 2008; Ramanathan, Reddy, Burke, & Estrin, 2007; Roussos et al., 2008; Shilton, Burke, Estrin, Hansen, & Srivastava, 2008). In the instance of disasters or emergencies that require immediate relief efforts (fast burning events) all sources of information are being pulled together (UNOCHA). All data that is timely and accurate is welcomed. When it comes to the mundane affairs of daily life, including functional utilities and economies or even disaster preparedness (slow burning events), policy makers tend to be more weary of volunteered information. The distinction between authoritative and non-authoritative is made. And if the sources of information are not authoritative then Trust becomes an issue as “in the absence of authority, trust is a proxy”(Poore, 2013). In both cases, fast or slow burning, because of the nature of VGI, a “trusted” entity or actant is required to either establish the usability of the information or add authority to the information. to guide the VGI towards its reuse (within the geoweb).

Such an actant is tasked to assess the VGI content and relays it to perhaps different actants for processing. In this paper an example of an actant is discussed that operates in the realm of fast burning events. Actants or agents however exist in any form of information assessment and exchange, from a personal or an institutional perspective. These actants exist, they are not in need of invention. In the case of VGI the actant has a steering role which requires authority, the ability to direct information flows and the knowledge or understanding of the information context. Therefore in this paper the actant in VGI is introduced as a “Conductor”, combining these characteristics. The VGI Conductor is neither entirely analogous to merely the conductor of an orchestra, the conductor on a train or a conductor as a component in electronics. It is also not just a moderator or facilitator. The Conductor has characteristics of all of these.

In aspects of daily life, for personal information needs, one is likely to be one’s own conductor. Choosing which data sources to use and accept for the day’s weather forecast or deciding how to send a personal message to on contact and a professional message via a different channel to another contact are actions of a Conductor. The way we edit a received e-mail message before forwarding it or how an interesting blog-post is phrased and shared via Twitter are both actions reusing online information and are sanctioned by ourselves as a Conductor.

Stuart Aitken (2013) mentioned that “a map is a conduit for discussion”. In this discourse, the geoweb is seen as a conduit for (discussing) spatially attributed information. “*the geoweb is an assemblage of heterogeneous networks that are designed to enable, steer and monitor the mobilities, actions and information generated by people and things*”(adapted from Straube, 2013). Inputs and changes to information are generated at the borders or entry of the geoweb and within the Geoweb, within its networks, this information is moved or drawn into a certain direction. The purpose of certain information elements defines the initial recipients and the mode of transmission in the geoweb and therefore the route and speed by which the information travels the conduit. To monitor at the gates of the geoweb requires a wide access to information sources and the capacity to monitor these all at once and the ability to understand the context of individual pieces of information. A conductor is equipped to deal with the assemblage of heterogeneous networks and actors that populate the geoweb.

The conductor thus exists already in many forms and in most cases its existence is taken for granted. In most cases it is an automated performance of software (like a virus scanner) but in cases where the information cannot be machine read (part of) the role of conductor must be performed by a person. Most of the “qualitative assessment” of VGI, or crowdsourced information for that matter, requires moderation by a person before it can be reused. You need to look at a picture to see if it’s content represents its attributes (caption and coordinates).

## EXAMPLE OF A CONDUCTOR

The characteristics or roles of a conductor are encompassing authority, direction, understanding and responsibility. Firstly a VGI Conductor has **authority** as it should be able to set standards (regarding the quality of geo-information), to reject or approve data for its reusability.

Secondly the Conductor can **direct** a course of action. Information is directed to tools or analysis methods, directed to different information channels depending on transmission speed and purpose and (re)directed to certain destinations.

This can only be possible if the Conductor has knowledge or **understanding** of the information it deals with in relation to its context, purpose and relevance.

As a consequence of these three characteristics a VGI Conductor is also **responsible** in a comparable way to a music conductor being responsible for timing and tuning of an orchestra, or a train conductor being responsible for the ticketing of passengers and keeping the train on schedule.

An example of a VGI Conductor is the way the Stand-By Task Force (SBTF)<sup>1</sup> works in disaster response activations. It is an example which covers all of the characteristics of a VGI Conductor.

The purpose of the Standby Task Force (SBTF) is to provide dedicated crowdsourcing, mapping, data scrambling and technology testing support to disaster response organizations, particularly local organizations. The SBTF, was launched in 2010, currently comprises over 1,000 skilled volunteers from more than 70+ different countries with dedicated experience in online Crisis Mapping<sup>2</sup>. The Crisis Mapping the SBTF performs is composed of four key components: information collection, visualization, analysis and response. To do this the SBTF takes a modular approach comprising different teams which are activated in combination or individually. Information from different sources enters through various channels and media to the SBTF and is distributed within the SBTF on the basis of information content and attributes. The teams translate, locate, analyze and report in order to verify and then redistribute information to disaster response and relief teams on the ground. The SBTF therefore acts as a Conductor that receives and acquires information, understands and processes it, and directs it to relevant parties. The fact that this activity and information is solicited from the SBTF and that they are activated on the request of official emergency relief organizations makes their operation authoritative.

Without a conductor like the SBTF the type and amount of information cannot be effectively used for disaster response. VGI, even crowdsourced information, is too heterogeneous. Text messages need to

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<sup>1</sup> <http://blog.standbytaskforce.com/>

<sup>2</sup> <http://blog.standbytaskforce.com/>

be translated, Pictures with geo-tags need to be analysed for relevance and accuracy and to get the proper geo-location.

## A FRAMEWORK FOR ASSESSING THE USABILITY OF VGI: THE CONDUCTOR'S WAND

There is much scientific debate regarding reuse and the voluntariness of online contributions. In this paper it is however “purposefully” set to third place after location and context. Reusability of spatial information is first of all dependent on location and context even if the provenance of the information is not yet established (Harvey, 2002, 2013). The ethical and legal debates regarding reuse are very important but without the first two dimensions there is little purpose in reuse. Provenance is however more interesting in the context of authority. In the conceptualization of the VGI Conductor, authority is set as the main characteristic. A conductor can therefore assert the provenance of the data to check if the source is authoritative or use its own authority to verify the data. The “mismatch between VGI as a product of often unknown provenance with a variable degree of data quality should be considered as a significant barrier for government adoption of VGI” (Johnson & Sieber, 2013) This aspect is therefore an important part of contextuality in VGI. The framework or “Conductor’s wand” proposed here is not used to assert provenance. It can be used by a VGI Conductor in a preceding step to pass judgement on whether or how VGI can be reused. The framework maps three dimensions of VGI: locatability, contextuality and purposefulness [fig. 1].

*1<sup>st</sup> dimension, Locatability:* the ability to determine (the level of accuracy of) the location information provided with VGI.

This can range between the geo-coding attached to the message (GPS-coordinates), an IP-address or a triangulation from mobile-phone receiving towers. As location information is the elementary component of VGI, the locatability of the information is seen in this model as the prime or first dimension of usability. As this includes all the parameters the GPS can provide the attribute Time is also included in this dimension.

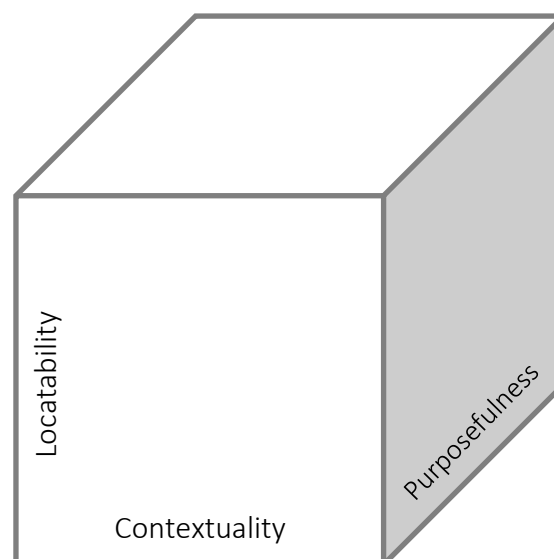


Figure 1: Three dimensions to assess the usability of VGI

2<sup>nd</sup> dimension, *Contextuality*: is defined as the amount of locational or environmental context (not computational context) provided in VGI to determine the location of the VGI subject (in relation/contrast to the location from which VGI was submitted; these usually are the coordinates a mobile app adds to a report).

As particularly unstructured contexts and incompleteness are defining characteristics of VGI. The completeness, clarity or quality of contextual information (the ‘contextuality’) is in this model seen as the second dimension of usability, which is required to validate the locatability of VGI. The first two dimensions are therefore linked to each other.

A combination of locatability and contextuality is usually needed to derive the exact location of a reported subject. Because of the way in which mobile reported VGI is transmitted a significant amount of VGI is located at the place of data recording or transmission and not at the actual location of the reported subject. This could be because the report was made while moving (on public transport) or a picture was taken of an object from a significant distance. In both cases the GPS coordinates provided as attribute with the report do not represent the actual location of the reported subject. The message context of the report must be understood or the picture must be viewed in relation to its tagged location or caption (checking street names or landmarks) in order to combine the provided coordinates with the subject. Depending on the richness of the contextual information the locatability of the information can be lower [fig. 2] for it to still be usable.

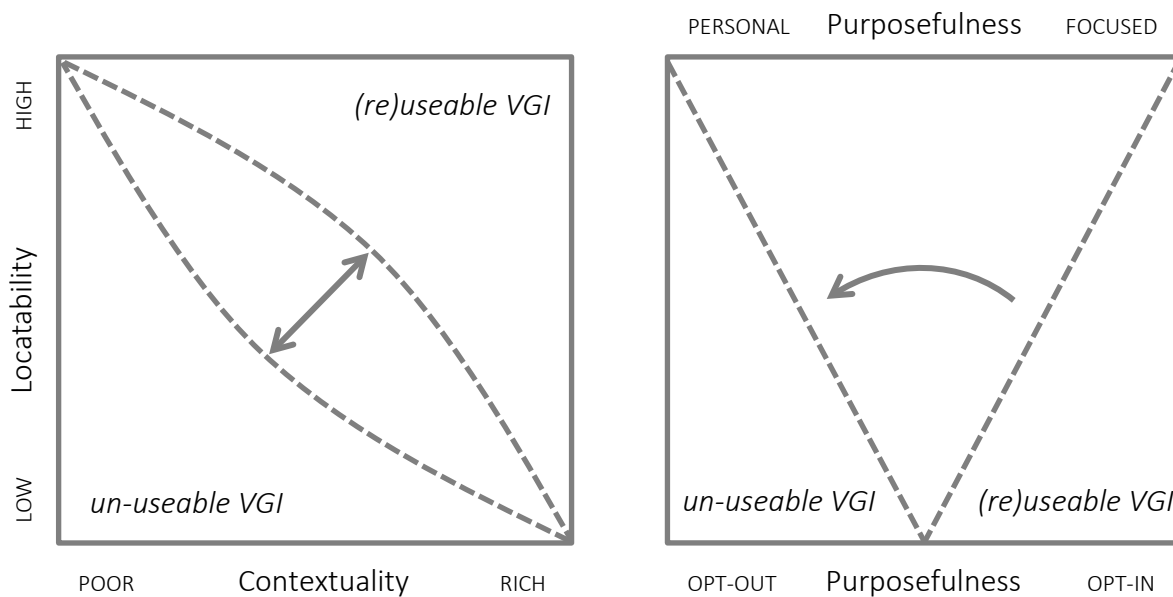


Figure 2 Usability of VGI as a function of Locatability and Contextuality and as a function of Purposefulness

3<sup>rd</sup> dimension, *Purposefulness*: It however remains important to know what is the data contributed for in the first place. The information can be submitted for a personal purpose (social media) and only directly make sense to associates of the sender. This type of information is usually difficult to reuse. Social media (twitter) can contain relevant key-words that are out of context and the geo-tag is often only indicative of the senders location and unrelated to the subject. The information could also have a more focused purpose. Information that is crowdsourced answers a question that is put in a certain context. Therefore the more focussed the purpose is the VGI can be more easily reused. Retweeting for instance is a very simple and direct way of reusing volunteered (geo)information. A message about

an event in a certain location is redistributed via the twitter network. In this case the purpose of the message also includes reuse of the data, as retweeting is one of the main features of Twitter. As this however discusses the “V” of VGI and does not take in consideration whether the information is usable from a geographic perspective it is regarded as only the third step in assessing (re)useability. Purposefulness can also be assessed according to the question whether the information is actually mined from volunteered or contributed data. Harvey (2013) argues that “the simple distinction between Volunteered and Contributed GI (opt-in vs. opt-out) is valuable for the data’s fitness for use”. This distinction gives way to a more ethical discussion whether certain data should be reused at all. If it is unknown whether data is submitted to be reused at all (opt-out) a choice can be made to discard such data completely [fig. 2]. In all cases VGI conductors have patrons. These patrons decide the ethical framework in which the conductor performs. These ethical considerations are not influencing the assessment framework presented here. Whether the purpose of the conductor is to assist disaster relief efforts, to perform crowd control, or do direct marketing on the basis of Facebook profiles, in each case the choice to assess information firstly on the basis of locational context is possible. The choice for opt-in or out and the personalized or focused nature of the information eventually provide the third dimension by which a VGI conductor can assess whether or how VGI can be reused.

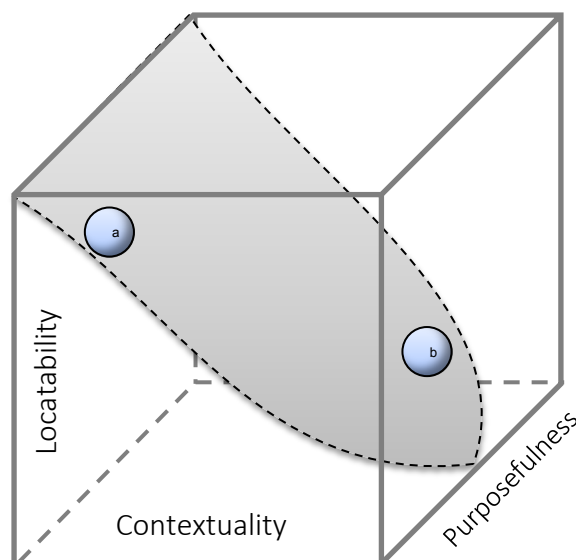


Figure 3: a flexible plane dividing usable and on-usable VGI

Based on three assessments a three dimensional space appears [fig. 3] where all VGI or specific app data can be positioned according to locatability, contextuality and purposefulness. The Conductor can set standards for VGI and as such a plane appears dividing the VGI in usable and non-usable. Depending on where in this cube certain (re)usable VGI is positioned provides a conductor an indication of possible processing required or restrictions for reuse of the information. Information that is highly locatable, low on context but focussed [point a in fig. 3] might be machine processed while information that is rich on context but less locatable would require moderation in order to make its reuse effective.

## CONCLUSION

The VGI Conductor is not something to be invented. It exists already. The VGI Conductor performs many unobtrusive tasks and is in regard of the current exaflood of information a required actant in the Geoweb. As shown in the example of the SBTF the conductor role is often played by a combination of people, hardware and software. For personal data use one needs to be its own conductor and make choices on apps and media to use. It therefore is a network actor/actant represented by persons, groups of people or automated systems and combinations of these. This paper suggests to give it a distinct place and the attention it deserves as there is no effective reuse of VGI possible without a conductor.

The performance of the conductor might be enhanced if it uses a framework to assess the (re)usability of VGI foremost on the basis of geographic context as represented through locatability and contextuality. The purpose and the voluntary nature of VGI dissemination form a third dimension in this assessment. Employing such a framework a VGI Conductor can play a more efficient role in the Geoweb and provide direction to information through understanding and authority. By performing this role the VGI Conductor becomes more prominently visible as the oil or glue, guiding flow or shielding wall in information provision in the Geoweb.

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