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# Some legal concerns with the use of crowd-sourced Geospatial Information

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**Abstract.** Volunteered geographic information (VGI), citizens as sensors, crowd-sourcing and ‘Wikipedia’ of maps have been used to describe activity facilitated by the Internet and the dynamic Web 2.0 environment to collect geographic information (GI). Legal concerns raised in the creation, assembly and dissemination of GI by *producers* include: quality, ownership and liability. In detail, accuracy and authoritativeness of the crowd-sourced GI; the ownership and moral rights to the information, and contractual and tort liability are key concerns. A legal framework and governance structure may be necessary whereby technology, networked governance and provision of legal protections may be combined to mitigate geo-liability as a ‘chilling’ factor in VGI development.

## 1. Introduction

Spatial law and policy occupies a fascinating phase in technological development as new legal relationships and operational imperatives arise. The ‘grey’ areas of interpretation and respective responsibilities are set to become more prominent. Geospatial information has been transformed by ‘disruptive’ technologies (‘innovative’) that have dictated a new *modus operandi*, from the collection of spatial data, storage, analysis to its use in information systems. The previous use of the floppy disk and compact disc (CD) to exchange data and information has given way to the universal service bus (USB), flash drives and cloud computing (CC). The displacement of CDs and digital video discs (DVD) as a storage media by CC has potentially made these physical media redundant. The information technology evolution has also witnessed innovative uses of the Internet from Web 1.0 to Web 2.0. In its latest guise, many new possibilities have emerged including the sharing of maps and spatial information in one common storage medium – the ‘cloud’.

This paper outlines some preliminary findings and concerns that are caused by disruptive technologies. The literature has prominently focused on technology and apart from Scassa (2013), little attention has been paid in previous studies to legal concerns. This paper posits the view that there are many uncertainties that may need to be resolved before the operational and technological innovations may be deployed on a large scale. In part 2 of this paper the Web 2.0, crowd-sourced maps and *producer* environment is described. This discussion leads to parts 3, 4, & 5 that raise



concerns with the quality of data and information, ownership especially of intellectual property rights, and legal liability in contract and tort respectively. The potential risks for each of these concerns have to be appropriately managed. Part 6 examines current legal frameworks and the legal governance of the collection and dissemination of geospatial data. The final part 7 summary and conclusion identifies five observations and suggested actions that may be taken to resolve the practical problems for *producers*. Many of the findings reported and discussed here are preliminary ones but nevertheless provide a basis for proposing a governance framework for all parties.

## 2. Web 2.0, Crowd-sourced Maps, VGI and *Producers*

This section lays the groundwork for a common understanding of the Internet environments beginning with Web 1.0 through to the collaborative milieu of Web 2.0 with innovative ways of harnessing the myriad applications. In particular, the spatial dimension and its mapping and recording is of particular interest especially with volunteered geographic information (VGI) and the different producers and users as participants in crises, emergencies and disaster management.

In the Web 1.0 environment, the World Wide Web (WWW) known synonymously as the Internet was envisioned by Sir Tim Berners-Lee as “a collaborative medium, a place where we [could] all meet and read and write”. [1] Recent developments on the Internet and especially within Web 2.0, have extended the range of use – from the desk-bound to the mobile device. However, the more ubiquitous ‘application’ (apps) of mobile electronic devices has produced new legal concerns in general and liability in particular. More specifically, net-citizens (netizens) who contribute to the collection, use and dissemination of geospatial information have triggered a re-evaluation of traditional legal frameworks. The legal and policy framework is continually being cajoled to adapt the law to provide novel solutions for the digital age.

In the Web 2.0 environment the static pages of websites are used and updated by collaborative and cooperative means by users for dialogue, creation of content, and the online meeting of virtual communities. The new environment and other mobile technologies have opened up the landscape for nearly everyone to access the Internet, to create and share content. There is a democratisation in the production of information.

In this environment communication takes place anytime and anywhere. However, the management of such activities will invariably be a place-based where ‘jurisdiction’ becomes pre-eminent and the law of the land prevails. In the absence of specific laws to govern electronic-based activities in a jurisdiction, existing law and regulations may have to be adapted to cater for and address new challenges of technology. The adaptation of the law could be by way of analogising case by case or re-writing rules and regulations for ‘special or exceptional cases’.

Furthermore, innovative ways of collaborating and disseminating information have been created to harness the dynamic power of Web 2.0. Paper maps have made way to electronic maps together with the so-called ‘crowd-sourced’ maps. *Ushahidi* (‘witness’ in Kiswahili) is the interactive map that was developed by concerned citizens during the disputed Kenyan elections of 2007. The interactive maps provided eyewitness accounts of violence across Kenya. The maps were accompanied by written text in *Ushahidi* and images were displayed on Google Maps. This example demonstrates the potential applications that could assist first responders and humanitarian organisations in the wake of natural disasters, crises and violent conflicts.

Volunteered geographic information (VGI) is “the widespread engagement of large numbers of private citizens, often with little in the way of formal qualifications, in the creation of geographic

information”. [2] VGI is part of a broader trend of “user-generated content” (UGC) that is becoming commonplace in Web 2.0-based applications. The VGI community is set to play an influential role in modern map making and they have sometimes been described as *producers* defined below. [3]

*Producer* is a portmanteau of two words combining ‘production’ and ‘usage’ – a word popularised by Axel Bruns (2008). [4] The word refers to the type of user-led content creation that takes place in a variety of online environments such as Wikipedia. There is the blurring of boundaries between producing and using, hence the *producer*.

Examples of other VGI include need for information and maps in crisis situations, for example, during the Haitian earthquakes of 2010. [5] Volunteer mapping efforts that assists in relief efforts have since been used in the context of forest fires, floods, hurricanes and other disasters. Volunteers capture and record information using mobile devices and submit these to a website or central agency that analyses, reviews and then publishes the data on base maps, for example, those provided by OpenStreetMap or GoogleMaps. [6] Most of these contributors are novices and non-professional map creators. While reliability and accuracy of VGI might be questioned, the timely production of near-instantaneous maps during times of crisis has proven invaluable. Further examples of VGI include the Libyan crisis map in 2011; the United Nations Organisation for the Coordination of Humanitarian Affairs (UNOCHA) maps; Transparency Morocco; Mamdawrinch; and Syrian Tracker 2013. [7]

Scassa (2013) identified a series of potential risks from the perspective of the operator of a VGI site, the contributor of VGI and user of the product, service or application that is created using VGI. The article gave an overview of emerging issues of which developers, contributors and users should be aware when engaging in VGI-related activities. The lessons for all are timely.

The digital environment has made nearly everyone with a mobile device a map maker and a digital recorder. Nearly every phenomenon that is observable may be captured and mapped. Using cell phones, global positioning system (GPS) devices and placing information on the Internet using social media has elevated the importance of the spatial context. The newly discovered cartographer may be untrained in geographic information systems (GIS) technology but are now enabled to contribute to location-based services and bringing GIS to the masses.

While expectations are on the rise, so are the legal risks. Legal liability questions have been raised where the subscribed data might be biased and wrong leading to an endangerment to life. VGI service providers on their part have to ensure that they do not engage in conduct that is deemed “negligent” and to verify volunteer contributions.

The ubiquity of location-aware devices that automatically record personal movements, habits and other information linked to one’s location raise other concerns such as privacy. Equally important are those relating to the ownership of geospatial information and the kinds of tacit agreements between producers and users.

Many of these questions have remained largely in the background, lightly discussed and seldom highlighted. In the following three sections, issues of quality of data and information, of ownership and of legal liability are reviewed to help prepare a proposed legal framework.

### **3. Concern # 1 Quality of data and information**

Amongst the range of potential risks is the concern with the quality of the data contributed by the 'crowd' relative to those produced by professional mapping agencies. Data authoritativeness is closely linked to the background and training of the contributors. Traditional government sources of GI have always been considered more 'authoritative' because of the professional training and other quality checks in place. What is considered authoritative geospatial data may be debatable and appropriate criteria may be necessary.

However, what is not in dispute is that the production of authoritative geospatial data is costly, time consuming and usually undertaken by the public sector. Evidence suggest that many government mapping agencies might be struggling to obtain continuing funding to maintain geospatial data or the mandate to keep geospatial databases current. As a result it seems that there may be a growing reliance on VGI data. While on the one hand, VGI data sources could be highly accurate, complete, in time and at a practical useable scale,[8] the potential risks are still largely unknown and little understood.

The life cycle of GI from the collection of data, cleansing, and assembly of results are prone errors and inaccuracies. Without careful editing and ground-truthing inaccuracies might creep in through misinterpretation of observations, digitising errors, resampling and the use of incorrect map projections as well as the inexpert final assembly of results.[9] For VGI data to be readily acceptable the issues of quality control and monitoring of VGI contributions are a prerequisite as the risks are neither hypothetical nor inconsequential. Tragic consequences could ensue from using 'bad' data.

The Canadian the Centre for Topographic Information, a division of Natural Resources Canada, has begun assessing the potential of a collaborative mapping model that combines contributions from provincial and municipal organisations as well as those from its citizens.[10] In Australia, the state of Victoria's Department of Sustainability and Environment has developed a Notification and Editing Service that encourages crowd-sourcing of GI. The OpenStreetMap Collaborative Prototype (OSMCP) project of the U.S. Geological Survey (USGS) and swisstopo [*sic*] Revision Service of the Swiss Federal Office of Topography are experimenting with similar ideas.

In the U.K. OpenStreetMap (OSM) is one of the better known examples of collecting and leveraging VGI. Initiated in 2004, the project was a response to the strict copyright laws that apply to Ordnance Survey maps and geospatial data. With OSM any interested party may view and edit geographic data in a collaborative way. Registered contributors may make additions, modify inaccurate features, delete stale or invalid data and generally edit features to improve the quality of the geospatial database. In addition to individual contributions, organisations have donated complete data sets to OSM. Ironically OSM does not use quality control experts to vet contributions. The quality of the data is refined over time through iterative corrections of the submitted data by subsequent contributions.[11]

The concerns about the quality of data also raises issues about who owns the contributed geospatial data in the mix. The rights to ownership of the intellectual property can be a 'real' issue especially when the end use is transformed from the altruistic ideals to the for-profit motives.

#### **4. Concern #2 Ownership: Intellectual property and moral rights**

Intellectual property rights (IPR) including the ownership of copyright is a pressing concern with VGI data. In most common law jurisdictions copyright is vested in the author of an original work that is the expression of an idea that also involves a degree of skill and judgement in the work.

In the U.S. ‘originality’ focuses on a creative spark, rather than on the ‘sweat of the brow’, whereas, in Canada ‘originality’ requires skill and judgement and not copied from a previous idea.

With electronic databases, concerns have been raised about whether the ‘arrangement’ of data qualify as sufficiently original. The views here may be contrasted to database protection laws in the EU especially the *sui generis* regime where protection is afforded not just to an original selection or arrangement of the data (similar to copyright law) but to the underlying data itself. In VGI applications and its products there may be independent rights in the underlying base map. Given the nature of any map is made up of layers of information there can conceivably be multiple copyright holders in any given work.

With many contributors adding to the volunteered geospatial database, there can be difficulties in tracing the heritage of the data and hence the ownership of the copyright. The ‘confected’ or synthetic data may ‘lose’ copyright status because of the difficulties associated with tracing the current and original owners of the data. It has been suggested that Creative Commons licences could assist in alleviating such a problem[12] and to avoid what Scassa (2013) has described as the ‘Wiki’ effect – where data are combined from thousands of disparate sources to form one or more coherent works. The perverse outcome may be that the confected data may become more inaccurate, corrupted with further errors and there may be no one to blame because there is no copyright holder or there may be too many owners to be held accountable.

The Australian Copyright Council has proposed several steps to manage and minimise potential liability risks when posting data on websites.[13] These include terms and conditions that state that the host service provider will not infringe copyright. In addition to indemnities, service providers must ensure that the agreements are legally binding. Service providers have also to educate users not to post material without the relevant copyright owner’s consent, to retain the right to remove material if copyright is infringed, to monitor sites for potentially infringing material, and to moderate the process of accepting contributions with a clear statement as to how to complain and how to assert one’s rights.

In cases where the VGI contributed data contain material that infringe copyright whether advertent or otherwise, efforts should be made to remove such material and steps put in place to prevent further infringement. Also the use of disclaimers to alert users to the limitations of the data can help mitigate and prevent litigation.

Other service provider-contributor agreements include the terms of service to be provided by the website, disclosure of information to third parties and data protection protocols including indemnities and warranties regarding the data in storage.

Traditionally geospatial data produced by government agencies have copyright vested in the Crown even in cases where the agency is the first publisher of VGI contributions. In these instances it is important to communicate the intention of the Crown to contributors and to emphasize the terms and conditions of use. In turn, VGI contributors may surrender ownership and use of their data and to limit the extent of the permitted uses.

There may be a binding agreement between the contributors and the websites using the contributed data to ensure that they have not infringed the rights of third parties and that they will indemnify site operators for any damages arising from any such infringements. Such an agreement could include a statement that unequivocally states that the contributors themselves have the rights to the contributed data. On the other hand, contributors may request attribution and acknowledgement of

their materials. In most jurisdictions moral rights clauses in the legislation enable the assertion of such rights.

Moral rights, recognised by Australia, Europe and the Berne Convention – *droit moral* -- protects the integrity of a creator's works in terms of the right to attribution (claim to ownership of a work), right not to have authorship of a work falsely attributed and a right to integrity (a right to object to distortion, mutilation or other modification which might be prejudicial to the creator's honour or reputation).[14]

Ownership issues in terms of the consent to release the data containing private, confidential and sensitive information are also pertinent here. The website may have implicit access to all data found on its servers. However, there is the danger that the data could be disclosed to third parties innocently, advertently, inadvertently by accident, and deliberately by unauthorised persons. The key to such security risks hinge on the contractual relationship between the user and the service provider and how these are managed.

In some cases, there may be jurisdictional prohibitions on the transfer of data across international borders. The EU Data Protection Directive, for example, regulates the processing of personal data within the European Union.[15] Important components of this Directive include privacy and human rights.[16] On 25 January 2012 the European Commission unveiled a draft of the EU General Data Protection Regulation that will supersede the Data Protection Directive which may have direct implications on geospatial cloud computing usage and deployment of crowd-sourced geospatial information on websites.[17]

The potential for the deployment of poor/bad data on VGI sites, misuse of the data, and innocently 'illicit' data can lead to a number of potentially unpredictable consequences. Examples of such use of innocent illicit data include the unauthorised use of copyrighted data contributed by a third party data supplier, and the inappropriate use of personal information by VGI user organisations that may contravene privacy and data protection legislation.

There may also be ethical considerations in the release of private information on public documents such as published maps. Scassa (2013) gave the example of *Proposition 8 Maps* – a mash-up of Google maps and Prop 8 donors to a campaign in support of a ban on gay marriages in California.[18] The map revealed names, addresses and donation amounts of donors. Such revelations were unforeseen by the donors and for some who may not have consented to the use of the information in this manner. The potential for mischief, subsequent harm and tort liability as a result of posting of the information could affect the VGI host, contributor and innocent bystander.

A breakdown in contractual relationships and the likely impact of tortious damage from using inaccurate and/or sensitive data point to a discussion of legal liabilities and personal responsibilities that follows next.

## **5. Concern #3 Liability: contractual and tortious**

While appearing to be a semantic one, there may be difficulties in determining whether a VGI website is the source of a product, service or mere provision of information. In general, legal liability in common law attaches to negligent behaviour where a duty of care was owed and was breached and where there was a causal link between the negligent act and the loss suffered.

In the case of contributors in the ‘crowd’ who may not have any specialised training or expertise in mapping or geography, mistakes and errors may occur the data collection phase itself. A threshold test for liability is whether there was an exercise of due diligence of a reasonable person engaged in that activity. Liability may be unlikely for an innocent mistake.

Tortious liability may arise in a number of other ways. As a shield against any liability VGI site operators could insist that users accept the terms of use of their data.

VGI data supplier organisations may be liable for negligent contributions of erroneous data that result in injury or damage to persons who have relied on that data. Data accuracy is a critical element that VGI organisations should guard jealously. The extent of the responsibility for user generated content could hinge on the degree of quality control in the data it receives, the editing and filtering of the data, the nature and subject-matter of the data and the degree of control asserted by the data supplier organisation in the data. Under common law tort, the greater the control the greater the responsibility and hence exposure to liability should anything go wrong.

Professional geospatial data producers assume a higher standard of care. They may be sued for providing incorrect data, misleading or negligent information as well as defamatory information.[19] However, it would be difficult to hold amateur contributors to the same standard of care as the collection of their data may not have undergone as rigorous a process as the professionals. Their data may contain minor errors, and may be a synthesis of data from numerous sources.

Another concern with VGI activity is that of the exposure to liability of the volunteer contributor. These volunteers may be described as ‘Good Samaritans’. In many jurisdictions, Good Samaritan law is not found on statute books but is a concept adopted by the courts and applied as public policy. However, practices vary in different jurisdictions.

In Australia, the various states have enacted Good Samaritan laws that protect professionals providing assistance at the scene of an accident or any emergency. Most of these provisions define a Good Samaritan (rescuer) as a person acting without expectation of payment or other consideration who comes to the aid of another. Hence, a Good Samaritan should not be liable for assisting in an emergency if all reasonable care and skill has been taken.[20]

However, the laws in much of Europe criminalize a failure to help people in an emergency. Indeed in Germany, the failure to provide first aid to a person in need of help is punishable under § 323c of the German Criminal Penal Code.[21]

In the U.S., courts have taken a view that there is no duty to rescue.[22] Robson’s (2011) discussion of the so-called Good Samaritan laws in the U.S. unequivocally demonstrates that a person is not required to rescue another, even if the person could do so safely.[23] The discussion suggests that:

- A volunteer group that undertakes to rescue others exposes itself to liability.
- A duty to rescue arises only when a person puts another in danger but has a responsibility to mitigate the harm and danger.
- A duty to rescue is required where there exists a special relationship between the parties.

Emergency services using crowd-sourced geospatial information are in an invidious position. The ‘Good Samaritan’ duty of emergency services could be mitigated by not undertaking rescue services and in the case of collecting geospatial data in situ of the emergency, by not providing the crowd-sourced data and maps. It would be ironic to note that, the digital volunteers could be considered to assume the role of a passive observer and not communicate with the victims. Or, the digital volunteers

could discourage reliance on the use of information with disclaimers and other notices with statements to the effect that the information are not to be relied upon in life threatening situations.

Other worries about legal liability, however, remain in the sense that crowd-sourced data might be misused; volunteers could get hurt in collecting the data; the legal responsibility for the data are unascertained and unascertainable; and the legal status of the volunteers themselves, as a loose collective of like-minded people who wish to help, is uncertain.[24] The U.S. Federal statute *Volunteer Protection Act of 1997 (VPA)* offers some protection to a broader range of volunteers such as operating under organisational structures of a particular kind and imposing limits on volunteer compensation.

In the case of contractual liability – relationship between the VGI website service provider and users – the ‘duty’ is expressed in the “Terms of Use” posted on the web page. Thus, for contributors, particular care must be exercised by not giving or promising any type of warranty or guarantee for the data submitted. To do so might expose and heighten the risk of legal responsibility for any errors. Contributors could refrain from providing any indemnification for the data and information submitted to the website.

From the preliminary findings of the above review, a legal framework may be needed to manage the viewpoints of the three major actors in the piece – the service provider as host, the ‘crowd’ as volunteer contributors, and the disaster manager both as contributor and user.

## **6. Current Legal Frameworks and Governance**

A preliminary conclusion is that the VGI community in general, and crisis mapping community in particular, may need to develop general standards that address issues of quality, ownership and liability. Each of these issues come about where crowd-sourced maps are deployed whether in a disaster situation or in the calm surrounds of a planning studio. It seems that the consensus is that laws that regulate the use of technology, the governance of volunteered information and protection for all is undoubtedly a looming challenge for policy makers and governments. One view is that if the legal questions are not properly managed, tort liability might have “the potential to destroy the model before it realises its potential”.[25]

Given the need for large-scale data and the ubiquity of geospatial data, technology has been developed to make these available anywhere, anytime and in any way. The Internet and sharing on the cloud and its use for geospatial applications promise a lot but many unresolved legal issues remain.

Since 2010, the Ordnance Survey (OS) GB, the National Mapping Agency in the U.K., has made available geospatial data to the public to encourage innovation and government transparency.[26] OS is by far the largest public sector agency that makes use of cloud computing as part of its web mapping service that deploys geospatial data to customer websites and enterprise systems, services that are hosted on the Amazon Web Services (AWS) platform.[27]

Increasingly one platform that is being used to host VGI and crowd-sourced maps is the ‘cloud’. Cloud computing provide a means to undertake computing tasks, software, data access, data storage resources. Users of cloud computing (CC) take advantage of computing infrastructure but are not involved in the detailed technical setup.

The advantages, offered by CC generally and to geospatial cloud computing (GCC) in particular, to analysts, users, data providers and others, are unlimited. The benefits include lower costs,

provide enlarged access to products and services and be able to do so online theoretically from anywhere in the world. The need for geospatial software may be leased or paid for on the basis of use and data used acquired on a needs basis through web services. This is indeed neo-geography *par excellence* and the 'cloud' is poised to radically change the way geospatial analytics are performed.

However, geospatial cloud computing raises other concerns such as the security of information and data in terms of unauthorised use of the services, the protection of personal, confidential and sensitive data, intellectual property rights especially of copyright and licensing the use of geospatial data and legal liability.

The Natural Resources Canada's *Primer on Cloud Computing* discusses a survey that lists ten different security risks. Among these risks include abuse and malicious use of cloud computing by spammers and hackers, weak application programming interfaces (API) that expose cloud computing users to confidentiality and integrity risks, technological vulnerabilities arising from shared technologies, data leakage, service and traffic hijacking, delegations of authority to the vendors and encryption issues.[28]

While the risk concerns appear credible especially with reports of data security lapses, helpful advice is available, for instance, from the European Network and Information Security Agency (ENISA).[29] In addressing some of these concerns an understanding of the roles and responsibilities of both the vendors and users are as important as assessing the threats and mitigating losses. Where these rights and duties have been established, the sharing of liability as well as the burden of the liability may be apportioned by mutual consent through arbitrators and mediators.

The International Bar Association (IBA) has been in the forefront of thinking in attempting to meet the challenges of technological developments. The IBA's proposed *International Geoinformation Convention* focuses on the reliability of information for the particular application and the limits the law should seek to impose on the undoubted power of the information. By addressing the many conflicting and overlapping existing rules and regulations associated with the collection and processing of GI, a new industry may develop with commercial certainty about rights and obligations of its many participants and also the confidence in moving in conformity with public opinion.[30] It may be posited that such an industry will not spontaneously blossom without the trellis provided by a robust international legal framework.

## 7. Summary and Conclusions

This paper has reviewed several concerns with the use of VGI-generated geospatial data. Five conclusions may be made in summary.

First, the Web 2.0 environment has witnessed a new wave of data collection methods, data use and data analytics. The challenge is how to manage this new world of geospatial data collection and dissemination. Cloud computing, the Internet of Things (IOT), open standards and open source all challenge traditional means of 'professional' data creation, collection and storage. With public sector funding of the collection of geospatial data becoming more restricted in straitened economic times, the public and private geospatial industry may have to turn to use shared crowd-sourced data. Protection by way of licencing and new methods of data ownership will have to be developed. In turn standards and new usage policies may also have to evolve. Yet, there remains tort liabilities related to questions of data assurance, integrity and ownership.

Second, there seems to be an acceptance of the terms of use of VGI data as well as the consequence of the negligent contributions of erroneous data. Also with amateur collectors and contributors of the data, there is an apparent lowering of the standards of care. The use of volunteered and crowd-sourced geospatial databases has highlighted the tensions with Good Samaritan laws especially for rescuers who may not be shielded legal liability. But the laws are mixed for different jurisdictions from the hard line U.S. position to the more benevolent Australian states. The challenge here for policy makers is that if there were to be no legal protection for volunteers, the ensuing litigation may destroy the VGI model before it reaches its full potential.

Third, cloud computing is the next 'storage' media that appeals to the needs of the neo-geography *par excellence*. Cloud computing is changing the way geospatial information collection and geospatial analytics are undertaken. However, the issues of security of information, the protection of personal, confidential and sensitive data, intellectual property and aspects of tort liability hover in the background.

Fourth, the record and reception of crowd-sourced geospatial data among different jurisdictions is mixed. For example, newly developed countries like China and India, and developing countries like Indonesia are very 'security conscious' and sensitive in so far as geospatial information and data are concerned. The fear of threats of invasion and border incursions persist.

Indonesia provides an extreme example where all geospatial data are collected by a central agency and no one else may collect such information. The Indonesian *Geospatial Information Act No. 4, 2011* provides the legal framework for acquiring accurate geospatial data and creates a regulatory framework for the administration of national geospatial information. Criminal sanctions are attached to deter the collection of geospatial data by private persons.[31]

Fifth, radical changes are needed to reduce *geo-liability*. This is because legal liability theories governing geospatial information at least in the common law world are largely under-developed and there is a tendency for the law to lag behind technology relative to resolving the growing problems and issues presented by technology and neo-geography. The disparities between legal and policy frameworks are evident.

Technological development in relative terms is without boundaries. Legal and policy frameworks tend to 'lag' and are not developed in a consistent manner. Such under-development leads to a degree of uncertainty and perhaps a 'chilling' effect on venture capitalists who might refrain from new and innovative investments for 'fear' of unknown legal repercussions.

On the other hand, addressing the legal and policy challenges head-on may lead to greater developments in geospatial information production and use. A legal framework that provides 'security' in all ways could also lead to long-term benefits to those concerned.

Given the three-way interlocking network of interests, the governance of VGI activity can be fiendishly difficult because of the various competing interests and tensions between each of the actors. This preliminary work has only focussed on the legal issues. The difficulties of legal analyses become more apparent in the absence of litigation and/or specific legislation in the field. Yet, the distinctiveness of the problem-set may warrant particular policies to address competing rights and interests and to emerge with solutions to practical problems in the use of geospatial VGI.

The final analysis suggests some kind of a 'relational' law is required within a framework where technology, networked governance and legal protection of geospatial information are woven into place. In such a scenario, it would be possible for volunteers to craft a code of practice that can be

universally practised. Such a softly-softly self-regulated environment could prove fruitful and more easily acceptable and accepted by like-minded geospatial professionals and by the map using first responder community – the *producers*.

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## End Notes

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- <sup>4</sup> Bruns, A (2008) *Blogs, Wikipedia, Second Life and Beyond: From Production to Producers*, New York: Peter Lang.
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- <sup>6</sup> See OpenStreetMap at <http://www.openstreetmap.org> and Google Maps at <https://maps.google.com> accessed 08/07/2013.
- <sup>7</sup> The url hyperlinks respectively are: <http://blog.standbytaskforce.com/2011/09/01/libya-crisis-map-report/>; <http://blog.ushahidi.com/2011/03/06/using-new-ushahidi-map-libya/>; <http://www.unocha.org/ochain/2012-13/>; <http://www.transparencymaroc.ma/TM/fr/>; [http://www.mamdawrinch.com/?l=en\\_US](http://www.mamdawrinch.com/?l=en_US); <https://syriatracker.crowdmap.com/>; <http://irevolution.net/2012/03/25/crisis-mapping-syria/> accessed 14/03/2014.
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- <sup>9</sup> Hunter, G (2009) 'Spatial data quality: Problems and prospects' in *Research Trends in Geographic Information Science*. Springer Verlag, pp. 101-122.
- <sup>10</sup> See Natural Resources Canada (2012) *Volunteered Geographic Information (VGI) Primer*, Canadian Geospatial Data Infrastructure Information Product 21e, Ottawa: Natural Resources Canada at <http://geoconnections.nrcan.gc.ca/18>.
- <sup>11</sup> Ather, A (2009) 'A quality analysis of OpenStreetMap data' Department of Civil, Environmental & Geomatic Engineering, University College London at <http://homepages.ge.ucl.ac.uk/~mhaklay/pdf/Dissertation-OpenStreetMap-Quality-Ather-2009.pdf> accessed 08/08/2013.
- <sup>12</sup> See <http://www.creativecommons.org/licences>. Creative commons licences give everyone from individual creators to large companies and institutions a simple, standardized way to grant copyright permissions to their creative work.
- <sup>13</sup> Australian Copyright Council (2009) *Websites: User-generated Content and Web 2.0* at <http://www.copyright.org.au/find-an-answer/browse-by-keywords/> accessed 08/08/2013.
- <sup>14</sup> See *Berne Convention for the Protection of Literary and Artistic Works*, 1988.
- <sup>15</sup> *Data Protection Directive 95/46/EC* on the Protection of Individuals with Regard to the Processing of Personal Data and on the Free Movement of such Data.

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<sup>16</sup> In particular see Mantelero, A (2012) 'Cloud computing, trans-border data flows and the European Directive 95/46/EC: applicable law and task distribution', *European Journal of Law and Technology*, Vol. 3 Issue 2, 2012. Available at <http://ejlt.org/article/view/96> accessed 08/08/2013.

<sup>17</sup> EU (2012) General Data Protection Regulation, EC 25 January 2012 [http://ec.europa.eu/justice/data-protection/document/review2012/com\\_2012\\_11\\_en.pdf](http://ec.europa.eu/justice/data-protection/document/review2012/com_2012_11_en.pdf).

<sup>18</sup> See Prop 8 Maps (2012) 'Prop 8 Maps: A mash-up of Google Maps and Prop 8 Donors' at [http://sfist.com/2009/01/09/mash-up\\_map\\_of\\_google\\_maps\\_and\\_prop.php](http://sfist.com/2009/01/09/mash-up_map_of_google_maps_and_prop.php); and [http://www.huffingtonpost.com/2009/02/02/prop-8-donors-find-out-wh\\_n\\_163234.html](http://www.huffingtonpost.com/2009/02/02/prop-8-donors-find-out-wh_n_163234.html) accessed 15/03/2014.

<sup>19</sup> See the English case of *Bolam v Friern Hospital Management Committee* [1957] 1 WLR 582 and the discussion on the higher standard of care required for professionals practicing in their field of expertise in Cho, G (2005) *Geographic Information Science: Mastering the Legal Issues*, Chichester: John Wiley & Sons Ltd., pp. 370 ff.

<sup>20</sup> See for instance Australian Capital Territory (ACT) *Civil Law (Wrongs) Act 2002*; New South Wales (NSW) *Civil Liability Act 2002*.

<sup>21</sup> See 'Online NewsHour: French Legal System', September 3, 1997 at [http://pbs.org/newshour/bb/law/july-dec97/french\\_9-3.html](http://pbs.org/newshour/bb/law/july-dec97/french_9-3.html) accessed 08/08/2013.

<sup>22</sup> Jackson, JZ & Vaurio, AM (1999) 'Good Samaritans in the Hospital', 158 *New Jersey Law Journal* 833.

<sup>23</sup> Robson, ES (2011) 'Potential liability for crowd-sourced disaster response groups' at <http://stipacommunia.wordpress.com/2011/09/26/potential-liability-for-crowdsourced-disaster-response-groups/> accessed 29/09/2011. The landmark common law case is that of *M'Alister (or Donoghue) v Stevenson*, HL [1932] A.C. 562 and Lord Atkin's neighbour principle and in *Chapman v Herse* HCA (1961) 106 C.L.R. 112 duties to rescuers.

<sup>24</sup> Robson, ES (2012) *Responding to Liability: Evaluating and Reducing Tort Liability for Digital Volunteers*, Washington, D.C.: Commons Lab, Woodrow Wilson International Centre for Scholars, September, 57 pp.

<sup>25</sup> Robson (2011) *op. cit.* above.

<sup>26</sup> See OS OnDemand Web Map Service (WMS) at <http://www.ordnancesurvey.co.uk/business-and-government/products/os-ondemand/index.html> accessed 08/08/2013.

<sup>27</sup> See Amazon Web Services (AWS) at <http://aws.amazon.com/> accessed 08/08/2013.

<sup>28</sup> See Natural Resources Canada (2012) *Primer on Policy Implications of Cloud Computing*, Canadian Geospatial Data Infrastructure Information Product 20e Ottawa: Natural Resources Canada available at [ftp://ftp2.cits.rncan.gc.ca/pub/geott/ess\\_pubs/291/291945/cgdi\\_ip\\_20e.pdf](ftp://ftp2.cits.rncan.gc.ca/pub/geott/ess_pubs/291/291945/cgdi_ip_20e.pdf) accessed 08/08/2013 and the survey results reported in Cloud Security Alliance (2010) *Top Threats to Cloud Computing V.1.0* available at <https://cloudsecurityalliance.org/topthreats/csathreats.v1.0.pdf> accessed 08/08/2013.

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<sup>30</sup> See International Bar Association at <http://www.ibanet.org/Article/Detail.aspx?ArticleUid=6309c6e9-d561-4876-839a-5ecaacba361e> accessed 22/08/2013.

<sup>31</sup> Zeiss, G (2011) 'Indonesia's Geospatial Information Act No. 4, 2011' found at <http://geospatial.blogs.com/geospatial/2011/10/Indonesias-geospatial-information-act-no-4-2011-.html> accessed 08/08/2013.

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