

# How to recruit and motivate users to utilize VGI-systems?

Sarah Composto,  
Jens Ingensand,  
Marion Nappez  
University of Applied  
Sciences Western  
Switzerland/GIS-lab/  
G2C Institute  
Route de Cheseaux 1  
1401 Yverdon-les-  
Bains, Switzerland  
{sarah.composto,  
jens.ingensand,  
marion.nappez}@heig-  
vd.ch

Olivier Ertz,  
Daniel Rappo  
University of Applied  
Sciences Western  
Switzerland/Department  
Comem+  
Route de Cheseaux 1  
1401 Yverdon-les-  
Bains, Switzerland  
{olivier.ertz,  
daniel.rappo}@heig-  
vd.ch

Rémi Bovard  
City of Nyon  
Informatique et  
population  
Unité Géomatique  
(SITNyon)  
Place du Château 3  
1260 Nyon,  
Switzerland  
{remi.bovard}@nyon.ch

Ivo Widmer,  
Stéphane Joost  
Ecole Polytechnique  
Fédérale de  
Lausanne/Laboratory of  
Geographical Information  
Systems (LASIG), School  
of Architecture, Civil and  
Environmental  
Engineering (ENAC)  
Bâtiment GC, Station 18  
1015 Lausanne,  
Switzerland  
{ivo.widmer,  
stephane.joost}@epfl.ch

## Abstract

VGI-systems enable researchers to collect geographic information located on private property that otherwise would be difficult to get. In a time of information overload it is difficult to get users to use a system and to get them spending time sharing geographic information. These points are crucial for the success of a project involving VGI. In this context we here evaluate usage statistics of two different participatory websites: “Signalez-nous” which is a platform to announce broken streetlights and “Urbangene” which aims at digitizing locations of ponds and species. In both cases media campaigns were used to recruit new users. However their influence quickly decreased. An important finding is how a system’s benefits are shared with the users. If the interest is less obvious to a user, other techniques need to be used.

**Keywords:** Volunteered Geographic Information (VGI), Information overload, Motivation, User recruitment, Usage statistics.

## 1 Introduction

Today we are living in a time of information overload. Each day new applications, programs and websites appear on the market. As a citizen it can feel difficult to sort important information from less important information [1]. Moreover information overload causes stress and has an impact on a human’s physical and psychological health [2].

VGI (Volunteered Geographic Information) is a recent trend that allows citizens to access and gather geographic data through mobile and web applications. [3]. This trend however relies on the fact that citizens 1. Find an application / a website among a vast choice 2. See an interest in spending time sharing geographic information and 3. Use the tool to share information several times [4]. These three points are crucial for the success of a project involving VGI. Priedhorsky [5] defines four prerequisites that need to be met: utility, motivation, correctness and usability.

The influence of information overload on the usage of VGI systems is difficult to explore since each system that is used adds more information. [6]. Another important element is that a VGI-system should not be conceived with a user as a passive

producer and consumer of geographic information in mind – the user of a VGI-system should be given the opportunity to express opinions and to interact through the system [7].

In this paper we analyze and compare usage statistics of two different VGI-systems: “Signalez-nous”, a platform to announce broken streetlights and “Urbangene”, a system to digitize the location of ponds. The idea of this analysis is to identify elements that indicate how to recruit and keep users and how to get high quality data.

This paper is structured as follows: First we present the two systems “Urbangene” and “Signalez-nous”. Thereafter we describe the hypotheses that are used for the analysis of the usage statistics. Finally after the analysis of the gathered data and discussion of our hypotheses we present our conclusions and perspectives for future work.

## 2 The “Urbangene” project

Aquatic ecosystems in urban areas are often threatened by human activities, which cause a fragmentation of environments and thus reduce connectivity between habitat patches.

To reconnect urban aquatic habitats, it is important to identify where urban aquatic ecosystems are located – both on public ground as well as on private property. In this context the “Urbangene” project was created in 2014.

Figure 1: The “Urbangene” interface.



The core of the project is a web-based platform, which allows citizens to digitize ponds in the Geneva cross-border area and to report species – such as toads and newts. A user can digitize a pond on a map, answer 3 - 10 questions and add a non-mandatory user-name.

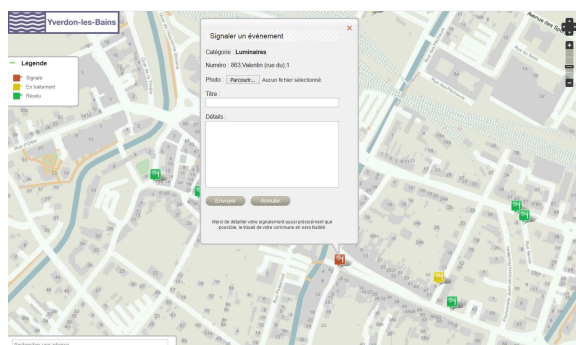
In order to get citizens to use the platform a large media campaign (12 articles in newspapers, one radio-transmission) was started at the launch of the website. Within four months 53 ponds had been digitized; however the location of only 26 ponds could be confirmed using reference data.

### 3 The “Signalez-nous” project

Public spaces include both streetlights and playgrounds. The larger a city is, the more difficult and expensive it gets to check this kind of equipment regularly.

In this context the “Signalez-nous” website was created in 2010. This website allows citizens to digitize a broken streetlight or a damaged playground in the city of Yverdon-les-Bains.

Figure 2: The “Signalez-nous” interface.



In 2010 when the system went online, several articles appeared in journals and one radio transmission was dedicated to the system. Since then the platform has been online.

## 4 Hypotheses

The goal of this analysis is to identify elements that indicate how to recruit and to keep users and how to get high quality data. We therefore established four hypotheses that will be used for the analysis of usage data:

1. Media campaigns get users to use a platform [8], however after a short while this influence decreases.
2. People use VGI-systems during their spare time [9].
3. Data quality increases if users need to authenticate [10].
4. In order to create a successful platform, users need to get something in return in order to continue using a system [11] [12].

## 5 Results

To confirm our hypotheses, we did not only use each platforms database, but we also utilized the web-server’s log-files, which we parsed and loaded into the same database. Web-server log-files contain useful information such as the access time and date, the URL that was requested and the users’ IP-addresses.

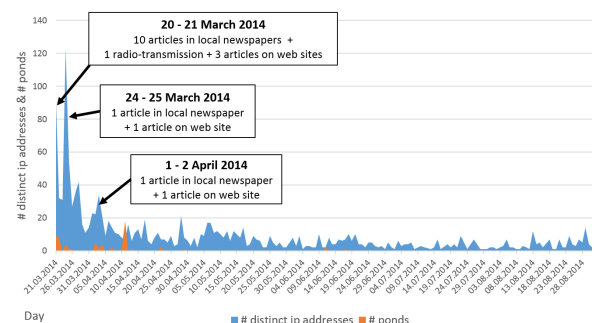
For each system we established a database, which contained the following information:

- The time and date an IP-address connected to the system
- The time and date objects were digitized
- The locations of all digitized objects

### 5.1 Media campaigns get users to use a platform

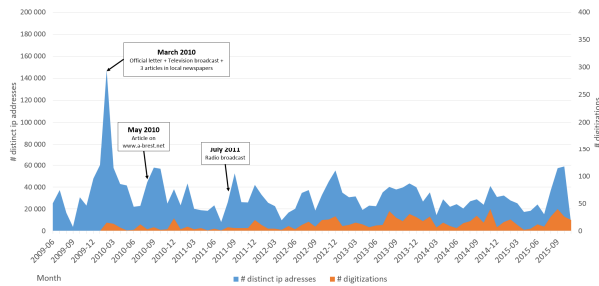
The media campaign that was started in March 2014 for the “Urbangene” project included 12 articles in newspapers and one radio transmission. Moreover a Facebook page and a project page were created. Finally the link to the platform was published on different web pages and forums. Figure 3 shows the usage statistics of the first months.

Figure 3: Access and digitization statistics of the “Urbangene” website.



The “Signalez-nous” campaign was created not only by the developers of the project, but also by the cities’ administration: an official letter was sent to all inhabitants explaining how to use the system. Starting in March 2010 three articles appeared in three different local newspapers and the news was broadcast on state-owned television and radio stations.

Figure 4: Access and digitization statistics of the “Signalez-nous” website.



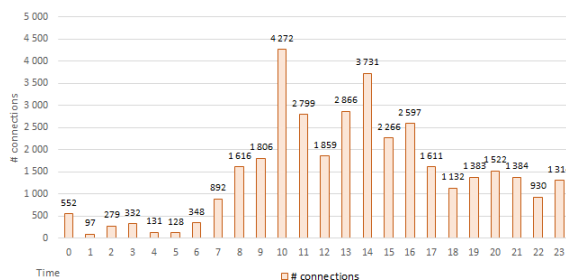
We can state that media campaigns have an influence on the usage of the platform (Figures 3 and 4). However the media campaign's influence quickly decreases. Regarding the “Urbangene” usage statistics, the effect lasted only a few days.

Figure 4 shows that there is a high correlation between simple access times (without digitization) and the count of digitization. In March 2010 when the website was started, many users connected without digitizing; after a while digitization numbers increased.

## 5.2 People use VGI-systems during their spare time

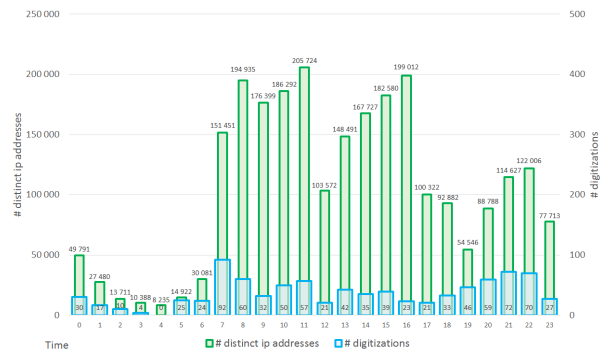
In order to highlight the users' behavior, we analyzed access and digitization times. The “Urbangene” web-server log files showed that users accessed the system mostly during working hours, with peaks around 10 a.m. and 2 p.m. It is therefore presumed that people used the platform at their workplace, after drinking a coffee and reading the newspaper or after having lunch. Interestingly users digitized ponds primary during evening hours.

Figure 5: Number of requests to the “Urbangene” webserver depending on the time of day.



Regarding the “Signalez-nous” usage statistics users generally accessed the system during mornings and afternoons with peaks at 11 a.m. and 4 p.m.

Figure 6: The access and digitization times concerning the “Signalez-nous” project.



The time, user's digitized broken streetlights and damaged playgrounds highly depends on the season. For instance the digitization frequency in winter is higher than during summer which can be explained by the fact that there is less sunlight in winter and people have more time to observe streetlights. Furthermore people often go abroad in summer which implies that less people make observations.

The usage statistics of both projects show that people mostly accessed the systems during working hours. On the other hand the time users digitize depends on the project's goal and thereby environmental conditions such as sunlight.

## 5.3 Data quality increases if users need to authenticate

One advantage of VGI-systems is the potential to collect large quantities of data. However it is necessary to check data quality in order to be able to re-utilize it within other contexts.

53 ponds were digitized using the “Urbangene” website. In order to evaluate data quality, these ponds were compared to other data sources such as a pond database that had been established by hepia (Geneva Institute of Technology, Architecture and Landscape), OpenStreetMap data and Google Maps imagery.

These reference data sources confirmed the location of 26 ponds (49 %). The location of 8 ponds were not far from a confirmed pond (possible explanation: imprecision) and the locations of 19 ponds (36 %) were not confirmed (possible explanation: errors).

Concerning “Signalez-nous”, data was checked by the city administration. Only few errors were reported.

We can state that the quality of the “Signalez-nous” data was higher than the quality of data of the “Urbangene” project. On the “Urbangene” website user authentication was optional. On the “Signalez-nous” website authentication was mandatory. This fact might lead to the conclusion that a mandatory user authentication increases data quality, however it is important to note that the kind of digitized objects (ponds versus broken streetlights) is very different. A broken streetlight has a direct effect on security while the existence of a pond does not.

#### 5.4 In order to create a successful platform, users need to get something in return

The usage statistics of both websites showed that users are willing to voluntarily share data. Articles, radio and television transmissions do help recruiting users, however after users have found a system, the influence of a media campaign quickly decreases.

The usage statistics of “Signalez-nous” showed that the system is still used after five years. A possible interpretation of this finding is that the act to digitize a broken streetlight does have a more direct and visible effect than the digitization of a pond. The impact of biodiversity on e.g. a citizen’s physical and psychological health on the other hand is much less visible.

### 6 Conclusions and perspectives

We were able to confirm the hypothesis that large quantities of users can be recruited using media campaigns, however the influence of such a campaign quickly decreases. The success of a VGI-system in terms of data quantity and quality depends on several parameters. An important point is the interest people see in using such a system. This interest can be stimulated if users directly benefit from the data they share (e.g. a broken streetlight that gets fixed) or if the application is able to mediate an indirect impact (such as the impact of biodiversity) using an interesting design (e.g. using gamification [13]).

We have found evidence that suggests data quality can be increased if users are requested to authenticate. However in order to ensure good data quality several other measures can be taken such as the possibility to enable users to validate other users’ data or to use reference data for automatic controls.

In a time where hundreds of new applications, websites and systems appear everyday it becomes a challenge to recruit new volunteers to use a new VGI-system and to convince these volunteers to continue using it. Further investigations are therefore necessary to identify the parameters that constitute a successful system. It would be interesting to compare our research results with usage statistics of well-known systems such as FixMyStreet (in comparison with the “Signalez-nous” project) and iNaturalist (in comparison with the “Urbangene” project).

### References

- [1] C. M. Bowman, P. B. Danzig and M. F. Schwartz, "Research Problems for Scalable Internet Resource Discovery," in *INET'93*, San Francisco, 1993.
- [2] D. Lewis, "Dying for Information? An investigation into the effects of information overload in the UK and Worldwide," in *Reuters Business Information*, London, 1996.
- [3] M. F. Goodchild, "Citizens as Voluntary Sensors: Spatial Data Infrastructure in the World of Web 2.0," *International Journal of Spatial Data Infrastructures Research*. Vol. 2, pp. 24-32, 2007.
- [4] D. Rotman, J. Preece, J. Hammock, K. Procita, D. Hansen, C. Parr, D. Lewis and D. Jacobs, "Dynamic Changes in Motivation in Collaborative Citizen-Science Projects," in *CSCW '12 Computer Supported Cooperative Work*, Seattle, 2012.
- [5] R. Priedhorsky, "Specialist Meeting on Volunteered Geographic Information Position Paper," in *Workshop on Volunteered Geographic Information*, Santa Barbara, 2007.
- [6] V. Deparday, "Enhancing Volunteered Geographical Information (VGI) - Visualization with Open Source Web-Based Software," Waterloo, 2007.
- [7] N. R. Budhathoki, "Reconceptualization of User is Essential to Expand the Voluntary Creation and Supply of Spatial Information," in *Workshop on Volunteered Geographic Information*, Santa Barbara, 2007.
- [8] T. Schoberth, J. Preece and A. Heinzl, "Online Communities: A Longitudinal Analysis of Communication Activities," in *Proceedings of the 36th Hawaii International*, Hawaii, 2003.
- [9] B. Engels, "Citizen Science - An overview of the current state, the possibilities and challenges and the opportunities for the future," 't Horntje, 2015.
- [10] Hickling Arthurs Low Corporation, Volunteered Geographic Information (VGI) Primer, Sherbrooke, 2012.
- [11] T. Bartoschek and C. Kessler, *VGI in Education - from K-12 to Graduate Studies*, New York, 2012.
- [12] J. C. Tweddle, L. D. Robinson, M. J. O. Pocock and H. E. Roy, Guide to citizen science: developing, implementing and evaluating citizen science to study biodiversity and the environment in the UK, Natural History Museum and NERC Centre for Ecology & Hydrology for UK-EOF, 2012.
- [13] V. Antoniou and C. Schlieder, "Participation Patterns, VGI and Gamification," in *AGILE*, Castellón, 2014.