ASSESSMENT OF THE VOLUNTEERED GEOGRAPHIC INFORMATION FEEDBACK SYSTEM FOR THE DUTCH TOPOGRAPHICAL KEY REGISTER

Magdalena Grus [a], Daniël te Winkel [a]

[a] Kadaster, the Netherlands, magdalena.grus@kadaster.nl and daniel.tewinkel@kadaster.nl

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ABSTRACT:
Since Topographical Key Register has become an open data the amount of users increased enormously. The highest grow was in the private users group. The increasing number of users and their growing demand for high actuality of the topographic data sets motivates the Dutch Kadaster to innovate and improve the Topographical Key Register (BRT). One of the initiatives was to provide a voluntary geographical information project aiming at providing a user-friendly feedback system adjusted to all kinds of user groups. The feedback system is a compulsory element of the Topographical Key Register in the Netherlands. The Dutch Kadaster is obliged to deliver a feedback system and the key-users are obliged to use it. The aim of the feedback system is to improve the quality and stimulate the usage of the data. The results of the pilot shows that the user-friendly and open to everyone feedback system contributes enormously to improve the quality of the topographic dataset.

1. INTRODUCTION

1.1 Kadaster and the Topographical Key Register (BRT)

The Dutch Kadaster is a non-departmental public body, operating under the political responsibility of the Minister of Infrastructure and the Environment. One of its statutory tasks is to maintain a number of registrations. Other activities are customised work and advice, information provision and international activities. One of the maintained key registers is the Topographical Key Register (BRT), which consists of digital topographic data sets at different map scales (1:10k, base data set and derived / generalized data sets at scale 1:50k, 1:100k, 1:250k, 1:500k and 1:1.000k). The law requires an actuality of less than two years for the whole range of the BRT product family (te Winkel, 2015). Governmental organizations are obliged to use the available BRT data sets for the exchange of geographical information. This is known as the "collect once, use many" principle.

1.2 Quality principles

The data quality of the Topographical Key Register is internally and externally controlled according to ISO19113 standards. The internal control takes place by means of the "control protocol" document which has to be published at least once a year to the public. The controlled elements are: logical consistency, positional accuracy, thematic accuracy, actuality, completeness and the feedback system. These elements are checked by the topographer during the update of the data set, the automatic validation procedures and the 5% quality metric at the end of the updating process. Furthermore, once every three years the quality of BRT has to be tested and evaluated by an independent expert against the same elements.

1.3 Quality and Feedback System

The feedback system is an important and compulsory tool to ensure the quality of the Topographical Key Register. The feedback process facilitates the correcting of any error detected in the key register by users of the data. The aim of the feedback system is to improve the quality of the data in the BRT. The Dutch Kadaster as an owner of Topographical Key Register has legal obligation to provide a feedback system. In the same time the key-users (municipalities, governmental organisations) are obliged to give a feedback when they have reasonable doubt that authentic data in the BRT is incorrect.

The private users, in contrast to the governmental key-users, did not have any legal obligation to provide feedback about errors in the topographic register.

1.4 Open data and its influence

In 2012 Topographical Key Register became open data under the CC-BY licence. This means that all the products of the BRT family became freely available to everyone to use and republish without restrictions from copyright and patents. The CC-BY licence bounds the user to provide the name of the creator and attribution parties with the created product (te Winkel, 2015).

It is since this decision that the amount of private users has grown enormously. Before open data the BRT was mainly used by governmental organisations. In the first year after open data (2012) commercial companies started to explore the possibilities of the BRT and in 2013 we saw a strong increase of the use by private persons (Figure 1) (Bregt et al., 2013; 2014). In this figure you see the distribution of users in user groups. In 2011 the use of the BRT for education / research was combined with the use by the government.

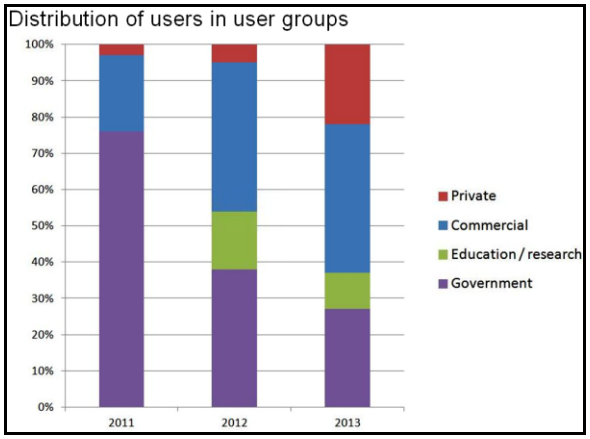

Figure 1. The users of the BRT separated in user groups

The introduction of the BRT as open data has led to a rapid growth in the use of the topographic products. The wider use of the data has led to an increased demand for better actuality, which exceeds the demand for data quality (te Winkel, 2015). The new users expect that a change in the real world is directly translated to the available maps and services. In several user meetings the increase of actuality of the topographic data sets was one of the main issues for improvement. In 2011 the actuality of the base data set (1:10k) just met the requirement of an actuality less than two years. For the small scale datasets the actuality was between two and ten years.

1.5 LEAN methodology

To increase the actuality of the BRT, Kadaster used the LEAN methodology to change the production process of the base data set. One of the elements of LEAN methodology is the focus on the direct creation of value for the customer. All steps in the process that do not add value for the customer are referred to as waste and are a target for elimination. This methodology changed the production process and the mindset of the employees.

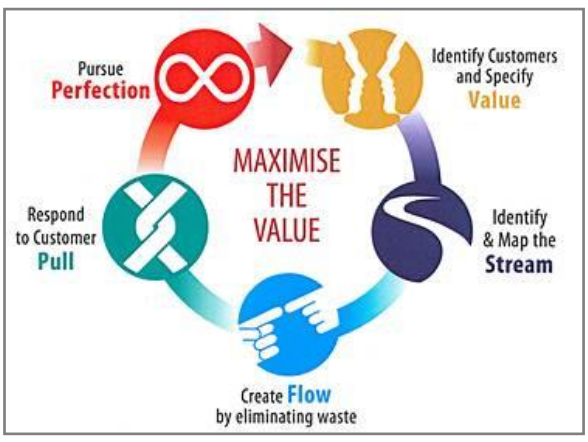

Figure 2. The principles of the LEAN methodology

It is difficult to see the waste in a production process when you look at all the production steps separately. Often the waste is not a step in the process, but, for example, a transfer of the product from one person to another person or a step that adds no value for the customer. By visualizing the value stream of the process, you can identify the waste and find a solution to eliminate it.

Also the customer was asked to participate actively in improving the production process. Every change in the specifications of the BRT product family or in the production process has to be evaluated by the customer from his users perspective. This careful approach may take some time, but in the end the customer is more satisfied, involved and more willing to accept the change.

1.6 Automatic generalization

The introduction of automatic generalization in September 2013 gave the actuality of the 1:50k scale data set a boost (te Winkel, 2015). The new process is developed between 2010 and 2013 in several iterations. In the development of this automated process Kadaster asked the customer to give feedback for the next development iteration. The iterative approach resulted in a product that was accepted and appreciated by the user. The result is a fully automated generalization production workflow that generalizes the 1:50k map series from the 1:10k base data set in less than three weeks.

The workflow starts with a validation end enrichment of the source data. This step is necessary to resolve remaining errors in the base data set and to add information used by the automatic process that is not (yet) present in the base data set. Detected errors are repaired in the data set and are reported to the production process of the 1:10k map for a substantial solution in the long term. The generalization process itself consists of three subsequent steps: model generalization, geometric generalization (displacement) and graphic generalization (cartographic conflict resolution). These three steps are developed as separate tools. The advantage of this modular approach is the potential to replicate the models, adapt parameter values or even substitute parts of the process and produce other map series (i.e. a 100k map series).

Because of the reduction in processing time, it is now possible to generalize the small scale data sets directly in flow after the finishing of the base data set. Therefore the actuality of the automatically derived data set is the same as the actuality of the base data set and meets the requirement of an actuality less than two years. Nowadays the base data set and derived map series are released simultaneously with the same actuality five times a year. For the customer this means more actual maps more frequent.

2. MAIN BODY

2.1 Pilot Feedback system for the BRT

In October 2013 the Dutch Kadaster started a research to develop and implement a user-friendly feedback system. One of the aims was to provide an easy to use and user friendly system for all users willing to give a feedback about the Topographical Key Register. The already existing feedback system was outdated and was not adjusted to the new user groups and this new purpose. Another goal was to check the potential of the crowdsourcing concept and to evaluate the quality of the data collected by volunteers. This research consists of four steps which are visible in Figure 3.

Step 1: Collection of a group of volunteers.
The request for the volunteers was placed on the Kadaster website and on social media (LinkedIn group for the BRT, Twitter).

Step 2: Building a user-friendly feedback system.
Kadaster developed a feedback system that worked on all device types (PC, tablets and smartphones) and on the most popular operating systems (iOS, Android, Windows).

Step 3: Collection and data validation.
To stimulate and effectively motivate the group of users without feedback obligation, we decided to validate immediately all delivered errors.

Step 4: Correct errors as soon as possible.
By directly updating our map when a reported error was accepted, Kadaster wanted to show its appreciation to the user group for cooperating in this research.

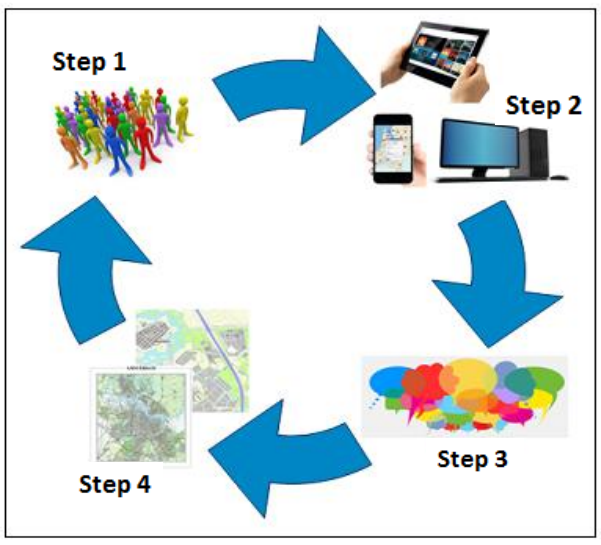

Figure 3. Feedback process flow during the pilot

2.2 Status and feedback over feedback

One of the crucial elements of the pilot was an interface showing the status of the received feedback. The status map application is a communication platform to inform detectors about the status of their feedback and to give comments regarding those feedbacks (Figure 4).

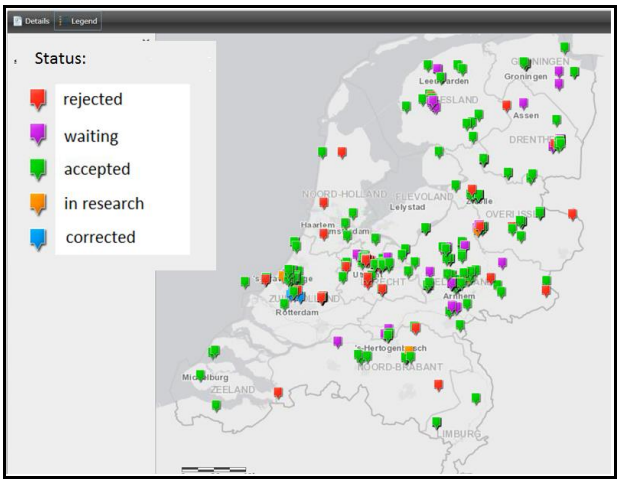

Figure 4. The status map application

By means of this status application the user's community is being informed about how Kadaster handles their findings. This makes the whole feedback process transparent to all. The users can view their own and others signals plotted on the map with additional information from Kadaster when or if they will be corrected.

2.3 Results of the pilot

Within two months (November and December 2013) Kadaster has managed to collect 130 volunteers who expressed their willingness to participate in the pilot. About 70% of them were not representing a governmental organisation (Figure 5).

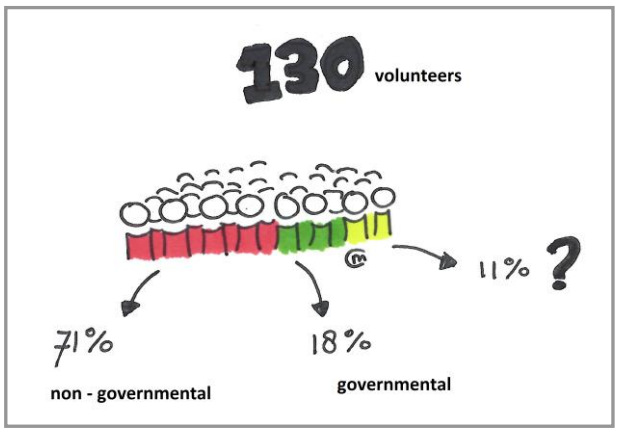

Figure 5. Different groups of volunteers

The request for the participants was placed on Kadaster website en on social media (LinkedIn group for the BRT, Twitter). The volunteers got an e-mail with the instructions how to use the "feedback application" and give a feedback. They were asked to use the provided hyperlink, choose the place they where familiar with and verify it with the data available/presented on the map in the application (Grus, 2014). By placing a point on the map it was possible to indicate the place with a potential error. Also the user was asked to provide some extra information about the user self (for example the type of user (private, government, education) and contact information).

From group of the volunteers around 80% actively participated in the pilot and gave a feedback about errors in the Topographical Key Register.

In two months time Kadaster have received around 369 feedbacks from de selected group of users. To give a better picture, in 2013 by means of the old feedback system Kadaster was receiving around 28 feedbacks, in 2012 – 10 and in 2011- 8 (Figure 6). This pilot attracted more attention than the existing feedback system.

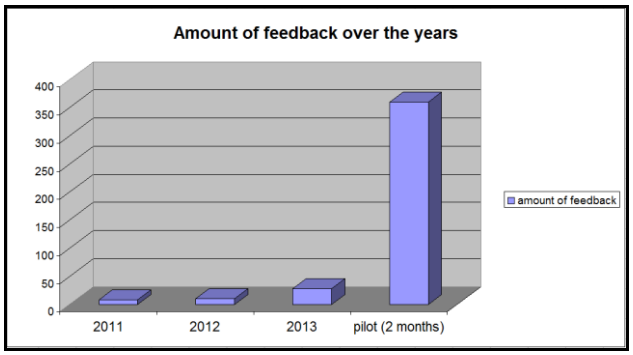

Figure 6. Differences in amount of feedback per year

In the last phase of the pilot we have send a questionnaire to all volunteers to evaluate the user-friendliness of the feedback system. The users were very enthusiastic about the pilot and very satisfied with the new feedback system.

2.4 Quality of the data

All the reported errors were checked by a group of qualified topographers. About 70% of the feedbacks received during the pilot (around 200 reported errors) were approved and as correct and they were used to adjust the digital topographic data set. 20% of the reported errors could not be verified, because recent aerial photographs were not available. When the new aerial photographs become available, also these reported errors are checked.
Only 10% of the provided feedback were rejected. One of the reasons to reject a feedback is the internal topographic rules. For instance when a reported missing object is not part of the specifications of the Topographical Key Register.

3. CONCLUSIONS

Actuality is one of the most important quality elements for the digital topographic data sets. Growing demand for the higher actuality of BRT products is a good motivator to look for new potential improvements. The improvement of the production process with the LEAN methodology and automatic generalisation resulted in an increased actuality. The position of the customer and his active contribution has become important element in the improvement of the production process.
The group of 71% non-governmental participants during the pilot, proves that the crowdsourcing as a source of product improvement has a huge potential. The results from the pilot prove also that an open to everyone, user-friendly and transparent feedback system can significantly contribute to improve quality of the digital topographic datasets.

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