THE USE OF GEOGRAPHICAL APPLICATIONS FOR MICRO-PLANNING SCHOOL LOCATIONS: THE @SCHOOL APP FOR PRESCHOOLS IN GHENT, BELGIUM

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Abstract

Parallel with the increased use of internet technology, more and more data becomes freely accessible. However, most of this data is only available in its raw form and centrally managed and thus not legible or applicable for non-professionals. Especially for primary needs such as health care or education, the availability of relevant information for inhabitants is crucial in improving their quality of life. Because education is one of the focal points in regional as well as in local policy, a dataset containing detailed information about school locations and characteristics was compiled on the regional level Flanders. However, this data is centrally owned and not made accessible for the public by a user-friendly tool. Therefore, a geographical application was developed, aimed at improving inhabitants' access to information concerning preschool locations in Ghent (Belgium). The combination of two open source programs (Google Docs and ESRI ArcGIS Online) makes it possible to centrally update the tool and make it available for all internet users in real-time.

In the first phase, local authorities as well as civilians are able to request all relevant information (i.e. school name, school address, capacity, Google street view) about the selected nursery school in Ghent by implementing this user-friendly and open source tool. Furthermore, the tool can be used to determine which preschool is closest to a specific address. In the next phase, the dataset used in the application will be extended to contain information concerning all primary schools of the Flemish community. Today, the application is used by different local authorities as a tool for policy support and is available to inhabitants in Ghent in the process of enrolment ('Central Application Register' or CAR). The convenient and intuitive interface makes the tool inclusive for poorly-educated parents or internet illiterates.

Keywords: GIS, open source, primary schools, geographical application, planning, Flanders.

1 INTRODUCTION

On the regional as well as on the local level, education is one of the primary goals of policy in Flanders (Belgium). In addition, taking into account today's knowledge society, young parents are becoming more convinced that high quality education is crucial for the wellbeing of their children. Therefore, not only their location of employment, but also access to a broad and well substantiated educational system is an important criterion in the choice of their home location. However, for the public (more specific, the average family households in Flanders), a coherent dataset containing detailed information about school locations and characteristics is hard to come by. The existing dataset is centrally owned, and is not fully accessible by a user-friendly tool. By using a Geographic Information System (GIS), the research project at hand aimed at developing a geographical application in answer to this problem. The application allows citizens to retrieve all relevant information concerning schools belonging to the Flemish community.

2 BACKGROUND

2.1 Micro-planning

2.1.1 School mapping

In micro-planning, cooperation between citizens and organizations is constructed in order to assess, prioritize and document the needs of the local community. This form of planning was initially designed to be used in developing countries and is based on regular and intensive meetings. School mapping (SM) is a normative approach to micro-planning school locations. Additionally, SM is also used to examine the equitability of resource distribution in and between schools and guaranty the efficiency after large-scale redevelopment of the schooling system [1]. SM consists of the use of different forms of technical data in order to influence the physical and social context of the analysis [2].

2.1.2 The local and decentralized level

Because SM is defined as a form of micro-planning, it is expected to work on the subnational or decentralized level. In the application of SM-processes it is desirable that decentralized actors and organizations cooperate with centralized decision supporting services and work with centralized data. This interaction between decentralized and centralized units should lead to a creative cooperation while maintaining responsibilities on all levels. If difficulties occur in preserving power relations on both levels, the negative result will mainly affect the decentralized level. This leads to one of the most frequent functional challenges of SM as a micro level process: decentralized actors seem to have an inevitable dependency towards the centralized policies, services or resources. Therefore, important decision making processes are mainly made on the centralized level instead of on the local, decentralized level, leading to discontinuities and eventually explicit local inequalities [2]. As a result, school mapping should not be a one shot activity for data collection purposes only, but it should be an ongoing process of analysis, assessment and action [3].

2.2 Geographic Information Systems

2.2.1 The use of Geographic Information Systems in educational planning

A GIS is an extremely efficient decision supporting tool for spatial analysis [4]. In comparison to other disciplines, such as archaeology [5] or spatial planning [6], the use of GIS for policy and planning for education is a fairly recent phenomenon. Important studies in this research area are carried out for the International Institute for Educational Planning (IIEP) or the United Nations Educational, Scientific and Cultural Organization (UNESCO), but they are limited [7,8]. Until now, a normative inclusion of GIS as a consistent component of educational policy and micro-planning is not reached. A breakthrough in the use of GIS is not expected, except when GIS can profile themselves as cost-efficient and easy to use tools or when they are recognized as clearly superior techniques in comparison to the methods that are now commonly used in planning. Yet, research in the usage of public participation GIS (PPGIS) and further adaptation towards educational micro-planning is becoming more popular [2].

2.2.2 Centralized data management versus decentralized use

An important issue when applying GIS is found in the centralized-decentralized relation between data and users. A lot of data needed for spatial analysis is centrally managed, while the GIS analyses are mainly applied on the local and decentralized level. Making the data publicly available also leads to discussion, especially in developing countries. The eventual success of a project depends on how local governments deal with the results and in what way the data is held up-to-date [9]. New developments in making data publicly available are an indicator for the growing importance of decentralized structures and the increasing role central data providers play. Because of the growing focus on networks and connectivity, it is possible to manage data centrally while making it available to a large amount of users [10]. For example, the application of open source programs is an interesting development in light of this discussion.

3 PHASES

In a preliminary stage, research of relevant literature as well as an exploration of the policies at hand was required. Therefore, cooperation between the University of Ghent and the Department Data-

Analysis & GIS of the city of Ghent was established. The research project itself consisted of two main phases.

3.1.1 @SCHOOL for the city of Ghent

In the first phase, an application was created that allowed the users to retrieve relevant information for all nursery schools in Ghent such as address, capacity, website, etc. In addition to its informational purpose, a possibility of spatially analyzing the data was added. By marking the home location (or any other location), the user can explore at what distances the surrounding schools are located based upon their catchment area, thus pinpointing the school closest to the location (Fig. 1). This information is crucial when taking into account the accessibility to preschools that citizens have, especially for low income households with a reduced mobility [11]. For these school catchment areas, the network distance was used, based upon the 100, 200, 500, 1000 and 2000 meter walking distance to school.

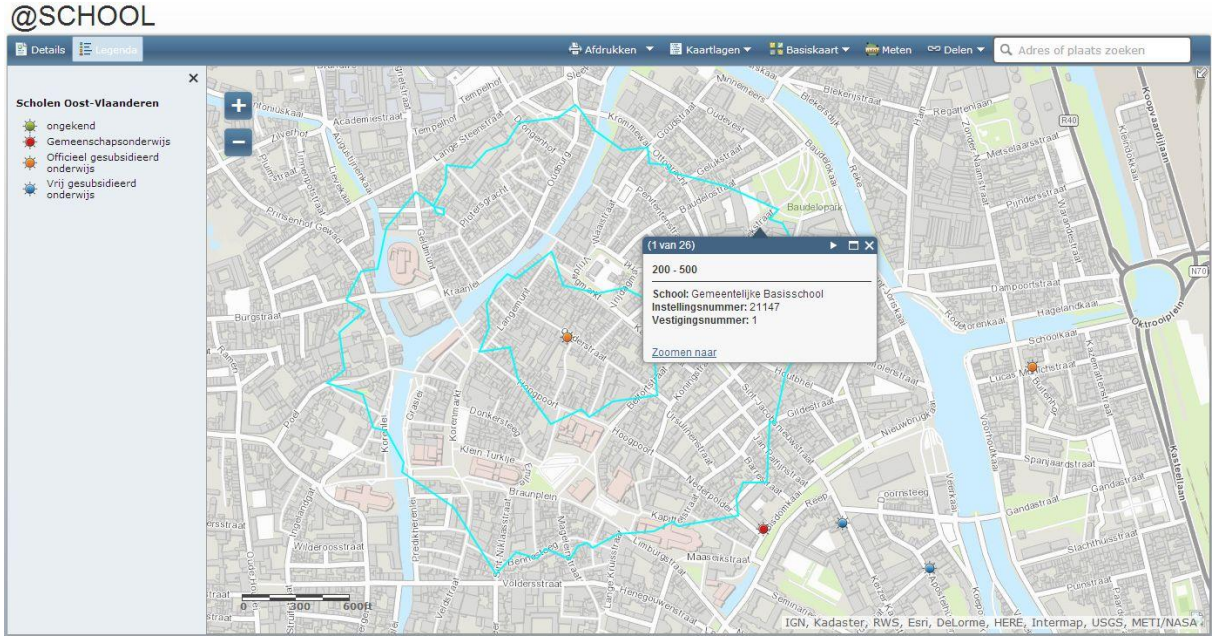

Figure 1: geographical application @SCHOOL; pop-up with information concerning the distance to a certain school

For Ghent, the geographical application is available since June 2013 on the website for enrolment (https://meldjeaan.gent.be/). As a result parents already had direct access to information concerning the schools during the period of enrolment for the school year 2013-2014. Citizens could use the application to determine the school that is located in the direct environment of for example the location of employment or the location of pre- or after school day care. The primary goal in the development of the geographical application was its user-friendly interface; the application had to be very easy to use, intuitive and had to be accessible for poorly-educated parents or internet illiterates. In addition, because of its central management, a coherent dataset was made available online to be used by local educational services.

3.1.2 @SCHOOL for the region of Flanders

For the second phase, all geographical locations of the primary schools in Flanders were collected, thus making the application generally applicable for all families in Flanders. This extended dataset containing all geographical information will further be completed by adding all relevant information, school by school. For this, the geographical application is promoted in the city of Ghent, in order to create an awareness of the benefit of using the application in the city's educational planning as well as locally by the inhabitants.

4 METHODOLOGY

4.1.1 Data collection

The first step was data collection. The data contained rudimentary information for all Flemish primary schools (location, school name, institution ID, location ID) and detailed information for all nursery schools in Ghent (school entrance, capacity, website).

4.1.2 Underlying structure

In the next step, a coherent dataset was constituted for all Flemish primary schools (and again, more detailed for all nursery schools in Ghent). ESRI ArcGIS for Desktop was used to join spatial data to informational data and to transform the geographic components from the Lambert 72 coordinate system to the WGS84 Web Mercator (Auxiliary Sphere) coordinate system. The latter is the commonly used coordinate system online and is also applied in the background maps for ESRI ArcGIS Online. In addition, ESRI ArcGIS for Desktop was used in combination with the ESRI ArcGIS Network Analyst Extension to calculate and construct the catchment areas for all nursery schools in Ghent. This resulted in six spreadsheets (one for each of the five Flemish provinces and one for Brussels), containing the needed fields with rudimentary data and a geographical component, the longitude and latitude of the school locations. These spreadsheets were managed on Google Docs as CSV-files (Fig. 2).

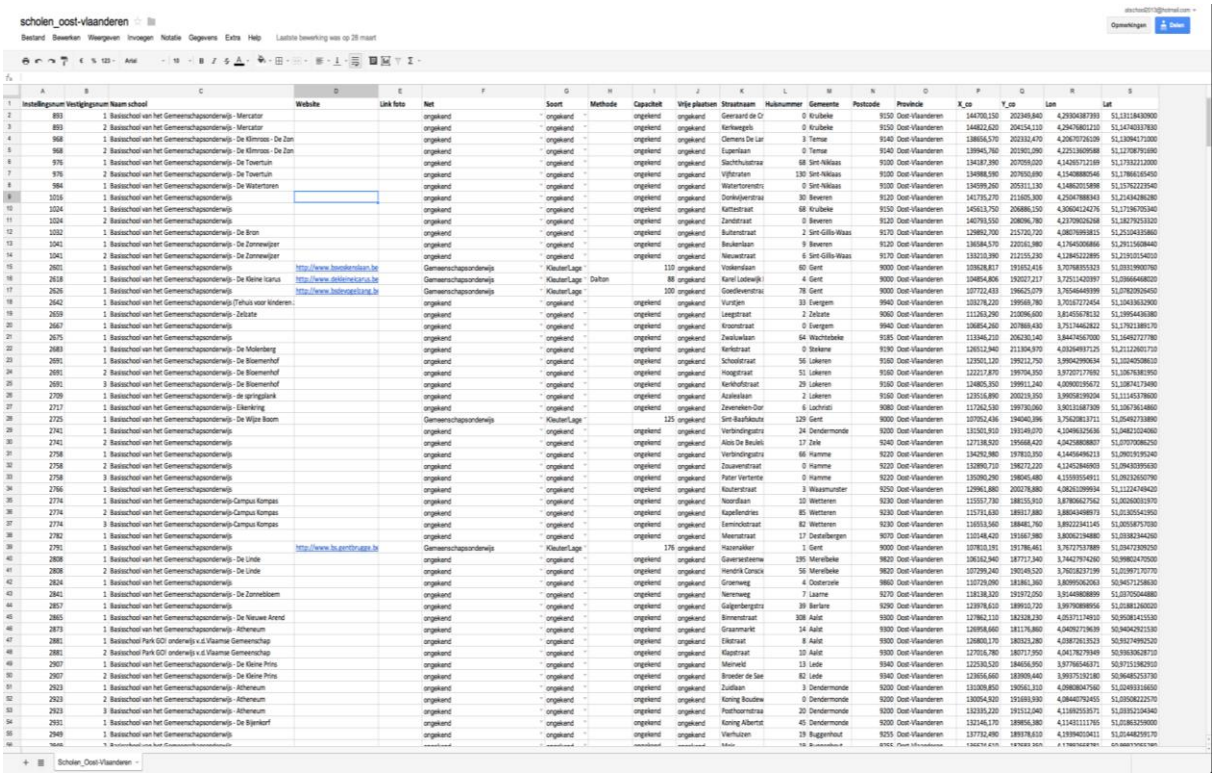

Figure 2: online available Google Docs CSV-file

4.1.3 Visualisation

In a final step, ESRI ArcGIS Online was used to create a user-friendly and visually attractive geographical application, containing the school information and the calculated catchment areas. The combination of two open source programs (Google Docs and ESRI ArcGIS Online) resulted in the geographical application @SCHOOL (Fig. 3).

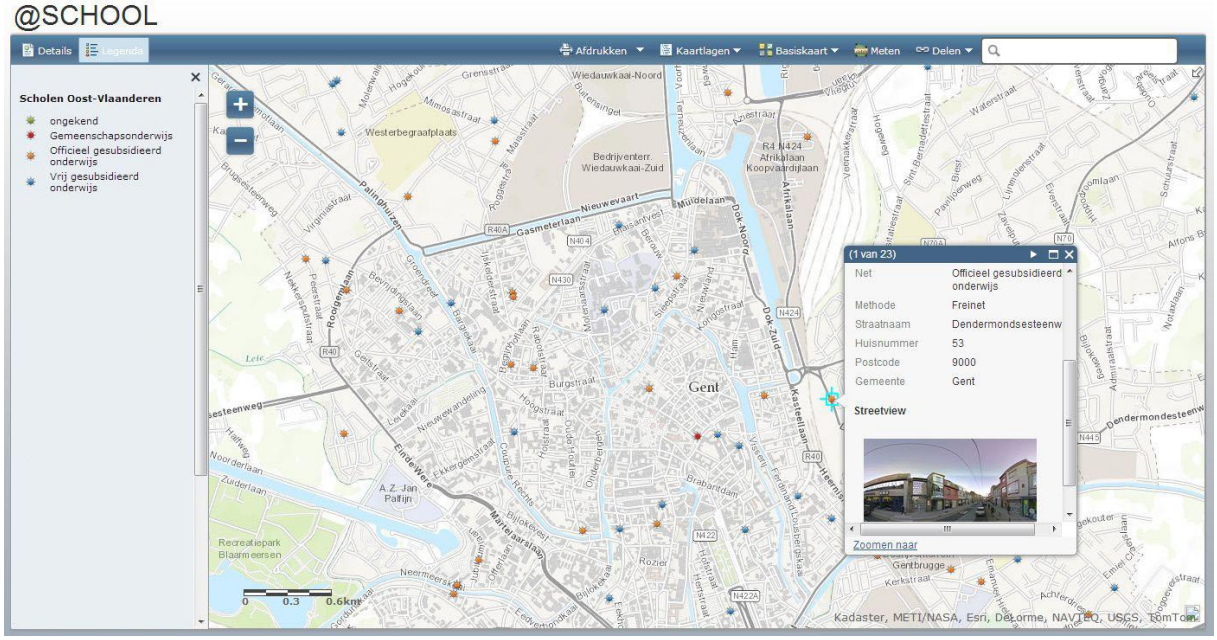

Figure 3: geographical application @SCHOOL, pop-up with general information concerning a certain school

4.1.4 Future steps

Future implementations consist of promoting the application to the public (with the help of the city of Ghent), using the application during the period of enrolment in Ghent and extending the dataset for all primary schools in Flanders. Therefore, all rudimentary information will be converted into detailed information by local governments, educational services and schools, and this in a controlled environment. Integration with existing initiatives such as the Schools of Tomorrow partnership which covers the design, building, financing and maintenance of school facilities for the next 30 years is also possible.

5 RESULTS

The result is a geographical web application. Two open source web application are used to join the spreadsheets to a geographical map layout: Google Docs is applied to manage the spreadsheets and ESRI ArcGIS Online to visualize them. The CSV spreadsheets are partially made available to the public and thus filled in by different participants in a coherent way, thus providing an inclusive nature by facilitating a dialogue between the different actors on different levels. A participative form of planning can improve citizens' quality of life (QOL) [12]. The most innovative element of the application is found in the way it is updated: by using the CSV-files in Google Docs, the editing is separated from the visualization. Because of this, the user is not confronted with the underlying structure and changes are made in a controlled online environment. By providing a link to the Google Docs in combination with a password, selected users can add data to certain fields of the existing CSV-files (Fig. 2). Eventually, the application is updated in real-time when an original file is edited.

As such, geographical data for all schools in Flanders and Brussels was made available and the corresponding additional information could be completed locally. This leads to a great advantage, because elements should not be added to the application, but only extra information for existing elements should be provided. Eventually, it is possible to provide online and real-time information concerning the schools' characteristics. This way, using the application will benefit the enrolment and contribute towards a solution to an ever growing social problem. Because of the possibility to receive information concerning the school capacity (and in extension the remaining capacity during enrolment), frustrations as a result of the huge amount of rejections when the maximum capacity is reached, will be reduced

6 CONCLUSION

The geographical application has proven its use: young families are facing a difficult choice in enrolling their children in the most suitable school and access to the correct information benefits everyone. Questions such as 'Which schools are catholic schools' or 'Where are the biggest schools located' are answered after a few simple mouse clicks. Furthermore, by entering an address in the application, the nearest schools are visualized and the distance zone from the address to the school is given. The application is linked to the Central Application Register (CAR or 'Centraal Aanmeldingsregister'), making this information accessible to the public. That way, a micro-planning process on the decentralized level is compiled.

By promoting the application, Ghent's city services will improve the overall awareness of the importance of education for the city and its inhabitants. As such, the city of Ghent acts as an activator for extending the detailed dataset to the whole Flemish community. Eventually, the dataset will contain detailed information for all primary schools in Flanders. This dataset is made available via online CSV-files (managed centrally) and the open source application @SCHOOL. By promoting the use of an online application to the target groups a continuous enhancement of the data quality and accuracy is guaranteed, while supporting a better communication between all parties.

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