Geonovum - *Spatial data on the web*

Applying for the following research topic:
#1 Modern ways of spatial data publication
Task 2 - Building a spatial application

Tenderer:
Spotzi
Veilingdreef 17
4614 RX, Bergen op Zoom
Nederland

Authors:
Dhr. T. van Sprundel – Lead Developer
teun@spotzi.com
Tel.: 0164-240000

Dhr. ing. R. Dolman – CEO Spotzi
remco@spotzi.com
Tel.: 0164-240000

Date:
6 June 2016

Spotzi

Index

1. Research Topic

Spotzi is applying for the following task:

- #1 Modern ways of spatial data publication, task 2:
  Building a spatial application

This document will describe our approach.

2. Motivation

Last year Spotzi applied for topic 2 of the project Spatial data on the web. In a few months we've created a platform that can be used by different authorities to share their data. During this project Spotzi researched the weaknesses and strengths of an open spatial data platform.

A lot of the participating and spectating parties responded positively on the platform and were amazed by what is possible in such a short timeframe. Spotzi experienced an excellent cooperation with Geonovum during this project and therefor Spotzi is willing to follow up this project with the newest tender from Geonovum.

Because Spotzi participated in the previous part of the Spatial data on the web project, we are familiar with all the ins and outs of the project. In addition to the information provided on the project Github page, we also have knowledge of what was discussed in the meetings and conversations during the last project. This knowledge can not only help us to work with the data, but also helps us in reviewing the lessons learned. Are there still missing parts or are the lessons learned clear enough.

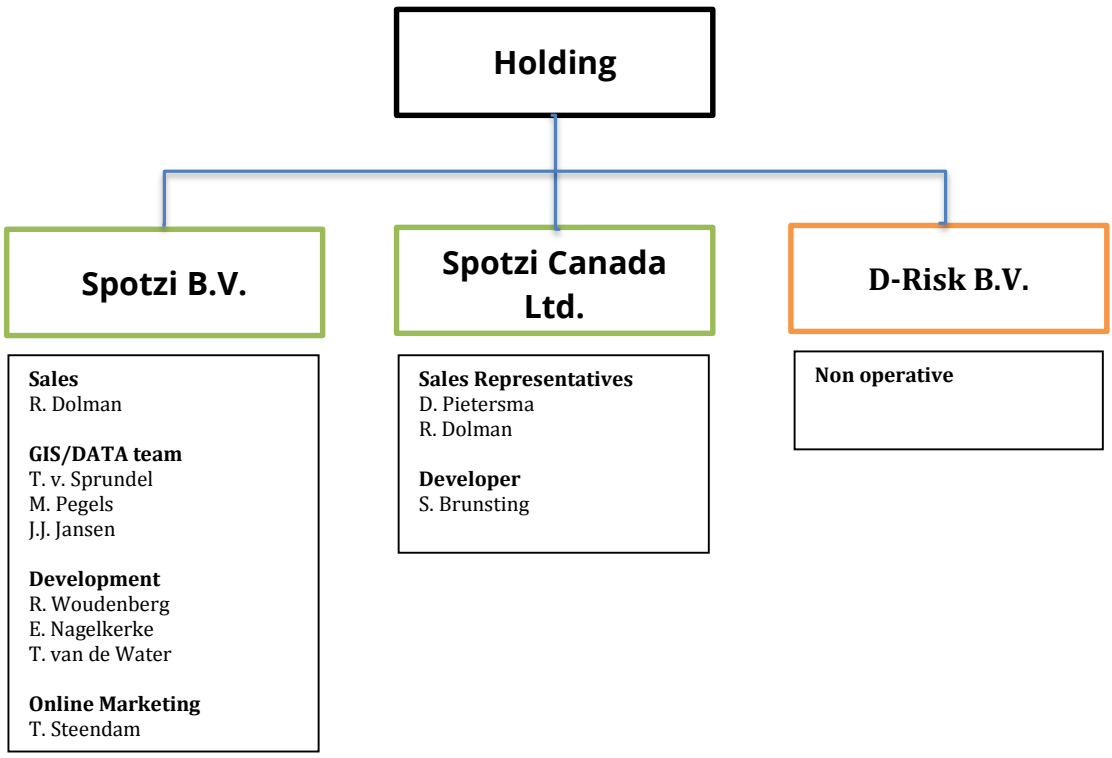
Spotzi believes that it has a good overview on the market and its needs, therefor Spotzi can create an application that actually will be used by different users. We know there is an ongoing increase in the demand for simple and understandable applications to save time for the user.

Furthermore, Spotzi is a spin off from the Risk Management Firm, D-Risk. One of the projects D-Risk was involved in was the renovation of the Rijksmuseum in Amsterdam in 2006. On behalf of the involved insurance companies D-Risk monitored the potential risks during the renovation works. Besides the renovation of the Rijksmuseum, D-Risk was also involved in many sewer renewal projects throughout the Netherlands in for example the municipality of Zaanstad. These projects have one thing in common: lack of insight and understanding of invisible, e.g. vibrations, and often unknown effects, like the sphere of influence of ground-water pumping, on its surrounding and specifically cultural heritage sites.

Construction projects in or near cultural heritage sites can affect the condition of the building and the objects inside. We found that there is still a lack of understanding on the relationship between the effects of construction works and its immediate surroundings.

Spotzi believes we can create an application that is simple to use and makes use of the delivered data sources from task 1. The construction knowledge of D-Risk in combination with the geo knowledge of Spotzi creates a strong combination. In construction, you have an average of five to fifteen percent failure costs, with this project we want to contribute to lowering this failure costs and contribute to the protection and preservation of Cultural Heritage sites in the Netherlands. Furthermore, we want to contribute to the quality of our environment in compliance with, and extension of the environmental law. The Noise Abatement Act exists in the Netherlands, but there is for example no legislation to prevent nuisance or damage caused by vibrations (*Kenniscentrum InfoMil, Beleid, wet- en regelgeving, 2016*). That makes creating our application (see chapter 3) even more important.

The organogram below describes the structure of Spotzi:



3. Application

The explicit answer we look for in this project and where we want a solution for is developing an understandable and quick web-application that contributes to lowering failure costs associated with construction works. We also want to contribute to the protection and preservation of Cultural Heritage sites in the Netherlands. Furthermore, we want to contribute to the quality of our environment in compliance with, and extension of the environmental law.

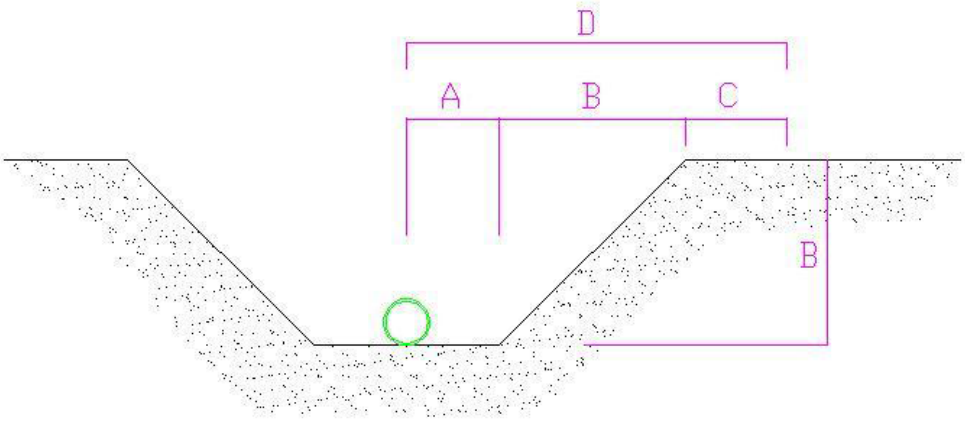
The application Spotzi is going to create needs minimal user input. First the user has the ability to draw elements (points, lines or polygons) on a map in combination with a form. In response to the users input the application will come to new insights of the risks associated with the construction works and the environmental rules on the construction sites and the rules for its immediate surroundings.

As mentioned in the introduction many construction projects have one thing in common: lack of insight or/and understanding of invisible (e.g. vibrations) and often unknown effects (e.g. the sphere of influence of ground-water pumping) on its surrounding and specifically cultural heritage sites.

Three common and often present 'spheres of influences' associated with construction projects are:

- Sphere of influence of vibrations. The type of influence is almost always present and can occur at for example demolition works, setting piles[1], setting a sheet pilling[2] wall, heavy transport, and speed bumps.

- Geotechnical sphere of influence. Image 1 depicts and explains the geotechnical sphere of influence associated with sewer renewal projects.



A: half (1/2) the slot width, B: the excavation depth, C: marge, D: geotechnical sphere of influence (=A+B+C).

Example: if the excation depth has a maximum depth of 2m and the slot with is 1m. The geotechnical zone is 4m.

[1] In Dutch: 'Heipalen'
[2] In Dutch: 'Damwanden'

- Geohydrological sphere of influence. This sphere occurs when there is need for ground-water pumping. Nowadays reinforced concrete piles are used, but the vast majority of monumental and historic buildings in the Netherlands are rest on wooden piles (especially in the Delta area). The actual number of wooden piles supporting Dutch houses is estimated to 16 million, water constructions not taken into account (*Life Expectation of Wooden Foundations - a Non-Destructive Approach, Klaassen 2015*). To avoid rotting of the piles the water level has to be carefully maintained. Ground-water pumping results in a lower ground water level, causing the tops of wooden piles to fall dry and crumble. These old constructions need attention for many safeguarding reasons.

The first step of the application is user unit; the user must define the location of the construction site and the associated construction works. Depending on the type of construction work an influence sphere is created. The sphere can be based on expert judgement but there is also the ability to make a more defined influence sphere based on the information from the form.

Secondly, the system will check different rules from the environmental act to see if there are any obstructions for the construction works. In this step we don't stick to the specific construction location. Also the full area of the influence spheres and its build-on constructions like houses will be thoroughly checked.

The third step of the application is sending the result to the user. The output of the information can result in all kinds of outputs for example recommendations for vibration prognosis or adjusting the monitoring plans. But it can also give the user new insights.

4. Plan of approach

Our plan of approach creating the application consists of the following steps. Our primary focus within this project will lie on identifying possible issues and successes. These will be reported to Geonovum and the other parties during the duration of the project.

Testing the data provided by task 1

Our first step in this project is testing the data provided by task 1. As stated in the invitation to tender[1], the party which is selected to work as data publisher on task 1 will publish Cultural Heritage data in compliance with the lessons learned. Testing the published dataset will consist of following topics:

- **Testing if the data is findable**
  In addition to the Cultural Heritage dataset the team from task 1 will also publish other datasets. We will inspect their data providing platform and will look for the Cultural Heritage dataset. Can we find the data and is it obvious what this dataset means?
  We will report our findings while searching for this data to the team from task 1, so we can help them improve their platform.
- **Testing if the data is understandable**
  When we find the data, we will investigate the understandability of the dataset. We will look at the data itself and at the corresponding metadata. Is it clear for the end-user, in our case our programmers, what this data means? Should it be clear to them, or do they lack specialist knowledge. Another question that we'll look at is if we're allowed to use this data.
- **Testing the connection to the data**
  When we've found the dataset that we want to use we're going to try to make a connection to the data. Is it possible for us to retrieve data from this dataset and how did the retrieval of the data go? Some important aspects are the time to the first successful call and the problems we've encountered while trying.
- **Content-types**
  We will also look into the different content-types that they deliver. We will discuss the different content-types with the providing party and will explain which content-type we favor and why. We will look into content-types that are missing and/or content-types that are provided but are not usable.
- **Findable by crawlers (optional)**
  Finally we can look at the crawlability of the published datasets provided by team 1. We will report if the datasets that we found are using an XML sitemap, links, persistent URIs and links to schema.org. This can be done in consultation with Geonovum.

Creating the web application

After we've tested the provided data from task 1 we will start developing the base of our web application. We will create a simple web viewer based on CartoDB[2] that will allow us to show geo-data on a map. We will also create a form where the end-user of the platform can apply for an environmental law and surrounding check. We will keep this base simple. We'll focus our development on letting it work with the Cultural Heritage data. Later we can add other functionalities.

1 https://docs.google.com/document/d/1W0olM57mrrmcMcnUdc0c-U3dpcb5DHBlrsllj0Hav3I/edit

2 https://github.com/CartoDB/cartodb

Create a connection to the data

Now we know our data source and have setup the base of our web application, we can continue creating a connection to the data. We will use the Cultural Heritage dataset that will be published by the party which is working on task 1. Creating a connection to the data will consist of the following topics:

- We're starting with investigating the usability of the dataset. Spotzi will request data from the data source using the content-type as described in part "*Testing the data provided by task 1"*. Is it clear for the developers how this dataset works and how we're supposed to be using it? Furthermore, can we, and *how* can we, query and visualize the data. Our findings will be discussed with the other parties.
- When we have access to the content of the Cultural Heritage data we're going to add this content to our platform. In contrast to storing the data in our Geospatial Data Platform, like we did in our last project, we're going to add the data directly to our application. We will not store the data and will not create a copy of the data.
- After we've add the Cultural Heritage data to our application, we're looking at the applications performance. The application should deliver a good user experience and we cannot allow high loading times here. We will also do some stress testing in collaboration with the data providers to investigate what will happen if more than 1000 users will query the provided data at the same time. Spotzi already has some stress testing tools available that we can use to test this.

Again we will report our findings to both Geonovum and the data providing party for each topic, so we can directly improve the system.

Create other connections

Now the Cultural Heritage data is implemented in the web application we're going to expand the application by adding other datasets from different data sources.

- **http://www.ldproxy.net**
  We are going to develop a connection to a proxy of the BGT on http://www.ldproxy.net/bgt/ and link the Cultural Heritage data to this dataset. We will retrieve feature types from the BGT. When a Cultural Heritage object is selected in the application we will use this proxy to retrieve the corresponding feature type, among other information.
- **http://demo.bp4mc2.org/def/imgeo#**
  In addition to the BGT proxy we will also add a connection to the Imgeo demo on http://demo.bp4mc2.org/def/imgeo#. Here we can retrieve more information about the information models of the used datasets. We're retrieving metadata about the objects of the Cultural Heritage dataset that we can present to the end-user of our web application.

We expect to need some assistance in connecting to these data sources. This will be in good contact with Geonovum. After we made a connection to these sources we will report our findings and troubles that we've encountered during this process. We will also analyse the provided data sources and will report the differences and similarities between these datasets, the datasets provided by the party which is working on task 1 and the compliances with the lessons learned.

Add logic to the web application

The next step is adding rules and logic to our web application. We have a working connection to the datasets. Now we need to create rules so we can query this data to come up with an answer for our end user. In this step we have two important topics:

- **Testing if the data is programmable**
  The Cultural Heritage data is findable and useable. Now we're researching if the data is also programmable. We will set up rules, based on the Environmental Law and other construction regulations. Next we're applying these rules on the Cultural Heritage data. We'll inspect the result and test if all went right. If we run into any problems regarding the programmability of the dataset we will discuss these findings with the data providing party to resolve these issues.
- **Use the data to come to an answer for the end user**
  The other topic we're researching is more about the end user. Is the web application able to come up with an correct answer for the end user, based on the provided data? In other words, does the application provided the answer we hoped for.

Evaluate

Our final step in this project is evaluating the lessons learned. We're looking into the lessons learned from the start and will evaluate if anything is:

- **Are the lessons learned complete**
  We will investigate if there is anything missing, wrong or not well formulated.
  For each lesson learned we will describe how this was implemented and what the effects were of this implementation on our project. During this stage we will look broader to the lessons learned in order to provide better answers. We will also keep close contact with Geonovum.
- **Does the form of the documentation, suit our developers?**
  Did our developers understand the lessons learned and did they have any suggestions improving the form of the lessons learned? Do they need other/more examples, or documentation?

At the end of the project we will deliver a report with all our findings, according to this plan of approach. This reports consists of improvements and suggestions for the lessons learned.

5. In-kind investment

Here you can find an overview of the expected workload for Spotzi.
As you can see we are willing to invest in working hours to develop this application.

Task	**Time**	
Testing the data provided by task 1	60	13th of June – 17th of June
Create the web application	20	20th of June – 21th of June
Create a connection to the data	64	22th of June – 28th of June
Create other connections	56	29th of June – 4th of July
Add logic to the web application	28	5th of July – 6th of July
Evaluate	28	7th of July – 8th of July
Total	**256 hours**	**19.200 euro (75 euro per hour)**

6. References and CV

Spotzi built an online datashop with editing functionalities. The best reference is to check our website and to create a free account. It is all build around open source so components of our solutions can be used for this proposal:

http://spotzi.com

Curriculum vitae of the team responsible for his project:

- Teun van Sprundel

Name + titel(s)	T. van Sprundel, BSc.
First name	Teun
Function	Lead Developer
Skills	Database specialist Data analysis Data management
Education	2008-2012 HBO Information and Communication Technology – HZ University of Applied Sciences – Vlissingen
Professional experience	-HTML/CSS/XML/JSON -PHP/Python -Microsoft SQL Server/SSIS/MySQL/PostgreSQL/MongoDb -ArcGIS/QGIS/PostGIS
Work experience	01-01-2010 – present GIS Specialist Spotzi and Lead Developer Responsible for managing the development team. Main focus is updating and maintaining the PostgreSQL and PostGIS database.

- Erik Nagelkerke

Name + titel(s)	E.G. Nagelkerke, BSc.
First name	Erik
Function	Developer
Skills	- Data management - PHP - Javascript - CartodB - PostgreSQL
Education	2011-2015 HBO Information and Communication Technology – HZ University of Applied Sciences – Vlissingen
Professional experience	- Microsoft SQL Server/SSIS/MySQL/PostgreSQL/MongoDb - CartoDB - App development - Augmented Reality (FHV Vorarlberg)
Work experience	01-02-2015 – present Developer Spotzi

- Remco Dolman

Name + titel(s)	R. Dolman, Ing.
First name	Remco
Function	CEO
Skills	Strategic management Product development Coordination Acquisition
Education	2001- 2002 Post HBO Business Administration, Hogeschool voor Economische studies, Rotterdam 1992-1996 HBO Civil Engineering – Dordrecht
Professional experience	CEO Spotzi - Responsible for product development - ArcGIS experience - Design experience - PostgreSQL and PostGIS - QGIS
Work experience	01-01-2007 – present CEO Spotzi BV 01-01-2006 – 2010 CEO Risk BV

Statement of agreement

Spotzi agrees that the deliverables of this publications will be shared under the CC/by license.