

A large crowd of people in silhouette, with many hands raised in the air, suggesting a conference or a celebratory gathering. The background is a solid blue color.

Crowdsourced GIS

with

Open Source Tools

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Outline of Presentation

- **Introduction**

Quick introduction about myself and what makes my brain tick

- **Crowdsourcing**

What is it and what determines a successful crowdsourcing project

- **Demonstration**

Explain a crowdsourcing GIS project I did last year and demonstrate it

- **Open source tools**

Highlight the software used to make the project.



Crowdsourcing

- What is it?

Wikipedia says:

Crowdsourcing is a sourcing model in which individuals or organizations obtain goods and services, including ideas and finances, from a large, relatively open and often rapidly-evolving group of internet users; it divides work between participants to achieve a cumulative result. The word crowdsourcing itself is a portmanteau of crowd and outsourcing, and was coined in 2005.

- New term but an old concept

Example with a GIS theme was the way longitude was determined back in the 17th century.

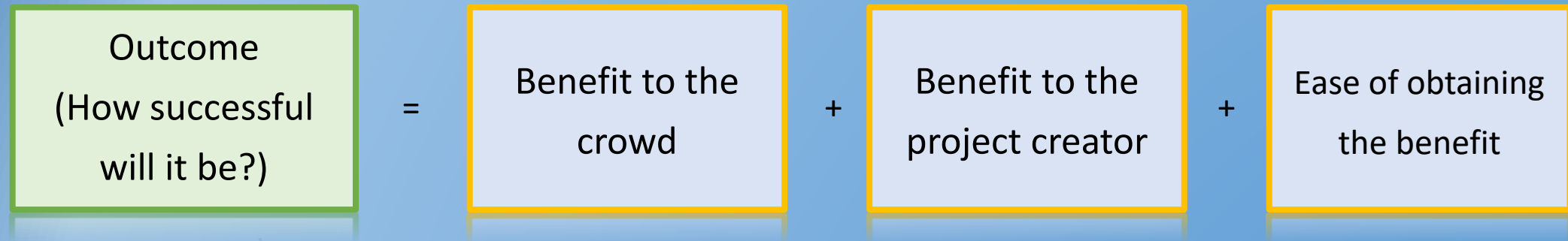
- More modern examples

Wikipedia, Open Street Map, Stack overflow, GIS stack exchange and the list go on...



Crowdsourcing

- What determines a successful project?



Crowdsourcing

Open Street Map Success

- Benefit to the crowd

- Great base map worth enhancing
- Highlight certain aspects on a map (eg mountain bike trails)
- Enjoyment of drawing maps – part of a bigger picture
- Working collaboratively rather than in isolation
- and many more....

- Benefit to the creator

OpenStreetMap Foundation:

“it is dedicated to encouraging the growth, development and distribution of free geospatial data and to providing geospatial data for anyone to use and share”

- Ease of obtaining the benefit

Would it have been as successful if the software was difficult to use?



Demonstration

- Project to review bus shelters
 - For Cassowary Coast Regional Council's asset section
 - Make sure they were being fully utilised and to report conditions
 - Predominately for bus shelters used by school students as they have higher turn around on usage
- Some traditional methods
 - Survey form with the Rates notice. ☹️
 - Enquire with the bus companies. ☹️
 - An online survey utilising a site like survey monkey. 😊
- Chosen solution
 - Online survey but with a GIS front-end. 😊
 - As a software developer, ease of obtaining the benefit was important.
 - Ran for 3-4 weeks and advertised through various media.



Demonstration

- Other features

- Restrict the viewing area.
- Making sure the request is within council's boundary.
- Use of tooltips to help with what's expected.
- Limit photo size (<25Mb).
- Making sure submission is complete prior to starting another one.
- Two urls – one for the option to submit anonymously and another to force contact details.
- Some server side protections against cyber attacks.

- Out of Curiosity – the results

- There were about 60 submissions. All genuine and only 6 didn't supply contact details.
- Over half were for new bus shelters, 9 reported damage to shelters, 6 relocations, 3 not shown in the map, 3 for the removal of shelters, 2 shelters shown on the map but not there & one for a larger shelter.
- 11 photos uploaded



Open Source Software Used

- Determining where to host

PHP was chosen with the Code Igniter MVC framework for the server side.

<https://codeigniter.com/>

- On the Browser side

- HTML, CSS and JavaScript

- To help manage the JavaScript coding, a MVVM framework is use to provide structure and link what data is shown and how it's modelled in code. There are many open source options available such as Angular, ReactJS, VueJS. I chose KnockoutJS for this project. <https://knockoutjs.com/>

- Another advantage of using a MVVM framework is that they usually allow you to build reusable components. Parts of the map interface are reusable components that have been used in other projects.



Open Source Software Used

- On the Browser side (continued...)
 - Bootstrap was used for the theming and layout of the website. It makes website look great and more usable without needing to be a graphic designer. There are many theme styles on the net so it just a matter of picking one you like. It also deals with making the site responsive – that is making it usable on different sized screens. <https://getbootstrap.com/>
 - For the mapping component, OpenLayers library was used. A great library and is actively developed. It improved considerable since version 3 and is now up to version 5. <https://openlayers.org/>



Open Software Used

Getting by without a Map Server

- The site was hosted on a shared server with limited scope for a map server to dish out mapping data.
- As opposed to desktop mapping, to display mapping data in a browser you really need to think what will be downloaded.
- Map servers such as GeoServer, MapServer, Mapnik & QGIS Server, generally compile the mapping data and send it to the browser as an image. This works fine visually and you're always guaranteed a reasonably downloadable sized image. This method also have it's downsides such as if you want to interrogate the data.



Open Software Used

Getting by without a Map Server

- **Cadastre** – Couldn't be downloaded as it's too big. I ended up using a vector tile format called mbTiles. Similar to raster tiling but with vector data and also does generalisation on the zoom levels. The format is reasonably new and there wasn't many translators around at the time. I used geojson-vt (<https://github.com/mapbox/geojson-vt>) to write a translator.
- **House numbers** – Because the cadastre was downloaded as a vector, I could use OpenLayers to put a house number label on the property.
- **Ortho Photos** – used the QLD governments map servers.
- **Bus shelters, Road centrelines & CCRC boundary** – Only small files so they were downloaded as a geojson files.
- **Labels** – Stamen toner labels. Zoomed in the road centrelines were labelled using OpenLayers.



Thanks for listening.

- Hope I've shed some light on the way I've done some of my software development that could be helpful in your endeavours.
- Great time to be in GIS – especially on the web side. Lots of development happening especially with the Open Source products.
- Any questions?

