

Slight Change

I thought this quote by Charles Darwin summarises the theme of my talk today quite well – quite literally actually. Because if you were here to learn about the online application for hazards and incidents mapping, I'm sorry there has been a slight change in the agenda.

The talk is now about:

Title Slide

So not only is this talk *about* change but the talk *itself* is an example of change. Now before you start booing, hissing and start walking out bear with me for just 5 more minutes and I will attempt to explain myself a little.

And quite frankly I didn't plan this change in advance but the thoughts about this new topic only started to formulate themselves in my head over the last few weeks.

As I was writing my notes for the talk I put myself in the audience shoes and to me the more sensible thing seemed to be that I'd rather hear about a topic that challenged my current way of thinking, even if it did not provide a clear conclusion I leave the lecture somewhat more enlightened than when I entered it.

So why the change of title? The original plan was to talk about an online-mapping application that I so lovingly built using OGC standards and free (Open Source) software but no matter how much I tried to convince myself that the application was cutting edge technology and followed best industry practices for developing online mapping applications, in reality it now lies as ...

Road kill

... road-kill amongst so many other mapping applications that have been flattened by the mash up artists who, over the last year or so, use free API's like Google and Microsoft to build apps of ever increasing sophistication and usefulness. Mash up BTW is a term that has become synonymous with applications that aggregate external data or user contributed data to create something useful.

The old web apps got bogged down with being

- Limited to a single client
- Locked in the data
- Poor usability
- Poor performance
- Quite simply "inadequate" for our new customers

And don't worry, I'll still show off my application more as an example of where I or perhaps even OGC may have failed to foresee this *new force* ...

A brief look at OGC's history:

Let just introduce OGC to you before returning to this new force that I speak of. And I'll give you a personalised account of learning about OGC not because I'm so special but rather my experience is not too similar to future intake of employees at this agency and so it's important their backgrounds are understood.

Firstly I owe a great deal to the OS community. In particular to Geospatial OS community. Like many who start-off with the conventional GIS route of undergraduate university courses using ArcXXX I had been tightly shackled by ...

Dongle Slide: ... the chastity belt of proprietary software. We tried all sorts of ways to get around it but it was no good ...

I remained innocently unaware of OGC until one fine spring day in 2003 a lecturer at the University of Melbourne, Geomatics Dept spoke about something called *WMS* and geospatial *metadata* and the power of being able to discover and access geospatial data on the internet. It was at that stage all theoretical but it was clear enough that I left the lecture determined to use this newly found knowledge of WMS and Metadata in my next GIS project.

DVD stack: Until this time my GIS projects were getting data from a CD ROM or a DVD

Having just attended a lecture on OGC Web Mapping Service and determined to learn more about the technology like any good student I headed for the nearest place that I could sit down in peace with my lecture notes in hand and Google'd for "WMS" and "Metadata"

This led me to the "Mapserver" website.

So what's so significant about Mapserver?

Tux slide: It's open source! Broadly speaking Open source licensed software is one that allows the viewing or changing of its source code. But open source can extend beyond code to data.

You may even have open source data - *more on that later.*

As it turns out that experience of discovering OGC & Mapserver in 2003 at the University of Melbourne had its roots much further back in time. Let me now go back in time

The year was 1982.

GRASS (Geographic Resources Analysis Support System) is an open source, Free Software Geographical information system (GIS) with raster, topological vector, image processing, and graphics production functionality that operates on various platforms through a graphical user interface and shell in the X Window System. It is released under GNU General Public License (GPL).

The recent GRASS 6 release introduces a new topological 2D/3D vector engine and support for vector network analysis. Attributes are managed in .dbf files or SQL-based DBMS such as MySQL, PostgreSQL/PostGIS, and SQLite. The system is capable of visualizing 3D vector graphics data and voxel volumes. GRASS supports an extensive range of raster and vector formats through the binding to GDAL/OGR libraries, including OGC-conformal (Open Geospatial Consortium) Simple Features for interoperability with other GIS. It also supports Linear Reference System.

This year GRASS is created by USACERL & CERL in Urbana, Illinois and is made public domain software that ran on UNIX

GRASS was meant for US Army to use in its Civil Works and Military Deployment Project

Its Open Source status means that GRASS was quickly taken up by other US, Canadian and even Australian Government agencies as their GIS of choice.

And so while the GRASS community is basking in their promiscuous sharing of new code that makes its way into GRASS -- continuously improving and enhancing it -- another set of people sit in dark rooms and wear the same chastity belt of proprietary software. **Dongle Slide**

One day these two communities meet and try to communicate but the two systems cannot speak to each other... **Petrol Pump Slide:** One problem is that proprietary software has the desire to make money by retaining their customer. And one of their favorite methods for locking in their customers is through proprietary data formats.

Once again open source takes on the initiative to bridge this gap. An organization called OGF (Open GRASS Forum) is started and they begin experimenting with this idea of Open Interfaces for Geoprocessing. This is the early 90's and one of the prominent figures in the GRASS community publishes a paper that takes the GIS world by storm. It discusses this idea of open interfaces for geoprocessing. This leads to some interoperability test-projects that make use of a consensus based interface development and this consensus process eventually develops into Open GIS Consortium, now renamed Open Geospatial Consortium (OGC).

So pardon the pun but **Slide:** "The roots of OGC are in GRASS Open Source"

And it should now come as no surprise to anyone that Mapserver, an open source software,

was what led me to discover OGC.

So what problem did OGC come to solve and why did that problem come about?

The problem was a result of a paradigm shift

SHIFT Slide: GIS in Gov't/Univ. Research → GIS in Gov't Business, Specialist industry

This is the mid 90's and GIS is still very much a niche industry but with a growing client base. Within this niche community an *expectation develops* amongst the GIS professionals that they should be able to work together seamlessly regardless of their GIS software. This is also the time when the internet is emerging. And so OGC gets down working on defining these standards that work in a networked environment

Standards Slide: These are some of the standards that OGC is best known for:

- Web Mapping Service (WMS)
- Web Feature Service (WFS)
- Web Coverage Service (WCS)
- Web Processing Service (WPS)
- Sensor Observation Service (SOS)
- OGC Catalogue Service (OCS)
- Style Layer Description (SLD)

Don't know about you but to me ...

LSV title slide: the standards always make more sense when studied in the context of a real application. So let's get into this Online Mapping Application for Incidents & Hazards Mapping. Most of you would know how Life Saving organizations are setup. There is a National Corporate Body (SLSA) and beneath them there are state-run Life Saving organizations. Each state will have several Life Saving Clubs that are responsible to the day to day lifesaving activities on the beaches under their particular jurisdiction.

Now LSV had some GIS capability but it was limited to the coastal risk management branch performing desktop GIS analysis. They realized that they needed to be able to extend that to their life saving activities. With particular emphasis on collection of real-time data on incidents and hazards. So the business objectives were:

Business Objectives Slide:

Collect information from LSC members regarding incidents, hazards, and changes in local conditions

Report information back to LSC members in near real time to support Life Saving activities

“The development of mapping and GIS functionality to support LSV staff and volunteers in better decision making”

Pre Application

Paper based little or no spatial information. Data was lacking reliability. Timeliness of data suffered. *Good points:* it was flexible and the low tech nature of the solution meant no restrictions.

Technical Requirements Slides:

- “fit for purpose” that is address all business needs but not too complex for user
- work at variable network speeds - even 56k
- hazards & incidents data collection from remote sites into a server-side repository
- distribute LSV corporate data such as ABSAMP database to LSC’s
- ABSAMP = Australian Beach Safety and Management Program
- hierarchical & role-based authentication
- local - state - national
- handle the temporal dimension of hazards. e.g. rips may last only a few hours
- budgetary limitations – so leverage open source & free data

Architecture slide: Data from external sources for situational awareness such as BOM radar with information on precipitation, satellite derived wind contours.

Break it up slides: now lest just focus on the 3 tier architecture. We have the client, application server and spatial database.

Simple features specification Slide

States how to represent valid geographic features in SQL, WKT, WKB are also defined so are valid operations

Change and Upheaval

Our society is continuously changing but it’s only every few decades that a change so profound comes along that it shifts public perceptions and expectations about the world in a radical way. Here we can learn a lot from history

School of Athens: There was the renaissance which pulled Europe out of the dark ages when

they (re)discovered the joys of reasoning and shedding superstition

Assembly line: Which set off the modern industrial age and combine with the effect petroleum powered combustion engine is related to the problem of our age.

Transducer: The basic component of modern circuitry, perhaps the greatest invention of the 20th century.

Then we all have our favourites: Maybe for you it was StarWars or perhaps it was that irresistible character with large blue eyes, a sparkling smile and dimples who's appearance would make anyone's heart melt ... Spongebob SquarePants

I believe we are currently living through another change.

New Force - Time person of the year slide

This year things changed. No longer were people passively watching the history being written.

A lot happened: New Markets, Creative drive, democratisation of history, accountability through social conscience, minorities got a voice, stereo types were broken, governments began to take notice of issues that they could have ignored in the past, individuals felt empowered, collective wisdom & knowledge was exposed

But it didn't stop at that. You had to have spatial data too didn't you despite the fact you had no background in geography and GIS. We could summarise the new public perception in the context of the geographic data as:

Change in Expectations Quote Slide *"Simple, easy and timely access to useful geographic information is my right and not a privilege"*

It's Web2.0 and the ideas that underlie it that has lead to this change and the question now is whether national mapping agencies have some responsibility in addressing this *new client expectation*. I'm not going to claim to have definite answers at this stage but to start with, let's look into the emerging web2.0 and try to understand the needs of this NEW breed of customer's.

SLIDE: It's easy to dismiss Web2.0 at first glance: Web2.0 may deceptively seem like a fad catering to the whims of teenagers in helping them find & share the best hangouts but upon closer look you will find that it is perhaps the most successful example of *interoperability* between diverse and distributed communities. The same technology that's being used to find the perfect pub can and is being used to:

- save lives in during a natural disaster or

- protect endangered species or
- even reduce poverty and conflict in the world

You cannot be serious! Why can I say this? Well let's have a look at some examples:

<http://kiva.org>

Microfinancing. The process of lending is so simple its addictive.

1. Browse business owners in need
2. View more detail
3. Start lending as little as \$25
4. Monitor borrower's progress and repayment of your loans
5. Read journal entries from the field staff

Microfinancing allowing one-on-one loans to entrepreneurs in poorer countries. 100% of your loan goes to the borrower. 99.7% of the loans are repayed.

A common theme of these projects is the frustration of watching governments or other large institutions fail at some fundamental issues. For <http://kiva.org> perhaps this was the inability of bureaucratic organisations to reduce poverty. *Web2.0 as a platform* is allowing people to do something about issues they really believe in.

What about a geospatial example?

What did the customer want again? That's right data, that they as taxpayers pay for us to collect. **But can they?** Probably not, why? We talk OGC. They don't have a say in OGC. **The disappointment with OGC becoming an exclusive club for the rich and famous leads to something interesting.** So they go off and take the matter into their own hands.

They develop new standards that do what they wanted so well that even OGC is forced to take notice:

"These powerful forces are creating "tensions" that impact how we shape and create standards for the global community ...

Many of these tensions and associated market forces are the same ones that are driving the evolution of the Web (Web 2.0 and Where 2.0) and the integrated GeoWeb ...

KML and GeoRSS are two new formats that are making great headway on the Web ...

... strong collaboration between the "traditional" standards community and the Where 2.0 community can provide the greatest benefit for everyone"

Can anyone guess who's saying this?

Carl Reed CTO, Open Geospatial Consortium, Inc.

So what do you need to get interoperability on the web out of the box?

Standard for *identification* of resource;

Standard to *interact* with the resources;

Standard *formats* for data exchange;

And lastly a standard way to handle *state*.

Lets take GeoRSS as an example: GeoRSS leverages existing standard (ATOM protocol) to add geographic information to the web making it instantly interoperable in the web environment (which our new customers expect).

Let's compare this neat use of GeoRSS with what I was trying to achieve with the hazards application using WFS. GeoRSS simple doesn't use GML while WFS does. GML has turned into a meta-markup language requiring people to agree on their particular schema before it can be used in production.

So our first problem is formats. Then WFS is exposed through a custom-defined RPC (by folks who can afford to sit on standards committees) and your gallant little freelance developer who is just buzzing with creative energy (www.mapbuzz.com) can't use it. So the second problem is hiding services behind RPC's and going against the RESTful nature of web and hence throwing away the benefits that come with it. Like page ranking, caching and serendipitous discovery of data (which HTTP and hence the web was designed for by its creators). Due to this design choice data get's tightly coupled to the web-application of choice ... something I have been guilty of in my past (<http://geospatial.nomad-labs.com/ws/geodelivery/geodelivery.html>)

Third and related is the problem of not having URI for features.

Next we have some examples of GeoRSS being used in a government context... (thanks Mikel)

Oh and I almost forgot DATA! Given that we are not yet ready to provide them with data as they want it this new customer hasn't stopped at standards. They are collecting and compiling geospatial data at a scale that has previously been the forte of large corporations, defense and government.

Other's , Google & Microsoft - folks who 10 years ago could never have been in GIS - are gearing up to serve this new client.

SUMMARY

Our society is continuously changing but it's only every few decades that a change so profound comes along that it shifts public perceptions and expectations about the world in a radical way. We could summarise the new public perception in the context of the GIS industry as:

Simple, easy and timely access to useful geographic information is my right and not a privilege"

It's Web2.0 that has lead to this change and the question now is whether national mapping agencies have some responsibility in addressing this new client expectation.

What are we waiting for?