"Making More of Mapping"

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Introduction

Geographic mapping is unique in its intuitive ability to communicate patterns in information. This was once the sole preserve of the specialist geospatial analyst. Today, with the introduction of online mapping, such as that from Google, web designers all over the World are now putting markers onto maps showing their office locations. Consider replacing this small table of data behind the online map with a massive database of information and business intelligence, and coupling this with search, visualisation, communications and computation logic.

In this document, we present a profile of this market and the new opportunities that true web-GIS brings, delivering high functionality, low cost, interactive online mapping applications for private or public consumption. Web-GIS can take the ability to analyse and extract information from your data to the very point-of-need. At the same time, online mapping can be used to share appropriate sections of this information with the public and provide a platform for the public to communicate back issues of importance.

Traditional GIS

Essentially, a GIS system comprises a store of base maps, a map server capable of accurately displaying the appropriate part of these maps together with overlays of data, and the computational functionality to process the data for these overlays from your raw data. These base maps will typically cost many thousands, if not hundreds of thousands, of pounds, per year in license fees.

Traditional Geographic Information Systems (GIS) have been around for over 20 years and are typically expensive, high-end functionality, systems requiring massive processing capability and highly skilled staff to program and operate them. They allow for any degree of geographical analysis to be applied to huge datasets, with millimetre accuracy. Because of this they are commonly used by a small number of specialist staff to deliver on requests from other departments. Typical applications include oil exploration, flood modelling and the mapping of utility pipes and cables.

Increasingly GIS is being applied to far simpler datasets, employing less then 10% of the capability of the system. Additionally, there is a desire to put the power of analysis into the hands of the people that require the results, or to publish results for the public. This becomes prohibitively expensive in terms of the licenses for GIS software, the detailed base mapping and the skilled staff to develop and manage the system.

Online map servers

Google introduced their online map service in 2005 and it has since been joined by Microsoft's own service, Virtual Earth. These online map servers deliver the GIS function of displaying an appropriate part of a base street map, terrain map, satellite or aerial imagery to a website at a vastly reduced cost, if not free.

These do not have the resolution accuracy of traditional GIS and don't display the detail available on such as Ordnance Survey's Master Map layers, but for the majority of applications this isn't required. Online map servers deliver web-optimised performance for thousands of simultaneous users, with adequate accuracy, and global mapping. Additionally, they are already familiar to most users and very simple to use.

Increasingly, there is recognition that online mapping is being used for business critical applications. Google, for example, have two levels of license, one allowing for free access for public service applications, and a 'Premier' license that comes with a service level agreement and business friendly terms and conditions, supports high traffic levels, additional security options and has no advertising.

Online mapping – web design

Application Programming Interfaces (APIs) are well documented and freely available for Google's online mapping, making it very simple for a web designer to integrate a map into their website and to overlay basic information, such as putting markers onto the map to show where stores are located. These implementations can be made very easy to use and work well for large volumes of users.

Another option available to web designers is to by-pass the use of an online map server and to create images of country and regional outlines using Flash, using this as a navigator for other data on their site.

Whilst bringing the power of maps to the communication and navigation of information, these applications are inherently limited to relatively simple, inflexible data structures. They are good for illustration but not for analysing or interacting with the data itself.

True Web-GIS

There are many mapping applications that have not previously been realisable, either because they require a level of functionality not available for large user-base applications, or because they are too expensive to develop using traditional GIS processes and systems. True Web-GIS opens up new opportunities to realise these projects both for public access over the internet or private access over a local network.

Zubed's true web-GIS systems bring traditional GIS functionality to online applications and can be quickly developed, at a low cost, using online map servers. These systems put a database behind the base mapping and apply proprietary technology to manage massive data volumes. A modular, customisable, capability allows the user to search / filter the data to be displayed, select from different display types, and apply communications and computational logic. Data can be updated at any time using a simple upload function or connected to a customer's live systems via web services or other API processes.
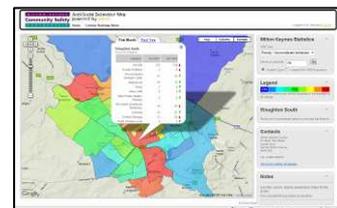
As well as being able to display specifically the data of interest, in the most accessible way, these systems allow users to extract the sub-set of information that they are most interested in, directly from the map, for use in any other analysis or publication application. By this means, analysis is being taken to the point-of-need, removing the need to request results days ahead of when it's needed, and to even perform ad-hoc analysis of up-to-the-minute information whenever questions arise.

What can you do with web-GIS?

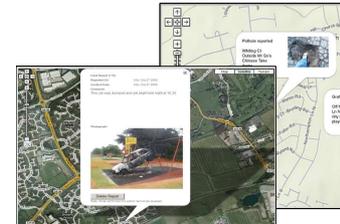|	
Point locations	The most common application requires for the displaying of points on a map representing individual items of data, filtered or searched for from a larger set. Clicking on any individual point will reveal the specific information relating to that point.
Thematic choropleth mapping	Choropleth mapping displays regional data by colouring-in regional boundaries to represent the aggregated data behind it. Clicking on any region will reveal data relevant to that region.

Heatmapping

Sometimes referred to as hot-spot mapping, this is the coloured representation of the level of a data type or the density of points. It might be applied where regional boundaries don't exist or to remove the constraint of these boundaries. Different methods of heatmapping allow for a trade-off between speed and detail.

Layering information

Multiple views can be combined to immediately identify relationships between different datasets.

Graphical / image overlays

Fixed images and the output of other modelling systems can be overlaid onto the map, such as that for flood limits or planning zones.

Data extraction and exporting

Many systems require the extraction of data directly from the map. Following selection of search and filter criteria, whether for point or heatmaps, the user can draw around a geographical region to extract data relating to that region, for use in another application, e.g. for mail-merging or secondary analysis.

Database interrogation

Whether considering a new office location, or assessing levels of insurance risk, given a geographic location, the system can interrogate a range of applicable databases to automatically highlight issues or calculate risk.

Inputing new point data or geographic areas

As these web-GIS solutions are truly interactive it is not just possible for the user to recover spatial information from within existing data. They can also submit new data to the system. This might be an individual incident or the definition of an area such as a school catchment boundary or anti-social behaviour dispersal region.

Data source integration	Data can be uploaded using a very simple CSV file (spreadsheet) format or automatically updated from an existing live source, e.g. CRM system or crime database. In this example RSS news feeds are being analysed in real time using semantics and the results posted to a map at the appropriate location.
Field reporting	It can be made possible for the public to post notes, photographs and other media directly to a map. In this instance this facility is being used to allow incident reporting. Alternatively, staff might use GPS enabled mobile phones to post photographs and messages automatically.
Semantic source analysis	Zubed systems can be semantically enabled, allowing them to carry out human language interpretation of unstructured documents and web sites. This is used in Zubed's recruitment applications to extract key information from applicant CVs.

Comparison of GIS systems

	Traditional GIS	Web design	Web-GIS
Number of users	●	● ● ●	● ● ●
Accuracy	● ● ●	●	● ●
Extraction of data	● ● ●	●	● ● ●
Low cost	●	● ● ●	● ●
Rapid development	●	● ●	● ● ●
Flexibility	● ● ●	●	● ●
Publication quality	● ● ●	● ●	● ●
Usability	●	● ● ●	● ● ●
Web performance	●	● ●	● ● ●

New opportunities provided by true web-GIS, such as Zubed's systems, enable the cost-effective production of highly accessible online GIS applications.

Bringing GIS to the web allows for a highly interactive experience. Users can communicate with the information behind the system, posting new data, drawing active geographic regions and extracting selected data for further analysis or application elsewhere.

With rapid outsourced development of a customised solution, based upon pre-tested functional modules, and the use of low cost, globally consistent, online mapping, there is no need to recruit specialist contract or permanent staff, either to develop or administrate the solution.

Using online mapping, such as that from Google, which is familiar to most users and optimised for the delivery of web-based solutions, web-GIS brings analytical functionality to the point-of-need and out of the specialist geospatial division.

Zubed Geospatial

Zubed Geospatial is a specialist mapping company, a division of Triad Group Plc. who are a leading provider of systems integration and application development to the public sector.

Zubed removes the cost and complexity of traditional GIS systems to produce customised interactive online mapping and analysis solutions for public and private sector organisations, typically having large dispersed audiences.

To learn more about Zubed Geospatial and what we can do for your online mapping go to www.zubed.com or contact us on 01908 278460.

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