Use of Open Source GIS in local authorities

A recent survey of local authority members of the Public Sector Mapping Agreement highlights considerable efforts to implement Open Source solutions. Paul Taylor and Gina Cavan present the findings

Over half of the local authorities that completed the survey use Open Source GIS software, citing economic reasons as a key motivation, and reported a variety of benefits and challenges. There is a high level of interest in Open Source technology by those who have not yet used the software. However, a variety of concerns such as lack of skills and support need to be addressed if Open Source GIS is to enjoy increased uptake within local authorities.

Open Source software is a rapidly growing and evolving domain. In recent years, there has been an increase in the development of Open Source GIS products, and there is now a plethora of alternatives to proprietary GIS solutions. Indeed, there are 356 GIS software products currently listed at freeGIS.org, comprising a very wide range of GIS projects at different stages of development.

Appealing choice

The apparent no-cost nature of Free and Open Source Software (FOSS) is a significant motivation for implementing such an approach. For local authorities across Britain, which tend to have a wide range of GIS operations across their enterprises, this may be an appealing choice given the current climate of austerity and the pressure on budgets. However, the indirect costs of FOSS, such as

training and support, can present significant barriers.

This study examined the current state of Open Source GIS use within local authorities. This included an investigation of the existing use of Open Source alternatives to proprietary GIS software, and the perceived benefits and challenges of adopting FOSS. This was supplemented by a comparison of the technical capabilities of several open source and proprietary desktop GIS packages.

A survey was distributed to Principal Contacts of the 367 English and Welsh Local Authority (LA) members of the Public Sector Mapping Agreement (PSMA) in 2014. A response rate of 41.4% was obtained (152 surveys returned). Respondents were asked a series of general questions about GIS in their authority before focussing upon Open Source GIS software specifically.

Context

Local authorities have varying organisational structures in place, with around two-thirds (63%) having a dedicated GIS/Geodata team. While there are typically less than three members in such teams (if present), more than half of the authorities surveyed estimate that they have upwards of 100 GIS users.

Furthermore, 76% of local authorities have a dedicated "Geo"

strategy. In terms of how frequently GIS platforms were reviewed, responses were diverse. A few authorities review them frequently (every six months or annually), while others review when licences are due. Many authorities are either not in the habit of reviewing their GIS architecture, or review it very infrequently.

Current use of Open Source GIS

More than half of the authorities that responded to the survey use Open Source GIS software (53%). The most important driver behind its adoption is cost (Fig.1). Thus, the potential for economic savings is the over-riding motivation for the majority of users. It is also worth noting that the next driver for adoption results from a GIS platform review.

Of the local authorities that have adopted Open Source GIS software, 62% report that it is used across multiple departments and not exclusively within the GIS team. FOSS is therefore not utilised in an enterprise-based approach. The majority of respondents thought that Open Source GIS software would be used more in their authority in the future (77% Yes; 6% Not sure; 17% No).

A wide range of Open Source software products are being used by respondents, a not unsurprising finding given the diverse FOSS market and freedom of choice when compared to the proprietary market with but only a few major commercial distributors from which to choose.

The most frequently-used products include: QGIS (53%) – for desktop GIS; PostGIS/PostGRES (36%) – for SDBMS; and, GeoServer (32%) and Open Layers (27%) – for web mapping. While FOSS ensures freedom of choice, the need to build software stacks, rather than use single off-the-shelf commercial systems, can add a further dimension of complexity.

Pros and cons

Adopters of Open Source GIS report high levels of benefit from its implementation. Almost three quarters cited greater systems flexibility (73%). Other benefits include financial savings (70%); increased interoperability between systems (59%), and financial gains (14%).

Major challenges included the need to 'self-support', the lack of an ICT strategy or ICT support, and limited documentation and assistance with implementation (Fig. 2). Despite this, most would advocate others to implement Open Source GIS software provided certain reservations were considered.

One such consideration in the present environment is the requirement to work towards Public Sector Network (PSN) compliance. This is an effort by central government to aggregate disparate PSNs
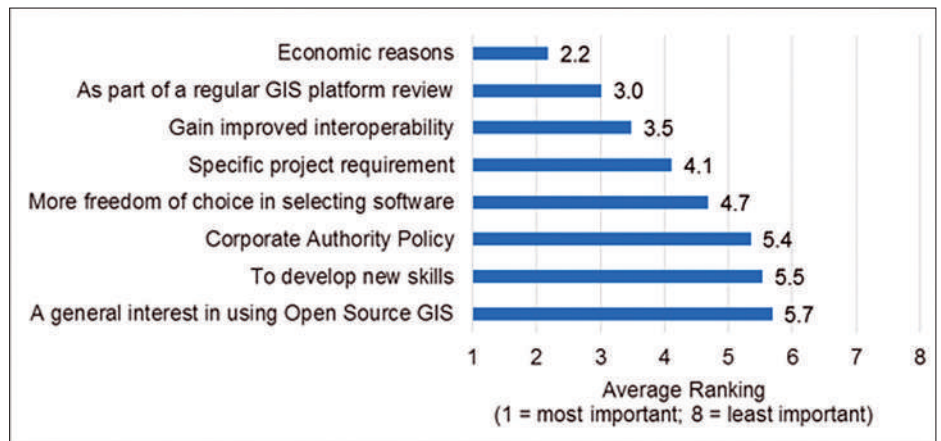

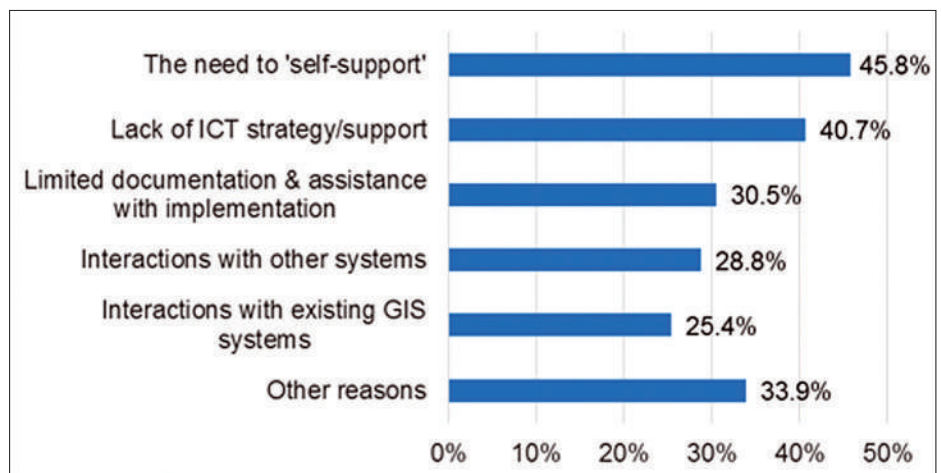Fig.1: Drivers for the implementation of Open Source GIS

Fig.2: The challenges facing local authorities when implementing Open Source GIS software
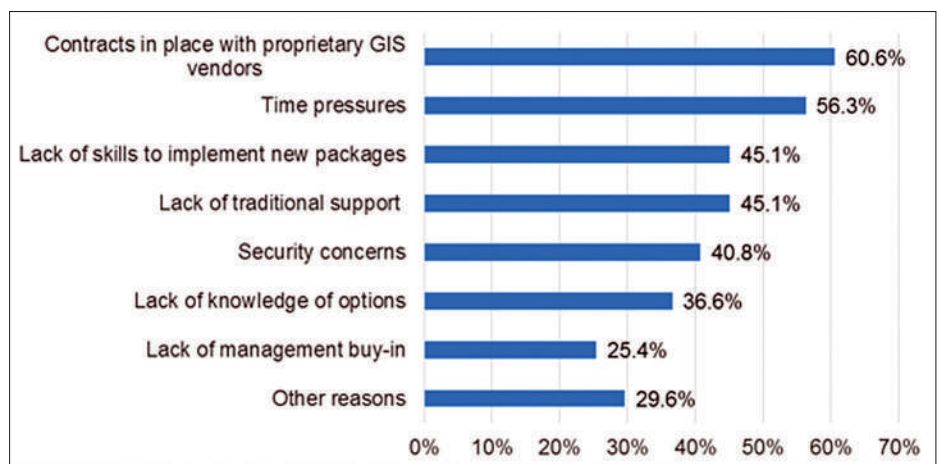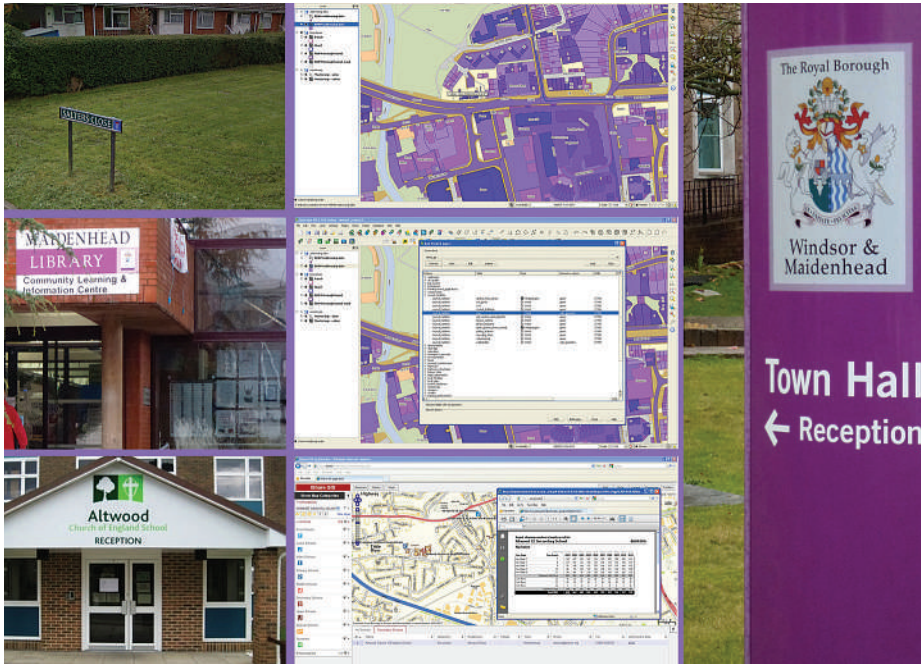

Fig. 3: Reasons why Open Source GIS Software is not currently being used

into a single, secure network for the delivery of ICT services. While membership of the PSN is not, at present, mandatory, many local authorities are in the process of ensuring they operate within the PSN Code of Connection1, a set of requirements whose primary focus is on security, reliability and data availability. Meeting these requirements must be demonstrated before connecting to the Government Secure Intranet. However, there is some uncertainty regarding how this specifically applies to GIS systems, which may add to future

challenges.

The survey also captured reasons why some authorities do not currently use Open Source GIS Software (Fig. 3). The most prolific reason given were contracts already in place with proprietary GIS vendors. Time pressures and lack of skills were other importantly cited reasons. Furthermore, the lack of knowledge was also a clear barrier to implementation, with 52% of respondents unsure as to whether Open Source GIS packages are currently mature enough to replace proprietary systems (18% yes; 30% no).

This public-facing website from Essex County Council utilises the iShareMaps Open Source web mapping portal from Astun Technology to help residents track the roll-out of Superfast broadband across the county

Open Source has been implemented extensively by the London Borough of Windsor & Maidenhead. Here, QGIS aids address searching using OS MasterMap (top) while PostGIS layers are added for Council facilities such as libraries (middle). Accessing schools-related information, regardless of format, is now a quick and simple task thanks to an interface to the iShare GIS Web mapping package
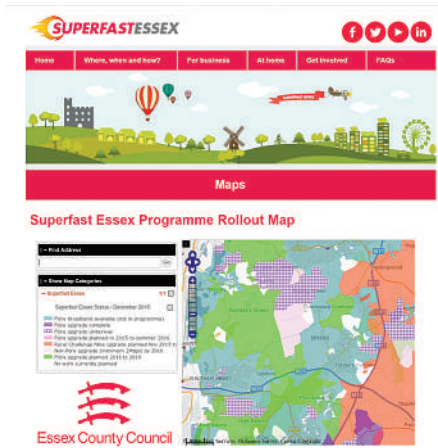
Improving take-up

It is notable that those who are currently using Open Source Software, and those who are not, have similar perceptions of the benefits and challenges that FOSS can bring. Thus, increased collaboration between both groups would be beneficial. An Open Source GIS portal for Local Governments could assist with many of the challenges. This may include the following elements:
• A central repository for storing technical documents;
• Cookbooks, or step-by-step guides to installing Open Source GIS software;
• Case studies to aid building a solid business case for management buy-in;
• Support network and forum for a wider community of users facing similar challenges.

A support network and forum could be hosted on existing platforms, such as the online 'Knowledgehub' – a Local Government Association-led hub for collaboration[2]. The 'Geographical and Spatial Information Knowledge Hub Group' has a membership exceeding 1,000 and could usefully include a dedicated section on Open Source GIS to address

some of the issues raised within this study.

This research was undertaken by Paul Taylor for his dissertation as part of the MSc in GIS with UNIGIS UK, a leading provider of online distance learning education in GIS, run jointly by Manchester Metropolitan University and the University of Salford,

[1] https://www.gov.uk/government/publications/psn-code-of-connection-coco
[2] https://khub.net

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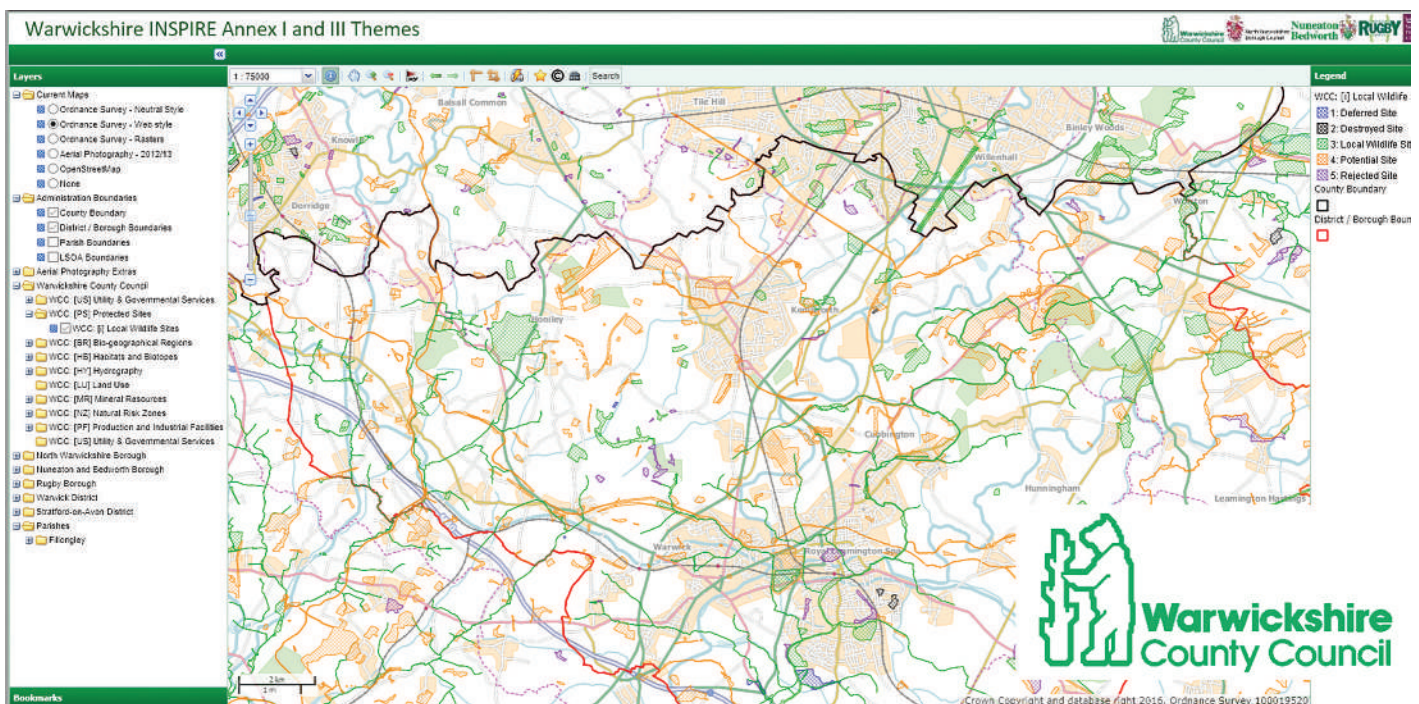
Three years ago, Warwickshire County Council implemented an Open Source Web-GIS to replace its existing proprietary solution. This uses a mix of the Heron Mapping Client for the web-front-end and GeoServer for back-end working in in conjunction with an existing Oracle database