

Spatial Data

A barrier to electronic service delivery in 2005?

Steven Ramage, Marketing Director, Laser-Scan and Dr Michael Sanderson, CEO, Laser-Scan examine the benefits that effective spatial data compilation can bring to local authorities.

Problem Definition

Take a County Council. In the last decade or so they will have invested in excess of a seven-figure sum collecting spatial data. This will not include the Ordnance Survey (OS) base reference data, now being delivered as OS MasterMap®. This spatial data is about locations of interest to the Council, such as schools, libraries, highways and planning applications. It is stored and manipulated in a software application that is known as a Geographical Information System, or GIS for short. This software contains, amongst other things, base reference map data from OS, an application supporting the departmental requirement, and the department's own data. Access to the departmental data is through an address gazetteer. The departmental application will have been written by one of a large number of vertical market specialist vendors, and will be provided in one of the popular GIS packages available from Autodesk, Bentley, Cadcorp, ESRI, Intergraph and MapInfo.

Over the last decade or so there will have been a proliferation of GIS tools being used by the Council. With the ODPM increasing the tempo for delivery of priority services electronically, the fragmented nature of the spatial data is a barrier to information provision to both the citizen and staff. Another issue is the OS Positional Accuracy Improvement (PAI) programme: spatial data is now being collected to a greater accuracy using GPS. This often leads to discrepancies between base data and asset data. The need for a strategic response has become a compelling business driver.

A Strategic Response

An appropriate response encompasses 3 elements:

- Protecting the investment in data and departmental applications
- Maximising the benefit from using OS datasets
- Incorporating spatial data at the heart of the Information Technology strategy.

Protecting the investment

In a perfect world all data, systems and applications would be compatible. There would be no issues of one dataset not matching another, no problems trying to capture data with one application and then manipulate it with another...in short there would be no issues at all.

Unfortunately that is not the case. Each departmental initiative has implemented GIS and updated the OS background maps according to local need. It is not possible to merge departmental datasets unless the feature or object in the Planning dataset can be recognised as being the same object as that in the Estates dataset. The first stage in resolving this conflict is to enhance the integrity of the existing datasets and protect the seven-figure investment already made.

An important step on the road to interoperability is accurate, error-free data. We need to be able to rely absolutely on the quality of our data; if we know the data is error-free then we can carry out automated tasks with peace of mind and data can be freely shared in the spirit of interoperability.

Laser-Scan has been working with the GIS vendors for several years to promote open, standards-based interoperable solutions. Laser-Scan's approach is data-centric, ensuring that data quality is mandatory for all centrally stored data. While the concept of spatial data quality may, at first, appear hazy or ill defined, Laser-Scan believes that it can be simply represented in terms of a contract of rules. Take, as an illustration, a land management/property registration application used to record ownership rights. In such a system, the business rules concerning the spatial data might be enumerated as:

- Every piece of land (parcel) has precisely one owner

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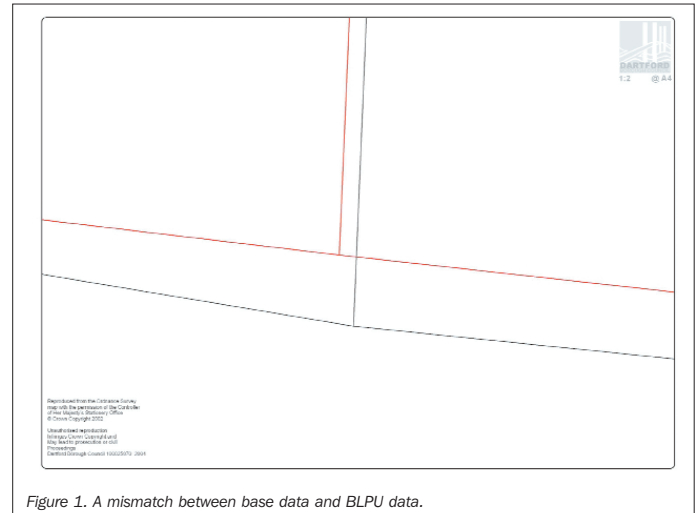


Figure 1. A mismatch between base data and BLPU data.

- Land parcels do not overlap
- Land parcels do not have gaps between them

Once these rules are adopted it becomes possible to monitor them and quantify the impact of data drift. Most importantly, these rules state the formal set of conditions that should be met before the data can be said to be fit for purpose.

Maximising the benefits from OS datasets

How do we take practical steps to start joining departmental spatial datasets? The first step is to engineer a central gazetteer. The existence of an accurate and up to date BS7666-compliant gazetteer is key to reducing duplication of address data and linking datasets. The new OS MasterMap product provides an opportunity to produce such a gazetteer that will allow communication with the national hub, known as the National Land and Property Gazetteer (NLPG). What is wrong with the current generation of gazetteers? There are several errors that were common in creating Basic Land & Property Units (BLPU):

- Snapping errors. Data has not been snapped to OS Land-Line® (polygons had to be created as part of this process, as this OS dataset was just a series of points and lines) and even where snapping tools have improved over the last five years they were not available to the original software, or were not used.
- Overshoots, undershoots, spikes and slivers. Small errors in the data could not be easily identified and need to be removed.
- Overlapping data. In creating the BLPU boundary data some of the boundaries overlapped each other.
- The organisation might have created more than one gazetteer!

If these errors were not corrected within the data, and the information was shifted to match the GPS base reference map, the errors would cause significant problems to the council. A polygon that has been badly drawn can result in a wrong land registration being shown on a search or the wrong planning application information being shown on a property.

Figure 1 (courtesy of Dartford BC) illustrates the problem. The old BLPU boundary is located in red

while the Land-Line mapping is in black. If the BLPU boundary on the right were used as the basis of a land search it would select registrations on the neighbouring property.

Laser-Scan has an effective range of tools to deliver the gazetteer function. These tools have been used in the creation of OS MasterMap and are effective in recognising the geometry of a feature or, as OS refers to them, the TOID™. The TOID can be cross-referenced to the BLPU. This is the basis of taking the fragmented datasets and combining them, i.e. providing data association.

Once the Council has set up its own gazetteer - their Local Land and Property Gazetteer (LLPG) - it will be critical to ensure that the protocols are in place to keep it up to date and in-line with other subsets of data that may exist throughout the Council. Regular updates to the gazetteer must be sent to the NLPG. The public accesses information from the NLPG, which is fed by the Council's LLPG; it is vital that updates are regularly communicated. At the time of writing we are expecting a ministerial announcement on a new addressing infrastructure to appear shortly. Failure to keep both the LLPG and the NLPG current will recreate the barrier to electronic delivery of information to the Council's customers and stakeholders.

Incorporating spatial data at the heart of the IT Strategy

The appropriate response is to bring the data together in a corporate database. Where the IT database of choice is Oracle, this is a manageable task. Oracle has a spatial data type, which most GIS software applications can read from, and write to, directly. Where Oracle is being used for the business systems, such as finance, housing benefits, and customer management, the IT department has skills in this area. The IT department also appreciates the need for business functional or domain experts to have the responsibility for managing the data according to a set of explicitly defined rules. This starts to make the spatial data interoperable with the business systems.

For Local Government organisations the most important aspects of these features are:

- **address** – the location of the feature in relation to other features
- **classification** – what kind of feature it is
- **position** – where the feature is located

The relationship between the features should ideally have certain other attributes:

- a set of business rules associated with them which govern how they change in relation to each other (a set of lifecycle rules)
- a statement of the provenance of the data (source, date, creator)

The remaining step is to agree a referencing methodology. Perhaps the most important detail we all need to agree is how the classification we have been creating is tied into the National Street Gazetteer (NSG) and the new Integrated Transport Network layer available from OS. When this is complete we will have a Digital National Framework (DNF). The OS is currently working with a number of its stakeholders to deliver this referencing methodology.


Conclusion

The step to removing the barrier to interoperability is to implement a DNF. The practical steps we can take today are to:

- establish the provenance and integrity of our spatial data holdings
- provide a central corporate resource for managing spatial data.

References

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- **Laser-Scan partner Aligned Assets article in GEO:connexion discussing LLPG and e-government in Britain.**
<http://www.geoconnexion.com/magazine/article.asp?ID=1874>
- **Laser-Scan and Exor provide a data linking service based around NSG and TOIDs.** www.exorcorp.com/highway_top.cfm



ACCURATE DATA FOR ACCURATE DECISIONS

The effectiveness of your organisation is based upon the decisions it makes. These decisions are usually made after consulting information held within your organisation. But what if this information is inaccurate? Badly informed decisions can at best be managed and in the worst case be disastrous.

Legacy data is often the result of multiple sources of data collected via a variety of software tools. Using different collection techniques and differing levels of quality assurance can result in data inaccuracies.

Overcoming these issues adds real value to the corporate data you have and allows you to make informed **accurate decisions**. Laser-Scan can help you to do just this, using **Radius Topology** to correct, maintain and protect data from inaccuracies. To find out more please visit our website or email info@laser-scan.com

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