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Data Integration: The future of OS MasterMap™

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Abstract

True data integration and interoperability has long been recognised as the key to delivering expanded geographical services. This should allow the user to define queries and perform spatial searches against a data model that mimics the real world rather than querying a group of overlayed 'layers' of disparate information.

To date OS MasterMap™ has provided an accurate base of rich topographic detail but will in the future be used as the starting point for developing integrated information that will allow the market to deliver new services to meet society's changing cultural and lifestyle demands.

Data integration allows the development of a valuable new type of 'living map', which becomes a tool for decision making rather than traditional large-scale data that only provides spatial context. This combined with emerging technologies like web services and pervasive computing will allow for the development of go anywhere applications that integrate data against a common reference framework and deliver it to the widest range of user applications. The ability to combine information promises to add up to more than the sum of the parts.

Background

The idea of a living map that is able to integrate and then deliver the information held by a variety of organisations has been one of the ideals at the heart of OS MasterMap™ development. It has been recognised that the provision of accurate spatial context and a means of uniquely identifying geographical features through the TOID® will allow organisations to relate their information to the identified spatial features. The TOID also provides them a means to pass their own information about the identified spatial features to other organisations.

Ordnance Survey is now working to integrate its large-scale data holding by creating new layers of OS MasterMap. This includes the announced address layer and the roads as part of a planned new integrated transport network. This on-going work to migrate content will provide a richer core of large-scale data that conforms to the same standards as OS MasterMap and will include a TOID for each of the features thus promoting the opportunities for data association. It also ensures that a common geography is used for Great Britain's large-scale spatial infrastructure providing consistence between features.

The benefits of creating and being able to maintain explicit links between related spatial data items will be delivering joined up information, often referred to as 'joined up geography'. It will unlock and combine the content of many spatial datasets held and maintained in different organisations. It will also limit the duplication of effort in data creation and maintenance. The importance of this process is particularly recognised by government as part of the 'joined up government' initiative. Many commentators have recognised the crucial role spatial information will play in this process. Indeed this was the thinking behind the Digital National Framework™ (DNF) which is used to underpin OS MasterMap.

Recognised Issues

Although Ordnance Survey is keen to promote the benefits of organisations using and sharing information through data association to OS MasterMap it is aware of the difficulties that exist whilst a feature's 'life cycle' can be changed as the result of processes that do not result from surveyed change to features. It is for this reason that Ordnance Survey is investigating issues that will strengthen the product through better processes for recording a feature life cycle and the possibility of making historic versions of a feature available.

Data Association

Data Association is the term used to describe the facility for Ordnance Survey customers to attach their own information to OS MasterMap features using TOIDs. At its simplest an organisation will take OS MasterMap data and match the features supplied with their own feature attributes. Once the association between the OS MasterMap feature and the third party's data has been made the third party is then able to pass this data to another party using the TOID as the primary identifier. If the recipient also holds OS MasterMap data or is using the TOID as a referencing system then they are able to correctly identify the data that has been passed to them.

This process can be illustrated through a couple of examples:

ROMANSE

Traffic congestion and systems for road management have become more widespread in the past few years. In Southampton the ROMANSE system has been developed to provide traffic and travel information. One function of ROMANSE online is the provision of a congestion map. The volume of traffic is monitored through a network of sensors located in the roads and this information is then made publicly available on the ROMANSE website.

The system is currently delivered using OSCAR Traffic-Manager® data but if it were migrated to use OS MasterMap roads data when it becomes available you could use the TOID as a reference to deliver ROMANSE road congestion information to anyone else who is using TOID as a reference and this could then be visualised using the appropriate OS MasterMap geometry. Any information held about the same features could also be made available through the TOID, examples may include highway authority data on road closures or local authority information on resident parking schemes or waiting restrictions. The community is united because it is using and sharing information about features that are appropriately defined for their use. Without a common referencing system there would be little opportunity to share information and also a requirement for many of the organisations to provide the geometry of features they are describing.

It is not hard to imagine how this information could be used to provide in-car telematics systems that are able to use the rich data holdings of many public and private organisations. The imminent arrival of increased bandwidth offered by 3G mobile phone system combined with the availability of data through web services could offer important new services that would help us maximise the potential of our transport network.

NLUD

The National Land Use Database (NLUD) PDL project contains data about previously developed land, and derelict land and buildings. This information is used to inform decisions about the availability of land for economic reuse. Through the NLUD-Baseline project it is hoped to develop a comprehensive, and up to date land use map of England. To achieve this there is a requirement to classify the appropriate polygon based land parcels from OS MasterMap topographic features. There is the possibility for significant savings in data capture cost if rather than digitising their own polygons the NLUD Baseline project is able to use the existing OS MasterMap features. This system could also use the OS MasterMap TOID as its own internal referencing system. This would bring other benefits, as it would provide a mechanism to pass additional information between interested organisations that were also using the TOID, i.e. local authority details on potential planning restrictions. If an area of interest comprised more than one OS MasterMap feature the property extent could be described as a collection of TOIDs. This would facilitate the exchange of geographic information without the need to deliver complex geometry.

Problems

If the feature described by the Ordnance Survey matches the feature used and described by other organisations then data association is likely to work. The above examples rely on Ordnance Survey's view of real world objects matching the view of customers or third party data suppliers. However, an alternative reality is that the third partys or customers view of real world features is similar but not the same as the Ordnance Survey's view. In these cases there is not a direct match between the features supplied in OS MasterMap and those used by other organisations, therefore there maybe a reluctance to adopt OS MasterMap or use the TOID as a means to provide data association.

Of the two examples above, the ROMANSE system is most likely to have a common perspective between Ordnance Survey's and user communities' views of the representation of real world features because the system describes a network which by its very nature is definable. However, it is unlikely that the Ordnance Survey's polygon based view of features and those described by NLUD as previously developed land totally match. What will happen is the NLUD and Ordnance Survey view will match most of the time but not all.

It is therefore necessary to conclude that there are many different views or perspectives of real world features, that the Ordnance Survey has but one of these views and that there is no simple method to enable different views to be integrated. Yet a common view or definition of features allows a community a simply mechanism to share information and can deliver real benefit.

Forward

Joining up Geography through data association is about a community using and referencing standard spatial features whenever this is possible and having methodologies to define, share and reference specialist features in standard ways when this is necessary.

OS MasterMap has made good progress toward providing a set of real world objects with an associated identifier (TOID). Yet it must endeavour to make sure that it works with customers to refine and enrich the set of topographic features that it provides and user communities should work to establish methods for their community to create and promote specialist features or versions of features that are suitable for their own purpose.

It is hard to imagine unified views of the world that can work for all users in all instances. Ordnance Survey for example has captured buildings to its own definition. Many real world objects that may appear to the average user as a single building have been captured as multiple features in OS MasterMap. This will obviously present users with an issue if they are trying to associate attribution to a real world feature that they consider to be one object but the Ordnance Survey have recorded as many.

Consideration must be given to the requirements for definition of features and methodologies for the promotion of features that meet user group requirements. Ordnance Survey and its customers must work together to make sure that Ordnance Survey provides not only GI content, but also the common data standards, services and infrastructure around that content which offer our customers the efficiencies of "Joining Up Geography". DNF™ is a key enabler for this process, yet further work is required to define methodologies that are essential for this to happen. Therefore the first challenge of Joining up Geography is to address real customer priorities in order to deliver features and methodologies to allow for data association that will drive forward change.

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