

## **A Military Customer's Perspective**

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### **Summary**

Military Survey (Mil Svy) is a Defence Agency within the UK Ministry of Defence (MOD). Traditionally one of Mil Svy's roles has been to produce military maps for use by the MOD. However, whilst we may be a provider to MOD, we are also a customer, potentially or in fact, of other geographic information producers.

Mil Svy was formed in 1991 and comprises a mix of military and civilian mapping and charting specialists. The organisation can trace its history back over 250 years to the autumn of 1747 when William Roy made the first measurements for the Military Survey of Scotland. Since those early days, the availability and utility of geographic information has changed almost beyond recognition. Mil Svy's essential role, however, has remained constant, and its Mission Statement today is currently stated thus;

'To ensure the provision of Geographic Support to Defence operations, planning and training.'

Increasingly Mil Svy's role in ensuring that provision has involved the rapid exploitation of other publishers' material, often in a multi-national environment.

This paper describes the problems facing Mil Svy as a customer, as distinct from a producer, of geographic information and some of the solutions we are proposing to overcome them.

### **Why does Mil Svy acquire geographic information?**

Since the Crimean War in the 19th Century, when one of the serving officers, Capt Thomas Best Jervis, acquired and reproduced copies of Russian maps at his own expense, Mil Svy and its predecessors have acquired geographic information. Traditionally the bulk of this material has been used as source material in the production of standard military maps. During the Cold War, typically these were products over a well defined area to which Mil Svy personnel had continued access. Furthermore, they were produced with a clear objective, namely the defence of Western Europe as part of a North Atlantic Treaty Organisation (NATO) force.

With the ending of the Cold War during 1989-90, the removal of regional superpower interests and ideological pressures has resulted in many diverse conflicts, often characterised by the fragmentation of former sovereign states. The traditional role of the MOD in the UK has expanded to include peacekeeping activities such as conflict prevention, supervision of elections and humanitarian relief world-wide.

For Mil Svy this has meant that whereas previously we stocked large quantities of a small number of products, we must now hold a greater variety of geographic information in smaller quantities and covering a much wider area of the world.

In 1997 the new Labour government of the UK initiated a fundamental examination of its defence requirements. This was known as the Strategic Defence Review (SDR), and its findings were reported to Parliament in July 1998. For the first time, SDR recognised Peace Support and Humanitarian Operations as valid military tasks in their own right.

With this increasingly global geographic perspective, Mil Svy had to recognise that no single organisation has the resources to produce and maintain geographic information for all possible contingencies over the entire world. It is therefore essential to the UK that, when required, Mil Svy has the ability to acquire and provide geographic information from sources around the world.

The length of time required to produce standard military mapping is usually measured in months, whereas the response time for humanitarian operations is often only a few hours. The use of locally produced geographic and acquired information therefore offers the following benefits over in-house production by Mil Svy;

- Timeliness
- Currency
- Cost Effectiveness

Such material can, where possible, be used directly, or by amending where required, possibly by use of a simple overprint. Deployable map production facilities can revise existing products in the field, extending Mil Svy's capability to rapidly produce timely geographic information.

Alternatively, paper mapping can now be speedily scanned and colour separated if required. The data may be directly plotted, transmitted to a remote site for local reproduction or used to generate printing plates.

This approach of exploiting material produced by other organisations clearly offers great benefits to Mil Svy. However it also places upon us an even greater responsibility to protect the Intellectual Property Rights, including copyright, of the original producer.

## **What geographic information does Mil Svy acquire?**

Mil Svy holds the archive of global geographic information for use by UK MOD. The majority of the collection consists of current topographic mapping, however Mil Svy also has extensive holdings of thematic maps, digital data, textual information and map reproduction material. Specialist thematic data used in a variety of civil industries may be acquired and used for humanitarian operations. For example:

- Digital Terrain Models (DTMs) for use as ground visualisation planning tools, as well as to support flight planning over terrain. In the Sarajevo airlifts during recent conflict in the Balkans, DTMs were essential to ensure the safe delivery of vital humanitarian supplies.
- Routes maps showing narrow constriction points and enabling assessments to be made on the ability to circumnavigate these, particularly during the supply of, or guarding the provision of, humanitarian assistance.

- Vector centre line datasets within towns to assist engineers in the planning of reconstruction following conflict or disaster.
- Original survey records to assist in the location and recording of positions of mines and unexploded ordnance.

For this collection of geographic information to be of use to MOD, it is essential that it is kept up to date through the regular acquisition of information and review of our holdings. For example, during 1997/98 Mil Svy acquired approximately 42 000 copies of maps, 1 500 datasets and a further 3 000 books and texts of a geographic nature and similar amounts of information are acquired annually.

## How does Mil Svy acquire geographic information?

Mil Svy acquires its material either by commercial purchase or under exchange arrangements such as Memoranda of Understanding (MOUs).

Mil Svy has negotiated a large number of such arrangements with nations world-wide and is actively seeking to increase these. These agreements not only include the exchange of information. They may also include any or all of the following services offered by Mil Svy:

- Training at the Royal School of Military Survey (RSMS) based in Hermitage, Berkshire. RSMS offers its world-renowned Army Survey Course, designed to train Military Geographic Officers in their professional management role<sup>1</sup>. Other specialised training courses are also provided. Over the past five years, the Royal School of Military Survey has enrolled and trained applicants from 15 different countries.
- Provision of technical support and advice in carrying out survey and aerial photography tasks. In 1997/98, Mil Svy carried out geodetic survey tasks in 6 different countries<sup>2</sup>.
- Mil Svy's reproduction facilities on an opportunity basis.

Commercial purchase is carried out both from suppliers in the UK and also by Mil Svy's overseas staff and representatives.

## The problems facing Mil Svy

### Working in a multi-national environment

SDR recognised that with minor exceptions, future operations will almost always be multi-national. The UK will usually be working as part of a NATO, United Nations (UN) or Western European Union (WEU) force, or an *ad hoc* coalition. UK forces will therefore be required to operate effectively alongside forces from other countries.

It is self evident that all participants within any particular operation must not only be using the same information, but that common standards of language, specification and format allow each user to fully comprehend and utilise that information, particularly in the field of Digital Geographic Information (DGI). This is particularly important in multi-national operations.

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<sup>1</sup> Students have the opportunity to be awarded an MSc in Defence Geographic Information Management from Cranfield University

<sup>2</sup> Military Survey Defence Agency, 'Annual Report and Accounts 1997/98'

As a producer, Mil Svy is able to ensure that its products conform to the appropriate national and international military standards. As a customer, Mil Svy has less control. Supplying onward to a multi-national environment, it is Mil Svy's responsibility to ensure that the products which it has acquired are not only usable by all concerned, but also releasable to them.

### **The releasability of material outside UK MOD**

Mil Svy operates within the UK Code of Practice on Access to Government Information<sup>3</sup> and is committed to making information available wherever possible<sup>4</sup>. Selected Mil Svy products are available for sale to non-Defence users through its Sales Agent. However, acquired information may not be so freely releasable.

When exchanged material has been specifically released to Mil Svy under the terms of an MOU for use by UK MOD only, Mil Svy is unable to release this material further without the express permission of the producing organisation.

The majority of acquired digital data (including Commercial Satellite Imagery) is only usable under licence arrangements which, again, typically restrict their use to UK MOD without further payment.

### **The protection of copyright**

All material produced by Mil Svy is Crown copyright. The associated rights for all Crown copyright materials are vested with the Controller of Her Majesty's Stationery Office (HMSO), who is responsible for granting permission to copy, for collecting fees and for legal action in the event of an infringement. However, the Controller of HMSO has delegated to Mil Svy the authority to administer copyright, for non-commercial purposes, in the conventional and digital maps and charts it produces.

Therefore, as a user of information, Mil Svy is well aware of its responsibility to avoid breaching copyright of other organisations' material.

Copyright, in itself, of course does not necessarily preclude the further release of mapping held by Mil Svy. What it does mean is that, quite correctly, any copies that are made may result in extra payment to the copyright holder. This all takes time, which in an emergency is often the one commodity that is in shortest supply.

## **Examples of Mil Svy's use of acquired information**

### **The direct use of acquired material**

The support of humanitarian de-mining activities are an important ethical initiative on the part of the MOD. Such activities include mine awareness, training, surveying, marking, clearing, quality assurance and survivor assistance. This will usually involve a number of international organisations in a coordinating role. The UN is one example of this, but there are many other Non-Governmental Organisations (NGOs) involved in various de-mining activities around the world.

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<sup>3</sup> Code of Practice on Access to Government Information (Second Edition, 1997)

<sup>4</sup> Military Survey Geographic Information Charter Standard Statement, Version 1 – December 1998

The provision of geographic information is critical to the management of any de-mining programme. Should civilian mapping not be available, Mil Svy will seek to support such work by advising on the availability and suitability of military mapping for a region and the source from which it can be obtained.

A large proportion of Mil Svy's holdings of geographic information, as described above, are not releasable outside of UK MOD without the express permission of the producer. This will always be sought before the release of material, but is not always forthcoming.

For example, in August 1998, Mil Svy had a request from a UK based company to support de-mining activities in Iraq. The best available mapping had been released to Mil Svy on the condition that it was not to be released outside of UK MOD. To comply with that agreement, Mil Svy had to supply copies of an alternative product; 1:100 000 mapping produced by the Former Soviet Union which had been acquired from a commercial source. Although being at a smaller scale and in Cyrillic script and therefore not as readily useable as the preferred product, this mapping was however sufficient to allow work to proceed safely and without delay.

### **The use of 'adjusted' acquired material**

Following the break-up of the Former Republic of Yugoslavia in 1991 into Serbia, Slovenia, Croatia, Bosnia-Herzegovina, Montenegro and the Former Yugoslav Republic of Macedonia and the resulting war in Bosnia in April 1992, a UN Peace Keeping Force was deployed to the region. At its height, the UN had over 30 000 soldiers in service in the area. A total of 35 nations contributed troops to the operation.

At the time of the signing of the Dayton Agreement in December 1995 in Paris, there were some 5 000 British troops in Bosnia serving with the UN protection force (UNPROFOR) while further British forces were deployed in Croatia.

At the start of these deployments it became clear that much of the mapping NATO had designated for the region was out of date and inappropriate for the mission of UNPROFOR. In addition, much of it had been produced by the US who, initially, were not prepared to release it to all of the non-NATO participating nations. There were also cartographic problems. As has so often been the case in crises around the world, complications existed because the operational area crossed a grid zone boundary and on this occasion also straddled the junction two spheroids.

Mil Svy rapidly decided to provide UK troops with topographic mapping based upon the Topografiska Karta (TK) previously used by the former Yugoslav National Army. Examples of this mapping had been acquired from a number of sources across Europe, both official and commercial, and had been assessed as planimetrically accurate and reasonably up to date. More importantly, it was compatible with the mapping being used by the various warring factions and hence was more appropriate for peace making activities. Place and feature names on the TK mapping within Bosnia had also been assessed as being more accurate than on the NATO mapping and therefore again more relevant to the UNPROFOR mission. Extensive efforts were made by Mil Svy to acquire further coverage of the TK mapping from a variety of sources.

Selected sheets of the TK mapping were very rapidly overprinted by Mil Svy to show the NATO operational grid (UTM) on a single spheroid and datum (WGS 84) and powerlines and significant changes to the road network that had been identified on commercial satellite imagery. The urgency of the operation required us to complete the production and dissemination of this new mapping within 6 weeks.

As the peace process developed, the importance of all participants using the same information became increasingly obvious. The Inter-Entity Boundary Line (IEBL) which was agreed at Dayton was agreed on a 1:600 000 map of the region which had been commissioned by the UN for planning purposes. This was based on a commercially produced tourist road map and was not planimetrically accurate. The IEBL and the Agreed Cease Fire Line (ACFL) had to be plotted onto the larger scale maps. The anomalies identified by this process had to be resolved before the overprinting of this information onto almost 1.75 million maps could be carried out by the US Defence Mapping Agency and Mil Svy. There were subsequently 42 agreed changes to the IEBL which had to be plotted onto the mapping, and the markers delimiting the IEBL on the ground physically moved as appropriate. The provision of this mapping played a vital role in the successful implementation on the ground of the Dayton Peace Agreement.

To support its activities, Mil Svy made extensive use of both its base plant facilities in the UK and its field deployable mobile production capability to produce a range of geographic information, much of which was based upon material from a variety of sources. The range of products produced included, in addition to the basic 1:50 000 and 1:100 000 scale mapping, minefield mapping, election mapping and products such as minefield awareness cards for the local population.

## **The way forward : developing international geographic standards for the military need**

Mil Svy is actively engaged in promoting the adoption of geographic standards worldwide, particularly in the field of DGI. The requirement for rigid adherence to standards is, however, dependent upon the product under examination. In general terms, in the field of paper mapping, Mil Svy's belief is that every last matter of detail does not necessarily have to be standardised to permit interoperability. This point can be illustrated by a study carried out by Mil Svy in 1994 on the standardisation between NATO and East European military mapping agencies.

### **The standardisation of NATO and East European mapping**

At the annual NATO Geographic Conference in 1994 Mil Svy presented a discussion paper to the military mapping organisations of the NATO nations and a number of former Warsaw Pact countries who were looking to standardise their mapping to the NATO format. Mil Svy's paper looked at areas where the military mapping of East European countries differed from, and in a number of cases was superior to, that of the NATO nations.

The clearest example of a fundamental difference between NATO and former Warsaw Pact 1:50 000 scale mapping is the inclusion of Military Geographic Information, which is not found on NATO designated standard topographic mapping. Most NATO series at 1:50 000 scale are either joint civil/military specifications (as in the case of the UK) or military topographic series (as in the case of the USA), but none were designed as a combined military topographic and military geographic information product, in the way that much former Warsaw Pact mapping was.

The conclusions of the paper were that the NATO military mapping agencies should be encouraging the East European military mapping agencies to retain the basic Warsaw Pact 1:50 000 map specification, with only the following modifications being necessary to make their maps operationally compatible with those of the NATO nations:

- The NATO-designated grid, spheroid and datum of the UTM grid on the WGS 84 system should be used.

- The inclusion of the NATO Standard Series Designation for product identification.
- Marginalia in the producer's language, the English language and, if necessary, a third language as agreed. The Roman alphabet to be used.

The overarching principle was that interoperability, rather than rigid standardisation *per se* is of crucial importance. This principle can be broadened to encompass all paper mapping that Mil Svy would seek to acquire. The cartographic world would indeed be a dull one if all the world's mapping products were produced to an identical range of specifications. Mil Svy is therefore keen to encourage good practice around the world, in order to support the interoperability of mapping products.

### **The development of DIGEST**

In a contrast to paper products, the swift and economic use of acquired DGI is directly dependent on the degree to which common standards are used in production, exchange and access. The customer, having identified the existence of the data through common metadata catalogues, wants it in a format and structure that requires the minimum of conversion and translation. The provenance and quality of that data is also critical to the successful conduct of military operations. The application of standards is the key to satisfying the requirement for military interoperability.

In response to this need, the Digital Geographic Information Exchange Standard (DIGEST), the first international standard for the exchange of DGI, was developed by the Digital Geographic Information Working Group (DGIWG) established by NATO in 1983. DIGEST supports not only the exchange of a range of data types, but provides format descriptions and defines the metadata essential for these descriptions. Metadata to support on-line catalogues and quality standards are two areas that DGIWG is actively focusing on, to support international interoperability<sup>5</sup>.

DGIWG, of which Mil Svy is a founder member, is an active player in the Technical Committee 211 of the International Standards Organisation (ISO/TC 211) responsible for the development of civilian international standards for geographic information/geomatics. DGIWG seeks to achieve the wider adoption of DIGEST in the civilian community through attaining ISO compliance for the standard, and associated data produced to specifications based on the standard. DGIWG has had discussions with the Open GIS Consortium, and is currently encouraging a better two way understanding with Industry.

### **The way forward : developing strategic relationships with national mapping organisations**

Mil Svy is currently developing Strategic Relationships with National Mapping Organisations (NMOs) and major geographic information producers within the UK. This 'burden sharing' approach allows each partner to utilise their particular strengths to the mutual benefit of both sides. Such arrangements will seek to;

- Ensure that current and accurate geographic information is available to both partners to meet the needs of their customers.
- Ensure that each partner is aware of the other's requirements in order to enable the exploration and development of technological and strategic initiatives.

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<sup>5</sup> More detailed information on DIGEST can be gained from the Internet home page of [www.digest.org](http://www.digest.org)

- Maximise the use of both partner's assets, including exploiting irreducible spare capacity, thereby sharing any efficiency savings between the partners.
- Reduce production costs in areas of common interest and to avoid duplication of effort.
- Promote geographic standards nationally and internationally.

## Conclusion

Mil Svy's remit is to ensure the provision of geographic support to the UK MOD. In an unstable world, UK may be asked to deploy forces at short notice to any part of the globe to offer support to peace operations or to provide humanitarian assistance.

No single organisation has the resources to produce and maintain geographic material at all scales over the entire surface of the world. In the case of Military Survey, this shortfall is met by targeted acquisition and rapid exploitation of that material. The self-evident advantages of this approach are tempered by increased responsibilities for the protection of data, particularly during its use in a multi-national environment.

As a customer of geographic information, Mil Svy requires data which is releasable, not only to the UK, but potentially also to coalition allies, and which is in a format which is both 'usable and fusible'. The absence of ready access to such information can and often does hinder military support to humanitarian operations.

In order to achieve these twin aims Mil Svy continues to develop partnerships and exchange arrangements and to develop national and international standards with geographic information producers worldwide. Current legislation places a duty upon Mil Svy to make its products available where possible. Whilst continuing to honour the release restrictions placed upon data, we would seek to make it available where appropriate, paying due regard to intellectual property rights. In exchange for material, Mil Svy has a wealth of experience to offer as a world-renowned centre for geographic excellence.

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