

MapAction in Action

David Spackman

Abstract

MapAction is a recently established UK-registered charity, largely manned by unpaid volunteers, whose purpose is to deploy a trained team of specialist personnel to assist in humanitarian relief operations. The team aim to set up a field-mapping centre at the site of a disaster and begin mapping the situation at regular intervals as the crisis unfolds. Recruitment, training and other preparation topics are mentioned, and the operational capability that was developed from scratch is described.

A MapAction team deployed to Sri Lanka soon after the tsunami disaster – its first emergency deployment - and stayed for three weeks, operating as an emergency mapping resource for, and at the invitation of, the Sri Lanka government. MapAction was faced with a series of challenges: a huge demand for situation maps, a shortage of field teams to collect data, and the sheer difficulty of getting about in a disaster zone of such geographical size. These difficulties were all overcome through resourcefulness and initiative. In addition the team trained local personnel in emergency mapping techniques so they could replace the MapAction team on departure. The team also initiated a process to harness the professional mapping community within Sri Lanka to help in the reconstruction phase of the country.

MapAction effectively demonstrated the usefulness of situation mapping in a disaster zone, proved their operational concept under adverse conditions, and believes that the GIS community will take satisfaction from the use of GIS in a worthy cause.

MapAction in Action

Ever wondered how geographical information systems (GIS) are being harnessed for humanitarian purposes, outside of the big organisations like governments or the UN? One small, relatively new NGO has come into existence with the prime purpose of applying the power of GIS to map humanitarian relief operations. MapAction is the name of this NGO. Its baptism of fire – forgive the misnomer – came in response to the Asian tsunami disaster when a team was scrambled at short notice to help map disaster relief efforts in Sri Lanka.

MapAction – Developing an Operational Capability

MapAction is a UK-registered Charity based in the South of England. Unpaid volunteers provide the operational capability and are backed up by one full-time paid official (the Director) who provides the central administrative hub and leads the team in the field. MapAction is governed by an independent Board of Trustees that include an elected member of the British parliament and a British peer of the realm and other distinguished trustees drawn from business and the aid sector. Funding – always a struggle - comes from private charitable donations.

The Charity was founded by Rupert Douglas-Bate, an experienced aid worker, and originally registered in the name Aid For Aid. It came formally into existence in 1997

but owing to lack of funding it proved necessary for the nascent entity to be put into suspended animation. In 2002, a generous donation from a private benefactor enabled the trustees to begin again by recruiting a full-time official with the remit to get the show on the road – I was that person. The name was changed to MapAction to describe more readily the Charity's role. We had no people, no equipment, no systems or procedures, no premises, and little money. In short my task was to develop an operational capability from scratch. I was given nine months: an exciting challenge.

Owing to low, initial funding levels our business model dictated that we should seek to recruit unpaid volunteers, and our small amount of cash should only be used to buy operational essentials needed to create a field capability: GPS, laptops, satphones. These are expensive items and their purchase left over little cash to buy other required items. We managed to beg and borrow additional kit sufficient for our needs.

Initially I started with four persons painstakingly recruited over the first month – after all, we had no track record, no 'name', and little to attract people to us. Gradually, over a period of a year I upped that number in stages to nine, then twelve, and finally by the end of 2003 we had established an operational pool of twenty persons, roughly one-third female and two-thirds male. Training covered a host of topics including VHF communications, logistics, medical first aid, security awareness, in addition, of course, to GIS and GPS/navigation skills. In particular we had to develop efficient and effective teamwork under field conditions in fraught situations.

After intensive training of the team, followed by a test exercise based on an earthquake scenario in and around Silverstone car racing centre in the UK, I declared us operational near the end of 2003. Since then, though we have packed much more activity and preparation into successive months we are, in relative terms, inexperienced. It has been an exciting period, full of ideas and action. We seek continually to improve our methods, and our teamwork. We don't pretend we have all the answers, but the journey has been challenging, absorbing, rewarding and fun: all aimed at a serious purpose, to harness the power of GIS for humanitarian relief work.

Team Structure

All members of the operational pool are professionally qualified volunteers, all employed in full-time jobs from a variety of work sectors. We have experts in remote imagery, geographical information systems, communications, logistics, computing, and medical skills. We train together regularly – in fact once a month - and have developed specialist systems and procedures. The commitment every volunteer makes is to deploy overseas for at least one week at a time; this roughly translates to the rescue phase of a disaster situation. In practise many volunteers manage a few days extra and some have given us far more. Time on deployment is limited owing to the imperative to return our unpaid volunteers to their employment duties as soon as possible. Employers have been very supportive of MapAction.

The operational pool has a loose structure but certain individuals are designated as functional coordinators. They are experts in their field and their role is to mastermind specialist aspects of our preparation and training such as GIS, logistics, security, communications and medical.

We rely on charitable donations to fund our activities - we receive no money from governments or international organisations such as the UN.

Operational Mapping Requirement

MapAction's purpose is to provide emergency mapping in the field. I should add a caveat – we don't create maps per se, we are not surveyors; what we do is to depict the situation on a map as a crisis unfolds. An important part of our service is that we update our maps at regular intervals, daily or more frequently, in accordance with changes in the dynamic situation pertaining at the time.

Our capability is predicated on responding to a sudden onset disaster, though we can and do get involved with other types of humanitarian relief activities. We have operated during famine in Lesotho, conducted development work in India, and we are currently providing satellite imagery to an Indian charity working on disaster relief in the Andaman Islands. We are keen to conduct training for aid workers in GIS techniques and are presently investigating such a role with the Norwegian Refugee Council, which looks after about one million refugees worldwide.

Our prime focus has been to develop an operational capability that meets the information requirements of the central coordinating authority at a disaster site. In practise we envisage this coordinating body being provided by the disaster emergency staff of a UN operations centre set up in the field, itself probably coordinating relief efforts with the local government's disaster management authority.

Operational Concept

There are 3 components to our operational capability: a field base set up at the location of a disaster, supported by a UK Base in England, and field teams that seek information.

The hub of the operation is the field base. This is set up quickly in a crisis zone and normally uses tents and independent power supplies. Everything is kept portable so we can be self-sufficient in the field. We are prepared to operate without freight and carry all vital gear, such as GPS, laptops, satphones, personal tents, on the person. This contingency plan was tested on our very first proof-of-concept deployment to Lesotho when South African Customs held up our freight for several days. We were able to conduct operations because we carried all essential kit in individual rucksacks.

From the field base, field teams, normally two persons each for safety and security reasons, are despatched to seek information. There is also a need for the usual logistic, liaison and other key activities to take place. An optimum – an affordable - size of a complete deployed team – field base and field teams – is about 10 - 12 people.

Development Strategy

MapAction uses modern technology as a matter of course in our role. The advent of low-cost, powerful computing chips, as GIS professionals are very much aware, has brought the power of GIS into the field. MapAction uses GPS, satellite imagery, and

satcoms as routine tools. Owing to this technology-bent we seek ways to keep abreast of developments in these and other relevant high-tech areas.

We attend international conferences - specifically those that seek to involve space technology in disaster relief. Volunteers have attended international GIS/Space/Aid symposiums held across Europe. We also enter projects that offer us ways to influence the space industry to assist the aid sector. At present we are currently in partnership with a number of European satellite companies in a project called RESPOND that is funded by the European Space Agency. The project is planning ways to improve access to satellite derived maps for the aid community.

More recently we have joined a project bid to the European Commission to track high value units in a disaster zone. The project lead is a Spanish space company.

Another key part of our activities is to seek to extend our volunteers' individual expertise and to widen our collective experience. We do this in two principal ways: by sending people on training courses, and by participation in international humanitarian exercises. In 2004 we sent several people to the UN emergency disaster-response courses held in Denmark, Norway, and Ethiopia. Volunteers from MapAction also recently (2005) attended similar courses in Singapore, Montserrat, Armenia and Lausanne; and we shall be sending other team members to Denmark and Salzburg later this year.

We participate in external training exercises because these give us exposure to real mapping requirements posed by real players. Two notable examples: a major UN exercise held in Norway last September (TRIPLEX 2004) that depicted a major flooding scenario, and a UK urban search & rescue exercise held in England in November 2004 that covered earthquake response.

MapAction, you will readily appreciate, is relatively new but is building its experience quickly. The pace has been fast, the opportunities exciting, the chance to build a worthwhile enterprise has been immensely rewarding, and it's been huge fun. I hope you can appreciate that our volunteers, whose efforts have made all this work, are amazing in their dedication and commitment.

Sri Lanka – Aftermath of the Tsunami

A deployment to Sri Lanka was our team's first experience of an emergency move in response to a rapid onset disaster. Our call out procedures worked well even though it was 26 December, and we had a team ready to go within 24 hours of the event. In fact we didn't depart until the 28th because the UN authorities in situ asked us to wait a day while an initial assessment was made.

We arrived on 29 December, with a team of 11 persons, in response to an invitation from the UN disaster assessment team. In fact, as it turned out we were one of the first foreign NGOs to arrive. On arrival, we discovered the UN team was not functioning in its role as coordination centre because the Sri Lankan government had taken swift control and was in the process of setting up a Centre for National Operations.

At the invitation of the Sri Lankan director of emergency operations, only recently appointed by the President, I joined the planning discussions on setting up the Operations Centre. As a result of these deliberations MapAction was invited to provide a mapping cell – an invitation I was very happy to accept. We quietly packed our tents away and moved into a wood-panelled room in the Presidential Secretariat building. This, of course, represented a departure for MapAction from our model of operating literally in the field. We were the first agency to set up and get running - perhaps not surprising as we were geared for just this sort of emergency. It also, in one jump elevated us to operating at a national level. It may be superfluous to add, in view of my earlier comments about our inexperience, that we were taking a risk: we were about to operate at a level we had not trained for. It was a risk: but I was confident that our team could rise to the challenge.

Incidentally, what did we do with our tentage? Rather than leave the tentage sitting quietly in a corner, we gave it away to a homeless fisherman who had lost everything in the disaster.

Over the next two weeks we worked 24 hours a day to provide situation maps at a national level. This gave us a privileged position from which to view events.

The first thing that faced us was the sheer scale of the disaster. Hundreds of miles of coastline had been destroyed and it was clearly not a practical proposition to deploy a handful of field teams to search out information. We had to rely on government departments including the military and police to provide the key items of data.

The first thing that MapAction had to establish was the information requirement itself: the picture, as it were, to be depicted on maps. Our task was to develop a series of themed maps to meet the demand. Mostly these were produced at a scale that showed the complete island of Sri Lanka, but we started to provide more detailed maps of specific areas when different needs were identified.

Sri Lanka - Challenges and Solutions

We were faced with three immediate problems:

First, an almost insatiable demand for maps. As a small emergency mapping unit trained to work alongside a UN emergency coordination team we were not geared for a map production process to meet a national requirement on this unprecedented scale of disaster. We carry one A3 colour printer and a back-up A4 colour printer – you will remember that we aim to travel light and work out of a rucksack. We had only three laptops with GIS software.

The second problem was a shortage of trained field teams; we had three of our own, though this could have been doubled to six by splitting each pair. The geographical reach of the disaster plainly dwarfed our ability to cover it all.

A third problem was the need to transport our field teams around, allied to the physical difficulties of getting about the devastated region covering hundreds of square miles.

These three problems represented interesting, urgent challenges.

The immediate need was for more map production power. The obvious answer was to seek help. Here we were lucky: we made contact with the International Water Management Institute, a research body on the Island, who lent us two powerful workstations, an A3 colour printer, and extra GIS staff to man the workstations on a 24 hour basis. In effect they became members of our team and were wonderfully supportive in many different ways.

In addition we purchased two extra PCs with large screens from local shops to supplement our laptops. These measures increased our efficiency by a factor of three and enabled us to meet demand.

Producing a situation map is akin to producing a newspaper. The first essential is a deadline. This was readily available: a UN coordination meeting was due to be held at 11 am on the next morning after our arrival (we had moved into the operations centre at midnight). Inevitably during the coming days this deadline changed to different times in accord with national policy decisions, so we were always under pressure to adapt to changing circumstances. I am glad to say we never missed a deadline.

The paucity of our field team capability was not so easily addressed. Primary information requirements in any disaster tend to be similar: the location and extent of the disaster-affected area; the location of the displaced persons; the state of the general infrastructure particularly roads, airfields, ports, railways.

In Sri Lanka local regional efforts were impressive at times. For instance, in some locations destroyed bridges were replaced within a few days by harnessing local resources quickly. However the word does not necessarily go back up the line quickly that a blocked route is now open or that local inhabitants had engineered a viable diversion. There is nothing new in this fact of course: by its nature a disaster situation is dynamic.

We tried to use different resources to capture key pieces of infrastructure information at regular intervals, not always successfully.

Field teams were one resource. In Sri Lanka I wanted 100 teams or more: I had three. I tapped into an incipient organisation that was striving to organise a host of willing volunteers. I contacted universities. I spent hours on the phone to international groups desperately wanting to send expert help. For many reasons regrettably nothing came of these options in the short term.

Later, by the third week we did have some success when we managed to harness the willing offer of help from the Island's four-wheel drive car club. They did sterling work after we trained them in GPS data collection and despatched them to all corners to collect information.

Even if we'd had sufficient personnel, the third difficulty I mentioned, of getting around a widespread devastated region, was not easy to solve in the early days. We tried to obtain aircraft, particularly from the military. This had mixed results from our

point of view. Aircraft need an infrastructure of their own and damaged facilities can limit their capability. Aircraft also, inevitably, are a scarce resource and the demands on their use often precluded their allocation to one of my mapping field teams.

An instance in which the system did work well was when the military allocated slots on a helicopter (provided, in that case, by the Indian Air Force) to one of my field teams. This saved the team a round-trip 8-hour car journey. On the ground at their destination they were picked up by a police car and driven along a damaged route. Using a GPS they track-logged the road and we were able to provide accurate geo-referenced data of a diverted route.

On other occasions field teams were merely passengers on aircraft and had to follow the flight itinerary that took them to places they didn't need to go and wasted several hours of their time as a result.

Satellite imagery, which can negate the need to travel round checking on specific areas, when one can get it at the right time, at the best resolution for the task in hand, and using the most appropriate sensors, is excellent. Unfortunately satellites are not always available overhead when their imagery is required, and there can be difficulties with distribution.

Imagery has many uses when it can be obtained. In particular it can give one a useful comparison between before-and-after shots. In Sri Lanka, heavy cloud obscured large parts of the coast for many days so the satellite capture of a normal image of affected areas proved difficult. The effect of the tsunami was compounded in the North East by seasonal rain and floods a few days after the mighty waves struck, and this factor complicated the relief picture.

If we had had an aircraft available at the time we might have been able to use a GPS to track the boundaries from the air. We have proved this can be reasonably accurate when we tried it out on that major UN exercise held in Norway last September that I mentioned earlier. That exercise scenario had been based on catastrophic flooding from a dam burst. We used a light aircraft with a hand-held GPS to follow the edges of a real lake that represented the flooded area. The GPS track compared favourably with a more accurate radar image we acquired later.

There are other air vehicles that we hope to use sometime in the future. Micro-light aircraft are one type and remotely-guided aircraft, also called UAVs, are another. There are some political and regulatory problems with using these latter beasts, and their costs can be prohibitive, but we have begun to investigate their possible use.

The story continues, but space is limited, so I shall draw my remarks to a close. A final problem remained: Who was going to take on the role of mapping cell in the operations centre when we departed? We had to think ahead.

As an emergency mapping unit MapAction can only stay for a short time. Our volunteers have to be back at the day job within a week or two, so we had to set in place succession planning. We did this by getting the Sri Lanka Survey Department to agree to take over from us. We began to introduce their GIS experts to our role in

the second week and we handed over to them before we left. They did an excellent job and stepped up to the mark with considerable professionalism.

There remained a need to initiate mapping at the District administrative level, and to harness in some way the GIS community on the Island in the reconstruction planning. I called a conference of some of the best GIS experts available: from universities, engineering firms, selected government departments, and so on, to start the ball rolling. This proved a useful forum for the GIS community to contribute to future national planning efforts.

The Sri Lanka experience for MapAction was a superb opportunity to test our operational capability. We believe we made a contribution that met our broad charitable aim: to assist other aid agencies in their splendid efforts to help victims during a terrible crisis.

Conclusion

In conclusion I would make three points:

We believe that crisis-situation mapping is an asset to humanitarian relief operations. Aid workers - decision makers and field operators – benefit from the capture of a dynamic situation, depicted in graphical form, at timely intervals.

MapAction demonstrated that it is able to punch above its weight given the opportunity. In Sri Lanka MapAction achieved a level of emergency mapping far beyond its apparent capability by seizing every means to magnify its effectiveness.

We hope the GIS community will take satisfaction from the efforts of MapAction to use GIS in a worthwhile cause.

David Spackman
Director, MapAction
operations@mapaction.org