Humanitarian GIS

Andy Kervell, MapAction Volunteer and Associate at Arup, talks to Abigail Tomkins

Andy Kervell (left) and the MapAction team mapping the Nepal earthquake response in Kathmandu.

FOR 11 years, MapAction has been sending out GIS specialists as volunteers to aid humanitarian response efforts. From the very first deployment after the Indian Ocean tsunami in December 2004 to the Nepal earthquakes this year, a steady stream of emergency maps has been created on site to aid search and rescue missions; pinpoint damaged roads and bridges; find sites for shelter; and display who is working where and on what to humanitarian responders and United Nations coordinators.

The list of deployments is a who's who of modern tragedies. January 2014, South Sudan, mapping displaced persons; May 2014, Serbia, mapping flood damage after four months' worth of rain fell in one day; June 2014, Iraq, creating a common data set of boundaries and administrative regions following conflict; September 2014, Liberia, mapping the Ebola outbreak; March 2015, Vanuatu, mapping communities affected by Cyclone Pam. It goes on and on. Floods, earthquakes, hurricanes, war, cyclones, typhoons, mass migration, landslides, famine, tsunamis. All mapped under the incredible pressures of time, security and the complex needs of those affected.

Andy Kervell has been volunteering with MapAction for five years. He's an associate at Arup and his day job involves the application of GIS and information management on large infrastructure projects. By day he works on Crossrail and Singapore's Thomson Line; by night he maps disease outbreaks, flood-hit communities and earthquake responders. Or something like that. Like all MapAction volunteers he uses ordinary GIS for extraordinary things.

Lessons learned in five years of mapping disaster response efforts and the many similarities to BIM

A notice found in the Philippines in the wake of Typhoon Haiyan, in November 2013.

How did you first get involved with MapAction?

I'd been working in GIS and information management for mine clearance planning in Cambodia, and I wanted to continue to help communities affected by disaster when I returned to the UK. MapAction was the way to do that. I've been with them for five years now.

How supportive is your employer?

Arup has a community engagement programme and allowing me time to spend with MapAction falls under that remit. The nature of disaster response means we have to leave for deployments on very short notice and my managers and colleagues are incredibly understanding of this. Obviously, if there's a project I'm working on and I'm needed for a vital stage, then I will turn down the deployment.
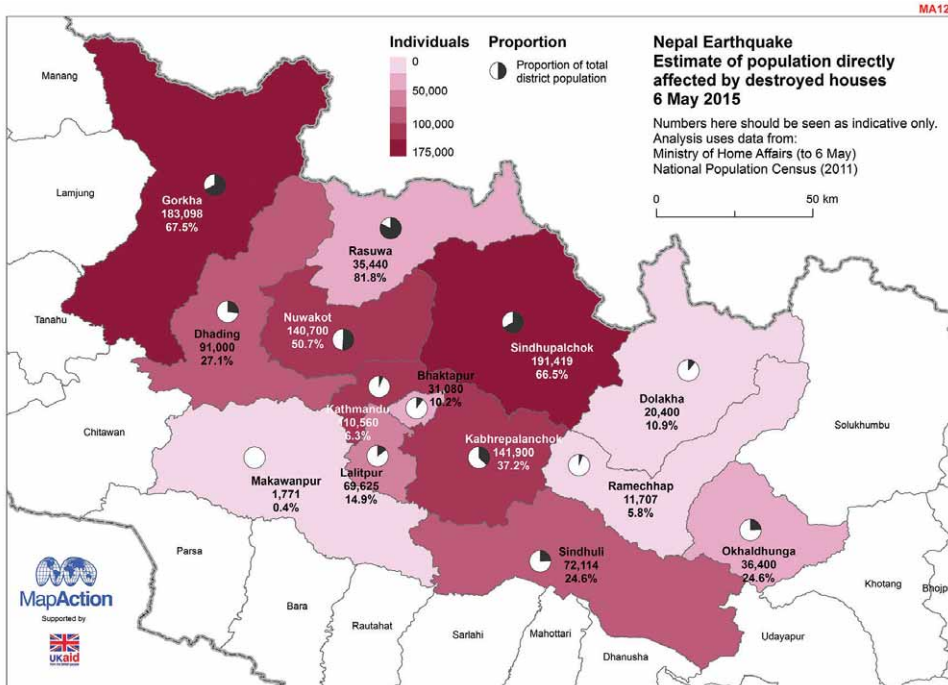
Although I often use my own leave for deployments, Arup does sometimes give me extra time to spend with the charity. My most recent deployment to Nepal used a week's worth of my time freely given by Arup and a week of my own annual leave. If you have that support from an employer it motivates you to stay with them.

How much time does volunteering take up?

I typically spend around three to four weeks a year with MapAction, and that includes light deployments where we rehearse our procedures. I also give up one weekend a month for training. Because we all work in rotation it's vital that we stick to the same processes and procedures so that the incoming team can pick up as the first responders leave. Sometimes the only handover opportunity is a brief meeting at the airport or by email. You have to train for that kind of drill.

I also look after the GIS circle within MapAction and I'm responsible for ensuring our software is operationally effective and volunteers are appropriately trained in its use. If I'm not out on deployment, I'm available for support to answer questions from teams in the field. It is a major time commitment, but it's worthwhile.

How vital is geospatial information in the aftermath of a disaster?

It's absolutely critical. There are so many spreadsheets in disaster response — of the responders; where the affected population is; which houses are damaged and so on. It's hard to fully understand what that information is when it is in stored in spreadsheet form — especially if you're a responder who has never been to that country before and are on unfamiliar territory.

Maps help with orientation and direct where aid needs to go. Maps can then tell you what roads are open near those areas; what airports are close by; and whether there is room for a helicopter to get in for an aerial survey.

Maps used in the the Nepal earthquake response, Sierra Leone's Ebola crisis and Typhoon Haiyan in the Philippines.

How does a typical (!) deployment work?

We get an SMS message on our phones to check our availability. There's a pool of about 40 volunteers and the team size varies from two to six depending on the scale of the response. The operational team shortlists volunteers taking into account their availability, experience, language knowledge and GIS skills. Once the team is set up, visas have to be attained, the kit is taken out of store, and flights arranged.

We also have a data scramble at this stage, where the whole pool of MapAction volunteers assesses what information we already have and what we need, so we can go out there with a full hard-drive of data. Even on the aeroplane, we find ourselves making our first maps.

Accommodation varies. If it's an earthquake, quite often we're staying in tents. More often, we stay in hotels. Security is an issue, so we will find hotels with good security and preferably good internet connections, and with secure transport to the site.

When we arrive in the field we go straight to the UN coordination hub for a briefing, and then we prioritise what to get started with. As the mission progresses we're constantly prioritising our efforts as different requests come in. Inevitably we have more requests than we can manage, and we have to make sure we're helping the masses rather than the few. Then two weeks later you either hand over your kit to the next volunteers coming in, or you pack up and bring it home with you. We then have end-of-mission reports where we address what worked and what could have worked better.
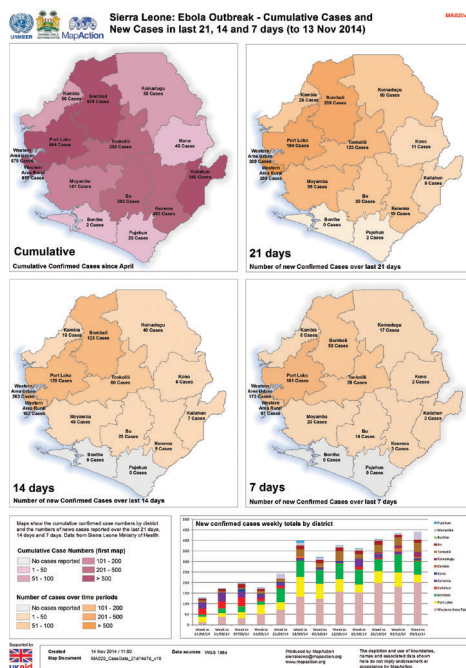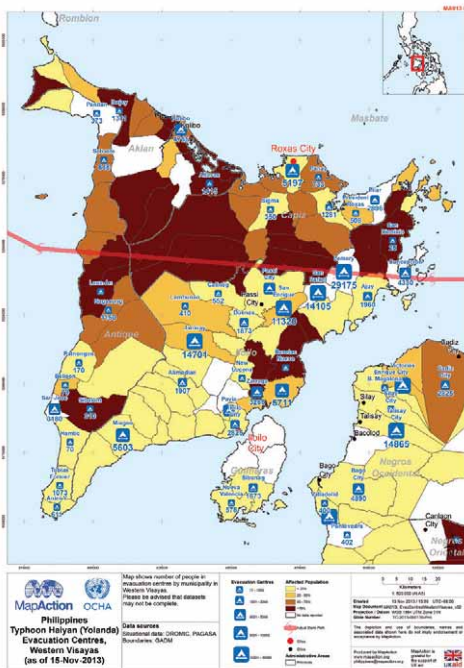
How do you decide which maps to create?

It's difficult because you're not always given all the information you need about how a map is going to be used. You can ask the question, but you don't always get a clear response.

If people come to us aware of what MapAction can offer, have data and/or can provide a clear description of what they need help with, we will do all we can to help them. When it comes to multiple requests, we always try to go with what the biggest humanitarian benefit will be from. Most of the time I think we get it right.

How do you work with other agencies?

When the UN system is deployed, it will coordinate the international response and liaise with the local government. We're usually based in the UN hub, and agencies come to us to ask for information. We have daily meetings with the UN coordinators so we are sure we are producing the right information for people.

We also make sure that we're in contact with the information leads on shelter, water and food, so that they know the kind of

support we can offer. We've had over 55 deployments now, most of them with the UN — we've built up a lot of trust and they know exactly what kind of information we can provide.

What did your deployment in Nepal involve?

I was there following the earthquakes that hit in April and May this year. I joined the team about four weeks after the first earthquake. It had gone past the urban search and rescue phase and into the longer term response. Lots of houses had been destroyed and there were huge numbers of homeless people. My role was to work out where the various responders were working and what progress they'd made. In any emergency, the international response breaks into clusters; shelter, water, food and so on, and these collate information and feed it back into the central hub, where we are then able to put it in map form and identify any gaps. It's very much a case of 'who, what, where' mapping and it directs where the response focuses next. It's incredibly useful in informing major donors as to where more funds are needed.

I was in Nepal for two weeks, and MapAction had a presence there for six weeks in the emergency response phase, and will have volunteers there until the end of August. Most volunteers are deployed in two-week chunks, as we all have day jobs to manage alongside our voluntary efforts.

How do you manage your family life with this?

My wife is also a MapAction volunteer and we understand the need for either of us to jet off on a deployment at short notice. Of course we worry about each other. She was on deployment in Nepal before me when the second earthquake struck in May. When I heard that news I was massively concerned. But then I know the risk assessments that have been carried out; I know the UN support structures that are in place for humanitarian workers; I know the precautions she'll have undertaken herself — and that does give you a level of confidence in the care available if anything does happen.

I went to Sierra Leone during the Ebola outbreak of 2014 and we had a lot of discussions with my family about the level of risk and exactly how I would be protected from it. As you can imagine, there were some concerns about that particular deployment.

How did the Sierra Leone deployment work?

It was in November last year and I was sent out as part of the international response to the Ebola crisis. At the time, the epidemic was getting worse, and we were asked to directly support the Sierra Leone government in establishing its National Ebola Response Centre.

We were there for four weeks, and as it was a long-term emergency we were aware that we had to establish systems that could be carried on by local workers. A GIS professional was recruited a week before we left, and we had a very intense handover of our procedures and data structures. We were under a lot of pressure within a military environment, but we succeeded. The same guy, Steve Sesay, is still in position now creating vital maps for the government.

How rewarding was it to see your work carried forward?

Massively so. It always is when you get feedback that your maps have helped people — whether it be search and rescue teams, or a government making decisions. When I was in Nepal, we had feedback that the government had found our maps very useful. It gives you tremendous satisfaction that you're providing a needed service. We never wade into disasters. We are always there at the request of the local government and to get that feedback means their request to the international community was justified.

Maps used in the Ebola crisis in Sierra Leone.

The MapAction map centre in Kathmandu.

Did you ever feel at risk from Ebola?
We were stationed in the National Ebola Response Centre, far away from the treatment centres. We were within a UN compound; we had strict handwashing zones; and we worked to a 'no-touch' policy, so there was no shaking hands. Personally, I never felt at risk from Ebola. My biggest fear was tackling the roads on the way back to the hotel. The driving was terrifying.

What's been the stand-out memory of your time with MapAction?
When I was leaving Sierra Leone, I saw the big British transporter planes bringing in equipment and supplies and it made me realise just how big the joint task force was. This was a country that was on its knees and the UK response was making a real difference.

At one stage I was presenting a briefing to the president of Sierra Leone. In a lot of deployments you sit in a UN coordination hub and you don't get that direct involvement — you're often three or four steps away from the major decision makers, but here I was talking a country's president through a map I'd made.

Have changes in technology helped in the five years you've volunteered?
They've helped and hindered. The internet has opened up contributions from the wider community, especially with the likes of OpenStreetMap, which has really helped in getting a base map of an area (in some cases better than that country's own national mapping data). The crowd-created data within OpenStreetMap really helped us in Nepal where we were dealing with rural communities with no existing mapping.

The flip side of this is that sometimes we have too much data and sometimes we have conflicting information. This happened in Sierra Leone where people were putting information online about where the treatment centres were, but it was often contradictory. Anyone can set up a web map now — it's very straightforward — but are you using the right data or are you confusing the situation? It's the same with social media. Twitter can give you a valuable guide as to what is happening, but it is by no means accurate. The crowd isn't always reliable and you need data to back that up. It's our job to establish a single source of truth.

Smartphones are altering the response effort. We now use mapping and data collection apps like OruxMaps, Openandromaps and KoBo. We download

There are similarities between a construction project and a disaster response effort — not least in the implementation of a common data environment.

the country information before we leave the UK and have it ready to install on responders' smartphones as soon as we arrive. They can then take waypoints as they're out in the field and we don't have to worry about them noting the wrong village name. People are so familiar with the smartphone interface now that when they're given an older GPS unit, they're swiping the screen and looking puzzled as to why nothing is happening.

Have you noticed any differences in the way disasters are handled since you've been volunteering?
It's a broader response community now; the donor agencies have access to more mapping information and they do a lot of analysis at their head offices to guide the mission in the field. The actual fieldwork hasn't really changed. It's still about getting the right kit and supplies to the right places, but the decisions behind that are probably better informed now.

I've noticed a change in field communications with better internet connectivity in the field and better satellite comms. There are organisations like Télécoms Sans Frontières who are working to integrate new technology into the field and coordinate its usage, but again it's a double edged sword as people jump at the chance to upload and download files into Dropbox and the bandwidth suffers.

What would improve the response system?
If more people could manage Excel things would run a lot smoother! The organisation of data can be quite pitiful in a response. It's been a problem for years and we spend a lot of time cleaning data up. I know everyone has different levels of data awareness and different strengths in the field, but if people could think about how they structure data it would make

our life easier. It's things like using an agreed standardised list for districts and settlements with location codes to account for the various local names and spellings for the same place.

It would also help if we could have a single point where responders can access our maps. Usually there are several places we have to go to make our information available. I think that will come in time as we become better at organising large data sets from multiple sources. Our head office is in regular contact with the UN in Geneva and we try to guide and influence to be part of the solution.

What kind of equipment and software do you use?

We're supported by Esri UK and ArcGIS is our main mapping software in the field. We also host data sets online so people can come along and use their own software.

We use open source software with QGIS — we find this platform good for training in the field, as countries who don't have the budgets to buy Esri can freely access it and build on our work going into the longer response effort. The community mapping program OpenStreetMap is excellent and incorporates satellite imagery which we find extremely useful.

The hardware we use comprises our own GNSS-enabled handhelds, laptops, printers, ink cartridges, paper, networking equipment and generators. If we're travelling to an area on a commercial flight, we're always aware of the weight restrictions, and have to be mindful of what we take out.

Do you ever go back to areas you were deployed?

Sometimes governments see our work and ask us to train local staff in humanitarian mapping techniques. This can really help in the organisation of data in readiness for the next disaster. The Philippines is a classic example of an area that is hit by typhoon after typhoon, and each time we go we are thinking about how the data we collect can be used again in disaster preparedness.

Do you feel your experiences with MapAction improve your work at home?

Without a doubt. When I'm out in the field with MapAction, I'm working with international development agencies and those contacts and that knowledge has assisted me in my professional role. There are quite a lot of similarities between a construction project and a disaster response effort — not least in the implementation of a common data environment.

I've been advising UNOPS, the operations arm of the United Nations, on longer term recovery projects and the adoption of BIM-type collaborative data sharing approaches — the convergence with my professional work has been quite clear. In both situations, you have lots of actors and various owners of data and you need for that to come together in a common place for people to understand what is happening, and for that to happen you need defined steps and procedures.

I also find the network of contacts you make through MapAction is invaluable. Working with so many GIS professionals, from a variety of sectors, provides great insight into different techniques and approaches and I have developed new skills as a result.

Are there lessons BIM could learn from the humanitarian sector?

Definitely. I'm seeing a lot of parallels as better collaborative working in the response field is rolling out at the same time as BIM is driving the information management throughout the physical asset lifecycle.

It's useful for me to feedback my professional experiences to both Arup's International Development Group and UNOPS, as they look at the longer term response efforts and how they can take advantage of the vast quantities of data that are generated in the emergency phase.

What attributes are you looking for in a MapAction volunteer?

Skills and commitment. The time commitment MapAction demands for training is considerable and it is vital to the success of the organisation. You're under so much pressure in the field you have to know that everyone is working the way they've been trained to.

Practically, you need GIS and data management skills, and to be self sufficient and able to go out and get the task done sensibly and safely. A sense of humour also helps!

Top: The Philippines in November 2013 after Typhoon Haiyan.
Bottom: Nepal earthquake devastation in Kathmandu earlier this year. ©ReSurge International

Is the recruitment process good at getting the right people?

The interview process is thorough. A lot of people feel it's harder to get a voluntary role with MapAction than it is to get a paid job. But it works. In my five years I've never been deployed with anyone I didn't feel should be there.

It's generally the commitment issue that volunteers struggle with. If situations change, if people have children, it can make them re-appraise how much time they can give. But we have a support team who don't go overseas and we find some people move over to that.

What advice would you give to someone thinking about volunteering with MapAction?

If it's what you really want to do, go for it! But you have to understand the level of commitment it demands. It's not just something to do because it will make your CV look good — you'll be giving up your own holidays and weekends — and you will need the support of your employer.

There's also an element of personal risk out in the field. We carry out in-depth risk assessments but the nature of humanitarian work means some risk will always be there and you need to discuss that with your family. That said, if you've got GIS or networking technical skills, and you want to give it a go, apply. We spend the first six months with new volunteers in a support capacity and once they see how the system works they can put themselves forward for the deployable pool. It gives volunteers a better understanding of what is involved before going into the field, and some prefer to remain as operational support.

If becoming a field volunteer isn't for you, we always need help in the charity and raising awareness of the work we do. We're not one of the more visible responders in the humanitarian world, we're a small charity and although we have an excellent patron in Prince Harry, we always need more support.

Andy Kervell was talking to Abigail Tomkins
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