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Rapid Humanitarian Assessments and Rationality: A Value of Information Study from Iraq, 2003-2004

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Rapid assessments are one of the standard informational tools in humanitarian response and are supposed to contribute to rational decision-making.[1] The extent to which the assessment organisation itself behaves rationally, however, is an open question. This can be evaluated against multiple criteria, such as the cost and value of the information it collects and its ability to adapt flexibly design or samples when the survey environment changes unforeseeably. An unusual data constellation from two concurrent recent (2003–04) rapid assessments in northern Iraq permits us to model part of the actual assessment behaviour in terms of geographical, community and prior substantive information attributes. The model correctly predicts the decisions, in 79 per cent of the 2,425 local communities in focus, that data collector teams in the Emergency Mine Action Survey made to visit or not to visit. The analysis demonstrates variably rational behaviour under conditions of insecurity, repeated regrouping and incomplete sampling frames. A pronounced bias towards very small rural settlements is irrational for the overall results, but may be a rational strategy of individual survey workers seeking to prolong their employment. Implications for future assessments are sketched in the areas of tools for urban surveys, greater adaptability, including early feedback from users, and sensibility to value-of-information concepts.

Keywords: decision-making, Iraq, rapid assessment, rationality, value-of-information

Introduction

This is an extended case study of a rapid humanitarian assessment and the factors that shaped a long series of decisions during its design and execution. The subject matter—contamination with landmines and unexploded ordnance (UXO)—and the setting—Iraq in 2003 and 2004—are almost incidental. The focus is on the rationality of decision-making during the assessment, meaning, in this case, the value of the information produced versus the effort needed to produce it. The depth of this analysis is made possible by a unique and serendipitous research opportunity: the geographic area of this assessment was inside that of another rapid assessment, much larger and of different scope. This permits us to model decisions by the landmine/UXO assessment staff in terms of information supplied by, inter alia, the larger assessment. To our knowledge, the actual behaviour of an assessment organisation has never before been studied like this. The model has excellent predictive power and generates a mixture of expected and surprising insights into the rationality of a segment of humanitarian activity.

For the practitioners of rapid assessments, our recommendations will hardly be revolutionary, but will validate what some know intuitively. We warn against committing to large samples in quickly changing survey environments and recommend more frequent learning cycles with the assessment users. The value of the information for policy and/or fine-tuning of relief should be reviewed early on, from the analysis of relatively small samples, and then periodically; revisions of instruments and samples should be possible in mid-course. We also agree with others who have postulated that there is a rural bias in humanitarian assessments and see a need for tools and staff incentives to assess adequately larger settlements and not get lost in multitudes of small remote places.

For the larger community of readers, we hope to weave together concepts that may prove instructive for the study and practice of humanitarian information management beyond the specifics of rapid assessments. Rapid assessments are a good starting point because they vividly illustrate value conflicts in information behaviour—notably between speed and reliability. But even in protracted crises and other situations that allow for more tranquil routines, pieces of information vary in value and cost. They are produced in a division of labour between principals and agents, such as lead agencies and sub-contracting non-governmental organisations (NGOs). Even within an agent organisation, managers and fieldworkers make myriad decisions to capture information or to omit it. These decisions are not random; nor are their consequences for the users. Our case study demonstrates a possible way of opening this maze from a 'value-of-information' perspective.

Quality and value of information

'Rapid'—for warriors and for humanitarians

During the most recent Iraq war, speed became a topic of significant focus, mixed with the aura of precision weaponry. Even for a subject as mundane as supply chain management, the *Harvard Business Review* used the dramatic title 'Speed kills' (Morales and Geary, 2003) in relation to activities in Iraq. The expectation of rapid achievement extended into the post-war period, including non-military aspects, until all activities were painfully slowed by ever-increasing insecurity.

The humanitarian community, not exempt from this climate, strained to execute a running start in its delivery of relief to the Iraqi people. This included attempts at rapidly displaying an operational picture. The tools summoned to this task had been around for many years prior to the emergency in spring 2003. It valued speed for a different reason—the premise that victims cannot wait. One of these tools, rapid assessments, had been part of the humanitarian toolbox for decades. In Iraq, however, some of the rapid assessments created a fabric of information so dense that they offered an unusually close look at the trade-off between speed and other desired qualities.

Information demands in post-conflict emergency relief and rehabilitation settings are heavy and are difficult to meet within useful time frames, and with acceptable reliability and precision. Over the past few years, the community of humanitarian practitioners

has started to build standardised systems of information collection, analysis and use. These systems are meant to facilitate information transfer across sectors and phases of the relief and development process, and ultimately enhance the baseline information available to peacekeepers and development agencies.

They all struggle, in varying degrees, with the basic fact that war destroys information, and that, as a result, the units on which they are expected to deliver substantive information are themselves not completely known. Some of the countries subject to the ravages of war and subsequent intervention by the humanitarian community have not had a reliable population census in many years; moreover, the destruction of records, the 'brain drain' of experts and population displacement have made much of the pre-existing data inaccessible or obsolete.

'Rapid assessments' have gained currency as stopgap measures to fill urgent information needs in turbulent post-war situations. Yet, they are not exempt from that turbulence. They are expected to produce rapid results, such as on levels of malnutrition, locations of displaced populations, or the status of basic infrastructure, with the minimum of foundational information existing and with very short set-up time.

A relatively new addition to this process has been the requirement to collect foundational data. These include a listing of populated places visited, complete with names, geographic coordinates, administrative status and a current population estimate. Such data are basic to the reconstitution of a community gazetteer. The gazetteer, which in the lingo of sample surveys is nothing else but the community frame, in turn is critical for concurrent population and facility surveys, project tracking and avoidance of duplication of effort.

Some of the initiatives to create standardised information systems were closely associated with the United Nations (UN) Humanitarian Information Centres (HICs), of which there have been several, including in countries undergoing recent military interventions by Western powers. These centres have been involved in rapid assessments, with responsibilities ranging from supporting independent assessments, to coordinating multi-party data collection efforts, to implementing them directly. For example, the HIC in Kosovo assembled a well-publicised rapid assessment from contributions by a variety of relief agencies, mapping the housing stock in war-affected villages and the need for urgent winterisation measures before the cold season in 1999–2000.

Unanswered questions

Although they are frequently done, little is known about the quality of rapid assessments. There is an obvious conflict between speed and completeness, regularly compounded by lack of security and/or access. Some domains, notably nutrition, rely on cross-culturally validated protocols, but many rapid assessments use instruments that have not been adequately pre-tested, and are administered by data collectors who were minimally trained. It is safe to assume that, from a survey quality perspective, sampling error, however serious, will often be outweighed by measurement error. For example, quality assurance in landmine impact surveys has repeatedly demonstrated

that more than 90 per cent of all affected communities countrywide were identified, but with initial (rapid) estimates of dangerous areas that subsequent technical surveys would reduce by a factor of five or more.

It is equally safe to say that, for a good part, if not most, of the assessments, by the time results reach the intended users, they no longer deserve the descriptor 'rapid'. In some cases, the rapidity is more descriptive of the users, who have left the scene or have morphed into a different policy landscape by the time the data are available for analysis, or findings are ready to inform decisions.

Such considerations have prompted us to study the rationality of rapid assessments in greater depth. The question *"Why rapid?"* may be easy to answer—in emergency response, delay is universally seen as policy failure. 'Rapid' is also seen in an inter-organisational context. Early collaboration in surveys and assessments signals that coordination processes are being established among disparate responders and reflects well on the humanitarian community.

Beyond that, several trade-offs remind us that the most rapid is not necessarily the best. Speed may compromise not only completeness but also other information standards such as reliability and validity. Its relationship with cost is far from straightforward; few are so naive as to believe that 'rapid' means 'shorter', and hence 'cheaper'. The rationality claims that the organisers of rapid assessments implicitly make therefore have to be weighed against a number of criteria, some of which are outside the purely temporal dimension:

- information costs versus benefits to decision-makers;
- use of pre-existing information;
- respect for policies that translate assessment goals; and
- dynamic adaptation during fieldwork.

This list in incomplete, but our material from Iraq allows us to test actual assessment behaviour against those four criteria. The test results then allow us to bring into sharper focus several questions that stakeholders in rapid assessments ought to ask regarding the expected quality and value: do we need a full-census approach, or will a sample survey yield better value? Do local key informants really know much about the subject matter? Do assessment staff members have the right incentives to produce information in effective and efficient ways? And, more generally and more importantly, can learning cycles during the execution of rapid assessments be shortened so that stakeholders can consider and agree on corrections mid-course, responding to changes in the task environment or to early, tentative findings of a practical significance.

Conceptual elements

In order to create a framework for the Iraq assessment material, we borrow elements from three theoretical traditions: principal-agent models in economics; value–of–information concepts in decision science; and mental maps and stopping rules in decision psychology. Benini et al. (2005) offer a full elaboration.

From a principal–agent perspective, Philipson (1997) takes a refreshing look at surveys as activities that take place in *markets for observations*. The interviewees and data collectors are the *producers* of the observations that the survey organisations demand. This view leads to the analysis of search costs, costs that may increase disproportionately if sample members withhold their observations, and replacements have to be recruited by the rules of systematic sampling, rather than the cheapest and fastest sample that could supply the observations.

Philipson analyses the marginal cost of interviews conducted in several major US surveys and finds for most of them steep increases during survey lifetimes. He also finds a very significant correlation between average costs and response rates. This latter variable parallels area coverage in rapid assessments; for example, data collectors replace unavailable sample members quickly and dynamically, in an attempt to keep resources busy at a satisfying load and with little thought for the variables of interest on which the left-out units might differ from the replacements. Survey managers usually have little control over how their field teams decide replacements. Beyond sampling issues, data collectors may follow a variety of employment, security and personal comfort incentives that dictate their detailed activities in the field, many of which go unobserved by their managers.

Mental maps and stopping rules have rarely been investigated for the information search part of the decision process. An exception is provided by Browne and Pitts (2003), who identified four considerations that can stop searches. We illustrate their rather bloodless concepts with the motivations that may prompt—in our empirical case—a landmine and UXO survey worker to stop visiting more potentially affected communities. Four types of rules stand out:

- *Magnitude threshold*—the survey worker determines that the information that he/she has collected exceeds the total amount of information expected of him/her (for instance, he/she has visited all suspected communities plus a multiple of unsuspected ones).
- *Difference threshold*—the worker determines that the marginal value of additional visits is falling below a satisfactory level (for example, the last 10 stops on his/her circuit did not produce a single contaminated village).
- *Mental list*—the surveys done to date supply information of sufficient diversity (for instance, he/she finally found a village with recent mine strike victims).
- *Representational stability*—the worker determines that, with the information so far collected, he/she can confirm the assumptions that his/her training conveyed (for instance, in his/her training on landmines and UXO, he/she had been told that affected communities tended to cluster. And, in fact, today he/she did not find a single affected community after moving out from known clusters more than 10 kilometres).

Finally, with a view to the rapid assessment *consumers,* we make limited use of concepts that the 'value-of-information' school in decision science (Dakins, 1999) has advanced. This school of thought, which has gained currency in many fields, from

medical testing to ecological risk management, attempts a rigorous approach to the collection and use of information when decisions must be made in conditions of high uncertainty. More information helps to reduce the uncertainty, but also costs more.

Empirical approach

Our study is set in Iraq. This country makes for an attractive case study because of the premeditated nature of the war and parallel preparations undertaken by the humanitarian community, including for rapid assessments. After a long build-up, the campaign unfolded as a kind of *blitzkrieg,* with the UN and NGOs anticipating that their assessment missions would execute a running start while the smoke of battle was still clearing.

We take advantage of the fact that we have material from two rapid assessments in Iraq that were carried out concurrently. It permits us to shed light on some quality questions, primarily the selection of communities that assessment personnel made during fieldwork. The first of these data collections, using pre-war assets, achieved an exceptionally dense coverage of local communities, and did so rapidly, although it was

Figure 1 The rapid assessment area in northern Iraq

Note: the two assessments were undertaken in several regions of Iraq, including the south. Data from densely surveyed contiguous districts is available for the northern portion only. To the advantage of this analysis, the area covered by EMAS happens to be almost completely wrapped inside the multi-sectoral RAP area. Both assessments straddle the 'Green Line', the de facto line of control separating government-controlled and autonomous Kurdish zones prior to the 2003 war.

limited chiefly to regions in the north. Known as the Rapid Assessment Process (RAP), and operated by the HIC for Iraq, it returned basic data on a broad scope of institutional domains. The concept and performance of HICs in several countries have since been evaluated (Sida and Szpak, 2004); a partial analysis of RAP data is available from Benini and Ross (2003); the RAP in Iraq, therefore, is not discussed further in this paper (for a fuller exposition, see Benini et al., 2005).

Instead, we shall focus on the second assessment. This was specific of a particular domain, covered an area largely inscribed in the first, and at the behest of the UN was carried out in the northern part of the country by the British charity Mines Advisory Group (MAG), with assistance from Vietnam Veterans of America Foundation (VVAF)'s Information Management and Mine Action Programs (iMMAP). Called the Emergency Mine Action Survey (EMAS), this assessment of landmine and unexploded ordnance contamination was slowed by the deterioration of the security situation and was orphaned, halfway through, by the departure of its major data user, the UN Mine Action Program (MAP), from northern Iraq.

The combined analysis of these two data bodies is enlightening. With its massive coverage of 5,700 populated places, the RAP offers a kind of gold standard against which the selection of communities made under the EMAS can be evaluated. EMAS visited a total of 1,760 communities. We model the EMAS decision to visit or not in terms of substantive community attributes, including some that the RAP collected. Their influence is revealed in addition to the intrinsic criteria that the landmine survey applied, chiefly in response to reports of suspected contamination. Our core model is a logistic regression of whether a community area identified by the RAP was ever visited by an EMAS team.

The Emergency Mine Action Survey

Significant landmine and UXO contamination was known to exist in parts of Iraq from the 1980–88 war with Iran and the 1990–91 Gulf War. In the Kurdish-controlled region, the UN, through the United Nations Office for Project Services (UNOPS), and several NGOs had been engaged in landmine/UXO survey, clearance, mine risk education and survivor assistance. The scale of these activities prior to the 2003 war was considerable, resulting also in the creation of local humanitarian mine action (HMA) NGOs.

That this war would produce newly contaminated areas was actively pursued in humanitarian preparations. During the winter of 2002–03, UNOPS relied on the Geneva International Centre for Humanitarian Demining (GICHD) to create an adapted data management tool for an emergency survey to start as soon as post-war conditions would permit. Its design incorporated, in a lesson learned in Afghanistan, a concern for abandoned and hazardous ordnance sites. Such sites were dangerous, even where they did not block access to resources, in that they could supply armed opposition movements or other unauthorised groups and individuals, or would attract scrap and explosives scavengers.

That concern also motivated a design for EMAS that differed from traditional land-mine impact surveys. EMAS was expected to advance much faster than impact surveys do in settled post-war conditions. In the spirit of a rapid assessment, data was to be handed over by survey organisations to UNOPS at short intervals, as opposed to being evaluated in total at the end of the data collection process. In theory, the whole EMAS was to be completed in a matter of a few months.

In practice, MAG took nine months for set-up and fieldwork, from June 2003 until March 2004, with several stand-down periods due to insecurity. The survey workforce counted six permanent expatriate team members, and a national staff ranging from 32 to 86 at different periods of operations. While security was a paramount concern, decisions to expand EMAS in space and time still must be understood in large part in terms of MAG being the agent for UNOPS, and in terms of MAG staff interpreting policies through a host of local decisions.

To begin with, UNOPS assigned MAG survey areas sequentially and with varying precision. *North* of the Green Line—the de facto line of control separating government-controlled and autonomous Kurdish zones prior to the 2003 war—UNOPS intended MAG to visit, to a depth of five kilometres from the line, all communities that had not already been surveyed before the war. UNOPS would designate one or two pri-ority districts at a time and compile the lists of communities already surveyed. MAG was to avoid these. In an exception to this rule, motivated by security and administra-tive factors, MAG surveyed more than 300 communities in the district of Akre, north of the line.

However, the major survey ambitions were aimed at the recently contaminated areas to the *south* of the Green Line, in districts and governorates that, before the war, the Iraqi government controlled. From this region, the Mine Action Centre at UNOPS Erbil had no information specific to the community level and, except for a one-time request to look at six villages that were the object of a specific risk communication, did not direct MAG to address or avoid specific communities. District assignments were relegated to MAG's own good judgment in view of security constraints and the availability of local experts.

UNOPS and MAG did have a body of prior information on possibly affected com-munities south of the Green Line. This was an excerpt from the Tactical Minefield Database (TMFDB) that the Coalition forces made available, through maps and a spreadsheet of contaminated sites, as early as May 2003. This information was not used for practical survey priorities although it was reviewed in coordination meet-ings with force representatives. By July, both UNMAS and MAG felt that the May 2003 TMFDB excerpt was outdated. For security reasons, updates that the Coalition had promised could not be collected from division headquarters in Tikrit and Mosul, and by August, MAG switched to a full census approach to all of the communities south of the Green Line.

While that may appear as a tactical field decision, in terms of information economics the census approach was to be of considerable consequence, as we shall demonstrate later. On a more immediate practical side, its implementation was punctuated by

prolonged halts of survey activity, as the security situation dramatically deteriorated, with the attack on the UN headquarters in Baghdad in August, and the murder of a MAG expatriate advisor in September.

The institutional landscape too changed during the life of EMAS. Shortly after the August attack, the UN withdrew most expatriate personnel from Iraq, including those who worked in the UNOPS Mine Action Program in Erbil. The MAP Mine Action Coordination Centre (MACC) was finally shuttered in November, concurrent with the end of the Oil-for-Food regime. Starting in August, MAG would hand over fortnightly data sets to a working group composed of the transitional government's Regional Mine Action Centre (RMAC), Coalition force representatives, UNOPS local planners (until November), five local mine clearance NGOs and MAG itself.

Ultimately, EMAS surveyed 1,760 communities in 11 districts of the six northern governorates. It found 290 communities (16.5 per cent) contaminated, with an estimated 263,780 residents. This population was living close to 574 distinct dangerous areas with a total surface, according to the claims made by local informants, of 627 square kilometres. Among the affected communities, 58 (20 per cent) reported a total of 122 recent victims (43 killed and 79 injured) from contamination-related accidents.

A surprisingly low 10 per cent of all dangerous areas were reportedly contaminated during the recent war. Most of these were south of, or close to, the Green Line; some were littered with cluster bomb units (CBUs). This finding is relevant in the context of rapid assessments because it may reflect the low degree of key informant knowledge in situations of rapid post-war population shifts. Many of the affected communities had undergone ethnic reversal, with Arabs moving out and leaving their places to Kurds who were not yet well acquainted with the local history and extent of contamination.

EMAS data was put to practical use during its lifetime. As mentioned above, MAG would transfer data in fortnightly sets, at first to UNOPS, and then to the RMAC, which took over from UNOPS. By 1 March 2004, as a result of this survey, among other factors, clearance and disposal work was either complete or ongoing in 122 (22 per cent) of the identified dangerous areas.

A predictive model of community selection

Survey productivity, in terms of community visits per day, fluctuated wildly over the lifetime of EMAS. This happened chiefly in response to the insecurity. The attacks on, and subsequent departure of, the UN affected the survey as 'lumpy events' redirecting its entire work. At the local level, however, decisions to survey a community, or not, were more finely grained, although the survey dynamics in time and space were, of course, intertwined.

Thus, when data collector teams were working inside a district, the selection of communities was made based upon considerations that were local, compared to such major events in Erbil or Baghdad that at times, resulted in a stark redirection of the programme. We hypothesise that locally three important factors were capable of generating community visits: the mental maps that guided survey staff; the policy guidance

that they received, notably from the UN (and the absence of such guidance during certain periods); and the density and quality of expert opinion and local key informants.

For the statistical model, each of these three concepts in turn is measured by three variables:

Mental maps

The mental maps and stopping rules that individual workers invoked in their choice of communities can only be speculated about (see above). However, we do know some of the global assumptions under which EMAS started:

- EMAS set out in the understanding that contaminated areas would be particularly dense near the Green Line, on both sides.
- Prior to the start of fieldwork, EMAS had received dangerous area information from an early version of the Coalition forces' TMFDB. Waiting in vain for updates, EMAS deleted this information from its image of the contamination south of the Green Line.
- Explosive remnants of war are known to cluster in space. Since the contamination is not directly observed, survey teams presumably generated more community interviews near *affected* communities.

Policy guidance

- One of the objectives was to paint a detailed picture of contamination from the recent war. Most, if not all, of this had happened south of the Green Line. We therefore expect communities in the formerly government-controlled areas to have a higher probability of some EMAS visits than those in the Kurdish areas.
- EMAS was told to remain clear of communities already surveyed by UNOPS. These communities were on the northern side of the Green Line, and most of them at some distance from it. We model the effect by interacting the distance from the Green Line, as defined above, with being on the northern side. We expect fast distance decay in the north, whereas on the other side EMAS teams would venture south as far as expert opinion and security encouraged them.
- UNOPS closed its Mine Action Centre in Erbil in November 2003. This created a policy vacuum. For districts north of the Green Line, MAG could no longer obtain lists of communities already surveyed. As a result, and benefiting from the good security on this side of the line, EMAS took to surveying all communities in Akre district.

Local experts and key informants

- EMAS teams were directed towards communities that local experts singled out as likely to be contaminated. Experts were available more readily in administrative centres and in health care institutions that cared for landmine/UXO victims. We expect that contaminated communities were more notorious if they enjoyed greater

access to these centres and institutions. We use two different measures, one aligning access to health care and commercial services, the other concerning education and utilities (see Benini and Ross, 2003). On both, we expect better access from the RAP points to result in more likely EMAS visits.

• Similarly, population size is expected to increase the chances that EMAS workers recognise a settlement as a local community in its own right and stop to visit it. Larger communities will be better known to begin with, and they may even be subdivided for separate key informant meetings to warrant detailed enough local knowledge. The effect, though, is expected to be less than proportionate to population; we use the population magnitude.

Hypotheses and test

The following table recapitulates the direction in which the modelled factors, as manifest in the specific variables, are expected to exercise their influence on the probability of EMAS teams visiting some point within a RAP-identified community area:

Table 1 Summary of hypotheses

Factor	Variables: nutshell rationale	Making it more (+) or less (-) likely that EMAS visits
Mental maps	Distance from Green Line: communities farther away have fewer dangerous areas	-
	Distance from nearest TMFDB point: affected communities should be close by, but EMAS chose to disregard this information	No effect
	Distance from nearest affected community: dangerous areas cluster	-
Policy guidance	Southern side of the Green Line: priority area	+
	Green Line: distance x northern side: avoid UNOPS survey area	-
	Akre district: for lack of specific guidance, survey entire district	+
Local experts and key informants	Better access to health care and commercial services: community better known among service providers	+
	Better access to schools and utilities: similar notoriety	+
	Population size: larger communities are better known, may attract multiple visits	+

The model is estimated as a logistic regression. Detailed output for statistically interested readers is presented in the appendix. In the following section, findings are presented in a non-statistical language.

Results

Mental image: not what you expect

In actual practice, the mental maps persisted in part only, and were updated as the survey progressed. On the southern side of the Green Line, EMAS workers advanced into Tameem governorate to a maximum of about 100 kilometres from the line, expecting to find fresh contamination. Numerous communities on these southern fringes were visited, but very few affected ones were found. Remarkably, this did not deter EMAS' commitment to a full census approach. In fact, on the southern side, the propensity to visit increased with the distance from the line.

The clustering assumption remained a guiding orientation throughout—the detection of an affected community would dramatically improve the chances of EMAS teams visiting neighbouring areas to check for contamination.

The most surprising finding is that EMAS field staff visited local communities more densely in areas *far* from TMFDB points. Most of them would not have known this, but neither did they behave indifferently to it—the statistics imply strongly that they were actively repelled from these points. The interpretation is not obvious—one is that survey workers escalated their commitment to finding affected communities far south where there were very few. We will offer a different interpretation below, in connection with incentives offered to local helpers.

Both policy and its absence are significant

The influence of policy, as captured in the 'Stay clear of UNOPS surveyed communities' instruction, and of a vacuum of such policy (full coverage of Akre district) were powerful. On the northern side of the Green Line, with the exception of Akre, the propensity to visit dropped steeply with distance from the line. In other words, closeness to the earlier UNOPS Landmine Impact Survey region effectively repelled EMAS activity.

However, this is not true of the expectation that EMAS would scout the southern side of the Green Line as a priority. Approximately 55 per cent of EMAS visits occurred there. Security pressures and the detection of affected communities not yet surveyed by UNOPS kept survey teams busy on the northern side for longer than policy would suggest.

Local experts were used, but incentives were not productive

It is in the area of expert opinion and local experts that our hypotheses are clearly refuted. Larger communities did stand slightly better chances of an EMAS visit than smaller ones, but not to a statistically significant degree. Yet, it is the local communities with *poorer* access to services that wound up being visited by EMAS more frequently, other things being equal. This runs counter to the common-sense assumption that communities with better access would enjoy greater notoriety among the health care and security personnel that EMAS canvassed in administrative centres, and among key informants in the visited communities.

This is surprising all the more because EMAS had good contacts with health care workers. Some of them drew up lists of places from which they had received landmine and UXO-injured patients. That EMAS used such information can be shown statistically;

closeness to health care and commercial services has a significant effect on being visited *and* identified as affected. But EMAS also used the very comprehensive lists of villages that health workers had compiled for their vaccination campaigns. These lists were complemented by information from local police and guides.

This resulted in a significant number of visits to communities that were far from service providers, and thus had very low access to services. This tendency was reinforced when EMAS realised that a considerable number of communities were undergoing ethnic reversal, and survey workers were told to explore aggressively for remote settlements where new inhabitants might need to be told about contaminated areas.

A double principal-agent problem?

The resultant set of communities visited by EMAS was a mixture of communities selected on the basis of prior information and those visited as a result of adaptive sampling in the field. The priors consisted of different types of information—distance from the Green Line, and absence from the lists of communities surveyed before the war. The adaptive sample part resulted from intensified searches around affected communities, from local expert opinion, and from scouting for newly repopulated or ethnically reversed communities. The data collectors were helped in this activity by local guides whom EMAS paid for services. It is reasonable to assume that this incentive, together with survey workers' desire to prolong their employment, was in part responsible for the intensive coverage afforded to areas far from any affected communities, TMFDB points or the Green Line.

The point that we want to stress is the active role that data collectors play in sample construction given the incompleteness of the prior sampling frame and variable security. Also, EMAS staff did not have the list of RAP survey points to which we have matched their visits—the EMAS survey points were the result of decisions taken using different sources of information, not the RAP. There was a double information asymmetry at work, between the principal (UNOPS) and the agent (MAG), and between managers and field teams, that fashioned ultimate sampling outcomes—and one would expect such constellations to occur in the most turbulent post-conflict rapid assessment environments.

Value of information

The EMAS cost slightly more than USD 1 million, not counting the cost of the UNOPS structure that used the information for clearance tasking. What was the value of the information purchased for that price? As we have seen, EMAS did inform priorities of clearance, and a broad estimate of areas in the survey region that were cleared by the end of fieldwork in March 2004 is possible. In principle, using area and victim figures, some model calculation of lives saved could be attempted. However, humanitarian mine action normally does not place a monetary value on a life, and therefore at most a cost-effectiveness indication may come forth.[2] It would be belittled by the fact, though, that mortality from the active use of explosives is much higher in contemporary Iraq than from passive, victim-actuated old devices.

If we cannot calculate the total value of the EMAS information, a small number of assumptions nevertheless permit us to propose a comparative importance measure for individual survey points within this rapid assessment. We then use this measure to investigate how the value of information fluctuated over the life of EMAS. We posit that the metric should express the importance of each community survey by two attributes: the population and the claimed contaminated area. The metric is approximately multiplicative in their magnitudes. For example, a town of 10,000 residents reporting a 1,000 square metre minefield receives a score similar to that of a 100-person village claiming that one square kilometre of its pastureland was littered with CBUs (because, expressed in logarithms, 4 x 3 = 2 x 6). The minutiae are documented in Benini et al. (2005). Furthermore, we make the simplifying assumption that in-country costs are constant per day during the 317 days from the officially declared end of major combat operations to the last field visit and are no different during downtime. Like Philipson (1997), we calculate the ratio of cumulative in-country cost to cumulative information value from assessments returned.

The results of this analysis are presented in Figure 2. An estimated total of USD 800,000 was spent in Iraq, but the shape of the cost curve is indifferent to this amount. After the initial set-up, EMAS started returning significant cumulative information value in early July and by the beginning of August had brought the average cost of an information unit below the USD 100 mark (start of the thick line). Subsequent downtimes obviously would drive those values up each time, and they would fall again when fieldwork resumed.

Figure 2 Information value and average survey cost
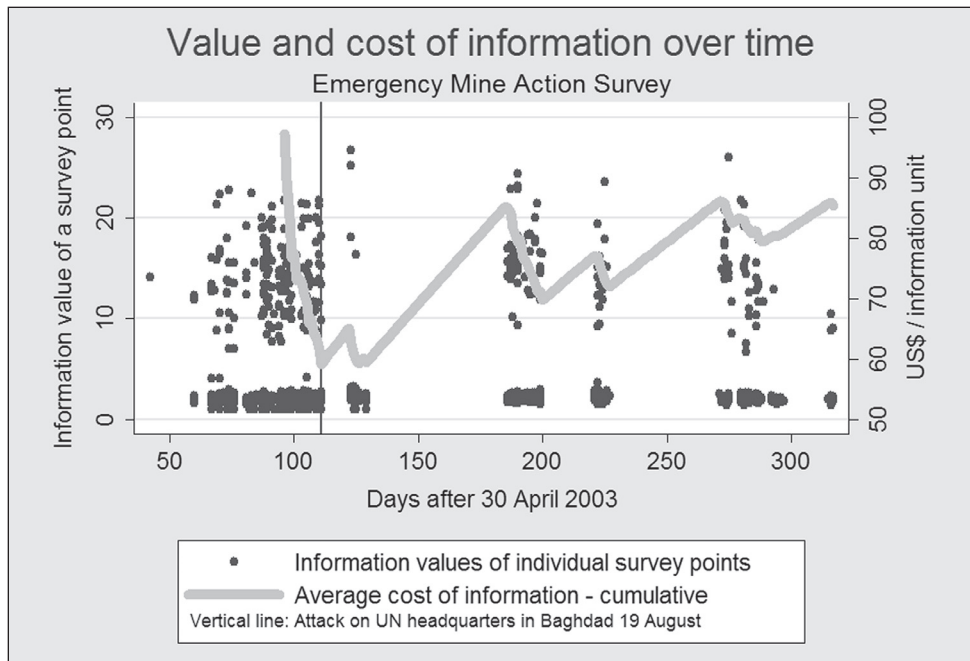
After 200 days, the reversals in average costs were minor. With the benefit of hindsight, and applying very crude cost-minimising thinking, one is tempted to suggest that the exercise should have been terminated around day 150. But the changes in security and in the value and cost of the next batch of assessments, if any more were feasible, were not predictable at that point. However, by day 250, an analyst looking at cost, population and contamination data already known would have been able to make a better informed recommendation. In all this, one has to keep in mind that the decision to stop confronted an ethical dilemma—between the risk of overlooking some affected communities and the humanitarian benefits that cost savings might produce.

The average cost was driven also in part by the addition of a large number of survey points with low information values (because these settlements were small and were not affected). These points tended to cluster in space, particularly in southwest Tameem. Visiting these communities contributed little value to the survey.

Another way of looking at these important statistics is to ask, with hindsight, how many communities needed to be visited in order to return the most important information, perhaps comparing with Pareto's famous '80–20' rule of thumb. We found that only 3.3 per cent of all EMAS visits were needed to record 80 per cent of the total contaminated area claimed by local informants. To reach this threshold for the cumulative population, 29 per cent of the visits would have sufficed.

One should keep in mind that the survey result of a community in fact not being contaminated has value for humanitarian planners. Taking that into account, a measure that combines the claimed magnitudes of population and contamination leads to a more relaxed position vis-à-vis information over-acquisition. By this measure, it took 57 per cent of all visits to attain 80 per cent of the total possible informational value.

Considerations for future humanitarian assessments

We will first recapitulate our findings in terms of rational survey behaviour, and then derive a small number of recommendations for future rapid assessment planning.

As we have seen, EMAS survey behaviour was compliant with policy guidance (and sensitive to the lack thereof during certain periods), but also showed significant adaptive sampling in response to the detection of affected communities. Surprisingly, the effect of prior information and of local expert opinion is not manifest in the manner expected. The contamination information that Coalition forces shared through the UN was discarded by EMAS as obsolete. But the data show that by not using the TMFDB segment shared with UNOPS and MAG, the search for affected communities was considerably less efficient. Assessment teams did visit communities near reported new contamination areas, but then multiplied visits beyond to a degree motivated more by staff and local helper incentives than by rational survey planning. In doing so, they relied heavily on local experts, particularly health care officials and police officers. These were effective for the safety of EMAS staff and for a dense coverage of communities under a full census approach. Nevertheless, this does not mean that a full census was warranted.

Two special circumstances, however, indicate that adaptive decisions were, indeed, made rationally. Extensive community visits were prompted also by a need to scout aggressively for newly repopulated communities about which the local experts and the foreign entities knew close to nothing. Additionally, in times of lingering hopes that the security situation may improve in areas yet to be surveyed, it can be economical to retain a trained survey workforce in a safe holding area, at the price of over-surveying some areas. Whatever the case, ultimately, rapid assessments like the EMAS require rational stopping rules for the acquisition of information—how to know when enough is enough.

What does the EMAS experience teach us? If its workers demonstrated variably rational behaviour under conditions of insecurity, repeated regrouping and incomplete gazetteer information, it is also fair to point a critical finger at the kind of small community rural bias that Kent (2004, p. 12) accuses much of humanitarian programming of harbouring, and which EMAS behaviour confirmed. By going to large numbers of very small rural places, EMAS (and, as Benini and Ross (2003) show, also the RAP) over-acquired information, in terms of the value that these assessments created for their consumers. In fact, both underline the need to develop and integrate urban assessment tools, and to make economies by compressing rural samples. On the urban side, the World Bank has occasionally promoted the development of appropriate methodologies, such as in Colombia (Hentschel, 2004), but a systematic restatement has not yet appeared prominently.

Second, the EMAS dynamics demonstrate the importance of adaptability during implementation, beyond what was foreseeable at the initial point of design. In this paper, adaptation appears chiefly in terms of sampling behaviour—the transition from an initial emphasis on suspected communities to a full census, and an escalating commitment to visiting small, remote settlements further south of the Green Line. But, it also shows this was equally true in terms of other EMAS tools, for example the pre-designed database format into which concepts were hard-wired that did not survive the pre-test and subsequently demanded makeshift corrections.

In the humanitarian arena, such adaptations all too often are still very ad hoc, leading to haphazard format changes that in the end frustrate survey estimation and generalisation to the entire population in focus. Other fields that practise rapid assessments, notably environmental studies, actively anticipate some of these unpredictabilities and respond in more controlled ways, including formalised adaptive sampling (Thompson and Seber, 1996). As a second best, humanitarian assessments have occasionally relied on respondent-driven or snowball samples (see Frank and Snijders (1994) for background, and Benini and Moulton (2004) for an application in Afghanistan). These do not preclude that entire clusters of concerned units in remote regions remain undetected, but they do lead data collectors to some or most units rapidly.

The larger question to ask is what the addition of more social science competency might do for the quality of rapid humanitarian assessments. The creation of HICs is a partial answer, mainly fostering greater use of database and Geographical Information System (GIS) technology. Just as important is the quality of the interaction between subject matter specialists (who ensure the validity of the assessment tool), the managers

of assessment staff and logistics, and the users. Quicker and more frequent learning cycles are critical. In this spirit, the initial assessment should be small, shallow (perhaps limited to district headquarters in an affected region) and emphatic on refining needs for the next waves with strong input from users. Subsequent assessments may then be broader in scope and wider in reach, as appropriate. They may also lead to a dovetailing between multi-sectoral community surveys and in-depth sectoral assessments, the latter carried out by organisations with specific expertise.

Finally, cost-benefit considerations have to be restated. Some types of rapid assessments do not come cheap if they are to be done properly. Many relief agencies consider information collection a sunk investment that they continue only to the extent of satisfying fundraising and reporting goals, and this will limit also their involvement in rapid assessments and in sharing the information. At the other extreme, some humanitarian coordination entities see a need for coherent and comprehensive bodies of foundational information, particularly with a view to the transition from relief to development. Between these two strategies, larger (for instance, countrywide) assessments face all the choices of substantive scope and sample size. They should be made in clear awareness of the types of decisions that the information will support and of its cost in terms of time and money. While we can put US dollar figures only on a fraction of policy alternatives, a familiarity with basic concepts of information value can only reinforce rationality in both assessment design and implementation.

Thus, in very practical ways, the designers of rapid assessments need to institute a small number of rationality safeguards. These will vary with context, but common denominators remain. From the start, a cycle of early and repeated analysis, reviews with stakeholders (particularly the users), and appropriate adaptations of tools and samples need to be laid out. In particular, while pre-tests may need to be brief and limited, they cannot be dispensed with in favour of wholesale imported tools. Second, field personnel require the authority to replace unavailable sample members quickly, but they need to document these replacements and their reasons. Third, the management needs to keep tabs on the efficiency of the operation and link it with stopping rules for information acquisition. This may necessitate reliance on tools of varying sophistication—from the formalised precision estimates used in nutritional surveillance to rough-and-ready weekly totals of communities or facilities assessed by the criteria in point. These steps create 'information about information'; they help us evaluate what we believe we know for what it can in fact do for humanitarian policy and its implementation.

Statistical appendix

Regression model

Both the RAP and EMAS data sets include the geographical coordinates of the community survey locations. For the RAP, local community areas are represented by Thiessen polygons. In the EMAS behaviour (community choice) model, the property of each RAP polygon in the analysis region to enclose at least one EMAS survey point is the dependent variable. The analysis region comprises a number of districts with dense RAP

as well as EMAS coverage, excluding other districts in which one or other of these assessments did insignificant amounts of work only.

For space reasons, the descriptive statistics of the model variables, their transformations as well as the procedure used to impute populations to communities with missing values are not given here. Details are found in Benini et al. (2005).

Access to services

We use the access to services scores that the RAP computed for each of its points (see Benini and Ross (2003) for details). There are two distinct access factors—one with which health care and commercial services are aligned, the other concerning education and utilities. The scores were the results of a principal component analysis of the (log-transformed) distances to the nearest providers of eight different kinds of services.

Results

Table 2 Detailed regression output

Logit estimates			Number of obs	=	2425			
			LR chi2(9)	=	1215.05			
			Prob > chi2	<	0.0001			
Log likelihood	=	-1068.901	Pseudo R2	=	0.3624			

Dependent variable:							
AT LEAST ONE EMAS POINT WITHIN RAP POLYGON	Coefficient	Standard error	z	P>|z|	[95% LCI	UCI]
MENTAL MAPS:						
Distance to Green Line (metres, log10)	0.826	0.166	4.98	< 0.001	0.501	1.151
Distance to nearest TMFDB point (metres, log10(x+1,000))	1.278	0.255	5.02	< 0.001	0.779	1.777
Distance to nearest affected community (metres, log10(x+1,000))	-2.647	0.195	-13.58	< 0.001	-3.029	-2.265
POLICY GUIDANCE:						
Is on northern side of the Green Line	8.917	1.037	8.60	< 0.001	6.885	10.948
Distance to Green Line (log10) x Is on northern side of line	-2.719	0.256	-10.63	< 0.001	-3.220	-2.218
Is in Akre district	3.089	0.192	16.06	< 0.001	2.712	3.466
LOCAL EXPERTS AND INFORMANTS:						
Access to health care and commercial services score	-2.178	0.526	-4.14	< 0.001	-3.210	-1.147
Access to schools and utilities score	-0.880	0.485	-1.81	0.070	-1.831	0.071
Current population (log10)	0.073	0.121	0.60	0.548	-0.165	0.311
Constant	4.131	1.215	3.40	0.001	1.750	6.511

Note: P-values < 0.10 are in the darker grey.

Table 3 Classification results

Classified + if predicted Pr(D) ≥ .5

True D defined as 'number of EMAS visits within RAP polygon > 0'

Sensitivity	Pr(+| D)	84.11%
Specificity	Pr(-|~D)	75.19%
Positive predictive value	Pr(D| +)	75.02%
Negative predictive value	Pr(~D| -)	84.23%
False + rate for true ~D	Pr(+|~D)	24.81%
False - rate for true D	Pr(-| D)	15.89%
False + rate for classified	Pr(~D| +)	24.98%
False - rate for classified	Pr(D| -)	15.77%
Correctly classified		79.38%

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Endnotes

1   The Veterans for America (formerly Vietnam Veterans of America Foundation (VVAF)), as well as any other persons or organisations named in this paper, is not responsible for the views expressed by the authors. Neither those organisations nor the authors are responsible for the accuracy of international borders displayed in maps or implied in the data. The term 'Green Line', as used in this report, is a de facto concept; and neither its geographical accuracy nor the position of all assessed settlements vis-à-vis this line are warranted.

2   We are grateful to one of the reviewers who pointed to a growing literature joining the study of land-mine clearance to cost-benefit analyses, including along value-of-life research lines. See: Harris, 2000; 2002; Elliot and Harris, 2001; Mitchell, 2004; and Gibson et al., 2005. However, as far as we know, none of the Mine Action Coordination Centres—in Iraq or elsewhere—uses any explicit value-of-life parameters in clearance prioritisation. The community classification used in the Global Landmine Survey deliberately excludes value-of-life considerations from its impact metric.

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