Key Performance Indicators and HMA
Time to Standardize?

by Roly Evans [GICHD] and David Hewitson [Fenix Insight, Ltd]

Measuring performance is the norm across a range of human activities. But is it a norm in humanitarian mine action (HMA)? Some might suggest that it is. However, if we measure our performance, it is unclear whether we do so in a standardized way so that meaningful comparisons can be made. HMA lacks standardized indicators, whether it is for items of explosive ordnance (EO) found and destroyed, m² of land released, or more general outcomes such as internally displaced persons returning to an area once cleared. Indicators can of course be ignored, misused, misreported, misunderstood. The playing field for operators may not be level. However, this is not a reason not to use key performance indicators (KPIs); it is a reason for standardizing their use. The time is overdue for mine action to develop standard indicators with agreed definitions in order to measure, understand, and compare performance more accurately.

INCREASING UNDERSTANDING TO REDUCE RISK

In the new International Mine Action Standard (IMAS) 07.14, risk is defined as "the effect of uncertainty on objectives."[1] Uncertainty arises when we don't have enough information on a subject or situation to be confident about taking the right decisions. An important part of the overall information and risk management process is the identification and use of KPIs that tell us about important aspects of our operational activity and the extent to which we are succeeding in pursuing goals and objectives. This article looks at the question of KPIs within HMA. It identifies specific KPIs that are likely to be particularly relevant and considers both the opportunities that the adoption of such indicators bring as well as some of the risks associated with them.

Photo above: Pattern-minefield clearance by MAG (Mines Advisory Group) in Mantai, Sri Lanka. The locations of cleared anti-personnel mines are represented by yellow pickets. Clearance of dense patterns minefields in countries such as Sri Lanka can give impressive KPIs such as low m²/mine cleared figures.
Image courtesy of GICHD/Roly Evans.

PAST PERFORMANCE MEASUREMENT IN HMA

Performance measurement has a mixed history in HMA. In the early years of HMA, the promotion and pursuit of individual performance indicators led to distortion of some management decision-making. The pursuit of m^2 of cleared land sometimes resulted in the expenditure of time and money clearing large areas that contained no explosive hazards. Money was often wasted on areas that need not have been a priority at the time or that were not put to subsequent use. Chasing the number of mines cleared sometimes led to the clearance of areas that had little or no impact on affected populations. Opportunities were missed to maximize the benefits provided to affected people.

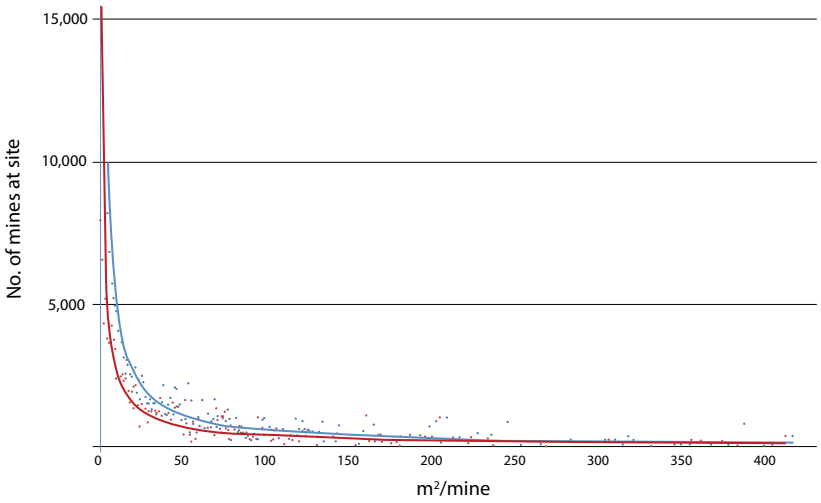

Figure 1. Analysis of m^2/mine by number of mines at site, including "best fit" curves, Afghanistan pre–2009 in blue, 2009–2012 in red: Survey Action Center (SAC) Afghanistan Database Project 2012. The fact that the red line is lower than the blue line implies an increase in average land release targeting efficiency within the pre- and post-2009 figures. Base data was provided by the Mine Action Coordination Centre of Afghanistan (MACCA).
Figure courtesy of David Hewitson.

In the 2000s, attention turned to how to avoid clearing land that did not contain hazards. Improved methods and approaches coalesced into the concepts known collectively as land release. More recently, additional efforts have been applied to concepts of results-based management and the need to understand better the outcomes and impacts accruing from the release of land.[2]

Historically, the focus on the figures m^2 "cleared" was understandable. The measurements were consistent with the intent of the *Anti-Personnel Mine Ban Convention* (APMBC), Article 5, where State Parties undertook "to ensure the destruction of all anti-personnel mines in mined areas under its jurisdiction or control ..."[3] However, in isolation, m^2 don't necessarily reveal much about how successful and efficient work has been. For a given area of land that was cleared, how would we decide whether the effort to clear that land was reasonable? Would it be m^2/item of EO cleared? If so what level of effort would we deem acceptable? 100 m^2/item, 1,000 m^2/item, 10,000 m^2/item, 100,000 m^2/item? The type of item is, of course, relevant. One thousand m^2/anti-personnel mine might be deemed reasonable, 1,000 m^2/7.62 x 39 mm cartridge probably wouldn't.

In the absence of clearly defined standards, operators often choose their own indicators, establishing their own rules for counting key data, and interpreting data reporting requirements in whatever ways seem to make the most sense or that yield the most favorable figures. Does any IMAS or National Mine Action Standard (NMAS) currently list standard KPIs for reporting? How many standard operating procedures (SOPs) detail standardized KPIs for reporting? The result is a situation in which there is a great deal of uncertainty about what constitutes "good" performance across the sector.

STANDARDIZATION OF KPIs IN HMA

Standardizing KPIs in HMA would bring important benefits. Donors and national mine action authorities (NMAAs) would be able to compare operational outputs and outcomes more easily. Operators would be more confident about demonstrating performance on a level playing field. The challenge is to agree which performance indicators should be standardized. Some *core* KPIs, especially in terms of land release, may be easy to identify while others might have more situation-specific value and be deemed discretionary. As a first step, it could be sensible to develop a set of core KPIs that can measure operational performance—especially but not exclusively in the context of land release—and a set of recognized discretionary KPIs that are available for use as and when relevant. Adopting standardized KPIs brings risks and challenges too. In order for data not to be misrepresented, common "counting rules" should be agreed and established, dictating clearly and unambiguously how data is to be measured, collected, recorded, and reported.

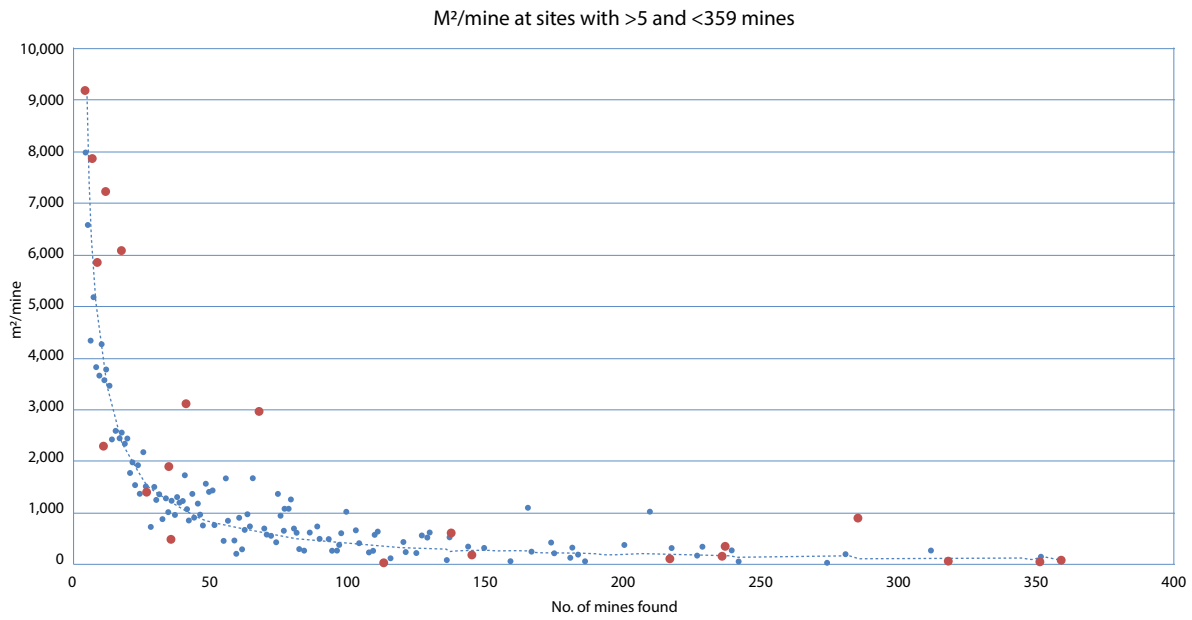

Figure 2. M²/mine data from Tajikistan (in red) showing the generally close alignment with the data from Afghanistan (in blue): Survey Action Center Tajikistan Land Release Project Report 2011. Base data was provided by MACCA and the Tajikistan National Mine Action Centre (TNMAC).
Figure courtesy of David Hewitson.

POTENTIAL CORE KPIs

KPIs selected as core should relate directly and fundamentally to questions of success. In HMA success typically means working safely, minimizing environmental impact, completing work on time and on budget, ensuring that no hazard items are left in released land, and helping achieve results that make a real difference to affected people.

TARGETING OF EFFORT: M²/EO item (Disaggregated)

The area cleared per hazard item is an indicator of efficiency in the targeting of assets. Mines in a well-recorded, intact, regular pattern are likely to be relatively easy to locate. Clearance work can focus on the specific rows where the mines are found, and decisions about when to stop work can be made early and with confidence. The m²/mine KPI is likely to be very low (possibly in single figures). In an area subject to a cluster-munition strike, unexploded submunitions may be widely separated (within an overall footprint) and exhibit a limited pattern. The m²/submunition figure is likely to be higher (perhaps hundreds). In an area containing only one or two *nuisance* landmines, the figure may be over ten thousand. Figures for the clearance of general explosive remnants of war (ERW) may be different again. Disaggregation of EO type is essential to ensure that comparisons are *like-for-like* and to provide operations managers with meaningful information.

On the one hand, m²/EO provides an indication of how easy (or difficult) it is to define the extent and distribution of contamination within an area. On the other, it reflects how successful operators are at defining the extent and arrangement of the contamination. Two organizations approaching a similar area of contamination could yield different m²/item results reflecting the general availability of information, how well Non-technical Survey (NTS) was conducted, how well Technical Survey/clearance work drew on the results of the NTS, and how well decision-making worked during site operations.[4]

M²/EO brings significant benefits and advantages. The first is that the two pieces of data necessary to calculate the KPI (m² and number of items) are perhaps the only two pieces of data that at least should be recorded at almost every land release site since the beginning of modern HMA. Secondly, analysis of this indicator in a number of countries suggests that, especially with respect to landmines, there is a remarkably consistent relationship between the number of mines found at a site and the amount of land that is investigated (Figure 2). Where there are few mines, it is relatively difficult to find them efficiently; where there are very many, it is much easier. The general statement may be obvious, but the nature of the curve that arises from the analysis suggests the potential to establish benchmark figures that could be applicable across many or all programs. Benchmarks need not generally be used as targets but instead reflect typical performance across a range of

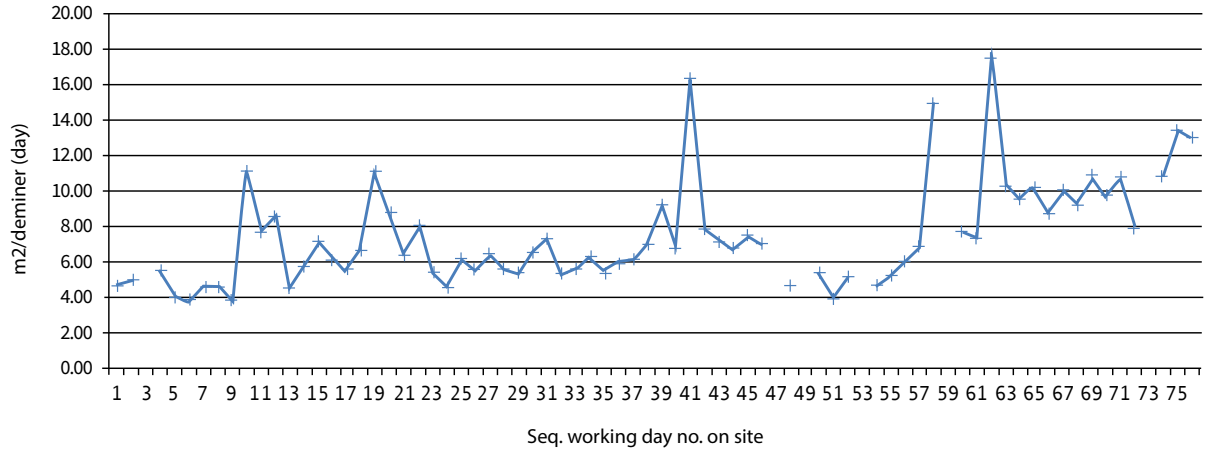

Figure 3. M² productivity/deminer, ratioed to a standard six-hour day equivalent (to ensure like-for-like comparability). A general upward trend in the KPI indicates deminers becoming familiar with site conditions. Stand out peaks in productivity were associated with areas where adjacent mines were blown in situ, breaking up nearby soil and vegetation, making it much easier for deminers to progress.
Figure courtesy of Fenix Insight Ltd.

operators, regions, and programs. In doing so, they help HMA managers understand where the performance of their operations sits relative to sector performance as a whole, identifying both occasions when above-benchmark performance could usefully be shared to help others benefit, and those when the reasons for below-benchmark performance should be questioned. With improved collection and analysis of performance data, a range of benchmarks could be established for different types of contamination, activities, and circumstances.

While m²/EO item helps us understand the efficiency of clearance activity, it also provides an indication of the effectiveness of decisions and activity undertaken earlier in the overall land release process: a low m²/EO item figure is also likely to reflect effective NTS and operational planning. KPIs often help us understand more than one aspect of an operational process, providing information about efficiency in one respect, effectiveness in another, and perhaps progress or compliance in yet another.

PRODUCTIVITY: M²/Asset/Time

Productivity, defined as the rate of production, has been widely measured in HMA for most of its history. It has clear value but needs to be handled carefully if it is to provide useful, comparable information about performance. The KPI can tell us the rate at which ground is being searched, how search rates change over time, how rates differ between sites and teams, and how rates relate to original planning assumptions. However, KPIs rarely tell the full story in isolation, and comparisons need to be done in context. If one team searches more m² in a given period of time than another, it does not necessarily mean it is more efficient. It does mean that operations managers should understand why such differences arise and be prepared to investigate if the causes of differences are not readily understandable.

Productivity KPIs are especially susceptible to misunderstanding if they do not offer like-for-like comparisons.

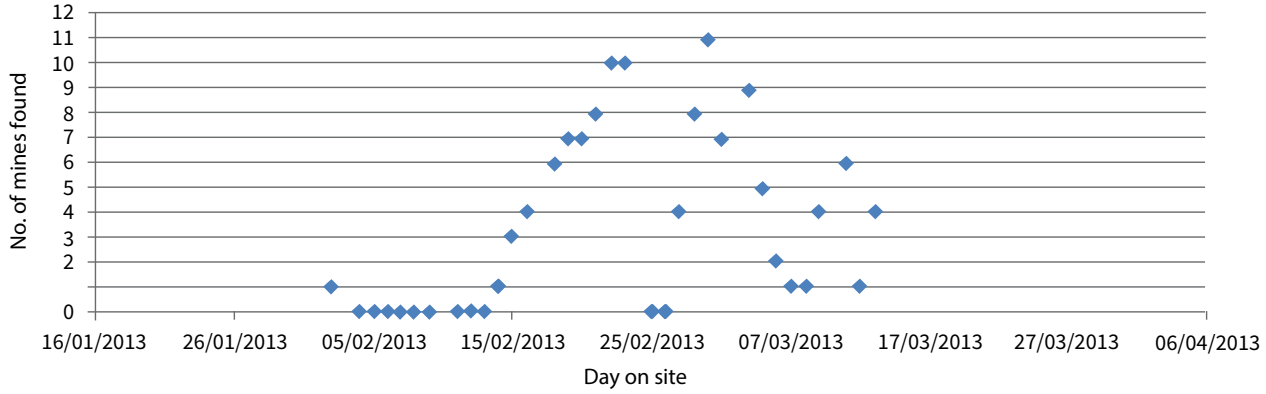

Figure 4. Mines found/day, a relatively clean site profile associated with a pattern minefield.
Figure courtesy of Fenix Insight Ltd.

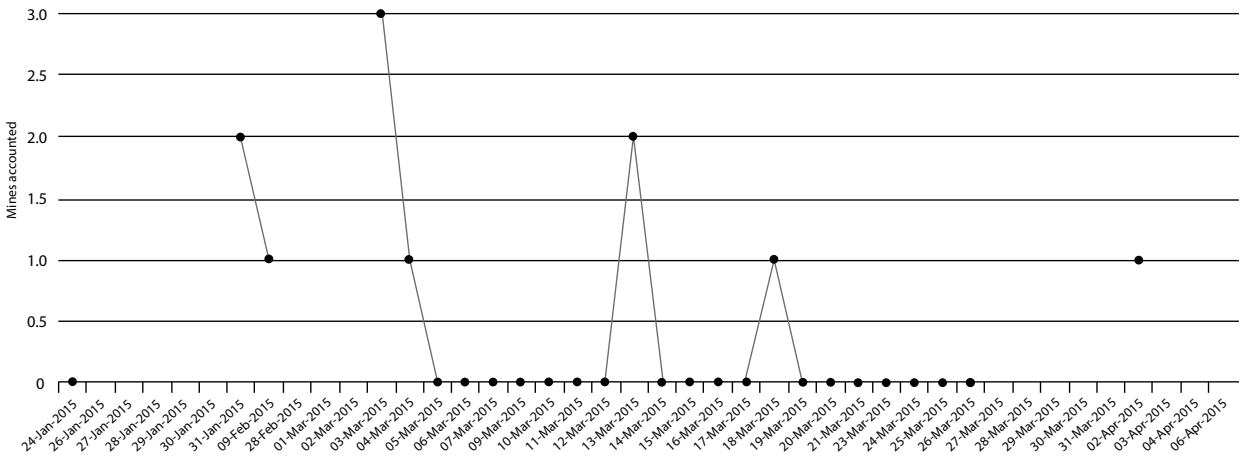

Figure 5. Mines found/day, an irregular profile associated with a mined area that is harder to "unlock." *Figure courtesy of Fenix Insight Ltd.*

Some programs choose to use m²/team/week; others use m²/deminer/day; others m²/deminer/hour. Not every team may be the same at all times; team numbers may fluctuate through sickness, leave rostering, or logistic constraints. The working week and day may vary reflecting weather conditions, travelling time, security issues, and other contextual factors. KPIs work best when they use unambiguous base data (m², the deminer, and the hour are all uniquely defined), but even then it is important to ensure that common counting rules are adopted. If the same m² has been processed by machine, dog, and deminer, is it counted three times, under separate KPIs, or once under a single land released heading for instance?

Productivity in land release is also strongly influenced by local circumstances and conditions. High levels of metal contamination can require more time-consuming excavations, slowing progress. Metal contamination might be such that the only option is full excavation, an even slower search process. Contamination type, slope, vegetation, soil type, and ground conditions (e.g., hard, wet, etc.) may also have a significant effect.

QUALITY MANAGEMENT KPIs

A number of simple quality management KPIs are also of value to the sector. Typically these center on the occurrence and severity of nonconformities, identified by organizational unit (e.g., a team), date, and management system aspect; whether it relates to quality, safety, or the environment; which standard or SOP requirement has not been satisfied, etc. Such KPIs have value when comparing teams in the same operating environment, looking for trends in performance, and when identifying aspects of standards or procedures that seem to be causing difficulties. However, there are potential problems when trying to compare differing quality management regimes in different countries. There is also the issue that many NMAS do not provide detail on the severity of different types of nonconformity. Accredited SOPs effectively list working requirements, but what requirements relate to major, minor, and critical nonconformities is also too often not specified clearly and consistently enough. Some contracts do specify, and IMAS 07.40 provides general guidance, but this is not universally applied. More clarity will be required in order for fair KPIs for quality management to be developed.

One quality KPI that may merit particular attention is EO remaining in released land. The absence of EO is a primary indicator of effectiveness of the land release process. If a hazard item is missed it indicates that the land release process has failed in some regard. Deciding what to do in the event that this specific nonconformity KPI is "non-zero" relies upon a thorough and reliable investigation and root cause analysis leading to appropriate and effective corrective and preventive actions.[5] This is an important indicator, but one that needs to be used with care by authorities, donors, and clients if operators are not to be frightened into avoiding or concealing declarations to avoid punitive measures.[6]

MAKING A DIFFERENCE: OUTCOME INDICATORS

Land release is also effective when it releases land that is used to yield developmental value. Developing meaningful outcome indicators to improve understanding of the benefits that arise from HMA is a challenging task, one that has yet to be meaningfully addressed by donors, authorities, and operators within HMA. However, even in the absence of an agreed selection of such outcome KPIs, there are some indicators that

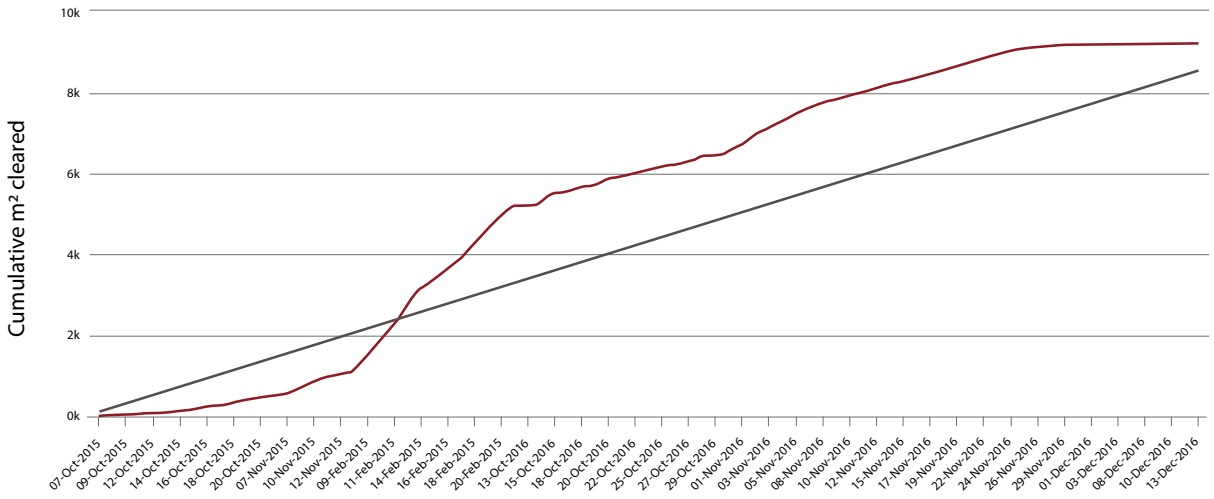

Figure 6. Progress chart showing a period when the production rate fell below the target line, followed by the deployment of additional clearance assets to increase the production rate and final completion around the target date. *Figure courtesy of Fenix Insight Ltd.*

could be adopted. The simplest is a comparison of the use of land following release against the expectation of its use reflected in the prioritization and planning process. If land is used in the way that was expected, it indicates that the overall tasking and land release process has been effective. If land is not used at all, or used for some unexpected purpose, then it indicates some failing in the overall system. Other KPIs that could be considered include the number of IDPs (internally displaced persons) returning/ha of released land, or number of IDPs returning/released buildings. HMA KPIs could potentially be developed and agreed that link directly to the Sustainable Development Goals (SDGs).

POSSIBLE DISCRETIONARY KPIs

Other KPIs may be useful and should be considered.

SITE CHARACTERISTICS: ITEMS FOUND PER WORKING DAY

Plotting the number of items found each working day brings a time-based, rather than a geographical perspective to land release. Once again, disaggregation of data is important. In a mined area, the shape of the KPI profile provides additional indications about how successfully the extent and distribution of contamination is being predicted. At regular, easy-to-define sites, a "clean" pattern might be expected. There may be a few mines at the beginning during "breaching" toward mine rows, a larger number during clearance in the main mined area, and a period when no mines are found at the end during "fade out" prior to the decision to declare the site complete.

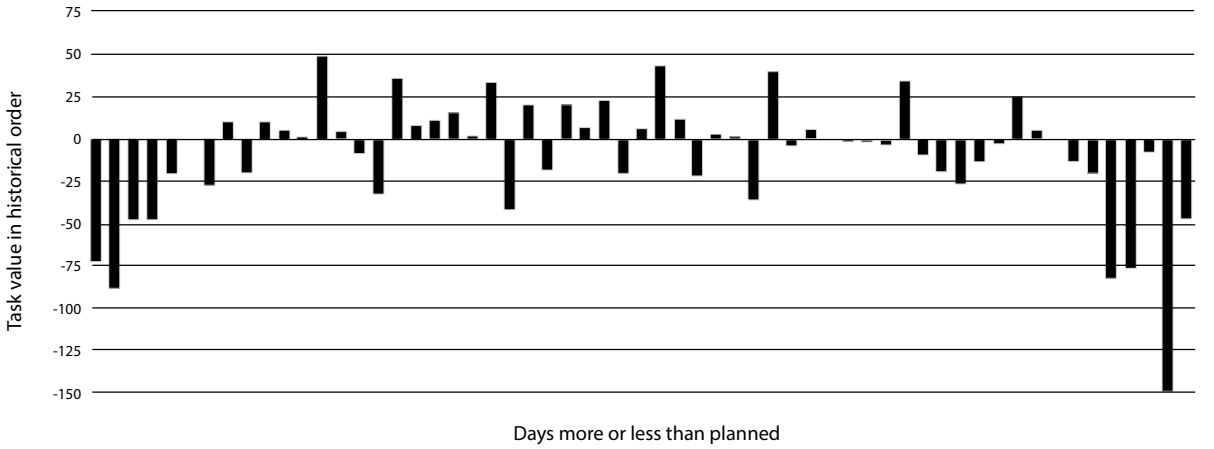

Figure 7. Duration variance by task. Tasks below the zero line were finished faster than expected; those above it later. In a perfectly planned project, all tasks would show as zero. In reality various "real world" factors may affect this KPI. *Figure courtesy of Fenix Insight Ltd.*

Metal contamination is one of the key factors affecting m²/searcher/day. The image above shows an area where the battle area clearance (BAC) searcher has excavated many times for each m² in the search for explosive submunitions.
Image courtesy of Roly Evans.

BAC on a hillside in southern Lebanon. The rocky nature of the ground, the vegetation, and the steep slope, along with the hot working conditions, are all factors that might affect KPIs such as m²/searcher/day.
Image courtesy of Roly Evans.

At sites where less information is available, or where it is harder to predict where contamination may be present, less regular profiles are likely.

PROGRESS: Proportion of Task Achievement

The percentage of task objectives achieved against time is one of the simplest indicators, but it is often ignored in HMA. It requires managers to predict both output at a site and the expected duration of work, which is not always a straightforward task. Even where no deadline is set, or where there may be some uncertainty about the volume of work expected at the site, HMA managers should be encouraged to set figures and monitor progress toward them, even if time and output targets need to be updated in light of new information.

PLANNING VARIANCE

Comparisons between when tasks are expected to be implemented against when they actually take place, and of planned duration against actual duration, provide indications of the reliability of planning processes. As with any KPI, there may be good reasons for differences between planned and actual activity, but managers should generally expect the reliability of planning to improve over time.

VIEWING KPIs IN CONTEXT

One of the erroneous arguments against the systematic use of KPIs in HMA is that they can be presented in a misleading way along the lines of the old apocryphal phrase, "lies, damn lies, and statistics." This is of course not a good argument for not using statistics or KPIs. It is, however, a good argument for not misusing data and indicators, as KPIs must be interpreted in context. Taken in isolation they can give rise to misleading or invalid conclusions. Comparison of the m²/mine figures between a pattern and nuisance minefield could lead to an assumption that one was inefficient compared with the other, but nuisance minefields also need to be reduced and cleared. Different field conditions (i.e., with varying contamination and vegetation levels) may explain significant variation in performance figures at apparently similar sites. There is currently no standardized way of recording field conditions to help understand variations in performance figures. The ability to disaggregate performance data by site characteristics would provide further support to improved understanding and decision-making. The nature of the contamination present at a site also influences performance. One minefield might contain easy to detect metal-cased, anti-vehicle mines, another minimum-metal, anti-personnel mines that are extremely hard to detect. Other considerations include how dangerous a mine is during excavation and removal and whether booby-traps are present as well as the effects of aging and degradation.

The results of one KPI often help us monitor the quality of another. Much like the navigator of a ship looking for constant logical consistency between different sources of information about the position of the vessel, any inconsistency in the implications of different KPIs demands management attention to find out why. If the m²/EO item for a typical team working in average conditions is low (implying that items are

likely to be found relatively frequently), but the finds/day figure is also low (implying that items are not found often) then it indicates a possible inconsistency requiring management attention—there may be many acceptable reasons, but there may also be an underlying data collection and reporting problem.

DATA COLLECTION

Indicators require accurate data. Unfortunately, HMA operators do not always collect enough data to a sufficient standard to generate meaningful KPIs. The first step therefore in generating any meaningful KPI is the collection of accurate and relevant data. In selecting what we want to monitor by means of KPIs, we are selecting what data we wish to collect. The use of electronic devices such as tablets and mobile phones has revolutionized reporting in HMA in the last decade. The standardized data input and the real-time view of operational data such methods enable—often immediately represented on dashboards—has been a huge help to the sector in several countries. However, regardless of the benefits of technology, the key to such data collection is the design of the actual forms, whether they are electronic or paper-based.

It is no exaggeration to suggest that forms are among the most important documents in HMA yet little attention is given to their design. A form should seek to capture, as accurately as possible, the necessary data. Long forms are rarely filled out carefully and there is a finite amount of data that operators can practically extract from the field. The imperative is therefore to select the most relevant data to capture. It is a choice, with data priorities preferably reflected in the forms. Ideally, an operator should decide the KPIs they wish to measure while designing the forms that will capture the all-important data in the first place. Designing forms might not be the most glamorous job in HMA, but it is among the most important.

Clearance of an AP minefield in dense vegetation. Such vegetation will significantly reduce the m²/deminer/day.
Image courtesy of Roly Evans.

A SafeLane Global Ltd site supervisor in a waterlogged minefield west of Mount Longdon, the Falkland Islands. Weather and the resulting ground conditions can have a significant effect on search and clearance KPIs.
Image courtesy of GICHD/Roly Evans.

STANDARDIZED DATA REPORTING

Meaningful indicators also require standardized data reporting. The principles of common counting rules and like-for-like comparisons are essential, but these are not necessarily applied in HMA. For example, m² reported as land released often leads to the suspicion that the figure represents mostly cancelled land, a product that is much cheaper to produce than m² cleared. M² reported as cleared can be heavily inflated and doesn't always represent the area that has been fully searched or where hazards have actually been removed. It is still not clear that m² indicated as

An M-14 minimum-metal, anti-personnel mine from a site where the vegetation was removed through burning. Comparisons of m²/deminer/dour, m²/searcher/day, or mines found/day must take into account the nature of EO found in order to be valid.
Image courtesy of Roly Evans.

IED components in Iraq, March 2016. HMA is still to standardise how such devices may be reported into operator and national databases, not only to allow better reporting under Article 7 of the APMBC but also to enable such databases to be used meaningfully as risk management/threat assessment tools.
Image courtesy of Ollie Shepherd.

either cancelled, reduced, or cleared is reported consistently. For example, say an organization physically cleared 15 percent of a confirmed hazardous area (CHA) in order to find 100 anti-personnel mines a record indicates is present, how would the other 85 percent be reported? Would it be counted as cancelled, reduced, or cleared? There are reasonable arguments for each option. However, there are not yet common counting rules for such a scenario.

The reporting of EO is another area where all is not necessarily what it seemed to be in the past. Often a very general figure of unexploded ordnance (UXO) might be reported. What that type of UXO might be is too often unspecified. Sometimes it can simply be small arms ammunition, which in any case is not UXO but abandoned explosive ordnance (AXO), or it can be larger caliber items that have not been armed or damaged. It is notable that much that is found on the battlefield is AXO. Firstly, correct reporting of ERW under Protocol V of the *Convention on Certain Conventional Weapons* defines ERW as either UXO or AXO.[7] Best practice would require adherence to this protocol. Secondly, if operators routinely recorded whether an item of ordnance was armed or not, better systematic risk management would be possible. The issue has further been emphasized by the lack of standardized reporting of IED contamination, where the need for databases to act as a tool for risk or threat assessment is even greater. In Iraq and Syria there have been instances of IED components such a 9 V batteries being reported as IEDs in databases, leading to situations where reported figures on IEDs are false. Once again, the need to establish common counting rules and like-for-like comparisons is clear.

- **Areas.**

Total area released	7,929 m²
Total area technically investigated	841 m²
% area technically investigated	11%

- **Land release process performed (key performance indicators/ratios).**

Average demining rate	10.40 m²/deminer/day (6hr)
Average efficiency	5.88 m²/mine
Average deminer day/mine	0.57 deminer days (6hr)
BAC rate	648 m²/deminer/day (6hr)

- **Quality non-conformances, complaints, accidents.** Nil
- **Recommendations for improvement.** Nil
- **Follow-up actions arising from the review.** Nil

Figure 8. KPIs integrated into the Management Review of the Site Implementation Plan document for Minefield 096 in the Falkland Islands, December 2017. Note the KPIs selected to be recorded in this key document include total area released, total area "technically investigated," percentage "technically investigated," average daily deminer rate, average efficiency expressed in m²/mine, average deminer days/mine, and the BAC rate for areas of the CHA not contaminated with mines.
Figure courtesy of Fenix Insight Ltd and SafeLane Global Ltd.

INTEGRATING KPIs INTO DAILY WORK

KPIs are already being used by a number of clearance organizations who monitor their operational outputs by using dashboards. Some organizations integrate graphical representation of KPIs into key reporting documents. This way, the use of KPIs is fully integrated into the work of the program and has become a norm.

Dashboards are becoming standardized across HMA and can be an effective way of easily monitoring selected KPIs. If more KPIs are standardized across the

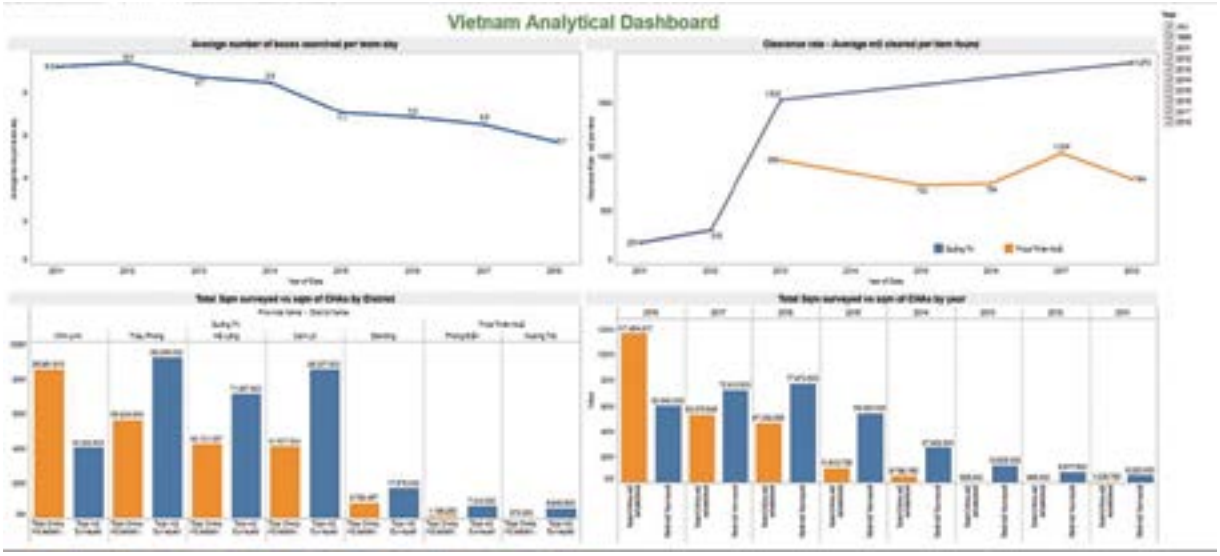

Figure 9. NPA Vietnam Analytical Dashboard showing KPIs concerned with the survey and clearance of areas contaminated by cluster munition remnants.
Figure courtesy of Norwegian People's Aid (NPA).

sector, dashboards showing comparative performance between operators at a national level will become easier to generate.

CONCLUSION

Assessing KPIs for operations analysis typically involves some form of comparison. For any form of comparison to be credible requires standardization. Basic KPIs that help us analyze operations in context should be welcomed by all in HMA, including donors, operators, and NMAAs.

This article has only briefly covered some of the more mainstream HMA KPIs that the industry might wish to consider formally adopting. Relevant KPIs not covered include reporting KPIs (e.g., proportion of reports accepted/rejected), accident KPIs, cost-related KPIs (a metric that has been subject to significant debate over the years in HMA), open burning open demolition (OBOD) KPIs such as the amount of explosive stores used relative to devices destroyed, and gender and diversity KPIs that typically reflect sex and age disaggregated data (SADD). These metrics could easily be deemed core KPIs and should be considered.

The scope of this subject is extensive but not always easy to address, and it is likely any progress to standardize KPIs will be incremental, possibly with an initial portion of core KPIs being agreed upon, accompanied by some discretionary KPIs being suggested. The development of a modest number of standardized KPIs, viewed strictly in context, is long overdue. Development of such KPIs could be done relatively quickly. It is time that HMA caught up with other industries.

See endnotes page 63

(The GICHD is currently developing a Technical Note for HMA on "KPIs and Mine Action." It would welcome any contributions on this subject (r.evans@gichd.org). Online training material covering the practical use of KPIs during HMA operations is available for free on the GICHD E-Learning Platform - https://training.gichd.org/)

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