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National Mine Action: Problems and Predictions

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National Mine Action:
Problems and Predictions

Introduction

I recently received an e-mail with real good news on the line: I would commit to sticking my neck in the noose once more. The questions included:

- Will technology ever improve speed and safety in Humanitarian Demining (HD)?
- What is the comparative efficiency among commercial, military and NGO clearance?
- Will dogs be more or less integrated into HD programs?
- When will land use priorities determine clearance priorities?
- Is "donor fatigue" a reality? If so, how do we fix it?

These questions are right in the middle of my current pet struggle to give technology its rightful role and place in mine clearance. I would like to discuss both technology in (HD) and donor fatigue, because technology is linked to funding. Present HD methods are too slow and ineffective at solving the total problem, so the donors do not get the same money.

I want to present this article simply as a South African who has been involved in HD on one hand and associated with research and development (R&D) on the other. By 1996, as one in the South African government-owned demining group, I was already using a presentation slide that read: A Technologist's Nightmare: You build the SILVER BULLET and nobody wants to use it.

Little did I realize then that this nightmare would turn out to be the truth for technology in general and not only for one individual in particular. The fact is that new technologies and products are being blown out of the game before they have been given a fair chance to develop into their full potential. Initially I blamed the people controlling the demining as being responsible. Now I realize that people developing the technologies are at least equally responsible. Too many are simply doing their R&D for R&D's sake or for financial gains with too little drive to get the product field-ready for deminers to use. This act in turn is upsetting the deminers in the field, justifying their attitude that the research monies should be used directly for demining.

Will Technology Ever Improve Speed and Safety?

The simple answer is YES. In fact, for us as a demining group, it already has. For example, in 1991–92 we cleared 12,000 mines from around 62 pylons on the Mmapula–South African border power line in Mozambique. We completed the job with two Campine mine resistant vehicles (MRVs) fitted with various demining accessories: two armoured bulldozers; and a detonating fuel-air gas mixture in one-meter diameter plastic-film tubes to work in spots that the machines could not get to, such as amongst the pylons bottoms and stays.

by Vernon Joynt, Technical and Scientific Consultant to the Council for Scientific and Industrial Research (CSIR), South Africa
The blast pressure of the fuel air gas mixture is sufficient to set off the func-
tional PMN and PMD6 mines used, but not the PMN2, which is blast protected.
Due to the fast movement of the PMN2 pressure plate during the blast, we found
the shallow-buried mines would jump out of the ground, making them visible.
Over most of the area being demined, the active mines were detonated by
steel wheels and dropped disc-rollers. As a check, the bulldozers would push
the soil and dead mines into heaps of earth that were sieved mechanically to
limit what we missed. At that point in time (1992), all that the contract required
was a safe surface to work on for the py-
lon repair crews, so only functional mines
had to be removed, while UXO and dead
mines under the surface were acceptable.
Our crew played soccer on the swept areas
to prove that no active mines were left behind.
A similar pattern appears after the
normal steel wheel and disc rollers had
passed. The gaps in the pattern showed
where a dull mine was to be found and
the deminers then simply destroyed it.
For clearing military-linked minefields this
pattern is the big advantage of rollers as
opposed to flails or tiller machines. The
latter leave no such patterns and move
around the mines that are not neutralised.
Using a backup detection array is also an
advantage or even a necessity.

There are many in the demining
community who have not really caught
ton the South African approach of us-
ing MIRV’s like Casspir, Buffalo or Wolves
linked to Steel Wheels and Rollers to
detonate mines while flattening and re-
moving vegetation. Putting a machine
that breaks and spreads the mines, the
pieces of which you must later locate,
does not support the approach. The
choice of starting with a full or tiller
as the first step in being technology to
mine clearance, as is happening at
present, is counterproductive for several
reasons. It will make the use of dogs and
other detection principles a problem.
Broken pieces of TNT mix into the soil,
making the use of dogs and other vapour
detectors dubious. Techniques like
Ground Penetrating Radar (GPR) also
need the mines to be intact and upright,
and the soil to be uniform without air
gaps in it. Also, moving the surface-shrap-
nel into the ground makes using selec-
tivity in metal detection more difficult
do. Now back to the example.
The total area cleared was 96,000
square meters, cleaned in five weeks by
seven men operating the machines and
one man was hurt on the bulldozer
when he removed the visor of the bomb
suit he was wearing because of the heat.
This bomb suit and helmet was used by
the driver of the bulldozer. The hel-
met and visor are considerably stronger
than the types used by deminers. These
can stop the shrapnel of a Valturma jump-
ing mine at a distance of one meter. This
pre-fragmented shrapnel is equivalent to
that of a PROM 1. The only problem
with the suit is that the price is $8,000
(U.S.) for the helmet aloud A pellet from
a jumping mine had gotten between the
driver’s head and the helmet, grazing his
head and drawing blood. He was lucky.
The UN statistical figures for removing
12,000 mines show that we should have
had at least six casualties, two of which
could have been fatal.
The cost was $135,000, or $1.40 per
square meter and nine cents for each mine
destroyed; 450 square meters were cleared
per man per day. During later contracts
where we worked under UN standards
and then had to also lift UXO and dead
mines, the figures changed with the ad-
inion of manual demining teams who
could work on such flat and loose “safe”
ground at a rate of 300 square meters per
man per day—up to 15 times faster than
normal for working in virgin mine fields—so it only raised the cost to $1.50
per square meter. In this first example,
technology proved its value by removing
vegetation and providing foot-safe ground.

Another example occurred in 1996,
the UN/AMIC contract in Angola, when 4,880 km of road was
cleared to a width of seven meters in one
year for $6.5 million. We cleared 215
mines consisting of improvised AT mines,
normal AT mines and AP mines in the
shoulders of the road and abutments of
the bridges. A further 802 elements of
UXO were uncovered. We used a total of
70 men, most of whom were manual
deminers hired from a Zimbabwean and
a British demining company. They were
supported by 24 Casspis and two Chubbey
systems run by South Africans and Angolans.
A very important component of the
team was the eight mine-detecting dogs
(MDXI's) of the American subcontractor
and the 20 South African dogs, half of
which were used at Calange in Angola
while the others were sent to Pretoria to
test the detection component of the Re-
mote Explosive Sensing Technologies
(REST) system we were using for detect-
ing low- and no-metal mines while do-
ing QA behind the manual deminers. The
REST system did the area reduction, with
the dogs searching out our low metal content
mines. They found three no-metal mines
that the handheld detector missed com-
pletely. The dogs held the key to the speed
and cost advantages achieved in the con-
tract, thus proving their worth in HD.
The total area cleared was 34,160,
square meters (3,416 hect-
ates or 8,440 acres), so the clearance was
done at 19 cents per square meter (a third
of the cost of normal manual demining),
with 1,500 square meters cleared per man
per day (at least four times quicker than usual for
cost disadvantages achieved in the con-
tract). In a separate calculation, the pric-
ing for the actual demining worked out
at 35 cents per square meter. This was at
least half the going rate for manual
demining in that area. In this contract,
we also did some work using a Casspir-
mounted metal detector array. It proved
very successful.

Based on a clearance comparison
done on a 20,000 square meter (two hec-
tares) piece of the mine field between
the three-meter-wide detector array on
the Casspir and our manual deminers using
hand held detectors, the array managed
to work 100 times faster, yet it still found
all the AP mines that the deminers could
find. The mines filled were a mixture that
included PMN, PMN2 and PMD6
mines. These are all low metal content

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A Mine Detecting
mines in a road in
AP mines. An important observation that came out of this test was done while we were weighing and inspecting every piece of metal the hand-held detectors were signal-
ning. We noticed that most of the false signals were pieces of shredded and metal junk, like wire and bottle tops that were either on top or in the first 10mm of soil. The array had been modified to ignore such small surface signals but to still find a PMN2 on the surface. This was the key advantage of the array.

Comments:
• The manual deminers worked be-
hind the array, and they uncovered an additional 1,640 metal signals not marked by the array. The 30 AP mines it did mark were the only mines they could find in the two hectare site, however.
• The array did mark a further 107 pieces of metal. Therefore, the array marked 15 times less false alarms than the hand detectors without missing the mines. So it was much more selective than the hand detectors.
• In light of the Database of Demining Incident Victims (DDIV) facts about how manual deminers miss at least three percent of mines, it would have been interesting to have had the ar-
ray behind the deminers. We may have

allowing the use of technology and three-
fold increases for price and speed. Dur-
ing the period from then until the end of 2000, we did 25 contracts for which the average contract price was slightly less than $400,000, and there was only one proper contract ($2.7million in 1998) in which we could use the technology ef-
ciently. This was the third example al-
ready given above.

The succession of small contracts where high capital investment and re-
bulitization cost made the Casspirs stay away virtually turned our group into a dog training company. The REST experi-
ence formerly has given us additional knowledge in the training and use of nor-
mal MDDs. This contract size problem can be seen as one of the main reasons that the R&D component of our group has been moved into the South African government’s R&D organization, the CSIR. R&D simply cannot be supported or properly used in these small demining contracts. The situation can be likened to a road building company trying to use its graders and dozers to compete for the repair of suburban side walk contracts. If any one group must bear the
blame for retarding technology in HD it
must be those responsible for fragment-
ing donor monies into these small pack-
ages. This really leaves demining technol-
y in the hands of the military. The military has the further advantage of gen-

erally assembling the best equipment, even if it is quite expensive. NGOs that have visionary management and strong financial support may become the tech-
ology leaders in HD. As for the com-
mercial companies, in my opinion they have no hope of competing, as long as the prescriptive nature and size of the con-
tracts remains small as they are at present. These companies are then forced into us-
ing manual demining and MDDs, in-
stead of the technologies that have in fact already proven to be most cost effective.
In the end, it will probably have to be the military, which is ac-
cused of causing the problem in the first place, that will have to provide the final solution to the problem.

Comparative Efficiency
Among Commercial, Military and NGO
Clearance Teams
There really needs to be no choice favoring any of the groups on efficiency.

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Conclusion
The management of HD must re-
fect on the fact that the established tech-
iques they are now supporting as the way to solve the big problem are too slow, not cost effective and causing too many ca-
sualties. Only when they have successfully addressed these problems will the donor fatigue and other growing problems be solved. Finally, everybody must get much more serious about getting the appropri-
ate technologies into the field.

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