Area Mine Clearing System (AMCS)

Study Report

Contract No. DAAB15-00-A-1009
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Prepared for the Countermine Division, Project Manager for Close Combat Systems
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BRTRC
TECHNOLOGY RESEARCH CORPORATION

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1.0 INTRODUCTION

1.1 Scope

This Study Report was prepared at the direction of the Countermine Division, Project Manager for Close Combat Systems based on a request from the US Army Engineer School. This report was prepared by BRTRC Technology Research Corporation under contract DAAB15-00-A-1009, Task No. 0013. The report provides an analysis of the various Area Mine Clearing Systems (AMCS) that are available or under development on the world's military and commercial markets. Because of the limited time available to conduct this trade-off analysis, it provides less than a complete or comprehensive look at all of the characteristics of such systems. However, it does examine many of the major requirements and performance criteria that will probably drive any area clearing system selection in the future. It addresses the guidance provided by the Project Manager's representative and input from the proponent on criteria and systems to be evaluated.

1.2 Background

Ever since the introduction of the landmine into modern warfare, armies have sought means to rapidly breach minefields or clear areas contaminated by mines. Experimental systems were used during World War II consisting of rollers, plows, and flail devices. Since that time, much focus and development has been given to the problem of breaching a lane through a complex obstacle system while under direct and indirect fire from enemy weapons. Not much serious attention had been given to the area clearing problem until the last ten years or so. Since the end of the Cold War, however, the US Army has become increasingly engaged in contingency missions around the world. In many of these areas, unexploded ordnance and residual landmines or booby traps frequently impact the ability of the peacekeeping or peace enforcement organizations to conduct their primary mission. Therefore, route and area clearance missions have been critical to mission success. Unfortunately, few mechanical mine clearing systems have been acquired, and soldiers must still rely on labor intensive manual methods of detection, probing and destruction of landmines. A few small clearing devices have been developed. However, the US Army still lacks an effective means to clear mines from large areas. Breaching equipment is typically unsuited for the area clearing missions, since generally speaking, area clearing missions are not normally conducted under direct fire and are not usually constrained by time. Therefore, some technologies such as flails are being reconsidered as potential options. In the past, flails and similar equipment were judged too slow, required too much power, and created too visible a signature to be useful in the breaching mission. These concerns are far less important for area clearing. As of this date, there is no formal separate Operational Requirements Document (ORD) for a Area Mine Clearing System (AMCS). However, the capability is being explored as part of the Joint Area Clearance ACTD in conjunction with humanitarian demining investigations.

In addition, the US Army Engineer School and the Project Manger for Close Combat Systems are working together in response to recent direction from the Commanding General, US Army Training and Doctrine Command (TRADOC) and the Army Requirements Oversight Council (AROC) to provide countermine equipment to support Operation Enduring Freedom (OEF).

In December 2001, the AROC approved a list of countermine equipment for procurement including several Mini-Flails for area clearance missions. There have been some performance issues as well as supportability issues associated with the use of the Mini-Flail. Other United Nations countries are using different systems to address the Area Mine Clearing mission.

1.3 Worldwide Developments

A number of countries have started to adopt Area Mine Clearing Systems for their forces engaged in peacekeeping, peace enforcement, humanitarian demining and other international missions. In the wake of the war in the Falkland Islands in the early 1980's, the British were faced with a massive residual landmine problem that needed to be addressed. In response to this situation, the United Kingdom has developed systems for area clearing missions. Furthermore, growing humanitarian concerns about the landmine problem in several regions have prompted other countries and commercial organizations to develop systems specifically designed to address humanitarian demining missions in conjunction with area clearing. There are numerous items on the commercial and military markets that have the potential to meet the Area Mine Clearing needs of the US Army. This trade-off study takes a look at those systems in an attempt to determine which system or systems offers the most promise for US forces.

2.0 REQUIREMENTS AND ALTERNATIVES

2.1 Requirement

As stated previously, there is no formal Operational Requirement Document (ORD) for an Area Mine Clearing System (AMCS) at this time. An initial draft ORD was prepared in October 1999 for review by the US Army Engineer School (USAES) at Fort Leonard Wood, MO. However, no action has been taken as yet toward approving this draft and creating a formalized requirement. In response to urgent requirements from the field, the PM-CCS and the USAES are currently considering courses of action related to the development and acquisition of a limited number of AMCS. In the absence of an approved ORD, the basic performance requirements of the system, as articulated in the draft ORD, were used as a gauge to establish the major evaluation criteria for the analysis and comparison of the alternative systems. The primary characteristics of such a capability are estimated below:

- Rates of Mine Clearance in various soil and vegetation conditions
- Effectiveness of Anti-Personnel and Anti-Tank Mine Clearance
- Environmental Impacts of Clearing and Operator Visibility
- Impacts of Slope, Depth, and System Width on Clearing Operations
- System Survivability against AT and AP mines
- Operator Survivability against AT blast and AP fragmentation
- Availability of a Remote Control or Remote Operation capability

- Air Deployability
- Ground Transportability
- Supportability of the System
- Maturity of the System and its Technologies

2.2 Alternatives Considered

This trade-off study/analysis examines the following Area Mine Clearing Systems (AMCS) alternatives. Principal characteristics of the systems are at Appendix A:

- Aardvark MK IV – Aardvark Clear Mine, Ltd. (UK)
- AMCV-Keiler – Rheinmetall Landsystems GmbH form. Mak Systems (Germany)
- Armtrac 100 – Ground Sift and Clear Systems, Ltd. (UK)
- Armtrac 325 -- Ground Sift & Clear Systems, Ltd. (UK)
- Armadillo – Terra Segura International Ploughshares Technologies (USA)
- BDM 48 Brush Deminer – PRO MAC Manufacturing, Ltd. (UK)
- BIGAT MiSa1 -- BIGAT GmbH (Germany)
- Bigfoot -- Redbus LMDS, Ltd. (UK)
- Bofors-Mine Guzzler – Bofors Defense AB (Sweden)
- Bozena-3 – Way Industry, a.s. (Slovak Republic)
- Compact Minecat 230 – Norwegian Demining Consortium AS (Norway)
- Digger -- Digger Demining Technologies Research (Switzerland)
- Floating Mine Blade -- Developer: CECOM – NVESD (USA)
- FMR 2000 -- HADI Maschinenbau GmbH (Austria)
- Grizzly Breaching Vehicle – United Defense Limited Partnership (USA)
- Heartlands BMHA III -- Heartlands Group (USA)
- Heartlands Uni-Disc III -- Heartlands Group (USA)
- Heartlands Uni-Sift, US-1– Heartlands Group (USA)
- Hydrema 910 Mine Clearing Vehicle – A/S Hydrema Danmark (Denmark)
- Hydrema M1220 Light Armored -- A/S Hydrema Danmark (Denmark)
- Hydrema Weimar w/MFV-1000 Flailhead -- A/S Hydrema Danmark (Denmark)
- Krohn Mechanical Mine Clearance System (KMMCS) – Walter Krohn (Germany)
- MCAP/D7 Dozer -- Caterpillar, Inc. (USA)
- MgM Rotar Mk-I – MgM Menschen gegen Minen e.V. (Germany)
- MgM Rotar Mk-II – MgM Menschen gegen Minen e.V. (Germany)
- Mine Breaker 2000/2 – FFG Flensburger Fahrzeuger GmbH (Germany)
- Mine Clearing Cultivator – Developer: CECOM - NVESD (USA)
- Mine Crusher 2000– FFG Flensburger Fahrzeuger GmbH (Germany)
- Minelifta – Corus Northern Engineering Services (UK)
- Minenwolf -- STS Safety Technologie Systems (Germany)
- Mineworm – Redbus LMDS, Ltd. (UK)
- Oracle w/Spitfire Tiller Drum– Countermine Engineering AB (Sweden)
- Patria RA-140 DS – Patria Vehicles Oy (Finland)
- Pearson Ploughs Full-Width – Pearson Engineering, Ltd. (UK)
- Rhino – Rheinmetall Landsystems GmbH (Germany)

- RM-KA 01 – DEMIN – KA d.o.o. (Croatia)
- Scanjack 3500 -- Scandinavian Demining Group AB (Sweden)
- Survivable Demining Tractor Tools (SDTT) -- Pearson Engineering, Ltd. (UK)
- Tempest Mk3 – Development Technologies Workshops (Cambodia)
- Viking Mine Clearing System (VMCS)– Hagglunds Moelv AS (Norway)

3.0 METHODOLOGY

3.1 General

No combat or battlefield simulation models were used in this Area Mine Clearing System (AMCS) trade-off analysis. However, a decision support software package entitled Expert Choice™ 2000 was employed for the performance and utility analysis of the alternatives. Relative performance of the alternatives with respect to the selected criteria shown in paragraph 2.1 form the basis for this portion of the Trade Study Analysis. Performance of the alternatives is based on information obtained through reference material, demining catalogues, PM-CCS data, manufacturers brochures, briefings, reports and other data regarding the systems. The results of the analysis first attempt to refine the list of forty (40) alternatives to the "Top 10" for a more in depth examination. Once overall performance is established, the results can then be integrated with affordability considerations in making an informed recommendation for the program.

3.2 The Analytical Hierarchy Process (AHP) and Expert Choice™ 2000

The methodology used in this study uses the Analytical Hierarchy Process (AHP). The AHP is a decision theory that was developed by D. Thomas L. Saaty at the Wharton School of Business of the University of Pennsylvania as a means to define, organize, and resolve complex questions involving multiple criteria of varying importance. It is a mathematical model that relies on the mechanics of pairwise comparisons, direct data input, and matrix algebra. The process makes possible a logical and systematic evaluation of each proposed alternative with respect to every other alternative over the full range of the criteria defined. Expert Choice™ 2000, a commercially available computerized AHP decision support software designed by Dr. Ernest H. Forman, was used as a primary tool in conducting the initial performance screening and overall utility analysis of the alternatives.

4.0 PERFORMANCE ANALYSIS

4.1 General

A hierarchy or decision tree description of the operational requirement serves as the core of the evaluation process. Based on guidance from the Office of the Project Manager and the US Army Engineer School, the hierarchy for AMCS analysis was derived indirectly from categories of data reasonably available on the majority of the systems. This data is presented in Appendix A. The evaluation hierarchy was developed by BRTRC analysts familiar with countermine and demining processes. Criteria weightings were calculated based on an understanding of the area

mine clearing problem, current system considerations, and guidance from the project manager. Actual weights were derived indirectly during the mechanics of the software pairwise comparison process. The relevant major evaluation criteria under each of the four criteria headings are shown in Figure 4-1:

Operational Performance Criteria	**Survivability Criteria**	**Deploy & Sustain Criteria**	**System Maturity Criteria**
1. Rate of Clearance (in square meters/hr) in various terrain & soil types 2. Clearing Effectiveness (in %) against AP & AT mines 3. Impacts of Clearing on the environment and operator visibility and the effect of slope, depth and device width on Clearing	4. System Survivability against AT blast, AP frag, and component protection 5. Operator Survivability against AT blast, AP frag and small arms fire, and remote capability	6. Air Deployability using standard military air transport 7. Ground Deployability using self-transport or normal transport means 8. Supportability in terms of system availability, confidence in support means, Training, Manpower, and Multi-Use options	9. System maturity in terms of hardware availability, field experience, and quantity of systems in use

Figure 4-1 Major Evaluation Criteria

Since the relative importance of each criterion is not equal, a series of pairwise comparisons was necessary to assess the relative significance or importance of one criterion versus another. Using the Expert Choice 2000 ™ software, pairwise comparisons were made and the individual comparisons were synthesized into an overall evaluation of importance of those factors. Results of the synthesis are expressed as criteria weights. The BRTRC analysts developed the proposed weightings based on extensive experience in countermine issues, programs, and operations. Inconsistencies in the pairwise comparison process identified by the software as an "inconsistency (IC) index" were resolved to assure that the IC was below the recommended upper limit of 0.1. Figure 4-2 shows the resultant evaluation hierarchy for use in the relative comparison of alternatives for Area Mine Clearing System (AMCS). Appendix B presents a “treeview” of the hierarchy.

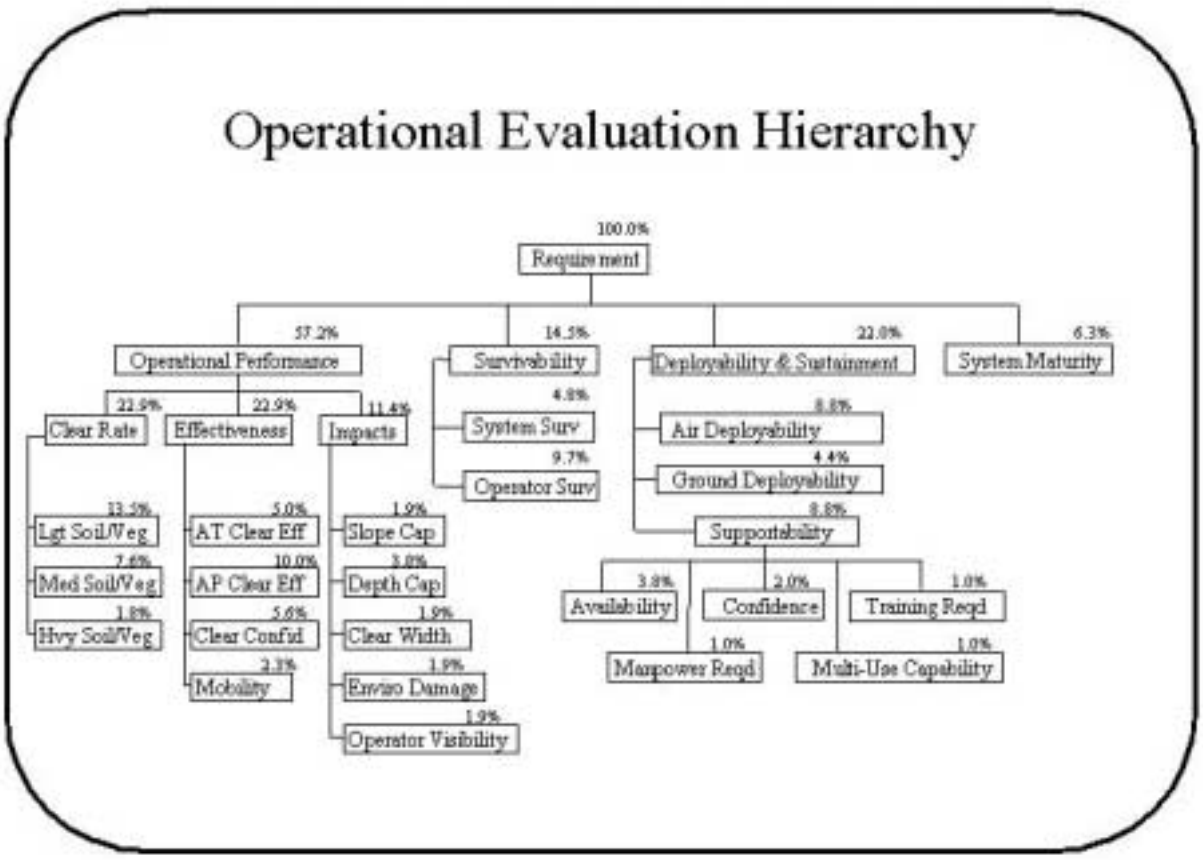


Figure 4-2 Area Mine Clearing System (AMCS)
Evaluation Hierarchy

4.2 Initial Screening of Alternatives versus Operational Hierarchy

Appendix C presents the initial screening results of the overall operational evaluation in numerical form for the various elements, factors and criteria in the overall evaluation hierarchy. These results are summarized in Figure 4-3. This section discusses the most significant of the findings. Input data for this Trade-Off Analysis was derived from demining catalogues, PM-CCS data sheets, test reports, reference material, manufacturer's brochures, briefings, technical reports and other data regarding the systems. Where data was not available (and the manufacturer did not respond to phone calls and e-mails), engineering judgment was used to supplement information and to fill data voids. In some cases (e.g. rates of clearance and effectiveness), numerical data was used directly. Other criteria inputs were based on a 0-10 point scale consistent with the specific performance element being examined. The results of this portion of the analysis are expressed in terms of the maximum possible score of "1.00" for the perfect system in every criteria. The relative rankings of the "Top 10" alternatives selected for further detailed analysis are shown in bold, italicized print.

Initial Screening Rank	**Alternative Name**	**Overall Score (max=1.0)**
1	***Aardvark Mk IV***	**.8379**
2	***Hydrema 910 MCV***	**.7549**
3	***Oracle with Spitfire Drum***	**.7507**
4	***Compact Minecat 230***	**.7240**
5	***MCAP with D7 Dozer***	**.7226**
6	***Scanjack 3500***	**.7018**
7	***Mine Breaker 2000/2***	**.7010**
8	***Patria RA-140 DS***	**.6904**
9	***Pearson Plough Full Width***	**.6688**
10	***Grizzly Breacher***	**.6682**
11	Krohn MMCS	.6646
12	Bozena-3	.6521
13	Armtrac 100	.6513
14	AMCV-Keiler	.6389
15	Rhino	.6252
16	Heartlands Uni-Sift US-1	.6191
17	Armtrac 325	.6052
18	Viking	.6002
19	Bofors-Mine Guzzler	.5966
20	Heartlands Uni-Disc III	.5847
21	Minenwolf	.5822
22	Pearson SDTT w/roller	.5536
23	RM-KA 01	.5491
24	Heartlands NI Grind BMHA III	.5155
25	Bigfoot	.5137
26	Mine Crusher	.5048
27	FMR 2000	.5021
28	Mine Clearing Cultivator	.4988
29	Tempest MK3	.4977
30	Armadillo	.4907
31	Minelifta	.4882
32	BDM 48 Brush Deminer	.4656
33	Digger	.4559
34	Hydrema M1220 Light Armored	.4112
35	MgM Rotar Mk-II	.4093
36	Floating Mine Blade	.4041
37	MgM Rotar Mk-I	.4020
38	Mineworm	.3885
39	Hydrema Weimar w/MFV-1000	.3836
40	BIGAT MiSa 1	.3336

Figure 4-3 Area Mine Clearing System (AMCS)

Systems that offer the best combination of performance across the major criteria are at or near the top of the list. The Aardvark Mk IV achieves nearly 84% of the total possible score by virtue of rating at or above the 90th percentile in many of the evaluated criteria. Despite lower clearing rates, the Aardvark Mk IV displays excellent clearing effectiveness, survivability, deployability, and technical maturity. On the other hand, the Hydrema 910 MCV meets about 75% of the requirement. The Hydrema 910 has slightly better clearing rates than the Aardvark; but is a little less effective than Aardvark in clearing Anti-Personnel (AP) mines. Additionally, Hydrema is not as deployable by air as some of the smaller and lighter systems. It requires special jacking devices for C-130 compatibility. The system may also require transport waivers. Although the Hydrema equals system survivability of Aardvark, it does not provide the same level of operator survivability. Both Aardvark and Hydrema received the highest rating in System Maturity. The Oracle with Spitfire Drum also reflects a total of about 75%. Its claimed operational effectiveness is better than Aardvark and Hydrema. However, it is the least mature system in the top ten – only one system has been built. Of the forty systems considered, 13 failed to achieve a level of 50%. Many of the lower ranked systems are special purpose systems, which were not designed for performing the entire area clearing mission.

4.3 Detailed Analysis of "Top 10" Alternatives versus Operational Hierarchy

Figure 4-4 below presents the detailed results of the overall evaluation in numerical form for the various top level and criteria. The results are shown in "Ratio Scale" where the total sum of capability equals unity (i.e. = 1). Thus, ten equal alternatives would be shown as 0.1 so that 10 times 0.1 = 1.0. Rank is shown in parentheses. Estimated unit costs are shown for comparison.

Alternative	**Overall 100%**	**Operation Perform 57.2%**	**Survivability 14.5%**	**Deploy & Sustain 22.0%**	**Maturity 6.3%**	**Estimated Unit Cost**
Aardvark Mk IV	.1161 (1st)	.1065 (3rd)	.1261 (1st)	.1330 (1st)	.1282 (1st)	$540K
Hydrema 910 MCV	.1047 (2nd)	.1020 (5st)	.0837 (9th)	.1217(3rd)	.1282 (2nd)	$700K
Oracle w/ Spitfire	.1041 (3rd)	.1111 (1st)	.1170 (2nd)	.0956 (6th)	.0385 (10th)	$900K
Minecat 230	.1003 (4th)	.0907 (9th)	.1081 (5th)	.1224 (2nd)	.1026 (6th)	$400K
MCAP/D7	.0998 (5th)	.0961 (8th)	.0920 (7th)	.1073 (4th)	.1282 (3rd)	$193K
Scanjack 3500	.0974 (6th)	.1062 (4th)	.0886 (8th)	.0850 (8th)	.0769 (8th)	$1.0M
Mine Breaker	.0972 (7th)	.1081 (2nd)	.1022 (6th)	.0625(10th)	.0897 (7th)	$1.2M +
Patria RA-140 DS	.0958 (8th)	.0999 (6th)	.0627 (10th)	.0988 (5th)	.1282 (4th)	Est $500K
Pearson FW Plough	.0923 (9th)	.0832 (10th)	.1090 (4th)	.0939 (7th)	.1282 (5th)	$4.5M
Grizzly	.0923 (10th)	.0962 (7th)	.1107 (3rd)	.0797 (9th)	.0513 (9th)	$5.0M +

Figure 4-4 Area Mine Clearing System (AMCS) - Detailed Analysis and Ranking

4.4 Operational Analysis Findings

The Aardvark Mk IV ranks considerably above the other alternatives as the most effective overall system considering the criteria of Operational Performance, Survivability, Deployability & Sustainment, and System Maturity. The system offers the highest level of survivability, deployability, and supportability and it is a technically mature system. In addition, it has the third best operational performance behind the Oracle and the Mine Breaker, primarily because of their higher clearing rates. The Aardvark Mk IV is highly deployable by both air and ground transport and is almost as air transportable as the Compact Minecat 230. Despite its operational performance ranking of 3rd, the Aardvark Mk IV emerges as the number one choice. The only significant drawback to the system is in the area clearing rates that fall below systems such as the Oracle with Spitfire Drum, Scanjack 3500, Mine Breaker 2000/2, Hydrema 910, and others.

The Hydrema 910 MCV is ranked 2nd overall despite its 9th place in survivability and 5th place in operational performance. The Hydrema offers above average clearing rates, clearing effectiveness, and system survivability. And, it can be transported by C-130 using special jacking devices. However, the Hydrema just exceeds height and width limitations of MTCM Pam 70-1 and transportation waivers may be needed for US military aircraft transport. Both Aardvark and Hydrema received the highest rating in system technical maturity based on having more than 10 systems in the field for more than six years. However, the Aardvark has undergone a more extensive maturation process. The Aardvark, developed in 1985, has over 200 systems in the field and has been improved to the Mark IV version. The Hydrema 910 was developed 10 years later and has 23 systems in the field.

The 3rd place system was judged to be the Oracle with the Spitfire Drum. This system's main advantages are in operational performance because of high clearing rates, system survivability and supportability. However, Oracle is not a mature system and it is far less effective and deployable by air or ground than many of the other systems in the top ten. It should be noted that much of the data regarding performance of Oracle was derived from manufacturer's claims of performance that could not be verified through other independent sources or test reports. It is recommended that confirmation of performance levels be established prior to any decision regarding the Oracle.

The 4th ranked Compact Minecat 230 does well in deployability & sustainment by virtue of its excellent air deployability characteristics. Although nearly as effective as the Aardvark, the system clearing rates place near the low end. (Excellent deployability and low clearance rates are a function of its smaller size in comparison to Aardvark and Hydrema). Furthermore, the Minecat 230 is not as technically mature as some of the other systems. The 5th ranked MCAP has only moderate performance in most areas except maturity. MCAP has the highest clearing rates in light soil conditions. The 6th place Scanjack 3500 offers the highest clearing rates and AP/AT effectiveness of any flail. However, the system is not as survivable or as mobile as other systems. And, the Scanjack 3500 is not technically mature and requires two C-130s for a single system. The remaining systems place well down on the list of operational performance and/or the system maturity scale. The first 11 pages of Appendix D provide a detailed comparison of the alternatives for each of the individually rated characteristics.

4.5 Sensitivity to Changes in Criteria Weighting

The collection of charts and diagrams in Appendix D beginning at page D-1 provide much additional insight into the impact of changes in the criteria weights on the selection of the various systems. In general, these charts reveal that the selection of the Aardvark Mk IV is not very sensitive to variations in the weighting of the criteria. These findings will be discussed in more detail in this section.

At the baseline criteria weights shown on D-1, the Aardvark Mk IV is 10% better than the Hydrema and 11% better than the Oracle. The performance chart at D-2 indicates that the primary strengths of the Aardvark are in Survivability, Deployability & Sustainability, and System Maturity. Moreover, the Aardvark is notably better in Survivability and Deployability than any other system. In addition, Aardvark matches the system maturity of 5 of the top 10 alternatives.

In the area of Operational Performance, however, the diagram at D-3 places the Aardvark about 5% below Oracle and 2% below the Mine Breaker 2000/2. Therefore, if Operational Performance were the only consideration (i.e. weighted at 100%), other systems would be better. However, if Survivability were the key criteria as on D-4, the Aardvark would rate about 8% better than Oracle and around 14% better than Grizzly. From a straight Deployability & Sustainment perspective, D-5 shows the Aardvark roughly 9% better than the Hydrema 910 and the Compact Minecat 230. The figure at D-6 indicates that the Aardvark is a mature technology system along with several others. This diagram also clearly highlights the shortcomings in this area for the Compact Minecat 230, Mine Breaker 2000/2, Scanjack 3500, Grizzly, and Oracle with the Spitfire Drum.

If the Operational Performance weighting were reduced to 50%, as shown on D-7, while increasing the remaining criteria proportionately, the Aardvark's advantage over the Hydrema 910 would increase from 10% to 13%. If Operational Performance and Deployability/Sustainability were equally considered as the main criteria as D-8 indicates, the Aardvark is still 7% better than the Hydrema 910 and 12% better than the Minecat 230. Adding Survivability to the mix and weighting it equally with the other two criteria per D-9 still maintains an advantage for the Aardvark Mk IV of 13% over Oracle, 14% over Minecat 230, and 20% over the Hydrema 910. Even when all four top level criteria are equally weighted at 25%, D-10 shows Aardvark still keeps its edge by at least 13%. These relationships are more sharply defined in the next series of pages called gradient diagrams.

Page D-11 shows that the selection of the Aardvark Mk IV is not very sensitive to the specific weighting of the Operational Performance criteria. In fact, the Aardvark is the preferred system over the entire range from 0 to about 88 percent. Above the 88% level, the Oracle and Mine Breaker 2000/2 are preferred in that order. The Hydrema is somewhat more sensitive to this weighting and falls to 5th place as emphasis on Operational Performance grows to above 60%. On the other hand, variations in the weighting of Survivability on D-12 have no impact on Aardvark's selection. It remains as the number 1 choice regardless of the specific weight for this criterion. However, as the weight of Survivability increases above about 17%, the Oracle transitions to the 2nd spot while the Hydrema 910 slips to 9th spot as the weight approaches 100%. If the base weight of Survivability were doubled to about 30%, Hydrema would place 4th behind the Aardvark, Oracle, and Minecat 230. It is highly unlikely that this criteria would increase above such a level.

The Aardvark is just as dominant in the area of Deployability & Sustainability. D-13 reveals that Aardvark is also the number 1 system across the entire range of weightings from 0 to 100%. Any increase in the base weight of this criteria shows a preference for Hydrema and the Compact Minecat 230 behind the Aardvark. If emphasis on Deployability increases to about 90% or above, then the Minecat 230 becomes the 2nd choice between Aardvark and Hydrema. However, the Minecat's advantage over Hydrema at this point is only about 0.5%. It is also unlikely that Deployability coupled with Sustainment considerations would be maximized to such a level. From a System Maturity viewpoint on D-14, it makes no difference what the specific weighting is because Aardvark ranks first over the entire range from 0 to 100 percent. Only right at 100% do the other systems match the Aardvark.

The performance diagram on D-15 reveals the contribution of the subcriteria of Operational Performance. This chart shows a rather narrow grouping of the systems in the area of Clearing Effectiveness and a slightly wider spacing for Impacts. Only in the area of Clearing Rates is there a clear dispersion of the candidate's performance. This factor primarily drives the selection of the Oracle and Mine Breaker 2000/2 over the Aardvark in this area in spite of the Aardvark's clear advantage with respect to Impacts. However, if the weighting of the Rate of Clearance criteria were reduced slightly from its baseline of 40% to 33% or under per D-16, the Aardvark would be preferred by virtue of its moderate Clearing Rate and distinct Impacts advantage. On the other hand, if Rates of Clearance were increased, Aardvark would fall to 7th place as this criteria approached a weighting of 100%. By increasing the weight of Clearing Effectiveness from 40% to 55% or over according to the diagram at D-17, preference in Operational Effectiveness would shift from Oracle and Mine Breaker 2000/2 to the Aardvark. If the weight of Impacts was raised from 20% to 55% or over as shown on D-18, the Aardvark would place 2nd between Mine Breaker 2000/2 and Oracle in Operational Performance. Of course, in the grand scheme, these changes are not necessary to further support the selection of the Aardvark Mk IV, since it is the preferred system even though it is not ranked 1st in Operational Performance.

The D-19 performance diagram shows the Aardvark Mk IV as the best system from a Survivability perspective primarily because of its Operator Survivability characteristics. Furthermore, the Aardvark is 2nd in System Survivability. Hydrema is 9th overall in Survivability because of Operator Survivability. However, it is 3rd in System Survivability less than 0.1% behind Aardvark. Oracle is ranked 1st in System Survivability and 3rd in Operator Survivability giving it an overall Survivability ranking of 2nd place followed by Grizzly in 3rd. According to D-20, the Aardvark and Oracle are ranked 1st and 2nd respectively across most of the range of System Survivability weightings between 10 and 85 percent. Above the 85% level, Oracle would be the preferred system. Below 10%, the Minecat 230 takes 2nd place behind the Aardvark. It is rather unlikely that survivability of the system would be considered more than 8 times greater than survivability of the operator. Therefore, the selection of Aardvark is not very sensitive to changes in this weighting. Similarly, on D-21, reducing the weighting of Operator Survivability below 24% from its base weight of 67% would also show a preference for Hydrema, Oracle, and Grizzly. However, this would indicate that System Survivability is more that three times as important as Operator Survivability. This does not seem likely.

The subfactor of the Deployability & Sustainment criteria are shown in the D-22 performance chart. The Aardvark is the best overall system in this area because of its strong air and ground deployability. Despite its mid-range supportability, Aardvark places near the best of the air and ground deployable systems. It is not the best in any one area. However, it is consistently good across all of the subfactors. The three best air deployable systems are the Compact Minecat 230, Aardvark MkIV, and Hydrema 910 in that order. Oracle and MCAP/D7 are the most supportable but much less air deployable systems than those noted above. Grizzly and Mine Breaker 2000/2 are the least supportable and least air deployable systems. The only real advantage that Grizzly has in this criterion is its ability to self-deploy by ground.

Aardvark, as depicted on D-23, is the preferred system at any weighting of Air Deployability between 12 and 62 percent. Above 62%, the Compact Minecat 230 would be preferred. Such an increase would reflect a 50 percent increase in the emphasis on this factor. With respect to Ground Transportability on D-24, Aardvark is preferred over the range of weighting between 0 and 75 percent. Above 75%, the Grizzly, Pearson Full-Width Plough, Patria RA-140 DS, and Hydrema 910 are preferred. Such a change would indicate nearly a factor of 4 difference. Thus, the selection of Aardvark is not very sensitive to weightings in this factor. From D-25, Aardvark also dominates across the Supportability weightings from 0 to 72%. It is quite unlikely that Supportability would become 4 times more important than the combined air and ground deployability considerations. Thus, Aardvark is not sensitive to changes in the specific weights of this criterion. Page D-26 shows the combined contributions of the subelements of Supportability and shows the principal advantage of the Oracle and MCAP/D7 with respect to their Multi-Use capability.

Therefore, small and even moderate variations in the weightings in the baseline evaluation hierarchy will have little or no impact on the outcome of this study. In fact, the Aardvark Mk IV is the preferred system even when large changes are made in several of the criteria. However, if Operational Performance considerations were given substantially greater importance (i.e. 88% or greater) at the expense of other factors, other systems would fare better. It is rather unlikely that the consideration of survivability, deployability, and maturity would be suppressed to such a low level.

The series of 2-Dimensional figures shown on pages D-27 through D-33 provide additional insight into the relationships of the various elements of the hierarchy. For example, D-27 shows the relative Operational Performance of the systems versus their Deployability & Sustainment characteristics. In these charts, right and up reflects the better performance.
Those systems placed near the intersection of the 0.1 and 0.1 crosshairs are considered “Center of Mass” or average systems when considering 10 alternatives.

Oracle and Mine Breaker 2000/2 are better Operational Performers than Aardvark as reflected on D-27. But, Aardvark is much more Deployable and Sustainable. In fact, Aardvark is the only system that lies fully within the upper right quadrant displaying better than average characteristics in both areas. The Hydrema 910 is the only other system partially in the same quadrant. On page D-28, Aardvark and the Hydrema 910 are again the only 2 systems in the upper right quadrant for Operational Performance vs. System Maturity.

It is also clear to see that several of the upper systems are equivalent with respect to maturity. However, there is a moderate range of Operational Performance among those systems.

The chart on D-29 is particularly interesting in that it compares Clearing Effectiveness vs. Rate of Clearance. All of the systems are spread along a narrow band near the average of effectiveness. However, the range of clearance rates varies from a low for the Pearson Full-Width Plough to a high for the Oracle. No systems are fully in the upper right quadrant having better than average characteristics in both of these criteria. However, the Hydrema 910 is fairly close to that quadrant. Aardvark has the best effectiveness; but is the 4th lowest in clearing rates. The remaining charts through D-33 show similar comparisons of some selected criteria.

Pages D-34 through D-43 are known as "Head-to-Head" diagrams. These charts compare the various systems in a 1-on-1 manner. For example, D-34 compares the Aardvark Mk IV on the left to the Hydrema 910 MCV. The length of the bars indicates the relative strength of the system for that criteria. In this case, the Aardvark Mk IV has an advantage in Operational Performance, Survivability, and Deployability & Sustainment. However, the Aardvark and Hydrema are about equal in terms of System Maturity. Overall, the Aardvark is the better system. The scale on the bottom reflects the actual difference in the values recorded in the evaluation (i.e. Aardvark = .1161, Hydrema = .1047 overall). The absolute difference of these numbers is 0.0114 or 1.14%. This is recorded as 1.14% for the purposes of this chart. In reality, the true difference is (.1161-.1047)/.1047 or about 11%. The remaining pages in Appendix D compare the Aardvark Mk IV directly to the other systems within the top 10.

5.0 INTEGRATION OF COST AND OPERATIONAL UTILITY

Figure 5-1 integrates the estimated unit cost of each system with overall score from the operational utility analysis. A full sized version of this same chart is at Appendix E. It should be noted here that the "unit costs" shown are rough estimates derived from a variety of sources. In some cases, the costs have been estimated using engineering judgment and similar systems as the basis. This discussion is representative of the overall performance of the various systems evaluated in this analysis. The titles of systems shown in "Red" are not transportable using the C-130 aircraft. Those shown in "Green" are transportable by C-130 military aircraft. Those shown in "Black" (e.g. Scanjack 3500) require multiple C-130 sorties. From this chart, it is clear that the best performing system is also one of the least expensive. There are cheaper systems. However, none rivals the overall operational utility of the Aardvark Mk IV. An additional advantage is that the Aardvark is C-130 transportable. The closest overall performing system to the Aardvark Mk IV is the Hydrema 910 MCV. This system is also transportable using the C-130; but must use special jacking devices. However, the Hydrema 910 MCV does have a unit cost about 30% greater than the Aardvark Mk IV. The Hydrema 910 MCV offers the next best value to the Aardvark. The Hydrema 910 MCV affords about a 10% higher rate of clearance; but has a slight decrease in clearing effectiveness against AP mines (i.e. about 2%).

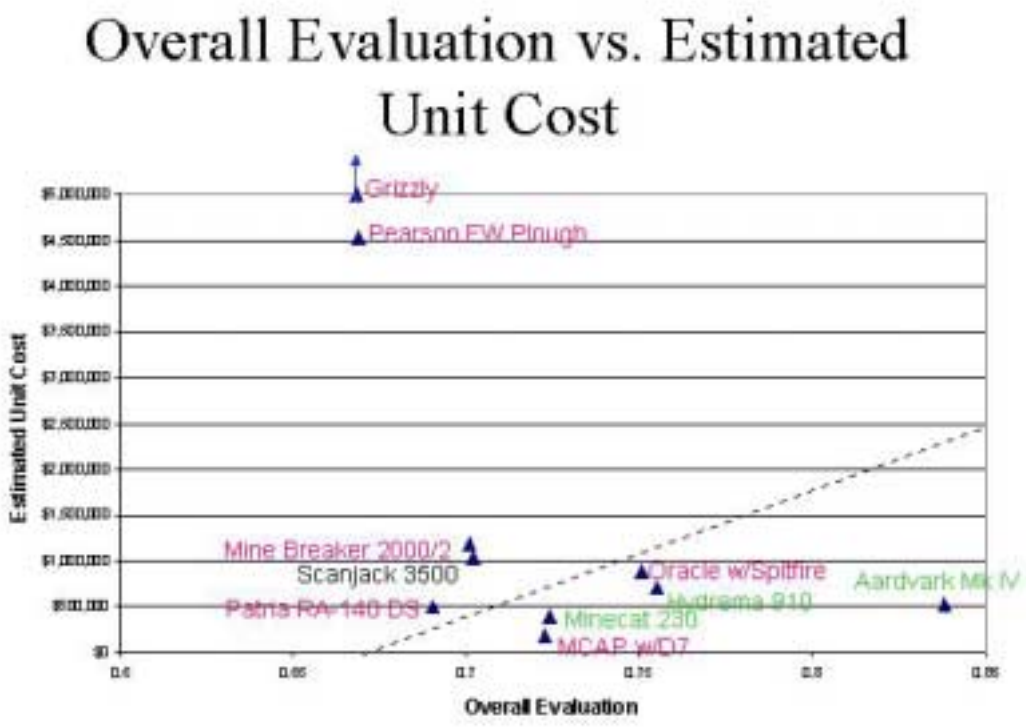


Figure 5-1 Comparison of Overall Evaluation and Estimated Unit Cost

There seems to be no discernable correlation between cost of the various systems displayed and their relative overall performance in terms of the combined evaluated criteria. This fact may highlight the complexity of the area mine clearing problem and the trade-offs required in order to maximize performance in one criteria versus another (e.g. clearing rates vs. clearing effectiveness). Some expensive systems perform at about the same levels as much cheaper systems. Prior to a final AMCS selection, unit prices of the systems should be verified. In Figure 5-1 it should be noted that the estimated cost of the Grizzly is only roughly indicated with a bar and arrow. The final production cost of these vehicles is not certain and prototypes are estimated at about $16 Million each. In actual production, these vehicles might exceed $5.0 Million per copy.

6.0 SUMMARY

This analysis recommends the Aardvark Mk IV as the best value and most cost effective alternative for an Area Mine Clearing System (AMCS) to meet the projected needs of US forces in a C-130 deployable package. The Hydrema 910 MCV is also recommended as the C-130/C-141 deployable option where higher clearing rates are required. Both the Aardvark Mk IV and the Hydrema 910 MCV are available commercially. Some additional insights into the Area Mine Clearing issue follow.

7.0 STUDY INSIGHTS ON AREA CLEARANCE

Research for this study included reading numerous test reports and other articles and reports concerning the use of mechanical clearing systems in minefields throughout the world. Some key insights from this review are described below.

7.1 Effectiveness

As in all countermine, there is no Silver Bullet for area clearance. There is no system that is best for all kinds of environmental conditions and for all types of mines. The 'best' mechanical clearance device is very much terrain (i.e. slopes, soils, moisture, and vegetation, as well as urbanization, ditches, termite hills, and other unique aspects to a particular location) dependent. Invariably, a toolbox approach is needed. However, the actual selection tools can vary. The analysis methodology used in this study identifies the best system across the board if one could only have a single system.

The top two, and five of the top eight systems are flails. Yet four of these five, including the top two, average only 90% clearance against Anti-Tank (AT) mines. Thus, the flail by itself is not enough if the threat is predominantly AT. Flails do very well against Anti-Personnel (AP) mines, with the top rated being assessed as 98% effective. Some of the alternative systems which perform well against AT are less effective against AP mines. High effectiveness against both AT and AP mines typically means high weight and, therefore, low deployability.

The rate of clearance for the MCAP/D7 w/rake assumed light vegetation. It is effective in those conditions, but totally ineffective in medium to heavy soil/vegetation. On the other hand, in cohesionless or sandy soils, the MCAP would be the most effective mechanical clearing system, with a clearance rate that could be as much as three to five times greater than used in this analysis. In a desert environment, a flail might theoretically be able to travel faster than with vegetation. However, the dust clouds would hamper operator visibility and the ability to distinguish the cleared from uncleared area.

Plow or rake type systems leave windrows (i.e. small soil berms) containing mines, which must eventually be cleared, manually or by other mechanical systems. The problem of clearing mines from the windrow is much more difficult in cohesive soils.

Flails are also limited by their ability to handle ditches, ravines and streambeds, and manmade features. Such irregular terrain can be most effectively cleared by hydraulic excavators equipped with small devices (e.g. about one meter wide) such as grinding, tilling or flail attachments. Demining personnel have also found that excavating buckets are useful in some of these conditions. Buckets like those for the MgM Rotar system can be employed on an excavator to clear mines from windrows.

Mechanical demining equipment is being used throughout the world for mine clearing; but the overwhelming amount of clearance done to date has been accomplished manually with mine dogs, electronic detectors and probes. Most mechanical clearing has been during tests or as an adjunct to manual clearing efforts. Flails are used to clear vegetation, trip wires, bounding

mine fuzes, and surface laid AP mines prior to clearance with hand-held mine detectors and dogs. The 99.6% clearance level (i.e. the UN Standard for demining) is an enormous challenge for mechanical clearance equipment. Furthermore, it is impossible to truly verify. Dependence solely on mechanical demining requires a willingness to accept a lesser standard of clearance.

A minimal area clearance toolbox should include a flail, an MCAP/D7 Dozer with rake, and an armored or protected hydraulic excavator with appropriate attachments. Mine clearing attachments should include an excavating bucket, sifting bucket (e.g similar to MgM Rotar or Hydrema Sifter), and a Countermine attachment (e.g. like the BDM 48 Brush Deminer, Heartland Uni-Disc II or Grinder, or Hydrema Bush Cutter or Deep Working Cutter). The final mix of attachments depends on their compatibility with the hydraulic excavator being considered.

7.2 Manual Clearance

The flail not only neutralizes mines and clears vegetation, it also detects mines. If an area is flailed without detonating any mines, and there no evidence of broken mine pieces, in the absence of intelligence to the contrary, it is reasonable to assume that the flailed area is free of mines. Further confirmation may be made by sweeping the area with hand-held detectors if desired. On the other hand, if the flail sets off mines in its initial passes, additional flailing is warranted to ensure all mines are destroyed. If AT mines are detonated by the flail, further manual clearing may be needed after the flail has eliminated the AP threat.

7.3 Safety

Efforts to improve operator safety by use of remote control may be at cross-purposes to unit safety. Many of the mechanical clearance system failures to destroy all the mines in testing have been attributed to the use of remote control. In a controlled test, evaluators know how many mines were used. Thus, it can be determined how many were missed. In the real world, you don't know that you missed mines until someone is killed or maimed in the area that was previously considered "cleared". Clearance with flails often requires multiple passes over the same ground. Trying to assure the overlap of enough passes by remote control on undulating terrain, or terrain containing significant vegetation and other obstacles is likely to result in missed or inadequately beaten (i.e. flailed) areas. Remote control operation is not the primary means of clearance for the highest rated systems, although it is available in several cases as an option. Several systems have demonstrated with crash dummy type instrumentation that the operator is safe in the worst case mine blasts. Specifically, Aardvark operators have survived thousands of mine detonations without injury. So, what is the real definition of safety in mine clearance? If the focus is on removing the threat of mines to unprotected soldiers who must use the area rather than the clearing system operator, then remote control of the clearing vehicle is not the best option.

Principal Characteristics of Area Mine Clearing Systems (AMCS)

Appendix A

Raw Data

	Bozena	Aardvark Mk IV	Armtrac 100	Hydrema 910 MCV
Operational length (total)	5282	7750	8400	10000
Reduced length (w/o attachment)	3102	5486	5000	9200
Operational width (total)	2680	3556	3000	4830
Reduced width (w/o attachment)	1750	2530	2200	2800
Clearance Width single pass (in meters)	1985	3000	2000	3500
Operational height (overall)	2200	3109	3150	3600
Reduced height (minimum)	2020	2613	3150	2700
Carrier/Host Vehicle weight (kg)	3690	11506	10400	15000
Clearing System only weight (kg)	860	3792	2600	3000
Operational/Combined weight (kg)	4550	15328	13000	18000
additional equipment required (number of pieces or 0)				
Weight of additional equipment required				
Prime Mover	Locust 750 remote controlled		New Holland tractor	910 mcv
Tracked/ Wheeled/ half tracked/ convertible	convertible	half tracked	Wheels	Wheels
width of tracks mm	300			
number of wheels				4
size of wheels				17.5R25
ground pressure kg/cm^2	0.66	wheels 1.35, track .35	Not given	Not given
climbing ability (degrees)	20	33	45	34
Method of clearance (Flail, tiller, grinder, cultivator, sifter)	Flail	Flail	Flail	Flail
number of flails/teeth	36	72	54	72
spacing between chains/ drums/chisels mm	55	37	10	49
Maximum Clearing Depth (in mm)	150-200	580	300	250
Is depth adjustable?? (y or No)	y	y	y	y
depth control auto/ manual /auto with overide	Mechanically	auto w override	Manual	auto w override
Clearance Rate (in sqm per hour)				
light soil/ small vegetation	500-1500	1440	2700	1000
medium soil/ medium vegetation	900	1107	1200	750
heavy soil/ dense vegetation	350-400	460	500	Not given
Number of Machines in Use	>40	>200	2	23
Locations in Use	Bosnia, Herzegovina, Croatia,Eritrea, Kosovo, Northern Iraq,Yugoslavia, Jordan, Ethiopia	over 25 countries	Bosnia, Kosovo, Mozambique, Lebanon	Denmark,Bosnia,Herzegovina,Croatia,Kosovo, Angola,Mozambique,Afghanistan,Eritrea
Commercially available?? (who, where)				
In development (where, when ready)		1107		
Experimental? (where, when ready)				
Clearing Effectiveness (in percent)	98%			
Anti-Tank (AT)	y	90%	94%	100%
Anti-Personnel (AP)	y	98%	y	98%
Can the System Clear??All Mines (y or No)	Except heavy AT	n		
Can the System Clear??Simple Pressure Only (y or No)	Y	y		
Is clearing test data available?? (y or No)	y	y		
Area Cleared so Far m2	over 6,000,000		5400000	Not given
Terrain impact				
Suitable for Hard surfaces (y or No)	y	y	n	Y
Suitable for Unpaved roads (y or No)	y	y	y	Y
Suitable for Open fields (y or No)	y	y	y	Y
Engine	Yanmar 51.1 kW		New Holland 123kw	Perkins 138kw
Fuel Capacity (liters)	50	200	280	300
Fuel consumption (Liters/hour)	7	23	32	60
Separate engine for clearing device	n	n	n	y Perkins 138kw
Fuel consumption separate engine l/hr				
Hydraulic oil capacity (l)	50	90	Not given	Not given
Is the system capable of remote control? (y or No)	y	optional	n	Opt

Greatest Dist (m)	500	Not given	0	0
cab airconditioned	y	y	y	y
remote station airconditioned	y			
number of cameras used	0			
recommended use (operator or remote control)	Remote	operator		
Transportability (derived from above wgt,L,W,H)				
Air Transport (C130, C141, C17, C5)	C130	C130 w/ removal of flail& air conditioner		C130
Ground Transport (M172A1, M870, HET)	truck w 6 ton trailor	low boy	low boy	
Self-Deployment Speed (kph)	12	50	45	35
Estimated Unit Cost including support equipment(FY03 $)				
Carrier Cost (FY03 $)	$119,482			
Clearing Device Cost (FY03 $)	$26,290 for 2			
Combined Cost (FY03 $)	$145772 plus 5-7% off for 2 or more	$540000+$65k for remote control	$338,000	$10M for 4 systems
Training costs	Free	included	$5000 per person	included
spare parts costs	$22,223 for 6 months	$120,000		included
repair costs	$3522 for tools			included
remote station Cost	$22,660			
Estimated Support Cost per year per system ($)	$180,840		$150,000	
Training duration (weeks)	6 working days	2 to 4 weeks		
AP Survivability	y	Excellent	y	y
AP System Blast (kg of explosive and number of blasts)				
AP Hours to repair following blast damage?				
AT Survivability	8.7 kg TNT wo/ serious damage			y
AT System Blast (kg of explosive and number of blasts)		10 kg	7kg	15kg
AT Hours to repair following blast damage?	within 1 hour	within 1 hour		1hour
Operator protection level (fragmentation mm)(eg. 7.62mm)	8	10	10	14mm armox 7.62 mm protection 47mm windows
System Reliability (MTBF in hours)				
Operational Availability (% or hours per mission)				
Timeframe for first delivery (months or years)	2 months	3	immediate	7
Estimated Production Rate (# per month)	3 per month	2		
Available Support (good some poor)	good			
Maintenance source (Contract, gov't, none, other)	Contract			
Supply source (Contract, gov't, none, other)	Contract			
Advantage 1	small, maneuverable, mature system	Mature system		Change direction of flail
Advantage 2	work in extreme climatic conditions	Simple mechanism easy repair		
Advantage 3		and access to spare parts		
Limitations 1	problems clearing PMA-2 a very small AP		below 100mm performance po	Slow
Limitations 2				Engine underpowered
Limitations 3				
Crew Size	1-2 per machine	2	1-3 per machine	1
1=10, 2=8, 3=6, 4=4, 5=2, >5 =0	10	8	10	10
truck deployment	6	10	9	9
air deployment	9	9	6	4

Data Source #1 (Mechanical Demining Equipment Catalogue.)

Data Source #2 (Jane's.)

Data Source #3 (Test reports, US)

Data Source #3 (Test reports, DERA, CROMAC)

Data Source #3 (Test reports, Other)

Data Source #3 (Manufacturers Data)

Characteristic

Raw Data

Minecat 230	Patria RA - 140 DS	RM - KA 01	Minelifta	Scanjack 3500	Viking	FMR 2000
6000	9450	4490	8990	14300	10500	7800
4850	7850	3500	4300	11000	4800	5000
2300	4000	2500	3555	3450	5000	3335
2000	2920	2500	3555	3000	3400	2665
2300	3400	2000	2500	3500	4000	2580
2700	2860	2000	3580	3700	4000	4080
2060	2860	1600	3195	3700	3300	3080
4700	1200	10000	15530	24000	21500	35560
2100	2400	2120	19970	8000	5700	3048
8000	14400	12120	35800	32000	32000	38608

Bobcat 863 H skid Steer loader			Kamatsu D65EX	John Deer 6081HTJ02		
Track	Wheels	Tracked	Tracked	convertible	Tracked	Tracks
385			660	750mm wide	Not Given	700
	6			8		
	14.00R-20					
0.4	Not given	0.5	1.09	0.96	Not Given	Not Given
Not given	25	32	30	17	27	14
Flail	Flail	Flails	Flail	double flail	flail	tiller
48	84	48	72	78	96	Not Given
50	40	42	95	45	42	30
500	370	200	200	400	250	600
y	y	y	y	y	y	y
Manual	Manual	Mechanical	manual	Manual (will have a tested computer control system by this fall)	manual	auto w override
2000	1500	1800	2500	2700	2800 to 8400	1300
Not given	750	1000	1800	2100	2000 to 6400	1000
Not given	300	500	800	1200	1120 to 4200	500
4	50	Prototype	Prototype	2	prototype	1
Bosnia, Kosovo,Iran	Not given	Croatia Prototype	Not given Prototype	Croatia, y 22 weeks	Not Given	Bosnia
y	y	y	n	100.00%	y	n
y	y	y	80%	98.20%	y	y
Y			n	y		
Y				y		
Y			y	y		
Not given	Not given	200000	Not given	3,600,000	Not Given	100000
n	n	n	n	y (but has not been tested)		
y	y	y	y	y		
y	y	y	y	y		
Deutz 54kw	Deutz 141 kw	Perkins	142kw	DEER 164kw	172kw	Mercedes 300kw
95	200	200	406	180	850	900
9	Not given	14	40	80 for both	85 for both	40
y Perkins 150 hp	y	n	y 200kw	y 410 kw	y 391 kw	n
21			50	80 for both		
102 for both	60	400	300	360	250	700
yes	n	y	n	Will have this Option this fall	y	y

Raw Data

1000	0	300	0	300	3000	800
Not given	y	Not given	y	y	y	Not Given
		0	1		y	
operator						
C130				2x 130 w/ mod		
12	70		5.37	22		
$400,000		$340,000		$1,034,000	Not Given	Not Given
included				included	Not Given	Not Given
$120,000				$156,000	Not Given	Not Given
				$198,000		
				included		
$150,000						
				12 days		
y	y		y	y		y
			.200 kg			
			1 hour			minimal
y	y		n	y		
10kg	10kg		TMA-4 5.9 kg	10kg		
			unrepairable	1 hour		
.65+.65 opt	armoured glass protected steel	20	0.6	12-13 plate & 69 mm glass	Not Given	y
			fair			
				22 weeks		
				1		
				Fair		
High Clearance rate	Can move long distances independent of a loader			Two Flails		
Small				Very Mature		
				Safety signal to warn drivers of unproofed areas		
Manual depth control only	Overheats in tropical regions		10 m blind spot front view	Signifacant erosion		
	Wheels vehicle		Difficult depth control	Bad Visability and backing trailer problems		
				Bad Depth control but developing a solution		
3	2	1	1	3 drivers, 2 maint	1	1
6	10	10	10	2	10	10
7	10	7	6	1	3	3
10	5	10	4	7	4	4

Raw Data

Krohn MMCS	Mine Breaker 2000/2	Mine crusher	Bofors-Mine Guzzler	Oracle w/ spitfire
7000	10940	5900	8460	13800
5000	7000	4470	7560	4947
3000	4510	3100	4120	4500
3000	3720	2170	3340	2580
2600	3690	2550	3000	3220
2850	3310	2660	3550	3640
2650	3310	2660	3400	3640
34544	33500	7400	33528	28210
2032	13500	1600	15240	6790
36576	47000	9000	48768	53000
	Leopard			CAT Track type Loader 973
Tracked	Tracked	Wheels	Tracked	Tracked
800				
0.5	0.98		0.98	0.89
40	27	27	17	27
tiller	tiller	tiller	tiller	tiller
156	66	60	15 discs/405 teeth	252
42	60		25	25
500	500		500	450
y	y	y	y	y
auto w override	Mechanical	Mechanical	Auto	Auto
4000	4000	4000	1200	800
2600	2400	2400	1100	400
1000	1000	1000	1000	250
8	2	0	1	1
Germany, Mozambique, Croatia	Bosnia, Korea		Croatia, Egypt	Croatia, Bosnia
y	y	n	y	99.60%
y	y	y	99%	99.60%
	y		y	y
	y		y	y
	y		y	
3060000	800000		800000	600000
	n		n	not given
	y		y	
	y		y	
Cat 750	619kw	Mercedes 160kw	CAT 640kw	CAT 210 kw
1200	940	130	800	1136
70	100	25	65	200
n	n	n	n	y 738 kw
800	840	31	270	350
n	opt		y	opt

Raw Data

Not Given	1000		800	not given
y	opt	opt	y	opt
			y	
			4	
$1,546,392	$1.2-$1.5 Million		$2,000,000.00	$900,000
Not Given				
Not Given				
			excellent	y
			no damage	
			y	y
			12kg	18kg
			under 1 hour	
Not Given	20mm arm steel 70mm prote glass	10 mm steel	16 mm arm 46mm glass	20 mm
			1 system I ready 16 month for next	
				excellent
				World Wide Support
				Operate in frozen soil
				Has capability of adding a full width rake for mine clearing
3	2	1	2	2
6	8	10	8	8
4	3	6	3	3
3	4	10	4	4

Raw Data

Rhino	Mineworm	Bigfoot	Minenwolf	Armtrac 325	MgM Rotar Mk-II	Pearson SDTT	BDM 48 Brush Deminer
9600	10000	6700	8310	8200	8000	5130	9880
7800	7000	4000	4885	6400	5760	5130	9000
4200	2700	2800	3680	3500	2400	3270	3380
3000	2700	2800	2500	2730	2396	3270	3380
3500	2500	2000	3000	3000	1800	variable	1220
3200	3400	2500	3050	3200	3250	4470	5000
3150	3400	2500	3050	3200	3250	4470	3070
46736	2032	4064	12600	15000	7415	9800	32512
14224	13208	6096	3800/4600	3000	2985	variable	1820
60960	15240	10160	16400/17200	18000	10400	10800	34544
			ARMTrac				CASE 940 B
Tracked	Tracked	Tracked	tracked	4foam filled tires	4 tubeless wheels	4steel wheels	tracks
700			Not given			600/800 mm wide	
1		0.4	0.5			1.4(if pneumatic)	Not given
24	30	45	40	45	30	30	35
tiller	sifter	piston mounted feet	flail or tiller	flail	sifter	roller,sifter,slasher,extractor	excavator mtd cutter
360		10	76 flails	74	600 l bucket		23 cutter bits
30	60	10	39.47368421	40.54054054	4mm		overlap
500	550		400	300	300		200
y	y	n	y	y	na		y
auto w override	auto		manual	manual	bucket scoop		manual
2000	750	300-1000	not tested	4000	Not given	Not given	Not given
1000				2800	Not given	Not given	Not given
600				2800	Not given	Not given	4 - 8 m2
3	0	0	0	2	1	2	1
Cambodia,Croatia, Isreal Korea,Jordan	Bosnia	Bosnia	germany (test)	Bosnia,Kosovo,Mozambique	Nambia	Cambodia, Thailand	Thailand
n	n	90%	y	n	n	n	n
98%	25%	85%	y	y	y	y	99%
no recommended not to clear AT or AP Crembo mines.							
y							
y							y Canadian
				6,000,000			
n	n	y	n	n	n	y	n
y	y	y	y	y	n	y	y
y	y	y	y	y	y	y	y
CAT 660 kw	224kw	187kw	Deutz 298kw	Volvo 242kw	Cat 60kw	Fiat 119 kw	CumminsGT830
1700	1000	1000		455	128	200	310
100	40	30	40	50	15	20	
n		n	not tested	n	n	n	n
1000	900	800		910	79	78	216
y	y	y	on request	n	n	n	n

Raw Data

1000	5000	5000		y	y	y	
2	y	4 cam 2 monitors			video of bucket		
3.8							
$1.8 million			$515,464	$230,000	$200,000	$250,000	
$42,000				$2,500			
$22,000				$300			
				2			
excellent	y	ok				y	
		0.152					.750 kg
minimal if any		45 min					
y	n					??	can survive 7kg
DM21 and TM62		5.5				6.5kg under tire	
a few hours		1 hour				repairable	
10mm arm				10mm steel	4mmplate/35mmglass	y, not given	
16			6				
		Claims not do damage soil					heavy vegetation
May not be effective against small AP mines	Lack of power						slow
Accumulated mud and dirt on lower drum making less effective				Not in production			
2	1	1	2	1	1	2	1
8	10	10	8	10	10	8	10
2	4	6	6	4	4	7	3
4	5	6	5	6	6	2	4

Raw Data

Digger	Hydrema Weimar M1220	Hydrema Weimar w/ MFV-1000	Tempest MK3	MgM Rotar Mk_1	Heartlands Uni-Disc III	Heartlands Uni-Sift	Heartlands BMHA III
3500	6610	6610	4000	7380	10000	7315	7315
2800	6350	6180	3500	5760	7000	4740	4740
1400	2486	2500	1600	2904	3048	3000	3000
1400	2486	2500	1600	2904	3048	2743	2743
1200	1000	1000	1200	2224	1000	3200	
1700	3920	3980	1600	3400	4000	3170	3170
1500	3920	3980	1600	3400	4000	3154	3154
2200	13424	15600	2400	7900	32202	22226	22226
500	292	400		1700	4082	2774	2724
2700	13716	16000	2700	9600	36284	25000	24950
	Hydrema Excavator	Hydrema Excavator		916 Cat front end loader	Cat 325B Hydraulic excavator	John Deere 850	John Deere 850
tracks	4 wheel		steel wheels	4 wheels	tracked	tracked	Tracked
0.7	Not given	Not given	Not given	Not given		0.44	0.44
17							
excavator mtd cutter	excavator mtd bush cutter	excavator mtd flail	flail veg cutter	bucket sifter	tiller	sifter	excavator bucket
44			34	1500 l capacity			
overlap			30				
vegitation only		5	25mm above gd		500	1000	
na						y	
		manual	auto		manual	manual	
4000	Not given	140-250	600-800	20	750	2500	
2000	Not given	Not given	350-600	10			
600-1000	Not given	Not given	200-350	0			
1	1	3	9	prototype	2	3	prototype
	Angola	croatia	Bosnia,Cambodia, Thaioand	Nambia	UXO in Grafenwoer		
					y		y
n	n			n	y	y	
y	y			99%	y	y	
					y		
					n		
					0	0	0
				n	n	n	no
				n	n	n	no
				y	y	y	y
2700cm3	Perkins 76 kw	Perkins 1004-40	Deutz 52kw		140kw	143kw	143kw
50	250	250	42		500	348	348
14		16	10				
n		n	n		y 448 kw	250hp	274hp
150	180	180	113				
y	unk	n	y	n	no		no

300			400				
	optional	optional	n	yes		optional	optional
			remote		op	op	op
			c130	c130		c17,c5	c17,c5
							$50,000
CHF70000			$106,500	$200,000	$ 678,400.00	$ 532,700.00	$ 547,000.00
			$10,000		incl	incl	incl
CHF500			$11,500				
			5				
			y		y	y	y
			.521kg				
			2 hours				1 1/2 hr
			n		y	y	
					10kg, 5 detonations	9kg	5kg
					2 hours	2 hours	4hr
	7.62		8mm steel	6mm plates	armored		9/16 armor; 2 1/2 in glass
			clears tripwire and vegatation				
			AP protectect V shaped hull				
				Limited to areas that a front end loader can operate			
				High cohesive vegetated soil may not sift well			
				AT mines might damage Rotar			
1	1	1	3	2	1	2	1
10	10	10	6	8	10	8	10
8	4	2	7	2	2	6	6
10	6	2	10	6	2	5	5

Raw Data

Floating Mine Blade	BIGAT MiSa1	AMCV-Keiler	ine Clearing Cultivat	Armadillo	MCAP/D7 Dozer	Pearson Ploughs Full width	Grizzly
6100	10000	10700	6100	4000	9187	10160	10160
4740	10000	8950	4740	2000	4740	7925	7925
4000	3500	6350	4000	1000	3870	4200	4020
3300	3500	3760	3300	1000	3300	3658	3658
2900	2800	4700	3660	1000	3576	4200	4020
4100	3500	3800	4100	750	3246	2885	2885
2500	3500	3800	2500	650	2500	2375	2375
22226	25000	46000	22636	500	22226	70653	68120
5900	0	7000	7420	500	1769	3620	3000
29486	25000	53000	31945	1000	25355	74273	71120
Hydraulic power unit			hydraulic Power Unit		armour		
1360			1889		3084		
D7R tractor	catepillar tracks	M48A2	Liebherr 742 B	Oxx All terain tractor	D7	M1 and Most tanks	M1A1
Tracked	tracked		Tracked	wheels	Tracked	Tracked	Tracked
610			610		610		
				4			
				6x12			
				0.35		1.1	1.1
				30			
	Tiller and Sifter	ction opposite wheel	cultivator	disc roller	rake	plow	plow
			23 tines	13		23 tines	
		24 hammer	143	50		175	
400	500	250	380	does not dig	305	300	380
y	y			n		y	y
mechanical		auto	manual	not adjustable	manual	manual	manual
7250	750	4000	4000	500	7000 in sand	21000	36000
	350	1500	2000	250	0	10000	18000
	0	940	600	0	0	5000	9000
prototype			prototype	beta phase			prototype
							y
y		98%	y	n	95%	y	y
some		98%	some	y	95%	y	y
n				AP only		y	y
				y		y	y
						y	y
		y	n	y	y	y	n
		y	y	y	some flat	y	not really
		y	y	y	depends on soil	y	y
150 kw	380 kw	815kw		22kw			
	20						
y 75 kw	2 * 10 KW						
	y			y			

Raw Data

	500m						
	1 remote only			y			
				c130 2 pickup trucks	c17, c5		
		50		20		66	66
	$1,000,000				$90,375	$4,445,399	
					$103000 rake and armour	$100,000	
				>$75K	$193,375	$4,545,399	$16 million
			y	y			y
				0.5			
			minimal	minimal			none
			y				y
			6kg				16
			2 hours				survived
					7.62		
					8 m		
							Fast
Small AP mines may be redeposited in soil AP have high [rob of det when sifted		Heavy sod tends to build up Small mines pass through assembly			limited to soil type works well in sand		Doesn't destroy all mines heavy expensive
	2	2	2	1	1	2	2
	8	8	8	10	10	8	8
6		10	6	8	6	10	10
5		1	4	10	5	2	2

AMCS
Performance Data and Calculations

Performance data & Calculations

	Bozena	Aardvark Mk IV
Method of clearance (Flail, tiller, grinder, cultivator, sifter)	Flail	Flail
Engine	Yanmar 51.1 kW	122 kw
Power (kW)	45.9	110.7
Separate engine for clearing device	n	n
number of flails/teeth	36	72
rpms	400	320
length of chains	593	1100
centerline spacing	55	42
spacing between chains/ drums/chisels mm	55	37
max spacing(centerline or dynamic)	55	42
Clearance Width single pass (in meters)	1985	3000
clearance Width minus overlap (in meters)	1330	2500
light soil/ small vegetation	500-1500	1440
medium soil/ medium vegetation	900	1107
heavy soil/ dense vegetation	350-400	460
Overlap width ratio	0.53198	1
Engine Power per meter ratio	0.626651103	1
approximate delivered power per meter ratio	0.509216854	1
light	**562**	**1440**
medium	**432**	**1107**
heavy	**180**	**460**
Operational Depth (mm)	125	200
Maximum Clearing Depth (in mm)	150-200	580
remote	9	0
camera	0	
	1.012616189	1.17333333
	0.855087142	1.110625
	0.435730737	0.56594635
	88%	90%
Anti-Tank (AT)	88%	90%
Anti-Personnel (AP)	94%	98%
AP Survivability	8	Excellent
AP System Blast (kg of explosive and number of blasts)		
AP Hours to repair following blast damage?		
AT Survivability	7 kg TNT wo/ serious damage	
AT System Blast (kg of explosive and number of blasts)		10 kg
AT Hours to repair following blast damage?	within 1 hour	within 1 hour
Operational length (total)	5282	7750
Reduced length (w/o attachment)	3102	5486
Operational width (total)	2680	3556
Reduced width (w/o attachment)	1750	2530
Operational height (overall)	2200	3109
Reduced height (minimum)	2020	2613
Carrier/Host Vehicle weight (kg)	3690	11506
Operational/Combined weight (kg)	4550	15328

Amtrac 100	Hydrema 910 MCV	Minecat 230	Patria RA - 140 DS	RM - KA 01	Minelifta
Flail	Flail	Flail	Flail	Flails	Flail
New Holland 123kw	Perkins 138kw	Deutz 54kw	Deutz 141 kw	Perkins	142kw
110.7	138	110	126.9	100	200
n	y Perkins 138kw	Perkins 110 k	y	n	y 200kw
54	72	48	84	48	72
350	400	384	300	600	150
1000	900	860	1000	300	835
44	49	48	40	42	35
10	49	50	40	42	95
44	49	50	40	42	95
2400	3500	2300	3400	2000	2500
1992	2905	1909	2822	1340	2075
2700	1000	2000	1500	1800	2500
1200	750	Not given	750	1000	1800
500	Not given	Not given	300	500	800
0.7968	1.162	0.7636	1.1288	0.536	0.83
1.25	1.068524971	1.29609992	1.011477762	1.35501355	2.16802168
0.932173295	0.876623377	0.81581028	0.877339572	0.51136364	0.42698864
1127	**1584**	**1022**	**1534**	**596**	**927**
866	**1217**	**786**	**1179**	**458**	**712**
360	**506**	**326**	**490**	**190**	**296**
150	125	200	185	100	200
300	250	500	370	200	200
0	0	0	0	9	0
				0	1
1.118484912	1.091104402	1.0340339	1.09509311	0.96687641	0.64879566
1.069488684	1.105828301	1.00469209	1.085694833	0.93349064	0.90326341
0.544984329	0.563502077	0.51196563	0.553242572	0.47568317	0.46028014
90%	90%	89%	90%	89%	88%
90%	90%	89%	90%	89%	0%
97%	96%	96%	99%	98%	80%
y	y	y	y		y .200 kg 1 hour
	y	y	y		n
7kg	15kg 1hour	10kg	10kg		TMA-4 5.9 kg unrepairable
8400	10000	6000	9450	4490	8990
5000	9200	4850	7850	3500	4300
3000	4830	2300	4000	2500	3555
2200	2800	2000	2920	2500	3555
	3600	2700	2860	2000	3580
3150	2700	2060	2860	1600	3195
10400	15000	4700	1200	10000	15530
13000	18000	8000	14400	12120	35800

Scanjack 3500	Viking	FMR 2000	Krohn MMCS	Mine Breaker 2000/2	Mine crusher	Bofors-Mine Guzzler
double flail	flail	crusher	tiller	tiller	crusher	tiller
DEER 164kw	172kw	Mercedes 300kw	Cat 750	619kw	Mercedes 160kw	CAT 640kw
410	391					
y 410 kw	y 391 kw	n	n	n	n	n
78	96	Not Given	156	66	60	15 discs/405 teeth
360	300	700				190
697,793	1160	750				1250
45	42			56		
45	42	30	42	60		25
42	42					
3500	4000	2580	2600	3690	2550	3000
2905	3000					
2700	2800 to 8400	1300	1600	2400	2000	1000
2100	2000 to 6400	1000	800	1000	1000	500
1200	1120 to 4200	500	400	400	0	250
1.162	1.2					
3.174603175	2.649051491					
1.061262175	0.988636364					
1888	**1857**	1300	1600	2400	2000	1000
1451	**1427**	1000	800	1000	1000	500
603	**593**	500	400	400	0	250
200	125	400	400	250	surface crusher	250
400	250	600	500	500	surface crusher	500
0	9	9	0	0	0	0
	y					y
1.477672424	1.199458033					
1.962420985	1.714176858					
1	0.873501084					
98%	96%					
98%	96%	0%	96%	96%	0%	0%
98%	98%	98%	98%	90%	80%	99%
y		y				excellent
		minimal				no damage
y						y
10kg						12kg
1 hour						under 1 hour
14300	10500	7800	7000	10940	5900	8460
11000	4800	5000	5000	7000	4470	7560
3450	5000	3335	3000	4510	3100	4120
3000	3400	2665	3000	3720	2170	3340
3700	4000	4080	2850	3310	2660	3550
3700	3300	3080	2650	3310	2660	3400
24000	21500	35560	34544	33500	7400	33528
32000	32000	38608	36576	47000	9000	48768

Oracle w/ spitfire	Rhino	Mineworm	Bigfoot	Minenwolf	Amtrac 325	MgM Rotar Mk-II
tiller/grinder	grinder	sifter	piston mounted feet	flail then tiller	flail	sifter
CAT 210 kw	CAT 660 kw	224kw	187kw	Deutz 298kw	Volvo 242kw	Cat 60kw
				268.2	217.8	
y 738 kw	n		n	not tested	n	n
252	360		10	76	74	600 l bucket
240	120			350	350	
1200				1000	1000	
				39	41	
25	30	60	10	39.47368421	40.5405405	4mm
3220	3500	2500	2000	3000	3000	1800
				2500	2500	
2500	2000	750	1000	2700	4000	20
1250	1000	250	250	1200	2800	10
600	600	0	0	500	2800	0
				1	1	
				2.422764228	1.96747967	
				1.049558081	1.02193813	
2500	2000	750	1000	750	**1522**	20
1250	1000	250	250	600	**1170**	10
600	600	0	0	250	**486**	0
200	100-350	300	0	200	150	150
450	500	550	0	400	300	300
0	9	9	9	0	0	0
	2	y	4 cam 2 monitors			video of bucket
					1.13479692	
					1.30484769	
					0.66491732	
					92%	
99.60%	0%	0%	90%	99%	90%	0%
99.60%	98%	25%	85%	99%	95%	99%
y	excellent	y	ok			
			0.152			
	minimal if any		45 min			
y	y	n				
18kg	M21 and TM62		5.5			
	a few hours		1 hour			
13800	9600	10000	6700	8310	8200	8000
4947	7800	7000	4000	4885	6400	5760
4500	4200	2700	2800	3680	3500	2400
2580	3000	2700	2800	2500	2730	2396
3640	3200	3400	2500	3050	3200	3250
3640	3150	3400	2500	3050	3200	3250
28210	46736	2032	4064	12600	15000	7415
53000	60960	15240	10160	16400/17200	18000	10400

Pearson SDTT	BDM 48 Brush Deminer	Digger	Hydrema Weimar M1220	Hydrema Weimar w/ MFV-1000
roller,sifter,slasher,extractor	excavator mtd cutter	excavator mtd cutter	excavator mtd bush cutter	excavator mtd flail
Fiat 119 kw	CumminsGT830	2700cm3	Perkins 76 kw	Perkins 1004-40
n	n	n		n
	23 cutter bits	44		
	overlap	overlap		
2000	1220	1200	1000	1000
2000	1000	4000	750	250
1000	500	2000	400	100
100	240	600-1000	200	50
2000	1000	1000	750	250
1000	500	500	400	100
100	240	240	200	50
surface rollers	100	above surface only		
surface rollers	200	above surface only		5
0	0	9	0	0
0%	0%	0%	0%	0%
95%	99%	50%	75%	80%
y				
	.750 kg			
??	can survive 7kg			
6.5kg under tire repairable				
5130	9880	3500	6610	6610
5130	9000	2800	6350	6180
3270	3380	1400	2486	2500
3270	3380	1400	2486	2500
4470	5000	1700	3920	3980
4470	3070	1500	3920	3980
9800	32512	2200	#REF!	15600
10800	34544	2700	13716	16000

Tempest MK3	MgM Rotar Mk_1	Heartlands Uni-Disc III	Heartlands Uni-Sift	Heartlands BMHA III	Floating Mine Blade	BIGAT
flail veg cutter	bucket sifter	tiller	sifter	grinder		Tiller and Sifter
Deutz 52kw		140kw	143kw	143kw	150 kw	380 kw
n		y 448 kw	185 kw	203 kW	y 75 kw	2 * 10 KW
34	1500 l capacity					
30						
1200	2224	1000	3200	1000	2900	
600-800	30	750	2500	750	6000	750
350-600	10	400	1000	400	0	350
200-350	0	200	0	200	0	0
600	30	750	2500	750	6000	750
350	10	400	1000	400	0	350
200	0	200	0	200	0	0
25mm above gd	**200**	380	300	100	100-400	**200**
25mm above gd	400	500	1000	200	400	500
9	0	0	0	0		9
						1
0%	0%	96%	0	0%	81%	0
50%	99%	90%	90%	97%	25%	90%
y		y	y	y		
.521kg						
2 hours				1 1/2 hr		
n		y	y			
		10kg, 5 detonati	9kg	5kg		
		2 hours	2 hours	4hr		
4000	7380	10000	7315	7315	6100	
3500	5760	7000	4740	4740	4740	
1600	2904	3048	3000	3000	4000	
1600	2904	3048	2743	2743	3300	
1600	3400	4000	3170	3170	4100	
1600	3400	4000	3154	3154	2500	
	7900	32202	22226	22226	22226	
2700	9600	36284	25000	24950	29486	

AMCV-Keiler	Mine Clearing Cultivator	Armadillo	MCAP/D7 Dozer	Pearson Ploughs Full width	Grizzly
flail direction opposite wheel rotation	cultivator	disc roller	rake	plow	plow
815kw		22kw			
	23 tines	13		23 tines	
24 hammer	143	50		175	
4700	3660	1000	3576	4200	4020
4000	4000	2000	6500	3000	5000
1500	0	0	0	700	1000
940	0	0	0	0	0
4000	4000	2000	6500	3000	5000
1500	0	0	0	700	1000
940	0	0	0	0	0
50,-50, or 250	250	urface rolle	152.5	150	190
250	380	urface rolle	305	300	380
0	9	9	0	0	0
		y			
95%	90%	0%	95%	98%	98%
85%	25%	80%	95%	98%	98%
	y	y			y
	minimal	0.5 minimal			none
	y				y
	6kg				16
	2 hours				survived
10700	6100	4000	9187		
8950	4740	2000	4740		
6350	4000	1000	3870		
3760	3300	1000	3300		
3800	4100	750	3246		
3800	2500	650	2500		
46000	22636	500	22226		
53000	31945	1000	25355		640000

AMCS
Deployability Data and Calculations

	Bozena	Aardvark	Armtrac 100	Hydrema 910 MCV	Compact Minecat 230	Patria RA - 140 DS	RM - KA 01	Minelifta	Scanjack	Viking	FMR 2000
total length	5282	7750	8400	10000	6000	9450	4490	8990	14300	10500	7800
reduced length	3102	5486	5000	9200	4850	7850	3500	4300	11000	4800	5000
operational width	2680	3556	3000	4830	2300	4000	2500	3555	3450	5000	3335
reduced width	1750	2530	2200	2800	2000	2920	2500	3555	3000	3400	2665
operational height	2200	3109	3150	3600	2700	2860	2000	3580	3700	4000	4080
reduced height	2020	2613	3150	2700	2060	2860	1600	3195	3700	3300	3080
prime sys weight	3690	11506	10400	15000	4700	12000	10000	15530	24000	21500	35560
Combined weight	4550	15328	13000	18000	8000	14400	12120	35800	32000	32000	38608
System Weight (lbs)	10010	33721.6	28600	39600	17600	31680	26664	78760	70400	70400	84937.6
Prime System Weight (lbs)	8118	25313.2	22880	33000	10340	26400	22000	34166	52800	47300	78232
System Length (in)	207.952756	305.11811	330.708661	393.700787	236.2204724	372.0472441	176.7716535	353.9370079	562.992126	413.3858268	307.086614
Prime System Length (in)	122.125984	215.98425	196.850394	362.204724	190.9448819	309.0551181	137.7952756	169.2913386	433.0708661	188.976378	196.850394
System Width (in)	105.511811	140	118.110236	190.15748	90.5511811	157.480315	98.42519685	139.9606299	135.8267717	196.8503937	131.299213
PrimeSystem Width (in)	68.8976378	99.606299	86.6141732	110.23622	78.74015748	114.9606299	98.42519685	139.9606299	118.1102362	133.8582677	104.92126
System Height (in)	86.6141732	122.40157	124.015748	141.732283	106.2992126	112.5984252	78.74015748	140.9448819	145.6692913	157.480315	160.629921
Prime System Height (in)	79.5275591	102.87402	124.015748	106.299213	81.1023622	112.5984252	62.99212598	125.7874016	145.6692913	129.9212598	121.259843
C-130 Weight Limit	42000	42000	42000	42000	42000	42000	42000	42000	42000	42000	42000
C-130 Length Limit	480	480	480	480	480	480	480	480	480	480	480
C-130 Width Limit	105	105	105	105	105	105	102	102	102	102	102
C-130 Height Limit	102	102	102	102	102	102	102	102	102	102	102
C-141 Weight Limit @ 3200 nm	60000	60000	60000	60000	60000	60000	60000	60000	60000	60000	60000
C-141 Length Limit	1090	1090	1090	1090	1090	1090	1090	1090	1090	1090	1090
C-141 Width Limit	111	111	111	111	111	111	111	111	111	111	111
C-141 Height Limit	103	103	103	103	103	103	103	103	103	103	103
C-5 Weight Limit @ 3200 nm	178000	178000	178000	178000	178000	178000	178000	178000	178000	178000	178000
C-5 Length Limit	1454	1454	1454	1454	1454	1454	1454	1454	1454	1454	1454
C-5 Width Limit	216	216	216	216	216	216	216	216	216	216	216
C-5 Height Limit	156	156	156	156	156	156	156	156	156	156	156
C-17 Weight Limit @ 3200 nm	130000	130000	130000	130000	130000	130000	130000	130000	130000	130000	130000
C-17 Length Limit	1022	1022	1022	1022	1022	1022	1022	1022	1022	1022	1022
C-17 Width Limit	204	204	204	204	204	204	204	204	204	204	204
C-17 Height Limit	142	142	142	142	142	142	142	142	142	142	142
Max Systems C-130 (Weight)	4.2	1.2	1.5	1.1	2.4	1.3	1.6	0.5	0.6	0.6	0.5
Max prime movr C-130 (Weight)	5.2	1.7	1.8	1.3	4.1	1.6	1.9	1.2	0.8	0.9	0.5
Max Systems C-130 (Length)	2.3	1.6	1.5	1.2	2.03	1.3	2.7	1.4	0.9	1.2	1.6
Max prime movr C-130 (lengtht)	3.9	2.2	2.4	1.3	2.5	1.6	3.5	2.8	1.1	2.5	2.4
Max Systems C-130 (Width)	1.00	0.8	0.9	0.6	1.2	0.7	1.0	0.7	0.8	0.5	0.8
Max C-130 (reducedwidth)	1.52	1.05	1.21	0.95	1.33	0.91	1.04	0.73	0.86	0.76	0.97
Max Systems C-130 (Height)	1.2	0.8	0.8	0.7	0.96	0.9	1.3	0.7	0.7	0.6	
Max C-130 (reduced Height)	1.3	0.99	0.8	0.96	1.3	0.9	1.6	0.8	0.7	0.8	0.8
Max Systems C-141 (Weight)	6.0	1.8	2.1	1.5	3.4	1.89	2.3	0.8	0.9	0.9	0.7
Max Systems C-141 (Length)	5.2	3.6	3.3	2.8	4.6	2.9	6.2	3.1	1.9	2.6	3.5
Max Systems C-141 (Width)	1.1	0.8	0.9	0.6	1.2	0.7	1.1	0.8	0.8	0.6	0.8
Max C-141 (reduced Width)	1.6	1.1	1.3	1.0	1.4	0.97	1.13	0.79	0.94	0.83	1.06
Max Systems C-141 (Height)	1.2	0.8	0.8	0.7	1.0	0.9	1.41	0.79	0.76	0.70	0.69
Max C-141 (reduced Height)	1.3	1.0	0.8	1.0	1.3	0.9	1.6	0.8	0.7	0.8	0.8
Max Systems C-5 (Weight)	17.8	5.3	6.2	4.5	10.1	5.6	6.7	2.3	2.5	2.5	2.1

Max Systems C-5 (Length)	6.99	4.8	4.4	3.7	6.2	3.91	8.2	4.1		2.6	3.5	4.7
Max Systems C-5 (Width)	2.05	1.5	1.8	1.1	2.4	1.4	2.2	1.5		1.6	1.1	1.6
Max Systems C-5 (Height)	1.8	1.3	1.3	1.1	1.5	1.4	2.0	1.1		1.1	1.0	1.0
Max Systems C-17 (Weight)	13.0	3.9	4.5	3.3	7.4	4.1	4.9	1.7		1.8	1.8	1.5
Max Systems C-17 (Length)	4.9	3.3	3.1	2.6	4.3	2.7	5.8	2.9		1.8	2.5	3.3
Max Systems C-17 (Width)	1.9	1.5	1.7	1.1	2.3	1.3	2.1	1.5		1.5	1.0	1.6
Max Systems C-17 (Height)	1.6	1.2	1.1	1.0	1.3	1.3	1.8	1.01		0.97	0.9	0.9
Total on a C-130 Aircraft	1	1	0	1 w/jacks	2	0	2			two loads	0	0
	reduced widtl	flail &AC ren	too tall	waiver??	cab lowered	too wide				if modified	weight/width/h	weight/height
Total on a C-141 Aircraft	1	3	0	1	4	0	5	0		two loads if mod	0	0
Total on a C-5 Aircraft	14	9	6	3	10	3	14	2		2	2	2
Total on a C-17 Aircraft	5	6	4	1	7	2	10	1		1 if modified	1	1
										too tall		
M172 weight	50000	50000	50000	50000	50000	50000	50000	50000		50000	50000	50000
M172 Length	192	192	192	192	192	192	192	192		192	192	192
M172 width	115	115	115	115	115	115	115	115		115	115	115
M870 weight	80000	80000	80000	80000	80000	80000	80000	80000		80000	80000	80000
M870 Length	357	357	357	357	357	357	357	357		357	357	357
M870 width	96	96	96	96	96	96	96	96		96	96	96
M1000 weight	140000	140000	140000	140000	140000	140000	140000	140000		140000	140000	140000
M1000 Length	403	403	403	403	403	403	403	403		403	403	403
M1000 width	119	119	119	119	119	119	119	119		119	119	119
Max Systems M172 (Weight)	4.995005	1.4827292	1.74825175	1.26262626	2.840909091	1.578282828	1.875187519	0.63484002		0.710227273	0.710227273	0.58866745
Max Prime Mover M172 (Weight)	6.1591525	1.975254	2.18531469	1.51515152	4.835589942	1.893939394	2.272727273	1.463443189		0.946969697	1.057082452	0.63912465
Max Systems M172 (Length)	0.92328663	0.6292645	0.58057143	0.48768	0.8128	0.516063492	1.086146993	0.54246941		0.341034965	0.464457143	0.62523077
Max prime movr M172 (length)	1.572147	0.8889537	0.97536	0.53008696	1.005525773	0.621248408	1.393371429	1.134139535		0.443345455	1.016	0.97536
Max Systems M172 (Width)	1.08992537	0.8214286	0.97366667	0.6047619	1.27	0.73025	1.1684	0.821659634		0.846666667	0.5842	0.87586207
Max M172 (reducedwidth)	1.66914286	1.1545455	1.32772727	1.04321429	1.4605	1.000342466	1.1684	0.821659634		0.973666667	0.859117647	1.09606004
Max Systems M870 (Weight)	7.99200799	2.3723667	2.7972028	2.02020202	4.545454545	2.525252525	3.00030003	1.015744033		1.136363636	1.136363636	0.94186791
Max Prime Mover M870 (Weight)	9.854644	3.1604064	3.4965035	2.42424242	7.736943907	3.03030303	3.636363636	2.341509103		1.515151515	1.691331924	1.02259945
Max Systems M870 (Length)	1.71673608	1.1700387	1.0795	0.90678	1.5113	0.959555556	2.019554566	1.00865406		0.634111888	0.8636	1.16253846
Max prime movr M870 (length)	2.92321083	1.6528983	1.81356	0.98563043	1.869649485	1.155133758	2.5908	2.108790698		0.824345455	1.889125	1.81356
Max Systems M870 (Width)	0.90985075	0.6857143	0.8128	0.50484472	1.060173913	0.6096	0.97536	0.685907173		0.706782609	0.48768	0.73115442
Max M870 (reduced Width)	1.39337143	0.9637945	1.10836364	0.87085714	1.2192	0.835068493	0.97536	0.685907173		0.8128	0.717176471	0.91497186
Max Systems M1000 (Weight)	13.986014	4.1516417	4.8951049	3.53535354	7.954545455	4.419191919	5.250525053	1.777552057		1.988636364	1.988636364	1.64826885
Max Systems M1000 (Length)	1.93794017	1.3208	1.21859524	1.02362	1.706033333	1.083195767	2.279777283	1.13862069		0.715818182	0.97487619	1.31233333
Max Systems M1000 (Width)	1.12783582	0.85	1.00753333	0.6257971	1.314173913	0.75565	1.20904	0.8502391		0.876115942	0.60452	0.90632684
Max Systems M1000 (reduced Wi	1.7272	1.1947036	1.37390909	1.0795	1.5113	1.035136986	1.20904	0.8502391		1.007533333	0.889	1.13418386
Total on M172	1 on 2	0		0	1	0	1	1 on 2		0	0	0
Total on M870	1	1	1 on 2	0	1	1?	2	1		0	1 on 2	1 on 2
Total on M1000	1	1	1	1	1	1	2	1	1 on 2		1	1

Krohn MMCS	Mine Breaker 2000/2	Mine crusher	Bofors-Mine Guzzler	Oracle w/ spitfire	Rhino	Mineworm	Bigfoot	Minenwolf	Armtrac 325
7000	10940	5900	8460	13800	9600	10000	6700	8310	8200
5000	7000	4470	7560	4947	7800	7000	4000	4885	6400
3000	4510	3100	4120	4500	4200	2700	2800	3680	3500
3000	3720	2170	3340	2580	3000	2700	2800	2500	2730
2850	3310	2660	3550	3640	3200	3400	2500	3050	3200
2650	3310	2660	3400	3640	3150	3400	2500	3050	3200
34544	33500	7400	33528	28210	46736	2032	4064	12600	15000
36572	47000	9000	48768	53000	60960	15240	10160	21000	18000
80458.4	103400	19800	107289.6	116600	134112	33528	22352	46200	39600
75996.8	73700	16280	73761.6	62062	102819.2	4470.4	8940.8	27720	33000
275.5905512	430.7086614	232.2834646	333.0708661	543.3070866	377.9527559	393.700787	263.7795276	327.1653543	322.8346457
196.8503937	275.5905512	175.984252	297.6377953	194.7637795	307.0866142	275.590551	157.480315	192.3228346	251.9685039
118.1102362	177.5590551	122.0472441	162.2047244	177.1653543	165.3543307	106.299213	110.2362205	144.8818898	137.7952756
118.1102362	146.4566929	85.43307087	131.496063	101.5748031	118.1102362	106.299213	110.2362205	98.42519685	107.480315
112.2047244	130.3149606	104.7244094	139.7637795	143.3070866	125.984252	133.858268	98.42519685	120.0787402	125.984252
104.3307087	130.3149606	104.7244094	133.8582677	143.3070866	124.015748	133.858268	98.42519685	120.0787402	125.984252
42000	42000	42000	42000	42000	42000	42000	42000	42000	42000
480	480	480	480	480	480	480	480	480	480
102	102	102	102	102	102	102	102	102	102
102	102	102	102	102	102	102	102	102	102
60000	60000	60000	60000	60000	60000	60000	60000	60000	60000
1090	1090	1090	1090	1090	1090	1090	1090	1090	1090
111	111	111	111	111	111	111	111	111	111
103	103	103	103	103	103	103	103	103	103
178000	178000	178000	178000	178000	178000	178000	178000	178000	178000
1454	1454	1454	1454	1454	1454	1454	1454	1454	1454
216	216	216	216	216	216	216	216	216	216
156	156	156	156	156	156	156	156	156	156
130000	130000	130000	130000	130000	130000	130000	130000	130000	130000
1022	1022	1022	1022	1022	1022	1022	1022	1022	1022
204	204	204	204	204	204	204	204	204	204
142	142	142	142	142	142	142	142	142	142
0.5	0.4	2.1	0.4	0.4	0.3	1.3	1.9	0.9	1.1
0.6	0.6	2.6	0.6	0.7	0.4	9.4	4.7	1.5	1.3
1.7	1.1	2.1	1.4	0.9	1.3	1.2	1.8	1.5	1.5
2.4	1.7	2.7	1.6	2.5	1.6	1.7	3.0	2.5	1.9
0.9	0.6	0.8	0.6	0.6	0.6	0.96	0.93	0.7	0.7
0.86	0.70	1.19	0.78	1.00	0.86	0.96	0.93	1.04	0.95
0.9	0.8	1.0	0.7	0.7	0.8	0.8	1.0	0.8	0.8
1.0	0.8	1.0	0.8	0.7	0.8	0.8	1.0	0.8	0.8
0.7	0.6	3.03	0.6	0.5	0.4	1.8	2.7	1.3	1.5
4.0	2.5	4.7	3.3	2.0	2.9	2.8	4.1	3.3	3.4
0.9	0.6	0.9	0.7	0.6	0.7	1.04	1.01	0.8	0.8
0.94	0.76	1.30	0.84	1.09	0.94	1.04	1.01	1.13	1.03
0.99	0.85	1.06	0.79	0.77	0.88	0.83	1.0	0.9	0.8
1.0	0.8	1.0	0.8	0.7	0.8	0.8	1.0	0.9	0.8
2.2	1.7	8.99	1.7	1.5	1.3	5.3	8.0	3.9	4.5

5.3	3.4	6.3	4.4	2.7	3.8	3.7	5.5	4.4	4.5
1.8	1.2	1.8	1.3	1.2	1.3	2.03	1.96	1.5	1.6
1.4	1.2	1.5	1.1	1.1	1.2	1.2	1.6	1.3	1.2
1.6	1.3	6.6	1.2	1.1	0.97	3.9	5.8	2.8	3.3
3.7	2.4	4.4	3.1	1.9	2.7	2.6	3.9	3.1	3.2
1.7	1.1	1.7	1.3	1.2	1.2	1.92	1.9	1.4	1.5
1.3	1.1	1.4	1.016	0.991	1.1	1.1	1.4	1.2	1.1
0	0	2	0	0	0	0	0	0	0
3 prime movers/sys		if disassembled				too tall			
0	0	3 (disassembled)	0	0	0	0	2	0	0
3 C5 for 2 sys	1	8	1	1	1	5	5	3	4
3 C17 fo 1 sys	1	6	1	1	1	2	3	2	3
				Requires reduction of ROP height					
50000	50000	50000	50000	50000	50000	50000	50000	50000	50000
192	192	192	192	192	192	192	192	192	192
115	115	115	115	115	115	115	115	115	115
80000	80000	80000	80000	80000	80000	80000	80000	80000	80000
357	357	357	357	357	357	357	357	357	357
96	96	96	96	96	96	96	96	96	96
140000	140000	140000	140000	140000	140000	140000	140000	140000	140000
403	403	403	403	403	403	403	403	403	403
119	119	119	119	119	119	119	119	119	119
0.621439154	0.483558994	2.525252525	0.466028394	0.428816467	0.372822715	1.49129086	2.236936292	1.082251082	1.262626263
0.657922439	0.678426052	3.071253071	0.677859482	0.805645967	0.486290498	11.1846815	5.59234073	1.803751804	1.515151515
0.696685714	0.445776965	0.826576271	0.576453901	0.353391304	0.508	0.48768	0.727880597	0.586859206	0.594731707
0.97536	0.696685714	1.091006711	0.645079365	0.985809582	0.625230769	0.69668571	1.2192	0.998321392	0.762
0.973666667	0.64767184	0.942258065	0.708980583	0.649111111	0.69547619	1.08185185	1.043214286	0.79375	0.834571429
0.973666667	0.785215054	1.346082949	0.874550898	1.132170543	0.973666667	1.08185185	1.043214286	1.1684	1.06996337
0.994302646	0.773694391	4.04040404	0.745645431	0.686106346	0.596516345	2.38606538	3.579098067	1.731601732	2.02020202
1.052675902	1.085481682	4.914004914	1.084575172	1.289033547	0.778064797	17.8954903	8.947745168	2.886002886	2.424242424
1.2954	0.828866545	1.536915254	1.071843972	0.657086957	0.9445625	0.90678	1.353402985	1.091191336	1.105829268
1.81356	1.2954	2.028590604	1.199444444	1.832989691	1.162538462	1.2954	2.26695	1.856253838	1.41684375
0.8128	0.540665188	0.786580645	0.59184466	0.541866667	0.580571429	0.90311111	0.870857143	0.662608696	0.696685714
0.8128	0.655483871	1.123686636	0.73005988	0.945116279	0.8128	0.90311111	0.870857143	0.97536	0.893186813
1.74002963	1.353965184	7.070707071	1.304879504	1.200686106	1.043903603	4.17561441	6.263421618	3.03030303	3.535353535
1.462314286	0.935667276	1.734949153	1.209952719	0.741753623	1.066270833	1.02362	1.527791045	1.23179302	1.248317073
1.007533333	0.670199557	0.975032258	0.733640777	0.671688889	0.719666667	1.11948148	1.0795	0.821358696	0.8636
1.007533333	0.812526882	1.392903226	0.90497006	1.171550388	1.007533333	1.11948148	1.0795	1.20904	1.107179487
0	0 1 on 2		0	0	0	0 1 on 2	1 on 2		0
1 1 on 2		1 1 on 2		1 on 2	0	1	1	1	1
1	1	1	1 1 on 2		1	1 3 on 2		1	1

MgM Rotar Mk-II	Pearson SDTT	BDM 48 Brush Deminer	Digger	Hydrema Weimar M1220	Hydrema Weimar w/ MFV-1000	Tempest MK3	MgM Rotar Mk_1	Heartlands Uni-Disc III	Heartlands Uni-Sift	Heartlands BMHA III	ting Mine B	BIGAT
8000	5130	9880	3500	6610	6610	4000	7380	10000	7315	7315	6100	10000
5760	5130	9000	2800	6350	6180	3500	5760	7000	4740	4740	4740	10000
2400	3270	3380	1400	2486	2500	1600	2904	3048	3000	3000	4000	3500
2396	3270	3380	1400	2486	2500	1600	2904	3048	2743	2743	2743	3500
3250	4470	5000	1700	3920	3980	1600	3400	4000	3170	3170	4100	3500
3250	4470	3070	1500	3500	3980	1600	3400	4000	3154	3154	2500	3500
7415	9800	32512	2200	12300	15600	2400	7900	32202	22226	22226	22226	25000
10400	10800	34544	2700	13716	16000	2700	9600	36284	25000	24950	29486	25000
22880	23760	75996.8	5940	30175.2	35200	5940	21120	79824.8	55000	54890	64869.2	55000
16313	21560	71526.4	4840	27060	34320	5280	17380	70844.4	48897.2	48897.2	48897.2	55000
314.9606299	201.9685039	388.976378	137.79528	260.2362205	260.2362205	157.4803	290.5512	393.7008	287.9921	287.9921	240.1575	393.7008
226.7716535	201.9685039	354.3307087	110.23622	250	243.3070866	137.7953	226.7717	275.5906	186.6142	186.6142	186.6142	393.7008
94.48818898	128.7401575	133.0708661	55.11811	97.87401575	98.42519685	62.99213	114.3307	120	118.1102	118.1102	157.4803	137.7953
94.33070866	128.7401575	133.0708661	55.11811	97.87401575	98.42519685	62.99213	114.3307	120	107.9921	107.9921	107.9921	137.7953
127.9527559	175.984252	196.8503937	66.929134	154.3307087	156.6929134	62.99213	133.8583	157.4803	124.8031	124.8031	161.4173	137.7953
127.9527559	175.984252	120.8661417	59.055118	137.7952756	156.6929134	62.99213	133.8583	157.4803	124.1732	124.1732	98.4252	137.7953
42000	42000	42000	42000	42000	42000	42000	42000	42000	42000	42000	42000	42000
480	480	480	480	480	480	480	480	480	480	480	480	480
102	102	102	102	102	102	102	102	102	102	102	102	102
102	102	102	102	102	102	102	102	102	102	102	102	102
60000	60000	60000	60000	60000	60000	60000	60000	60000	60000	60000	60000	60000
1090	1090	1090	1090	1090	1090	1090	1090	1090	1090	1090	1090	1090
111	111	111	111	111	111	111	111	111	111	111	111	111
103	103	103	103	103	103	103	103	103	103	103	103	103
178000	178000	178000	178000	178000	178000	178000	178000	178000	178000	178000	178000	178000
1454	1454	1454	1454	1454	1454	1454	1454	1454	1454	1454	1454	1454
216	216	216	216	216	216	216	216	216	216	216	216	216
156	156	156	156	156	156	156	156	156	156	156	156	156
130000	130000	130000	130000	130000	130000	130000	130000	130000	130000	130000	130000	130000
1022	1022	1022	1022	1022	1022	1022	1022	1022	1022	1022	1022	1022
204	204	204	204	204	204	204	204	204	204	204	204	204
142	142	142	142	142	142	142	142	142	142	142	142	142
1.8	1.8	0.6	7.1	1.4	1.2	7.1	2.0	0.5	0.8	0.8	0.6	0.8
2.6	1.9	0.6	8.7	1.6	1.2	8.0	2.4	0.6	0.9	0.9	0.9	0.8
1.5	2.4	1.2	3.5	1.8	1.8	3.0	1.7	1.2	1.7	1.7	2.0	1.2
2.1	2.4	1.4	4.4	1.9	2.0	3.5	2.1	1.7	2.6	2.6	2.6	1.2
1.1	0.8	0.8	1.9	1.0	1.0	1.6	0.9	0.9	0.9	0.9	0.6	0.7
1.08	0.79	0.77	1.85	1.04	1.04	1.6	0.89	0.85	0.94	0.94	0.94	0.74
0.8	0.6	0.5	1.5	0.7	0.7	1.6	0.8	0.6	0.8	0.8	0.6	0.7
0.8	0.6	0.8	1.7	0.7	0.7	1.6	0.8	0.6	0.8	0.8	1.0	0.7
2.6	2.5	0.8	10.1	2.0	1.7	10.1	2.8	0.8	1.1	1.1	0.9	1.1
3.5	5.4	2.8	7.9	4.2	4.2	6.9	3.8	2.8	3.8	3.8	4.5	2.8
1.2	0.9	0.8	2.0	1.1	1.1	1.8	0.97	0.9	0.9	0.9	0.7	0.8
1.18	0.86	0.83	2.01	1.13	1.13	1.8	0.97	0.93	1.03	1.03	1.03	0.81
0.8	0.6	0.5	1.5	0.7	0.7	1.6	0.8	0.7	0.8	0.8	0.6	0.7
0.8	0.6	0.9	1.7	0.7	0.7	1.6	0.8	0.7	0.8	0.8	1.0	0.7
7.8	7.5	2.3	30.0	5.9	5.1	30.0	8.4	2.2	3.2	3.2	2.7	3.2

4.6	7.2	3.7	10.6	5.6	5.6	9.2	5.0	3.7	5.0	5.0	6.1	3.7
2.29	1.68	1.62	3.92	2.21	2.19	3.4	1.89	1.80	1.83	1.83	1.37	1.57
1.2	0.89	0.79	2.33	1.01	1.00	2.5	1.17	0.99	1.25	1.25	0.97	1.13
5.7	5.5	1.7	21.9	4.3	3.7	21.9	6.2	1.6	2.4	2.4	2.0	2.4
3.2	5.1	2.6	7.4	3.9	3.9	6.5	3.5	2.6	3.5	3.5	4.3	2.6
2.16	1.58	1.53	3.70	2.08	2.07	3.2	1.78	1.70	1.73	1.73	1.30	1.48
1.1	0.8	0.7	2.1	0.9	0.9	2.3	1.1	0.9	1.1	1.1	0.9	1.0
0	0	0	3	0	0	3	0	0	0	0	0	0
too tall	too tall	too tall										
0	too tall	0	5	0	0	6	0	0	0	0	0	0
7	7	2	20	5	1	27	5	1	3	3	2	1
5	0	1	14	4	0	24	3	0	2	2	2	1
		Boom removed										
50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000
192	192	192	192	192	192	192	192	192	192	192	192	192
115	115	115	115	115	115	115	115	115	115	115	115	115
80000	80000	80000	80000	80000	80000	80000	80000	80000	80000	80000	80000	80000
357	357	357	357	357	357	357	357	357	357	357	357	357
96	96	96	96	96	96	96	96	96	96	96	96	96
140000	140000	140000	140000	140000	140000	140000	140000	140000	140000	140000	140000	140000
403	403	403	403	403	403	403	403	403	403	403	403	403
119	119	119	119	119	119	119	119	119	119	119	119	119
2.185314685	2.104377104	0.657922439	8.4175084	1.656989846	1.420454545	8.417508	2.367424	0.626372	0.909091	0.910913	0.770782	0.909091
3.065040152	2.319109462	0.699042591	10.330579	1.84774575	1.456876457	9.469697	2.87687	0.705772	1.022553	1.022553	1.022553	0.909091
0.6096	0.950643275	0.493603239	1.3933714	0.737791225	0.737791225	1.2192	0.660813	0.48768	0.666685	0.666685	0.799475	0.48768
0.846666667	0.950643275	0.541866667	1.7417143	0.768	0.789126214	1.393371	0.846667	0.696686	1.028861	1.028861	1.028861	0.48768
1.217083333	0.893272171	0.864201183	2.0864286	1.174979887	1.1684	1.825625	1.005854	0.958333	0.973667	0.973667	0.73025	0.834571
1.219115192	0.893272171	0.864201183	2.0864286	1.174979887	1.1684	1.825625	1.005854	0.958333	1.064892	1.064892	1.064892	0.834571
3.496503497	3.367003367	1.052675902	13.468013	2.651183754	2.272727273	13.46801	3.787879	1.002195	1.454545	1.45746	1.233251	1.454545
4.904064243	3.710575139	1.118468146	16.528926	2.9563932	2.331002331	15.15152	4.602992	1.129235	1.636086	1.636086	1.636086	1.454545
1.133475	1.767602339	0.917793522	2.5908	1.37183056	1.37183056	2.26695	1.228699	0.90678	1.239617	1.239617	1.486525	0.90678
1.574270833	1.767602339	1.007533333	3.2385	1.428	1.467281553	2.5908	1.574271	1.2954	1.913038	1.913038	1.913038	0.90678
1.016	0.745688073	0.721420118	1.7417143	0.980852776	0.97536	1.524	0.839669	0.8	0.8128	0.8128	0.6096	0.696686
1.01769616	0.745688073	0.721420118	1.7417143	0.980852776	0.97536	1.524	0.839669	0.8	0.888954	0.888954	0.888954	0.696686
6.118881119	5.892255892	1.842182829	23.569024	4.639571569	3.977272727	23.56902	6.628788	1.753841	2.545455	2.550556	2.158189	2.545455
1.279525	1.995360624	1.036052632	2.9246286	1.548593041	1.548593041	2.55905	1.387019	1.02362	1.399344	1.399344	1.678066	1.02362
1.259416667	0.924342508	0.894260355	2.159	1.215848753	1.20904	1.889125	1.04084	0.991667	1.007533	1.007533	0.75565	0.8636
1.261519199	0.924342508	0.894260355	2.159	1.215848753	1.20904	1.889125	1.04084	0.991667	1.101932	1.101932	1.101932	0.8636
0	1	0	2	0	0	1	0	0	1 on 2	1 on 2	1 on 2	0
1	3 on 2	1 on 2	2	1	1	2	0	0	0	0	0	0
1	2	1	3	1	1	2	1	1	1	1	1	1

AMCV-Keiler	Mine Clearing Cultivator	Armadillo	MCAP/D7 Dozer	Pearson Ploughs Full width	Grizzly
10700	6100	4000	9187	10160	10160
8950	4740	2000	4740	7925	7925
6350	4000	1000	3870	4200	4020
3760	2743	1000	2743	3658	3658
3800	4100	750	3246	2885.44	2885.44
3800	2500	650	2500	2374.9	2374.9
46000	22636	500	22226	70652.64	68120
53000	31945	1000	25355	74272.64	71120
116600	70279	2200	55781	163399.808	156464
101200	49799.2	1100	48897.2	155435.808	149864
421.2598425	240.1574803	157.480315	361.6929134	400	400
352.3622047	186.6141732	78.74015748	186.6141732	312	312
250	157.480315	39.37007874	152.3622047	165.3543307	158.2677165
148.0314961	107.992126	39.37007874	107.992126	144	144
149.6062992	161.4173228	29.52755906	127.7952756	113.6	113.6
149.6062992	98.42519685	25.59055118	98.42519685	93.5	93.5
42000	42000	42000	42000	42000	42000
480	480	480	480	480	480
102	102	102	102	102	102
102	102	102	102	102	102
60000	60000	60000	60000	60000	60000
1090	1090	1090	1090	1090	1090
111	111	111	111	111	111
103	103	103	103	103	103
178000	178000	178000	178000	178000	178000
1454	1454	1454	1454	1454	1454
216	216	216	216	216	216
156	156	156	156	156	156
130000	130000	130000	130000	130000	130000
1022	1022	1022	1022	1022	1022
204	204	204	204	204	204
142	142	142	142	142	142
0.4	0.6	19.1	0.8	0.3	0.3
0.4	0.8	38.2	0.9	0.3	0.3
1.1	2.0	3.0	1.3	1.2	1.2
1.4	2.6	6.1	2.6	1.5	1.5
0.4	0.6	2.6	0.7	0.6	0.6
0.69	0.94	2.59	0.94	0.71	0.71
0.7	0.6	3.5	0.8	0.9	0.9
0.7	1.0	4.0	1.0	1.1	1.1
0.5	0.9	27.3	1.1	0.4	0.4
2.6	4.5	6.9	3.0	2.7	2.7
0.4	0.7	2.8	0.7	0.7	0.7
0.75	1.03	2.82	1.03	0.77	0.77
0.7	0.6	3.5	0.8	0.9	0.9
0.7	1.0	4.0	1.0	1.1	1.1
1.5	2.5	80.9	3.2	1.1	1.1

3.5	6.1	9.2	4.0	3.6	3.6
0.86	1.37	5.49	1.42	1.31	1.36
1.04	0.97	5.28	1.22	1.37	1.37
1.1	1.8	59.1	2.3	0.8	0.8
2.4	4.3	6.5	2.8	2.6	2.6
0.82	1.30	5.18	1.34	1.23	1.29
0.9	0.9	4.8	1.1	1.3	1.3
0	0	6	0	0	0
reduced width					
0	0	12	0	0	0
1 with reduced width	2	45	3	1	1
0	1	30	2	0	0

50000	50000	50000	50000	50000	50000
192	192	192	192	192	192
115	115	115	115	115	115
80000	80000	80000	80000	80000	80000
357	357	357	357	357	357
96	96	96	96	96	96
140000	140000	140000	140000	140000	140000
403	403	403	403	403	403
119	119	119	119	119	119

0.428816467	0.711450078	22.72727273	0.896362561	0.305997912	0.319562327
0.494071146	1.004032193	45.45454545	1.022553439	0.3216762	0.33363583
0.455775701	0.79947541	1.2192	0.530837052	0.48	0.48
0.544893855	1.028860759	2.4384	1.028860759	0.615384615	0.615384615
0.46	0.73025	2.921	0.754780362	0.69547619	0.726616915
0.776861702	1.064892454	2.921	1.064892454	0.798611111	0.798611111
0.686106346	1.138320124	36.36363636	1.434180097	0.489596659	0.511299724
0.790513834	1.606451509	72.72727273	1.636085502	0.514681919	0.533817328
0.847457944	1.48652459	2.26695	0.987025144	0.8925	0.8925
1.013162011	1.913037975	4.5339	1.913037975	1.144230769	1.144230769
0.384	0.6096	2.4384	0.630077519	0.580571429	0.606567164
0.648510638	0.8889537	2.4384	0.8889537	0.666666667	0.666666667
1.200686106	1.992060217	63.63636364	2.50981517	0.856794152	0.894774517
0.956654206	1.678065574	2.55905	1.114204855	1.0075	1.0075
0.476	0.75565	3.0226	0.781033592	0.719666667	0.751890547
0.803882979	1.101932191	3.0226	1.101932191	0.826388889	0.826388889

0 1 on 2		2 1 on 2		0	0
0	0	4	0	0	0
0	1	6	1	0	0

AMCS
Criteria Evaluation Data

Operational Performance					**0.56**
Rate of Clearance			*0.24*		
Light Soil/ Light Vegetation	Meters Squared/hr	0.13			0.135
Medium soil/ Medium vegetation	Meters Squared/hr	0.09			0.076
heavy soil/ Dense Vegetation	Meters Squared/hr	0.02			0.017
Clearance rate reduction	Above rates were reduced by 50% for systems that leave windrows behind and by 67% for systems that throw mines to the front				**0.228**
Effectiveness of clearance			*0.22*		
AT Clearance	%	0.05			0.05
AP clearance	%	0.09			0.1
Confidence	US test=10;DERA,CROMAC=9; Other test,Mine Action Center Reports=6;Calculated=7; quoted test=6, educated guess o	0.06			0.056
Mobility	Skid steer / trkd 1 piece=10,halftrk 1 piece=9, tracked excavator mtd =8, 4 whl tractor =7, 4 whl truck =5: 2 piece trkd =4	0.02			0.023
					0.229
Impacts of and on Clearance				**0.1**	
Slope capability	>=30degrees or 57%=10 ; 25 degree or 47% =8; 20degrees or 36% = 6; 15 degrees 26% =3	0.018			0.019
Depth Capability			*0.027*		
Operating depth	>250 =10; 200=9, 150=7 100=5; 0=3	0.009			0.013
maximum depth	500 =10, .400 =9; >300=8; >200= 6; >100=4; roller=2	0.018			0.025
Clearance Width	>4 =10; 4=9; 3-6-3.9=8; 3.3-3.5=7; 3.0-3.2=6; 2.5-2.9 =4; >2 =2; <2=0	0.018			0.019
Environmental Impact		0.017			0.0185
Visibility	No Remote (R),non flail/grinder=10, No R ginder 8, No R flail=7,6, R w/ video non flail 5, R w/video flail 4, R w/o video 3, r	0.02			0.0185
					0.113
Survivability					**0.163**
System				0.063	
AT					
AT Explosive size	>15kg =10,10-15Kg =9, 8-10KG =8, 7kg =7, etc	0.015			0.012
AT hours to repair	<1=10, 1=8, 2-4=7; 5-8=5; >8 =0	0.01			0.007
Number of blasts	>4 =10, 3=9,2=8,1=7 0=0	0.005	0.03		0.004
AP					**0.023**
AP Experience	Tested against frag +blast =10, frag only =8, blast only =6, not = 0	0.03			0.023
AP Small arms Design	Vital components protected =10 not =0	0.003	0.033		0.003
Operator				0.1	**0.026**
AT Blast survivability					
(No remote or optional)					
Location of explosive	under op=10, rear wheel or track=8, front wheel track =6 demining unit =4	0.02	0.06		0.058
Impact on operator station	none =10, slight =7 moderate or more =0	0.02			
Size of explosive	10=10, 9=9 etc	0.02			
Or Remote required	remote required gets 9, not gets 0	0.06			
AT Blast					
Remote Option					
remote Optional	Enter % AT clearance times 10 if no remote or optional, else 0	0.03			0.029
AP Small arms Design	7.62 or greater 10, Protectve glass &Plate >15mm=10; plate> 9mm=9; Plate 8mm =8 etc. Armored but not specified =4, r	0.01			0.01
Deploy Sustain					**0.21**
Air Deploy	>1 on C130=10; 1on C130 =9; 1 on >1 C130=8; 1 if mod on >1 C130=7; >1 on C17=6; 1on C17=5; 1 if mod on >1C17= 4	0.08			
Ground deploy	Self deployabba>30mph&.50 miles=10; SD .20 mph=9; >1 on a M172=8; 1 on M172=7; 1 on >1M172=6; >1 on M870=5;	0.035			
Supportability			0.085		
Availability	Cat or John Deere =10, other wordwide dealer =8, local available = 6: military chasis =4, unique =0	0.035			
Confidence	Suportability good based on tests =10, poor or nor info =5, unused/untested =0	0.02			
Training required	common prime mover in army =10, training avail 2wks=9, 3wks =7, 4 weeks =6, 5=5, unstated =3, none avail =0	0.01			
Manpower required per system	1=10, 2=8, 3=6, 4=4, 5=2, >5 =0	0.01			
Multiuse	Fielded Construction Prime mover =10, Prime has multiple cm&constuction attachments=8, Prime has Multiplre CM att=(	0.01			
System Maturity	> 10 built,field>6 yrs=10; >4built field>6 yrs=9; >4 built,field>3 years=8, > 2built field>4 yrs=7; >2 built,field>2 years=6; 2 built =5; 1 built and used in field to demine= 3; prototype				0.067
				Total	**1**

Bozena	Aardvark	Armtrac 100	Hydrema 910 MCV	Compact Minecat 230	Patria RA - 140 DS	RM - KA 01	Minelifta	Scanjack	Viking	FMR 2000	Krohn MMCS	Mine Breaker 2000/2	Mine crusher
562	**1440**	**1127**	**1584**	**1022**	**1534**	**596**	**927**	**1888**	**1857**	1300	1600	2400	2000
432	**1107**	**866**	**1217**	**786**	**1179**	**458**	**712**	**1451**	**1427**	1000	800	1000	1000
180	**460**	**360**	**506**	**326**	**490**	**190**	**296**	**603**	**593**	500	400	400	0
88%	90%	**90%**	**90%**	**89%**	**90%**	**89%**	0%	**98%**	**96%**	0%	96%	96%	0%
94%	98%	97%	96%	96%	99%	98%	80%	98%	98%	98%	98%	90%	80%
8	10	7	9	8	7	7	9	7	7	5	5	5	5
10	9	6	5	10	5	10	9	4	9	10	10	9	6
6	10	10	10	6	8	10	10	3	8	0	10	8	8
5	9	7	5	9	7	5	9	9	5	10	10	10	3
6	10	8	6	10	8	6	6	9	6	10	10	10	2
0	6	2	7	2	7	1	4	7	9	4	4	8	4
9	9	9	9	9	9	9	9	9	9	9	9	9	9
2	7	6	6	6	6	2	6	5	4	5	10	10	10
8	9	7	10	9	9	0	5.9	9	0	7.5	9	7.5	0
10	10	0	10	8	8	0	0	8	0	8	5	10	0
10	10	8	10	9	8	0	7	8	0	7	10	10	0
10	10	10	10	6	6	0	10	10	0	6	10	6	0
10	10	5	5	5	5	10	10	10	0	5	0	10	0
	10	4	8	10	4	0	4	4	0	4	7	4	0
	10	0	7	10	0	0	0	10	0	10	7	10	0
	10	7	5	7.5	10	0	5.9	10	0	7.5	10	7.5	0
9	0	0	0	0	0	9	0	0	9	9	0	0	0
10	**10**	**3.33**	**6.67**	**9.2**	**4.7**	**10**	**3.3**	**8**	**10**	**10**	**8**	**7.2**	**0**
0	**9**	**9**	**0**	**8.9**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**9.6**	**0**
	9.00	9.0	0.0	8.90	9.0	0	0	0	0	0	9.6	9.6	0
	10	9	10	6.5	10	10	6	10	0	4	10	10	10
9	9	6	**8**	10	5	10	4	7	4	4	3	4	10
6	9	9	9	7	10	7	6	1	3	3	4	3	6
8	8	8	6	8	6	5	8	6	6	0	8	4	8
10	10	5	10	5	5	0	0	10	0	0	5	5	0
9	7	7	6	4	6	3	3	7	3	3	3	5	10
10	8	10	10	6	10	10	10	2	10	10	6	8	10
0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	10	5	10	8	10	1	1	6	1	1	9	7	1

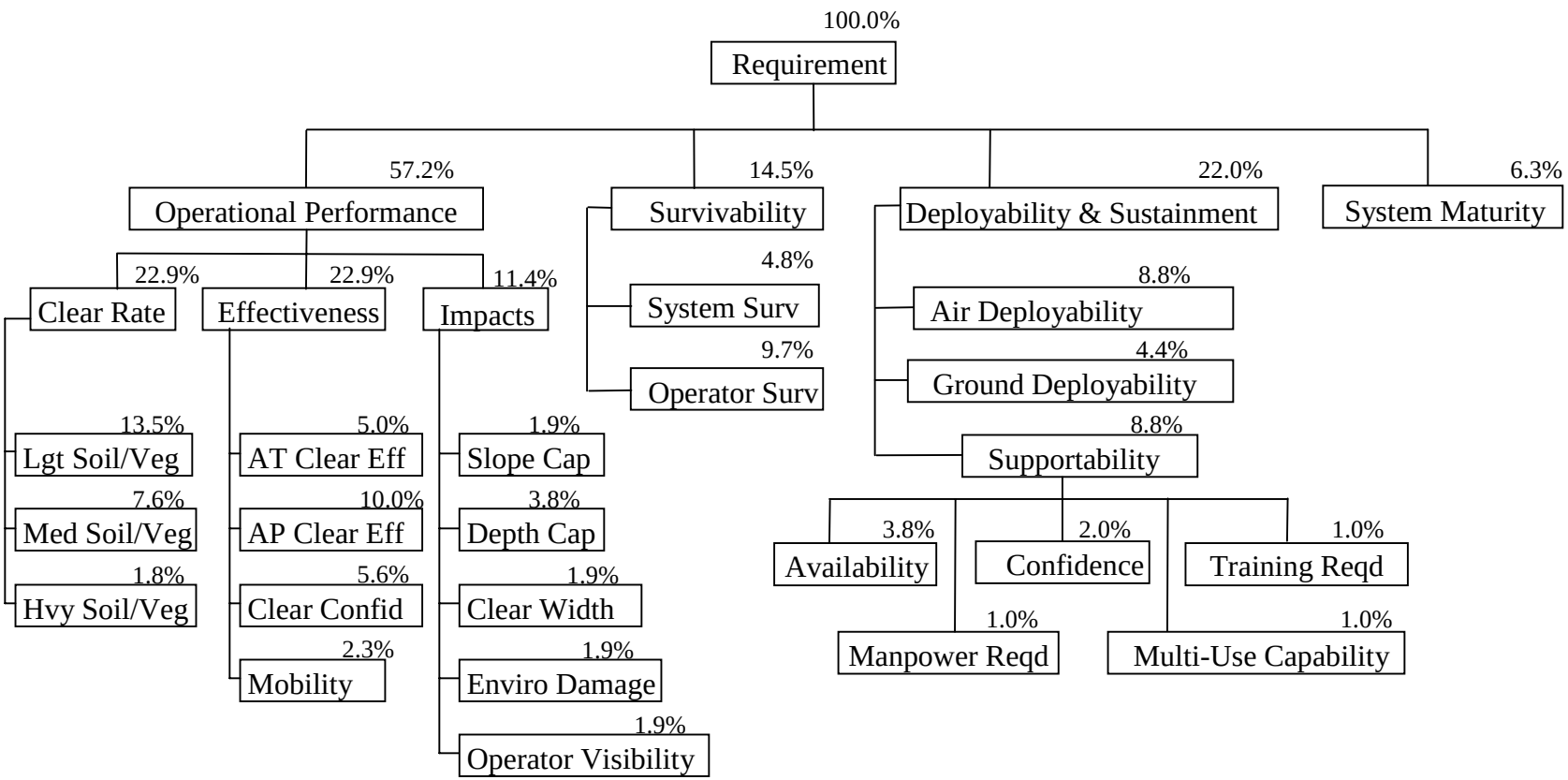
Bofors-Mine Guzzler	Oracle w/ spitfire	Rhino	Mineworm	Bigfoot	Minenwolf	Armtrac 325	MgM Rotar Mk-II	Pearson SDTT w / roller	BDM 48 Brush Deminer	Digger	Hydrema Weimar M1220	Hydrema Weimar w/ MFV-1000	Tempest MK3	MgM Rotar Mk_1
1000	2500	2000	750	1000	750	**1522**	20	2000	1000	1000	750	250	600	30
500	1250	1000	250	250	600	**1170**	10	1000	500	500	400	100	350	10
250	600	600	0	0	250	**486**	0	100	240	240	200	50	200	0
0%	99.60%	0%	0%	90%	99%	90%	0%	0%	0%	0%	0%	0%	0%	0%
99%	99.60%	98%	25%	85%	99%	95%	99%	95%	99%	50%	75%	80%	50%	99%
9	6	9	8	8	5	5	5	5	8	5	5	5	5	5
9	2	7	4	4	10	6	6	6	8	10	5	8	6	6
3	8	6	10	10	10	10	10	10	10	3	6	6	6	8
10	9	10	10	3	9	7	7	3	5	3	8	8	3	7
10	9	10	10	2	9	8	8	2	6	0	8	8	0	8
6	6	7	4	1	6	6	0	1	0	0	0	0	0	2
9	9	9	9	10	9	9	10	10	9	9	9	9	9	10
6.5	8	5	5	5	6	6	10	10	10	3	8	7	2	9
9	10	9	0	8	7	7	0	6.35	7	0	0	0	5	0
10	10	0	0	5	0	0	0	5	0	0	0	0	0	0
10	10	10	0	7	8	8	0	1	7	0	0	0	10	0
10	10	6	6	10	10	10	10	6	10	10	10	10	10	10
5	10	5	10	10	5	5	5	5	10	10	5	5	5	5
4	4	7	4	4	4	4	0	7	4	0	0	0	7	0
10	10	0	0	10	0	0	0	7	0	0	0	0	10	0
10	10	10	0	10	7	7	0	6.35	7	0	0	0	5	0
0	0	9	9	9	0	0	0	0	0	9	0	0	9	0
10	**8**	**10**	**10**	**10**	**3.7**	**3.7**	**0**	**6.8**	**3.7**	**10**	**0**	**0**	**10**	**0**
0	**10**	**0**	**0**	**0**	**9.9**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
0	10	0	0	0	9.9	9.2	0	0	0	0	0	0	0	0
10	10	10	10	10	9	9	4	4	10	10	10	10	10	4
4	4	4	5	6	5	6	6	2	4	10	6	2	10	6
3	3	2	4	6	6	4	4	7	3	8	4	4	7	4
8	10	0	0	0	8	8	10	6	0	0	6	6	6	10
10	10	10	5	5	0	0	5	5	5	5	5	5	5	5
3	10	1	3	3	4	7	10	7	3	7	7	7	5	10
8	8	8	10	10	8	10	10	8	10	10	10	10	6	8
0	8	6	0	0	6	8	8	8	8	0	5	5	0	4
7	3	7	1	1	1	1	1	6	1	1	1	7	9	1

Heartlands Uni-Disc III	Heartlands Uni-Sift	Heartlands NI Grind BMHA III	Floating Mine Blade	BIGAT MiSa1	AMCV-Keiler	Mine Clearing Cultivator	Armadillo	MCAP/D7 Dozer	Pearson Ploughs Full width	Grizzly
750	2500	750	3000	750	1333	2000	2000	3250	1500	2500
400	1000	400	0	350	500	0	0	0	350	500
200	0	200	0	0	313	0	0	0	0	0
			50%		33%	50%		50%	50%	50%
96%	0	0%	81%	0	95%	90%	0%	95%	98%	98%
90%	90%	97%	25%	90%	85%	25%	80%	95%	98%	98%
5	5	5	5	1	5	5	6	3	5	5
10	3	8	9	7	10	3	5	10	10	10
8	8	10	10	6	8	10	10	10	8	8
10	10	10	10	9	10	10	3	7	7	7
10	10	10	9	10	6	8	2	8	8	8
0	6	0	4	6	10	8	0	8	10	10
9	6	9	5	6	4	5	10	3	0	0
10	10	8	9	5	7	10	5	10	5	8
9	8	5	No Data	0	8	6	0	7.5	9	10
10	7	7	POC at NVESD	0	8	7	0	10	7	8
10	7	7	Chris Wanner (703) 704-1076	0	10	8	0	10	10	10
6	6	6		0	10	6	6	6	10	10
0	0	0	has been phoned and emailed at	0	10	5	5	10	10	10
4	4	4	c wanner@nvl.army.mill		4	4		1	4	4
10	10	10			7	7		7	7	7
10	9	5			9	6		7.5	10	10
0	0	0		9	0	9	9	0	0	0
8	**7.7**	**6.3**	**0**	**10**	**7.1**	**10**	**10**	**5.2**	**7**	**7**
9.6	**0**	**0**	**0**	**0**	**9.8**	**0**	**0**	**9.5**	**9.8**	**9.8**
9.6	0	0			9.8			9.5	9.8	9.8
4	4	9			10			10	10	10
2	5	5	5	2	1	4	10	5	2	2
2	6	6	6	2	10	6	8	6	10	10
10	8	10		0	4	8	0	10	8	4
5	5	5		0	5	5	0	5	10	10
10	7	10		0	9	7	8	10	10	6
10	8	10		8	8	8	10	10	8	8
8	5	8	6	0	0	3	6	10	0	0
5	5	1		0	10	1	1	10	10	4

Evaluation Hierarchy
"Tree View"
for the Area Mine Clearing System
(AMCS)
Analysis

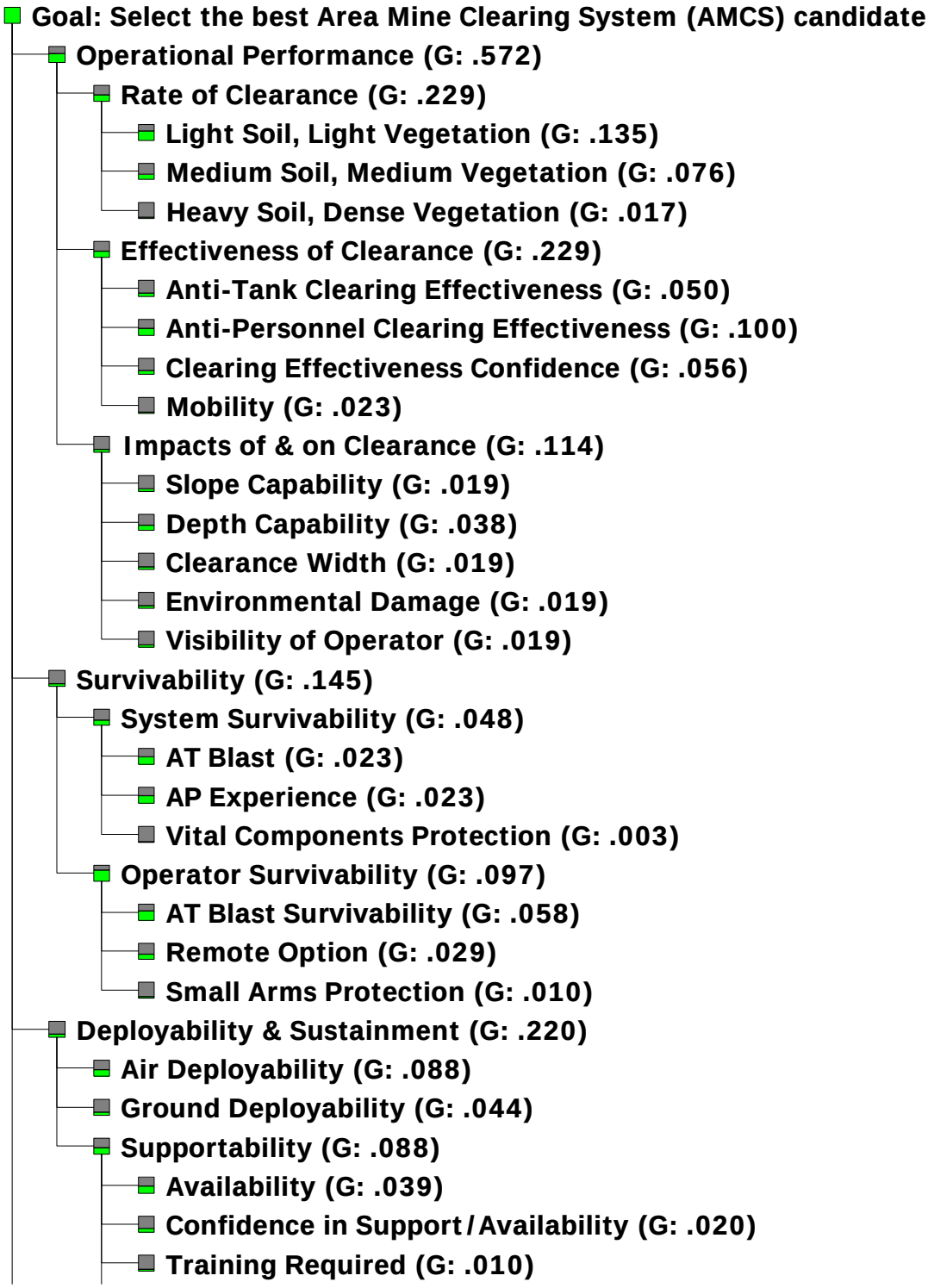
Appendix B

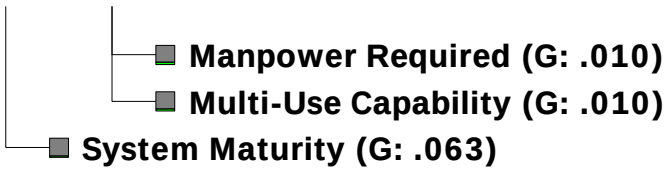
Operational Evaluation Hierarchy



Model Name: AMCS-40 ALTS TO TOP 10 REVISED

Treeview





Alternatives

Aardvark	.1161
Hydrema 910 MCV	.1047
Oracle w/ Spitfire	.1041
Scanjack	.0974
Compact Minecat 230	.1003
MCAP/D7 Dozer	.0998
Patris RA-140 DS	.0958
Pearson FW Plough	.0923
Mine Breaker 2000/2	.0972
Grizzly	.0923

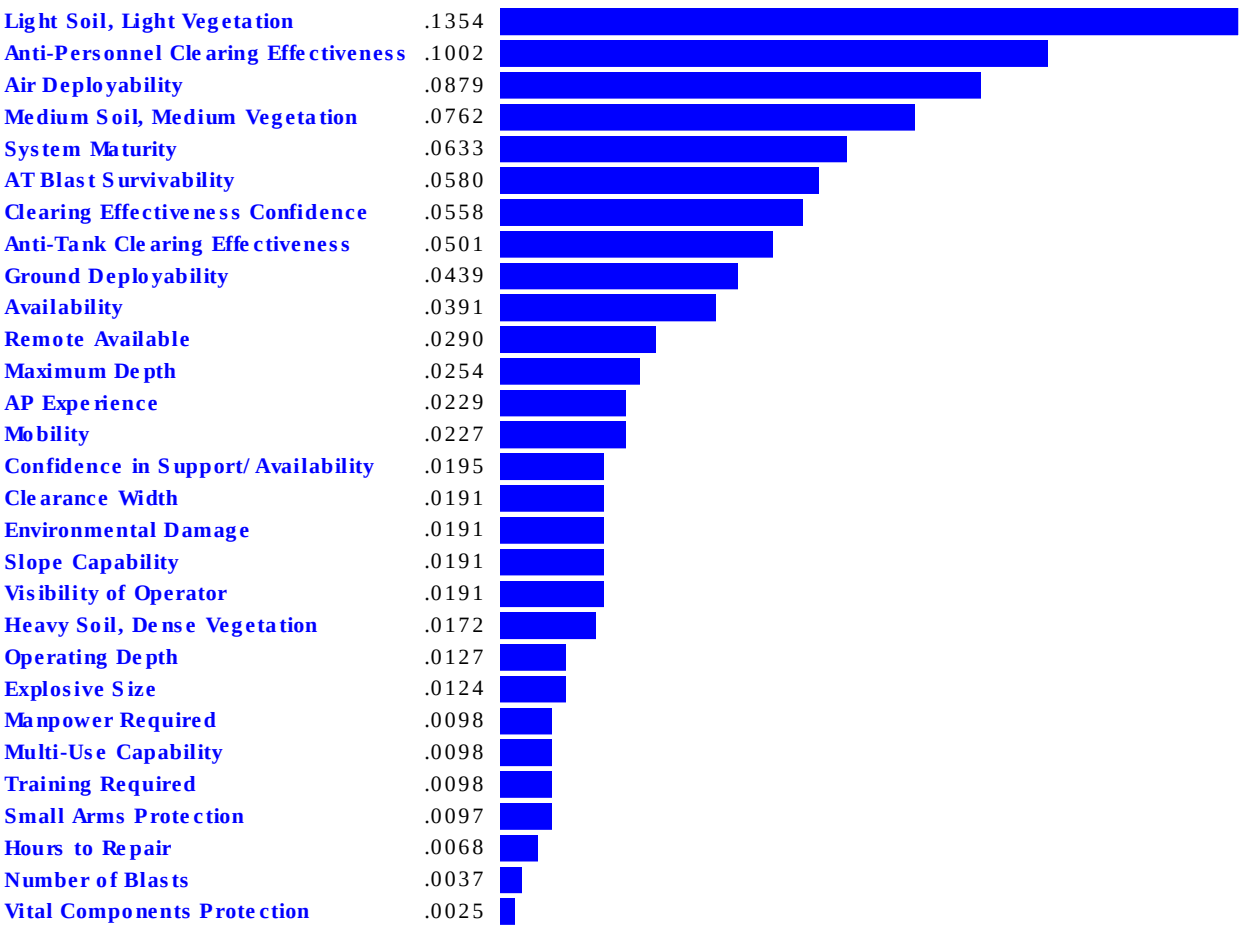
Model Name: AMCS-BASE WEIGHTING

Synthesis: Summary

Synthesis with respect to:

Goal: Select the best Area Mine Clearing System (AMCS) candidate

Overall Inconsistency = .01



Initial Screening Results for the Area Mine Clearing System (AMCS) Analysis

Appendix C

AID	Ideal mode Alternative	Total	Costs	INCR Rate of Clearance Lgt Soil/Veget	INCR Rate of Clearance Med Soil/Veget	INCR Rate of Clearance Hvy Soil/Veget
		1		0.135	0.076	0.017
A2	Aardvark	0.8379		1440	1107	460
A4	Hydrema 910 MCV	0.7549		1584	1217	506
A16	Oracle w/ Spitfire	0.7507		2500	1250	600
A5	Compact Minecat 230	0.724		1022	786	326
A38	MCAP/D7 Dozer	0.7226		3250	0	0
A9	Scanjack	0.7018		1888	1451	603
A13	Mine Breaker 2000/2	0.701		2400	1000	400
A6	Patris RA-140 DS	0.6904		1534	1179	490
A39	Pearson Ploughs Full Width	0.6688		1500	350	0
A40	Grizzly	0.6682		2500	500	0
A12	Krohn MMCS	0.6646		1600	800	400
A1	Bozena	0.6521		562	432	180
A3	Armtrac 100	0.6513		1127	866	360
A35	AMCV-Keiler	0.6389		1333	500	313
A17	Rhino	0.6252		2000	1000	600
A31	Heartlands Uni-Sift	0.6192		2500	1000	0
A21	Armtrac 325	0.6052		1522	1170	486
A10	Viking	0.6002		1857	1427	593
A15	Bofors - Mine Guzzler	0.5966		1000	500	250
A30	Heartlands Uni-Disc III	0.5847		750	400	200
A20	Minenwolf	0.5822		750	600	250
A23	Pearson SDTT w/roller	0.5536		2000	1000	100
A7	RM-KA 01	0.5491		596	458	190
A32	Heartlands NI Grind BMHA III	0.5155		750	400	200
A19	Bigfoot	0.5137		1000	250	0
A14	Mine Crusher	0.5048		2000	1000	0
A11	FMR 2000	0.5021		1300	1000	500
A36	Mine Clearing Cultivator	0.4988		2000	0	0
A28	Tempest MK3	0.4977		600	350	200
A37	Armadillo	0.4907		2000	0	0
A8	Minelifta	0.4882		927	712	296
A24	BDM 48 Brush Deminer	0.4656		1000	500	240
A25	Digger	0.4559		1000	500	240
A26	Hydrema Weimar M1220	0.4112		750	400	200
A22	MgM Rotar Mk-II	0.4093		20	10	0
A33	Floating Mine Blade	0.4041		3000	0	0
A29	MgM Rotar Mk-I	0.402		30	10	0
A18	Mineworm	0.3885		750	250	0
A27	Hydrema Weimar w/MFV-1000	0.3836		250	100	50
A34	BIGAT MiSa1	0.3336		750	350	0

INCR	INCR	INCR	INCR	INCR	INCR	INCR	INCR	INCR	INCR
Operational Performance									
Effectiveness of Clearing					Impacts of Cearing and on Clearing				
AT effect	AP effect	Confidence	Mobility	Slope	Op Depth	Max Depth	Clear Width	Environment	Oper Vis
0.05	0.1	0.056	0.023	0.019	0.013	0.025	0.019	0.0185	0.0185
90	98	10	9	10	9	10	6	9	7
90	96	9	5	10	5	6	7	9	6
99.6	99.6	6	2	8	9	9	6	9	8
89	96	8	10	6	9	10	2	9	6
95	95	3	10	10	7	8	8	3	10
98	98	7	4	3	9	9	7	9	5
96	90	5	9	8	10	10	8	9	10
90	99	7	5	8	7	8	7	9	6
98	98	5	10	8	7	8	10	0	5
98	98	5	10	8	7	8	10	0	8
96	98	5	10	10	10	10	4	9	10
88	94	8	10	6	5	6	0	9	2
90	97	7	6	10	7	8	2	9	6
95	85	5	10	8	10	6	10	4	7
0	98	9	7	6	10	10	7	9	5
0	90	5	3	8	10	10	6	6	10
90	95	5	6	10	7	8	6	9	6
96	98	7	9	8	5	6	9	9	4
0	99	9	9	3	10	10	6	9	6.5
96	90	5	10	8	10	10	0	9	10
99	99	5	10	10	9	9	6	9	6
0	95	5	6	10	3	2	1	10	10
89	98	7	10	10	5	6	1	9	2
0	97	5	8	10	10	10	0	9	8
90	85	8	4	10	3	2	1	10	5
0	80	5	6	8	3	2	4	9	10
0	98	5	10	0	10	10	4	9	5
90	25	5	3	10	10	8	8	5	10
0	50	5	6	6	3	0	0	9	2
0	80	6	5	10	3	2	0	10	5
0	80	9	9	10	9	6	4	9	6
0	99	8	8	10	5	6	0	9	10
0	50	5	10	3	3	0	0	9	3
0	75	5	5	6	8	8	0	9	8
0	99	5	6	10	7	8	0	10	10
81	25	5	9	10	10	9	4	5	9
0	99	5	6	8	7	8	2	10	9
0	25	8	4	10	10	10	4	9	5
0	80	5	8	6	8	8	0	9	7
0	90	1	7	6	9	10	6	6	5

INCR	INCR	INCR	INCR	INCR	INCR	INCR	INCR	INCR	INCR
				Survivability					
	System Survivability				Operator Survivability			Air	Ground
AT Blast Expl Size	AT Blast Repair Hrs	AT Blast # Blasts	AP Exper	Vital Comp	AT Blast	Remote	Small Arms		
0.012	0.007	0.004	0.023	0.003	0.058	0.029	0.01	0.088	0.044
9	10	10	10	10	10	9	10	9	9
10	10	10	10	5	6.67	0	10	8	9
10	10	10	10	10	8	10	10	4	3
9	8	9	6	5	9.2	8.9	6.5	10	7
7.5	10	10	6	10	5.2	9.5	10	5	6
9	8	8	10	10	8	0	10	7	1
7.5	10	10	6	10	7.2	9.6	10	4	3
9	8	8	6	5	4.7	0	10	5	10
9	7	10	10	10	7	9.8	10	2	10
10	8	10	10	10	7	9.8	10	2	10
9	5	10	10	0	8	0	10	3	4
8	10	10	10	10	10	0		9	6
7	0	8	10	5	3.33	9	9	6	9
8	8	10	10	10	7.1	9.8	10	1	10
9	0	10	6	5	10	0	10	4	2
8	7	7	6	0	7.7	0	4	5	6
7	0	8	10	5	3.7	0	9	6	4
0	0	0	0	0	10	0	0	4	3
9	10	10	10	5	10	0	10	4	3
9	10	10	6	0	8	9.6	4	2	2
7	0	8	10	5	3.7	9.9	9	5	6
6.35	5	1	6	5	6.8	0	4	2	7
0	0	0	0	10	10	0	10	10	7
5	7	7	6	0	6.3	0	9	5	6
8	5	7	10	10	10	0	10	6	6
0	0	0	0	0	0	0	10	10	6
7.5	8	7	6	5	10	0	4	4	3
6	7	8	6	5	10	0		4	6
5	0	10	10	5	10	0	10	10	7
0	0	0	6	5	10	0		10	8
5.9	0	7	10	10	3.3	0	6	4	6
7	0	7	10	10	3.7	0	10	4	3
0	0	0	10	10	10	0	10	10	8
0	0	0	10	5	0	0	10	6	4
0	0	0	10	5	0	0	4	6	4
					0	0		5	6
0	0	0	10	5	0	0	4	6	4
0	0	0	6	10	10	0	10	5	4
0	0	0	10	5	0	0	10	2	4
0	0	0	0	0	10	0		2	2

INCR Availability	INCR Deployability & Sustainment Supportability Confidence	INCR Training	INCR Manpower	INCR Multi-Use	INCR System Maturity
0.039	0.02	0.01	0.01	0.01	0.063
8	10	7	8	0	10
6	10	6	10	0	10
10	10	10	8	8	3
8	5	4	6	0	8
10	5	10	10	10	10
6	10	7	2	0	6
4	5	5	8	0	7
6	5	6	10	0	10
8	10	10	8	0	10
4	10	6	8	0	4
8	5	3	6	0	9
8	10	9	10	0	10
8	5	7	10	0	5
4	5	9	8	0	10
0	10	1	8	6	7
8	6	7	8	5	5
8	0	7	10	8	1
6	0	3	10	0	1
8	10	3	8	0	7
10	5	10	10	8	5
8	0	4	8	6	1
6	5	7	8	8	6
5	0	3	10	0	1
10	5	10	10	8	1
0	5	3	10	0	1
8	0	10	10	0	1
0	0	3	10	0	1
8	5	7	8	3	1
6	5	5	6	0	9
0	0	8	10	6	1
8	0	3	10	0	1
0	5	3	10	8	1
0	5	7	10	0	1
6	5	7	10	5	1
10	5	10	10	8	1
				6	
10	5	10	8	4	1
0	5	3	10	0	1
6	5	7	10	5	7
0	0	0	8	0	0

AID	Ideal mode Alternative	Total	Costs	INCR Rate of Clearance Lgt Soil/Veget	INCR Rate of Clearance Med Soil/Veget	INCR Rate of Clearance Hvy Soil/Veget
		1		0.135	0.076	0.017
A2	Aardvark	0.8379		0.4431	0.738	0.7667
A4	Hydrema 910 MCV	0.7549		0.4874	0.8113	0.8433
A16	Oracle w/ Spitfire	0.7507		0.7692	0.8333	1
A5	Compact Minecat 230	0.724		0.3145	0.524	0.5433
A38	MCAP/D7 Dozer	0.7226		1	0	0
A9	Scanjack	0.7018		0.5809	0.9673	1
A13	Mine Breaker 2000/2	0.701		0.7385	0.6667	0.6667
A6	Patris RA-140 DS	0.6904		0.472	0.786	0.8167
A39	Pearson Ploughs Full Width	0.6688		0.4615	0.2333	0
A40	Grizzly	0.6682		0.7692	0.3333	0
A12	Krohn MMCS	0.6646		0.4923	0.5333	0.6667
A1	Bozena	0.6521		0.1729	0.288	0.3
A3	Amtrac 100	0.6513		0.3468	0.5773	0.6
A35	AMCV-Keiler	0.6389		0.4102	0.3333	0.5217
A17	Rhino	0.6252		0.6154	0.6667	1
A31	Heartlands Uni-Sift	0.6192		0.7692	0.6667	0
A21	Amtrac 325	0.6052		0.4683	0.78	0.81
A10	Viking	0.6002		0.5714	0.9513	0.9883
A15	Bofors - Mine Guzzler	0.5966		0.3077	0.3333	0.4167
A30	Heartlands Uni-Disc III	0.5847		0.2308	0.2667	0.3333
A20	Minenwolf	0.5822		0.2308	0.4	0.4167
A23	Pearson SDTT w/roller	0.5536		0.6154	0.6667	0.1667
A7	RM-KA 01	0.5491		0.1834	0.3053	0.3167
A32	Heartlands NI Grind BMHA III	0.5155		0.2308	0.2667	0.3333
A19	Bigfoot	0.5137		0.3077	0.1667	0
A14	Mine Crusher	0.5048		0.6154	0.6667	0
A11	FMR 2000	0.5021		0.4	0.6667	0.8333
A36	Mine Clearing Cultivator	0.4988		0.6154	0	0
A28	Tempest MK3	0.4977		0.1846	0.2333	0.3333
A37	Armadillo	0.4907		0.6154	0	0
A8	Minelifta	0.4882		0.2852	0.4747	0.4933
A24	BDM 48 Brush Deminer	0.4656		0.3077	0.3333	0.4
A25	Digger	0.4559		0.3077	0.3333	0.4
A26	Hydrema Weimar M1220	0.4112		0.2308	0.2667	0.3333
A22	MgM Rotar Mk-II	0.4093		0.0062	0.0067	0
A33	Floating Mine Blade	0.4041		0.9231	0	0
A29	MgM Rotar Mk-I	0.402		0.0092	0.0067	0
A18	Mineworm	0.3885		0.2308	0.1667	0
A27	Hydrema Weimar w/MFV-1000	0.3836		0.0769	0.0667	0.0833
A34	BIGAT MiSa1	0.3336		0.2308	0.2333	0

INCR	INCR	INCR	INCR	INCR	INCR	INCR	INCR	INCR	INCR
Operational Performance									
Effectiveness of Clearing					Impacts of Cearing and on Clearing				
AT effect	AP effect	Confidence	Mobility	Slope	Op Depth	Max Depth	Clear Width	Environment	Oper Vis
0.05	0.1	0.056	0.023	0.019	0.013	0.025	0.019	0.0185	0.0185
0.9	0.98	1	0.9	1	0.9	1	0.6	0.9	0.7
0.9	0.96	0.9	0.5	1	0.5	0.6	0.7	0.9	0.6
0.996	0.996	0.6	0.2	0.8	0.9	0.9	0.6	0.9	0.8
0.89	0.96	0.8	1	0.6	0.9	1	0.2	0.9	0.6
0.95	0.95	0.3	1	1	0.7	0.8	0.8	0.3	1
0.98	0.98	0.7	0.4	0.3	0.9	0.9	0.7	0.9	0.5
0.96	0.9	0.5	0.9	0.8	1	1	0.8	0.9	1
0.9	0.99	0.7	0.5	0.8	0.7	0.8	0.7	0.9	0.6
0.98	0.98	0.5	1	0.8	0.7	0.8	1	0	0.5
0.98	0.98	0.5	1	0.8	0.7	0.8	1	0	0.8
0.96	0.98	0.5	1	1	1	1	0.4	0.9	1
0.88	0.94	0.8	1	0.6	0.5	0.6	0	0.9	0.2
0.9	0.97	0.7	0.6	1	0.7	0.8	0.2	0.9	0.6
0.95	0.85	0.5	1	0.8	1	0.6	1	0.4	0.7
0	0.98	0.9	0.7	0.6	1	1	0.7	0.9	0.5
0	0.9	0.5	0.3	0.8	1	1	0.6	0.6	1
0.9	0.95	0.5	0.6	1	0.7	0.8	0.6	0.9	0.6
0.96	0.98	0.7	0.9	0.8	0.5	0.6	0.9	0.9	0.4
0	0.99	0.9	0.9	0.3	1	1	0.6	0.9	0.65
0.96	0.9	0.5	1	0.8	1	1	0	0.9	1
0.99	0.99	0.5	1	1	0.9	0.9	0.6	0.9	0.6
0	0.95	0.5	0.6	1	0.3	0.2	0.1	1	1
0.89	0.98	0.7	1	1	0.5	0.6	0.1	0.9	0.2
0	0.97	0.5	0.8	1	1	1	0	0.9	0.8
0.9	0.85	0.8	0.4	1	0.3	0.2	0.1	1	0.5
0	0.8	0.5	0.6	0.8	0.3	0.2	0.4	0.9	1
0	0.98	0.5	1	0	1	1	0.4	0.9	0.5
0.9	0.25	0.5	0.3	1	1	0.8	0.8	0.5	1
0	0.5	0.5	0.6	0.6	0.3	0	0	0.9	0.2
0	0.8	0.6	0.5	1	0.3	0.2	0	1	0.5
0	0.8	0.9	0.9	1	0.9	0.6	0.4	0.9	0.6
0	0.99	0.8	0.8	1	0.5	0.6	0	0.9	1
0	0.5	0.5	1	0.3	0.3	0	0	0.9	0.3
0	0.75	0.5	0.5	0.6	0.8	0.8	0	0.9	0.8
0	0.99	0.5	0.6	1	0.7	0.8	0	1	1
0.81	0.25	0.5	0.9	1	1	0.9	0.4	0.5	0.9
0	0.99	0.5	0.6	0.8	0.7	0.8	0.2	1	0.9
0	0.25	0.8	0.4	1	1	1	0.4	0.9	0.5
0	0.8	0.5	0.8	0.6	0.8	0.8	0	0.9	0.7
0	0.9	0.1	0.7	0.6	0.9	1	0.6	0.6	0.5

INCR	INCR	INCR	INCR	INCR	INCR	INCR	INCR	INCR	INCR
			Survivability						
	System Survivability				Operator Survivability			Air	Ground
AT Blast Expl Size	AT Blast Repair Hrs	AT Blast # Blasts	AP Exper	Vital Comp	AT Blast	Remote	Small Arms		
0.012	0.007	0.004	0.023	0.003	0.058	0.029	0.01	0.088	0.044
0.9	1	1	1	1	1	1	1	0.9	0.9
1	1	1	1	0.5	0.667	0	1	0.8	0.9
1	1	1	1	1	0.8	1	1	0.4	0.3
0.9	0.8	0.9	0.6	0.5	0.92	0.9889	0.65	1	0.7
0.75	1	1	0.6	1	0.52	1	1	0.5	0.6
0.9	0.8	0.8	1	1	0.8	0	1	0.7	0.1
0.75	1	1	0.6	1	0.72	1	1	0.4	0.3
0.9	0.8	0.8	0.6	0.5	0.47	0	1	0.5	1
0.9	0.7	1	1	1	0.7	1	1	0.2	1
1	0.8	1	1	1	0.7	1	1	0.2	1
0.9	0.5	1	1	0	0.8	0	1	0.3	0.4
0.8	1	1	1	1	1	0		0.9	0.6
0.7	0	0.8	1	0.5	0.333	1	0.9	0.6	0.9
0.8	0.8	1	1	1	0.71	1	1	0.1	1
0.9	0	1	0.6	0.5	1	0	1	0.4	0.2
0.8	0.7	0.7	0.6	0	0.77	0	0.4	0.5	0.6
0.7	0	0.8	1	0.5	0.37	0	0.9	0.6	0.4
0	0	0	0	0	1	0	0	0.4	0.3
0.9	1	1	1	0.5	1	0	1	0.4	0.3
0.9	1	1	0.6	0	0.8	1	0.4	0.2	0.2
0.7	0	0.8	1	0.5	0.37	1	0.9	0.5	0.6
0.635	0.5	0.1	0.6	0.5	0.68	0	0.4	0.2	0.7
0	0	0	0	1	1	0	1	1	0.7
0.5	0.7	0.7	0.6	0	0.63	0	0.9	0.5	0.6
0.8	0.5	0.7	1	1	1	0	1	0.6	0.6
0	0	0	0	0	0	0	1	1	0.6
0.75	0.8	0.7	0.6	0.5	1	0	0.4	0.4	0.3
0.6	0.7	0.8	0.6	0.5	1	0		0.4	0.6
0.5	0	1	1	0.5	1	0	1	1	0.7
0	0	0	0.6	0.5	1	0		1	0.8
0.59	0	0.7	1	1	0.33	0	0.6	0.4	0.6
0.7	0	0.7	1	1	0.37	0	1	0.4	0.3
0	0	0	1	1	1	0	1	1	0.8
0	0	0	1	0.5	0	0	1	0.6	0.4
0	0	0	1	0.5	0	0	0.4	0.6	0.4
					0	0		0.5	0.6
0	0	0	1	0.5	0	0	0.4	0.6	0.4
0	0	0	0.6	1	1	0	1	0.5	0.4
0	0	0	1	0.5	0	0	1	0.2	0.4
0	0	0	0	0	1	0		0.2	0.2

INCR Availability	INCR Deployability & Sustainment Supportability Confidence	INCR Training	INCR Manpower	INCR Multi-Use	INCR System Maturity
0.039	0.02	0.01	0.01	0.01	0.063
0.8	1	0.7	0.8	0	1
0.6	1	0.6	1	0	1
1	1	1	0.8	0.8	0.3
0.8	0.5	0.4	0.6	0	0.8
1	0.5	1	1	1	1
0.6	1	0.7	0.2	0	0.6
0.4	0.5	0.5	0.8	0	0.7
0.6	0.5	0.6	1	0	1
0.8	1	1	0.8	0	1
0.4	1	0.6	0.8	0	0.4
0.8	0.5	0.3	0.6	0	0.9
0.8	1	0.9	1	0	1
0.8	0.5	0.7	1	0	0.5
0.4	0.5	0.9	0.8	0	1
0	1	0.1	0.8	0.6	0.7
0.8	0.6	0.7	0.8	0.5	0.5
0.8	0	0.7	1	0.8	0.1
0.6	0	0.3	1	0	0.1
0.8	1	0.3	0.8	0	0.7
1	0.5	1	1	0.8	0.5
0.8	0	0.4	0.8	0.6	0.1
0.6	0.5	0.7	0.8	0.8	0.6
0.5	0	0.3	1	0	0.1
1	0.5	1	1	0.8	0.1
0	0.5	0.3	1	0	0.1
0.8	0	1	1	0	0.1
0	0	0.3	1	0	0.1
0.8	0.5	0.7	0.8	0.3	0.1
0.6	0.5	0.5	0.6	0	0.9
0	0	0.8	1	0.6	0.1
0.8	0	0.3	1	0	0.1
0	0.5	0.3	1	0.8	0.1
0	0.5	0.7	1	0	0.1
0.6	0.5	0.7	1	0.5	0.1
1	0.5	1	1	0.8	0.1
				0.6	
1	0.5	1	0.8	0.4	0.1
0	0.5	0.3	1	0	0.1
0.6	0.5	0.7	1	0.5	0.7
0	0	0	0.8	0	0

Detailed
Evaluation of the Alternatives
For a
Area Mine Clearing System (AMCS)

Appendix D

Model Name: AMCS-40 ALTS TO TOP 10 REVISED

Synthesis Summary:

Synthesis with respect to:

Goal: Select the best Area Mine Clearing System (AMCS) candidate

Overall Inconsistency = .01

Model Name: AMCS-40 ALTS TO TOP 10 REVISED

Data Grid

		INCR
Alternative	Total	Operational Performance Rate of Clearance Light Soil, Light Vegetation (G: .135)
Aardvark	.8379	1440
Hydrema 910 MCV	.7549	1584
Oracle w/Spitfire	.7507	2500
Compact Minecat 230	.7240	1022
MCAP/D7 Dozer	.7226	3250
Scanjack	.7018	1888
Mine Breaker 2000/2	.7010	2400
Patris RA-140 DS	.6904	1534
Pearson FW Plough	.6688	1500
Grizzly	.6682	2500

	INCR
Alternative	Operational Performance Rate of Clearance Medium Soil, Medium Vegetation (G: .076)
Aardvark	1107
Hydrema 910 MCV	1217
Oracle w/Spitfire	1250
Compact Minecat 230	786
MCAP/D7 Dozer	0
Scanjack	1451
Mine Breaker 2000/2	1000
Patris RA-140 DS	1179
Pearson FW Plough	350
Grizzly	500

	INCR
Alternative	Operational Performance Rate of Clearance Heavy Soil, Dense Vegetation (G: .017)
☑ Aardvark	460
☑ Hydrema 910 MCV	506
☑ Oracle w/Spitfire	600
☑ Compact Minecat 230	326
☑ MCAP/D7 Dozer	0
☑ Scanjack	603
☑ Mine Breaker 2000/2	400
☑ Patris RA-140 DS	490
☑ Pearson FW Plough	0
☑ Grizzly	0

	INCR
Alternative	Operational Performance Effectiveness of Clearance Anti-Tank Clearing Effectiveness (G: .050)
☑ Aardvark	90
☑ Hydrema 910 MCV	90
☑ Oracle w/Spitfire	99.6
☑ Compact Minecat 230	89
☑ MCAP/D7 Dozer	95
☑ Scanjack	98
☑ Mine Breaker 2000/2	96
☑ Patris RA-140 DS	90
☑ Pearson FW Plough	98
☑ Grizzly	98

	INCR
Alternative	Operational Performance Effectiveness of Clearance Anti-Personnel Clearing Effectiveness (G: .100)
☑ Aardvark	98
☑ Hydrema 910 MCV	96
☑ Oracle w/Spitfire	99.6
☑ Compact Minecat 230	96
☑ MCAP/D7 Dozer	95
☑ Scanjack	98
☑ Mine Breaker 2000/2	90
☑ Patris RA-140 DS	99
☑ Pearson FW Plough	98
☑ Grizzly	98

	INCR
Alternative	Operational Performance Effectiveness of Clearance Clearing Effectiveness Confidence (G: .056)
☑ Aardvark	10
☑ Hydrema 910 MCV	9
☑ Oracle w/Spitfire	6
☑ Compact Minecat 230	8
☑ MCAP/D7 Dozer	3
☑ Scanjack	7
☑ Mine Breaker 2000/2	5
☑ Patris RA-140 DS	7
☑ Pearson FW Plough	5
☑ Grizzly	5

	INCR	INCR
Alternative	Operational Performance Effectiveness of Clearance Mobility (G: .023)	Operational Performance Impacts of & on Clearance Slope Capability (G: .019)
☑ Aardvark	9	10
☑ Hydrema 910 MCV	5	10
☑ Oracle w/Spitfire	2	8
☑ Compact Minecat 230	10	6
☑ MCAP/D7 Dozer	10	10
☑ Scanjack	4	3
☑ Mine Breaker 2000/2	9	8
☑ Patris RA-140 DS	5	8
☑ Pearson FW Plough	10	8
☑ Grizzly	10	8

	INCR	INCR
Alternative	Operational Performance Impacts of & on Clearance Depth Capability Operating Depth (G: .013)	Operational Performance Impacts of & on Clearance Depth Capability Maximum Depth (G: .025)
☑ Aardvark	9	10
☑ Hydrema 910 MCV	5	6
☑ Oracle w/Spitfire	9	9
☑ Compact Minecat 230	9	10
☑ MCAP/D7 Dozer	7	8
☑ Scanjack	9	9
☑ Mine Breaker 2000/2	10	10
☑ Patris RA-140 DS	7	8
☑ Pearson FW Plough	7	8
☑ Grizzly	7	8

Alternative	INCR Operational Performance Impacts of & on Clearance Clearance Width (G: .019)	INCR Operational Performance Impacts of & on Clearance Environmental Damage (G: .019)
☑ Aardvark	6	9
☑ Hydrema 910 MCV	7	9
☑ Oracle w/Spitfire	6	9
☑ Compact Minecat 230	2	9
☑ MCAP/D7 Dozer	8	3
☑ Scanjack	7	9
☑ Mine Breaker 2000/2	8	9
☑ Patris RA-140 DS	7	9
☑ Pearson FW Plough	10	0
☑ Grizzly	10	0

Alternative	INCR Operational Performance Impacts of & on Clearance Visibility of Operator (G: .019)	INCR Survivability System Survivability AT Blast Explosive Size (G: .012)
☑ Aardvark	7	9
☑ Hydrema 910 MCV	6	10
☑ Oracle w/Spitfire	8	10
☑ Compact Minecat 230	6	9
☑ MCAP/D7 Dozer	10	7.5
☑ Scanjack	5	9
☑ Mine Breaker 2000/2	10	7.5
☑ Patris RA-140 DS	6	9
☑ Pearson FW Plough	5	9
☑ Grizzly	8	10

Alternative	INCR Survivability System Survivability AT Blast Hours to Repair (G: .007)	INCR Survivability System Survivability AT Blast Number of Blasts (G: .004)
☑ Aardvark	10	10
☑ Hydrema 910 MCV	10	10
☑ Oracle w/Spitfire	10	10
☑ Compact Minecat 230	8	9
☑ MCAP/D7 Dozer	10	10
☑ Scanjack	8	8
☑ Mine Breaker 2000/2	10	10
☑ Patris RA-140 DS	8	8
☑ Pearson FW Plough	7	10
☑ Grizzly	8	10

Alternative	INCR Survivability System Survivability AP Experience (G: .023)	INCR Survivability System Survivability Vital Components Protection (G: .003)
☑ Aardvark	10	10
☑ Hydrema 910 MCV	10	5
☑ Oracle w/Spitfire	10	10
☑ Compact Minecat 230	6	5
☑ MCAP/D7 Dozer	6	10
☑ Scanjack	10	10
☑ Mine Breaker 2000/2	6	10
☑ Patris RA-140 DS	6	5
☑ Pearson FW Plough	10	10
☑ Grizzly	10	10

Alternative	INCR Survivability Operator Survivability AT Blast Survivability (G: .058)	INCR Survivability Operator Survivability Remote Option (G: .029)
☑ Aardvark	10	9
☑ Hydrema 910 MCV	6.67	0
☑ Oracle w/Spitfire	8	10
☑ Compact Minecat 230	9.2	8.9
☑ MCAP/D7 Dozer	5.2	9.5
☑ Scanjack	8	0
☑ Mine Breaker 2000/2	7.2	9.6
☑ Patris RA-140 DS	4.7	0
☑ Pearson FW Plough	7	9.8
☑ Grizzly	7	9.8

Alternative	INCR Survivability Operator Survivability Small Arms Protection (G: .010)	INCR Deployability & Sustainment (G Air Deployability (G: .088)
☑ Aardvark	10	9
☑ Hydrema 910 MCV	10	8
☑ Oracle w/Spitfire	10	4
☑ Compact Minecat 230	6.5	10
☑ MCAP/D7 Dozer	10	5
☑ Scanjack	10	7
☑ Mine Breaker 2000/2	10	4
☑ Patris RA-140 DS	10	5
☑ Pearson FW Plough	10	2
☑ Grizzly	10	2

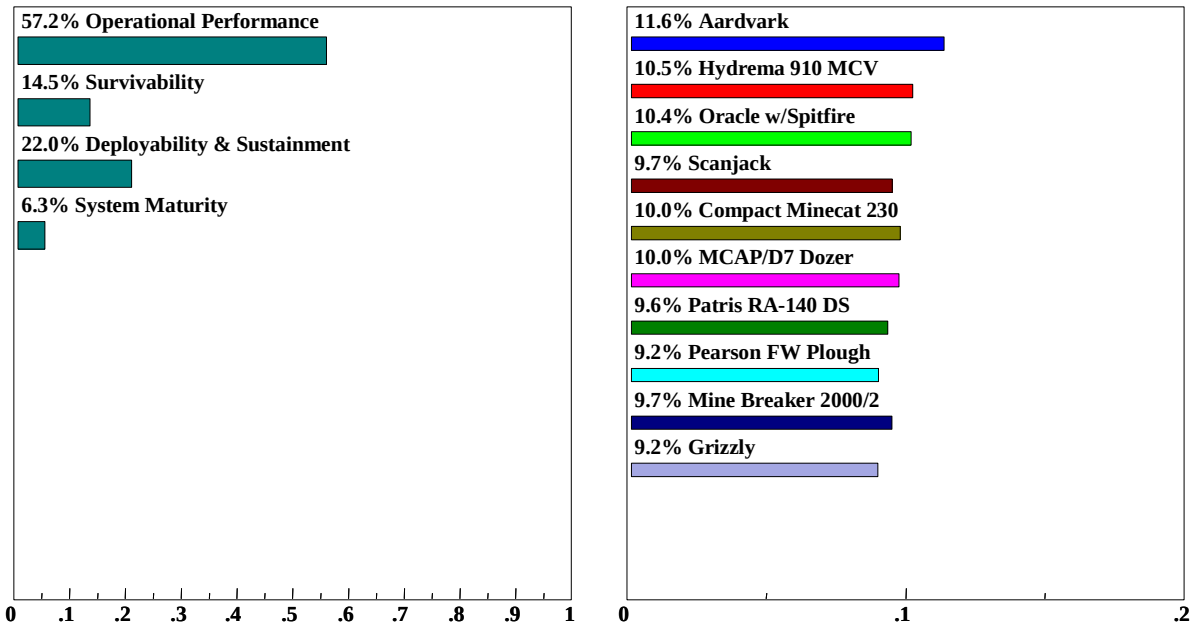
Alternative	INCR Deployability & Sustainment (G Ground Deployability (G: .044)	INCR Deployability & Sustainment (G Supportability Availability (G: .039)
☑ Aardvark	9	8
☑ Hydrema 910 MCV	9	6
☑ Oracle w/Spitfire	3	10
☑ Compact Minecat 230	7	8
☑ MCAP/D7 Dozer	6	10
☑ Scanjack	1	6
☑ Mine Breaker 2000/2	3	4
☑ Patris RA-140 DS	10	6
☑ Pearson FW Plough	10	8
☑ Grizzly	10	4

Alternative	INCR Deployability & Sustainment (G Supportability Confidence in Support/Availability (G: .020)
☑ Aardvark	10
☑ Hydrema 910 MCV	10
☑ Oracle w/Spitfire	10
☑ Compact Minecat 230	5
☑ MCAP/D7 Dozer	5
☑ Scanjack	10
☑ Mine Breaker 2000/2	5
☑ Patris RA-140 DS	5
☑ Pearson FW Plough	10
☑ Grizzly	10

Alternative	INCR Deployability & Sustainment (G Supportability Training Required (G: .010)	INCR Deployability & Sustainment (G Supportability Manpower Required (G: .010)
☑ Aardvark	7	8
☑ Hydrema 910 MCV	6	10
☑ Oracle w/Spitfire	10	8
☑ Compact Minecat 230	4	6
☑ MCAP/D7 Dozer	10	10
☑ Scanjack	7	2
☑ Mine Breaker 2000/2	5	8
☑ Patris RA-140 DS	6	10
☑ Pearson FW Plough	10	8
☑ Grizzly	6	8

Alternative	INCR Deployability & Sustainment (G Supportability Multi-Use Capability (G: .010)	INCR System Maturity (G: .063)
☑ Aardvark	0	10
☑ Hydrema 910 MCV	0	10
☑ Oracle w/Spitfire	8	3
☑ Compact Minecat 230	0	8
☑ MCAP/D7 Dozer	10	10
☑ Scanjack	0	6
☑ Mine Breaker 2000/2	0	7
☑ Patris RA-140 DS	0	10
☑ Pearson FW Plough	0	10
☑ Grizzly	0	4

Dynamic Sensitivity for nodes below: Goal: Select the best Area Mine Clearing System (AMCS) candidate



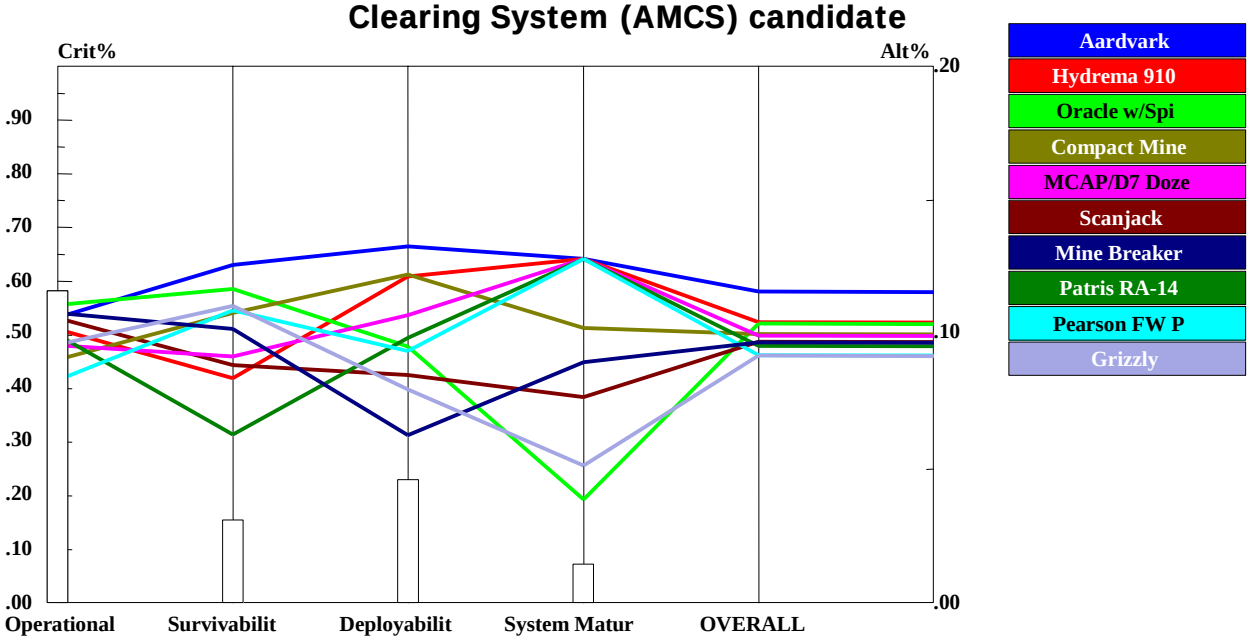
Objectives Names

Operational	Operational Performance
Survivabilit	Survivability
Deployabilit	Deployability & Sustainment
System Matur	System Maturity

Alternatives Names

Aardvark	Aardvark
Hydrema 910	Hydrema 910 MCV
Oracle w/Spi	Oracle w/Spitfire
Scanjack	Scanjack
Compact Mine	Compact Minecat 230
MCAP/D7 Doze	MCAP/D7 Dozer
Patris RA-14	Patris RA-140 DS
Pearson FW P	Pearson FW Plough
Mine Breaker	Mine Breaker 2000/2
Grizzly	Grizzly

Performance Sensitivity for nodes below: Goal: Select the best Area Mine Clearing System (AMCS) candidate



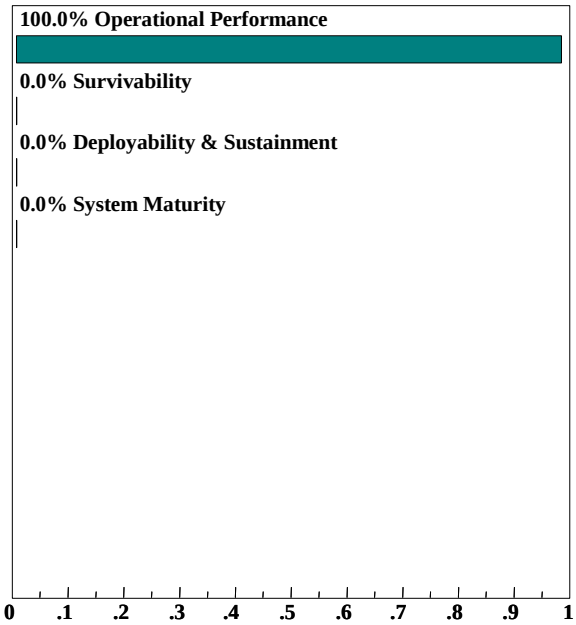
Objectives Names

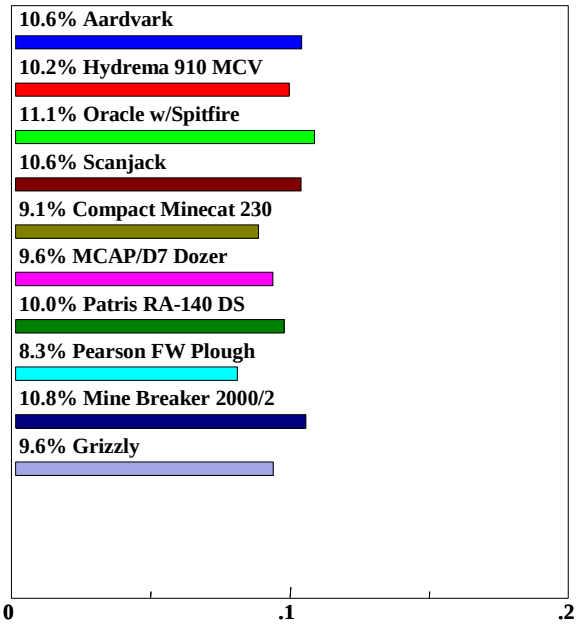
Operational	Operational Performance
Survivabilit	Survivability
Deployabilit	Deployability & Sustainment
System Matur	System Maturity

Alternatives Names

Aardvark	Aardvark
Hydrema 910	Hydrema 910 MCV
Oracle w/Spi	Oracle w/Spitfire
Scanjack	Scanjack
Compact Mine	Compact Minecat 230
MCAP/D7 Doze	MCAP/D7 Dozer
Patris RA-14	Patris RA-140 DS
Pearson FW P	Pearson FW Plough
Mine Breaker	Mine Breaker 2000/2
Grizzly	Grizzly

Dynamic Sensitivity for nodes below: Goal: Select the best Area Mine Clearing System (AMCS) candidate





Objectives Names

Operational	Operational Performance
Survivabilit	Survivability
Deployabilit	Deployability & Sustainment
System Matur	System Maturity

Alternatives Names

Aardvark	Aardvark
Hydrema 910	Hydrema 910 MCV
Oracle w/Spi	Oracle w/Spitfire
Scanjack	Scanjack
Compact Mine	Compact Minecat 230
MCAP/D7 Doze	MCAP/D7 Dozer
Patris RA-14	Patris RA-140 DS
Pearson FW P	Pearson FW Plough
Mine Breaker	Mine Breaker 2000/2
Grizzly	Grizzly

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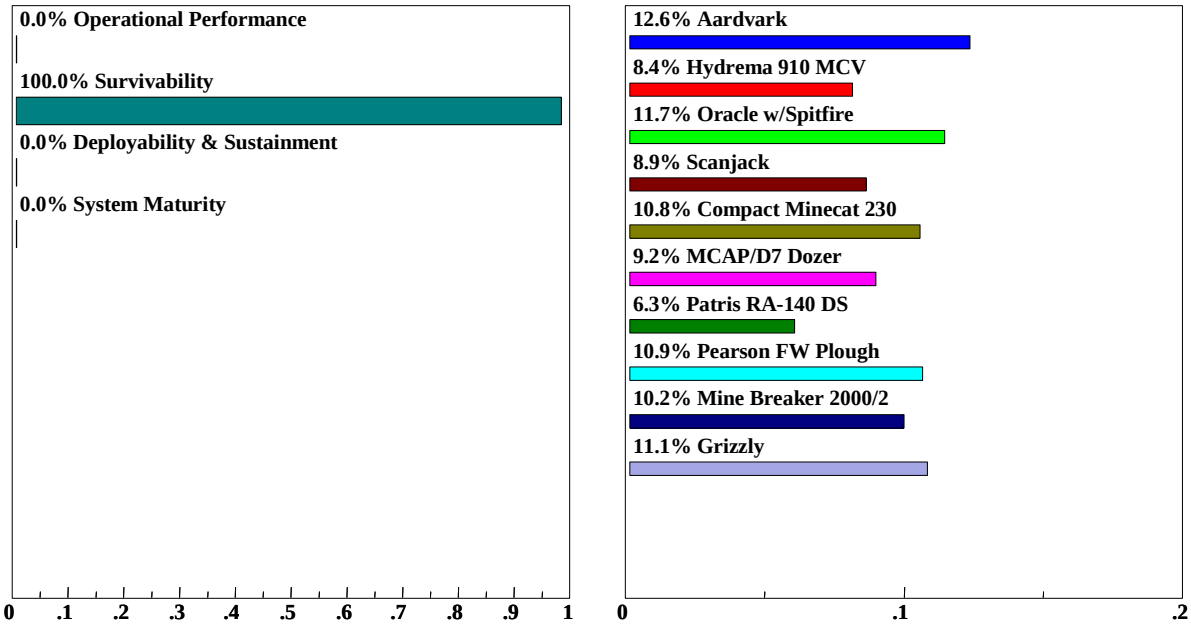

Objectives Names

Operational	Operational Performance
Survivabilit	Survivability
Deployabilit	Deployability & Sustainment
System Matur	System Maturity

Alternatives Names

Aardvark	Aardvark
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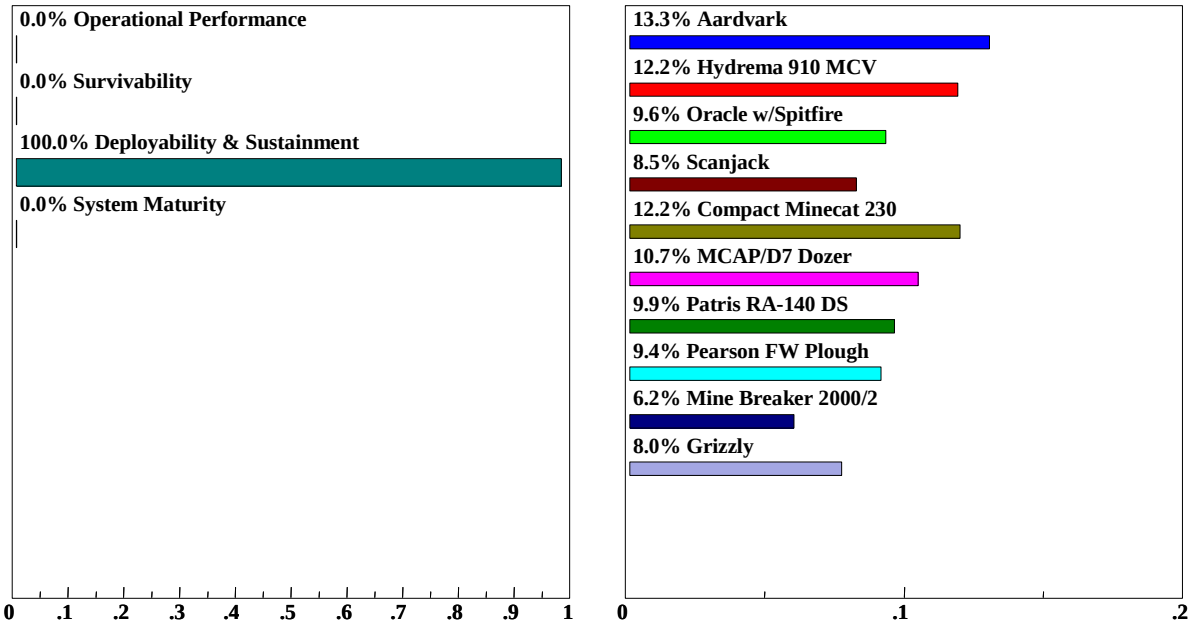

Objectives Names

Operational	Operational Performance
Survivabilit	Survivability
Deployabilit	Deployability & Sustainment
System Matur	System Maturity

Alternatives Names

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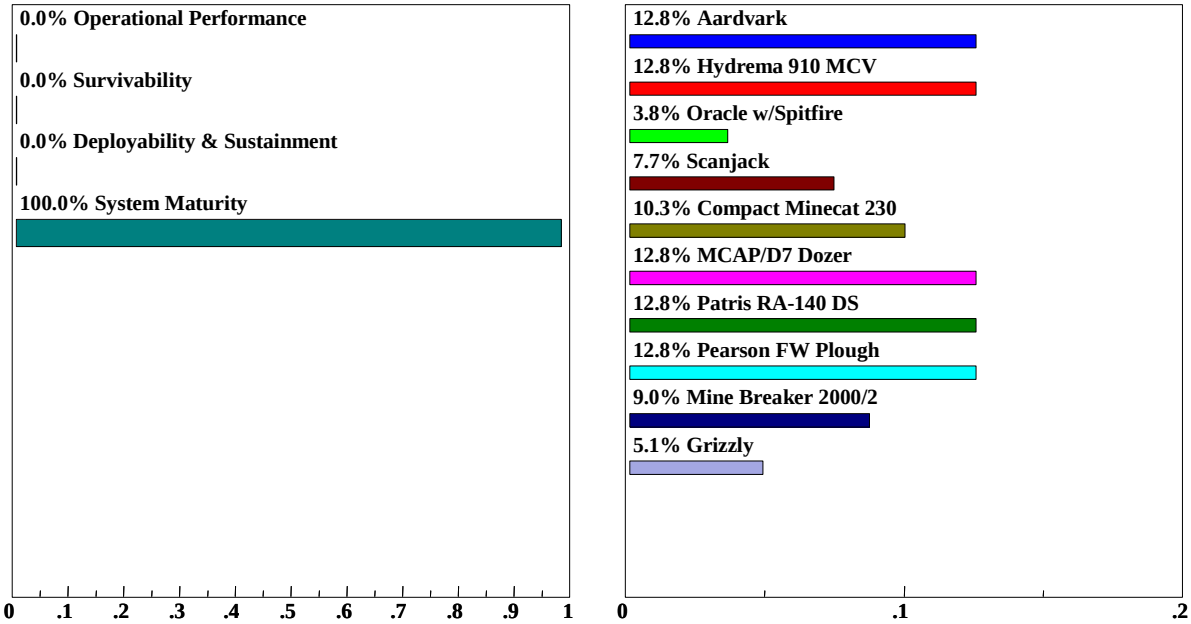

Objectives Names

Operational	Operational Performance
Survivabilit	Survivability
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Alternatives Names

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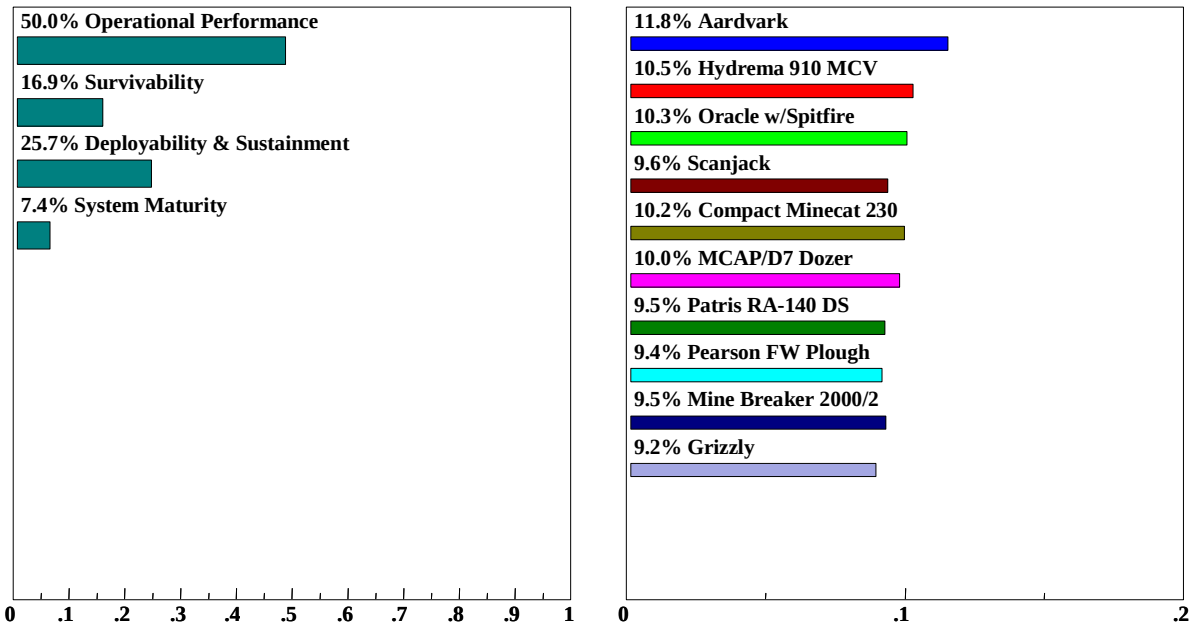

Objectives Names

Operational	Operational Performance
Survivabilit	Survivability
Deployabilit	Deployability & Sustainment
System Matur	System Maturity

Alternatives Names

Aardvark	Aardvark
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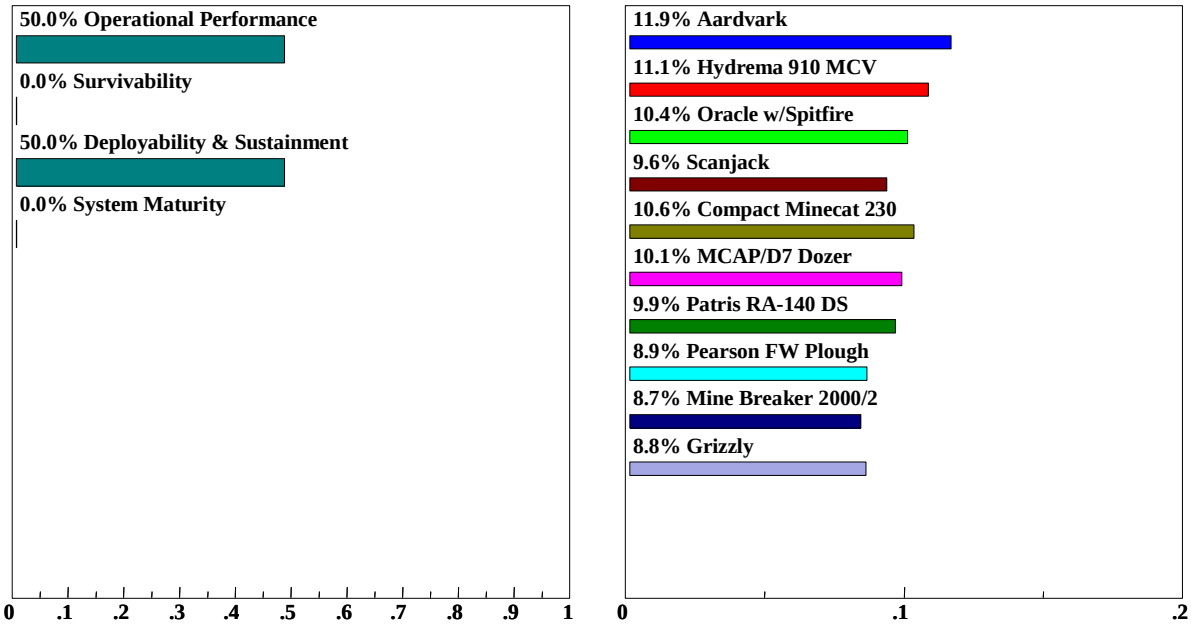

Objectives Names

Operational	Operational Performance
Survivabilit	Survivability
Deployabilit	Deployability & Sustainment
System Matur	System Maturity

Alternatives Names

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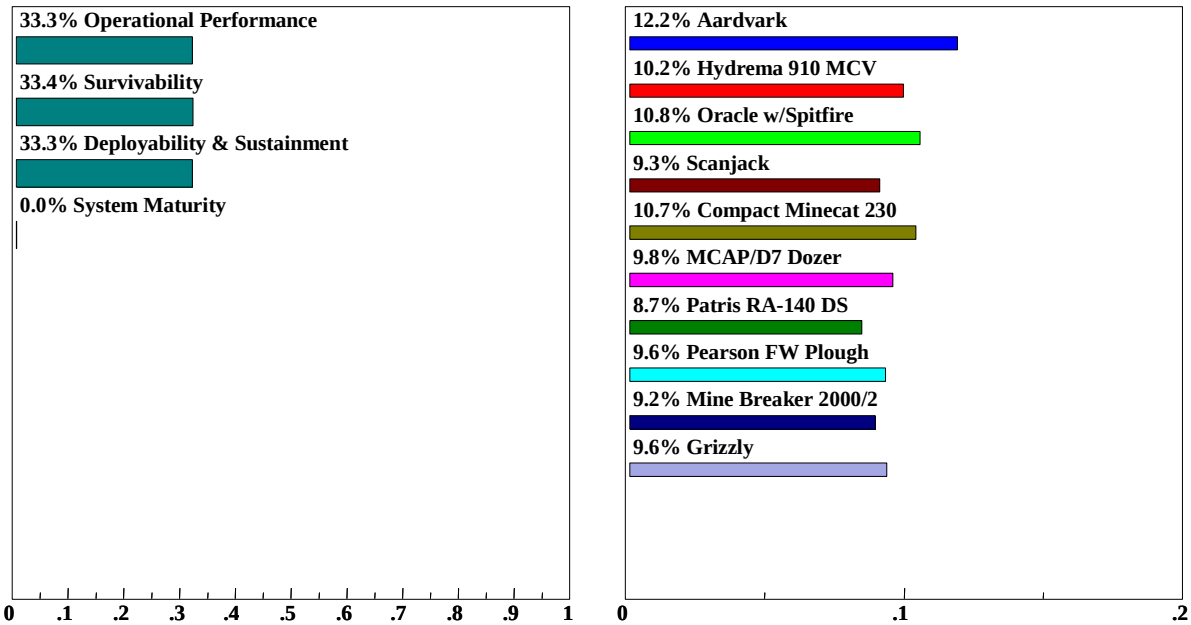
Dynamic Sensitivity for nodes below: Goal: Select the best Area Mine Clearing System (AMCS) candidate



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Operational	Operational Performance
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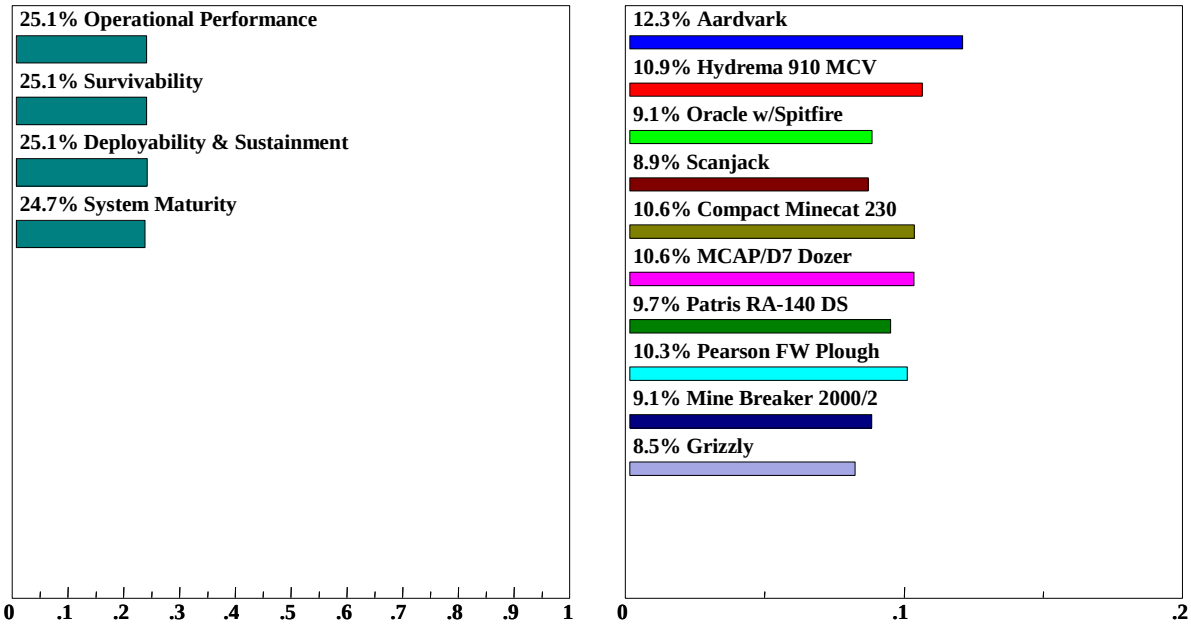

Objectives Names

Operational	Operational Performance
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Alternatives Names

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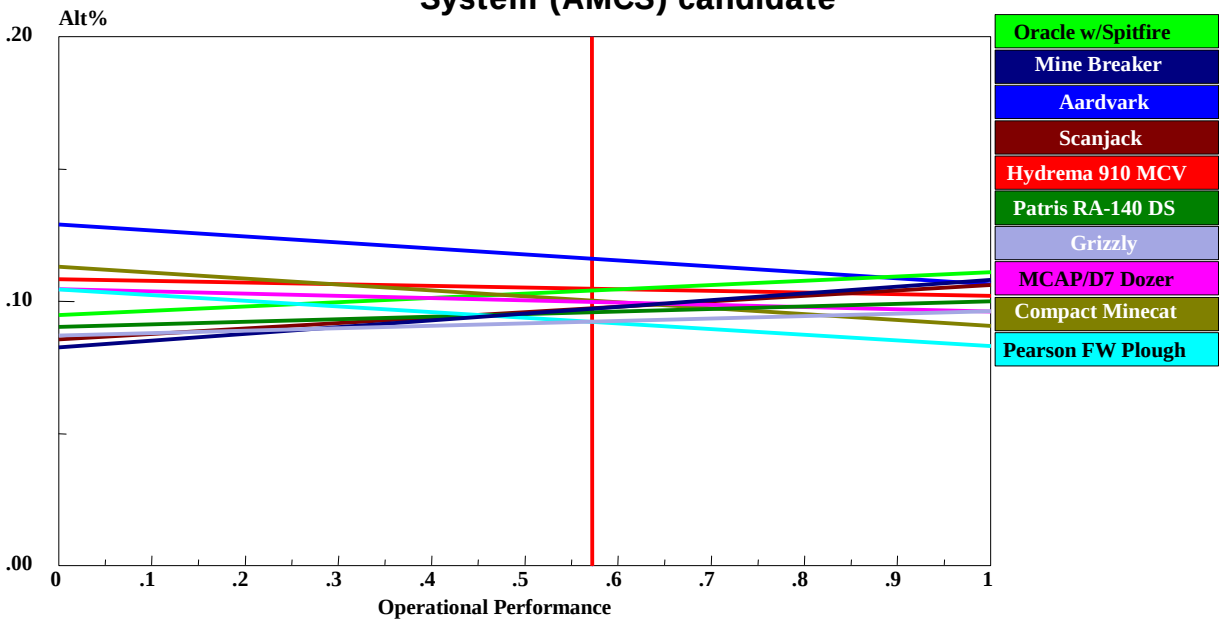

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Operational	Operational Performance
Survivabilit	Survivability
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Alternatives Names

Aardvark	Aardvark
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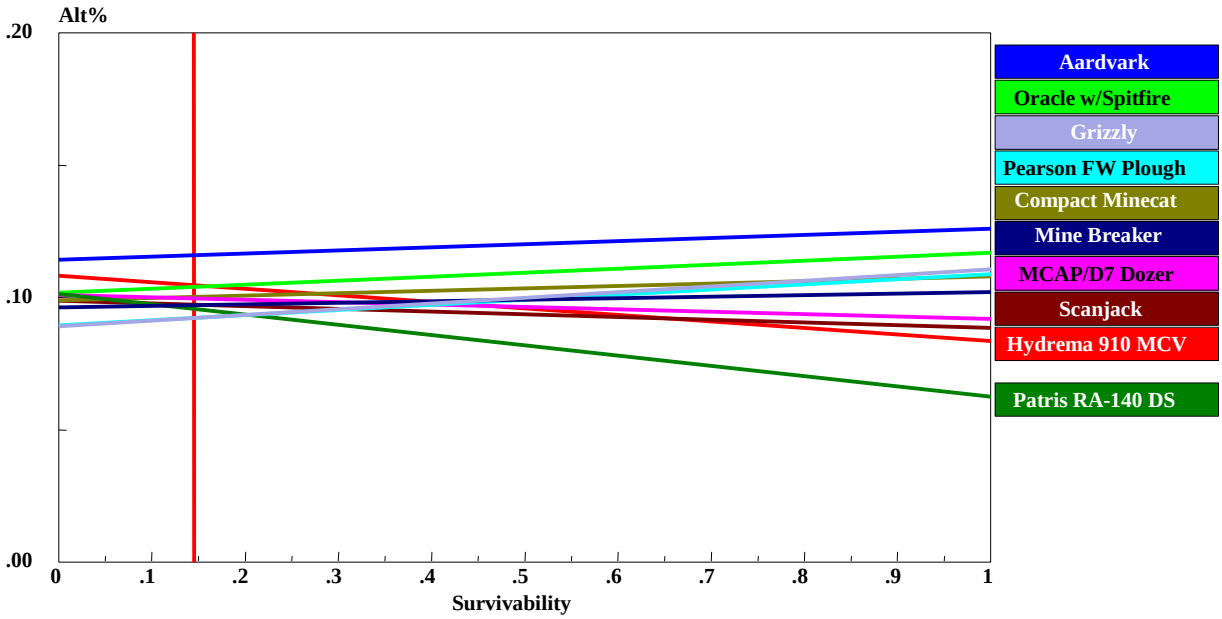

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Operational	Operational Performance
Survivabilit	Survivability
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Alternatives Names

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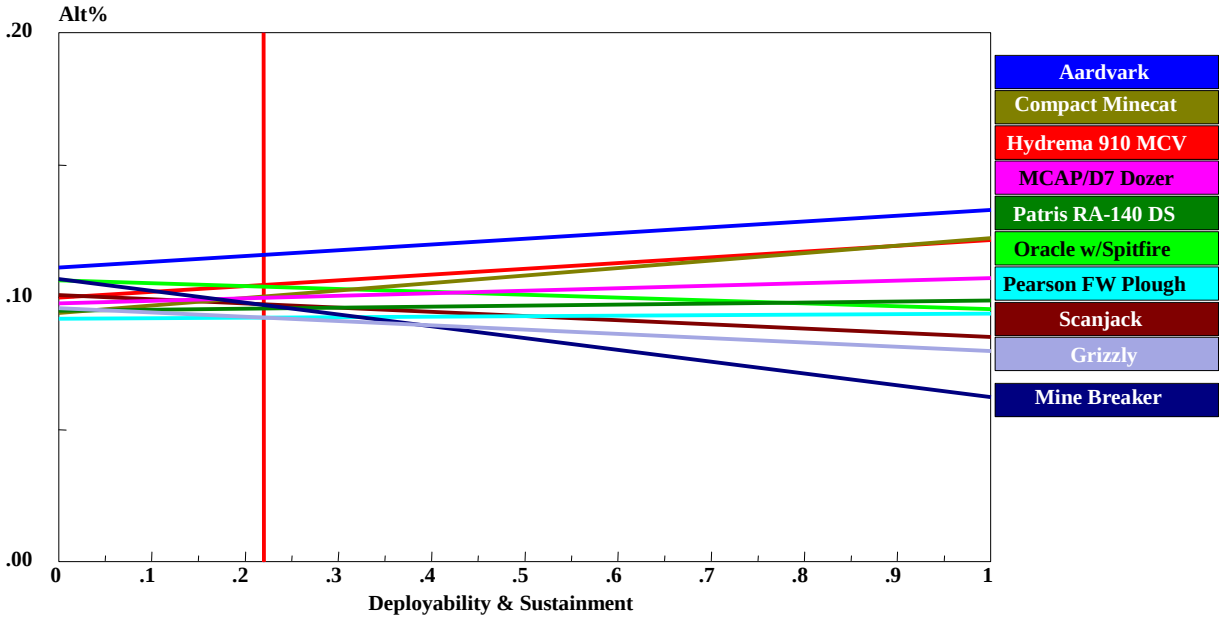

Objectives Names

Operational	Operational Performance
Survivabilit	Survivability
Deployabilit	Deployability & Sustainment
System Matur	System Maturity

Alternatives Names

Aardvark	Aardvark
Hydrema 910	Hydrema 910 MCV
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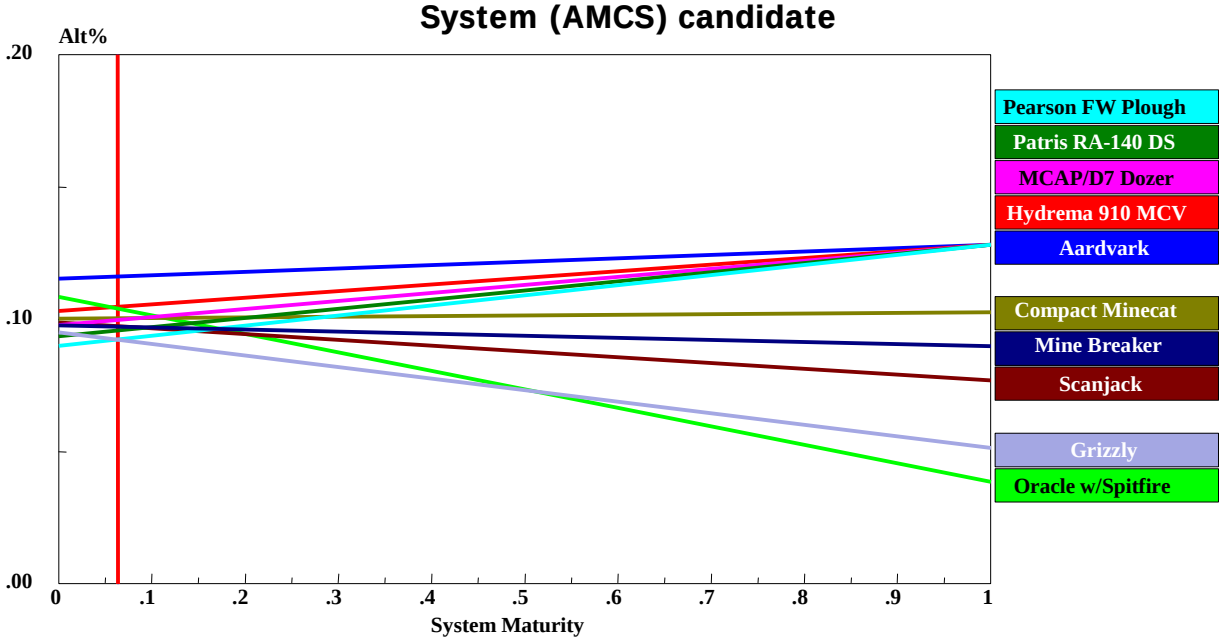

Objectives Names

Operational	Operational Performance
Survivabilit	Survivability
Deployabilit	Deployability & Sustainment
System Matur	System Maturity

Alternatives Names

Aardvark	Aardvark
Hydrema 910	Hydrema 910 MCV
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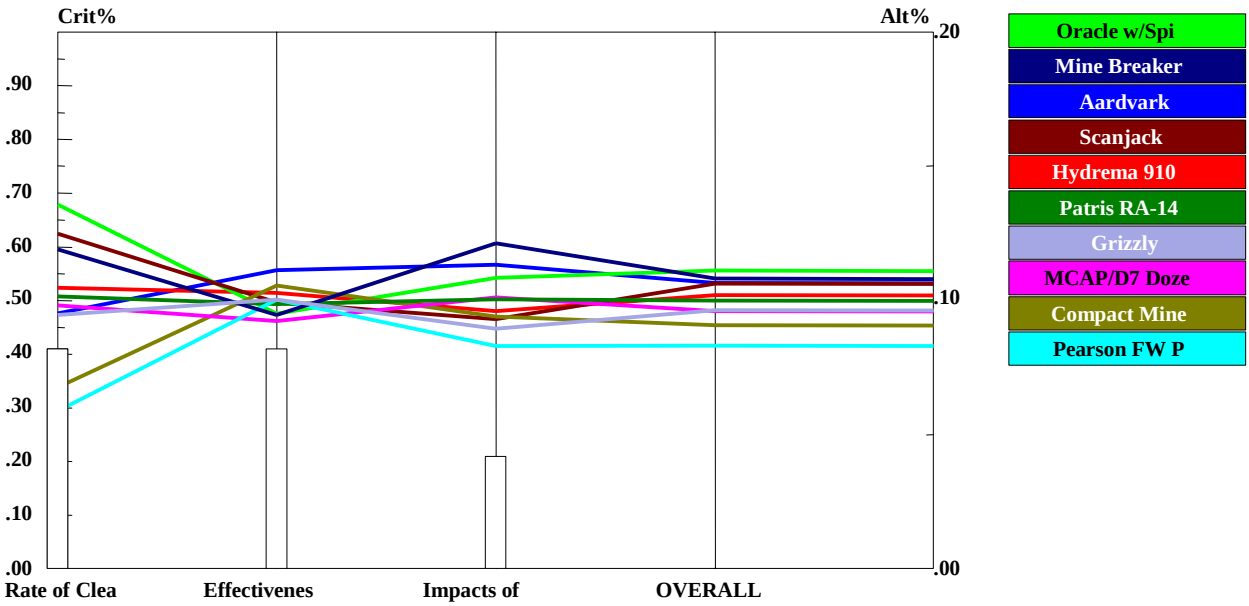
Patris RA-14	Patris RA-140 DS
Pearson FW P	Pearson FW Plough
Mine Breaker	Mine Breaker 2000/2
Grizzly	Grizzly

Performance Sensitivity for nodes below: Goal: Select the best Area Mine Clearing System (AMCS) candidate > Operational Performance (G: .572)



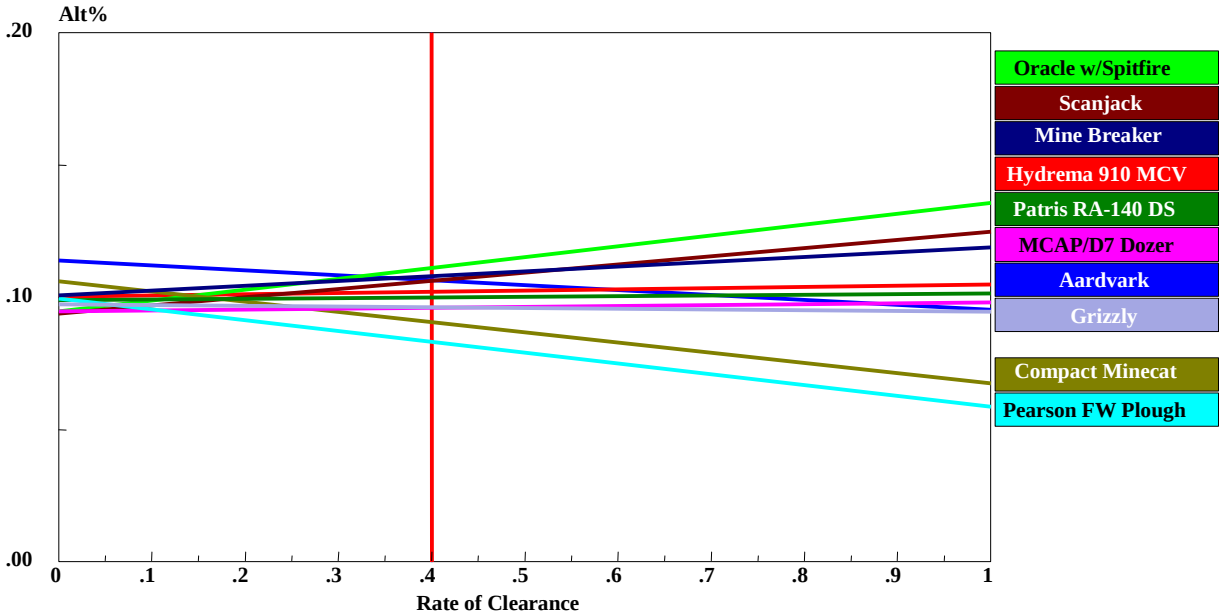
Objectives Names

Rate of Clea	Rate of Clearance
Effectivenes	Effectiveness of Clearance
Impacts of &	Impacts of & on Clearance

Alternatives Names

Aardvark	Aardvark
Hydrema 910	Hydrema 910 MCV
Oracle w/Spi	Oracle w/Spitfire
Scanjack	Scanjack
Compact Mine	Compact Minecat 230
MCAP/D7 Doze	MCAP/D7 Dozer
Patris RA-14	Patris RA-140 DS
Pearson FW P	Pearson FW Plough
Mine Breaker	Mine Breaker 2000/2
Grizzly	Grizzly

Gradient Sensitivity for nodes below: Goal: Select the best Area Mine Clearing System (AMCS) candidate > Operational Performance (G: .572)



Objectives Names

Rate of Clea	Rate of Clearance
Effectivenes	Effectiveness of Clearance
Impacts of &	Impacts of & on Clearance

Alternatives Names

Aardvark	Aardvark
Hydrema 910	Hydrema 910 MCV
Oracle w/Spi	Oracle w/Spitfire
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MCAP/D7 Doze	MCAP/D7 Dozer
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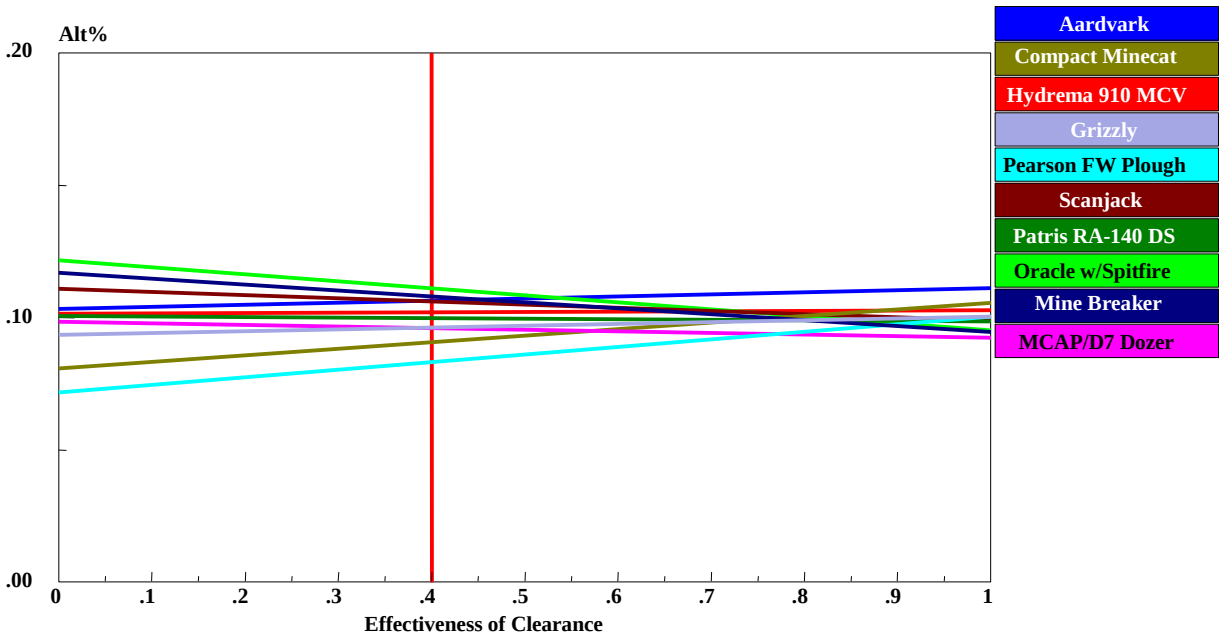
Pearson FW P	Pearson FW Plough
Mine Breaker	Mine Breaker 2000/2
Grizzly	Grizzly

Gradient Sensitivity for nodes below: Goal: Select the best Area Mine Clearing System (AMCS) candidate > Operational Performance (G: .572)



Objectives Names

Rate of Clea	Rate of Clearance
Effectivenes	Effectiveness of Clearance
Impacts of &	Impacts of & on Clearance

Alternatives Names

Aardvark	Aardvark
Hydrema 910	Hydrema 910 MCV
Oracle w/Spi	Oracle w/Spitfire
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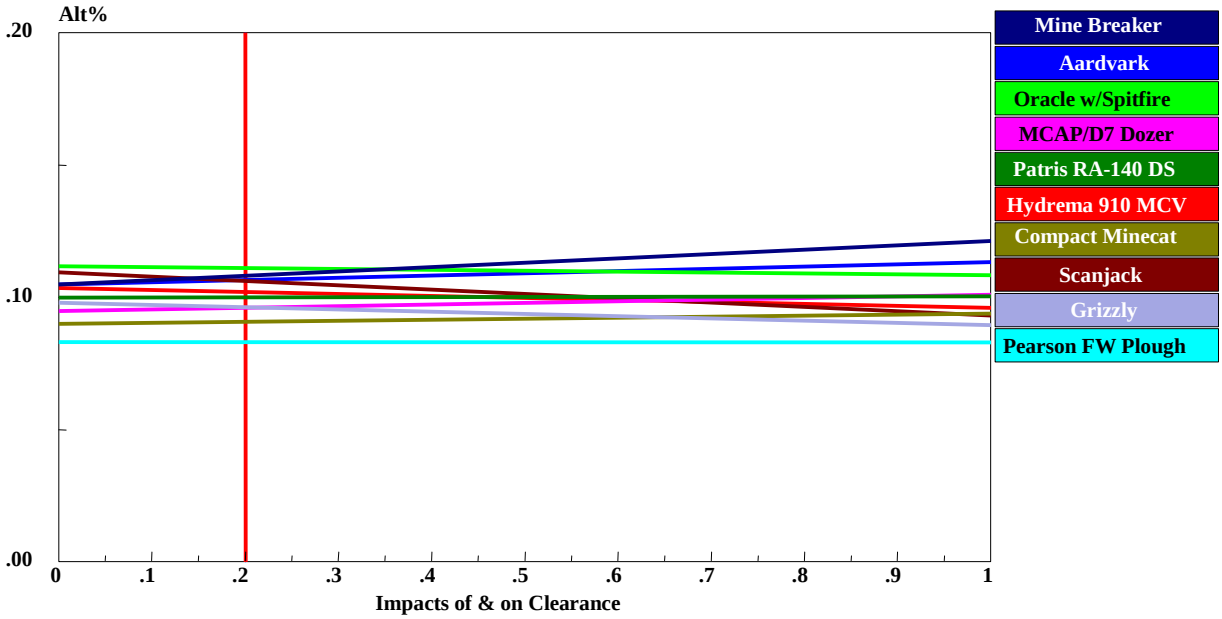

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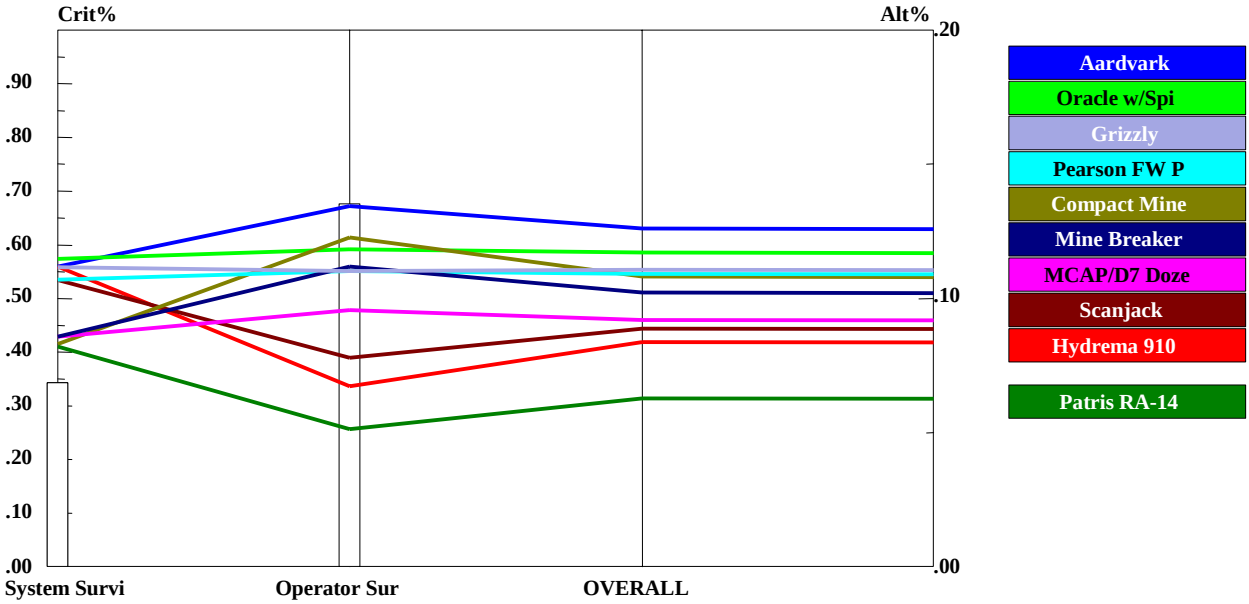
Performance Sensitivity for nodes below: Goal: Select the best Area Mine Clearing System (AMCS) candidate > Survivability (G: .145)



Objectives Names

System Survi	System Survivability
Operator Sur	Operator Survivability

Alternatives Names

Aardvark	Aardvark
Hydrema 910	Hydrema 910 MCV
Oracle w/Spi	Oracle w/Spitfire
Scanjack	Scanjack
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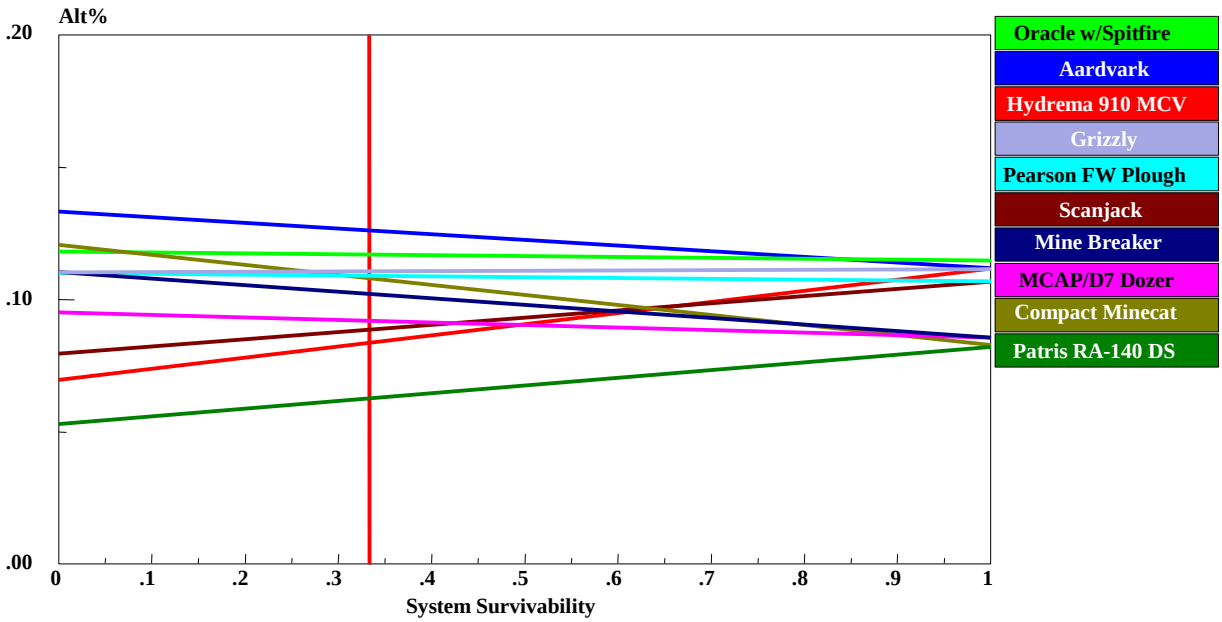
Gradient Sensitivity for nodes below: Goal: Select the best Area Mine Clearing System (AMCS) candidate > Survivability (G: .145)



Objectives Names

System Survi	System Survivability
Operator Sur	Operator Survivability

Alternatives Names

Aardvark	Aardvark
Hydrema 910	Hydrema 910 MCV
Oracle w/Spi	Oracle w/Spitfire
Scanjack	Scanjack
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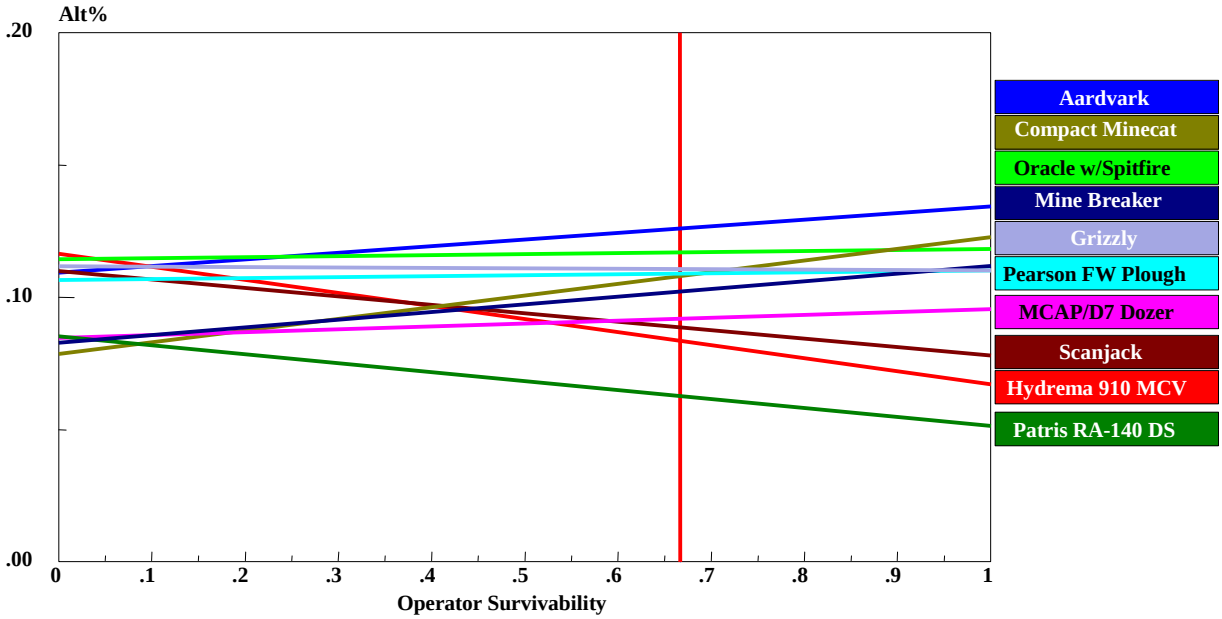

Objectives Names

System Survi	System Survivability
Operator Sur	Operator Survivability

Alternatives Names

Aardvark	Aardvark
Hydrema 910	Hydrema 910 MCV
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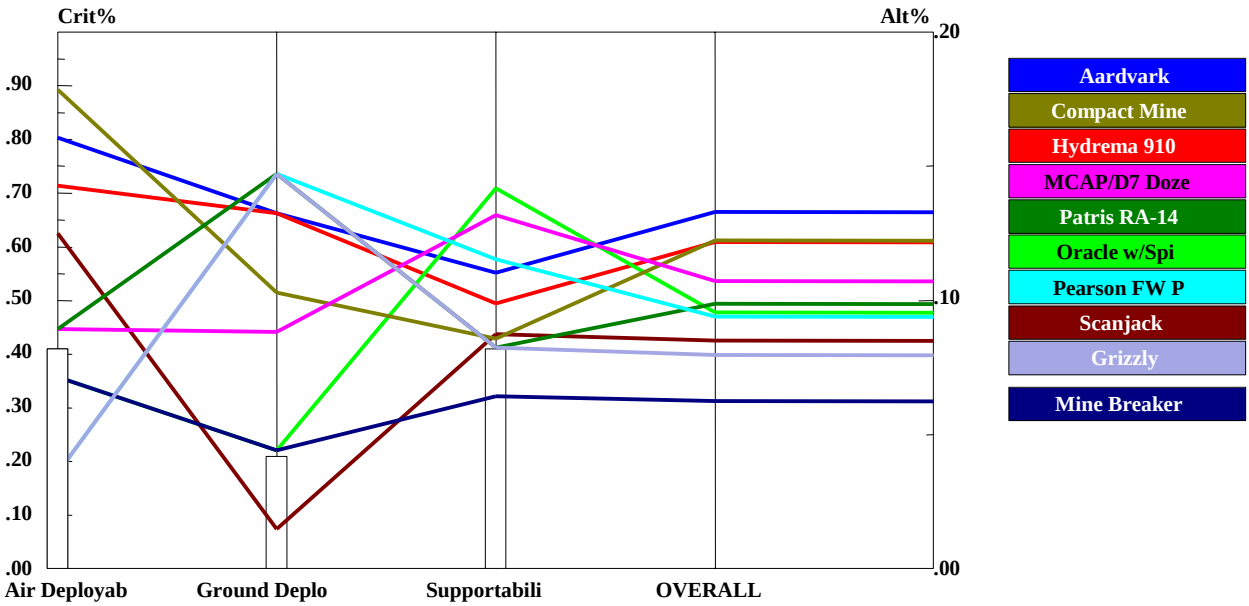
Mine Breaker	Mine Breaker 2000/2
Grizzly	Grizzly

Performance Sensitivity for nodes below: Goal: Select the best Area Mine Clearing System (AMCS) candidate > Deployability & Sustainment (G: .220)



Objectives Names

Air Deployab	Air Deployability
Ground Deplo	Ground Deployability
Supportabili	Supportability

Alternatives Names

Aardvark	Aardvark
Hydrema 910	Hydrema 910 MCV
Oracle w/Spi	Oracle w/Spitfire
Scanjack	Scanjack
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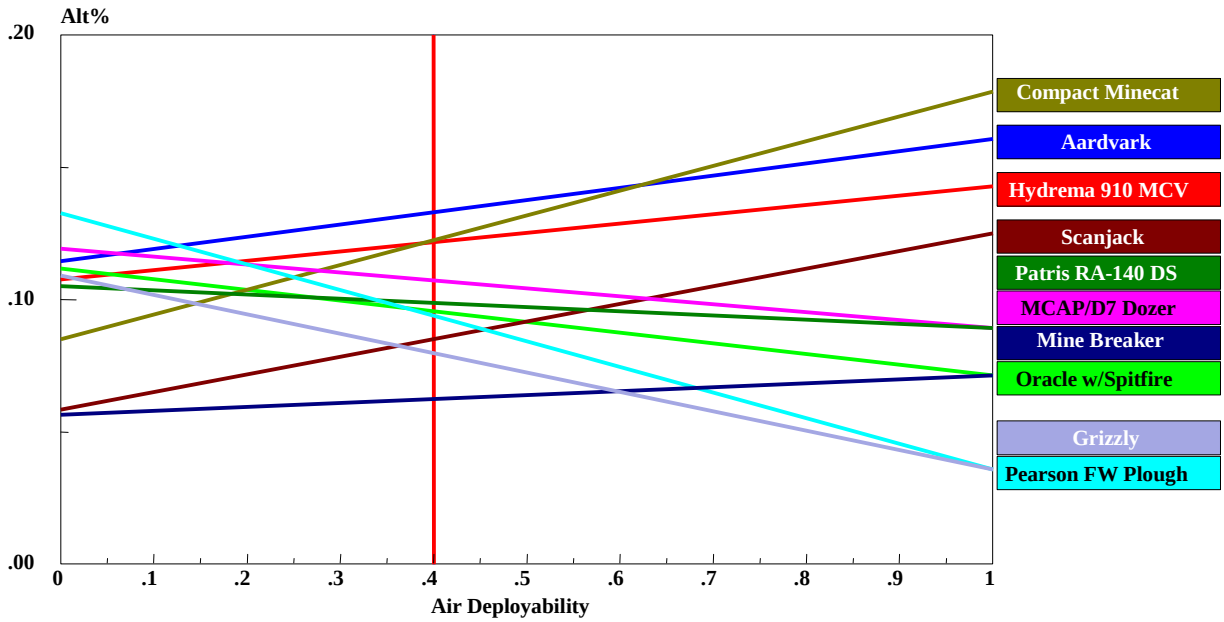

Objectives Names

Air Deployab	Air Deployability
Ground Deplo	Ground Deployability
Supportabili	Supportability

Alternatives Names

Aardvark	Aardvark
Hydrema 910	Hydrema 910 MCV
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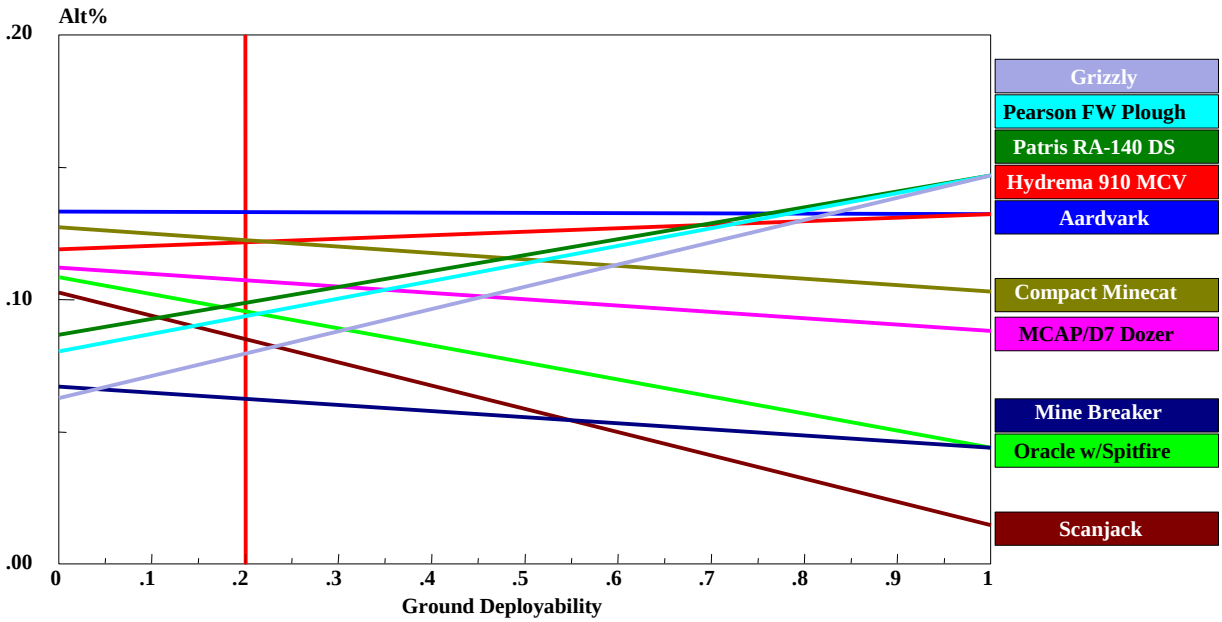

Objectives Names

Air Deployab	Air Deployability
Ground Deplo	Ground Deployability
Supportabili	Supportability

Alternatives Names

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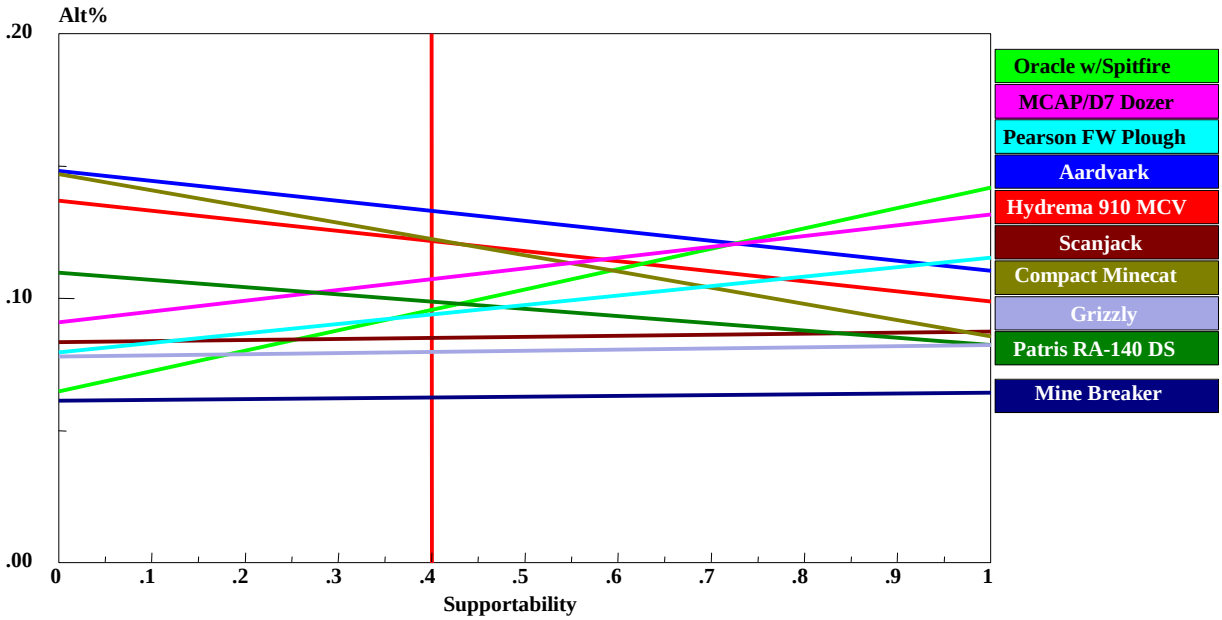

Objectives Names

Air Deployab	Air Deployability
Ground Deplo	Ground Deployability
Supportabili	Supportability

Alternatives Names

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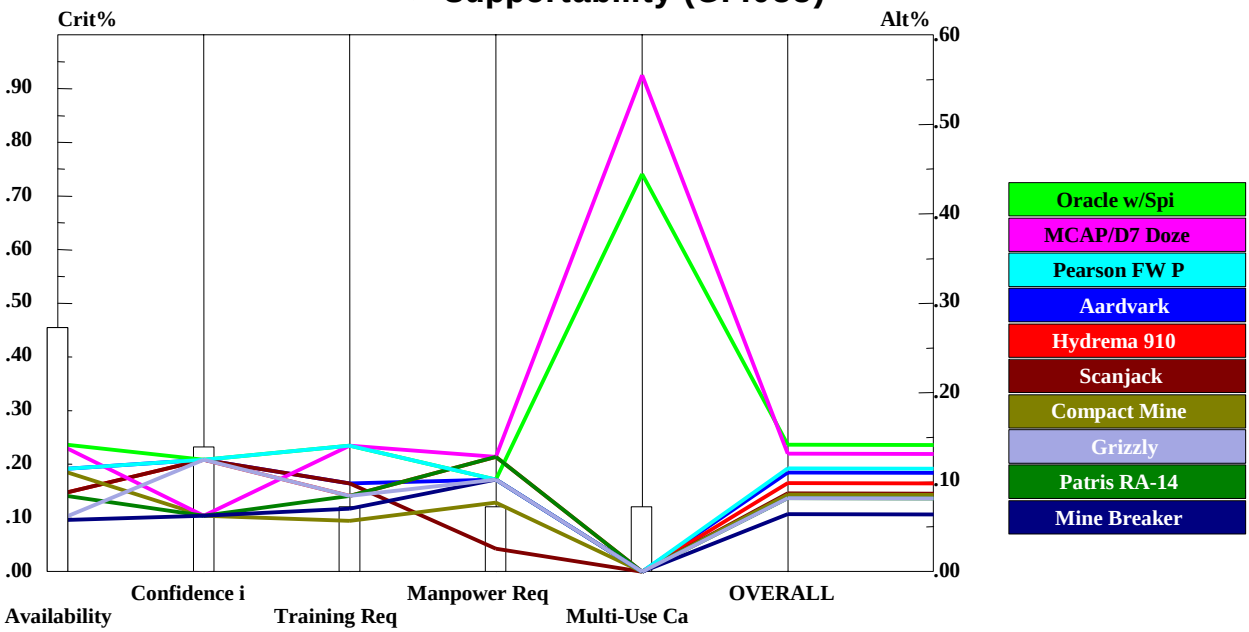
Grizzly	Grizzly

Performance Sensitivity for nodes below: Goal: Select the best Area Mine Clearing System (AMCS) candidate > Deployability & Sustainment (G: .220) > Supportability (G: .088)



Objectives Names

Availability	Availability
Confidence i	Confidence in Support/Availability
Training Req	Training Required
Manpower Req	Manpower Required
Multi-Use Ca	Multi-Use Capability

Alternatives Names

Aardvark	Aardvark
Hydrema 910	Hydrema 910 MCV
Oracle w/Spi	Oracle w/Spitfire
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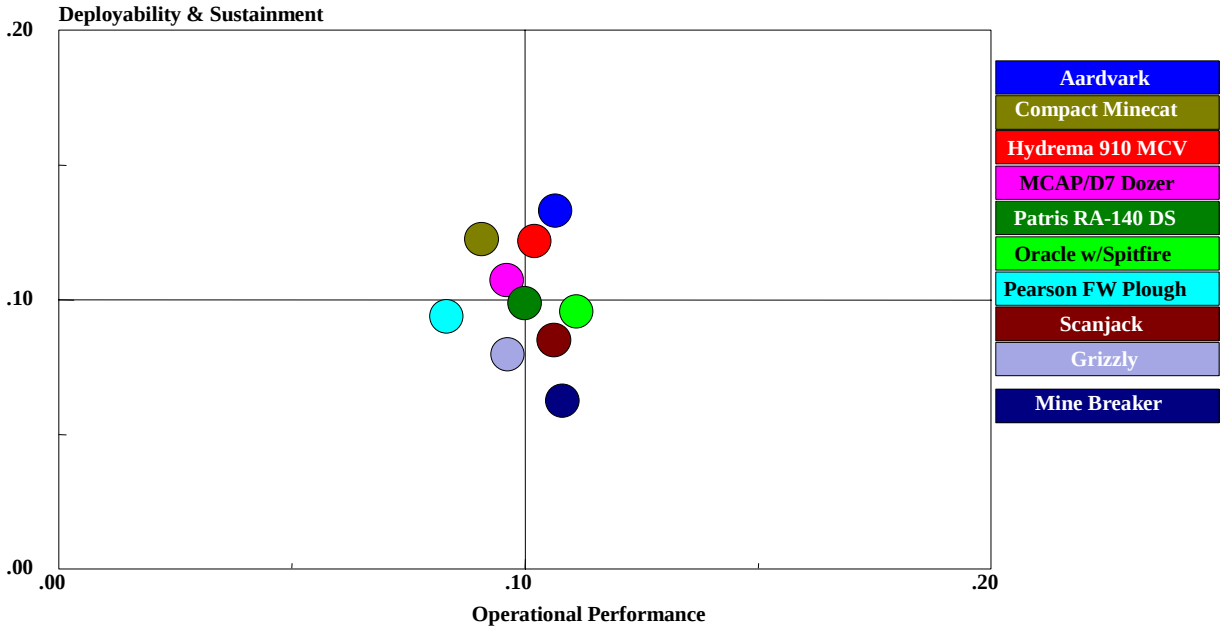
Mine Breaker	Mine Breaker 2000/2
Grizzly	Grizzly

Two Dimentional Sensitivity for nodes below: Goal: Select the best Area Mine Clearing System (AMCS) candidate



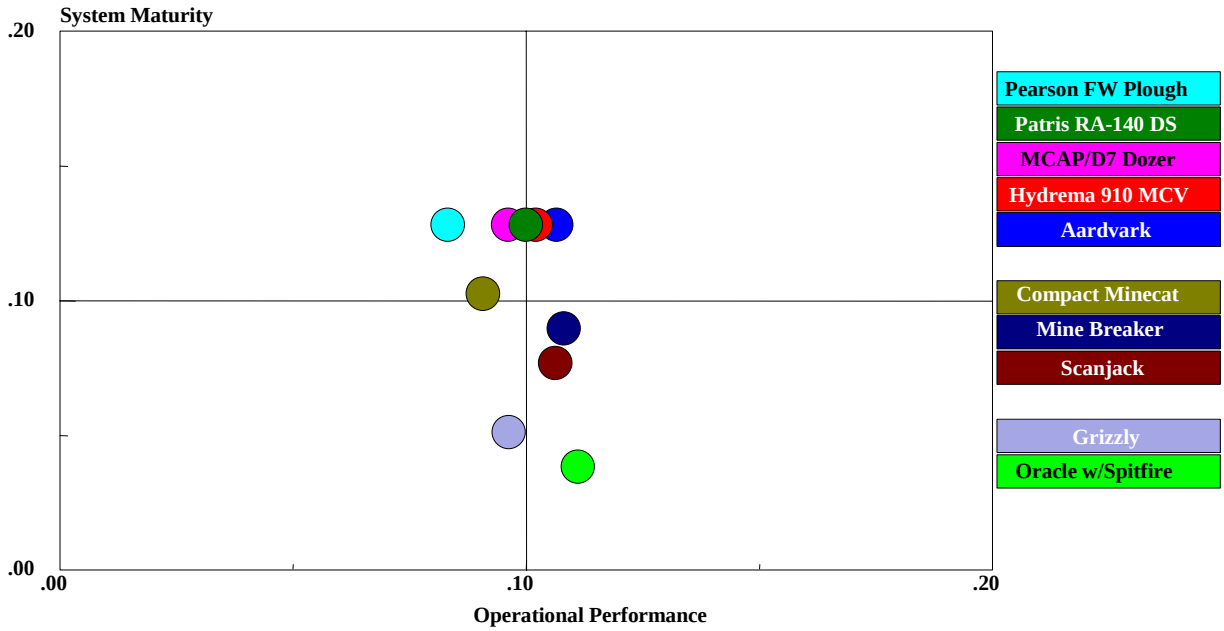
Objectives Names

Operational	Operational Performance
Survivabilit	Survivability
Deployabilit	Deployability & Sustainment
System Matur	System Maturity

Alternatives Names

Aardvark	Aardvark
Hydrema 910	Hydrema 910 MCV
Oracle w/Spi	Oracle w/Spitfire
Scanjack	Scanjack
Compact Mine	Compact Minecat 230
MCAP/D7 Doze	MCAP/D7 Dozer
Patris RA-14	Patris RA-140 DS
Pearson FW P	Pearson FW Plough
Mine Breaker	Mine Breaker 2000/2
Grizzly	Grizzly

Two Dimentional Sensitivity for nodes below: Goal: Select the best Area Mine Clearing System (AMCS) candidate



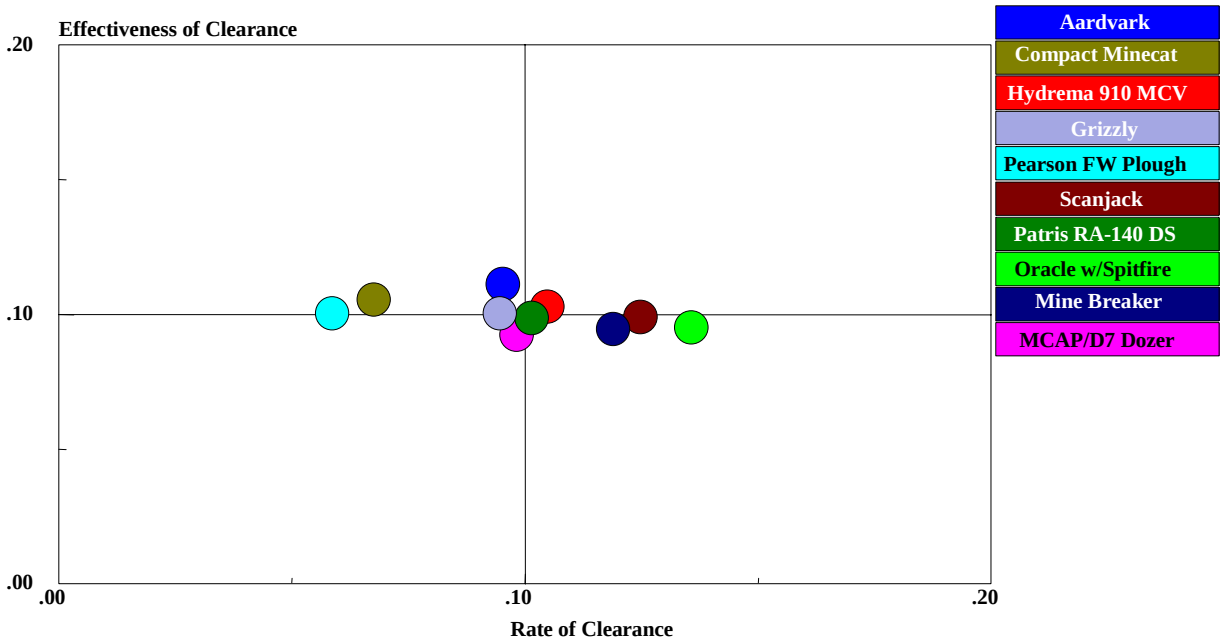
Objectives Names

Operational	Operational Performance
Survivabilit	Survivability
Deployabilit	Deployability & Sustainment
System Matur	System Maturity

Alternatives Names

Aardvark	Aardvark
Hydrema 910	Hydrema 910 MCV
Oracle w/Spi	Oracle w/Spitfire
Scanjack	Scanjack
Compact Mine	Compact Minecat 230
MCAP/D7 Doze	MCAP/D7 Dozer
Patris RA-14	Patris RA-140 DS
Pearson FW P	Pearson FW Plough
Mine Breaker	Mine Breaker 2000/2
Grizzly	Grizzly

Two Dimentional Sensitivity for nodes below: Goal: Select the best Area Mine Clearing System (AMCS) candidate > Operational Performance (G: .572)



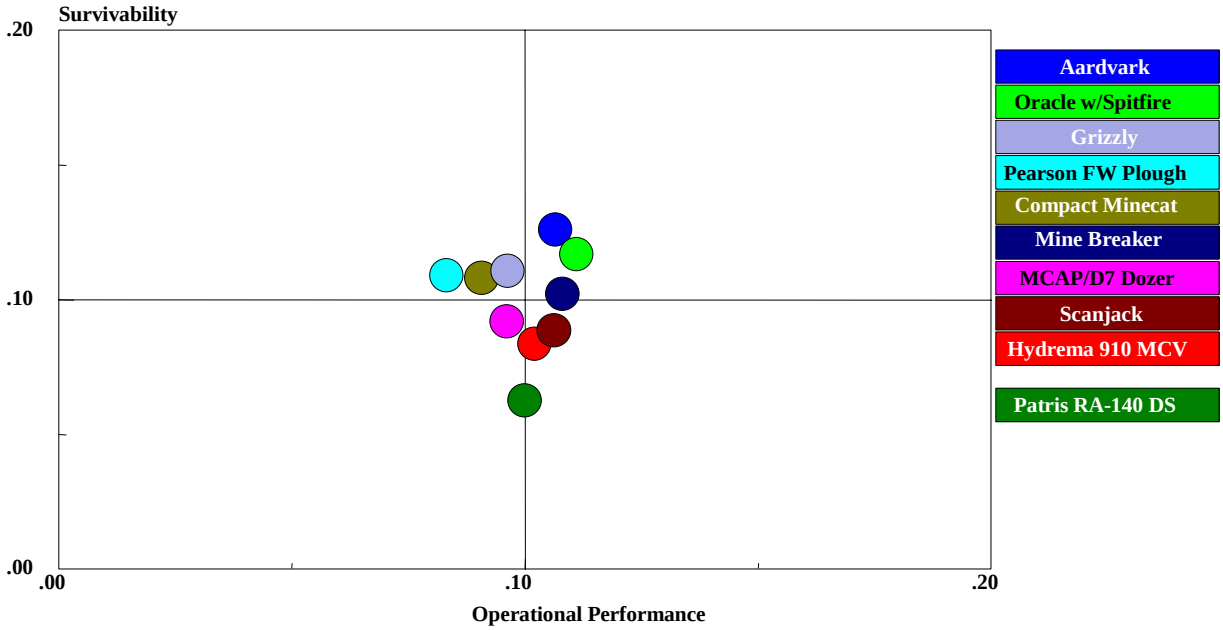
Objectives Names

Rate of Clea	Rate of Clearance
Effectivenes	Effectiveness of Clearance
Impacts of &	Impacts of & on Clearance

Alternatives Names

Aardvark	Aardvark
Hydrema 910	Hydrema 910 MCV
Oracle w/Spi	Oracle w/Spitfire
Scanjack	Scanjack
Compact Mine	Compact Minecat 230
MCAP/D7 Doze	MCAP/D7 Dozer
Patris RA-14	Patris RA-140 DS
Pearson FW P	Pearson FW Plough
Mine Breaker	Mine Breaker 2000/2
Grizzly	Grizzly

Two Dimentional Sensitivity for nodes below: Goal: Select the best Area Mine Clearing System (AMCS) candidate



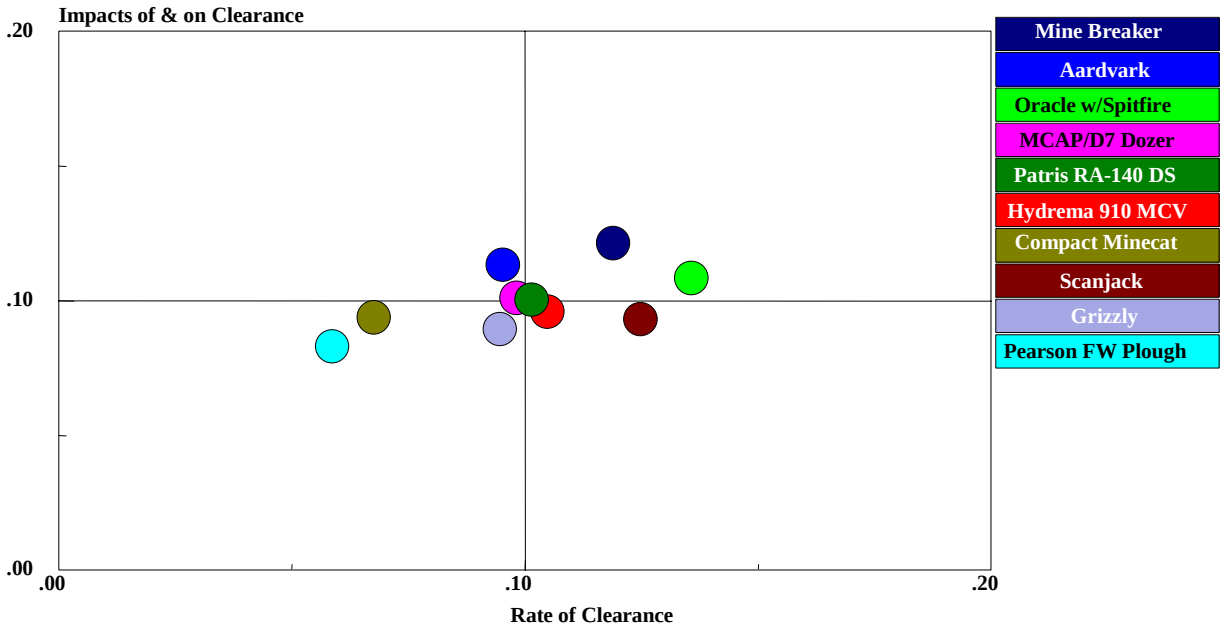
Objectives Names

Operational	Operational Performance
Survivabilit	Survivability
Deployabilit	Deployability & Sustainment
System Matur	System Maturity

Alternatives Names

Aardvark	Aardvark
Hydrema 910	Hydrema 910 MCV
Oracle w/Spi	Oracle w/Spitfire
Scanjack	Scanjack
Compact Mine	Compact Minecat 230
MCAP/D7 Doze	MCAP/D7 Dozer
Patris RA-14	Patris RA-140 DS
Pearson FW P	Pearson FW Plough
Mine Breaker	Mine Breaker 2000/2
Grizzly	Grizzly

Two Dimentional Sensitivity for nodes below: Goal: Select the best Area Mine Clearing System (AMCS) candidate > Operational Performance (G: .572)



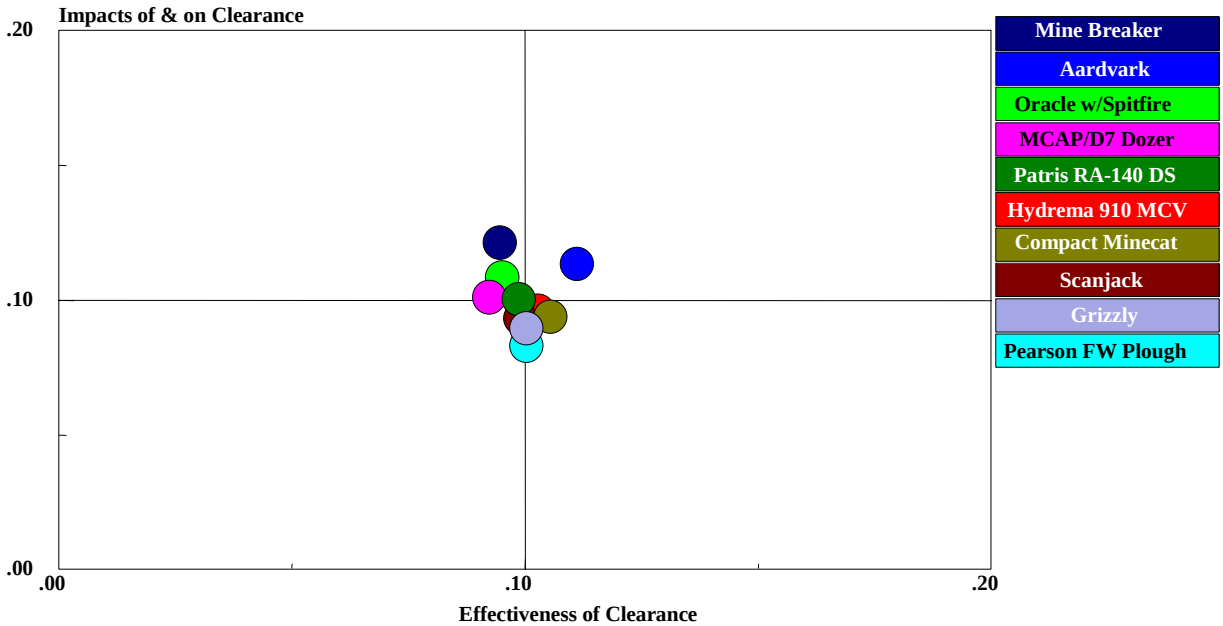
Objectives Names

Rate of Clea	Rate of Clearance
Effectivenes	Effectiveness of Clearance
Impacts of &	Impacts of & on Clearance

Alternatives Names

Aardvark	Aardvark
Hydrema 910	Hydrema 910 MCV
Oracle w/Spi	Oracle w/Spitfire
Scanjack	Scanjack
Compact Mine	Compact Minecat 230
MCAP/D7 Doze	MCAP/D7 Dozer
Patris RA-14	Patris RA-140 DS
Pearson FW P	Pearson FW Plough
Mine Breaker	Mine Breaker 2000/2
Grizzly	Grizzly

Two Dimentional Sensitivity for nodes below: Goal: Select the best Area Mine Clearing System (AMCS) candidate > Operational Performance (G: .572)



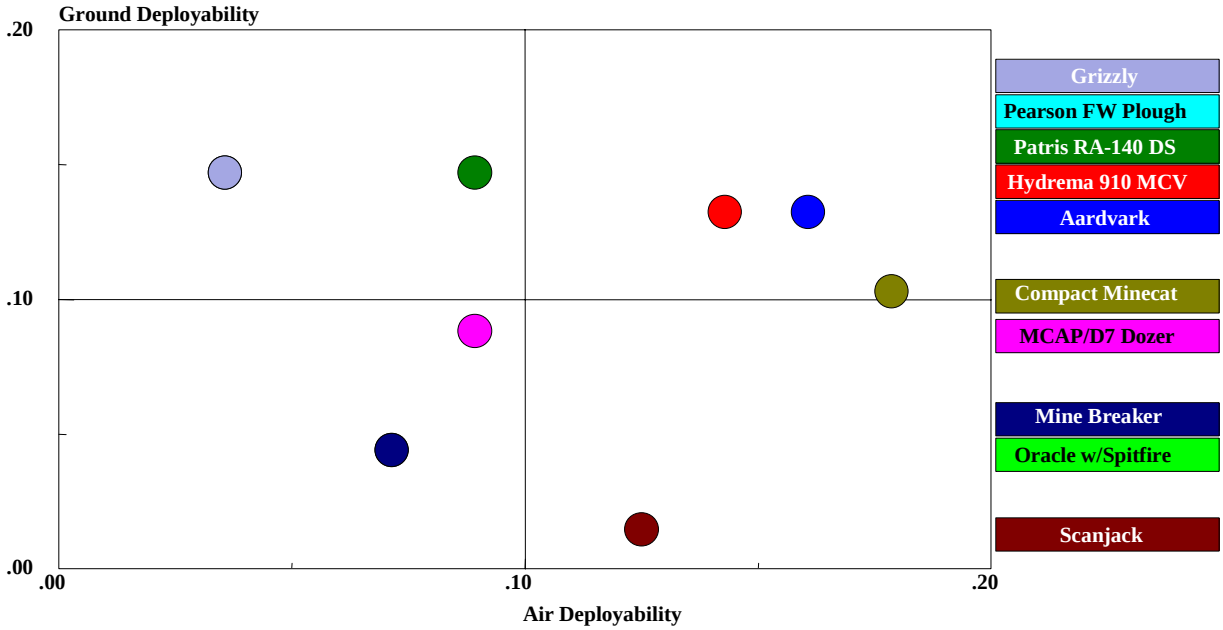
Objectives Names

Rate of Clea	Rate of Clearance
Effectivenes	Effectiveness of Clearance
Impacts of &	Impacts of & on Clearance

Alternatives Names

Aardvark	Aardvark
Hydrema 910	Hydrema 910 MCV
Oracle w/Spi	Oracle w/Spitfire
Scanjack	Scanjack
Compact Mine	Compact Minecat 230
MCAP/D7 Doze	MCAP/D7 Dozer
Patris RA-14	Patris RA-140 DS
Pearson FW P	Pearson FW Plough
Mine Breaker	Mine Breaker 2000/2
Grizzly	Grizzly

Two Dimentional Sensitivity for nodes below: Goal: Select the best Area Mine Clearing System (AMCS) candidate > Deployability & Sustainment (G: .220)



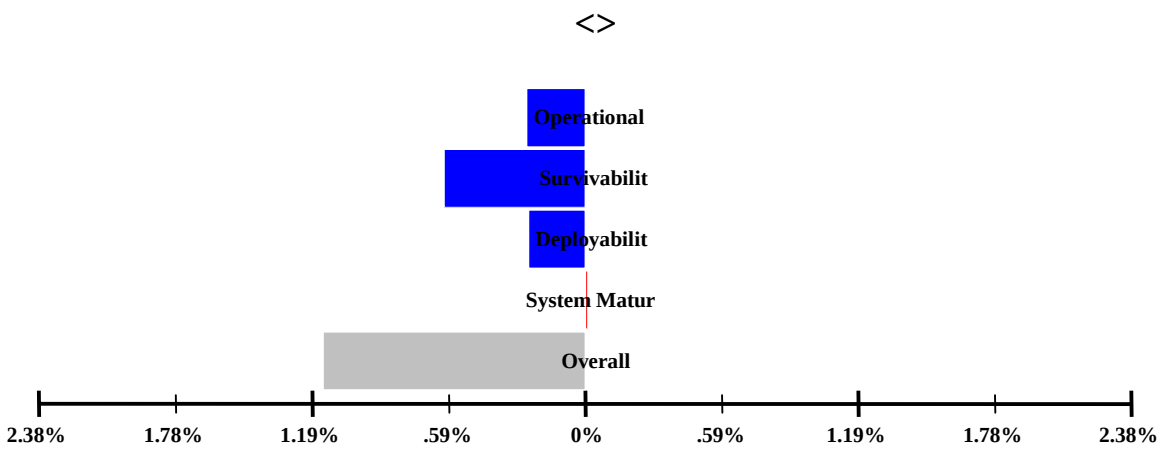
Objectives Names

Air Deployab	Air Deployability
Ground Deplo	Ground Deployability
Supportabili	Supportability

Alternatives Names

Aardvark	Aardvark
Hydrema 910	Hydrema 910 MCV
Oracle w/Spi	Oracle w/Spitfire
Scanjack	Scanjack
Compact Mine	Compact Minecat 230
MCAP/D7 Doze	MCAP/D7 Dozer
Patris RA-14	Patris RA-140 DS
Pearson FW P	Pearson FW Plough
Mine Breaker	Mine Breaker 2000/2
Grizzly	Grizzly

Weighted head to head between Aardvark and Hydrema 910 MCV



Objectives Names

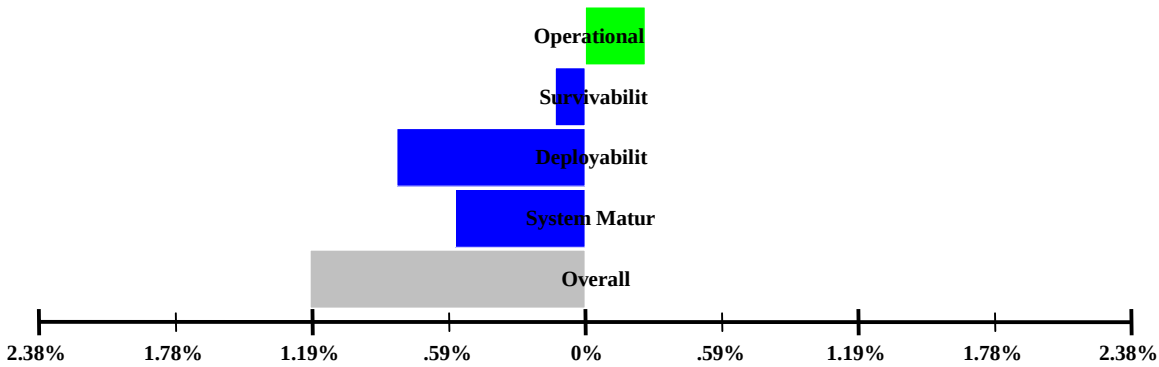
Operational	Operational Performance
Survivabilit	Survivability
Deployabilit	Deployability & Sustainment
System Matur	System Maturity

Alternatives Names

Aardvark	Aardvark
Hydrema 910	Hydrema 910 MCV
Oracle w/Spi	Oracle w/Spitfire
Scanjack	Scanjack
Compact Mine	Compact Minecat 230
MCAP/D7 Doze	MCAP/D7 Dozer
Patris RA-14	Patris RA-140 DS
Pearson FW P	Pearson FW Plough
Mine Breaker	Mine Breaker 2000/2
Grizzly	Grizzly

Weighted head to head between Aardvark and Oracle w/Spitfire

<>



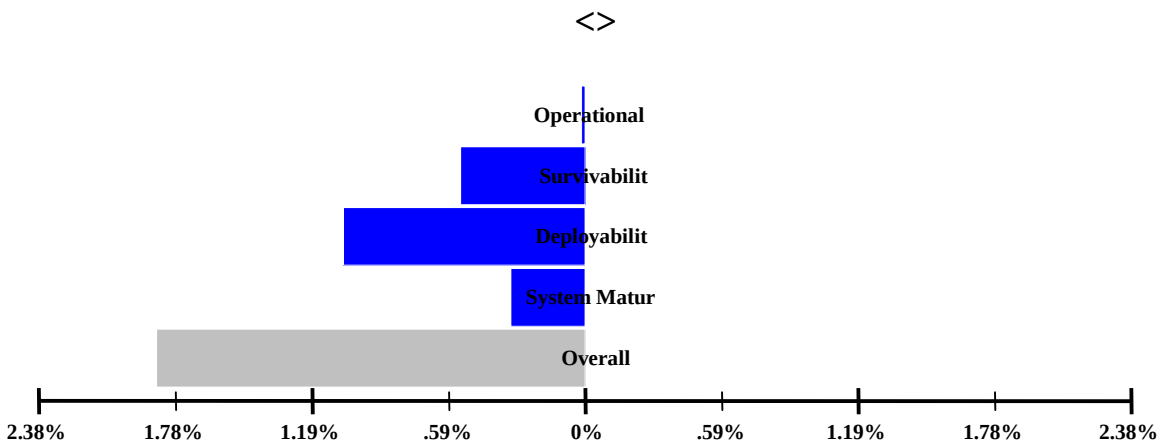
Objectives Names

Operational	Operational Performance
Survivabilit	Survivability
Deployabilit	Deployability & Sustainment
System Matur	System Maturity

Alternatives Names

Aardvark	Aardvark
Hydrema 910	Hydrema 910 MCV
Oracle w/Spi	Oracle w/Spitfire
Scanjack	Scanjack
Compact Mine	Compact Minecat 230
MCAP/D7 Doze	MCAP/D7 Dozer
Patris RA-14	Patris RA-140 DS
Pearson FW P	Pearson FW Plough
Mine Breaker	Mine Breaker 2000/2
Grizzly	Grizzly

Weighted head to head between Aardvark and Scanjack



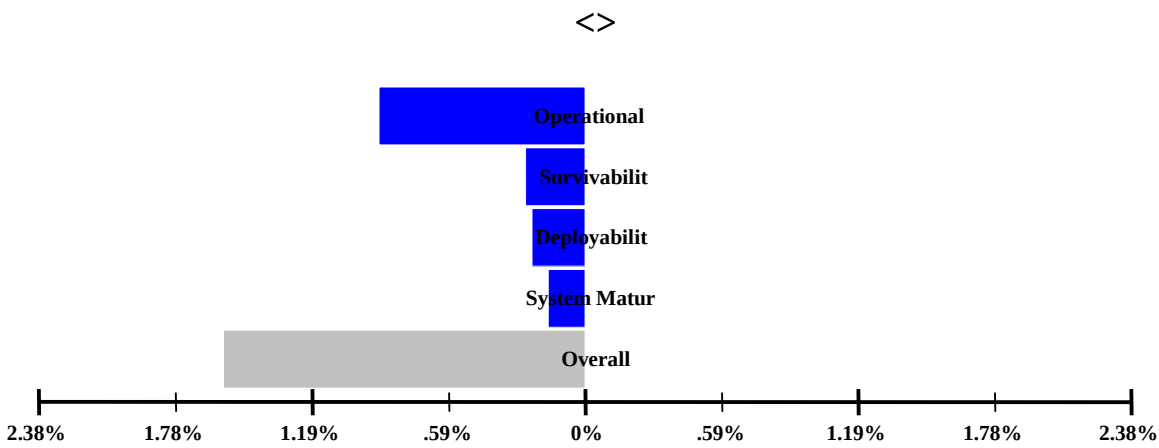
Objectives Names

Operational	Operational Performance
Survivabilit	Survivability
Deployabilit	Deployability & Sustainment
System Matur	System Maturity

Alternatives Names

Aardvark	Aardvark
Hydrema 910	Hydrema 910 MCV
Oracle w/Spi	Oracle w/Spitfire
Scanjack	Scanjack
Compact Mine	Compact Minecat 230
MCAP/D7 Doze	MCAP/D7 Dozer
Patris RA-14	Patris RA-140 DS
Pearson FW P	Pearson FW Plough
Mine Breaker	Mine Breaker 2000/2
Grizzly	Grizzly

Weighted head to head between Aardvark and Compact Minecat 230



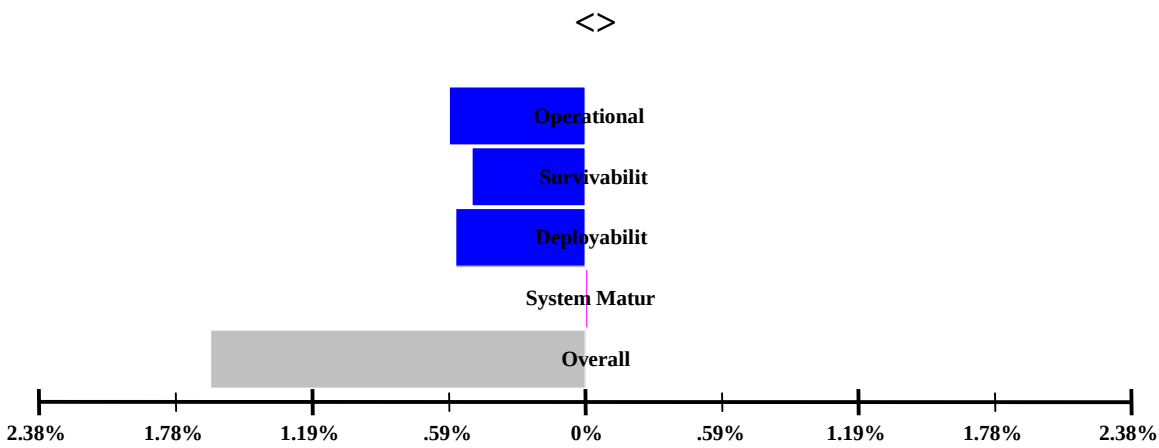
Objectives Names

Operational	Operational Performance
Survivabilit	Survivability
Deployabilit	Deployability & Sustainment
System Matur	System Maturity

Alternatives Names

Aardvark	Aardvark
Hydrema 910	Hydrema 910 MCV
Oracle w/Spi	Oracle w/Spitfire
Scanjack	Scanjack
Compact Mine	Compact Minecat 230
MCAP/D7 Doze	MCAP/D7 Dozer
Patris RA-14	Patris RA-140 DS
Pearson FW P	Pearson FW Plough
Mine Breaker	Mine Breaker 2000/2
Grizzly	Grizzly

Weighted head to head between Aardvark and MCAP/D7 Dozer



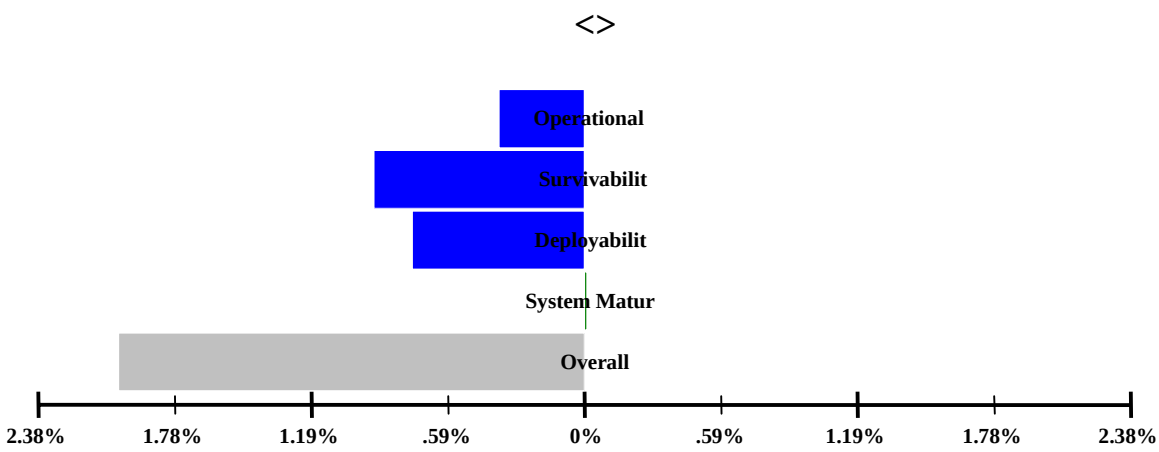
Objectives Names

Operational	Operational Performance
Survivabilit	Survivability
Deployabilit	Deployability & Sustainment
System Matur	System Maturity

Alternatives Names

Aardvark	Aardvark
Hydrema 910	Hydrema 910 MCV
Oracle w/Spi	Oracle w/Spitfire
Scanjack	Scanjack
Compact Mine	Compact Minecat 230
MCAP/D7 Doze	MCAP/D7 Dozer
Patris RA-14	Patris RA-140 DS
Pearson FW P	Pearson FW Plough
Mine Breaker	Mine Breaker 2000/2
Grizzly	Grizzly

Weighted head to head between Aardvark and Patris RA-140 DS



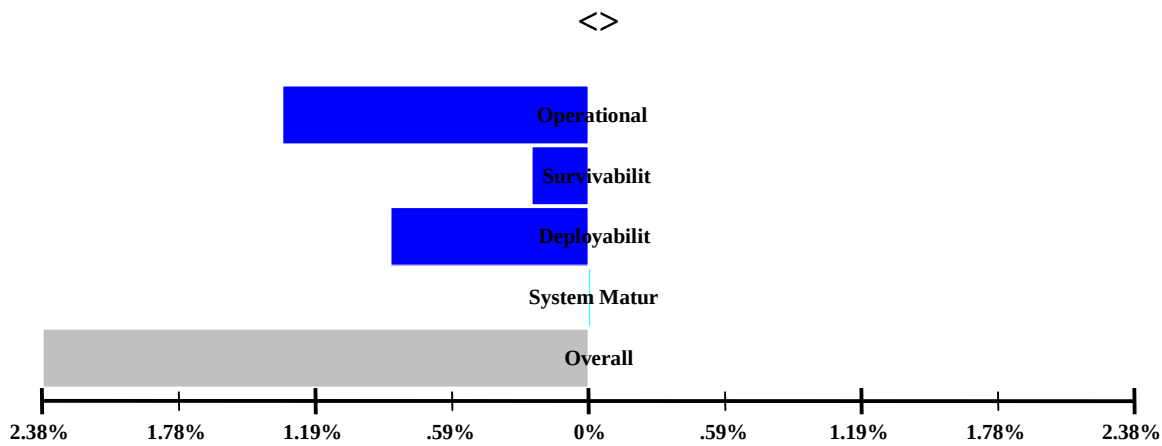
Objectives Names

Operational	Operational Performance
Survivabilit	Survivability
Deployabilit	Deployability & Sustainment
System Matur	System Maturity

Alternatives Names

Aardvark	Aardvark
Hydrema 910	Hydrema 910 MCV
Oracle w/Spi	Oracle w/Spitfire
Scanjack	Scanjack
Compact Mine	Compact Minecat 230
MCAP/D7 Doze	MCAP/D7 Dozer
Patris RA-14	Patris RA-140 DS
Pearson FW P	Pearson FW Plough
Mine Breaker	Mine Breaker 2000/2
Grizzly	Grizzly

Weighted head to head between Aardvark and Pearson FW Plough



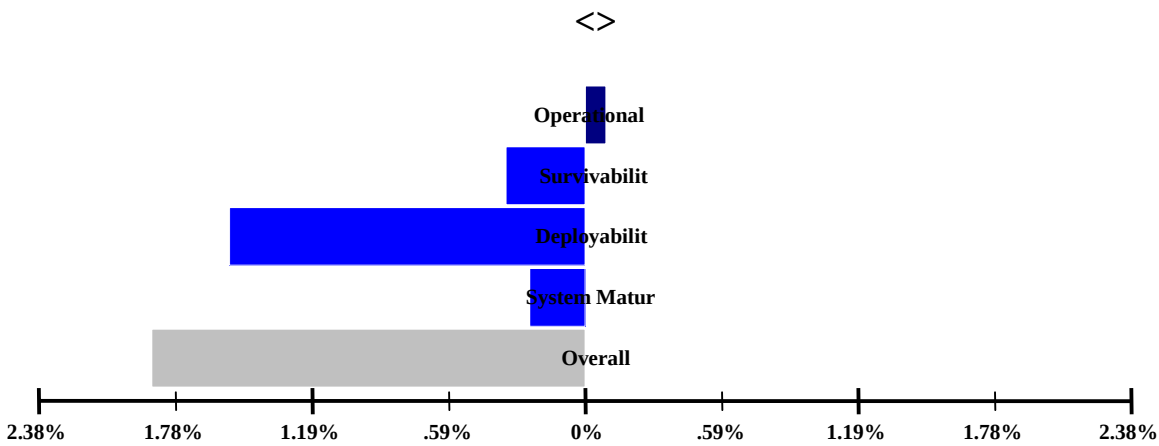
Objectives Names

Operational	Operational Performance
Survivabilit	Survivability
Deployabilit	Deployability & Sustainment
System Matur	System Maturity

Alternatives Names

Aardvark	Aardvark
Hydrema 910	Hydrema 910 MCV
Oracle w/Spi	Oracle w/Spitfire
Scanjack	Scanjack
Compact Mine	Compact Minecat 230
MCAP/D7 Doze	MCAP/D7 Dozer
Patris RA-14	Patris RA-140 DS
Pearson FW P	Pearson FW Plough
Mine Breaker	Mine Breaker 2000/2
Grizzly	Grizzly

Weighted head to head between Aardvark and Mine Breaker 2000/2



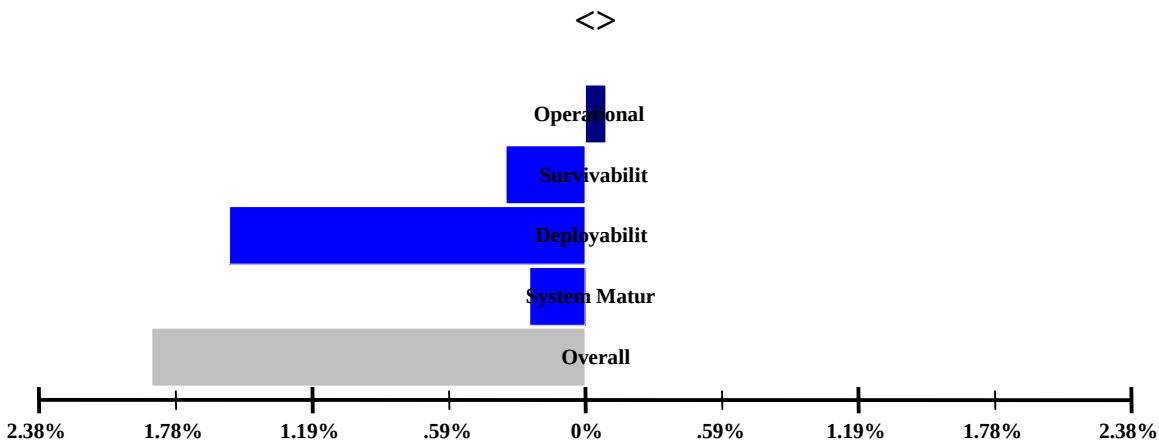
Objectives Names

Operational	Operational Performance
Survivabilit	Survivability
Deployabilit	Deployability & Sustainment
System Matur	System Maturity

Alternatives Names

Aardvark	Aardvark
Hydrema 910	Hydrema 910 MCV
Oracle w/Spi	Oracle w/Spitfire
Scanjack	Scanjack
Compact Mine	Compact Minecat 230
MCAP/D7 Doze	MCAP/D7 Dozer
Patris RA-14	Patris RA-140 DS
Pearson FW P	Pearson FW Plough
Mine Breaker	Mine Breaker 2000/2
Grizzly	Grizzly

Weighted head to head between Aardvark and Mine Breaker 2000/2



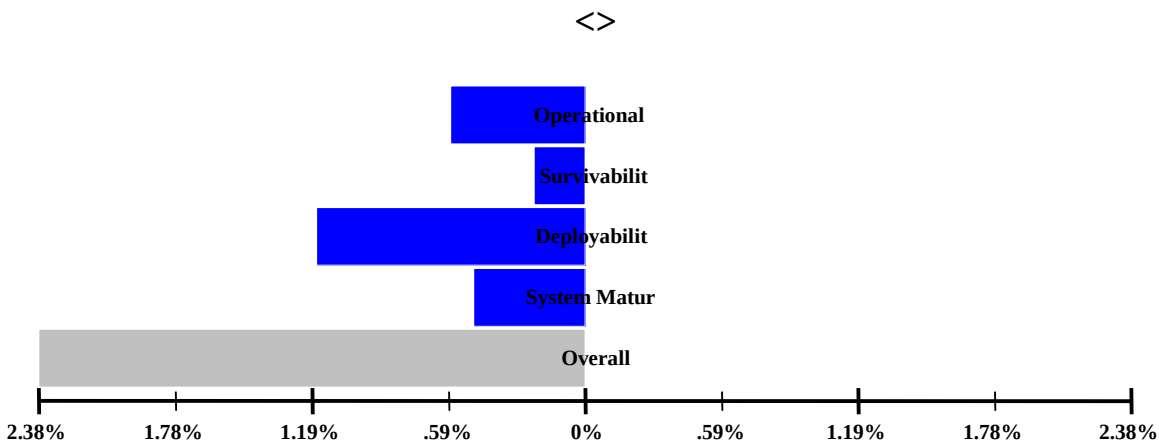
Objectives Names

Operational	Operational Performance
Survivabilit	Survivability
Deployabilit	Deployability & Sustainment
System Matur	System Maturity

Alternatives Names

Aardvark	Aardvark
Hydrema 910	Hydrema 910 MCV
Oracle w/Spi	Oracle w/Spitfire
Scanjack	Scanjack
Compact Mine	Compact Minecat 230
MCAP/D7 Doze	MCAP/D7 Dozer
Patris RA-14	Patris RA-140 DS
Pearson FW P	Pearson FW Plough
Mine Breaker	Mine Breaker 2000/2
Grizzly	Grizzly

Weighted head to head between Aardvark and Grizzly



Objectives Names

Operational	Operational Performance
Survivabilit	Survivability
Deployabilit	Deployability & Sustainment
System Matur	System Maturity

Alternatives Names

Aardvark	Aardvark
Hydrema 910	Hydrema 910 MCV
Oracle w/Spi	Oracle w/Spitfire
Scanjack	Scanjack
Compact Mine	Compact Minecat 230
MCAP/D7 Doze	MCAP/D7 Dozer
Patris RA-14	Patris RA-140 DS
Pearson FW P	Pearson FW Plough
Mine Breaker	Mine Breaker 2000/2
Grizzly	Grizzly

Comparison of Overall Evaluation vs. Estimated Unit Cost For a Area Mine Clearing System (AMCS)

Appendix E

Overall Evaluation vs. Estimated Unit Cost