



USARAK Support: Side-by-Side Mobility Analysis



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Background



- ❑ USARAK (1-40 CAV, 4th BDE, 25th IN) requests support for decision regarding potential scout equipment. COTF contacted Mobility team.
 - Reported the Up-Armored HMMWV (UAH) to not meet Scouts' needs
 - Interest in higher performing off-road vehicles (e.g., the Side-by-Side)
 - Felt that lighter vehicle would improve mission effectiveness
- ❑ AMSAA discusses with TARDEC the status of the response; much previous email discussion regarding units' lessons learned (e.g., force protection, rollover safety, SOCOM configuration and use, spare parts availability)
- ❑ AMSAA offer to support is well received by USARAK S&T Advisor and 1-40 CAV S-4; follow-on discussions highlighted several points
 - Unit requests comparison of several Side-by-Side vehicles with UAH
 - Anticipated to utilize COTS vehicles in upcoming (Oct) training exercise

AMSAA provides analytical support directly to Soldiers for materiel decision.



Vehicles of Interest



- ❑ Vehicle baseline: UAH – M1151.
 - Configuration still to be defined; anticipated to be lighter than “typical”
 - Approximately 12,000 to 16,000 lb with 190 hp.
 - In consideration of the open design of the alternatives, AMSAA recommends comparison also be made to unarmored HMMWV and/or the SOCOM GMV
- ❑ Multiple alternative vehicles requested (various fidelity of information):
 - HDT Storm
 - Polaris MRZR 4
 - CANAM
 - Full spec range under investigation (est. 2,000 to 10,000 lb, w/ 50 to 150 hp)
 - HDT Sword
 - Teryx 750 4x4 RUV
 - Prowler C2



HDT Storm



MRZR 4



Teryx 750



Scope of Effort



AMSAA will perform a variety of mobility analysis to support the Soldiers' equipment decision.

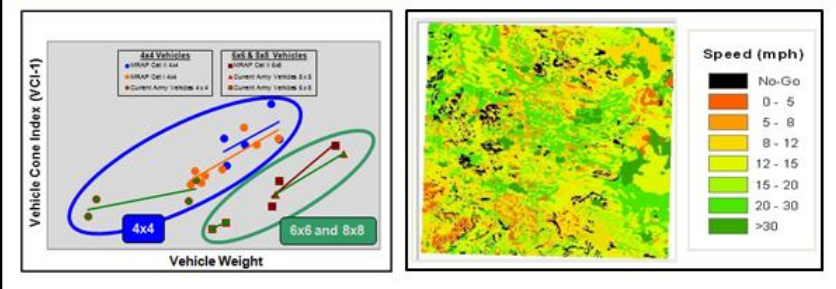
TruckSim / CarSim

Steering & Handling Analysis

| Modeling / Analysis Task | Modeling Tool | | | |
|---------------------------------------------------------------------------------------------------|---------------|------|------|-------------|
| | TruckSim | NRMM | FCPM | Power Audit |
| Speed & Acceleration <i>(Top Speed, Dash Time); includes Coastdown validation</i> | ✓ | N/A | N/A | N/A |
| Gradeability / Speeds on Grades <i>(Indicator of Recovery and Towing Capability)</i> | ✓ | ✓ | N/A | N/A |
| Steering / Handling <i>(Rollover & safety comparison)</i> | ✓ | N/A | N/A | N/A |
| Off-Road Mobility <i>(traffability, V_{xx} speed, VCI_x)</i> | N/A | ✓ | N/A | N/A |
| Fuel Consumption Prediction <i>(Based on VCI_x and vehicle powertrain)</i> | N/A | N/A | ✓ | N/A |
| Power Audit <i>(Involves confirming power calculations from data provided by S4)</i> | N/A | N/A | N/A | ✓ |
| Other Analysis <i>(Potential for other considerations as efforts develop)</i> | N/A | N/A | N/A | N/A |

Modeling

Off-Road Mobility Modeling & Analysis Using NRMM





Study Example – Analytical Comparison



Problem

Various Program Managers request AMSAA Mobility analysis to support vehicle performance evaluation and procurement decisions.

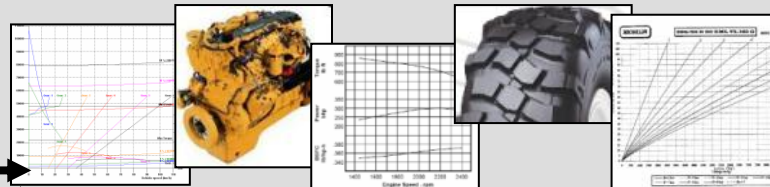
Impact

AMSAA comparison of these vehicle characteristics were used to inform materiel procurement decisions.

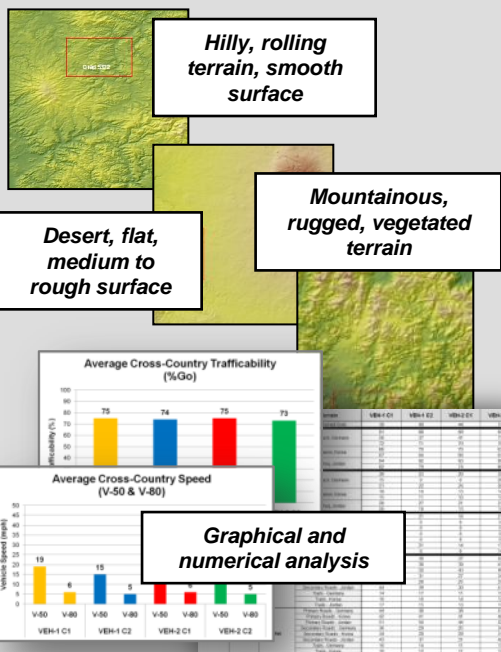
Identify Study Vehicle Configurations

- Personnel
- Armor packages
- Added weight from payload
- Reduced horsepower from electrical loads

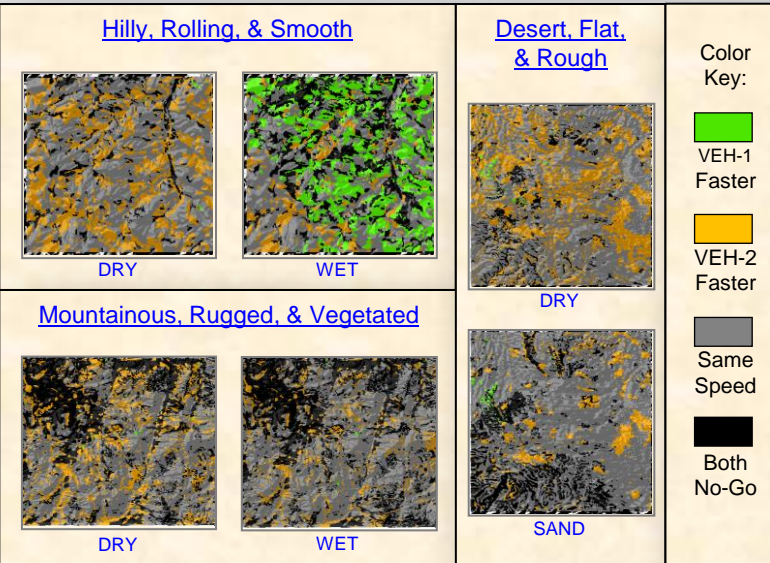
Review Similar Vehicle Models and Major Configuration Differences



Leverage Previous Modeling and Simulation Efforts (notional)



Formulate Conclusions (notional)



- Except for the very soft (wet), rolling terrain, VEH-2 can go everywhere that VEH-1 can.
- In most cases, the VEH-2 is as fast or faster than VEH-1

AMSAA assesses a broad spectrum of mobility performance parameters.



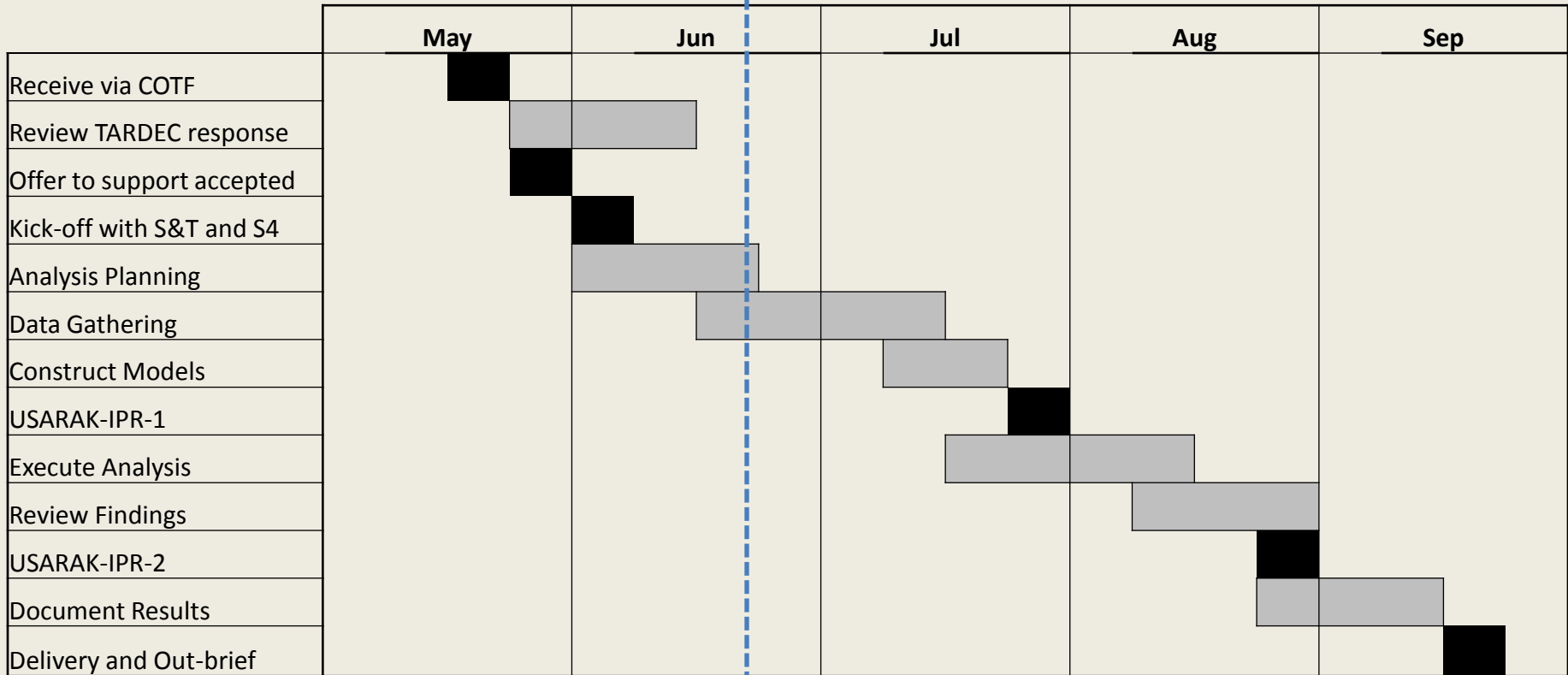
Potential Issues and Concerns



- ❑ Comparison of potential materiel to a program of record.
 - Involvement of PM LTV versus systems with no PM
 - Data availability / ease of access for measurement
- ❑ Performance focused comparison (limited to certain “-ilities”).
 - Have already discussed implication of lightly/un-armored vehicle
 - Consideration of the log-tail associated with a new article (possible fuel needs)
- ❑ Obtaining vehicle data necessary for analysis:
 - Suspension kinematics and compliances, tire data, steering kinematics, etc.
 - Engine power and torque curves, driveline gearing, weight distribution, etc.
 - Some data will be easier to acquire than others



Work Schedule / Current Status



Have established working relationship with TARDEC & USARAK.

Upcoming tasks:

- Refine scope with customer / further define vehicle configuration
- Gather platform characteristics through “creative” means



Questions / Comments?



- Thank you for the opportunity to directly support the warfighter with our analysis.
- Please contact the POC on cover if there are any questions or comments.