TPMI's Response to Army Applications Laboratory RFI – technology for terrain shaping of the deep battlefield

Precision timing and selection of targets to canalize the enemy into kill zones in the deep battlefield.

USA, November 3, 2023 /EINPresswire.com/ -- Tipping Point Military Innovation (TPMI) is pleased to submit a proposal to the Army Applications Laboratory (AAL) Request For Information (RFI). TPMI's virtual sand table provides an innovative solution as to how it can help with the Army's problem (below).

The Problem: The Army is looking for technologies that contribute to one or more tasks that impact the enemy's ability to maneuver 70-150km+ from the forward line of troops (FLOT).

Primary Question: How does your proposed solution address the problem statement listed above?

A technology which could bring precise knowledge of the terrain 70-150 km from the FLOT to Soldiers of all ranks would help guide use of force. TPMI offers an advanced visualization system, which will help achieve this.

TPMI's proposed system is an advanced 3D virtual military sand table, which will improve observation, identification, and classification of threat targets. This knowledge would enable the US Army to deliver firepower to strategic points to impede enemy maneuvering in the deep battlefield.

TPMI's 3D virtual, interactive sand table would enable a strategic process for defeating adversarial forces by forcing enemy forces to bottleneck and bunch up into a killing zone. Step 1 is to analyze threat vehicles by types, numbers and distributions. Step 2 is to determine possible routes of approach from threat vehicle locations to the FLOT. Step 3 is to determine canalization areas associated with the routes of approach. These canalization areas will be annotated on

TPMI's virtual sand table. Step 4 is to determine the killing zones associated with the canalization areas.

TPMI's 3D virtual sand table would enable an improved visual analysis of canalization points and a more intuitive approach to coordinating the strike. TPMI's sand table will help Soldiers determine the first weapons strike (type(s), number(s), timing, and location(s)) of cannon-fired or air dropped anti-tank mines to cause enemy threat vehicles to bunch up. Once enemy vehicles are bunched up, TPMI's technology will help Soldiers determine a second strike of munitions to efficiently eliminate enemy forces in the killing zones.

Secondary Question #1: Explain in narrative format the product that you build, manufacture, produce, develop, or propose and how you see it best meeting the needs of the Army.

The US Army is scheduled to receive 100,000 Integrated Visual Augmentation Systems (IVASs). The product that TPMI will build will be an advanced visualization suite for Soldiers called the 3D virtual sand table, which will be viewed on the IVASs.

TPMI's deliverable will be an end-to-end demonstration of the 3D virtual sand table, which will help guide the type, number, timing, and location of delivery of munitions.

This deliverable will include creating a virtual sand table from actual 3D data used in the OWT. Note that this could be created using LIDAR data collected from actual units at the National Training Center in CA. The sand table would portray terrain slopes, riverbed networks, road network, soil types, urban areas, vegetation locations, types of vegetation and terrain slopes. Virtual unit friendly and enemy vehicles will be placed on the sand table. The sand table will allow analysis of routes of approach from the blue force to the threat locations and annotation of the sand table with these routes.

A simulation will be delivered to enable Soldiers to locate areas for possible canalization. Soldiers will be able to locate points along a canalized portion of the routes for potential blockage and associated killing zones. Finally, Soldiers will be able to conduct a simulated attack plan to pick out the type, number, timing, and location of delivery of munitions.

TPMI's technology would tie directly into the PEO STRI's One World Terrain (OWT). Key features of the 3D virtual sand table include:
• [Tangible tools for markup of virtual terrain](#) (US Patent 11,207,133).
• [Tangible tools for digital transformation of virtual terrain](#) (US Patent 11,417,071)
• Advanced visualization technology to coordinate viewing for multiple users (US Patent 11,574,435)
• Applying AI to a sub-volume within the OWT for improved AI analysis (US Patent 10,959,696)
• Generating a realistic OWT (e.g., soil type, moisture content, degree of deforestation), which will help to determine targeting to achieve desired crater size/ depth (US Patent 10,878,639)
• Integrating generative AI into wargame simulations (US Patent 10,956,635)

- Enabling a "virtual dissection" process of terrain data for enhanced targeting (US Patent 10,950,338)

Together, these technologies will improve unit coordination, visualization of terrain canalization areas and blocking points and targeting at the killing zones.

Secondary Question #2: What would it be like for a Soldier viewing TPMI's 3D virtual sand table?

TPMI's 3D virtual sand table can depict a wide range of activities ongoing all at once. For example, a Soldier viewing TPMI's 3D virtual sand table would be able to see:
- UAVs equipped with sensors (e.g., FLIR, Radar, LIDAR, EO) that observe, identify, and classify threat targets to impede enemy maneuver
- ATACMS with earth penetrator rounds with precision location and associated vertical decent and range consistent with requirements capable of forming obstacles to shape existing terrain
- Brilliant Anti-Tank (BAT) munitions
- Russian loitering munitions

TPMI's 3D virtual sand table will help Soldiers see the complete picture of friendly and enemy crafts and well as key terrain features for targeting, such as bridges, a road with forest on both sides, a road with steep canyons on both sides, a road with a river on one side and steep on the other, and closing off one road of a network forcing another longer route. TPMI's 3D sand table will give the US Army the ability to strategically impair enemy maneuver in the deep fight (70-150+ km).

Secondary Question #3: What are additional benefits of TPMI's advanced visualization system?

The US Army is scheduled to receive 100,000 Integrated Visual Augmentation Systems (IVASs). TPMI's product is an advanced visualization suite for Soldiers called the 3D virtual sand table, which will be viewed on the IVAS. TPMI's technology would therefore tie directly into the PEO Soldier's Integrated Visual Augmentation System. TPMI aims to deliver improvements to the IVAS including:
- Headset-based LIDAR to improve spatial mapping for the Soldier (US Patent 11,006,100)
- Headset-based eye tracking for coordinated targeting for a team (US Patent 11,380,655)
- Visual alert system for rapid and precise targeting (US Patent 11,093,051)
- Improvements in Soldier's re-navigation (US Patent 11,442,534)
- Eye-tracking system to assure a comprehensive visual search pattern (US Patent 11,442,538)
- To boost a Squad leader's knowledge of where each member of his squad is looking (US Patent 11,380,065)
- A pseudo-GPS system to maximize lethality in urban warfare (US Patent 11,341,731)
- A pseudo-GPS system's 3D hazard tracking system (US Patent 10,973,485)
- Localized image enhancement at a GPS coordinate (US Patent 11,709,546)
- See through walls in urban warfare (US Patent 10,766,989)
- Advanced 3D rendering algorithm for Soldiers (US Patent 10,964,095, US Patent 11,625,891, US

Patent 10,964,124, and US Patent 10,657,731)
• AI for Soldier analysis (US Patent 11,205,297)
• AI-assisted consultation process (US Patent 11,090,873)
• Object classification and targeting (US Patent 11,058,390)
• AI-based targeting (US Patent 11,179,130)
• Applied foreknowledge and rehearsals for more effective operations (US Patent 10,959,696)
• Using AI to prevent information overload (US Patent 11,188,800)
• A method to visually localize the origin of a sound - key for rapid targeting (US Patent 10,846,911)
• Improving a Soldier's interaction with complex military equipment (US Patent 11,285,674 and US Patent 11,090,873)

About the Author: Dr. Robert Douglas, who is the Managing Director of TPMI, served on the Army Science Board for 20 years and led 7 major studies. A graduate of West Point, he served as a career officer as an infantryman and worked for Lockheed Martin as Director of Systems Analysis and as VP of Engineering at DRS Technologies. He has 17 years of experience in 3D technology innovation, served as Principal Investigator for a National Science Foundation grant on 3D imaging, and has been granted 80+ US Patents, the majority of which are advances in 3D technology.

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