



Research and Development Solutions



...where knowledge | generates solutions

Research and Development Solutions

KGS Research and Development (R & D) delivers expertise in systems engineering, human factors engineering, cognitive systems engineering and biopsychology system applications. Our mission is to provide breakthrough technologies in support of all KGS lines of business, to perform contract research and development to advance science and engineering, and to develop new products to solve complex challenges. KGS R & D has distinguished itself in the areas of remote sensing, intelligence, medical simulation, physiological research, chemical/biological warfare countermeasures and weapons systems.



KGS provides unequalled technical support to meet the unique requirements of public sector research and development programs including:

- Trauma Training Simulators for military medical personnel and Civilian Paramedics
- Anthropomorphic Test Devices for Lethal and Non-Lethal Weapons
- Tools for Coordinating Ballistic Missile Defense Sensors and Operations
- Cognitive Systems Engineering and Artificial Intelligence for Intelligence Analysts, Image Interpreters, MASINT Analysts and Missile Defense Operators
- ISR Phenomenology
- Remote Sensing
- System Engineering

KGS creates and implements enduring solutions to resolve our client's most complex challenges. The Research and Development division engineers and builds breakthrough solutions that advance science and engineering, turning ideas to solve problems into fully operational technologies and products that achieve mission objectives.

Research and Development Project Examples:

Anthropomorphic Dummies for Medical Training and Weapons Testing

- Research to develop unparalleled realism for medical trainers for US Army RDECOM-ARL-STTC
- Simulation of aspects of human sensory and physiological systems for lethal and non-lethal weapons
- Developed and fielded system which incorporates two-way real-time wireless communication for commands and data capture (e.g. trainer feedback)
- Perform computer modeling to relate physical sensor data to psychophysics and the behavioral domain

Human Factors Evaluation Methodology Development

- User evaluation for image/sensor chain analysis
- Supporting purchase decisions for U2-R, P3 sensors
- Cockpit user evaluations for B-2 sensor suite upgrade

Sensor Systems Engineering

- Developed Moving Target Indication Radar Toolkit for AFOSR including sensor engineering models and the National MTI Radar Scale (similar to NIIRS) to support operations and development of future systems
- System concepts and functional definition for B-2, U2-R, ATARS, DARPA Assault Breaker and classified sensor systems
- Area delimitation and common operational picture from open source data
- Conducted largest scope automatic target recognition evaluation for AFRL

Smallsat ISR Study Systems Engineering for DARPA-TTO (Discoverer II)

- Reduced on-orbit cost of reconnaissance satellites by a factor of 20
- Insertion of commercial satellite management practices to reduce cost and improve effectiveness
- Direct downlink to tactical commander in theater
- Ground stations to support store-and-forward to CONUS
- Dial-a-Sat for tasking and control

Airborne/Spaceborne IT System

- Proved feasibility of system concept for AFRL for coordinated ISR, exploitation and reporting from sensor platforms using artificial intelligence technologies
- Reduce intelligence-cycle time to enhance predictive battlespace awareness
- Reduce targeting time to improve kill-chain by revolutionizing CTPED functions
- Operational test of U2-R ASARS II radar system for AFOTEC

Field Data Collections

- Large scale collection planning and management
- Field data collection to identify new sensor-target phenomenologies
- Testing of denial and deception techniques
- Evaluation and modeling of jamming techniques
- Human factors testing in field exploitation shelters

Innovation in Action

KGS's applied research provides technically superior solutions and products that are customer-needs driven, enabling clients to achieve their most complex mission objectives. An example of KGS's innovation can be found in its nationally acclaimed, award-winning product, TraumaFX.

TraumaFX™: The Way Forward

The Multiple Amputation Trauma Trainer (MATT™) is a ruggedized, tetherless, remote controlled human patient medical simulator that delivers high fidelity simulations of lower body blast injuries commonly caused by IEDs and other sources. Jointly developed by KGS and US Army RDECOM-ARL-STTC, MATT employs state-of-the-art special effects materials and technologies to deliver incredibly realistic visual and tactile stimuli with lifelike response to treatment. Tourniquets must be applied with realistic force to control hemorrhaging; responders can use field techniques such as hand, knee and elbow pressure to occlude bleeding.

MATT's unparalleled ruggedness allows it to be carried and dragged through inhospitable field environments without damage, making it ideally suited for use in Combat Lifesaver training courses. MATT is the first anthropomorphic trauma simulator to implement animatronic movement of injured limbs, significantly increasing the realism and appropriate difficulty of treatment. Extraordinary visual and tactile realism provide desensitization to traumatic amputation injuries, allowing medics, Corpsmen, Soldiers and other first responders to perform life saving tasks more efficiently and effectively in the field, which leads to significant improvement in treatment of blast injuries.

Researched and developed under the Severe Trauma Simulation Army Technology Objective (ATO), TraumaFX was engineered specifically to meet rigorous requirements of military and civilian training needs such as:

- Training for Tactical Combat Casualty Care
 - > Care Under Fire and Tactical Field Care (Medics, Corpsmen)
 - > Combat Lifesaver (All US Army Personnel)
- Military Doctor and Nurse Training
- Civilian EMT/Paramedic Shock Trauma Certification
- Civilian State Shock Trauma Systems
- Fire and Emergency Academies
- Medical Schools



The TraumaFX MATT project has received two awards during its first year of production, one from the US Army for Excellence in Modeling and Simulation and one for Innovation in the DoD SBIR Program.

The TraumaFX project has not only resulted in fielding of a lower-body simulation, but KGS internal research and development has developed and fielded an upper body simulator which meets current Tactical Combat Casualty Care (TCCC) requirements.

