



# USAMRMC

## STRATEGIC COMMUNICATION PLAN

### U.S. ARMY MEDICAL RESEARCH AND MATERIEL COMMAND



## Telemedicine & Advanced Technology Research Center (TATRC)

**Mission:** The Telemedicine & Advanced Technology Research Center provides tele-health solutions and executive medical research management to enhance and support military health care and promote innovative medical technologies. TATRC serves as the primary execution manager for Defense Health Programs research while exploring science and engineering technologies ahead of programmed research, leveraging other programs to maximize benefits to military health care. TATRC is the science and technology scout for military medicine and the center of gravity for Army telemedicine initiatives. TATRC initiates, sponsors, promotes, and oversees programs and partnerships in medical science and engineering that support military medical programs. With the strategic application of funding from small business innovation research/small business technology transfer, Army Medical Department (AMEDD) advanced medical technology initiatives, and other sources, TATRC accelerates the implementation of novel science and engineering technology applications through validation studies, translational research, and demonstration projects. As a result, TATRC is a network of experts and capabilities positioned to rapidly address urgent DoD needs.

### Background

The origins of TATRC can be traced to the early 1990s when the U.S. Army and U.S. Air Force medical departments sought to jointly develop, procure, and deploy a filmless medical diagnostic imaging system. By 1993, the Medical Advanced Technology Management Office (MATMO) had been established and identified as the DoD's "Telemedicine Test Bed." In 1998, MATMO was reorganized and emerged as TATRC. Since its inception, TATRC has played a leading role in the development of advanced technologies in the areas of health informatics, medical imaging, mobile computing and remote monitoring, and simulation and training. TATRC also has played a strong role in promoting professional organizations, such as the American Telemedicine Association during its early years, and has continued to be a principal player in advancing concepts for the future of virtual reality, simulation, biomaterials, and health care institutions. For more than 17 years, TATRC has been exploring and implementing telemedicine and other advanced medical technology solutions. By investing in new ideas, TATRC continues to improve health care for the U.S. Armed Forces and their families, as well as the public sector. An important focus of TATRC is partnership with major U.S. universities, a broad range of commercial enterprises, and other federal agencies. With the elimination of congressional special interest funding, TATRC provides research execution management expertise in support of Army and Defense Health Medical Research Programs. TATRC's multidisciplinary partnerships with government, academia, and industry help to maintain its focus on world-class, integrated research and development for DoD. Its research programs continue to address the ever-changing world of medical requirements both on the battlefield and in hospitals of the future.

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### Major Portfolios:

TATRC focuses mainly on execution management of research and bridging gaps in technology areas that are critical to military health care requirements. The following are TATRC's major research portfolios:

- *Acoustic Trauma*: Recent technology advances may make it possible to productively address the leading form of veteran disability—hearing loss. This portfolio involves the formation of collaborative efforts among congressional special interest projects, U.S. Navy intramural research, and the U.S. Department of Veterans Affairs (VA).
- *Advanced Prosthetics and Neural Engineering*: Projects under this portfolio explore advanced prosthetics, orthotics, and other assistive devices, treatments, and interventions for patients with major limb amputations, fractures, and other orthopedic-related injuries. The portfolio also includes efforts for earliest adoption of proven technologies at DoD rehabilitation medicine centers.
- *Biomonitoring Technologies*: This portfolio is focused on identifying and developing point-of-care medical technologies and supporting architectures to improve military health care through the application of wireless and sensor technologies. These range from individual physiological monitoring for commanders, medics, and rehabilitation experts to monitoring of casualties during evacuation. The portfolio also includes external and global environmental health threat monitoring technologies.
- *Computational Biology*: Research in this area focuses on development and application of methods for analysis, interpretation, prediction, and modeling of biological data. For example, recent developments in genomic research present both challenges and opportunities to extract knowledge from large amounts of gene and protein data that could lead to early detection of biological threats and emerging infectious diseases, as well as the discovery of new drugs and treatment regimens.
- *Health Information Technologies*: Designated as the information management (IM)/information technology (IT) research arm for the Military Health System (MHS) Joint Medical Information Program Office, this portfolio is responsible for all health informatics-related programs within TATRC and is the primary research capability in this area for DoD, collaborating across military services and working closely with combat and materiel developers, Medical Communications for Combat Casualty Care, communication battlelabs, and the service Chief Medical Information Officers, and addressing joint medical requirements.
- *International Health/Mobile Health*: Mobile health technologies provide affordable and practical solutions to medical issues in austere environments, including remote and underserved regions of the world outside of the United States. Recent efforts in direct support of combatant commands and the Office of the Assistant Secretary of Defense (Health Affairs) Office of International Health are piloting demonstration projects in the U.S. Central Command (CENTCOM), U.S. Africa Command, and U.S. Southern Command (SOCOM).
- *Infectious Diseases*: These projects strive to advance technology for the prevention, detection, and effective treatment of infectious, chronic, and parasitic disease. Current projects focus the use of telemedicine, home care monitoring, evolving biosensor development, and advanced immunologic testing in vulnerable populations.



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- **Medical Imaging Technologies:** Organized into four distinct areas—portable imaging and image-guided therapeutics, advanced high-performance imaging, computational methods and decision support in imaging, and optical/para-optical imaging techniques—projects under this portfolio have gained national and international recognition for advancing the state of the art in this discipline.
- **Medical Logistics:** The portfolio focuses on the application of transformational technologies that can be applied to core logistics systems and processes used to support operational medicine. These broad technology areas include enterprise-wide integration technologies; asset management and visibility; supply management; and energy, materials, transport, and the environment.
- **Medical Robotics:** These projects aim at developing, adapting, and integrating technologies to treat patients in fixed and mobile medical facilities, as well as to locate, identify, assess, treat, and rescue battlefield casualties.
- **Nanomedicine and Biomaterials:** This portfolio focuses on identifying novel developments in materials science and biomaterials that can improve drugs and devices for diagnosis and therapy of a number of medical conditions.
- **Neurotrauma:** This portfolio was developed in close collaboration with the Combat Casualty Care Research Program and is focused on serious brain injury, spinal cord injury, peripheral nerve injury, and other forms of acute neurological trauma in operational settings.
- **Regenerative Medicine:** Regenerative Medicine contains many novel approaches for the treatment of damaged tissues and organs by using therapies that prompt the body to autonomously regenerate and by using autologous cells from the patient's body to seed on biodegradable scaffolds for the creation of engineered organs. This new portfolio was created in response to the current military medical needs to treat traumatically injured tissues resulting from combat or battlefield wounds.
- **Resilience and Neurorehabilitation:** This portfolio is focused on cutting-edge neurorehabilitation and occupational therapy technologies and the science of neuroplasticity that can be applied to prevent, mitigate, and treat neuropsychological injuries associated with trauma, stress, neurotoxic chemicals, and other operational threats to Warfighter brain health.

### Key Themes & Messages

TATRC has consistently provided the enabling technologies that will best support 21st century Army health care. TATRC has played an important role in championing organizations such as the American Telemedicine Association and has been a leader in areas such as the use of virtual reality tools, biomaterials, and hospital-of-the-future concepts. TATRC's vision, as an important extension of its legacy, encompasses the creation of opportunities for technology transfer to the public sector as well as the battlefield. By leveraging its partnerships with industry and academia, TATRC helps make medical care and services more accessible to Warfighters, reduces costs, and enhances the overall quality of health care in wartime and peacetime.

### Q & A

**Q: Why does USAMRMC need an organization like TATRC?**

**A:** TATRC's main priority is moving medical technology solutions into the Military Health System. TATRC provides the Command with the speed and agility to pioneer



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the investigation of new ideas and capabilities and to address novel initiatives that may not be embedded in its core programs while serving as a major execution agent for USAMRMC and its numerous research endeavors. Large organizations develop layers including rules for members to operate within accepted processes and convention. Management controls typically include a research acquisition system with a well-defined path of identified needs, a regimented linear development of need oriented products, and critical (potentially terminal) decision points. The organizational “cost” is a regimented culture “inside the box” that produces incremental improvements but tends to stifle revolutionary or disruptive advances. Innovation on the other hand tends to occur in a less constrained, less conventional, and less risk averse environment. Transformational change also requires visionaries, activist management, and the persistent efforts of individuals who champion ideas despite institutional and cultural barriers toward disruptive change. There is a need in every large organization for a protected semi-autonomous center that can pursue new ideas and generate new technologies. TATRC continues to provide this latter capability for USAMRMC.

### **Q: What emerging technologies does TATRC bring to USAMRMC?**

A: TATRC provides the only medical computational biology expertise within DoD, led by the Biotechnology High Performance Computing Software Applications Institute (BHSAI). BHSAI conducts research across a spectrum of important capabilities, ranging from network science and high-performance computing applications to development of multiscale models and medical decision support algorithms.

The Advanced Information Technology Group is exploring new strategies and options for medical IM, in close coordination with larger federal efforts on the electronic health record, including the National Health Information Network (NHIN). In 2009, this team was recognized as the only group to provide an actual demonstration of medical data exchange through the NHIN adaptor. Based on the maturity of regenerative medicine and advanced prosthetics technologies piloted through TATRC during the past decade, USAMRMC has established a new Research Area Directorate (RAD) dedicated to rehabilitative medicine. This would not have been possible without the TATRC support to the Military Amputee Research Program, ocular trauma, regenerative medicine, and other pioneering efforts. Modern medical training will increasingly rely on modeling and simulation technologies, ranging from in silico simulations in virtual worlds and synthetic environments to biofidelic manikins and part-task trainers, many of which have been promoted and even initiated by TATRC. TATRC’s robotics portfolio evolved and has grown into an important effort in medical robotics that has pioneered concepts for remote extraction, evacuation, and medical support. Medical imaging technologies, particularly neuro-imaging, will provide critical capabilities to DoD and VA management of the injured Warfighter now and in the future aging population.

### **Q: Who are TATRC’s customers?**

A: TATRC’s customers include DoD researchers and research users, as well as outside scientists and entrepreneurs with potential solutions that can address DoD needs. To this end, TATRC plays a key role in connecting those with relevant problems to those with the potential solutions to the problem. Each of the RADs has a dedicated TATRC portfolio manager representing and connecting their respective needs to extramural projects and emerging science and engineering advances. TATRC is the IM/IT research



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arm for the Military Health System Joint Medical Information Program Office. TATRC also supports research requirements and needs established by the Defense Centers of Excellence, Uniformed Services University of the Health Sciences, AMEDD Center and School, and Director of Defense Research and Engineering (Joint Technology Coordinating Group 1).

### **Q: *What has TATRC done for our Soldiers?***

A: Most recently, TATRC's Deputy Director led a tele-traumatic brain injury (Tele-TBI) program that helped injured Warfighters and their families' link to their health care providers by cell phone technology. The Tele-TBI team increased remote access for critical care monitoring by placing commercially available robots in several key medical centers. The team obtained approval through a Joint Urgent Operational Needs Statement to increase medical bandwidth in the CENTCOM operational theater. This one action has saved lives thanks to the timely transmission of large amounts of data such as brain scans. TATRC also obtained approval to connect NATO forces in Afghanistan into the successful Army Knowledge Online Teleconsultation Service that allows rapid turnaround expert medical consultations from Army providers to health care providers operating in remote environments.

### **Q: *What are some of TATRC's accomplishments?***

A: TATRC has developed a wide variety of products in the area of telemedicine and advanced technology that benefit the Warfighter, including:

Creating a common development environment for state-of-the-art software development and testing, supporting Composite Health Care System, Armed Forces Health Longitudinal Technology Application (AHLTA), Nationwide Health Information Network, and mobile health systems development by the MHS, industry, and academia. This research capability permitted development of the Patient Ancillary Web Services platform for network-enabled patient data retrieval and was used to demonstrate the ability to transfer a standardized medical record between agencies through the standard Federal Health Architecture gateway and agency adapter.

**AHLTA Print:** Provides the ability to print all or specific sections of the AHLTA Electronic Health Record for a patient within 3 to 5 minutes. The current print process takes several hours to complete this task. TATRC is working with the MHS to ensure all Information Assurance issues are addressed. This project already is estimated at saving the MHS PAD Office approximately \$5.5 million a year in providing patient records to the Social Security Administration for Wounded Warrior Claims alone.

**AHLTA Mobile Prime (AMP):** This prototype application provides real-time out-patient record consultation services through reading and writing to the enterprise AHLTA Clinical Data Repository. AMP supports the IOS device (iPhone or iPad) or Android Smartphone platform. The web services interface make it easy to incorporate the writeback capability into a variety of applications. Furthermore, the web services interface will provide a clinical domain-agnostic interface to the workflows.

Piloting the commercially available Clinical Looking Glass software at Walter Reed National Military Medical Center (WRNMMC) Medical Home to increase access to clinical data for quality assurance and comparative effectiveness studies, the publication of research studies, and the validation of research findings in military facilities with military data. The application, adapted to the MHS, has been used to support more than 20 studies and is currently being piloted in the WRNMMC Medical Home and shows value in improving quality of care for chronic care patients and in reducing costs associated with re-admissions.



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Using the existing Army Knowledge Online (AKO) secure e-mail system to establish the teleconsultation program that answers rapid consult requests by on-call specialists in more than 19 medical and 7 dental specialty services, with a total of 9,285 consults to theater serving more than 2,292 deployed provider users since its inception, and with referrals resulting in prevention of unnecessary evacuations and facilitation of appropriate evacuations. AKO teleconsultation services were extended to all NATO forces in 2008.

Developing mCare to connect injured warriors with their case workers at the Community Based Warrior Transition Units utilizing the Soldiers' personal cell phones for bi-directional HIPAA-compliant messaging managed by a central, secure web portal and system. The system has already been used to send more than 138,000 secure messages reminding patients of appointments and disseminate administrative, health, and wellness information and assisting case manager information management and real-time alerts for critical issues. mCare was recognized as one of the Army's Greatest Inventions of 2010.

Identifying and advancing a technology solution (the TEMPUS Pro) for point-of-injury medical monitoring and casualty data acquisition through downselection of candidate technologies in a Joint Capability Technology Demonstration and in subsequent field studies and network integration experiments, resulting in early technology adoption by SOCOM and the Marine Corps Warfighter Laboratory. The system generates a digital TCCC record of patient encounters, provides voice, physiological data, and still photo or video transmission for telementoring, and transmits medical information over secure tactical networks from forward deployed medics to supporting medical treatment facilities and ultimately to update AHLTA and Theater Medical Data Store.

Managing a multiyear funded effort to improve the Safety of Military Blood Products with the development of technology from Caridian/TerumoBCT –Pathogen Reduction Technology (PRT). The PRT technology also known as the Mirasol System™ reduces the risks in blood transfusion associated with bacteria, viruses, parasites, and white blood cells while retaining the blood characteristics associated with therapeutic efficacy. This technology is warranted due to the massive transfusions received by military patients and the global concern of emerging pathogens that could adversely affect the safety of the blood supply worldwide (e.g., the appearance of HIV in the 1980s). This technology has matured to the advanced development realm and currently includes collaborative efforts by TATRC, Congressionally Directed Medical Research Programs, U.S. Army Institute of Surgical Research, U.S. Army Medical Materiel Development Activity, and JPC-6.

Developing a family of high performance computing software applications for research on diagnostic assays and to identify drug and vaccine candidates, providing significant advantages in time and efficiency for military lab researchers with virtual screening for drug discovery, potentially reducing months or years of work to days. Some of these applications have been downloaded by more than 1,000 users in the biodefense research community.

Developing tools for DoD pharmacovigilance in collaboration with the FDA to use powerful data mining programs to identify drug associations with adverse events in the clinical data repository. These products are used by the newly established DoD Pharmacovigilance Center.

The *Web-Enabled Refractive Surgery Information System*, which captures refractive surgery clinical data to conduct outcome analysis. The system was developed by



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doctors for doctors to meet the business needs and clinical environment found at regional medical centers.

The *Joslin Vision Network* has developed a proven retinal imaging device and clinical service designed to prevent blindness and vision loss for people with diabetes.

*Teleconsultation/Teledermatology* facilitates delivery of medical treatment through information and telecommunication technologies. Teleneurosurgery consultation is conducted on a relatively routine basis between Afghanistan and Landstuhl Regional Medical Center in Germany.

The *Virgil Chest Tube Insertion Simulator* was one of the first chest trauma training systems for combat medics that employ realistic anatomy in a visually advanced training curriculum. Also a winner of the Army's Greatest Invention Award in 2003.

*Combat Medic Training System (COMETS)* is the world's first autonomous mannequin-based training system funded by TATRC and RAD II, and USAMRMC's first technology approved by ASAALT for licensing to a foreign company for sales worldwide. COMETS, now transitioned to CAE Healthcare and known as Caesar™, is one of the most realistic and physiologically advanced trauma patient simulators available. Caesar allows learners to develop critical thinking skills and core treatment modalities that are important in reducing morbidity and mortality in combat care.

The *Digital Information and Communications System* enables service members to establish communications (e.g., self-sufficient Internet and telephone coverage) in remote areas and provides local authorities with medical situational awareness and telemedicine services.

*Battlefield Medical Information System-Tactical* is a system for storing, inputting, and outputting patient medical data on a mobile or fixed computer platform.

**Q: Where can I find more information about TATRC?**

A: Further information about TATRC and its major portfolios is available online at [www.tatrc.org](http://www.tatrc.org) or call the TATRC Public Affairs Office at 301.619.7927.



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