A Team of Teams

The concept of a “team of teams,” as recently espoused by General Stanley McChrystal, is bringing the agility, adaptability, and cohesion characteristic of small teams to up to the enterprise level. A successful “team of teams” relies on networking and a shared awareness of the challenges being faced, regardless of how geographically and organizationally dispersed the constituent team components may be. The Range Commanders Council (RCC) exemplifies this shared awareness aspect of a “team of teams.” With expertise available from 100 member and associate member agencies and an informal interdependent organizational structure tailored to adapt to emerging challenges, our member ranges contribute to a shared awareness at the leadership, programmatic, and technical levels that has no equivalent elsewhere.

The following pages summarize some of the 2015 range contributions made by the RCC technical groups. Highlighted are two RCC efforts, one of which is ongoing, oriented towards mitigating the impact of energy development near ranges.

Anticipating Environmental Side Effects From Renewable Energy Development

Renewable Energy (RE) is widely recognized as essential for the continued prosperity of our nation, however, RE development projects located near testing and training ranges has the potential for unintended environmental consequences that could impact the range mission. The RCC’s Sustainability and Environmental Group (SEG) has developed a playbook entitled “Commander’s Guide – Anticipating Environmental Side Effects from Renewable Energy Development” to help enable range commanders, major commands, fleets, and their staffs to anticipate potential environmental side effects and offers a set of solutions for addressing those unintended and possibly unknown issues. Points to consider include defining the project’s area of influence, how to identify current and future exposure to risk from

Priorities for 2016

Sustaining on-site working group and technical meetings as member ranges face greatly reduced travel budgets.

Maintaining the RCC as the principal forum for dispensing technical guidance and best practices on range operations for DoD and NASA ranges.

Inclusion of service training ranges as full RCC members.

Minimizing the impact spectrum encroachment and frequency reallocation will impose on DoD and NASA ranges.

Continuing to partner with TRMC on projects that promote the development of common standards and common approaches towards encroachment mitigation at MRTFB installations.
environmental regulation, accessing the intersection between environmental concerns and renewable energy impacts, and available resources. This Commander’s guide is one of several produced by the RCC to address the emerging impact of environmental issues on test and training ranges.

Quantifying Risk to Public Energy Infrastructure

Encroachment, in various forms, remains one of the principal threats to mission conduct among DoD test and training ranges. An example would be the placement of high voltage power lines and other unoccupied infrastructure near areas being used for range activities. The RCC 321-10, Common Risk Standards for National Test Ranges, the most frequently cited source for range safety criterion, does not provide guidance for the protection of unoccupied public infrastructure. The RCC’s Range Safety Group (RSG) has teamed with the Test Resource Management Center (TRMC), Office of the Assistant Secretary of Defense for Energy Installations and Environment, and the DoD Siting Clearinghouse (SCH) to correct for this omission. The overall scope of the effort is to equip the RCC 320-10 with recommended analytical approaches and risk criteria that can be used to protect unoccupied public infrastructure, especially infrastructure associated with electrical transmission lines and nearby renewable energy generation systems.

Phase 1 of this two-phase effort was completed in 2015 in which a two-tiered methodology for protecting infrastructure was developed; a first tier to determine the type of protection to be afforded to the infrastructure (hazard containment versus risk management) and a second tier to assess potential damage resulting intrinsic (direct) versus extrinsic (connected) damage. Tolerable risk criteria depend upon the first tier assessments. A notional application of the Phase 1 methodology was applied to a wind turbine farm, based upon a scenario provided by the SCH.

The Phase 2 effort, which is currently ongoing, has the following goals:

1. Development of a risk level (level of protection) versus asset criticality (impact to public) matrix.
2. Identification of a threshold or range of damaging objects/energy must be identified to be used to calculate the probability of impact.
3. Support of the recommended criteria with technical justification, precedence with similar activities, or concurrence by RSG leadership.
4. Inclusion of recommended analytical techniques to perform the analysis and a list of available resources and tools.

These recommendations will be proposed for incorporation into the next RCC 321 update.

TECHNICAL GROUP ACTIVITIES

Data Sciences Group (DSG)

The DSG is engaged in advancing cybersecurity requirements in the Research Development Test and Evaluation (RDT&E) arena that are either not addressed or are otherwise inhibited by DoD-wide Risk Management Framework (RMF) requirements. The DSG efforts include an active presence in TRMC’s RDT&E Reciprocity Community Forum to develop cybersecurity guidance, information security
architecture requirements, and development of a standardized RDT&E overlay for range activities. The DSG’s Data Analysis and Display Committee (DADC) is teaming with the RCC’s Optical Systems Group (OSG) to establish a TrackEye working group. The DADC has responsibility of the Data Display Markup Language (DDML), which is part of the IRIG 106 Chapter 10 standard. The Data Management Committee is supporting the Knowledge Management initiative by TRMC for the Joint Strike Fighter program requiring "big data" analytics. The DMC is developing a T&E metadata model based upon range-provided data dictionaries. This may ultimately result in a future RCC standard.

**Electronic Trajectory Measurements Group (ETMG)**
The increased inter-service dialogue occurring as a result of the Range Radar Replacement Program delay has been actively fostered by the ETMG to facilitate a common understanding of performance requirements. Development of a data link system requirements compatible with Common Range Integrated Instrumentation System (CRIIS) is an ETMG objective for UAS, land vehicles, and marine vessels being used in extended areas of operations. As a result of system requirements changes, alternative solutions for fielding a GPS component to the CRIIS are being evaluated. The ETMG members are actively involved in Advanced Range Data System (ARDS) sustainment, including correcting the broken configuration management process and reducing the microplate into a smaller form factor. Refraction correction models. Members are involved in establishing the core functions of RADCAL using smaller satellite packages with enhanced capabilities. New for 2015 are tasks to document radar-based TSPI capabilities as well as refraction correction capabilities of MRTFB ranges.

**Frequency Management Group (FMG)**
The FMG continues to work with the DoD CIO and MILDEP Spectrum Management Offices on the implementation of activities to vacate the spectrum impacted by the Advanced Wireless Service 3 (AWS-3) auction. The group has completed an Aeronautical Mobile Telemetry (AMT) Receiver Site database and consolidated with the Aerospace Flight Test Radio Coordinating Council (AFTRCC) which provides a central repository for all DoD and Commercial AMT Receiver Site information; currently rewriting frequency management guidelines for test and training ranges, updating inter-range frequency deconfliction standards, and modernizing procedures for geo-locating radio frequency emitter signals on the range and surrounding areas of interest. Three new subcommittees have been established: Electronic Attack/Electronic Warfare, Enhanced Flight Termination and Unlicensed-National Information Infrastructure. The C-Band telemetry utilization to include iNET implementation, 1780 – 1850 MHz repurposing efforts will remain among the top issues being worked along with streamlining the frequency assignment processes that pass through multiple agencies. The FMG Electronic Attack/Electromagnetic Warfare Subcommittee is actively engaged with STRATCOM Space Operations Branch and FAA Spectrum Engineering Division to streamline the scheduling and mitigation process for conducting GPS test events on CONUS ranges. Because all UAVs over 40 lbs. are required to be equipped with Ku emitters for Command and Control, the FMG will be working with spectrum offices to draft a plan to reduce adjacent channel interference for presentation to Joint Staff, STRATCOM, and the National Telecommunications Information Administration.

**Meteorology Group (MG)**
The National Oceanic and Atmospheric Administration (NOAA) will launch the next generation Geostationary Operational Environmental Satellites (GOES-R) in the coming year (NOAA is an RCC associate member). GOES-R satellites will provide significant improvements over the legacy GOES satellites to including advanced imagery, solar data, and Global Lightning Mapper (GLM). Ranges will now have access to solar data directly via the spacecraft. National Weather Service, Evaluation Branch, Sterling
Field Support Center (SFSC), an associate member, is actively involved in the evaluation of meteorological sensors identical to those utilized at DoD ranges. Recent SFSC activities include Ceilometer Atmospheric Profiling Project partnerships with DPG, WSMR, and YPG and a Multi-Thermistor Radiosonde Assessment used by both 30th SW and 45th SW launch support systems.

**Optical Systems Group (OSG)**
The OSG Software Committee is creating a library of common software that could be shared between OSG ranges. TRMC has agreed to host an online repository for the software. The underlying assumption of linearity in new Pixel-Level Photon Transfer (PLPT) camera characterization methods is questionable and the OSG will conduct research towards adapting PLPT methods to range instrumentation cameras which may exhibit a nonlinear response characteristic.

**Range Operations Group (ROG)**
The ROG has become the lead RCC element in developing best practices guidance for the testing of small unmanned aerial systems. The ROG is working with the Range Safety Group (RSG) to update the *Range Safety Criteria for Unmanned Air Vehicles* (RCC 323-99) standard. The new version will modernize the methodology of how the ranges determine whether the system is safe to fly and what safety mechanisms are in place to allow test and training to occur and how the various classes of UAS’ integrate with airspace and common operator picture/radar feeds. The ROG is seeking how to best adapt airspace to the increased demands of 5th Generation aircraft and associated weapons delivery challenge.

**Range Safety Group (RSG)**
Phase 1 of an initiative to quantify infrastructure risk was completed utilizing funding contributions from the TRMC and the Office of the Assistant Secretary of Defense for Energy Installations and Environment; development of risk levels, damage thresholds, and other metrics comprise ongoing Phase 2 efforts to be completed in FY16. The RSG members are assessing acceptance processes for autonomous flight safety systems to ensure range safety requirements will be met. A taxonomy was developed for UAV mishaps. Several recent launch failures were examined to determine the correlation between debris disbursement and the disbursement predicted from the range safety models in use at the time of failure.

**Sustainability and Environmental Group (SEG)**
The SEG members are participating as beta testers for High-voltage Electromagnetic Modeling tools being developed to anticipate the impacts of high-voltage transmission lines, including possible concomitant radio frequency inference. The SEG is aiding TRMC with their range review process to combat the effects of encroachment upon open air ranges. Best practices for programmatic environmental assessments supporting recurring test events as well as National Environmental Protection Act (NEPA) preparation are principal topics of inter-range discussion.

**Telemetry Group (TG)**
The TG has been actively involved in range efforts related to the Spectrum Reallocation Fund, including sharing cross-range expertise in evaluating impacts to aeronautical telemetry infrastructure. This group is also involved in the assessment of preliminary test results from the recently completed iNET Developmental Flight Test. The TG’s four subcommittees were uniformly busy in 2015 having made substantial advancements in updating Telemetry Attributes Transfer Standards, promulgation of STANAG updates to member ranges, establishing new standards for data quality metrics and encapsulation, and updating best practices for recorder validation.
Timing and Telecommunications Group (TTG)
A new effort to update standards for connectivity between microwave links, leased lines, the Defense Research Engineering Network (DREN) utilization, and satellite channels has been undertaken (the TTG had done similar work in 2009). A catalog of Command Systems for mission control is also being developed. Updates to Range Timing Architectures have been completed as well as a Video over IP Guide. Error corrections for the IRIG Standard 200-04 Serial Time Code have been developed and are currently in the process of further refinement.

Underwater Systems Group (USG)
USG representatives are actively supporting the Naval Seafloor Cable Protection Office including facilitating Federal Communications Commission applications for landing licenses. Other initiatives supported include testing of hydrokinetic devices, Ocean Systems Support Activity projects, underwater forensic data collection, development of deployable seismic and hydro-acoustic systems, and various types of landing craft evaluations. Portable Underwater Tracking Range activities are also being supported including development of replacement transponders. Discussion of mooring failures for mine surrogates may result in development of a best practices mooring standard. Collaboration on parallel portable range concepts is being considered as a means for cost savings and standardization of practices.

Digest of FY15 RCC Products

Number of Technical Standards Published: 7

106-15 Telemetry Standard (Part 1)
124-15 Telemetry Attributes Transfer Standards (TMATS) Handbook
125-15 XML Style Guide
179-15 Knowledge Management Assessment
217-14 Range Timing Architecture Handbook
466-15 Airborne Network Camera Standard
467-14 Procedures for Characterizing the Imaging Performance of High-Speed Focal Plane Arrays

Number of Special Reports Published: 2

Commander’s Guide – Anticipating Environmental Side Effects from Renewable Energy Development

Metadata Description Language for Integration Plan for IRIG 106

Cost Avoidance/Savings (CY15): $56,666,500
Cumulative Cost Avoidance/Savings (since 1991): $611,777,811
Army
Aberdeen Test Center
Dugway Proving Ground
Reagan Test Site
White Sands Missile Range
Yuma Proving Ground

Navy
NAVAIR Atlantic Ranges (Patuxent River)
NAVAIR Pacific Ranges (Point Mugu/China Lake)
Naval Undersea Warfare Center Division, Keyport
Naval Undersea Warfare Center Division, Newport
Pacific Missile Range Facility

Air Force
30th Space Wing (Vandenberg, AFB, CA)
45th Space Wing (Patrick AFB, FL)
96th Test Wing, (Eglin AFB, FL)
412th Test Wing (Edwards AFB, CA)
Arnold Engineering Development Complex

Non-DoD
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