THE DISPATCH

Volume 2, Issue 3 | Defense Threat Reduction Information Analysis Center | October 2012

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Program Manager's Corner

I am pleased to announce that by mid-October DTRIAC STARS-U users will see the first version release of Next Gen STARS. STARS users will see a significantly different tool compared to what they see today when they log on to the system and we hope it will dramatically improve your online interaction with the DTRIAC collection. We of course welcome feedback on the system so that we may incorporate your inputs and ideas as we develop future improvements in our spiral development efforts.

This past July DTRIAC, in conjunction with the Defense Technical Information Center (DTIC) and Google, hosted its second Information Exchange Series presentation. The presentation and subsequent Q&A, was very helpful in allowing the DTRIAC to explain the benefits of one of its key initiatives; database federation. In early 2013, the Next Gen STARS schedule will allow STARS-C users to search the DTIC database at the same time it searches the DTRIAC database.

I hope you find this issue of the Dispatch highlighting some of the activity tied to the DoD Nuclear Weapons Effects User Group informative. Please contact me directly if you ever have any questions or comments related to the DTRIAC. craig.hess@dtra.mil or (505) 846-2071.

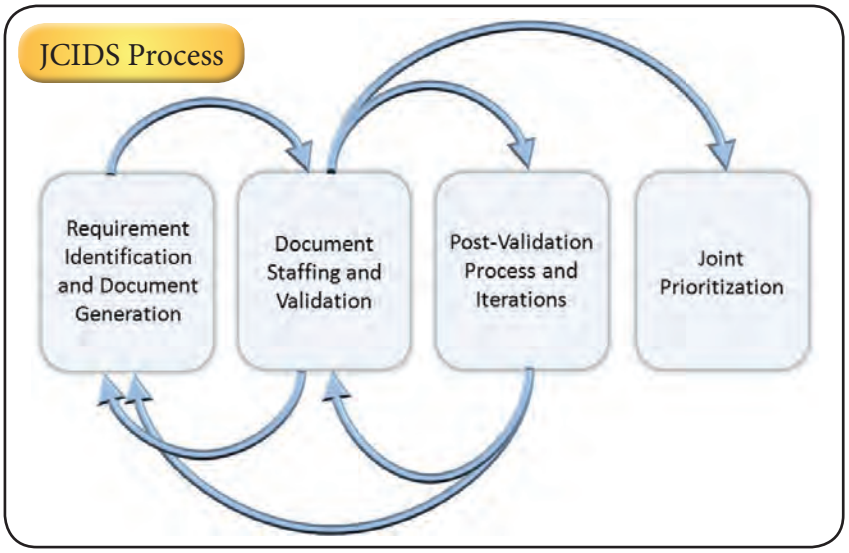
Thanks,
Lt Col Craig Hess
DTRIAC Program Manager

LRSO and DTRIAC's Role in System-of-Systems Engineering

Air-Launched Cruise Missile (ALCM)
Image Courtesy of globalsecurity.org

Across the street and down the block from DTRIAC, the Air Force Nuclear Weapons Center (AFNWC) is planning the development of a new $1.3 billion weapon system to replace the air-launched cruise missile (ALCM). ALCM is an autonomous, subsonic aerial vehicle with an integral warhead used aboard the Air Force's bomber aircraft. Designed to carry large warheads over long distances with high accuracy, systems like ALCM remove the need for launch platforms to penetrate enemy airspace, dilute an enemy's forces, and complicate defense of its territory. Under current plans, the Air Force will continue work on an analysis of alternatives (AoA) that weighs various technological options for a new missile, called the Long-Range Standoff (LRSO) weapon.

The nature of changing threats since the end of the Cold War has transformed the Department of Defense (DoD) acquisition strategy from threat-based acquisition to capabilities-based acquisition. This transformation drives the need for joint capabilities to support joint operations. As a national asset, a national strategy, and a national policy, nuclear deterrence must be a joint endeavor. LRSO is one of the Air Force's first forays of a nuclear-specific weapon system into the Joint Capabilities Integration and Development System (JCIDS) process. Capabilities-based solutions frequently involve multiple interoperating systems and combine materiel and non-materiel aspects. LRSO will most certainly be composed of existing and new systems and therefore will also feature integration and interoperability as key objectives.



In parallel, the improvements implemented in acquiring new defense capabilities created the system-of-systems (SoS) approach. A relatively current (2007) OSD-sponsored research project performed by the Office of the Under Secretary of Defense for Acquisition, Technology, and Logistics (OUSD[AT&L]) describes the research discipline of SoS.

- Individual systems are usually owned by the military services or agencies
- Current systems will be part of the long-term defense inventory and need to be factored into any capability solution
- Changing threats and concepts drive new (sometimes ad hoc) configurations of systems to address shifting needs
- Each element of a capability must integrate with other related capabilities and possibly an entire enterprise or enterprise architectures (e.g., nuclear command, control, and communications [C3])
- Systems will simultaneously be associated with a functional portfolio as well as one or more cross-portfolio mission capabilities (e.g., nuclear strike or global strike)

The SoS description is remarkably relevant, considering that LRSO will be a nuclear weapon system. Capability needs will be satisfied by groupings of legacy systems, new programs, and technology in a SoS approach.

LRSO and DTRIAC's Role in System-of-Systems Engineering *(continued)*

DoD can capitalize on DTRIAC's unique attributes to help streamline acquisition projects like LRSO. These attributes include:

- The depth and breadth of its archives
  - o A large and diverse physical collection from sources such as the services, DoD, and DOE National Laboratories
  - o A large digital collection
  - o The extensive time frame covered by the archives (the dawn of the nuclear era to present day)
- Its organization (the collection is searchable by specific delivery platform, weapon, etc.)
- Its ability to integrate information and perform technical analyses (reports, phenomena, or effects taken in context; for example, electromagnetic pulse [EMP] studies on airframes or transient radiation effects in electronics [TREE])
- Its focused relevance (nuclear and nuclear-related science and technology)

Using DTRIAC's extensive resources, the services (the Air Force in this case) can develop new technologies to eliminate shortfalls in the existing nuclear infrastructure and inventory.

Consistent with JCIDS, the Air Force is conducting the LRSO AoA as part of its pre-milestone A (i.e., Materiel Solution Analysis phase) activities. The AoA will define platform requirements, provide cost-sensitive comparisons, validate threats, establish measures of effectiveness, and assess candidate systems for eventual procurement and production.

To do this, the AoA will perform necessary SoS research, and the two processes will complement each other. DTRIAC will be the enabler by providing:

- historical information (e.g., photos, dimensions, schematics, and data on internal components) for baseline knowledge and comparative purposes;
- threat information, the possible effects of those threats, and the ability to perform scientific and technical analyses to understand those threats (e.g., directed energy or radiation effects on a guidance system);
- requirements information, legacy or postulated (e.g., military characteristics and stockpile-to-target sequence); and
- capabilities and integration information (e.g., range, accuracy, and C3 architecture).

DTRIAC products will provide the framework of existing knowledge and information and set the standard for future knowledge and information for systems being acquired.

DTRIAC plays a pivotal role in acquisition activities by providing information, products, and services for DoD organizations as they perform studies and analyses for, make informed decisions about, and explore the trade space involving new weapons or weapon systems according to the SoS approach and DoD's JCIDS process.

Finding Aircraft Survivability Information

The April 2012 Defense Nuclear User Group conference hosted by the United States Army Nuclear and Combating Weapons of Mass Destruction Agency (USANCA) demonstrated the continuing requirement across the Department of Defense (DoD) for information regarding nuclear weapons and related matters. The questions facing policy makers, warfighters, and the acquisition community have evolved from the Cold War era, but the need for understanding nuclear weapon phenomenology and effects on personnel and equipment endures. In fact, the type and fidelity of the data to answer emerging questions from hard target defeat to detonation of an improvised device in an urban area are increasing.

DTRIAC represents DTRA and its predecessor organizations' institutional memory to include a vast collection of data and reports related to nuclear weapons effects. The challenge for researchers accessing the collection is to search and identify relevant data sets organized around today's research requirements. This article illustrates the difficulty of locating specific reports without knowing the desired report title and offers expert strategies used by the DTRIAC staff to support searching the DTRIAC collection.

Finding Aircraft Survivability Information *(continued)*

The question of aircraft survivability remains a topic of interest in modern area and is an example of the challenge in narrowing a user search to germane documents. The following set of returns illustrates the importance of understanding the database and how refining the search can expand or narrow a search.

Search Query	Number of Hits in STARS
Aircraft and Survivability	271
Aircraft Survivability	200
Aircraft adj1 Survivability	30

In the first search strategy (placing the word "and" between the terms), the two terms in the query may be anywhere within the metadata of the document's STARS record. In the second search strategy, both words must be within the same field, such as the title, abstract, or keywords. The third search strategy (placing "adj1" between the terms) searches for instances where the word "survivability" is immediately adjacent to the word "aircraft." Placing "Adj2" between the terms would return results where the word "survivability" is within two words of "aircraft"; "Adj3" returns "survivability" within three words of "aircraft," etc.

Another way to search for survivability is to look at the problem from the opposite direction—in order to survive, aircraft vulnerabilities must be minimized. Searching for "aircraft and vulnerability" provides 1,462 hits. This is primarily due to the origins of DTRIAC collection being in nuclear weapon effects; aircraft are very vulnerable to these effects.

Other Possible Search Terms

Searching on specific threats such as airblast, thermal radiation, or prompt provides other records that may be of interest to the researcher. These threats are again primarily from nuclear weapons. Over the years, the military has looked at other threats to aircraft survivability besides nuclear weapons. DTRIAC has records related to aircraft survivability on high-energy lasers, dust, directed energy, high-power microwaves (HPM), and particle beams.

If the researcher is interested in a specific aircraft, that search term should be used. A quick search in the collection finds many types of aircraft: B-1, B-52, F/A-18, KC-135, F-15, F-4, F-111, F-111A, as well as naval aircraft. If subsystems are of interest, the researcher should look for that subsystem and perhaps "failure mode," "failure rates," or maybe just "damage."

Remember that combining the search terms with the Boolean operator "and" will help refine your search results.

Corporate Authors

Most US aircraft were built by just a few companies and a search by author can provide many results. By putting "Boeing" in the author field of the STARS Advanced Search feature provides the researcher with 2,644 hits. Other corporate authors to try would be McDonnell Douglas and Kaman Avidyne.

Finding Aircraft Survivability Information *(continued)*

Codes

Several computer codes are related to aircraft survivability.

- SLICE: provides a nuclear vulnerability envelop of stationary or moving targets
- NOVA: Nuclear Overpressure Vulnerability Analysis
- ADINA: Automatic Dynamic Incremental Nonlinear Analysis looks at aircraft structural survivability/ vulnerability.
- LVAC: Laser Vulnerability Assessment Code looks at lasers on fuel tankage systems
- TRAP: Thermal Response Analysis Program looks at response of aircraft to thermal radiation

Most of these codes were developed years ago and are in programming languages that are not Windows based.

The Air Force Nuclear Weapons Center is updating the Nuclear Hardness Database System that calculates safe escape for aircraft. Should you be interested in that information, please contact Cynthia Herrera at 505-853-4938, Cynthia.herrera@kirtland.af.mil.

If you still cannot find what you need, the helpful staff at DTRIAC can always assist you with your research. Please contact them at dtriac@dtra.mil.

Data Analytics

Powerful enterprise search engines like Solr Lucene and Google Search Appliance have made indexing and search of disparate information assets located across an organization or agency possible. Providing an easy interface to discover and retrieve organizational information assets increases the value of each piece of data.

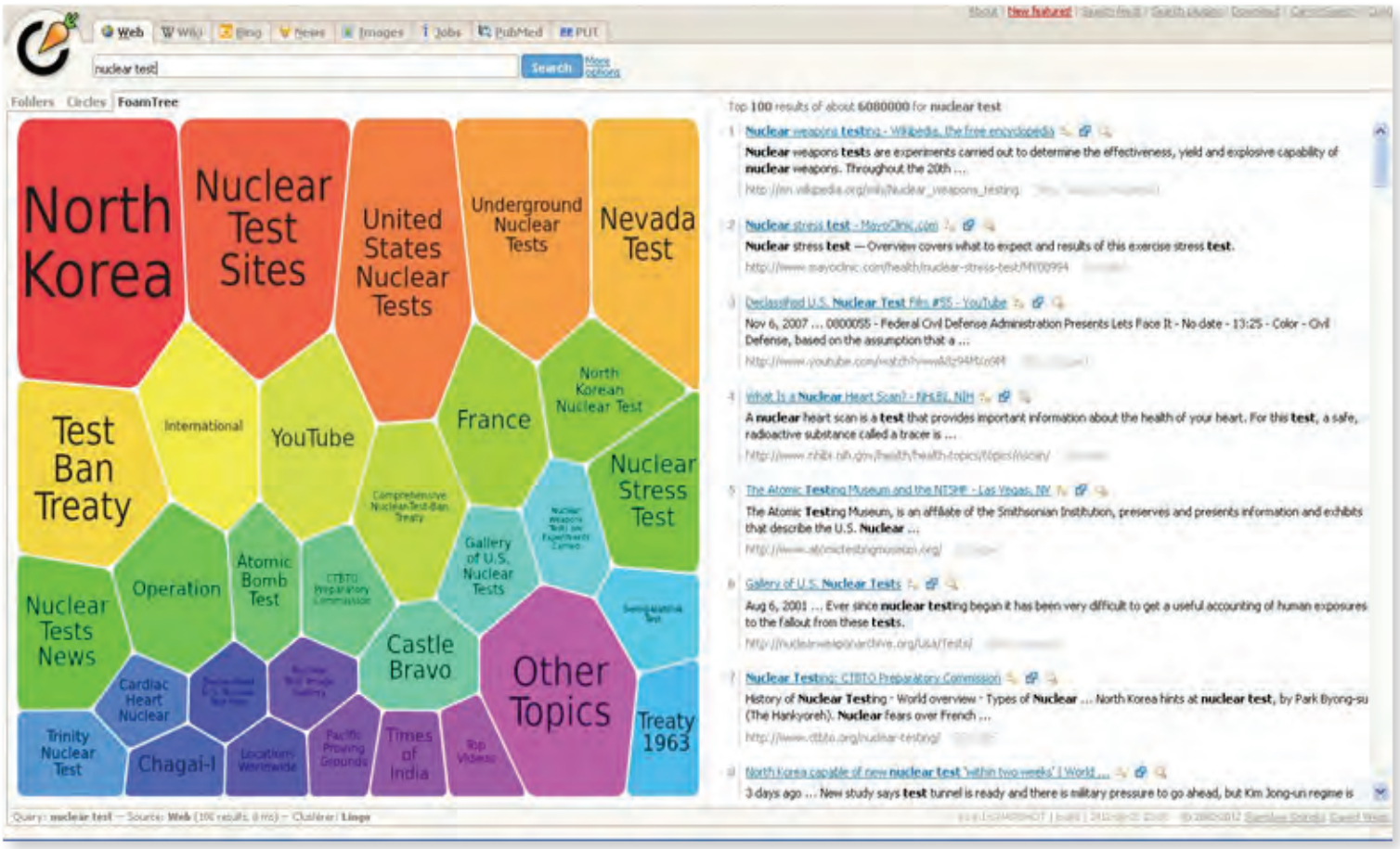
The next logical step, once search and retrieval is conquered, is to analyze the data as a whole to comprehend the information assets as a collection of knowledge that can benefit the organization, most often in the decision making process.

Data analysis comes in many forms: data mining, text analytics, data visualization, and descriptive statistics. Each has different approaches and solves different problems. The term data analysis is sometimes used as a synonym for data modeling, where a specific definition and format is applied, based on our domain of interest (such as finance, business development, or customer service) to structured and unstructured data in order to better understand it.

In Next Generation STARS, we've added the capability to create a descriptive visualization of the DTRIAC library collection. The "Heat Map" is a physics-inspired map to increase understanding and analysis of hierarchical data such as groups of documents, network domains, etc. It is a visualization that allows an immediate view of the entire DTRIAC library collection (if no search terms are applied) or of particular search results.

Data Analytics *(continued)*

Figure below shows an Internet search on "nuclear test."



Search results clustering is a technique of post-processing of search results that aims to group them into thematically related categories.

For example, when clustering web search results for the "apache" query, one will likely see groups related to the Apache Software Foundation and Apache Web Server as well as groups about Apache County, Apache Indians, or the Apache attack helicopter.

The NextGen STARS search results clustering is based on an open source document clustering engine. The engine offers specialized search results, clustering algorithms that emphasize the quality of cluster labels.

After the initial Heat Map feature is released in Next Gen STARS, the clustering algorithm will be trained in the following several months to create cluster labels that reflect the vocabulary of the STARS end users based on user feedback.

In a future release of Next Gen STARS, multiple clustering algorithms will be applied to show both the automated clustering and the results of applying the Effects Manual taxonomy to the DTRIAC Collection.

STARS
STi Archival and Retrieval System

Ask the IAC

How Do I Set Up a DTRIAC TAT?

Information Analysis Centers (IACs) are established with the explicit intent to perform additional tasks within their areas of expertise and technical focus beyond the basic core activity. These additional tasks are called technical area tasks (TATs), and the requesting organization normally provides the funds necessary to perform the task. DTRIAC provides the Department of Defense and Defense Threat Reduction Agency (DTRA) with a mechanism for securing work to meet research and analysis requirements as they relate to reducing the threat of weapons of mass destruction (WMD).

Fields of Interests for TATs

DTRIAC provides DTRA with scientific and technical information analysis support across all DTRA mission areas. TATs must utilize the DTRIAC collection or augment a core function. They generally include studies, analyses, assembly of data collections, and development of tools and techniques for the collection and analysis of data as well as other unique scientific and technical activities.

DTRA's mission is to safeguard America and its interests from weapons of mass destruction (chemical, biological, radiological, nuclear, and high explosives) by reducing the threat and providing quality tools and services.

Guidelines for Processing TATs

To establish a TAT, a delivery order or task order must be added to the DTRIAC contract, which is an Indefinite Duration/ Indefinite Quantity (ID/IQ) contract. The delivery order must include the statement of work (SOW) within the DTRIAC mission areas, deliverables, periods of performance (POPs), and funding levels.

DTRIAC's COR can guide personnel through this process. He can be contacted at 505-846-0554.

Early Strategy Session (ESS)

DTRA holds early strategy sessions (ESSs) to determine what contract vehicle is appropriate for the work in question. DTRA has an ESS form that is completed prior to the meeting and is the outline for the discussions. TATs requested by external customers have the ESS set up by the DTRIAC Contracting Officer's Representative (COR).

Once the ESS determines that DTRIAC is the appropriate contract vehicle, the government person requesting a TAT completes an SOW, an Independent Government Cost Evaluation (IGCE), creates deliverables (DD Form 1423) and submits funding. The DTRA contracting office will then request a technical and cost proposal from the contractor and subsequently the government requester will then evaluate the proposals. Finally, the DTRA contracts office creates a contract modification to place the work on contract.

Why Choose a DTRIAC TAT?

- Structure is well established within DTRA and recognized throughout DoD
- Statement of Work (SOW) provides for wide range of research and development (R&D) tasks to support reduction of WMD
- Multiple subcontractors can be added to help meet contracting goals for small, disadvantaged, and minority-owned businesses.
- All funding appropriations are applicable for contract award and can be used for the contract period of performance.
- Any STI developed is captured by DTRIAC and available to the DoD and government
- The TATs are part of a multiyear R&D contract vehicle
- Users can leverage the DTRIAC databases, reports, and inquiry support

DTRIAC Data Helps Satisfy User Requirements

Within DoD, there is no shortage of issues facing the combating weapons of mass destruction (CWMD) community of interest (COI) when it comes to dealing with nuclear weapon effects. From OSD to service components to USSTRATCOM, these organizations play a prominent role in examining a variety of WMD scenarios and preventing or responding to a number of situations involving nuclear weapons effects. With the current moratorium on nuclear testing, the CWMD COI is dependent upon access to data generated from over 50 years of testing.

Understanding nuclear weapons effects is absolutely essential in many areas, such as targeting support, consequences of execution, test monitoring, and treaty verification. Second-and third-order effects resulting from a thermonuclear blast or the detonation of an improvised nuclear device have also taken on increased significance in the post-Cold War era; questions regarding systems survivability, hosted payloads on satellites, and system life extension programs top the list.

CBRNE analysts and responders need information on effects in urban environments. Given the proliferation of nuclear materials information, nuclear forensics and attribution are also very significant topics for homeland security and threat reduction. By understanding phenomenology and applying the data, the CWMD COI can answer many questions.

Each of these mission areas can benefit from the volumes of information (from test reports to raw data) contained within DTRIAC. Having served as the information repository for the Defense Nuclear Agency and its predecessor organizations since 1961, the DTRIAC collection is more comprehensive than any other nuclear and radiological information collection in the world.

Six million pages of online scientific and technical information provide DTRIAC customers with information essential to tackling a host of problem sets, including source region electromagnetic pulse (SREMP), cratering and ground shock, fireball and dust cloud rise, EMP coupling and margins on COTS components in mission-critical systems, prompt radiation, cold x-rays, and trapped radiation belts.

These six million pages are the digitized portion of the collection and represent only a fraction of the overall DTRIAC collection. Another 12,000 cubic feet of documents and reports remain in the queue to be cataloged and subsequently scanned on demand.

If you feel DTRIAC may be able to help your organization meet any requirements related to nuclear weapons effects, please do not hesitate to contact us.

DTRA Sponsors DoD Nuclear Weapons Effects Users Group

The Department of Defense nuclear weapon effects community traditionally spans five mission areas: survivability, targeting support/consequences of execution, response/recovery, treaty monitoring/verification and forensics. For this reason, it is important to look across the entire community to collaborate and possibly fund projects to meet these users' needs.

In April, DTRA J9, and the U.S. Army Nuclear and Combating WMD Agency (USANCA) put this notion to practice by hosting the first-ever Department of Defense Nuclear Weapon Effects Users Group (DNUG), attended by more than 250 personnel from United States Strategic Command, National Nuclear Security Administration, DoD services and agencies, and Department of Energy. The 2012 DNUG was designed to highlight the research and development needs of a wide spectrum of DoD organizations in nuclear weapons effects and to expose existing and potential new capabilities for meeting those needs.

During the 2012 DNUG, customers and sponsors from across DoD stated their users' needs, including those stemming from numerous planning efforts to sustain or replace the nuclear triad, and performers in industry, academia, and the national laboratories had the opportunity to describe their capabilities for meeting those needs.

In addition to DTRA and USANCA, The Defense Intelligence Agency and Air Force Technical Applications Center supported the collaborative planning and execution of the meeting. All of these organizations, as well as United States Strategic Command; Navy Strategic Systems Programs; Air Force Nuclear Weapons Center; Air Force Space and Missiles Center; Missile Defense Agency; Office of the Under Secretary of Defense for Policy; and Office of the Assistant Secretary of Defense for Nuclear, Chemical and Biological Defense Programs presented user needs during the meeting.

Of the event, DTRA Chief, Nuclear Effects, J9-Nuclear Technologies Mark Sward said, "We were overwhelmed with the response from the user community, and look forward to larger and deeper user participation at next year's DNUG."

As follow-up, DTRA J9-Nuclear Technologies will summarize the expressed user needs in an actionable format and will initiate follow-up contacts throughout the coming year to assess progress towards meeting those needs, especially through interagency collaboration.

Nuclear Phenomenology with a System-of-Systems Approach

The best way to understand how DTRIAC and the tools available through DTRIAC support a system-of-systems approach is to discuss a recent example.

B-52H
U.S. Air Force Photo
www.af.mil (981209-F-4190S-002.jpg)

The USAF was conducting an analysis of alternatives (AoA) for the B-52H Strategic Radar Replacement (SR2) Program. One of the many items included in the SR2 AoA was to understand the effects of nuclear environments upon the B-52H and therefore upon any major aircraft system such as the radar.

The B-52H nuclear mission begins with an aircraft on alert status at an Air Force base in the continental United States (CONUS). The aircraft is loaded with a mission-specific nuclear payload (possibly a combination of combination of stand-off weapons and bombs) and is parked at one end of the runway. The flight crew remains in a nearby building. Upon scramble notification, the B-52H has a set amount of time to become airborne and reach a specified distance from the air base. During this period (referred to as "base escape") the aircraft may be subjected to nearby detonations from enemy nuclear weapons. Then the B-52H will conduct a CONUS exit, refueling from available KC-135R aircraft. During CONUS exit, the B-52H may traverse close to radioactive debris clouds from various detonations. Eventually, the B-52H will receive its "Go" confirmation and penetrate enemy airspace During which it will be exposed to the nuclear environments from nuclear-tipped surface-to-air missiles, radioactive debris clouds, and its own gravity bomb detonations. Then the B-52H will return to a specially designated long-term recovery base to await its next mission.

There were no original nuclear hardness or survivability specifications for the B-52H, but there was a derived specification listed in Boeing's B-52H Modification Planning Guide (MPG). The USAF AoA support team reached out through DTRIAC to find the subject matter experts (SMEs), the historical documentation, and the tools necessary to justify the specification levels listed in the MPG. Exelis Inc. (then ITT) personnel who had worked on upgrades to the B-52H to support its role as a cruise missile carrier and who also supported the design and assessment of the B-2A were called upon to assist the AoA team in understanding the effects of nuclear environments and how effects impact the mission capability of a bomber.

Exelis reviewed the MPG; contacted contributors from the B-52H System Program Office, Air Force Global Strike Command, United States Strategic Command, DTRA, Boeing, and the Department of Energy; and convened a meeting at the Air Force Nuclear Weapon Center (AFNWC). After participants confirmed the mission capability of the B-52H was expected to remain the same with the new radar system, the team gathered extensive historical documentation from the DTRIAC archives. The documents detailed the testing of the B-52 (C and D models) to the effects of nuclear detonation in free air nuclear environments as well as in Defense Nuclear Agency and United States Air Force supported nuclear simulations (high energy, shock tube, and various thermal flash facilities). From these data, the SMEs were able to ascertain the current capability of the B-52H to survive the nuclear detonation effects of electromagnetic pulse (EMP), thermal flash, overpressure, gust, and radiation. The EMP requirements are separately covered by various military standards for integrate electromagnetic effects (IEE). The SMEs were then required to justify the overpressure, gust, thermal flash, and nuclear radiation environment requirements. Knowledge of the design specifications for the B-1A and the B-2A aircraft combined with the MPG specifications enabled SMEs to use the AFNWC calculational tools that are distributed through DTRIAC. The SMEs conducted a parametric assessment of the B-52H throughout its mission profile and thereby supported a conclusion that the MPG specifications were sufficient for the overall B-52H and all of its systems.

Using the calculational tools, the SMEs could evaluate the effects of the nuclear detonations during base escape scenarios and evaluate the levels of radiation to which the B-52H will be exposed during CONUS exit. Using these ascertained levels, the B-52H can be evaluated for its susceptibility during penetration to its targets.

Nuclear Phenomenology with a System-of-Systems Approach *(continued)*

This parametric assessment confirms the reasons behind the various MPG-specified nuclear environment levels. The delicate balance of overpressure, gust and thermal flash environments becomes obvious. One can determine the diminishing returns of a barrage of nuclear weapons on the base as well as determine the cost effectiveness of the selected specification levels.

Similarly, the parametric assessment reveals a delicate balance between aircrew performance and avionics performance when exposed to the initial nuclear radiation levels. This information supports SMEs assessment of MPG specification levels for prompt nuclear radiation hardness and uses that level of hardness to evaluate the susceptibility of the B-52H to further radiation exposure during penetration.

The assessment of the B-52H-carried nuclear gravity bombs (at all combinations of yields and height of bursts) must be balanced to the inherent capability of the B-52H structure. Finally, the statistically calculated levels of long-term radiation at or near the various recovery bases provides a basis for arriving at a cost-effective specification for total radiation dose on the B-52H electronics.

Without the historical documentation preserved in the DTRIAC archives and the utilization of calculational tools, which have undergone rigorous validation and verification, it would not have been feasible to ascertain a level of nuclear environments to which the current B-52H and its new systems should be required to survive. In performing this assessment, the SMEs were able to both justify the stated specifications in the MPG and compare the hardness of the B-52H to the levels required for the B-2A bomber.

This same level of data gathering and extensive calculations can and will be used in the assessment of Long-Range Standoff (LSRO) weapons and in the evolution of a specification for the next generation Long-Range Strike Aircraft (LRSA). The LSRO will be carried by current and future aircraft and must survive similar nuclear environment levels for base escape, CONUS exit, and penetration to target. Once released from its carrier aircraft, the LSRO must survive penetration as well as the potential fratricide environments from other nearby LSRO detonations. The LRSA will have similar requirements as those levied on the B-52H and the B-2A, and an AoA must be supported using the same methodology to justify the LSRA nuclear specification levels.

Both DTRIAC and AFNWC support the data gathering and calculational efforts necessary during a system-of-systems assessment.

DTRIAC Collection Additions

DTRA Technical Reports

DTRA-TR-04-32, Omnibus Nuclear Assessment Tools Development

DTRA-TR-09-25, The Morning After

DTRA-TR-10-46, Thermal History Using Microparticle Trap Luminescence

DTRA-TR-10-48, Combined Injury Modeling: Radiation and Burn Workshop Report

DTRA-TR-10-67, Fundamental Particle Combustion Kinetics Measurement in the Shock Tube in Support of Enhanced Blast Weapons Development

DTRA-TR-10-69, Solid State Recrystallization of Single Crystal Ce:LSO Scintillator Crystals for High Resolution Detectors

DTRA-TR-10-70, Composite-Nanoparticles Thermal History Sensor

DTRA-TR-11-2, Development of Enzyme-Containing Functional Nanoparticles

DTRA Internal Reports

DTRA-IR-12-28, Demonstration to Counter Nuclear Smuggling in the Black Sea Region (Demonstration Plan, Process, and Integrated Master Schedule)

DTRA-IR-12-29, Strategy to Counter Nuclear Smuggling in the Black Sea Region: Foundation for a Regional Concept of Operations (CONOPS)

DTRA Small Business Innovation Research

Development of Photoconductive Semiconductor Switch

This Quarter in History

July 26, 1956
The Intercontinental Ballistic Missile (ICBM) Program is started by the Strategic Air Command (SAC).

August 29, 1949
The USSR tests their first atomic bomb, RDS-1. The bomb had a yield of 22 kt and was an implosion bomb—nearly an exact copy of Fat Man (detonated over Nagasaki in 1945). The test surprised and alarmed the United States and spurred the Cold War arms race.

September 19, 1957
The first underground nuclear test, RANIER, was conducted at the Nevada Test Site.

September 30, 1998
The Defense Special Weapons Agency (DSWA) merged with other elements to form the Defense Threat Reduction Agency (DTRA).