
# COMPANY REPORT

TWENTY TWELVE

# FROM FIELD TO LAB

## Who We Are

Riverside Research is a not-for-profit organization composed of leading engineering and technology experts. We reliably achieve our sponsors' goals by making their mission our mission, by providing exceptional scientific expertise and trusted solutions, by advancing science and innovation, and by consistently delivering value.


RIVERSIDE RESEARCH
Technical Excellence. Trusted Solutions.

# Investing in Our Greatest Asset

At Riverside Research, we strongly believe that our highly specialized staff is what sets us apart as a trusted solutions provider. We have established an atmosphere that attracts and retains the best and the brightest by continually investing in our people through relevant, mission-focused professional development initiatives. In 2012, we continued our investment by endorsing the pursuit of professional credentials from the International Council on Systems Engineering (INCOSE) and the Project Management Institute (PMI). Several employees, including those pictured above, earned certification from these internationally recognized associations.

Front Row: INCOSE certifications were awarded to (left to right) **Jose Astudillo**, Associates Systems Engineering Professional (ASEP); **Emily Bell**, Certified Systems Engineering Professional and DOD Acquisition (CSEP+ACQ); **Mark Robertson**, CSEP; and **Clement White**, ASEP (not pictured).

Back Row: PMI credentials were awarded to (left to right) **John Ross**, Project Management Professional (PMP); **Ed Waldspurger**, PMP; **Kevin Culli**, PMP; and **Shawn Kitchin**, PMP (not pictured).

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# Letter from the President

## Dear Colleagues and Friends of Riverside Research:

As an independent, not-for-profit organization, our success is linked directly to that of our customers. Simply put, their mission is our mission. Our success is not determined by profit, but the extent to which our expert staff and innovative research labs advance science and technology on behalf of our government sponsors. With this in mind, I am pleased to report that 2012 was a solid year despite an increasingly challenging business environment.

We take great pride in being a trusted solutions provider to the Intelligence Community, the Department of Defense, and the Department of Health and Human Services. Regardless of economic constraints, budget cuts, or any other external factor, our commitment to the organizations that comprise and serve these distinguished communities remains strong.

It is our dedication—our unwavering commitment to service—and our culture of unbiased technical excellence that makes Riverside Research a trusted mission partner to the United States government and a growing presence in the national security and intelligence sectors.

When I joined the company in 2002, Riverside Research employed 179 people. Since then, the company has maintained an average year-on-year growth rate of 13% in revenue and 10% in manpower, culminating in 2012 with more than 530 employees and nearly $100M in revenue. I proudly attribute this steady growth to the technical strength of our people, the vision of our leadership team, and our unwillingness as an organization to compromise our core values.

## A Year of Milestones

Fiscal year 2012 was one of several milestones, many of which will be highlighted throughout this company report. Our **Senior Technical Expert** program allowed us to sharpen our focus on technical excellence while establishing an effective mechanism for mentorship and, ultimately, sustained community leadership in each of our Centers of Excellence. Our **Independent Research and Development** (IR&D) program, highlighted throughout this report as "Solutions that Matter," increased in scope and impact as we turned the creative ideas of our people into cost-effective, mission-focused solutions for our government customers. Not only do we move science from the lab to the field, our IR&D program brings first-hand field experience back to the lab to address customer challenges. Our education outreach also attained new heights as the innovative learning materials developed under our **Science, Technology, Engineering, and Math** (STEM) program expanded exponentially, preparing future generations of America's technical workforce for careers in remote sensing and earth sciences.

## Integrated Laboratories

Perhaps the most significant milestone of 2012, and the focus of this company report, was the integration of our six geographically dispersed, multi-disciplinary research laboratories into one organizational unit: the Research and Engineering (R&E) Group. Establishing an interconnected laboratory structure capable of providing full-spectrum technical solutions to the biomedical, cyber, defense, and intelligence communities, as well as reach-back support to our Advisory and Assistance Services is a discriminator for Riverside Research and an integral part of our rebranding effort that began in 2010. The following pages will talk in more detail about our unique laboratory capabilities.

## Applied Research Solutions

Another notable milestone was the activation of Applied Research Solutions (ARS) as a majority-owned small business subsidiary of Riverside Research. Backed by our legacy of technical excellence, ARS provides the government a cost-effective avenue to obtain technical and programmatic solutions in the cyber, intelligence analysis, and information technology mission domains. ARS also allows us to maintain work share and expand our operating envelope in an environment that mandates an increased use of small businesses. Launched in March 2012, ARS is well on its way to being an independent small business partner to the Department of Defense and Intelligence Community and a valued branch of the Riverside Research enterprise.

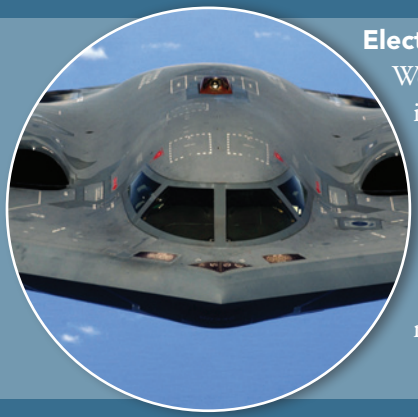
Sincerely,

Richard Annas
President

# Centers of Excellence

**Airborne Reconnaissance**

We apply our engineering, management, logistics, and acquisition expertise to support existing ISR platforms such as the RC-135 RIVET JOINT, as well as emerging payloads for the MQ-1, MQ-9, and U2 programs.

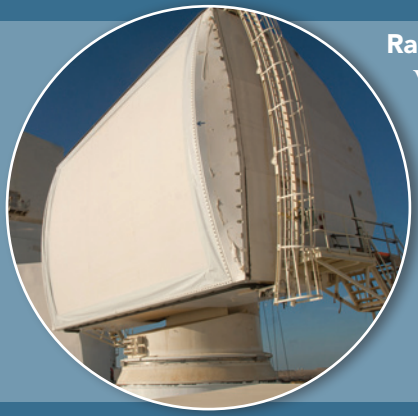


**Electromagnetic Sciences**

We provide technical expertise in all areas required to perform analysis, computation, and design optimization of electromagnetic interactions, including physics, engineering, computer science, and mathematics.

**Biomedical Engineering**

We conduct theoretical, experimental, and pre-clinical research to advance the state of the art in biomedical ultrasonic and optical technology for detecting, diagnosing, imaging, and treating disease.



**Radar**

With expertise across all radar disciplines, we provide solutions that support government agencies in developing new systems, sustaining and modernizing existing assets, and defining new mission requirements.

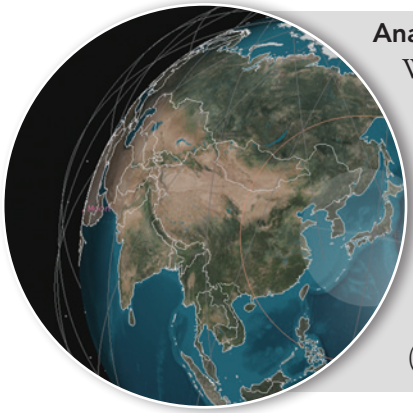
**Cyber**

Our cyber solutions align with national cybersecurity goals and strategic initiatives to advance technology that supports national security, public safety challenges, and critical infrastructure protection.

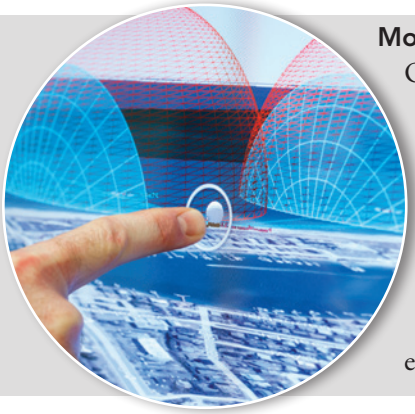
**Technical Intelligence**

We have broad expertise in the MASINT and GEOINT domains with unique expertise in Overhead Persistent Infrared, multi- and hyperspectral systems, collection planning, and the Air Force Technical Sensor Program.

# Our Services



**Analysis of Alternatives** (AoA)
We have extensive experience with the Joint Capabilities Integration Development System (JCIDS), AFI 10-601 (Operational Capability Requirements Development), and USAF Office of Aerospace Studies (OAS) AoA Guidance.



**Modeling & Simulation** (M&S)
Our M&S expertise supports informed decisions about critical scenarios, acquisitions, and technologies from a position of technical accuracy, delivering collaborative and immersive environments and toolsets.

**Program Management**
Our program management and technical support services span the development, fielding, operation, and sustainment of specialized technical intelligence, airborne reconnaissance, CBRN forensics, and related systems.

**Systems Engineering**
Always focused on life cycle sustainment and cost, our technical experts provide customers with robust systems engineering expertise that moves complex systems from concept definition to operational deployment.

**Education & Training**
We are a national leader in technical research and the development, presentation, and maintenance of fully-accredited curriculum focused on intelligence, operations research, scientific test and analysis, cyber, and UAS.

**Additional Services**
Three emerging capabilities were added to our list of services in 2012: (1) Security and Facility Engineering, (2) Trusted Cloud Computing, and (3) Scientific Software Sustainment and Development.

# Letter from the VP, R&E

As Vice President of the Research and Engineering (R&E) Group, it was my distinct pleasure to oversee the successful consolidation of our six laboratories under a common management structure—the R&E Group—during 2012. This very important milestone was a key goal of the restructuring/rebranding initiative that began in 2010.

Establishment of the R&E Group creates a unified and robust set of laboratories that performs cutting-edge, multidisciplinary research in critical technology areas in support of internal and external customer needs. The labs pursue new markets, execute contracts directly with sponsors, and provide technical reach-back support to our Advisory and Assistance Services personnel—a key discriminator in an increasingly competitive market. The labs also seek to expand their technical offerings through targeted IR&D investments in support of our customer base. In all of these activities, the R&E Group supports Riverside Research's Centers of Excellence, ensuring that lab efforts are aligned with the strategic direction of the company.

As we move forward, Riverside Research is already starting to reap the benefits of the newly integrated laboratory structure. Our innovative research capabilities and unique tools are more effectively showcased under the R&E Group, while the combined talents and resources produce incredible synergies and greater coordination of our diverse research and laboratory activities. Our goal is to provide full-spectrum technical solutions by assembling technical experts from across the labs to meet or exceed customer requirements.

Each of the labs made substantial progress over the past year, both in terms of exciting technical innovations and in breaking into new

markets and customers. Some of these achievements are highlighted in the following pages. We are also planning and implementing the expansion and modernization of several laboratories, including the Biomed Lab, RAD Lab, and MAD Lab; these upgrades will result in modern facilities with state-of-the-art equipment, computer systems, networking infrastructure, and visualization displays for customer presentations and internal collaboration.

Our long-term vision is for the R&E Group to become a premier, nationally recognized technical resource, similar in scope and prestige to the historically acclaimed Bell Laboratories. While upholding the highest levels of professionalism and integrity, we strive to provide our customers with unparalleled technical excellence in promoting public health, prosperity, and security in service to our great nation.

Sincerely,

Frank Falco, PhD
Vice President, Research & Engineering Group

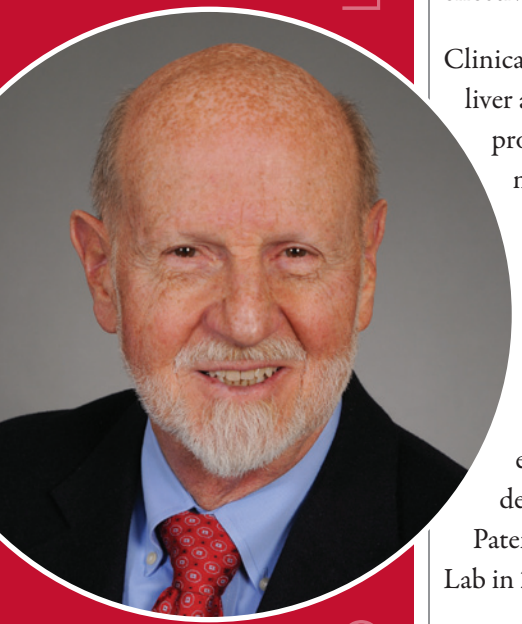
Peter Beer
Director of Business Development, R&E Group

Eric Patterson
Director of Operations, R&E Group

## R&E Group Leadership

To more effectively manage and promote the R&E Group, Dr. Falco recently refined the roles and responsibilities of the group's leadership. Mr. Peter Beer now serves as Director of Business Development for the R&E Group. In this capacity, he is the primary interface to our corporate business development, capture, and strategic planning division, helping to manage the R&E business pipeline, communications, and organizational conflicts of interest while leading the IR&D and Strategic Investment program. Mr. Eric Patterson, now the R&E Group Director of Operations, serves as the primary interface to our programs division and a liaison to corporate IT and Security. Mr. Patterson is also responsible for personnel management, program and process control, program information management, workforce development, indirect funding oversight, and infrastructure management.

BIOMED LAB



# Biomedical Engineering Laboratory

For more than 35 years, our New York-based Biomedical Engineering Laboratory (Biomed Lab) has made ground-breaking advances in the use of ultrasound for detection, diagnosis, imaging, and treatment of disease. Recently added optical capabilities synergize with previously-developed acoustics technology, enabling the Biomed Lab to achieve these same purposes in novel and effective ways.

Clinical studies have included ophthalmic diagnosis and therapy, liver and kidney diagnosis, thrombus and plaque characterization, prostate-cancer imaging, and detection of lymph-node metastases. Related ultrasonic technology studies include therapeutic transducer and bioeffects modeling and novel transducer-fabrication methods. Developing optics technologies include fine-resolution, functional and structural, all-optical, holographic, photoacoustic imaging as well as acousto-optical methods. Potential clinical applications include non-contact assessment of burns, evaluation of incipient pressure and friction ulcers, and early detection of ophthalmic-disease precursors. The United States Patent and Trademark Office issued two patents to the Biomed Lab in 2012, bringing the total number of active patents to 18.

Although the research currently undertaken by the Biomed Lab focuses primarily on biomedical applications, the methods being investigated also are applicable to materials testing and a wide range of other non-biomedical topics.

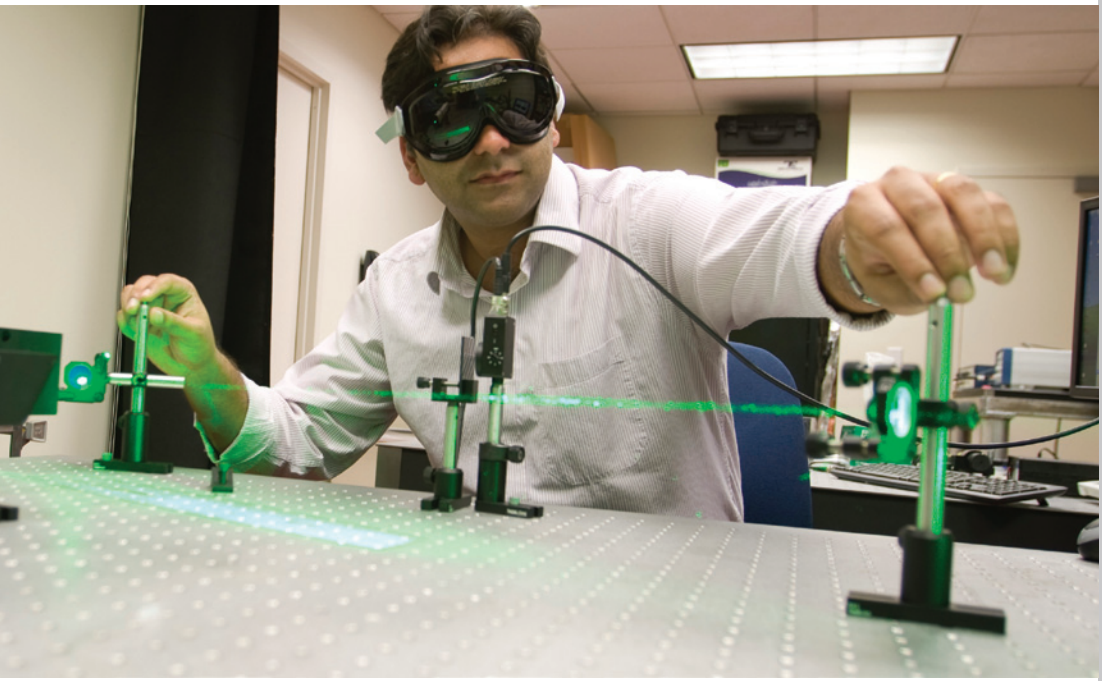
## Domain Expertise

- Characterization and imaging of biological tissue and non-biological materials
- Integration of acoustical and optical imaging technologies
- Ultrasonic bioeffects, safety, and therapy
- Ultrasound transducer technology and fabrication
- Acoustical and optical scattering theory and modeling
- Laser technology

## Equipment/Toolsets

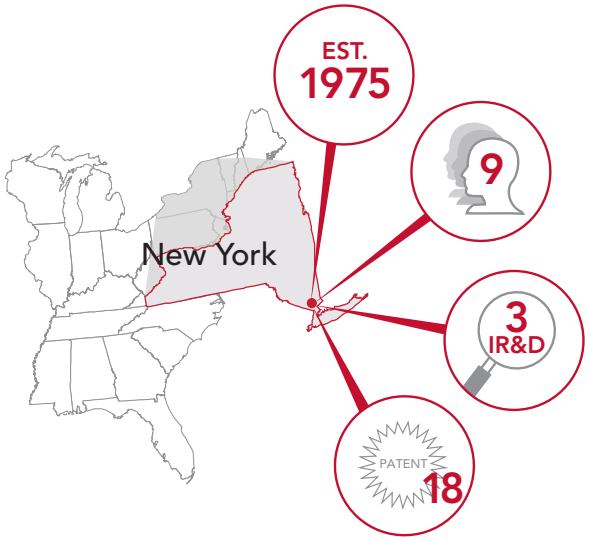
- Multiple acoustic and optical benches
- Piezopolymer transducer-fabrication facility
- Calibrated hydrophones
- Spectrophotometric facilities
- Computer-controlled, high-precision, 3D machining capability

Ernest Feleppa, PhD
Biomed Lab Director



Dr. Parag Chitnis helped establish Riverside Research as an emerging leader in the field of optics research through his efforts to design and implement our new optics laboratory.

> The Biomed Lab has achieved international recognition as one of the world leaders in biomedical ultrasound research. We hope to achieve similar recognition for our work in purely optical and combined optical and acoustical technologies.
>
> –Dr. Ernest Feleppa




# Solutions that Matter

## Enhanced Ophthalmic Imaging

Annular-array technology developed over the last 7 years by Dr. Jeffrey Ketterling provides a major improvement in image quality compared to current ophthalmic-imaging technology. Current clinical imaging of the eye is performed with mechanically scanned transducers that have a limited depth of field and a resulting limited depth range where a good image can be obtained. This means that a limited region of the front or back of the eye, but not both simultaneously, can be viewed in a high-quality image.

In order to improve current industry standards and achieve a clinically feasible annular-array system, the Biomed Lab, in collaboration with a commercial partner, invested in an IR&D project to integrate the Biomed Lab's annular-array imaging prototype with an existing compact, hand-held probe. The project resulted in an operational system, proving that annular-array technology can be utilized in a commercial hand-held probe.

CSE LAB

# Computational Science & Engineering Laboratory

Based in Champaign, Illinois, our Computational Science and Engineering (CSE) Lab provides scientific computing, trusted cloud, and engineering research and development services to a wide variety of organizations in the Department of Defense, aerospace, agricultural, and construction engineering industries. In support of scientific computing, the CSE Lab develops and employs high performance, physics-based computational codes, state-of-the-art graphical user interfaces, and multidisciplinary system-level design optimization tools for high power microwave, antenna, radar, and non-cooperative target ID programs.

Additionally, the CSE Lab provides accredited 24/7 trusted computing hosting services for sensitive but unclassified information, web and database application development, and help desk support functions to more than 50 government and industry organizations worldwide. The research activities of the CSE Lab include harnessing UAS and remote sensing technologies for agricultural, geological, and environmental applications and investigating domain decomposition and multi-scale methods for computational electromagnetic codes.

Under contract to the National Institute of Building Sciences, the CSE Lab provides secure hosting, maintenance, and support services for ProjNet$^{SM}$—an accredited, web-based suite of collaboration, communication, and database tools for the construction industry. ProjNet$^{SM}$, originally developed by the U.S. Army Corps of Engineers' Construction Engineering Research Laboratory, dramatically improves the building design review process, expedites issue resolution, improves accountability and transparency, and reduces the time and cost of construction management.

## Domain Expertise

- Scientific Software Development
- Engineering Services
- High Frequency Computational Electromagnetics
- Trusted Cloud Services
- Web Application Development
- Unmanned Aerial Systems
- Computational Methods

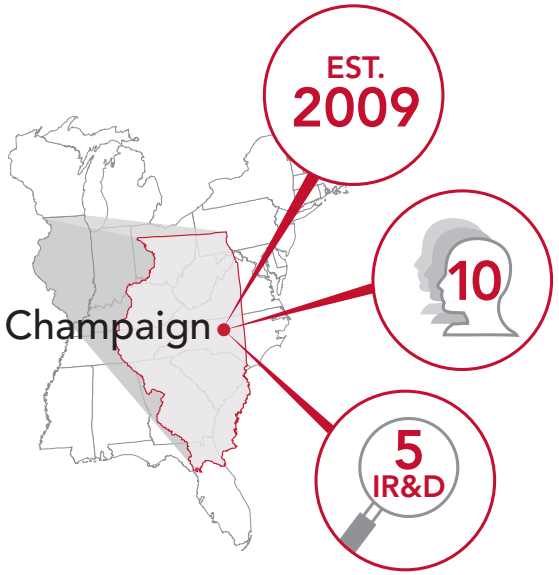
## Equipment/Toolsets

- **ProjNet$^{SM}$ Suite:** A secure cloud-based tool suite for facility collaboration
- **Aurora:** A ray-tracing EM simulation engine
- **Fiber:** A refined data model library
- **Constellation:** A configuration tool for multidisciplinary applications
- **Centaur:** A parametric data model library
- **Discrete Event Simulation:** A system-level design optimization framework

Glen Salo
CSE Lab Manager

Our multi-copter UAS platforms represent enabling technologies with many practical applications.

> CSE Lab's positive impact on the efficiency and productivity of a broad range of government and public sectors is extraordinarily rewarding and exciting.
>
> –Glen Salo




# Solutions that Matter

## UAS to Improve Crop Yields

The CSE Lab executed a 2012 IR&D project to test the feasibility of using sensor-equipped unmanned aerial systems (UAS) to improve crop yields through precision farming and other agricultural applications. After conducting a series of test flights near the CSE Lab facility in Champaign, Illinois, Riverside Research worked with university researchers and agriculture industry partners to format and analyze the imagery and telemetry data collected by electro-optic and long-wave infrared sensors aboard the UAS.

Results suggest that properly-equipped UAS offer great promise to the agriculture industry with numerous applications to support agronomic management decisions. Specifically, this IR&D effort demonstrated that imagery gathered from UAS flights over corn and soybean fields can be used to assess the extent of crop damage resulting from hailstorms. Follow-on research topics are planned.

CYBER LAB

# Cyber Research Laboratory

Our Cyber Research Laboratory (Cyber Lab) provides government and commercial customers with end-to-end cybersecurity support from our Dayton Research Center located near Wright-Patterson Air Force Base, Ohio. With extensive expertise in reverse engineering, systems security assessment, vulnerability discovery, software protection, and malicious software analysis, the Cyber Lab designs software sensors by carefully studying the essential behavior elements of a complex system. Discoveries are implemented as software introspection tools capable of providing data on demand. By understanding the analyst tradecraft, our experienced cyber experts ensure that all proprietary toolsets are designed with intuitive, practical, and easily extensible functionality.

The Cyber Lab is currently developing a set of intelligent tools called "DigR" that enables analysts to make quicker decisions and better understand what software is doing. By stealthily monitoring the execution of an operating system, application, or component, the DigR tool suite collects low-level runtime information and egresses this information back to the analyst in a human-readable form. (See *Solutions that Matter* for more.)

In the Cyber Lab, Riverside Research has established a state-of-the-art binary analysis capability to support operations at every level of classification.

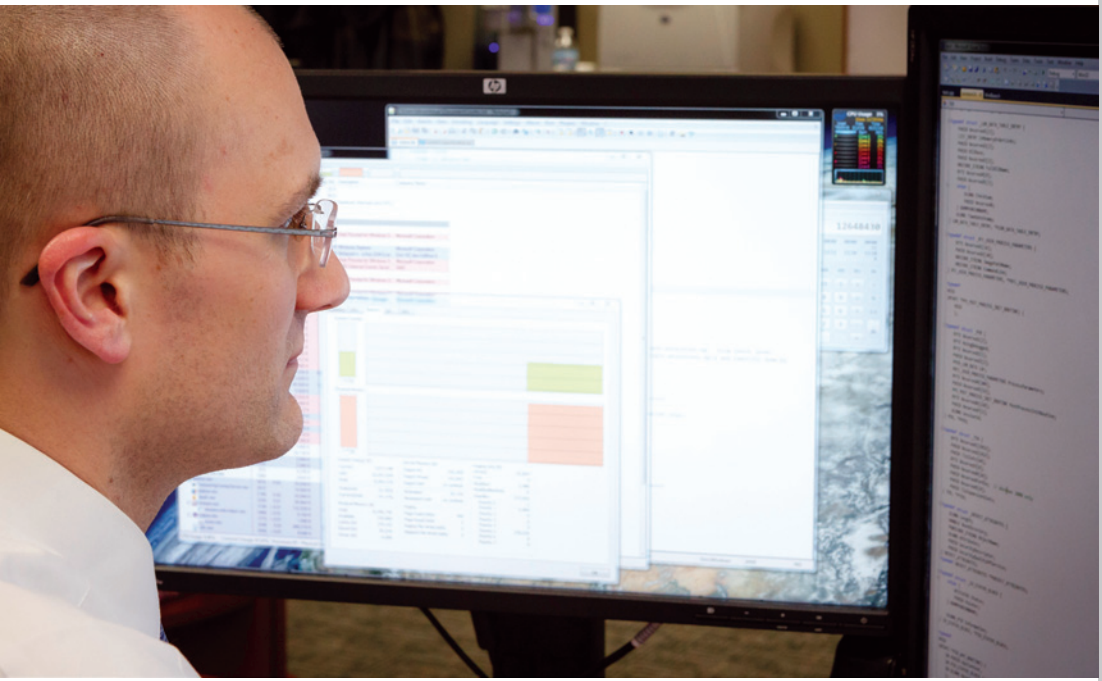
## Domain Expertise

- **Reverse engineering and red teaming**
- **Vulnerability discovery**
- **Software engineering and tool development**
- **Artificial intelligence solutions to novel computer security problems**

## Equipment/Toolsets

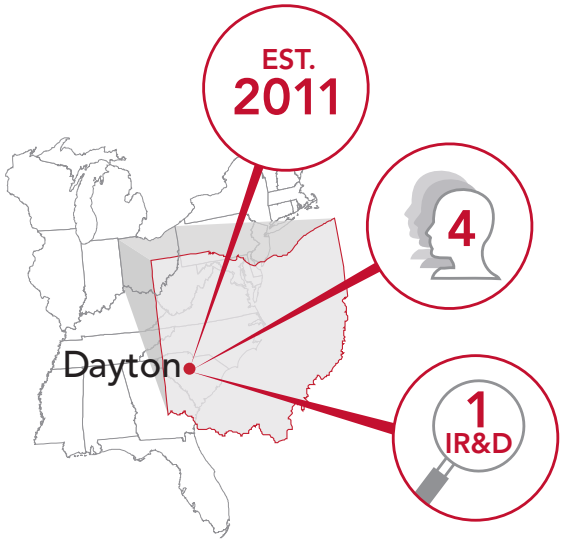
- **DigR:** Binary analysis and editing tools for humans
- **Cerberus:** Universal stealthy debugger
- **Hades:** A Windows kernel-level debugger
- **Helikaon:** A Linux debugger
- **Deobfuscator:** A deobfuscator plugin
- **Data Code Miner:** External library hooker
- **Quiet-RIATT:** Import address table re-constructor

Adam Bryant, PhD
Cyber Lab Manager



Brian Krumheuer writing code for the reverse engineering tool suite, DigR.

> Software technologies touch nearly every aspect of our lives. Our researchers are committed to the idea that these technologies should be made trustworthy so we can safely leverage the capabilities they offer us.
>
> –Dr. Adam Bryant




# Solutions that Matter

## Simplified Network Analysis

DigR, an IR&D project of the Cyber Lab, is an integrated tool suite for reverse engineering application software from executable forms. It provides analysts with easy-to-use tools to graphically inspect software without source code, determine if software is trustworthy and safe to run on a network, and detect tampering. DigR also provides static and dynamic analysis capabilities for stealthy debugging.

A beta version of DigR was released at the end of 2012, allowing initial users to import and analyze a 32-bit Windows program, detect common functions and patterns, identify potentially "interesting" points in the code, and manipulate the instructions, text strings, and functions of executable software. Future work will leverage DigR's pluggable architecture, enabling network analysts to easily develop plug-ins that sense, analyze, and visualize low-level cyber information.

EM LAB

# Electromagnetics Laboratory

Based in our New York Research Office in Lower Manhattan, the Electromagnetics Laboratory (EM Lab) offers government and industry customers over 30 years of expertise in the research and development of advanced computational tools that analyze electromagnetic interactions and optimize the design of complex electromagnetic applications. Our subject matter experts provide highly-efficient computational kernels and design optimization tools capable of producing practical, realizable designs for applications of electromagnetic radiation and scattering.

Our kernels are well validated, highly accurate, and designed to fully exploit high performance supercomputers through extensive use of vectorization, multi-level parallelization, and asynchronous operations. Capable of realizing practical solutions in hours, the EM Lab's optimization tools employ several global and local methodologies, including genetic algorithms and minimum gradient techniques, as well as advanced capabilities, including Pareto methods for multi-objective design optimization and constraints to enforce the manufacturability and design requirements. Tools developed by the EM Lab have advanced the operations and technical achievements of numerous programs.

EM Lab expertise spans the full range of technical subject matter areas required to perform investigations into EM scattering and radiation mechanisms, signature predictions, and design solutions.

## Domain Expertise

- Electromagnetic phenomenology
- Computational electromagnetics
- Antenna and scattering predictions
- Multiobjective design optimization
- High performance computing
- Software development and testing
- Modeling and simulation
- Intuitive user-friendly interfaces
- Measurements and data analysis

## Equipment/Toolsets

- **BMDSim:** Ballistic Missile Defense Simulation

Jeffrey Pursel, PhD
EM Lab Director

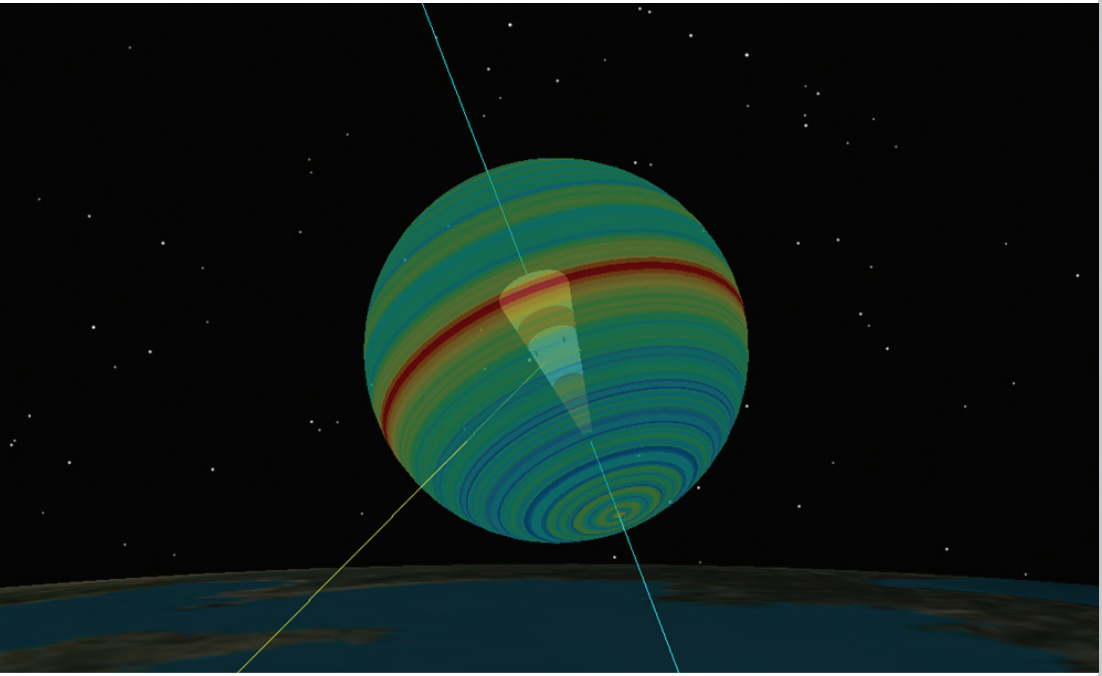
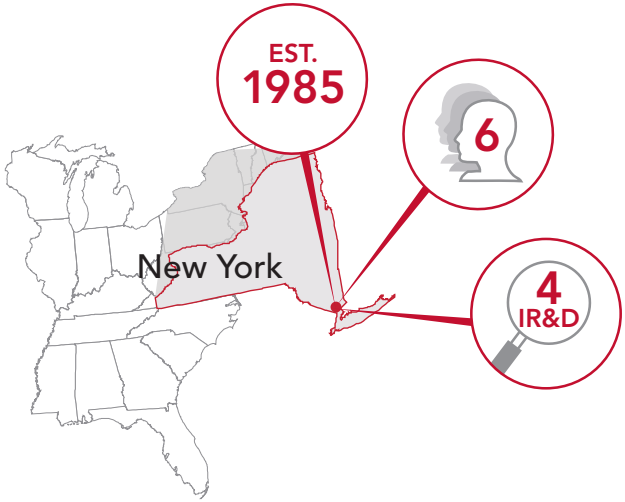


Illustration of newly developed integrated capability for ballistic missile defense simulation: visualization depicts a notional reentry vehicle, corresponding radar cross section, and radar line of sight.

> Advanced technical challenges, highly skilled staff, and broad collaboration provide for a decidedly rewarding work environment.
>
> –Dr. Jeffrey Pursel




# Solutions that Matter

## New Ballistic Missile Analysis

Ballistic Missile Defense Simulation (BMDSim), a collaborative IR&D effort, leveraged the combined strengths of three Riverside Research Labs: EM Lab, MAD Lab, and RAD Lab. By integrating several existing lab tools, BMDSim demonstrated a new capability to simulate, visualize, plan, and analyze the technical radar collection of reentry vehicles, wakes, decoys, rocket bodies, debris, and other observables associated with ballistic missile systems.

The integrated modeling and simulation capability leveraged radar predictions, physics-based missile trajectory simulation, and radar performance analysis tools to provide customers with a highly accurate means to perform end-to-end simulations of ballistic missile defense radar events. This IR&D project expanded Riverside Research capabilities in several key business segments, including missile defense and space surveillance and reconnaissance.

# Modeling & Application Development Laboratory

MAD LAB

Our Modeling and Application Development Laboratory (MAD Lab) provides trusted, user-focused solutions to challenging problems in mission planning, collection visualization, threat analysis, and alternative and trade-off analysis. With operations in Chantilly, Virginia, and Dayton, Ohio, the MAD Lab specializes in producing 4D interactive visual applications that support the acquisition and operational communities throughout the life cycle of any new program—from studies to acquisition, development, testing, operations, and finally performance monitoring of space-based and airborne collection systems.

Built upon a standard foundation, MAD Lab tools use sound, physics-based modeling practices to ensure model integrity. Likewise, the MAD Lab has adopted a standardized modular build approach to leverage agnostic sensor applications through the use of parameter files where possible. This enables the reuse of existing, proven modules to support time-critical efforts.

With years of experience in operational collection support, the MAD Lab's technical staff developed several government-hosted tools under this standardized modular philosophy, including the Automated Collection Planning Tool (ACPT), the Aircraft Mission Planner (iAMP), the Automated Collection Guidance Environment (ACGE), and the United States Nuclear Detection System (USNDS) Constellation Management Boresite Allocation Tool (COMBAT).

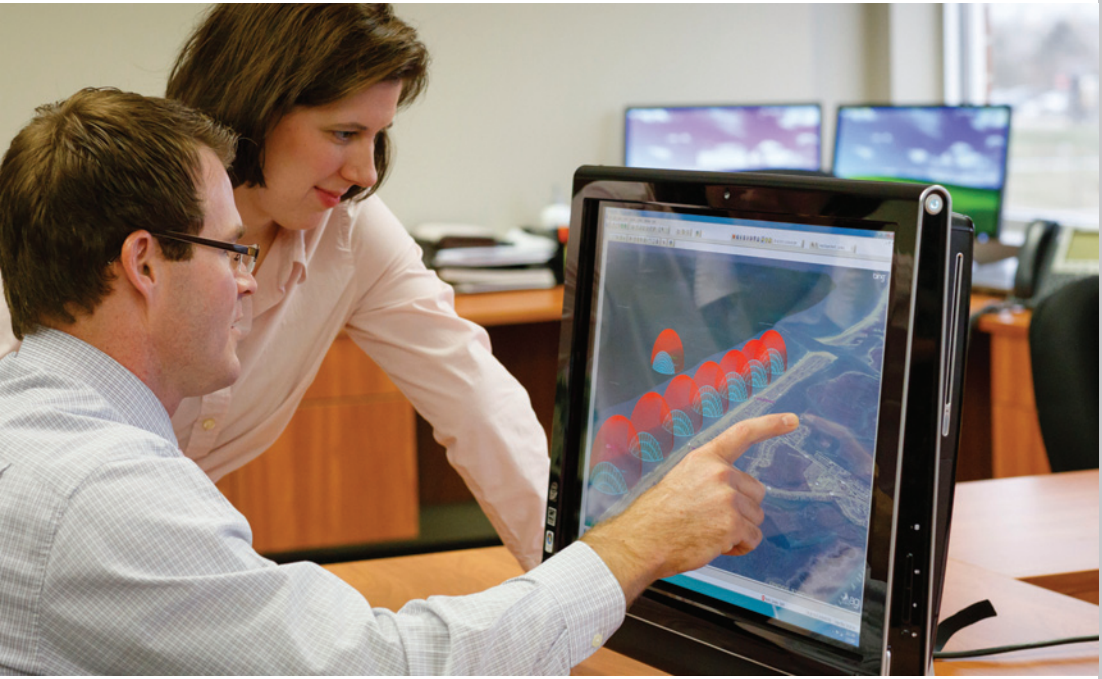
## Domain Expertise

- 4D System Modeling and Simulation
- Analysis of Alternatives
- Collection Planning
- Web Portal Design and Development

## Equipment/Toolsets

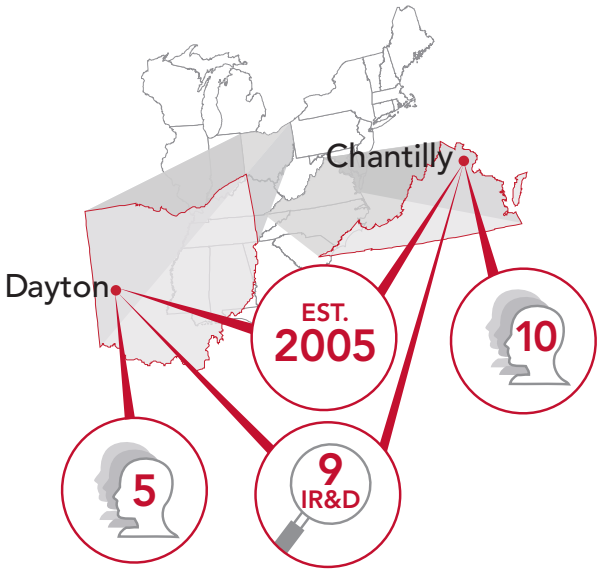
- **ACPT:** Automated Collection Planning Tool
- **SNAP:** Satellite Nomination and Planning Portal
- **iAMP:** Aircraft Mission Planner
- **eCRT:** Enterprise Collection Research Tool
- **RE-Viewer:** Radar Engineering Viewer

John Ploschnitznig
MAD Lab Director



Toni Lovingshimer and Damian Black demonstrate the integration of MAD Lab tools with touch-screen technology.

> Our goal in the MAD Lab is to simplify a very complex world through automation and visualization. Our staff merges technical competency, operational experience, software superiority, and just plain hard work to produce tools which empower our customers.
>
> –John Ploschnitznig




# Solutions that Matter

## GEOINT at Your Fingertips

CHRONICLE, an IR&D project of the MAD Lab, is an extensible, easily integrated web-based application that quickly searches, discovers, and displays geo-tagged data on a common user interface. Many collection systems produce hundreds of footprints on a daily basis. With CHRONICLE, the user can quickly and interactively query previously executed, current, or planned collection footprints that overlay user-defined search areas. The results are then displayed on a four-dimensional colorized globe detailing the area with information related to the collection.

This unique search and display tool was designed to address specific challenges within the operational community. The National Geospatial-Intelligence Agency recently integrated CHRONICLE with the Enterprise Collection Research Tool (eCRT), the MAD Lab's flagship application supporting collection requirement operations for the GEOINT community.

# Radar Assessment & Development Laboratory

RAD LAB

Our Boston-based Radar Assessment and Development Laboratory (RAD Lab) is comprised of national radar subject matter experts with unrivaled experience in the development, implementation, and assessment of radar system algorithm functionality and mission performance. This expertise is leveraged by various entities within the Department of Defense seeking independent, objective assessments to meet a wide range of radar acquisition and sustainment needs.

For more than 35 years, the RAD Lab has proudly supported the development and operation of some of the most advanced radar systems ever deployed for Ballistic Missile Technical Collection, Ballistic Missile Defense, and Space Situational Awareness missions. This legacy of technical support includes full life cycle engineering services—from concept definition and specification development through formal testing, independent verification and validation, deployment, sustainment, and eventual service life extension or system modernization. It also includes IR&D efforts that address specific customer challenges. The RAD Lab is aided by a robust set of indigenously developed radar data analysis tools that provide fast and effective troubleshooting of technical radar system issues including detailed post-event forensic analysis of collection missions.

With the capability to handle and process collateral data, the RAD Lab includes an expanding network of classified personal computers, a full radar simulation string (as Government Furnished Property), and classified connectivity to receive and disseminate radar data products.

## Domain Expertise

- Feasibility and System Architecture Trade Studies
- Sustainment and Modernization Studies
- Analysis of Alternatives (AoA)
- Independent Verification and Validation (IV&V)
- Developmental and Operational Testing
- Algorithm Prototyping and Assessment

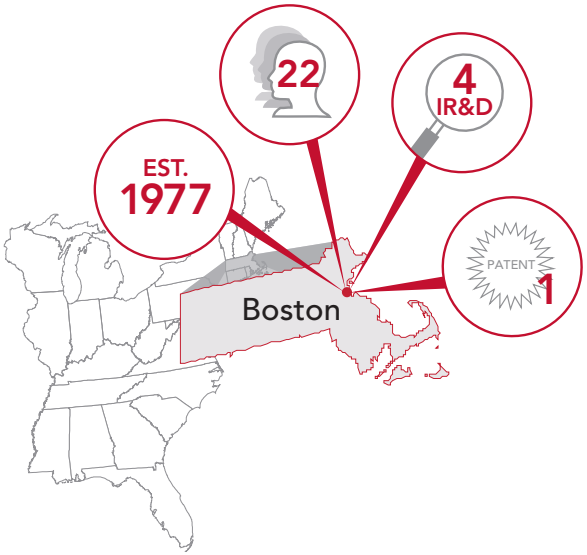
## Equipment/Toolsets

- **PHAROS:** Performance, Health, and Analysis of Radar Operations Suite
- **RADSim:** Generic Radar Simulator

Philip Chorman
RAD Lab Director

Michael Hammond, Cobra Judy Replacement (CJR) Lead Systems Integrator on behalf of the US Navy, stands before the Cobra King platform at Norfolk Naval Air Station, June 2012.

> Through the dedication and ambition of our staff, the RAD Lab is evolving from a primarily technical advisory services role to an industry-wide advanced solutions provider.
>
> –Philip Chorman




# Solutions that Matter

## Powerful Radar Analysis Tools

Under the 2012 IR&D program, the RAD Lab invested in the development of two advanced radar toolsets that greatly enhance the capabilities of engineers, data analysts, and system maintainers working with the highest-fidelity data collection radars fielded today.

**PHAROS**: Performance, Health, and Analysis of Radar Operations Suite enables rapid, quantitative evaluation of sensor performance by extracting and transforming recorded data from various sensors into a common format compatible with generic analysis tools and accessible through a single, intuitive graphical user interface.

**RADSim**: Generic Radar Simulator enables users to simulate the core functional elements of technical collection sensors without the use of specialized system hardware or software. Together these toolsets improve diagnostic and performance correction capabilities while serving as a test bed for the development and evaluation of advanced radar algorithms.

# Senior Technical Experts

The technical strength and experience of our people is a differentiator that elevates Riverside Research as an industry leader in airborne reconnaissance, biomedical engineering, cyber, electromagnetic sciences, radar, and technical intelligence. Many of our experts are asked to speak at the world's most influential technical conferences on national security, homeland defense, and public health issues. These experts are regarded as "thought leaders" within their respective communities, translating their expertise into high-value solutions.

In January 2012, Riverside Research established the Senior Technical Expert (STE) program to recognize these thought leaders as representatives of our Centers of Excellence. Through an application process, the nine individuals pictured on the right were selected as the first group of Senior Technical Experts.

With oversight from Jim Bower, Chief Technology Officer, our STEs will maximize their effectiveness as a technical resource for business development, supporting proposals and IR&D efforts while cultivating a new wave of influential thought leaders through focused mentorship of our junior staff. The STEs will also work to advance their scientific disciplines through publications, conference presentations, and community outreach.

Jim Bower
Vice President, Strategic Planning & Development & Chief Technology Officer

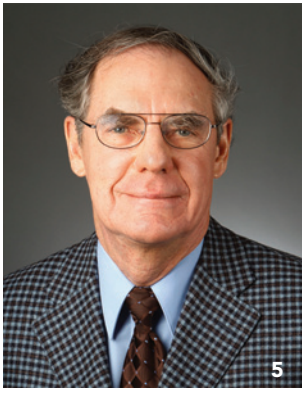
> "I am thrilled to guide our initial cadre of Senior Technical Experts and leverage their collaborative thinking to further enhance our role as a trusted solutions provider.

## STE Highlight

**Juan Lopez,** our STE in Critical Infrastructure Protection, received the 2012 Distinguished Hispanic Ohioan Award for his leadership, professionalism, and exceptional community service. Through his affiliation with the Society of Hispanic Professional Engineers, Juan regularly shares his experiences as an Air Force Cyber Researcher with students throughout Dayton, Ohio.












1 Mr. Ernest Pennington, Airborne Reconnaissance

2 Dr. Jeffrey Ketterling, Ultrasound Imaging

3 Mr. Juan Lopez, Critical Infrastructure Protection

4 Mr. John Ploschnitznig, Radar and Technical Intelligence

5 Dr. James Lange, Remote Sensing

6 Dr. Howard Evans, Overhead Persistent Infrared

7 Dr. Jeffrey Pursel, Electromagnetics

8 Dr. Lawrence Turnbull, Weapons of Mass Destruction

9 Mr. Richard Bartell, Optically-based Remote Sensing

# Applied Research Solutions

Applied Research Solutions (ARS) is a for-profit, small business subsidiary of Riverside Research serving the Department of Defense (DOD) and Intelligence Community (IC) in the mission domains of Cyber, Intelligence Analysis, and Information Technology.

## Solutions

**Intelligence Programs:** ARS provides MASINT/Full Spectrum GEOINT tasking, collection, processing, exploitation, and dissemination (TCPED) solutions to the national and tactical DOD/IC at large, successfully delivering counterterrorism, hard target analysis, and systems software integration/IT support across a multitude of programs.

**Cyber Solutions:** ARS builds upon a strong foundation of cyber capabilities by leveraging our long-standing Anti-Tamper/Software Protection support to AFRL, including 57 black teams, 45 red teams, wireless sensor networks architecture, predictive modeling, and deployment of over 3,000 devices to 187 DOD/contractor sites.

**Space Situational Awareness:** ARS supports the Air Force Space Command by obtaining and maintaining the awareness needed for successful and safe space operations, constantly seeking methods to improve the Space Surveillance Network's radar and optical sensors that detect and track orbiting space objects.

**Information Technology & Software Development:** From Service Oriented Architecture (SOA), LINUX, and JAVA system development to database technologies and all system administration functions, ARS delivers SCI-cleared software systems engineers and IT professionals to mission partners within days of any requirement.

Kevin Sullivan & Gary Wittlinger
ARS Executive Team

ARS was launched on March 1, 2012 under the proven management team of Kevin Sullivan (left) and Gary Wittlinger (right).

Headquartered in Dayton, Ohio, ARS delivers tremendous reach across Wright-Patterson AFB mission entities, such as the Air Force Research Laboratory (AFRL), the Air Force Institute of Technology (AFIT), the Air Force Materiel Command (AFMC), the National Air and Space Intelligence Center (NASIC), and the Air Force Life Cycle Management Center (AFLCMC).

ARS is incorporated as a small business in the state of New York under the primary NAICS Code 541712.

# Education Outreach

Riverside Research understands that the future of the United States rests heavily on the next generations of our national technical workforce. The critical thinkers, decision makers, and innovators of tomorrow are sitting in classrooms today, eager to learn about Science, Technology, Engineering, and Mathematics (STEM). With these future leaders in mind, Riverside Research continued to invest in several STEM programs at the middle school, high school, and collegiate levels during 2012.

## Mentor-guided Internships

Our internship program with Sinclair and Clark State Community Colleges, launched in 2010 to help the Dayton, Ohio workforce transition from its manufacturing roots to a tech-savvy unit capable of supporting the new high-tech business areas developing in and around Wright-Patterson Air Force Base, continued to grow in enrollment and employment. Total enrollment reached 86 interns by the end of 2012 with approximately 30 obtaining employment upon completion.

## Electronic Textbooks

Our e-Text user base continued to expand as well. In order to generate excitement in STEM careers amongst younger students, our adaptable *Geodesy* and *Remote Sensing* e-Texts, both used as collegiate-level learning materials, were tested in middle and high schools throughout the Dayton region in a multi-district pilot program facilitated by the Dayton Regional STEM Center. This program demonstrated that students of all ages can benefit from the multifaceted design and interactive nature of e-Texts.

## Community Outreach

Outreach activities in 2012 included Dayton's annual TechFest, the Vectren Dayton Air Show, Air Camp, Students Open to Aviation Research (SOAR), Aerospace Adventures (A2), the Boy Scout Troop 191 "Rocket Lock In," Chaminade Julienne's STEMM Gateway Summer Camp, and the annual Space Fest held at the National Museum of the US Air Force. It has been our pleasure to support these events over the years; 2012 was no exception.

Dr. Andrew Shepherd demonstrates the *Geodesy* e-Text for 76 Dayton-area 7th graders.

# Board of Trustees Award Winners

Recipients of the 2011 Ralph J. Mastrandrea Memorial Award (seated, left to right):

**Dr. Parag Chitnis**, for establishing Riverside Research as an emerging leader in the field of optics research through his exceptional efforts to design and implement our new optics laboratory in the Lizzi Center for Biomedical Engineering;

**Mr. Vince Schuster**, for his superior performance and flawless execution of the AFRICOM Theater Light Aircraft Support and high altitude research platform programs as SP50 Deputy Program Manager for the Medium Aircraft Division within Big Safari;

**Mr. Michael Cloutier**, for his proven leadership and impeccable performance as Project Engineer for the Non-Standard Aviation, VISTA, and PROSPECTOR programs within Big Safari; and

**Mr. Alex Gutman**, for his key role in Riverside Research winning the AFIT/ENR Project Support Services contract re-compete, as well as helping to establish AFIT's OSD-directed Air Force Test and Evaluation Center of Excellence.

Recipients of the 2011 Lawrence H. O'Neill Award for Sustained Excellence (standing, left to right):

**Mr. Patrick Grieco**, for his distinguished accomplishments, consistent dedication, and trusted subject matter expertise in support of the National Geospatial-Intelligence Agency, National MASINT Management Office, and National MASINT Committee;

**Dr. James Schmitz**, for his technical and programmatic leadership within the National Air and Space Intelligence Center and for contributing to the development and fielding of new capabilities that fully exploit the potential of U.S. intelligence collection assets;

**Mr. Don McElreath**, for his exceptional, level-headed leadership and wholehearted commitment to the mission of the Air Force and pivotal role in the Cobra Judy Replacement program assuring continuity of this critical national security asset; and

**Mr. Terrance Gnau**, for continually exemplifying superior technical and program management expertise and helping solidify Riverside Research as the Air Force Research Laboratory's contractor of choice for new work.

Also pictured are Mr. Thomas Pitts, Chairman of the Board of Trustees (far left), and Mr. Richard Annas, President (far right).

# Board of Trustees

Standing (left to right): James M. Mungenast; Richard G. Annas, President; Leslie W. Seldin; Maureen Dunn McBride; Vincent J. Coyne; Seated: Stephen D. Brodie; Thomas G. Pitts, Chairman; Heidi Schultz; Robert A. Calico

## New Members

Maureen Dunn McBride and Heidi Schultz joined the Board in 2012, becoming the first female Trustees in company history.

Ms. McBride was elected to the Board in April 2012 after a 32-year career with the Tennessee Valley Authority.

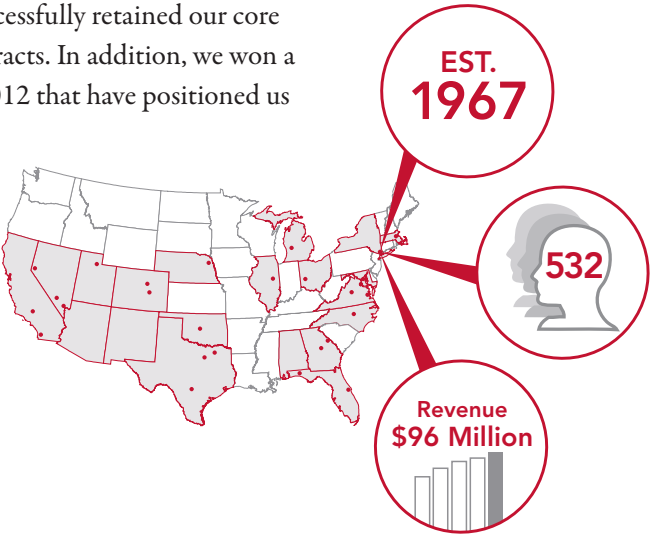
Ms. Schultz was elected to the Board in October 2012. She was a founder and VP at Eastern Research Group, Inc. for nearly 30 years.

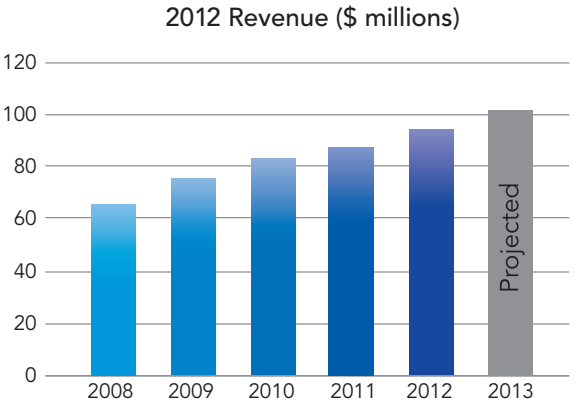
# Financial Results

Riverside Research and ARS, our small business subsidiary, ended Fiscal Year 2012 (FY12) with $96M in revenue, representing over 10% growth from FY11. Since FY08, revenue has increased by $31M—a compound average growth rate of about 11% per year.

For the second consecutive year, we successfully retained our core business by winning all recompete contracts. In addition, we won a number of new program contracts in 2012 that have positioned us for continued growth.

Michael Cade
Director of Finance




Riverside Research has maintained an average year-on-year growth rate of 11% since 2008.

# FROM LAB TO FIELD

## Our Mission

Riverside Research's centers of technical excellence move science from the lab to the field for the benefit of our nation. We build teams of recognized experts to deliver effective, efficient, high-value solutions and services to our sponsors.

www.**riverside**research.org