

Shaping the Future: Missile Detection System Advances With Help From Aerospace Experts

by Laura Johnson
January 17, 2017

A missile coming towards the United States is not something most Americans like to think about. Fortunately, someone has thought about it, and come up with a missile detection system that would warn the military if such an event were to occur.

That system is the Space Based Infrared System (SBIRS) and it is of vital importance to the protection of the nation.

“SBIRS is important because if any nation launches a ballistic missile against the US, we want to give the president as much time as possible to respond and defend the country,” said Russ Averill, general manager of Aerospace’s Space Based Sensing Division.

As Aerospace personnel are helping prepare for an upcoming SBIRS launch on Jan. 19, it seems an appropriate time to look at a system that is so crucial to national defense.



A SBIRS satellite is encapsulated in its payload fairing at Cape Canaveral Air Force Station in preparation for its Jan. 19 launch. Aerospace is proud to be recognized on the mission patch as part of the team. (Photo provided by U.S. Air Force)

Essentially, SBIRS is composed of satellites that scan the Earth for infrared radiation, that is, heat, given off by missile plumes. Short wavelength infrared radiation is an ideal part of the spectrum to use for missile detection, as opposed to visible light, ultraviolet, etc., because it’s easier to quickly see the missile plume and separate it from the background.

There are SBIRS satellites flying over the equator, as well as SBIRS sensors hosted on satellites that go in a highly elliptical orbit over the poles. The system also uses older satellites from the Defense Support Program (DSP), which was the predecessor to SBIRS.

The various SBIRS sensors are capable of doing wide area scans as well as focusing in on a particular area. The data that is collected is sent to equipment on the ground that receives and processes the information—and a lot rides on making sure that information is accurate.

“It has to be reliable,” Averill said. “The message has to be fast and right.”

Accordingly, the team has continued to improve its capabilities, and SBIRS provides all kinds of new functionality compared to DSP.

“We’re seeing dimmer targets at faster rates,” Averill said, describing the current system as the culmination of 20 years of effort. “We’ve vastly improved our performance with the new ground system this year,” he said. “This system right now is pretty cool.”

Although SBIRS’ main functions are missile warning and defense, battlespace awareness, and technical intelligence, its usefulness extends into other areas. For example, in addition to sensing missiles, the satellites can detect and identify other

heat sources, such as forest fires or volcanic eruptions.

Regardless of how the data is used, Aerospace is right there in the thick of it, providing the technical answers that enable the SBIRS mission to accomplish its goals.

For example, Aerospace was able to solve a tricky dilemma by developing an algorithm to help the satellites determine their position without using GPS, which might be necessary in a hostile situation.

Aerospace's history with the program is extensive and provides the needed background to ensure continued mission success.

"Aerospace provides the technical backbone that sees across contractors and time," Averill said. "We advise the government independently, making the system cost effective, as technically capable as possible, and providing mission assurance, making sure it works."

Innovation: After a Struggle, SBIRS Launches Successfully

by **Randolph L Kendall**

January 23, 2017

In a fitting start to 2017, which will see the 70th anniversary of the U.S Air Force, the third Space Based Infrared System (SBIRS) satellite was successfully delivered to geosynchronous transfer orbit on Friday evening. The Atlas V 401 rocket lifted off from SLC-41 at Cape Canaveral Air Force Station at the beginning of the launch window, and delivered the satellite precisely to its intended orbit.

Once again, the final count was very smooth. But it was not without a struggle to get to that point as SBIRS GEO Flight 3 was originally scheduled to launch last summer, but was delayed due to a combination of issues on both the spacecraft and the launch vehicle, as well as Hurricane Matthew. That led to the first attempt on Thursday afternoon, during which the integrated ULA/Air Force/Aerospace team demonstrated significant innovation and agility by utilizing historical family data and prelaunch test data to clear the rocket for launch after losing several key sensors.



An Atlas V rocket launches the SBIRS GEO-3 satellite on Friday, Jan. 20. (Photo: United Launch Alliance, LLC)

Unfortunately, while the rocket was finally ready to go near the end of the launch window, the launch had to be scrubbed for the day due to interference from an aircraft in the range safety hazard area.

The next day was picture-perfect though, and things couldn't have gone smoother. As they say, "all's well that ends well," and this launch also represented a fitting end to the careers of two retiring Aerospace engineers, Paul Russell and Tom Duncan, both of whom have supported Atlas V since the very first launches. Both were called out for special recognition during the postflight quick-look reviews and Duncan, the Eastern Range Atlas V systems director, was acknowledged not only for his contributions to the success of many missions, but for having been a valuable mentor to numerous Air Force officers when they were stationed at Cape Canaveral. These included United Launch Alliance Vice President Laura Maginnis, the mission director, Col. Kent Nickle, and Lt. Gen. Samuel Greaves, who noted, "Tom has a very distinct voice, and whenever I heard it on the net, I always felt comfortable in making the decision to launch."

This was the 116th successful ULA launch, the 69th Atlas V launch, and the 36th National Security Space launch on an Atlas V rocket.

Editor's Note: Randolph "Randy" Kendall, a graduate of the University of Michigan, is Aerospace vice president of Launch Program Operations.

Conflict-of interest-disclaimer: The Orbiter editor is a graduate of the University of Michigan.

Shaping the Future: Aerospace Works to Ensure an Informed Space Policy

by Gabriel A Spera
January 11, 2017

The Aerospace center for space policy analysis — one of five strategic initiatives recently announced by President and CEO Steve Isakowitz — issued an informative backgrounder on the National Space Council. The incoming Trump administration has signaled that it might move to revive the advisory organization, which has been absent from the White House since the George H.W. Bush administration.

According to Dr. Jim Vedda, senior policy analyst at Aerospace, a White House space advisory group was originally mandated by the National Aeronautics and Space Act of 1958, the same legislation that created NASA. Since that time, some form of space advisory group has supported the agendas of most (but not all) presidential administrations. These achieved varying degrees of success in steering national space policy. The question now arises as to whether a National Space Council will indeed become a feature of the Trump White House, and whether it will chart a sustainable path forward or fall victim to the same pitfalls that hobbled many of its predecessors.



According to Vedda, the success of the new council will depend on numerous factors — most critically, the president’s level of interest and attention. If new priorities eclipse the space domain, the space council will have a hard time achieving meaningful results. This is important to remember, because the space agenda will often be dictated by events beyond the council’s control — for example, a terrorist attack, a financial crisis, or an escalation in global tensions. Organizational structure and staffing are also critical, Vedda said. “The council staff needs to have adequate size and expertise,” he said. “Additionally, it would be preferable to have dedicated staff rather than detailees from agencies to minimize the likelihood of turf battles.” The staffing balance must also consider the need to maintain productive relationships with Congress, relevant agencies, and other components of the Executive Office of the President, especially the Office of Management and Budget.

“Informal interactions and individual personalities matter,” Vedda said. “Getting the chemistry right can mean the difference between smooth, successful operations and stalemate.”

Properly configured, a National Space Council could go a long way toward efficiently setting goals and fixing problems that cut across the civil, commercial, and defense space sectors, Vedda said. Some of these issues include export control, acquisition reform, the health of the space industrial base, space debris mitigation, space traffic management, facilitation of emerging commercial space industries, and determination of goals and priorities for space activities beyond low Earth orbit. “The search for solutions to these problems will drive the requirements and expectations of space-related agencies across the government, and a National Space Council could be driving that search and shaping the next generation of the nation’s space activities,” he said.

For further details, see Vedda’s paper at <http://www.aerospace.org/wp-content/uploads/2017/01/NationalSpaceCouncil-HistoryAndPotential.pdf>

Growth: Ed Swallow Explains Business Development

by Ed Swallow
January 05, 2017

(Editor's Note: Ed Swallow is vice president of Vaeros Operations.)

Aerospace is at a crossroads: the historical dominance of the space business by the military is waning, but the military's dependence on space has never been greater. How does The Aerospace Corporation continue to serve its biggest customers — the Air Force, national security organizations, National Aeronautics and Space Administration (NASA) and National Oceanic and Atmospheric Administration (NOAA) — while remaining relevant and vibrant in a new space environment where companies and private institutions around the world are bringing innovation on an unprecedented scale?



As our industry grows to new heights and in new directions, Aerospace must grow with it or risk becoming irrelevant. In military space, where Aerospace cannot increase its footprint outright, growth means sustaining and increasing the value — the bang for the buck — of every hour of JO. In the world of civil and commercial space, growth at Aerospace not only means growing our value to our customers, but also seeking out new business with government agencies outside of the Department of Defense and bringing our half-century of experience to the aid of burgeoning private space enterprises; growth also means growing the skills and experience level of our scientists and engineers so they can better serve all of our customers and stay ahead of emerging trends to keep our customers current. In all cases, this “business development” will have a starring role in the future of Aerospace.

What is Business Development?

Aerospace employees have heard that everyone at the corporation is involved in growth, and many have equated that with business development. The term “business development” has many interpretations, so this paper is designed to define BD for Aerospace. Sometimes it is helpful to start with what BD is not. BD does not mean that all Aerospace employees should be “selling” the corporation to their customers. Selling is taking something the corporation has and telling our customers “you need this.” This is not what business development is about and not what the corporation desires of employees.

In fact, for most employees, business development involves enhancement of the reputation of the corporation through performing their daily customer support activities in an excellent manner, delighting their customer, and solving their customer's toughest problems.

Expectations of Employees

The expectations of everyone's involvement in business development may be new to some employees. It really is pretty simple — everyone is expected to be sensitive to when a customer says, “I need, I want, I have a problem,” or “I have a challenge.” This is a cue from our customers that either our current support is not meeting their needs or they have a new requirement that is not being met. When employees hear these types of words from their customers, they are expected to provide this information to their management chain so that it can be addressed in the most appropriate manner.

Aerospace is committed to growing our business. While there are many benefits to growth, unlike for-profit companies driven by a financial bottom line, our ultimate objective is increasing our value to our customers. Business development is key to the corporation growing its value. This means listening to customers, communicating with management, and helping the corporation meet customer needs. It may involve being straight with our customers and telling them that Aerospace may not be the right solution for their specific issue.

We do have people with a business development title within the company. They act as a natural extension of each employee's normal daily activities, acting as a matchmaker between the challenges facing our customers (cued by those four phrases “I need, I want, I have a problem, or I have a challenge”) and the capabilities of the corporation to satisfy those challenges.

Business development thus involves all employees working as a team to satisfy the needs, satiate the wants, solve the problems, and address the challenges that most affect our customers' missions.

Key Tenets of Business Development

Aerospace does not perform classic business development where the goal is to sell the same product to multiple customers. Aerospace business development involves providing unique solutions tailored to the specific needs of our customers. Aerospace business development includes the following key tenets:



Delight your customers. Business development is not about selling a product regardless of the customer's need. It is about satisfying the customer by matching Aerospace's capabilities to an unmet customer need and delighting them by delivering our services above and beyond expectations.

Respond quickly to satisfy customer needs and wants. Customers generally dislike when we provide a briefing denoting an untargeted list of the corporation's capabilities and products as it is often a waste of time. They prefer that we target capabilities to needs that are currently unmet with proposed solutions, both internal and external, that will meet those needs efficiently and effectively.

Understand and solve your customer's problems and challenges. Successful business development involves a great deal of effort before a presentation is made to the customer. We must understand their specific needs, the technical/programmatic/political environment, and challenges customers face in meeting these needs. We will then be best able to craft solutions consistent with each customer's culture that will solve their problems.

Develop relationships with organizations outside of the corporation. Our customers need situational awareness, so developing relationships and providing the backplane function across current and potential customers is critical. Customers prefer to do business with people they know and trust. Hence, a very important aspect of growing the business is developing relationships with organizations beyond that of seller-customer. This might involve building relationships during professional society meetings, serving together on review committees, attending the organization's award ceremonies/banquets, etc.

Open up opportunities for increasing value rather than closing sales. First and foremost, we need to identify ways our current efforts continually increase the value we provide to our customers. Business development is about identifying opportunities to match the capabilities of the corporation to the needs of a customer, and then nurturing the opportunities to fruition so that our customers' needs are satisfied in an efficient and timely manner.

Participate in a team sport. There are no "lone wolves" in business development; it is a team sport. Business development requires talents from all levels of the corporation working together to identify customer opportunities, learn about the customer's specific needs and culture, describe potential solutions, review risks to the corporation and customer, and match corporate capabilities to meet customer needs.

Important Business Developer Roles

Growing our business provides technical and financial benefits to the corporation. However, the ultimate goals of growth are increasing our value to our customers and remaining consistent with Aerospace's responsibility to act in the national interest. That is the business development role all Aerospace employees must embrace. In addition, we have people with the Business Development title, who play the following important roles in meeting these goals:

They are the voice of new customers within Aerospace. Aerospace has expertise, experience, labs, tools, etc. that are unmatched in the space industry. However, since Aerospace does not "market" its capabilities in the traditional sense, many potential customers are not familiar with the depth and breadth of Aerospace's capabilities. A business developer must be the voice of the new customer within Aerospace so that the full scope of our technical capabilities can be brought to bear to solve the customer's needs.

They help the corporation understand new customers' needs, desires, problems, and challenges. While Aerospace is intimately familiar with many of the needs of the major companies and subcontractors in the space industry, there are many specific customer needs that never rise to the attention of Aerospace management. It is the role of the business developer to gather reliable and actionable information on the customer's technical needs, big picture desires, cultural problems, and specific challenges. This information is critical in enabling Aerospace management to make informed decisions on whether and how best to pursue customer opportunities.

They match the new customers' needs to Aerospace's capabilities. Aerospace does not typically provide a specific tool or a subject matter expert's time to meet a customer's needs. Instead, Aerospace provides capabilities that consist of the expertise of several individuals, years of experience and lessons learned, unique laboratory capabilities, and simulation and analysis tools. It is the role of the business developer to match a current Aerospace capability or develop a tailored capability to meet the customer's needs.

Growth and business development is well aligned with the core values of The Aerospace Corporation. Dedication to mission success comes from increasing our value to our customers at the most critical times. Technical excellence comes from growing our people's skills and experiences to provide the best possible solutions to our customers. We are committed to our people to help them grow as individuals and as contributors to our customer's mission success. Innovation is at the heart of growth – identifying continuous, responsive and game-changing innovations to increase our value to our customer. And none of this works without integrity and objectivity.

Innovation: “Gateway” Officially Opens

by Nancy Profera
January 25, 2017

Approximately 100 employees turned out for the opening of the refurbished entryway to the Ivan A. Getting Laboratories on Monday, Jan. 23. The building is named after Aerospace's first president, who was known for his vision and integrity, and led the company during its founding years from 1960 to 1977.

“Ivan Getting was instrumental in establishing an Aerospace laboratory facility,” recalled Dr. Lubo Jovic, a principal engineer, who has worked at the company for nearly 34 years. “He really pushed for it, having seen what was being done at Lincoln Labs.”

Two short sets of introductory remarks opened the ceremony, with Dr. Sherrie Zacharius, vice president, Technology and Laboratory Operations, and President and CEO Steve Isakowitz welcoming employees and guests.

“The displays in this laboratory represent curiosity, creativity, and the technical breadth and depth of this corporation,” said Zacharius. “The laboratories and the research carried out here are both our legacy and our future.” Regarding the makeover, she said, “It represents the corporation's commitment to innovation and inspiration, and it provides the opportunity to showcase the day-to-day stuff we do here in ETG.”



Steve Isakowitz, left, addresses the grand opening gathering to mark the refurbishment of the Ivan A. Getting Laboratories lobby. (Photo: Eric Hamburg)



Redesigned exterior entrance to the Getting Laboratories. (Photo: Eric Hamburg)

Isakowitz said, “Today's an important milestone for this laboratory. I'm super impressed at this area and the work that's been done.” Ever quick to remind employees of the strategic imperatives, he added, “It's the hallmark of innovation, and the hallmark of shaping the future. This is not just a lobby, but a gateway to innovation.”

Former and retired leaders of Aerospace attended the event, including Drs. George Paulikas and Joe Straus. Also in attendance were Chuck Gustafson, senior vice president, Engineering and Technology Group, as well as James Clemmons, principal director, Space Science Applications Laboratory, and James Nokes, principal director, Space Materials Laboratory,

The facility now boasts a modern-looking glass entryway surrounded by desert landscaping, new flooring and painting within, and a striking high-definition video wall with

nine 55-inch monitors that play videos at 4K resolution, the greatest amount available today. There are historical and current photos and montages of the work performed in the labs along the walls.

The mood at the opening seemed to be reflective of the early days, as well as excitement about the current work happening in the labs. When the *Orbiter* asked attendees what they thought were the most interesting things to have happened in the labs over the years, there was a mix of responses:

- Cubesats and picosats (four employees mentioned these)
- Failure and anomaly analysis—"We have saved many programs."
- High-resolution electron microscope.
- Flight projects. The scientific instruments we've flown in space.
- Development of the MAKO sensor.
- The telescope now on the E pod.
- The development of the radiation dosimeter—this is/was revolutionary on space missions.
- The study of debris from the breakup of space shuttle Columbia in 2003.
- The "amazing," one-of-a-kind, can't-make-them-elsewhere prototypes we develop.
- The operational systems.
- Advances in our understanding of space weather.
- Nondestructive evaluation capabilities.
- Laser communications and the invention of the chemical laser.
- Cutting-edge instrumentation and techniques.
- The development of evaluation techniques for spacecraft and batteries.
- The development of models of space radiation.
- Analysis and characterization of gas and materials over New York City after 9/11.
- Additive manufacturing of polymers and metals. The ability to identify defects during manufacturing.

As Tammy Choy, Aerospace Fellow, in Enterprise Information Services, summed up, "We can do things for the customer that no one else can." Darren Rowen, manager, Small Satellite Development and Operations said, "If you have a problem with something here in the labs, there is always someone who can help you. We have machines and capabilities to diagnose all kinds of things. Aerospace is unique in that way."

Awards and Recognitions, January 2017

by Gail Kellner
January 30, 2017

Aerospace employees frequently earn recognition for their professional accomplishments. This *Orbiter* feature acknowledges those honors and awards, including the publication of books. To nominate someone for consideration in this section, send details of the award in a timely fashion to orbiter@aero.org, or contact Gail Kellner at gail.d.kellner@aero.org.

Mark DiPrinzio, Dr. Lake Singh, and William Whittecar

Marc DiPrinzio, senior engineering specialist, Mission Analysis and Operations Dept.; Dr. Lake Singh, section manager, and William Whittecar, senior member of the technical staff, both of the Performance Modeling and Analysis Dept.; and Cornell University collaborator Dr. Patrick Reed received the "Best Paper" award from the 26th American Astronautical Society (AAS)/ American Institute of Aeronautics and



Astronautics (AIAA) Space Flight Mechanics Meeting. Their award-winning submission was entitled "Reducing Wall-Clock Time Of Metaheuristic-Driven Constellation Design with Coarse Parametric Mapping."

The authors will receive their awards at the AAS/AIAA Space Flight Mechanics Meeting in February in San Antonio, Texas.

The paper describes a technique to increase the computational speed of analyzing a constellation design problem. In broad terms, the technique involves performing necessary high-fidelity orbit propagation before the optimization is attempted. These high-fidelity results are then mapped into a low-fidelity surrogate function that drastically increases the speed of design evaluations, thus promoting an improvement in convergence rate of three orders of magnitude.

Danielle Sherrod

Danielle Sherrod, senior attorney, Office of the General Counsel and Secretary and president of the Aerospace Black Caucus, has been elected to the board of directors of the Constitutional Rights Foundation (CRF). CRF is a national nonprofit organization that seeks to instill in America's youth a deeper understanding of citizenship through values expressed in the U.S. Constitution and its Bill of Rights. The organization also educates young people to become active and responsible participants in society.

Members of CRF's board of directors are drawn from the worlds of law, business, government, education, media, and other areas. CRF develops, produces, and distributes programs and materials to teachers, students, and public-minded citizens throughout the country. Aerospace supports CRF annually through the Expanding Horizons Internship Program whereby high school interns are hosted by Aerospace's Corporate Communications and Public Affairs Division.

Aerospace Team

An Aerospace team received Systems Engineering Division/national security customer Team of the Quarter recognition for July through September 2016. The honors were acknowledged on Jan. 5.

The award is for exceptional performance and outstanding contribution to analysis of a critical national security asset. Members of the team included: Dr. Matthew Ferringer, Karl Doty, Ryan McKennon-Kelly, William Whittecar, Dick Dickinson, Dr. Grant Karamyan, Krista Katayama, Dave Barnard, Dr. Zoltan Somogyi, Dr. Richard Casten, and Matt Gypson.

January 2017 Obituaries

by Elaine Young
January 01, 2017

Sincere sympathy is extended to the families of:

Leonard Beck, member of technical staff, hired Dec. 26, 1963, retired June 1, 2010, died Dec. 4, 2016.
Donovan Bjerke, member of technical staff, hired March, 18, 1963, retired May 1, 1985, died Dec. 4, 2016.
Alan Bredon, member of technical staff, hired Sept. 4, 1963, retired Oct. 1, 1993, died Dec. 3, 2016.
Robert Covey, member of technical staff, hired Nov. 15, 1999, retired Feb. 1, 2013, died Dec. 12, 2016.
Michael Forth, office of technical staff, hired March 17, 1980, retired June 1, 2005, died Oct. 29, 2016.
Thomas Fuhrman, member of technical staff, hired Oct. 24, 1972, retired Jan. 1, 2010, died Dec. 19, 2016.
Victor Garcia, member of technical staff, hired Aug. 21, 1972, retired Aug. 1, 1986, died Nov. 15, 2016.
Charles Holt, member of technical staff, hired May 16, 1977, retired Dec. 1, 2000, died Nov. 23, 2016.
John Langre, member of technical staff, hired March 6, 1961, retired Dec. 1, 1976, died Nov. 3, 2016.
Harlan Matheson, member of administration staff, hired June 12, 1961, retired March 1, 1997, died Oct. 28, 2016.
Donald Nicholson, member of technical staff, hired Oct. 19, 1965, retired Feb. 1, 1984, died Nov. 11, 2016.
Samuel Tennant, retired president and CEO, hired Aug. 7, 1961, retired Jan. 1, 1992, died Dec. 10, 2016.
James Watson, member of technical staff, hired Oct. 19, 1992, retired June 1, 2012, died Aug. 27, 2016.
LaVonne Wilhoite, office of technical staff, hired Oct. 26, 1966, retired March 3, 1991, died Aug. 27, 2016.

To notify Aerospace of a death and have it included in the Orbiter, please contact Human Resources at 310-336-5107.

January 2017 Anniversaries

by Elaine Young
January 01, 2017

45 Years

Enterprise Information Services

Richard Haber

40 Years

Engineering and Technology Group

Melvin Cohen

Enterprise Information Services

Peggy Tatum, Susan McCormack

Space Systems Group

Billie Nealy

35 Years

Engineering and Technology Group

Juana Iroz, Maria Miller, Nicholas Sramek, Sylvia Hernandez

30 Years

Engineering and Technology Group

Alan Jenkin

Executive Offices

John Langer

National Systems Group

Dorien Garman, Walter Bloss III

Vaeros

Jeffrey Muhle

20 Years

Engineering and Technology Group

Matthew Marshall, Michael Papadopoulos

National Systems Group

Dennis Potts

Systems Planning, Engineering, & Quality

Peter Thomas, Thomas Schwendtner

15 Years

Engineering and Technology Group

www.aerospace.org

Brett Soltz, Jacob Rome

Enterprise Information Services

Kevin Severin

Operations and Support Group

Mary Villanueva

Space Systems Group

Benjamin Cano, Patricia De La Torre, Slava Ananyev, William Slutter

10 Years

Engineering and Technology Group

Andrew Stapleton, Chiging Wang, David Willmes, Greg Bloy, Mary Brady, Matthew Gypson,

Myron Szot, Robert Schellhase

Enterprise Information Services

Anne Mockus, Karyn Urrea

Operations and Support Group

Brett Randall, Crayton Reder, Trina Kilpatrick

Space Systems Group

Henry Bazak, Roger Knobbe

Systems Planning, Engineering, & Quality

Christopher Tarsitano

5 Years

Engineering and Technology Group

Matthew Conway

Space Systems Group

Dawn Pfeifer, Scott Murphy

These articles are reprinted from the Orbiter, a publication of
The Aerospace Corporation
2310 E. El Segundo Blvd.
El Segundo, CA 90245-4691

310-336-5000

www.aerospace.org

Orbiter Staff: orbiter@aero.org

Editor: Lindsay Chaney, 310-336-0961, lindsay.d.chaney@aero.org

Assistant Editor: Laura Johnson, 310-336-1179, laura.m.johnson@aero.org