

Pulse

Volume 42 | June 2025

Making the Connections:

Accelerating product development through digital engineering

Small changes, big impact:

How kaizen is transforming operational excellence

Mission capabilities at the speed of the fight

BAE SYSTEMS

The Beacon

Strategy, innovation, and the art of the impossible

By **Chris Rappa**, Vice President of Strategy and Planning
With **Laura Goodwin** and **Colleen Stone**, Communications

In Strategy and Planning, we're in the business of possibility. Our mission is to empower our people with the resources, frameworks, expertise, and tools needed to turn the impossible into the inevitable. We want to help you shape the future, not just plot a course. From infrastructure modernization to AI exploration, our work is driven by one purpose: to empower and equip our people to deliver for our customers.

A strategy defines how this can be achieved. Good strategy is bold, agile, and resilient – not rigid or predictable. One way to make strategies more robust is with innovation, turning obstacles into opportunities. The best innovation does what some would say is impossible. Let's explore what that means.

We shouldn't take 'impossible' for simple fact, we should take it as a challenge. It reflects the limits of our current perspective, not the true limits of what can be done. Ingenuity challenges the status quo, often striking the familiar script of "we've always done it this way." But every challenge is an opportunity to innovate, disrupt, and create something new. We should not fear taking risks, failing, and learning from our mistakes. In the end, it's not about being perfect – it's about being bold, fearless, and willing to push the boundaries of what's possible.

How do we help those around us be bold? When someone floats their "idea balloon," one's first instinct may be to pop it – but what would happen if you added more air? Maybe that additional air changes the composition slightly. The idea keeps floating, evolving with each person's contribution. Did you pop any balloons today? How many did you add air to?

Arthur C. Clarke's Third Law states, "Any sufficiently advanced technology is indistinguishable from magic." Innovation, at its best, feels like magic.

We do so many cool things here in Electronic Systems. You are all magicians disguised in business casual, working across teams and disciplines to transform the impossible into reality for our customers. How do we cultivate this? How do we do more? We must create an environment where employees feel empowered to bring their best forward.

One place where our innovative culture truly shines is through our Empower program. The Empower program is the strategic innovation arm of our business and provides funding and guidance for maturation and prototyping when appropriate. This initiative has come a long way since its inception, evolving from an open portal for ideas to focused sprints that tackle specific challenges. And now, in its 15th anniversary year, Empower has reached a major milestone with the launch of our Innovation Impact Accelerator. This accelerator is designed to amplify the potential of our team members, providing them with the mentorship and resources they need to take their ideas to the next level.

But we know that advanced thinking is only half the battle. We need to give our ideas the runway they need to take flight. That's why we're investing in better collaboration tools, enhancing our processing infrastructure, and embracing cutting-edge technologies to eliminate obstacles that have previously limited capabilities.

With these investments, our teams can accomplish significantly more with the same resources, tackling twice as many customer challenges and creating exponentially more value with every effort. The result? A more agile, advanced, and impactful organization that's better equipped to drive business growth and success.

Can we do more? Let us know. We're here to add air to your balloon. 🎈



Take me home!

Every issue of *Pulse* magazine is fully approved for public release. Feel free to share with family and friends.

Inside this Edition:

Electronic Systems Pulse Volume 42 explores the intersection of technology and strategy, featuring stories that demonstrate how our business is leveraging advanced methods, quality-focused approaches, and strategic initiatives to drive innovation.

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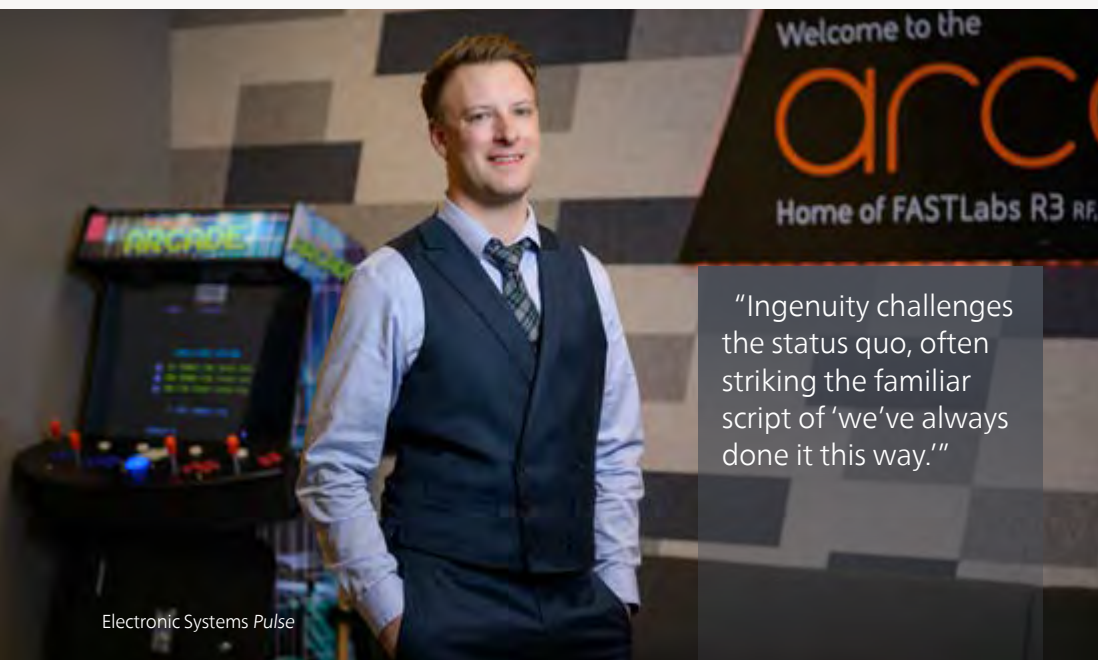
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"Ingenuity challenges the status quo, often striking the familiar script of 'we've always done it this way.'"

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On the cover:

To keep pace with customer needs and expectations, BAE Systems is transforming and accelerating product development through digital engineering



Small changes, big impact:

How kaizen is transforming operational excellence

By Colleen Stone, Communications

Every day at BAE Systems, our work supports those who protect us and those who keep the world moving. Our customers depend on us to develop and deliver high-quality solutions on-time and within budget. To ensure we're delivering our absolute best, we embrace a mindset of continuous improvement. One way we do this is through kaizen, which in Japanese means "change for better" or "improvement."

"The reason we focus on continuous improvement is our customers," explained Roxanne Benzel, Lean Systems Master Black Belt/Six Sigma Black Belt. "We strive to not only meet but exceed their expectations, by refining our processes, enhancing efficiency, and driving innovation."

With over 50 kaizen events completed last year, this approach has become a fundamental part of our operational excellence. It helps us to streamline workflows, boost quality, and deliver even greater value, all while advancing our 2025 business goals.

What makes kaizen different: Targeted process improvement

At its core, kaizen events facilitate quick and focused improvements that drive real results. Instead of tackling big enterprise-wide changes, kaizen focuses on specific processes where teams can make meaningful enhancements in just days.

"The beauty of kaizen is its focus," highlighted Benzel. "We zero in on key areas where we can create immediate, measurable impact."

By addressing one process at a time, teams can quickly implement solutions, see the direct benefits of their efforts, and build momentum for a culture of continuous improvement.

From frustration to flow: Transforming the intercompany work order process

One example of this targeted approach in action is the recent transformation of our intercompany work order (IWO) process – a system that facilitates the transfer of work and associated costs between two parts of the business, ensuring accurate accounting and transactions.

When survey feedback revealed employees were struggling with the IWO procedure, finance director Don McCarty knew something had to change, especially with a forecasted increase in IWOs.

Don assembled team members from Quality, Finance, Program Management, and Operations for a focused kaizen event. Master Black Belt Neil Craig facilitated the event as they methodically broke down every step of the IWO process.

"By breaking the workflow down into manageable steps, we could pinpoint the areas that weren't performing optimally and determine the best course of action," said McCarty.

"When process issues arise, especially in complex systems with multiple interfaces, bringing the team together to analyze each step and identify the problem areas is essential," added Craig.

Through this kaizen event, the team implemented four key enhancements that transformed the process:

1. Developed comprehensive training materials.
2. Created a database of subject matter experts for quick problem solving.
3. Improved access to necessary tools and resources.
4. Enhanced communications about the new process.

A follow-up survey six months later confirmed the impact: significantly fewer bottlenecks and more satisfied team members.

How kaizen works: Turning specific challenges into opportunities

Kaizen events at BAE Systems are fast-paced, focused activities, where small cross-functional teams collaborate over three to five days to drive meaningful progress. The philosophy is simple yet powerful: small, incremental changes lead to significant improvements over time. "Score a run by going from base to base; don't wait for the home run," as Benzel puts it. By bringing people together from different functions, these events foster diverse perspectives and collaborative problem solving.

Every successful kaizen begins with a project charter, a critical roadmap outlining the scope, team members' roles, project objectives, and measurable business impact. "The power of kaizen comes from a team's commitment to the charter and a shared focus on results," stated Sydney Holtzen, a participant in our Quality Leadership Development Program.

With the charter established, teams follow a structured approach:

- Assess the current state: Walk through processes to identify gaps and opportunities.
- Collaborate on solutions: Brainstorm targeted improvements within the defined scope.
- Implement and measure impact: Execute changes and track long-term results.

By staying aligned with the charter and focused on ongoing enhancement, kaizen teams turn everyday challenges into opportunities for growth, efficiency, and innovation.

The power of employee-driven change

What makes kaizen truly special is how it empowers every BAE Systems’ employee to transform the processes they know best. By equipping teams with tools to identify inefficiencies and opportunities, the methodology creates a culture of ongoing refinement at every level of the organization.

“One of the most rewarding moments is seeing participants have that ‘aha’ moment – recognizing opportunities in their roles and feeling empowered to take action,” said Holtzen.

Kaizens strengthen collaboration by bringing together team members who are most intimately familiar with a task. By directly involving people in generating ideas, identifying challenges, and implementing solutions, the approach creates a sense of ownership that makes change management smoother and results more impactful.

Achieving operational excellence with kaizen

“Kaizens play a crucial role in supporting our HEAT strategy. By driving operational excellence across the organization, everyone is empowered to improve one process at a time,” said Brian Svoboda, vice president of Quality. “Our goal is to excel in everything we do, ensuring reliable delivery through world-class operations. These events help us achieve our goals by driving collaborative and innovative solutions that support our missions of We Protect Those Who Protect Us® and We Innovate For Those Who Move The World™.”

As we continue to strive for excellence, kaizen events remain a key catalyst for driving progress, encouraging a culture where continuous improvement is everyone’s job, and delivering value to those we serve. 📊



Team members collaborate in a cross-functional kaizen event to drive operational excellence.



Sydney and Roxanne lead a kaizen event to enhance process efficiency.



Teamwork in action during a recent kaizen event.

Empowerment: Stepping into a moment of mentorship

with Shab Smith, C4ISR Systems engineering director By **Emily Rodrigues**, Communications

“There’s something about being outside, moving, and talking that makes conversations more open and reflective. Those walks with my mentors helped me gain clarity and perspective, and I try to create those same opportunities for the people I mentor today.”



Our mentoring series features impactful leaders who share their career journeys and insights. In this session we talk with Shabnam Smith, an engineering director in C4ISR Systems, about her journey through BAE Systems, reaching beyond your comfort zone, and defining career moments.

Tell me about your career at BAE Systems and the journey you've been on?

I've spent my entire career at BAE Systems, and that's been an intentional choice. I joined the Engineering Leadership Development Program straight out of college. Over the years, I've had the opportunity to work across a wide range of technologies – supporting programs that operate undersea, in space, and everywhere in between.

For me, engineering has always been a creative space, offering the chance to solve complex problems in innovative ways. But what has kept me at BAE Systems is more than just the technical work, it's the people. The company has continually invested in my growth, providing opportunities to take on new assignments and expand my skills. Leadership has trusted and advocated for me, allowing me to step into increasingly impactful roles. I've had incredible mentors along the way who have guided, challenged, and supported me at pivotal moments in my career.

At the same time, mentoring others has been one of the most rewarding aspects of my journey. I've had the privilege of working with and developing talented engineers, helping them navigate their own career paths, and watching them grow into confident capable leaders. The friendships and professional relationships I've built here mean so much to me.

As someone who thrives on variety and creativity, the ability to work with many different domains, collaborate across teams, and engage with customers has been incredibly rewarding.

Did you always want to be an engineer?

No, definitely not. When I was younger, I never saw myself as an engineer. I always considered myself a creative person, and I had a misconception that engineering was rigid, black and white, like a math equation with only one correct answer. I was surprised to find that there is so much space to be creative. The hard problems we're trying to solve here at BAE Systems – there are several different ways to solve the same problem, and the challenge lies in thinking outside the box. That creative problem-solving aspect is what keeps me engaged.

Can you recall a defining moment or experience in your career?

A defining moment in my career was stepping away from Compass Call, a program I had spent almost 10 years on and one where I had essentially "grown up" professionally. At the time, I had just started my family, and staying in a familiar environment felt like the right decision. But when I finally chose to trust in myself and step into a new challenge, I quickly realized that my success wasn't tied to a specific program – it was a reflection of my own skills and adaptability.

That experience reinforced my confidence and shaped how I approach my career. Now, I actively seek out challenges rather than staying in my comfort zone, knowing that growth comes from the unknown.

How have you benefited from mentorship relationships?

Being in engineering hasn't always been easy and at times I questioned whether this was the right space for me. Over the years, I've seen the culture evolve and peer-to-peer mentorship

has been a huge part of my journey. Early on, the guidance and encouragement I received from mentors helped me navigate challenges, build confidence, find my voice, and understand my own potential in ways I couldn't always see for myself.

One of the most valuable lessons I've learned is that mentorship isn't just about answering questions or guiding someone through a specific event – it's about advocacy. The best mentors don't just offer advice, they open doors, push you to take risks, and help you recognize opportunities you may have overlooked. Some of my most meaningful mentorship moments happened outside of traditional meetings – simply stepping away from the office and going for a walk. There's something about being outside, moving, and talking that makes conversations more open and reflective. Those walks with my mentors helped me gain clarity and perspective, and I try to create those same opportunities for the people I mentor today.

That's why I make it a priority to mentor others, especially mid-career professionals looking to pivot and expand their impact. Sometimes mentorship means providing technical guidance or career advice, but more often, it's about helping someone see what they're truly capable of. Sometimes people just need a confidence boost to realize they can stretch themselves further than they thought possible. Watching someone step into new challenges and succeed is one of the most rewarding aspects of my career.

At its core, mentorship is about relationships. It's about lifting each other up, advocating for the people you believe in, and ensuring that as we grow in our careers, we're bringing others along with us.

What advice do you have to reach beyond your career comfort zone?

One of the biggest lessons I've learned is that discomfort expands your comfort zone. I wasn't always someone who took big leaps, I preferred a step-by-step approach. But I've realized that you don't need to have everything figured out before jumping into a new challenge. Trust yourself, lean on your strengths, use your network, and embrace the learning process. Growth happens in the moments that feel uncertain.

If I had to sum up my career philosophy, it would be this: Run toward challenges, do not shy away. Take on demanding work and embrace discomfort to shape your career and fuel growth. Accepting challenges isn't something to fear – it's a privilege. The most meaningful experiences come from tackling what seems daunting and proving to yourself that you can.

As you undertake challenges, advocate for yourself. Too often, talented professionals hesitate to ask for what they deserve. If you don't pursue opportunities no one will chase them for you – you must claim them.

Ultimately my career has been shaped not just by what I do, but by where I do it. BAE Systems has given me the opportunity to grow, innovate, and mentor others in an environment that values creativity and different perspectives. I hope to continue pushing boundaries, mentoring future leaders, and fostering an environment where the next generation of engineers feels empowered to do the same.

If you are interested in working with rising stars like Shabnam, explore career opportunities at jobs.baesystems.com





Paying it forward: Mentoring our heroes for a stronger tomorrow

By **Alice Crutcher**, Communications



As part of our mission to protect those who protect us, BAE Systems values the unique skills and experiences that veterans, transitioning service members, and military spouses bring to the workforce. In January, the company launched a new program with American Corporate Partners (ACP), a national nonprofit organization, to provide mentorship opportunities for military members and their spouses. This program enables employees to mentor and support these individuals as they transition to civilian careers.

Through a commitment of one hour per month, employees are making an impact on the lives of military members and their families. Mentors virtually connect with their mentees for discussions about working in the aerospace and defense industry, writing a resume, and interviewing for a corporate job.

The mentorship program has already been instrumental in the lives of many veterans who now work at BAE Systems. Program Manager Kris Stonaker leveraged the ACP mentorship program after serving 22 years in the U.S. Navy as a helicopter pilot. His mentor, a fellow veteran who also transitioned to the corporate world through BAE Systems, provided valuable insight and guidance into working at the company and in the industry.

Kris credits the mentorship program with helping him navigate the journey to a civilian career. "BAE Systems' mission resonated with me, and when a Navy connection reached out to me about a role that would provide a critical self-defense capability to a Naval aviation customer, I was determined to be part of that team," he said. Now, Kris is paying it forward helping to connect his colleagues to veterans who are looking for resources and support as they navigate the civilian workforce. This year, 25 employees will participate in the program, demonstrating our commitment to supporting career aspirations for those who have served.

Ready to launch your career with a company that values your military experience? Explore career opportunities at BAE Systems and learn more about our commitment to supporting veterans and military families. [▶](#)

BAE Systems' M-Code GPS receiver solutions are reliable and ready

By **Shelley Walcott**, Communications

An all-out sprint is underway between the United States and near-peer adversaries to develop and advance satellite-based navigation systems. The most innovative of these systems prevent the jamming or spoofing of Global Positioning System (GPS) signals used to provide positioning, navigation, and timing (PNT) to U.S. armed forces in contested environments.

Admittedly, it is a race with hurdles, including a growing misconception about the reliability of GPS and whether the military's highly encrypted signal known as M-code is "ready for prime time." Work has been underway for more than two decades to modernize GPS with the more secure, jam-resistant, M-code. However, a recent U.S. Government Accountability Office report suggests technical and manufacturing challenges have delayed the deployment of M-Code.

BAE Systems is actively developing and fielding a comprehensive family of M-Code GPS receiver solutions. We have created security-certified Common GPS Modules (CGMs) that leverage the robust M-Code signal across an all-inclusive GPS receiver portfolio. This portfolio scales from the world's smallest and lowest-power M-Code GPS for size, weight, and power (SWaP)-challenged applications, to highly robust receivers with integrated anti-jam antenna electronics for exceptionally challenging environments.


In addition, ongoing efforts for DIGAR™ production is ensuring the reliability of military GPS systems for aircraft and other platforms operating in challenging signal environments. DIGAR uses advanced antenna electronics, high-performance signal processing, and digital beamforming for better GPS signal reception and superior jamming immunity with both the powerful M-Code and legacy Y-Code GPS signal.

The diverse line of M-Code receivers includes the ASR™-M, MPE™-M, MicroGRAM™-M, NavGuide™, NavStrike™-M, NavStorm™-M, and SABR™-M. The NavGuide handheld is anticipated to begin customer deliveries this year.

To date, BAE Systems has delivered selective availability anti-spoofing module products to more than 45 countries and has begun delivering M-Code GPS receivers in multiple form factors and levels of capability to the U.S. armed forces and its allies through foreign military sales. Additional M-Code capable receiver form factors are also on the horizon.

Customers who have integrated these products into their platforms are at a competitive advantage, as the open-architecture capability can be tailored to solve their most pressing battlefield problems at an affordable price with a short timeline.

While the scrutiny of the operational efficiencies of M-Code products provided by defense technology companies is important and necessary, significant successes and advancements are currently underway.

BAE Systems is not only dedicated to maintaining a supply of cutting-edge GPS solutions today, but also proactively overcoming the challenges of a rapidly changing defense landscape for the foreseeable future. 



Making the Connections

How ES is transforming and accelerating product development through digital engineering to keep pace with customer needs and expectations.

By **Barbara Driscoll**, Communications

The Engineering function in Electronic Systems is in the process of transforming how it develops products. The goal is to more rapidly and effectively innovate, develop, and deliver capabilities to our customers.

To accomplish this, the team is on a multi-year journey to expand use of digital engineering (DE). In short, DE advances design creation, analysis, verification, and maturation by connecting and communicating system design information through digital models and artifacts – rather than through a mix of standalone design artifacts and Microsoft Office documents.

In the ideal future state, these models can be used to represent nearly every aspect of a product throughout its life cycle: from

requirements, architecture, hardware, software, and firmware, to performance tests, mission performance simulations, and dozens of other purposes. Project artifacts such as specifications, technical drawings, and analytical results would also be digital.

The power of DE is realized when all of these pieces of data are connected. Together, they create the single, authoritative source of truth (ASoT) for project data. It is the backbone of DE by which everyone involved across a product's life cycle can store, reference, manage, and update project information in real time.

This is a game changer because it enables seamless collaboration and accelerates development in ways that

traditional methods cannot. Historically, different engineering tools have been unable to communicate with each other, and data sets have been stored in separate silos. The digital threads bridge these gaps.

For years, pockets of engineers in different business areas have matured their use of models, particularly to develop hardware and software including simulation and test. Since mid-2023, all new Electronic Systems programs use digital engineering, starting with model-based systems engineering (MBSE). Through MBSE, engineers represent the system's architecture, behavior,

foothold for advancing our model-based engineering. Now other disciplines can derive their requirements and produce content in alignment with the systems model."

Last year, the U.S. Department of Defense (DoD) began requiring digital engineering on new programs aligned with the DoD Digital Engineering Strategy.

"Our progress to date has kept pace with customer expectations for model-based engineering and digital engineering," said McQuarrie. "We have also stood up the on-premise cloud computing infrastructure to support the computing, and host

and performance, and virtually simulate how it will work to identify potential problems that could be resolved before the system is built. This reduces errors and rework, increasing efficiency and productivity while clearly communicating the system architecture to development teams.

With MBSE, teams have been up to 40 percent faster in reaching their System Requirements Review, where customers ensure that the system requirements are well-defined, complete, and consistent with their needs and expectations. The quality of their architectures is also better.

"It's a small step that represents big change," said vice president of Engineering Allan McQuarrie. "It creates the desired

common engineering desktops and applications suites for the engineering disciplines. The next step in the evolution of our model-based engineering is to make the connections."

This year, Engineering teams are creating and executing road maps that will guide how they will connect all their tools and data within digital engineering environments, in U.S. segments and Rochester, UK. In these environments, programs will create their threads connecting the authoritative data and models that provide actionable information to decision makers throughout the life cycle.

First, the teams must achieve interoperable tools for seamless data exchange, which involves standard data formats,

security and access controls, and change management that synchronizes complex and changing product designs, requirements, and configurations.

“At its core, model-based engineering (MBE) aims to transform the way information is generated and managed,” said Jim Wankel, acting director of ES’ Model-Based Engineering Capability Group. “The result of this will enable our team to make decisions earlier in the product life cycle with higher confidence, have a higher quality product and, through validated models, allow us to better understand product capability across the mission environment envelope.”

Digital threads will allow engineers to better evaluate their designs. For example, an engineer designing a system component could conduct a trade evaluation of a component part to see the impact it has at the system and mission levels by connecting to the system and mission models.

The threads will also move data more quickly through the engineering process as a single source, rather than today’s practice of having to translate it into different states such as CAD files, drawings, and production aids. These involve manual translations that can introduce errors and require rework cycles, said Neil Clarke, director of the Engineering team at ES’ site in Rochester, U.K.

Other major benefits of the threads include the ability to: continuously improve the model throughout development and with feedback from the field; leverage core design models and artifacts across ES programs to save time and budget, and conceivably even leverage digital threads created by another program.

This is just the beginning. The digital thread is an operational breakthrough of such tremendous importance, all the possibilities are still yet to be discovered.

“How we apply artificial intelligence to an automated digital environment is so exciting, we can’t yet imagine all the potential benefits it offers,” said Clarke. “It’s like when first-generation cell phones were introduced. Who could have imagined all the functionality we’d expect from a smart phone a little over a decade later.”

The teams face considerable challenges in gaining connectivity across the engineering teams supporting business areas with diverse tools, methods, and data formats.

Wankel’s team is working to launch the Data Web Express (DWE), a digital engineering environment that will provide our U.S. defense engineers with the ability to build and manage digital threads from common tools and analysis methodologies, streamlining the decision-making process. We’re currently testing the DWE in a controlled setting, with plans to roll it out to various programs later this year. While we’ve made progress in connecting some of the tools that help us architect products, there’s still more work to be done to fully integrate all the necessary systems. Models for hardware and software are currently being connected

as performance models are still federated. In addition to these, the team is also focused on modeling that confirms manufacturability and affordability – creating a connection to factory test data which will serve to confirm model accuracy and design optimization.

“ES has established significant momentum in embracing digital engineering and model-based engineering. Though the engineering work does not change, and the method expedites the process, it does require a change in our mindset and our culture,” said Wankel. “We will learn to rely on the analytics of validated models, but that won’t come easy. As engineers, we need to see proof before acceptance, and this can take time. Mindset shifts can be hard. We ask that each of us lean into model-based engineering and evaluate its merits.”

In the U.K., the team is focusing on the early stages of connecting tools together and the data models required to create conformity. This sets the foundation to implement digital threads. “We are moving toward an incremental infrastructure release initially focused on upgrading key tools with inbuilt interconnectivities,” said Clarke. “These will

form our digital backbone on which we can define a digital process set fully embracing MBE and generative artificial intelligence.”

The long-term goal for digital engineering is to connect digital threads across the entire product life cycle from mission modeling assessments, product design, verification, through manufacturing and sustainment, all while providing visibility across stakeholder functions,

including Contracts, Engineering, Operations, Program Management, and Quality. This is just within BAE Systems.

“Our customers and suppliers have their own digital enterprises that they are operating in and, generally we are at different levels of maturity – not always using the same tool sets, and not capturing project requirements in the same way,” said Mike Crawford, engineering director for the Controls & Avionics Solutions and Power & Propulsion Solutions business areas. “As we move forward on this journey, it will be important for us to not only progress the maturity of our internal capabilities but also understand how we integrate into our customers’ and suppliers’ environments. When we are successful with this, it will unlock a tremendous amount of value to our customers and our business.”

With companies across the aerospace and defense industry on the same path, MBSE is being done in a federated way.

“The long-term plan is to integrate our Engineering teams and functional stakeholders, our customers, our suppliers,” said McQuarrie. “The challenge is to get all of us synched up and connected. At end of the day, it’s about bringing that whole value chain together to focus innovation and development for the greatest impact on our customer missions.” ■

“How we apply artificial intelligence to an automated digital environment is so exciting, we can’t yet imagine all the potential benefits it offers.”

Streamlining Electrification for Diverse Markets



By **Carol Gorenflo**, Communications

Electrification Simplified™. It's not just a tag line at BAE Systems, it's what we do. We've tackled the complexity of electrification to make it easier for both vehicle manufacturers and their operators to transition their buses and heavy-duty trucks to operate on electric power.

By using a modular architecture, our propulsion system is flexible enough for multiple platforms and can accommodate fuel-cell, battery-electric, and hybrid-electric power. Our latest propulsion system increases operational efficiencies and unlocks new capabilities with the additional power we harness. It was crafted to drive the expansion of electrification beyond transit city buses.

In doing so, BAE Systems engineers pioneered ground-breaking power electronics technology that can streamline vehicle electrification systems while expanding the range of power solutions available.

How exactly did we do this? Our innovative technologists designed scalable power electronics known as our propulsion power system (MPCS) and our accessory power system (MAPS). These systems employ sectional building blocks, each serving a distinct function. This approach allows for flexible and efficient customization, to meet diverse application requirements across numerous platforms and reducing the need for additional development efforts.

Each building block, or 'slice' as we refer to them, has a unique role. One of our 'slices' converts power from high voltage to low voltage, while another converts DC (direct current) to AC (alternating current) power. Each capability is packaged into a slice thinner than the size of a personal size pizza box, at only 1.5 inches thick. The slices can be stacked to make one scalable, compact component – instead of several components, like many of our competitors.

Rob Vovos, lead engineer in the development of our new flexible power systems, notes, "with fewer components, we have fewer connections and cables, simplifying the process. Our 'slice' approach offers customization by enabling us to combine

slices according to the vehicle's power needs, ensuring we avoid adding unnecessary capabilities."

Let's consider a sanitation truck in a city that has gone electric. The truck is equipped with the capabilities and requirements to do its job, including automated front loaders or side loaders, air conditioning, batteries, heating, and trash compacting. To support the truck's electric operation, we would include a slice to power the loaders, a slice to support the batteries, a slice for propulsion of the vehicle, and so on – we are able to provide all the power for this vehicle with just a few slices.

Combining functions within one component, versus creating separate components, means 25-40 percent fewer parts than our competitors, streamlining integration. As the industry progresses, we're finding vehicle manufacturers are looking for more accessory power than ever before. Fortunately, our systems can supply more than ample power to them, without sacrificing space or adding excess weight.

If you were to examine a competitor's electric drivetrain solution, you might see an entanglement of undecipherable connections – posing safety concerns as well as difficulty in servicing the vehicle. In contrast, with our simplified approach, it's much easier to follow the connections to driveline components.



2025 ACT tradeshow booth

Our customers value the efficiency our consolidated approach offers. By integrating cutting-edge electronics and switching technology, we significantly enhance performance. We're using silicon carbide for faster switching, and gallium nitride to lower heat and resistance.

Due to its myriad benefits, electrification is a goal for today and the state of the future. With our flexible and compact approach, our power electronics design is destined to become the benchmark for Electrification Simplified™.

See our power systems in action. Click or scan the QR code to watch an animation that shows how our innovative design provides the flexibility to electrically power a range of heavy-duty vehicles and drivetrains.





The HEAT is on in Rochester: Shaping the future of our U.K. site for generations to come

By **Joanne Pohl**, Communications

Our facility in Rochester, U.K. has seen the design and manufacture of avionics solutions and technology for more than a century, with parts of the site dating back to the production of Stirling Bombers during World War II. In recent years it's been home to ground-breaking innovations such as developing the Striker® II Helmet-Mounted Display, taking flight controls underwater as part of the Dreadnought submarine, and producing the world's first certified active interceptors.

In October 2024, the biggest change in more than a generation to the historic Rochester site was announced. Redevelopment plans with a £220 million investment – the largest the company has made in a single site for at least a decade – will see a new 32,000m² state-of-the-art factory built, with ground set to be broken in 2026. The new factory will see strides in efficiency and collaboration, improving outcomes for customers and enhancing the employee experience.

"This is a once-in-a-lifetime opportunity to shape the future of the Rochester business for generations to come," said Rochester Business Center Director Dave Banks. "We're ensuring we can keep serving our global customer base, protecting servicemen and women who put themselves in harm's way for our sake, supporting commercial air travel, and developing the next generation of precision controls."

Building the new Rochester factory isn't a straightforward task, however. "It's a bit like replacing parts in an aircraft while it's mid-flight", says Banks. "Unlike other sites where a piece of land is purchased and a new factory is built, due to our space constraints we're redeveloping the site we're working on, while maintaining performance for our customers."

The progress so far

The transformation of the Rochester site started in 2016 with an exploration of whether refurbishment, relocation, or building a new factory would be the best option.

Since the build of a new factory was decided on, a core team has been on a journey to understand planning rules, obtain advice from the local Medway Council, and consult with manufacturing and program leads within the current factory to inform the master plan of advance works.

"To make the most of this blank canvas and create a factory that, from the ground up, meets our needs, we've engaged extensively with internal and external stakeholders and organizations," said Sam Berkhauer, business transformation director.

The new factory is a true team effort, with every function of the business engaged to understand their requirements of operational, maintenance, and resource efficiency needs. Data gleaned in hundreds of hours of dialogue and workshops with cross-functional teams is now progressing the design planning, led by colleagues from BAE Systems' Real Estate and Infrastructure (RE&I) team.

Impacts in efficiency

“The build of the new factory takes us one step closer to bringing our future factory to life,” said Lee Penford, operations director at the Rochester Business Center. “Our vision is to create a world-class advanced technology manufacturing facility that reflects our products and services. The infrastructure of the building will enable a digitally connected factory where data from equipment and processes is available in real time. The manufacturing areas are designed as highly flexible and visual workspaces with the ability to rapidly reconfigure, enabling better utilization and increased growth capacity.” Unhampered by an older building, a new factory designed from scratch will include a ‘digital backbone’ to enable data-driven decision-making from a single point of truth, with cross-functional programs located together, resulting in closer collaboration.

Benefits for employees

Successful transformations are built on the foundation of strong engagement, particularly with employees. To do this, workshops have been held with Operations colleagues to gather insights, experience, and commitment – all critical in making this transition smooth, efficient, and successful.

“The build of the new factory is being used to galvanize colleagues in a conversation to bring them along on this journey: making sure that our people are not only informed, but actively involved in shaping their future workspace,” said Berkhauer.

This dialogue shows that the new factory is more than just a change of location, or bricks and mortar: it’s about a sense of belonging, purpose and pride in what we do and how we do it. For our employees, the new factory is needed to secure the future for generations to come.

As the largest employer in the area, the new factory is poised to have a significant impact on the local economy. With plans to add 300 employees to the Rochester site over the next five years, the factory represents a major milestone in the company’s growth, underscoring our commitment to investing in the local community.

There’s a palpable sense among our technicians, engineers, and support teams that this is an opportunity to build a future our people can take pride in – to foster an environment where innovation and continuous improvement thrive, where high standards are the norm and where we raise the bar for excellence together.

“The spirit of creativity, collaboration, and inspiration that has been present throughout our history will no doubt continue to guide us as we design and realize the bright future that we are envisioning for the Rochester site,” said Banks. 🏗️



Sam Berkhauer and Lee Penford

Mission capabilities at the speed of the fight

By **Mike Roske** with **Mark Daly**, Communications

Our adversaries are formidable and the battle for control of the electromagnetic spectrum gets harder every day. The signal environment is dense, and adversaries' electronic warfare (EW) systems are increasingly complex and resilient. They use a broader range of the spectrum, advanced waveforms, and networked capabilities, and have access to rapidly reprogrammable high-performance hardware.

Gone are the days of years-long development cycles and extended periods of developmental and operational testing. Complex digital threats evolve at a much faster pace than classic EW development.

For the warfighter, speed is life. The Department of Defense (DoD) and industry must pull together to get effective EW capabilities into their hands as quickly as possible and must continue to deliver advanced capabilities through iterative improvements and continuous mission learning. We need to react faster, often with less information up front. We also need to be able to adapt our work when we get new information and/or requirements change – which is a new way of thinking about traditional defense acquisition.

While we don't know everything on day one of a program, we know enough to get started, and how to work with our partners, customers, and supply network to collaborate across boundaries to deliver flexible capabilities that can evolve at the speed of need.

Effective capabilities

Operational analysis is a critical component of EW design and development. Each EW capability must earn its way into the arsenal through demonstrated performance. That starts with tactics development where the capability is challenged in model form to achieve mission success against new and postulated threats.

EW models are educated by real-world data captured at the leading edge of the battlespace and analyzed for performance and limitations.

By working with the customer community to better understand emerging threats, missions, and tactics, we are better prepared to fully utilize effective modeling and simulation and data-driven development, creating a continuous development and improvement flow.

Open architecture – fieldable mission software suites

Open architecture is critical to EW development because it enables agile software-defined radio (SDR) capabilities that can rapidly evolve to meet the changing threat. The push for open architectures is about standardizing requirements and interfaces to drive faster development timelines and enable rapid capability sharing across multiple platforms with minimal effort. Ported capabilities can increase operational effectiveness without reinvention.

BAE Systems is actively developing modern open architecture standards in collaboration with industry and defense partners. We have been building SDRs for years, and are now focusing on making them more open, modular, and configurable. We have a significant amount of fielded hardware today. With minor firmware/software updates, we can unlock its potential.

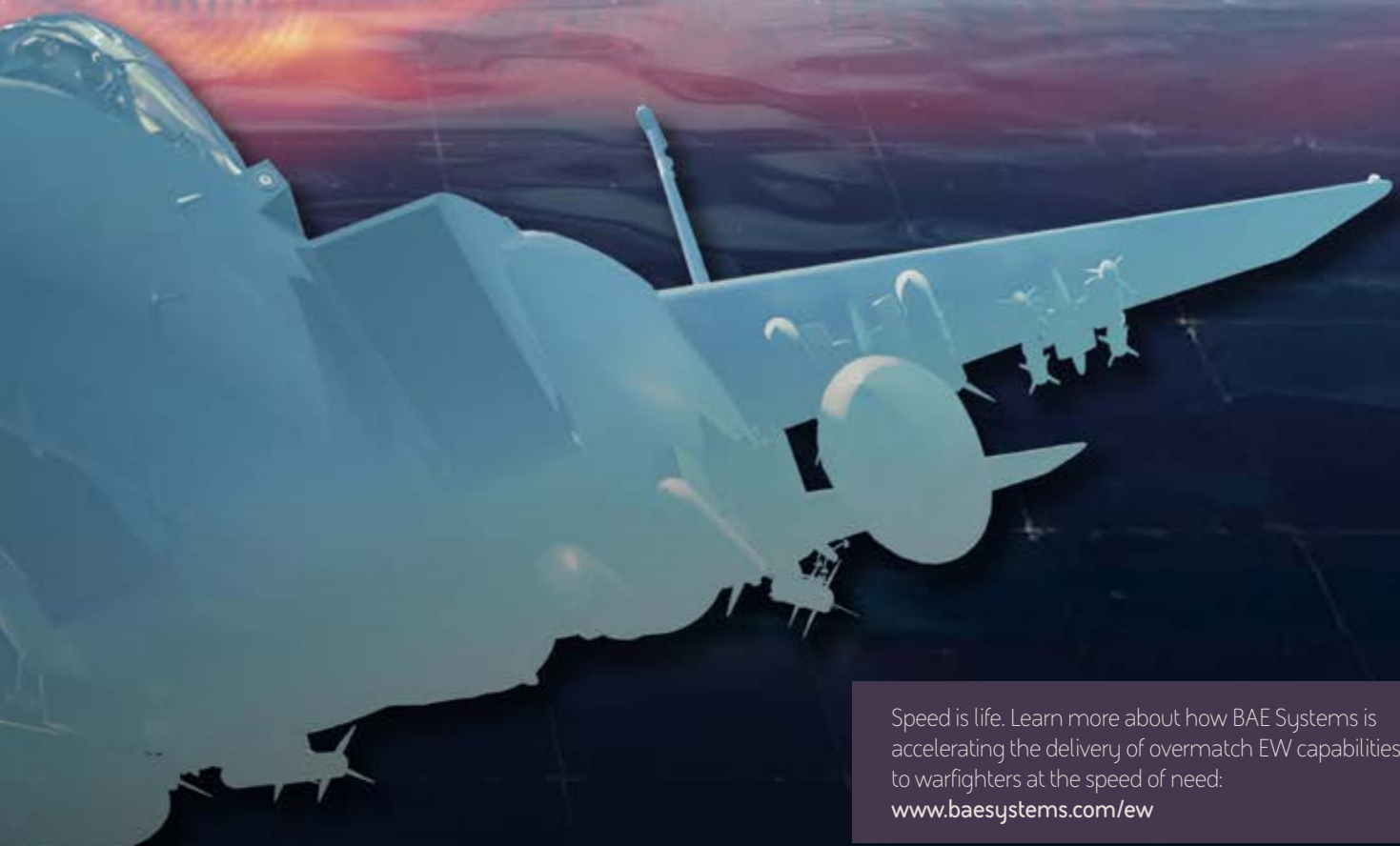
Open architecture, like the core design of our Storm EW™ spectrum warfare suite, opens the aperture for software developers to run applications. Today, a growing number of companies and research labs (including our FAST Labs™ research, development, and production organization) are building highly portable and effective apps and mission capabilities. Broadening the pool of available developers enables and encourages competition and speeds the delivery of innovative new capabilities to the fleet.

Creation of EW applications by independent industry developers (or the DoD) amplifies a need for a capability integrator whose role is to ensure harmonious operation, cyber resiliency, and resource management to meet overall mission objectives.

While open EW architectures evolve and become outdated, the core tenets of capability against threats and flexibility do not. The use of open architectures drives the DoD and industry to continuously adapt throughout the life cycle of an enduring fleet.

Leveraging military electronics – hardware for operational overmatch

The reuse of common core EW hardware will also be critical for accelerating capabilities to the field. BAE Systems is working on a common suite of highly capable, highly produceable multifunction mission systems and software. These common hardware building blocks can be customized for specific platforms and missions, leveraging years of engineering and



Speed is life. Learn more about how BAE Systems is accelerating the delivery of overmatch EW capabilities to warfighters at the speed of need: www.baesystems.com/ew

manufacturing expertise and cutting costs. Leveraging existing hardware provides customizable, platform-agnostic EW systems for existing fleets – including those of our allies – and provides access to a growing library of software capabilities.

Custom and COTS hardware

Highly capable EW suites will require a blend of custom, high-performance military hardware with commercial-off-the-shelf (COTS) hardware. There is a time and place for COTS, and there are absolutely cases where highly specialized hardware is critical to mission success.

Commercial computing power continues to rapidly improve and is accessible to adversaries. COTS hardware is good for some applications, but is not always the best solution for EW systems where performance and latency matter. The highly congested


electromagnetic environment has intense processing demands, and EW systems need to respond rapidly to threats when lives are on the line.

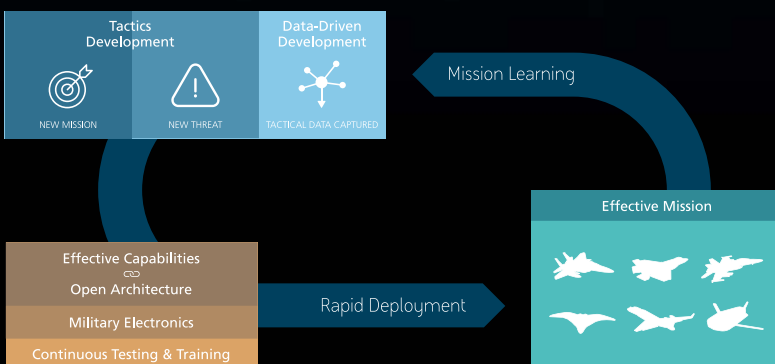
Custom military electronics make sure that our warfighters have overmatch capabilities against the adversary across the spectrum – faster response, higher power, and embedded functions unmatched by COTS.

Adaptable EW

Not every system in the strike package needs to be able to defeat advanced adversaries on its own. As tactics and networked EW capabilities evolve, swarms of platforms of varying sizes will collectively deliver EW effects on the battlefield. Transceivers and EW hardware in the future will come in all shapes and sizes. They will need to deliver capabilities on tight timelines, and in many cases, must fit into tight spaces. Those systems will help the government do more with what's already been developed and will have the flexibility to empower the platforms of the future.

Continuous testing & training

Capability integration, validation, and testing will also be critical for delivering effective mission capabilities at the speed of the fight. Continuous testing and training readies warfighters for effective mission operation, exploring every corner of performance via high-fidelity simulations and real-world operations to ensure the equipment, capabilities, and most importantly – the people – are ready for the fight. 



Outpacing our adversaries through continuous collaborative development – from concept to combat.

In case you missed it [ICYMI]: A pulse on our top stories

From groundbreaking innovations to key program milestones, Electronic Systems employees are solving our customers' toughest challenges. If you missed any of the latest news, we've got you covered! Here's a roundup of the top stories shaping our company and industry.

Scan or click the QR codes to dive into the full articles featured in the spread.



Electronic Systems names 'Partner 2 Win' Supplier of the Year award winners

Thirteen winners were announced during a ceremony in Massachusetts. The honorees were selected for best-in-class performance in achieving on-time delivery and quality standards in 2024, as well as partnering with BAE Systems to advance and provide technology-led aerospace, defense, and security solutions to its customers.



BAE Systems to power new hybrid-electric bus fleet in San Francisco

BAE Systems will provide 42 electric drive systems for the San Francisco Municipal Transportation Agency's (SFMTA) new fleet of hybrid-electric buses. The company will deliver its Gen3 electric drive systems to bus manufacturer New Flyer for integration into the vehicles, providing San Francisco with proven and cost-effective technology that reduces fuel use and emissions.



BAE Systems significantly expands Endicott operations to support aircraft electrification

The company announced expansion of its operations in Endicott, N.Y., with a 150,000 square foot addition to its existing footprint. The dedicated facility will be equipped for high-voltage energy storage systems (ESS) development, manufacturing, and field support, advancing sustainable aviation solutions.



BAE Systems awarded \$85 million contract to deliver Network Tactical Common Data Links to the U.S. Navy

The company announced that in 2024, the U.S. Navy awarded BAE Systems an \$85 million production contract to deliver additional Network Tactical Common Data Link (NTCDL) systems. NTCDL will enable a real-time exchange of voice, data, imagery, and full-motion video from a variety of air, surface, subsurface, and man-portable sources. Systems under the company's current contract are presently being installed on U.S. Navy aircraft carriers and will be installed on new Constellation-class frigates.



BAE Systems and Airbus collaborate on sustainable aircraft technology

BAE Systems has signed an agreement with Airbus to provide the energy storage system for Airbus' microhybridization demonstration project for commercial aircraft. The two companies will advance sustainable aviation by maturing and integrating electrification technologies that can reduce aviation's carbon footprint.



BAE Systems awarded \$347 million NERVE contract from NGA to modernize and sustain GEOINT library

The National Geospatial-Intelligence Agency (NGA) awarded BAE Systems a five-year indefinite-delivery, indefinite-quantity \$347 million contract for NERVE, the National System for Geospatial-Intelligence (NSG) Enterprise Repository and Virtual Environment program. Awarded in 2024, NERVE will modernize the NSG Consolidated Library (NCL), which includes expanding it from a physical data center to cloud-based data services.



BAE Systems to provide actuator control units for JetZero's sustainable jet demonstrator

Late last year the company announced it will provide and integrate actuator control units (ACUs) for JetZero's next-generation blended wing body aircraft demonstrator, which is designed to deliver enhanced energy efficiency and reduced emissions.



Data Link Solutions receives up to \$1 billion IDIQ award for MIDS JTRS modernization efforts

The U.S. Navy has awarded Data Link Solutions (DLS), a joint venture between BAE Systems and Collins Aerospace, an indefinite delivery, indefinite quantity (IDIQ) award with a ceiling value up to \$1 billion for the Multifunctional Information Distribution System Joint Tactical Radio System (MIDS JTRS). The contract includes continued production, retrofits, development, and sustainment of MIDS JTRS terminals for future growth. MIDS JTRS provides situational awareness and enables Link 16 connectivity with jam-resistant, line-of-sight voice, video, and data communications for sea, ground, and air assets.



European nations invest in BAE Systems' most advanced fighter pilot helmet

The consortium behind the Eurofighter Typhoon has awarded BAE Systems a £133 million contract to further develop its Striker® II Helmet Mounted-Display (HMD). Under the new contract, awarded by the four-nation Eurofighter consortium – Germany, Italy, Spain and the UK, BAE Systems engineers will continue to mature the helmet's capability alongside a programme of flight testing.

The mission continues

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