Naval Air Warfare Center Aircraft Division

Strategic Plan

November 2011

A Strategic Plan for a Challenging and Dynamic Future

Our Strategic Plan flows from the vision, strategies, and guidance of the Chief of Naval Operations and the Commander, Naval Air Systems Command (NAVAIR). It is aligned with the strategic priorities of the Department of Defense (DoD), and the Department of the Navy (DoN) leadership, the Naval Aviation Enterprise (NAE), and NAVAIR. Within the Naval Air Warfare Center Aircraft Division (NAWCAD), this document describes our strategic vision, objectives, major thrusts, and enduring values covering the period 2012 – 2016. The purpose of this plan is to guide those changes needed for our continued mission success in the challenging and dynamic future environment – one that demands clarity of vision and boldness of action as we efficiently deliver and sustain critical warfighting capabilities on behalf of Naval Aviation, the Navy, and our nation.

NAWCAD will be the architect of all naval air combat systems, providing definitive leadership and full spectrum Research, Development, Acquisition, Test, and Evaluation (RDAT&E) capability to successfully meet the rapidly changing, complex, diverse and increasingly sophisticated needs of our national security. We will be the recognized leader in transitioning advanced technologies to air combat applications and efficiently delivering affordable, effective, and sustainable systems.

In charting our future course, this Strategic Plan incorporates the collective contributions of NAWCAD leaders, customers, and external stakeholders. It reflects thoughtful research and analysis by the Strategic Cell into the effects and imperatives of emerging technologies, trends in science and engineering, the benefits of alternative business models, and the attributes essential for an organization like NAWCAD to continue delivering extraordinary value to the warfighter in an increasingly complex and interconnected operating environment. This plan communicates how we will focus our resources, establish our strategic priorities, and make investments and decisions that position NAWCAD to efficiently and responsively support Naval Aviation Program Executive Officers (PEOs), National Level 1 Competency Leaders, and other national security customers. Our strategic objectives are classified in three broad performance outcomes: 1) Outpacing the Threat and Delivering Advanced Fully Integrated Warfighting Capabilities – *establishing enabling advanced capabilities*, 2) Reducing Acquisition Cycle Time and Total Ownership Cost – *responding to the emerging economic conditions*, and 3) Establishing a Comprehensive Workforce Strategy – *recognizing and unleashing the full potential of our human enterprise*.

We trust you will find this Strategic Plan useful in guiding our priorities and actions in the months and years ahead.

R. L. MAHR
Rear Admiral, United States Navy
Commander

G. K. KESSLER
Executive Director

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Naval Air Warfare Center Aircraft Division Strategic Plan

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A New Direction

The world is moving at a speed that makes it difficult to avoid being overcome by events. In response, NAWCAD established a Strategic Cell to shape a future significantly different than what we are experiencing today. This document provides a long-range view of the environmental factors that will shape our future and describes the important initiatives needed to prepare NAWCAD for the next 20 years.

Our central theme in preparing for the future is the W. Edwards Deming assertion that "There is no substitute for knowledge." This axiom was amplified by the recent Naval Research Advisory Council report which suggested that "There is no knowledge without doing." Although these statements are instinctive to many of us, there are many counter-forces that could impede our migration back to a knowledge-based organization that can lead successful systems development programs. Two technical commodities that are in critically short supply in NAWCAD must become a visible part of our future technical landscape — bench scientists well versed by experience in areas critical to naval air combat systems and systems engineers and analysts capable of executing both conceptual and detail designs for platform modifications. Additionally, our contracting, acquisition, and test organizational structure must be able to quickly adapt to the specialized demands of fleet and Combatant Commander projects, to include developing and providing acquisition alternatives. Given the complexity of our challenges, we recognize that going forward our ability to innovate, learn, and apply knowledge faster and better than our adversaries will be our primary source of sustainable advantage.

The NAWCAD Strategic Cell has assessed the major forces likely to influence our organization in the decades ahead, prioritized the most important areas and then overlaid these on the NAVAIR Commander's Intent for strategic alignment. The forces that were considered influential were categorized as political, economic, social (workforce), technological, and operational. This environmental assessment and the supporting initiatives are presented in this plan. Since the last Strategic Plan was published in 2008, emerging environmental influences have changed the vector of several thrusts. Such changes must be anticipated throughout the future and this document is, consequently, a living document.

Preparing for the 2025 NAWCAD Strategic Environment

To characterize the strategic operating environment for NAWCAD in the 2025 timeframe, we must consider a full range of influences and identify those key factors and trends expected to most profoundly affect our future. Although the future is uncertain, trends can be extended and emergent technologies and cultural norms assessed for down-range effects. We must also accept that disruptive technologies and events around our increasingly interdependent globe will continue to radically affect needed capabilities as well as national and naval views. Such global "Black Swans" are exacerbated by complex global interdependencies and the tendency of systems to seek "optimization" in efficiencies through high leveraging of resources with diminished buffers.

Our future success will increasingly depend on our ability to be strategically aware, possess the requisite foresight, develop potential futures to position ourselves, and adapt to an increasingly dynamic environment. We must be able to grasp the significance of new information in context and take appropriate actions – continually transforming, embracing new paradigms, developing important organic capabilities, and altering our business models to better meet the complex demands of our time. Our understanding of the world around us and our mission-aligned adaptation to it will define our success and value to Naval Aviation, the DoN, and our nation as a whole.

We have described NAWCAD's future environment along the five dimensions – Political, Economic, Social, Technological, and Operational. To some extent, these divisions are arbitrary and overlapping. However, by assessing our future through multiple lenses, we gain a better appreciation for the type of environment in which we will likely find ourselves by 2025. The strategies we choose today must enable our continued excellence in the environment of the future.

Political

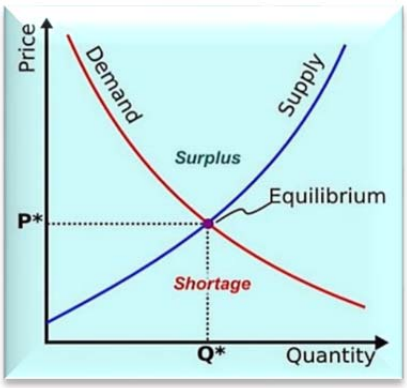
Karl von Clausewitz famously stated, "War is nothing more than the continuation of politics by other means." Global political systems are increasingly interconnected as economies increase in interdependency through the multinational nature of businesses, industries, and markets – a trend that shows no signs of abating. As global relations become more important to the economic health and continued political viability of the United States (U.S.), the importance of global U.S. naval forces as instruments of humanitarian relief and diplomacy, international law enforcement, and military power projection will also continue to grow. The advantages of operating off mobile sea-based platforms, including aircraft carriers, will be challenged by increased military capabilities from emerging global economies, some hostile to U.S. and western interests. Our naval forces will be an arm of national and international political alliances and must maintain military superiority to provide

assured access to the global commons, to include the oceans, international air space, outer space, and cyberspace.

At the global scale, large political entities will naturally form alliances and will compete for access to precious resources, both in the form of human capital and natural resources, to potentially include water, oil, natural gas, and rare earth minerals. Terrorism will continue as a counter-force to globalist political tendencies. These dissident groups will likely continue to wage unconventional warfare against western democracies and major commercial institutions, potentially forming alliances of convenience with organized crime and drug cartels for mutual advantage. Combatting these criminal and terrorist networks will require inter-agency and multi-national collaboration in intelligence, policing, and irregular warfare. Regional conflicts with the potential for weapons of mass destruction, including cyberattacks, can also be expected to continue, based on longstanding divisions and competition for resources. The Middle East will continue to be a region of concern, moderated to some degree by our political and economic ties with oil-producing nations. Conflicts in many parts of Africa may also turn much of that continent into a political "frontier" where groups strive for political control of failed and failing states. As seen in the recent "Arab Spring," ubiquitous access to breaking news and information via cell phones/Personal Digital Assistants (PDAs) combined with social networking applications enables the rapid formation of viable political movements aimed toward rapid overthrow of political institutions. The full potential for national and transnational movements of like-minded peoples using such models for social and political reform is potentially enormous.

NAWCAD will play a critical role in maintaining the technological superiority of U.S. naval forces through aggressive development of air warfare and intelligence exploitation applications. As U.S. naval forces are required to perform a full spectrum of military and non-military operations involving worldwide allies and coalition forces, our ability to leverage inter-agency and international technology investments and collaboration/communications tools will be critical to achieving desired outcomes. The need for shared technologies and increased worldwide collaboration means the NAWCAD customer demand will likely grow in diversification, with work from allied nations and other federal agencies, while other military services and naval warfare communities gravitate to NAWCAD in areas where NAWCAD has become recognized as a center of excellence. Greater collaboration with industry and academia in technology and product development will also make these customer groups an expanded portion of the NAWCAD business base.

Economic



In considering the future "Economic" environment, we must appreciate how global economic forces will likely affect NAWCAD. Recent world history has tended to discredit highly centralized, state-owned, command-based economies, beginning with the collapse of the Soviet Union two decades ago and followed by the "opening up" of the Chinese economy to western capitalist investment and industry. This economic learning has found its most recent manifestation in the "European debt crises" and the current struggles of the U.S. economy. Capital investment and wealth in certain "third world" economies should increase, propelled by a combination of relatively cheap labor and other

resources, greater political stability, and the increasingly global nature of economic forces. China, which some economists expect to overtake the U.S. as the world's largest economy within the next 10 years, may be expected to continue policies aimed at becoming a world leader in many areas of technological advancement. Additionally, the emerging economies of states such as India and Brazil will influence global trade and labor. The continued dependency of the world economy on oil, almost certainly for the next 10 to 20 years, combined with the movement toward more democratization in the oil-rich states, means a rising middle class in those regions and associated growth in consumer demand. Once the current "debt crises" is behind the U.S. and Europe and the root causes of structural unemployment are addressed, these economies should resume relatively healthy growth, although at rates less robust than the emerging economies.

While recent economic history has tended to discredit the sustainability of predominantly state-run economies and validated a competitive free enterprise model, it has been largely silent on the value of strategic national investment in new technology research and development (R&D) and in human intellectual capital. However, there is a growing consensus among academics, political leaders, and economists that there is an urgent need for increased U.S. Government investment in science, technology, engineering, and mathematics (STEM) education and in basic and applied R&D leading to technology breakthroughs with the potential to spawn new industries and renewed economic vitality within the U.S. Renewed emphasis on national R&D investment will result in expanded R&D activity within NAWCAD.

In the near-term, increased pressures will require particular emphasis to be placed on R&D projects that increase system reliability and reduce operational and maintenance costs. These would include corrosion control, energy efficient power, and propulsion systems. Also increasing in value will be technologies that enable the fielding of similar capability at less cost and that neutralize superior numbers of less advanced weapons systems. We can expect increased investment in automated/autonomous systems and technologies that reduce engineering design, time, and costs; procurement unit prices; training pipelines; and sustainment footprints. These near-term economic and new technology pressures will converge to promote increased collaboration by NAWCAD with industry R&D programs, Federally Funded Research and Development Centers, University Affiliated Research Centers, and international allies as a way to better leverage precious intellectual and facility investment. NAWCAD will need to develop a diverse national security business base to enable cost-effective capability advances for Naval Aviation. NAWCAD will need to leverage the National Security Strategy 2010 and Office of the Chief of Naval Operations (OPNAV) instructions 4000.84B policies promoting inter-Service and inter-agency collaboration as a means to develop this business base. [1]

[1] Specifically, National Security Strategy 2010 states that "we are improving the integration of skills and capabilities within our military and civilian institutions, so they complement each other and operate seamlessly…. However, work remains to foster coordination across department and agencies." OPNAV instructions 4000.84B states that "It is Navy policy to seek increased economies and effectiveness by developing support arrangements with other Navy activities, DoD components, and Federal agencies by

Social

In examining the "Social" environment of the future, we are focused primarily on the workforce, its demographics and skills base, and the culture from which the workforce is drawn. By 2025 the "Connected Generation" will dominate the workforce and the impact will be felt in how business is conducted, how we communicate, manage, organize ourselves, and get work done. "Going viral" has recently entered our lexicon to describe how matters of interest are able to spread globally at "light speed" through the formal and informal networks that connect us. The workforce will be extremely comfortable in adopting "an app for that" – or performing tasks and functions now exclusive to a few on their own PDA or subsequent generations' equivalent. This workforce will be highly receptive to new technologies and rapidly-evolving personal and professional relationships. The task- and project-oriented organizational forms will likewise develop and disband quickly, with colleagues capable and comfortable with meeting on very short notice from disparate locations worldwide using hand-carried personal devices in virtual collaborative work spaces.

As workdays transcend geography and time zones, lines between work and personal lives will blur. (Public and private organizational forms will take on a more permeable and dynamic quality, merging, evolving, and disaggregating quickly in response to innovative value-creation and delivery propositions in a dynamic, competitive environment.) Effective response to emergent challenges will be achieved by accessing the technical knowledge and talent available throughout global knowledge networks. Creativity and imagination will be highly prized in enabling simplifying solutions to increasingly complex and chaotic environments. The workforce will be highly mobile organizationally, with many more options relative to occupations effectively done from home offices as well as done through frequent travel and more complex personal interaction.

New learning methods rely heavily on virtualization and virtual reality, to include competitive "gaming," to accelerate creativity and the experiential learning processes and to model reality to test and advance theoretical science. The workforce will have greater access to self-paced learning from the world's leading education and trade institutions. Computers will be learning at phenomenal rates and increasingly teaching and protecting humans. Breakthroughs in medicine and health care will extend the productive lives of people beyond current retirement norms, with an older workforce continuing to make major contributions to society. Basic human principles of morality and ethics will continue to influence behavior, organizational rules, and political law. And despite increased reliance on robotics and autonomous systems, a warrior subculture and ethos

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participating in local Joint Interservice Regional Support Group initiatives." This instruction goes on to state that "Navy activities should seek or provide intraservice or interservice support when it will prove to be beneficial to DoD and can be provided or obtained without jeopardizing the assigned missions of the receiver or provider."

will likely persist and be cultivated within our military forces, to include the values of courage, honor, and devotion to duty.

As a consequence of these forces and trends, the NAWCAD workforce must be highly creative, analytical, knowledgeable, "tech savvy," networked, ethical, and empowered, operating within a culture characterized by open communication and delivering high value to the warfighter customer and the taxpaying public. This will require that we move away from a culture overly-focused on bureaucratic authority and control, while ensuring process reliability and outcomes of consistent superior quality and safety. The workforce must also be characterized by "technical excellence at the edge" and by rapid learning and adaptation through the widespread use of advanced techniques in discovery and acquisition of knowledge and skills. As NAWCAD rises to this challenge, it will be considered among the nation's most desirable places to work.

Technological

The pace of technological progress continues to accelerate with the next several years expected to witness revolutionary changes in computing power/artificial intelligence, transportation, communications, and in increased use of outer space and undersea mediums for commercial purposes. We can expect breakthrough advances in many forms of energy use, storage, and transmission – for both productive and destructive effects. While the full range of technological development can only be lightly touched on here, areas of particular impact to the work at NAWCAD are likely to include nanotechnology and meta-materials applications, autonomous systems, electronic/cyber warfare, directed energy (DE), human-systems integration, psychological operations, and three-dimensional (3-D) virtualization. Nanotechnology will permeate and impact all facets of military and civil technology: electronics, computing, communications, sensors, propulsion and fuels, structural materials, medical/health, etc. Meta-materials and other light-manipulating technologies will minimize visual observability in ways similar to the ability of stealth technologies to minimize radar cross sections. Unmanned combat air systems will conduct operations autonomously, using artificial intelligence algorithms and Low-Probability-of-Intercept/ Low-Probability-of-Detection (LPI/LPD) communication links across a family of unmanned combat systems. Quantum physics will be entering systems design and development in advanced computing and sensors providing secure computational capability. Directed energy weapons (DEW) will provide in-flight re-arming/re-charging capability, queued by extraordinarily sensitive sensors and directed through fully integrated fused arrays of hyperspectral systems at aerospace and surface targets. Advanced human-systems integration (human/machine interfaces) will move beyond visual and aural stimuli to take advantage of all sensory stimuli, to include tactile, with commands being activated and controlled by voice, eye movement, and even thought.[2] As access to information becomes more ubiquitous and potentially more powerful, science and technology in

[2] http://www.wired.com/dangerroom/2011/04/next-step-for-darpas-mind-controlled-prosthetics-relibability/

the psychological and cognitive domain will become increasingly valuable and sophisticated. Advances in computing capabilities, combined with 3-D imaging and virtualization technologies, will revolutionize design engineering and prototype development.

This rapidity and complexity of scientific and engineering advancement will demand a highly advanced technical workforce at NAWCAD that works closely with industry, academic, and other Governmental R&D labs to rapidly bridge the gap from scientific discovery to direct war-fighting application as a fundamental organizational competency. Although the demand for flight test services will not diminish, NAWCAD facilities will increase capabilities in and reliance on modeling and simulation, virtualization, ground testing of highly complex systems, and adopting new methods for applying scientific discovery and technological break-throughs to the domain of air warfare. Advanced facilities will exist to enable coordinated and autonomous air operations, nanotechnologies, meta-materials, DE weapons integration, rapid prototyping, and lead systems integration. Facilities will be securely networked using a variety of wireless technologies. We will need to continue to cultivate advanced internal expertise in communications/autonomy/artificial intelligence and software development. With our expanded role in systems integration, our hands-on systems engineering and trade skills will need to develop commensurately, increasing the scope of organically-generated intellectual property, to include integration data rights.

Operational

Operational forces include evolving organizational and business models as well as the ways in which warfare is conducted. Major trends in operational models will be heavily influenced by the political, economic, and social forces discussed above, enabled by advances in communications and other enterprise management technologies. To continue as a highly valued instrument of national security, NAWCAD will need to evolve its business models to enable the organization to efficiently and cost-effectively perform its mission. We must operate as a complex adaptive "thinking and learning" system using advanced planning and decision capabilities based on virtual collaboration, modeling, simulation and analytics. We will employ alternative acquisition and delivery models that enable our warfighting customers to continue to outpace the threat from a position of technological leadership.

All processes across the spectrum of RDAT&E and sustainment will operate faster and more efficiently through approaches tailored to a specific customer needs. Many manually-intensive processes will become automated, including those requiring complex decision algorithms. Within defined parameters, those with relevant knowledge will be empowered to act on that knowledge consistent with the corporate interest. We can expect to more directly respond to warfighter needs/requirements/demands through communications links direct with joint and combined air forces combatant commanders, other in-theater commanders, and their staffs. The symbiotic/synergistic relationships between

Government and commercial logistics services will continue to develop, as worldwide supply chain management and transportation becomes increasingly "commoditized."

NAWCAD operations must be efficient, affordable, collaborative, customer-driven, and reliant on knowledge-based decisions that exploit systems of relevant, real-time information. Operations must be guided strategically across the enterprise, being sufficiently robust and agile to accommodate both linear improvements and revolutionary/disruptive transitions. An increasing portion of our business will be done directly with unified combatant commanders and fleet headquarters staffs collaborating constructively with federal intelligence and law enforcement agencies. Global collaboration will rely on 3-D virtual environments and mobile devices. Robust information assurance will be required for cyber-security and multi-level secure operations.

2025 The Day in the Life

Given that our operational processes are paced with the speed of technological advances, the following is a notional, realistic scenario of the future:

At 0700 Brianna, a leader in the structural engineering branch and home based in Patuxent River, Md., was drinking a cup of coffee in her kitchen when she felt a vibration on her waist alerting her that there was a video mail that required her attention. On the video screen she saw her co-worker, Dylan, who informed her that last night there was a failure of a mounting bracket for the newly deployed high-energy laser being used on the MV-22D in the Fifth Fleet. Nobody was hurt, and the laser was kept in place by another bracket, but the squadron was concerned because they hadn't been doing anything unusual at the time. Brianna sighed, since now she'd have to go into the office early. She had been working at NAWCAD for almost 15 years and was one of many who telecommuted several days a week. With modern communication, working at home was almost no different than working at her cubicle, but now she might need access to a multi-site video conference and that was easier to do from work. She wished the phone companies would speed deployment of the new network cables to her neighborhood.

She knew this was an urgent problem because the MV-22s had to employ the high-energy laser against small boat swarm attacks just last week and, as always, tensions were high whenever a littoral combat ship had to transit the increasingly congested sea lanes through which more than 90 percent of the world's commerce still moved. While the UF-41, the unmanned aircraft derived from the UCLASS program, provided great situational awareness and was capable of targeting a few of the smaller boats, using a weapon still required a man-in-the-loop and the MV-22 mounted laser was both fast and accurate against many targets in a short period of time.

Brianna looked at the 3-D pictures sent from LPD 26, the USS *John P. Murtha*, which displayed the failed component. The magnified image of the fractured surface showed nicely on the flexible high-definition display, and indicated that the failure was caused by fatigue. Brianna expected this wouldn't be an easy problem to solve since she knew they could not add any more material to the aluminum structure due to takeoff weight restrictions on the aging MV-22 fleet.

Before leaving the house, Brianna added a voice note on top of the video mail and forwarded her thoughts to her Navy network, which included members at the Fleet Readiness Centers (FRC), warfare centers, and Navy laboratory engineers. This network was only a limited version of the

cloud-computing network developed by NAVAIR Strategic Operations, which was being expanded as the budget permitted.

By 1010, Zach, an engineer at FRC Southwest in San Diego, suggested a solution based on some preliminary work he had done on the F-35C during depot level maintenance. He thought the MV-22 could use a combination of a carbon composite structure and a titanium bracket. This combination would be weight neutral with potentially better fatigue resistance and a 35 percent margin of safety in static strength and fatigue. Zach sent a set of draft drawings and pointed out that the 35 percent margin of safety was important because that could allow the new parts to be used without time consuming and costly structural validation and certification. By the time Brianna had reached her desk, Ellie and Jake, from Cherry Point and Lakehurst respectively, had validated Zach's prototype design. Ellie ran a series of simulations, using the government-owned design model of the V-22 to run a fatigue life analysis, while Jake's experience with digital printing allowed him to assess the intricate part for manufacturability. Ellie's simulation took about 15 minutes to run on a supercomputer derived from one that had "beaten" humans in a quiz show almost 15 years earlier. Jake took a little longer to apply his practical experience.

Impressed with the progress this "wiki" thinking had made, instead of a video conference, at 1130 Brianna convened a virtual meeting with her structures team, materials engineers, maintenance personnel from the fleet, and engineers from the laser manufacturer. Their avatars gathered for the briefing using the NAWCAD Virtual World, which let everyone, including the logisticians and Fleet maintainers, contribute to the final bracket design by watching the results of Ellie's simulation runs, and allowed their avatars to manipulate the part to test tool access for installation. Encountering only typical issues that they dealt with collaboratively, they identified minor changes to a radius and mounting hole size. When Ellie ran it again, the team-built result showed a 99.99 percent confidence level the design would provide the necessary margin and the engineers recommended they move to prototype. Elizabeth, chief scientist at the NAVAIR Technology Office was also "in world" and quickly agreed the design would have priority on the digital printer at Marine Corps Air station Cherry Point, waiting only on Brianna's confirmation of the design change from her boss and budget from the program office.

By 1350, Brianna had completed the brief to her boss and, based on his advice, had accessed a classified database that indicated the direct digital manufacturing machine aboard the carrier USS *Ford*, operating not far from the *Murtha*, could build the titanium brackets in three hours. Zach's computer-generated 3-D drawings were sent to the *Ford* over the network so they could set it up while the Technology Office's digital printer at Cherry Point made a prototype that could be used for a test-fit.

Josh, a contracting specialist, also forwarded Zach's composite design to the North Atlantic Treaty Organization composite center at Hamburg, Germany, for a quote. The center is known for rapid prototyping of composite components. The contract for the composite components was executed using the worldwide military contracting network established for such contingencies. If Josh gave approval once the design was finalized, the first parts could be built and shipped within 72 hours and should be available to the squadron a day later.

From 1500 to 1630, Brianna went "in world" again and attended a virtual critical design review (CDR) for the Advanced Long-Range Unmanned Strike Fighter Trainer, which was "chaired" by Sam's avatar, which Sam was controlling from his office in Orlando. Brianna and everyone else in the CDR really appreciated not having to travel as much as they used to for these reviews, especially since the structures portion of the CDR took only a few minutes. Of the 53 requests for action

(RFA), which were previously identified, 52 had been resolved using simulation and design iteration on the same cloud computing network supercomputer that Ellie had used earlier. The last RFA was still open, but only required minor contract modification, which the automated contract modification program should be able to handle easily once the program office gave the go-ahead.

At 1735, a short video mail from Javier, the Cherry Point Fleet Support Team (FST) lead, let her know the plastic prototype had fit well, and they had proceeded to manufacturing on the *Ford* for the aircraft deployed with the strike group. In parallel, the aircraft bulletin was prepared using the automated system that had been in place for about three years. Brianna's cubicle neighbor Jordan told her he was still amazed at how quickly the FST could respond. When he started working at NAVAIR in 2008, it could take the FST several shifts to do what the combination of the network connectivity, remote digital printing, and some software applications now accomplished in a few hours.

Brianna's workday was finally over. She drove up Route 235 in traffic, wishing somebody would invent a teleporter. After dinner, she and her husband sat down with their twin 13-year-old son and daughter and turned their attention to the World Series game playing on her two-year-old holographic television set. The Red Sox were winning 3 – 0, heading for what looked like would be a sweep of the Brewers and avenging the previous year's loss to the modern day dynasty from Milwaukee.

Our Strategic Vision (Our North Star)

NAWCAD will be the architect of all Naval Air Combat Systems providing definitive leadership and full spectrum RDAT&E capability to successfully meet the rapidly changing, complex, diverse and increasingly sophisticated needs of National Security. We will be the recognized leader in transitioning advanced technologies to air combat applications and efficiently delivering affordable, effective, and sustainable systems.

We are committed to the continual pursuit of excellence in support of the warfighter. We relentlessly pursue the development of distinctive and specialized capabilities to meet critical national and international security challenges. Our unique and talented workforce is our priority, and we are fully committed to hire, mentor, develop and educate, and retain the nation's preeminent workforce. Fundamentally, NAWCAD is committed to being a recognized exemplar of the capabilities essential for delivering the products and services needed to ensure mission success.

Our Strategic Objectives

NAWCAD will focus on warfighter value, capability relevance, purposeful innovations, total ownership costs, and operational excellence in pursuing the following Command objectives:

Objective #1: *Outpace the Threat and Deliver Advanced Fully Integrated Warfighting Capabilities*

(See Major Strategic Thrusts 3, 4, and 5)

Strategic Objectives

- ✓Objective #1: Outpace the Threat and Deliver Advanced Fully Integrated Warfighting Capabilities
- ✓Objective #2: Reduce Acquisition Cycle Time and Total Ownership Cost
- ✓Objective #3: Establish a Comprehensive Workforce Strategy

Strategy 1.1: - Understand the threat and transition high-payoff technologies to fill the recognized gaps. Enhance situational awareness of developments in leading edge technologies as potential future disruptors to include: nano and meta materials, autonomy, and DE weapons.

Strategy 1.2 – Promote the use of NAWCAD laboratories, test facilities, and ranges as a means to identify and eliminate gaps in warfighting capability and supportability. Partner with other Naval Warfare Centers and Services to leverage the best RDAT&E infrastructure within DoD. Continue to keep NAWCAD positioned as the most complete complex in the world for the development of air combat systems.

Strategy 1.3- Build on nationally-unique integrated and interoperable test facilities to support DoD integration and interoperability efforts. Identify and resolve shortcomings in our capabilities to develop integrated, interoperable air combat systems.

Strategy 1.4 – Increase our involvement with Fleet experiments as a valid battlespace integration proving ground.

Strategy 1.5 – Design autonomous, interoperable air platforms, sensors, and weapons leveraging artificial intelligence that provide immediate and sustainable increase in overall warfighting capability.

Objective #2: *Reduce Acquisition Cycle Time and Total Ownership Cost*

(See Major Strategic Thrusts 1 and 2)

Strategy 2.1 – Provide full spectrum capabilities as the Lead Systems Integrator and Architect for all Naval air platforms.

Strategy 2.2 – Build on and integrate current Rapid Prototyping capabilities to accelerate products to the warfighter.

Strategy 2.3 –Establish an Advanced Product Development organization and concept of operations.

Strategy 2.4 – Build on standard operating procedures to promote agile and adaptive processes that are responsive to needs.

Objective #3: *Establish a Comprehensive Workforce Strategy*

(See Major Strategic Thrust 6)

Strategy 3.1 – Establish broad awareness of the future environment and identify the skills set associated with emerging technologies and missions.

Strategy 3.2 – Establish an end-to-end workforce development and management system. Such a system will:

a. Promote greater innovation, creativity, and critical thinking in the workforce through alignment of workforce measures and associated awards and consequences with desired outcomes.
b. Develop new employee indoctrination, training, and development programs for scientists, engineers and logisticians that provide hands-on experience via bench science and rapid prototyping to promote the development of "deep" expertise.
c. Design training programs to prepare our people with the new skills they will need to effectively support future technologies, systems, and their inherent interdependences.
d. Establish robust Advanced Degree/Non-Degree Program access for technical, business and leadership excellence as part of continuous workforce development to raise average education levels toward the post-graduate degree level to address anticipated levels of system development and support sophistication and complexity.
e. Create a Data Fusion and Analysis Capability to provide analytical assessment and predictive scenario development to provide current and future insights and foresight across business, technical and operational domains.

Strategy 3.3 – Establish a mobile, agile and highly dynamic Learning Organization to drive innovation creativity, and systems thinking. Strategic elements include comprehensive research and education partnerships with academia and industry, exploitation of diverse sources of information and knowledge through social networking, and participation in salient events, conferences, seminars, and other orientation opportunities oriented toward better meeting warfighter needs.

Strategy 3.4 – Leverage Virtual Technology and other technological advances to enhance workforce learning and development as a means of creating immersive warfighting related scenarios, collaborating with project partners from anywhere in the world 24/7, and as a means of training the warfighter and our workforce.

Major Strategic Thrusts

1 – Lead Systems Integration (LSI)

See Strategic Objective #2

Initiative Description

NAWCAD will be an architect for air combat systems procurements executed by NAVAIR. This will require that NAWCAD have the scientific, technical and operational acumen to specify, develop, and test all elements of such combat systems with particular emphasis on the complex environment in which they must operate. This responsibility applies to all procurements, regardless of size and complexity. Specification processes will include prototyping for acquisition efforts that range from major systems upgrades to "rapid fielding "initiatives.

Major Strategic Thrusts

1 - Lead Systems Integration (LSI)
2 – Rapid Acquisition
3 – Autonomy
4 – Nano and Meta Technology
5 – Directed Energy Weapons
6 – Workforce Development

NAVAIR LSI capabilities are equal to the best "benchmarks" in industry and are recognized as a DoD exemplar. Competent technical experts, or "T-people," with substantial backgrounds in relevant platforms and systems derived from T&E, and Engineering and Prototyping assignments of increasing complexity, support all efforts. NAWCAD prototyping efforts are recognized as a superior approach to competition advocacy and acquisition alternatives for many programs. NAWCAD simulation capabilities are "State-of-the-Art" for the modeling of complex systems and the analysis of Unintended System Events. Our Proof-of-Concept T&E approach is a major force in risk identification and mitigation. Our design efforts, both contractor and organic, are supported by instrumentation-for-design.

Recent Activities/Accomplishments

- Interviewing Industry leaders with successful LSI perspectives.
- Looking at current training and on-the-job work that accelerates LSI capability.
- Reaching out to other strategic groups to share ideas.
- Looking at ways to keep personnel connected to places where NAVAIR teams are excelling.
- Trip to Naval Air Warfare Center Weapons Division (NAWCWD) to meet with leadership and look at their training plan for new hires to give them in depth growth, to look at new efforts and to strategize on future scenarios for LSI.
- Examples of government-led LSI capabilities include Digital Flight Control System, Harpoon Block III, and Unmanned Combat Air System Demonstrator (UCAS-D).

2 – Rapid Acquisition

See Strategic Objective #2

Initiative Description

Under certain conditions, our systems acquisition processes are inflexible, too risk adverse, and lack an effective mechanism to balance acquisition risk and operational need. A need exists to expedite delivery of urgent/special program capability, when required. Processes (driven by current Joint Capabilities Integration and Development System; Defense Acquisition System; Planning, Programming, Budgeting, and Execution; and DoN/DoD policies) are designed to meet all systems requirements and do not allow for needed flexibility in trade-offs among program performance, schedule, and cost, creating an atmosphere of unresponsiveness to customer needs.

NAVAIR needs a process and decision mechanism that looks at warfighter requirements in terms of Initial Operational Capability requirements, battlefield conditions, and urgency in exercising the appropriate acquisition response. This effort requires communication with the customer, commitment to better understand the warfighter's requirement and time sensitivities and the use of informed judgment in applying process, risk, and Life Cycle Cost/Total Ownership Cost considerations in meeting warfighters' needs. In situations where urgent warfighter need requires an expeditious response, a Rapid Response Process has been developed jointly by the PEOs/Program Manager, Air; Competencies; and the NAWCs. The Rapid Response Cell (RRC) provides assistance in developing a strategy to identify methods and techniques for improving the "Speed to Fleet." The RRC will help determine the path to answering the need through rapid integration, prototyping, and/or acquisition. The RRC maintains files of capabilities and projects throughout the command to aid in the fielding of future needs.

Recent Activities/Accomplishments

- Reestablished the Rapid Response Working Group (RRWG) in response to the NAVAIR Commander's Intent as a conduit for rapid acquisition policy development, change, and documentation of best practices.
- The Program Success Orientation Team (PSOT) assisted the RRWG by researching over 189 documents relating to rapid acquisition policy, regulations, and statutes within the Federal Government.
- The RRWG utilized research findings to develop a draft NAVAIR Urgent Needs Process and Rapid Acquisition Instruction appropriate for our organization that provides rapid acquisition guidance and describes available resources.
- The PSOT has begun work with AIR-4.5 to establish roles and responsibilities with respect to rapid acquisition planning and execution within the NAE.

3 – Autonomy

See Strategic Objective #1

Initiative Description

According to the DoD Unmanned System Integrated Roadmap Fiscal Year 2011-2036, "to be autonomous, a system must have the ability to operate without human intervention. In addition, autonomous systems optimize behavior in a goal-directed manner in unforeseen situations (i.e., in a given situation, the autonomous system finds the optimal solution)." The members of the autonomy thrust team of the NAVAIR Strategic Team define autonomy for an air vehicle as an unmanned system that can perform one or more useful tasks within a complex unpredictable environment without human intervention. The two definitions are similar; both require no human intervention, both refer to goals or tasks, and both refer to unforeseen or unpredictable environments. An interim step between automation, where all predictable actions are programmed into the system prior to the mission, and full autonomy could be a man-in-the-loop scenario where a human can provide re-tasking or some level of control within the autonomous mission.

Naval leadership supports implementing autonomous operations into the fleet. The DoN Secretary of the Navy (SECNAV), stated before the House Armed Services Committee on 24 February 2010 that there are four strategic, tactical, and personnel management imperatives he believes the Department of the Navy must address to maintain preeminence as a fighting force and successfully address whatever comes in the future. He said theses four areas reinforce the strategic framework of the Quadrennial Defense Review and address the areas of risk it identifies. Optimizing unmanned systems was included in the four imperatives and he stated "We continue to support research and development activities to improve these capabilities and increase the level of autonomy in unmanned systems." The CNO's Sailing Directions of September 2011 state that "Unmanned systems in the air and water will employ greater autonomy and be fully integrated with their manned counterparts."

The team's approach to addressing the autonomy needs of the Navy is to share our knowledge of autonomy within current programs in the Navy and to acquire the funding necessary to build an autonomy laboratory at NAVAIR Patuxent River to be used to develop, design, analyze and test future autonomous systems.

Recent Activities/Accomplishments

- Working as the deputy for the Office of the Secretary of Defense (OSD) Test Resource Management Center Unmanned Autonomous System (UAS) Science and Technology (S&T) for T&E working group to promote the development of test technologies to assess the performance of UAS.
- Presented a paper/concept to the office of the Under Secretary of Defense for Acquisition, Technology and Logistics for the path forward for building confidence/trust in Airborne Sense and Avoid technology development on the Global Hawk family of UAS, including the Navy Broad Area Maritime Surveillance (BAMS) system as a first step.

- Editing a paper for the BAMS program to determine a strategy on Due Regard (International Airspace Access) test strategy for satisfying the appropriate regulatory agencies.
- Providing support to the Automation/Autonomy Working Group of the Naval Unmanned Air Systems Cross Functional Team. Support includes determining the state-of-the-art of automated and autonomous systems/operations within NAVAIR systems. The systems include BAMS, UCAS-D, Small Tactical UAS, and Fire Scout. Support also includes determining where autonomy could help reduce manning and crew workloads in current and future NAVAIR systems.

4 – Nano and Meta Technology

See Strategic Objective #1

Initiative Description

Developments in nano- and meta-materials will affect every system and platform in the Navy. The United States must embrace this technology area in order to meet evolving threats and maintain a survivable forward presence. An element of the Nation's response is the creation 10 years ago of the National Nano-Technology Initiative under the National Academy of Science (NAS) which rivals the Manhattan project is terms of financial investment. Based on world-wide achievements to date, it is likely that naval air combat systems can benefit from effects as diverse as reduced corrosion, from the application of super-hydrophobic materials, to enhanced stealth, from special electromagnetic effects in some meta-materials. NAWCAD will support the development of robust capabilities in the application of nano- and meta-materials.

The first major initiative of the Nano- and Meta-Materials Working Group (N/MWG) was organizing a Nano-/Meta-Materials Workshop at the Southern Maryland Higher Education Center in 2011, focused on the identification of opportunities and technical challenges associated with the application of such technologies to Naval Aviation. The goal was optimizing the Command strategy for exploiting nano- and meta-enabled developments. Participants included 106 technical experts from government, industry and academia, eight plenary speakers, and a key-note speaker who is one of the world's leading researches in the application of nanoscience to cloaking, — Professor Sir John Pendray, FRS, Imperial College of Science and Technology, London, United Kingdom (U.K.). The workshop provided a good view of both the global and national environments related to nanotechnology investments and produced a number of observations and recommendations related to aerospace structures, acoustics, avionics (including electromagnetic applications), propulsion and power, and materials processing and manufacturing. A by-product of this workshop was the development of lines of communication between leading national research figures in this area and people of similar interests at NAWCAD. These connections have led to participation by NAWCAD technologists on DoD and Navy panels and steering groups. Additionally, communications with Dr. Michail Roco, Director of Engineering, NAS, led quickly to the conclusion that NAWCAD is one of the few organizations specifically interested in transitioning nanotechnology developments to useful commodities. Dr. Roco's guidance has been extremely helpful in identifying pockets of expertise in academia that may be productive.

Facilities investment will be required to enable the application of nano- and meta-materials technologies to Naval Aviation. Currently, the most comprehensive form of the facilities plan is a Military Construction (MILCON) proposal abstract entitled the Nano-Scale Engineering and Technology Center which is made up of 20 individual laboratory areas for specific applications, three prototype manufacturing process development cells, and an environmental test facility. Each of the 20 specialized laboratory areas is being worked by NAWCAD technical specialists familiar with both extant facilities and potential applications.

The N/MWG has been expanded to include additional adjunct engineering staff, including junior professionals, aimed at developing research proposals for seed funding that will target special applications of high interest. The goal is to broaden the experience base of our people and make meaningful progress toward improvements in naval air combat systems. University interfaces are also being pursued so that partnership proposals can be developed in a way that exploits the strengths of the individual organizations. Joint efforts with the University of Maryland and Pennsylvania State University are currently in place.

Recent Activities/Accomplishments

The N/MWG has been very active in a broad array of efforts aimed at enhancing the ability of NAWCAD to exploit this technology area on behalf of naval air combat systems, to include:

- Workshops focused on maritime combat applications.
- Participation in Navy and DoD working groups.
- Networking with national and international leaders in the field
- Developing university interfaces,
- MILCON planning.
- Research project development.

5 – Directed Energy Weapons (DEW)

See Strategic Objective #1

Initiative Description

The technological advances in DEW will result in militarily relevant operational capabilities in the near future for those who choose to pursue or procure them. DEW include High Energy Lasers (HEL) and directional radio frequency (RF) weapons, of which High Power Microwaves (HPM) are a subset.

Continuing technology advancements in the fields of HEL and HPM enable consideration for development of DEW for tactical weapons use. Open source reports indicate that many nations are pursuing these weapons. Other nations lead in key science and technology areas such as power generation, antenna design, RF sources, and propulsion systems. The CNO Strategic Studies Group (SSG) XXIX assesses that the 2020 operational environment will include a wide range of DEW. High power, long range DEW will be the purview of the major powers that chose to pursue them. Highly proliferated, lower power DEW will offer significant capability at relatively low cost to even unsophisticated adversaries. Regardless of whether the U.S. Navy chooses to pursue these capabilities, it will have to fight them. In the area of HEL, for example, the developments include high temperature/high power pump diodes and high power fiber lasers. In the area of HPM the developments include explosive, pneumatic and electronically-pumped high power RF sources. DEW technologies offer the possibility of achieving superiority on the battlefield through the employment of revolutionary offensive and defensive combat weapon systems.

In addition to U.S. advancements, there are foreign developments related to DEW that require tracking. Knowledge of foreign DE developments, through either cooperative efforts or information and hardware exploitation, will result in cost-reduction advantages and the development of countermeasures. NAWCAD will partner with NAWCWD to ensure NAVAIR primacy in this strategic thrust.

Recent Activities/Accomplishments

A Directed Energy Weapons Office (DEWO), a Technical Project Office (TPO) that is in the Emergent Weapon Systems (EWS) Division, has been established for over three years. EWS is a Division within the Weapons & Energetics Department, AIR 4.7. DEWO responsibilities include management of the NAWCWD 4.0 DEW Strategic Thrust, Lead for NAVAIR's DEW Enterprise Team (DEWET), and NAVAIR Lead for NAWCAD DEW Major Strategic Thrust. DEWO efforts over the last two years have resulted in:

- NAVAIR/NAWCWD being selected for the FY12 HEL Future Naval Capability program worth $44M over a 5 year period. Successful execution of this S&T program should result in NAVAIR conducting TPO activities associated with developing, integrating, and supporting HEL weapon systems on eight NAVAIR platforms over the next 20 years.
- NAVAIR/NAWCWD having developed an HPM weapon system brassboard of a scalable frequency agile pulsed high power RF source based on Drift Step Recovery Diode pulsed power and pulse forming network that shapes the pulses and couples into a electrically steerable antenna array that will be radiate test items.

- NAVAIR engaging with the OSD DE Test and Evaluation Capabilities program submitting requirements for NAVAIR Directed Energy Test & Evaluation Capability for precision guided munitions weapon systems and aircraft.
- NAVAIR engaging with OSD HEL Joint Technology Office and being selected to participate in the Robust Electric Laser Initiative program.
- NAVAIR engaging in the CNO SSG study on DE and heavily influencing the final report provided to the CNO in which heavy direction is provided to accelerate DE weapons to the warfighter.
- Proposed and obtained approval for an FY13 HEL R&D Lab MILCON Program.
- Supported a Legislative Environmental Impact Statement to obtain the capability to perform mega-watt class HEL and extremely high power microwave full-power live-fire test and evaluation for the China Lake Land Range and the Pt. Mugu Sea Range.
- Developed a DEW RDAT&E Facilities Roadmap.

6 – Workforce Development

See Strategic Objective #3

Initiative Description

In 2025, our work, and the tools to complete our work, will be ubiquitous and virtual; offices will be everywhere; team members will live halfway around the country and the world. How, where, and when we work will be dynamic as long as we produce results. By the year 2025, the rules of the NAVAIR workforce will have to be rewritten if we are to compete for top talent, outpace the threat of our adversaries, and remain relevant in today's irrevocably changing world.

NAVAIR will experience daunting challenges as we compete for the best talent in 2025 in order to maximize our organization's success. In the next seven years, our current profile of decision-makers will be the workforce minority. Tracking current paths for retirement, the Baby Boomer generation - those born between 1946 and 1964 - along with their toolsets, cultural biases, and mindsets, will transition from being our workforce majority to a minority. Generation X (those born between 1965 and 1980) and the Millennials (those born after 1980) are becoming the new majority.

An ongoing challenge for NAVAIR's future workforce is diversity. We must continue to promote a diverse "on board" demographic to make the graduates of the future feel welcome. Our current recruiting programs are oriented toward developing that diverse workforce of the future. Additionally, NAWCAD must continue its outreach efforts to inspire and develop the technically superior workforce so vital to Naval Aviation's and the nation's military and economic future. NAWCAD's Outreach activities seek to inspire the future workforce to pursue STEM fields and to potentially seek a future career at NAWCAD.

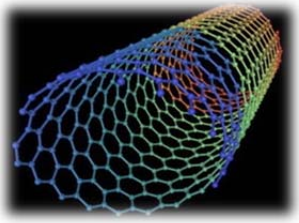
Our senior-most leadership, keenly aware that the world around them is changing and already recruiting a new breed of employee, must adapt workplace policies to appeal to all generations, their toolsets, and their work culture. These policies must address the following seven disruptive forces that will impact the lives of our future workforce and organization: 1) Shifting Demographics, 2) The Knowledge Economy, 3) Globalization, 4) Digital Workplace, 5) A Culture of Connectivity, 6) Participation Society, and 7) 21st Century Workers (Millennials).

Recent Activities/Accomplishments

Recent activities and accomplishments of the Workforce Development team include:

- Prototyping a NAVAIR telework program (Human Resources (HR) and workforce thrust area)
- Benchmarking against best practices, lessons learned, and trends of other successful government and defense activities.
- Assessment of current and desired skills - (Competency Management in HR)
- Learning Organization initiative
- Leading Academic partnerships to foster streamlined paths in order to produce significantly more PhD's and Master's






Our Mission

NAWCAD is the principal RDAT&E and fleet support activity for manned and unmanned naval aircraft for the Navy and DoD. This includes air vehicles, propulsion systems, avionics, mission systems, human systems, aircraft launch and recovery equipment, landing systems, air traffic control, communications, ship/shore/air operations, and training systems. Provides support, as needed, to other naval systems commands, other DoD activities, other federal agencies, and coalition forces in response to national security objectives.

Our Values

We value the following in achieving our vision:

- Technical excellence within the workforce with emphasis on advanced technical, business management, and leadership degrees.
- Innovation and creativity.
- Research and development, advanced technology, rapid prototyping, and analytic capability as our principal means of addressing warfighter requirements.
- Rapid acquisition once a technical solution has been verified.
- Resourcefulness, leveraging other people's ideas and resources, and thinking differently to solve technical and managerial problems.
- Speed of execution in all our business processes.
- Protecting life in all our activities.

Summary

This strategic plan is a living document and will be reviewed annually by NAWCAD leadership to accommodate environmental changes which may impact our current strategies and operating plans.

Appendix A: List of Acronyms

3-D	Three Dimensional
BAMS	Broad Area Maritime Surveillance
BI	Business Intelligence
BRAC	Base Realignment and Closure
CDR	Critical Design Review
CLO	Counter Low Observable
CNO	Chief of Naval Operations
DE	Directed Energy
DEW	Directed Energy Weapons
DEWET	Directed Energy Weapons Enterprise Team
DEWO	Directed Energy Weapons Office
DoD	U.S. Department of Defense
DoN	U.S. Department of the Navy
EWS	Emergent Weapon Systems
FRC	Fleet Readiness Center
FST	Fleet Support Team
HEL	High Energy Laser
HPM	High Power Microwave
HR	Human Resources
I/O	Information Operations
IP	Internet Protocol
IWC	Integrated Warfighting Capabilities
LO	Low Observable
LPI/LPD	Low-Probability-of-Intercept/Low-Probability-of-Detection
LSI	Lead Systems Integrator or Lead Systems Integration
MILCON	Military Construction
N/MWG	Nano- and Meta-Materials Working Group
NAE	Naval Aviation Enterprise
NAS	National Academy of Science
NAVAIR	Naval Air Systems Command
NAWC	Naval Air Warfare Center
NAWCAD	Naval Air Warfare Center Aircraft Division
NAWCWD	Naval Air Warfare Center Weapons Division
OPNAV	Office of the Chief of Naval Operations
OSD	Office of the Secretary of Defense
PDA	Personal Digital Assistant
PEO	Program Executive Officer
PGM	Precision Guided Munitions
PMA	Program Manager, Air

PSOT	Program Success Orientation Team
R&D	Research and Development
RDAT&E	Research, Development, Acquisition, Test, and Evaluation
RF	Radio Frequency
RRC	Rapid Response Cell
RRWG	Rapid Response Working Group
S&T	Science and Technology
SIAP	Systems Integration and Planning Enterprise Team
SSG	Strategic Studies Group
STEM	Science, Technology, Engineering, and Mathematics
TPO	Technical Project Office
U.S.	United States of America
UAS	Unmanned Air System of Unmanned Autonomous Systems
UCAS-D	Unmanned Combat Air System Demonstration
U.K.	United Kingdom
U.S.	United States of America
USN	United States Navy
VADM	Vice Admiral
WD	Weapons Division
WG	Working Group

Appendix B: Listing of Current Strategic Thrusts

Representatives from the PEOs and NAVAIR were brought together to form a NAWCAD Strategic Cell which conducted a comprehensive assessment of political, economic, social, technological, and operational factors which could impact how NAWCAD will conduct business in the future. Twenty-two areas have been identified as having an impact on our mission with six factors noted as having the greatest Impact (*). These factors will be addressed as strategic thrusts with associated mitigation or exploitation plans. Detailed planning for each of these thrusts will be addressed in subsequent operational plans. A strategy description, or vision, for each one of these strategic initiatives is described below:

Political

Encroachment: We envision a multi-/inter-agency model that addresses ongoing encroachment issues in a way that maintains operational readiness by drawing on an array of subject matter experts and other stakeholders while leverages improved infrastructure that supports testing needs while minimizing adverse impact on the surrounding community from noise and interference. We will take full advantage of a mature/robust modeling and simulation capability and the ability to leverage facilities and other assets across agencies and geographic locations to reach a diverse range of customers and providers. Our management processes enable us to identify current and future encroachment issues in time to minimize the associated risks and adverse effects.

Regionalization and Base Realignment and Closure (BRAC): NAWCAD will address regionalization and BRAC challenges through proactive engagement with regional partnership organizations. Previous BRACs have caused consolidations at Patuxent River, such as the Rotary Wing Center of Excellence and the Fixed Wing Center of Excellence. We expect the next effort to examine NAWCAD and its relationships with regional players by focusing on unique partnerships in the local area. For example, a longstanding partnership agreement is our membership in the Joint Atlantic and Chesapeake Regional Cooperative. This effort will address the strengths, weaknesses, opportunities, and threats of the local area as NAWCAD focuses on the years ahead.

Economic

Energy: We envision reduced energy consumption by aircraft and related operating systems as well as in shore installations through a combination of technology investments and changes to operating concepts that directly support SECNAV energy goals. NAWCAD becomes, or closely collaborates with, the single Navy Air Breathing Propulsion Organization focusing on all naval propulsion systems (air, ground, and sea) using a single fuel type on battlefield. NAWCAD will help develop and test fuel sources, processing methods, and additives that will be significantly different and potentially 100% synthetic, yet still meet fuel specifications for turbine, diesel, and piston driven propulsion systems. NAWCAD will apply the results of the Propulsion Organization in concert with a proven acquisition approach that will achieve the required energy savings for the Navy. NAWCAD installations will reduce consumption and increase alternative energy sources (to achieve net-zero), in large part aided by smart buildings, smart infrastructure, and telework. By

2025, the population of NAWCAD workers reporting to the base for work on any given day will be reduced to approximately one-half the current level (although ground and flight test staff will continue to work on site), with associated reductions in building footprint and energy consumption.

Infrastructure Investment: We envision NAWCAD designing, building, and operating state-of-the-art facilities supporting naval product development.

Social

Workforce Development:* Our workforce vision has NAWCAD ranked as the #1 place to work in the U.S. (not just Government). We envision a workforce with new, more advanced levels of scientific and engineering leadership and skill sets that is highly networked, adaptive, agile, "tech savvy," analytical, and applies an enterprise perspective. The workforce is innovative, flexible, practices open communication (within information security parameters), and is focused on providing top value to the customer and tax payer.

Technological

DEW:* NAWCAD will improve near term collaboration with NAWCWD, uniting efforts across NAVAIR and with other stakeholders conducting DEW work. We will build the workforce, related technology, and infrastructure necessary to design, test, and deploy offensive and defensive airborne DEW capabilities. We will contribute to a comprehensive assessment of NAVAIR's DEWET relative to appropriate roles and responsibilities and competency representation with the intent to enhance DEWET robustness and effectiveness.

Autonomy:* The NAWCAD vision for Autonomy is that by 2025, at a minimum, an autonomous UAS has gained approval for entry into the Engineering and Manufacturing Development phase (passes Milestone B) where an autonomous UAS is an unmanned system that can perform one or more tasks within a complex unpredictable environment without human intervention.

Nano- and Meta-technology:* NAWCAD will be the lead DoD innovator and transition agent for nano and metamaterials based technologies for aviation weapon systems. We will focus on exploratory R&D, and technology insertion. We will maintain a robust internal capability and extensive academic and industrial partnerships.

Information Operations (I/O): NAWCAD employs advanced capabilities in developing, integrating, and supporting I/O capabilities for Naval Aviation systems, developing a deep understanding and ongoing awareness of the threat environments that I/O capabilities intended to counter and the ability to ensure our systems can operate successfully in these environments. These I/O capabilities encompass all the I/O pillars of Electronic Warfare, Computer Network Operations, Military Deception, Psychological Operations, and Operations Security.

3-D Immersive Environment: By 2025, we envision 3-D immersive environments being ubiquitous and transparent platforms in all areas of information exchange. Immersive environments, particularly virtual worlds, bring information density and a promise of presence to

* One of six Major Strategic Thrusts addressed in the body of the NAWCAD Strategic Plan

create a transformative work experience. As NAWCAD continues to infuse this technology, we transform work flow; advance data and information interpretation; enhance and expedite decision-making through the use of live real-time data representation; and create a unified, immersive sense of connection within our ever-growing, dynamic, global workforce and directly with the warfighter.

Vertical Lift (VL): We envision NAWCAD transforming Naval Aviation VL capabilities through the development and fielding of next generation VL technologies to meet operational needs. This will require that we modernize infrastructure to meet the needs of current and future VL development, testing, and fielding; develop a fully trained, capable, and motivated workforce, able to perform LSI projects; energize and engage the industrial base; fully collaborate with OSD/Joint partners; and effect crucial VL resource investment in R&D, S&T, and infrastructure.

Net-centricity: NAWCAD will lead the effort to migrate from baseline tactical architecture to a net-centric environment to enhance the performance of joint mission threads (e.g., integrated air and missile defense, surface warfare, built-in test and diagnostics, LPI/LPD, and multi-level security).

Advanced Computing Capability: NAWCAD will identify, evaluate, and implement cost-effective advanced computing capabilities to improve mission effectiveness in support of the warfighter. We will provide technical excellence and revolutionary concepts for current and future information, data, and networking requirements, piloting new technologies in the following areas: cloud computing and mobile devices, high performance computing, data storage/transport/ management, and standard software/interfaces.

Low Observable (LO)/Counter LO (CLO): We envision NAWCAD supporting all aspects of future LO and CLO systems. NAWCAD LO/CLO expertise will encompass security; flight systems; logistics; maintenance; workforce; technology; and Command, Control, Communications, Computers and Intelligence.

Aerospace Industry: We partner closely with Defense Contract Management Agency, OSD, and other relevant professional organizations to monitor the health of the DoD/aerospace industrial base and to ensure a robust and responsive supplier network. We are world-class customers with a high degree of proficiency in supply chain management. Our deep understanding of the complexities of the industrial base, coupled with our proactive management approaches and tools, ensures timely and effective intervention when supplier performance issues arise, thereby minimizing program impact and ensuring effective, timely, and enduring support to the warfighter. We will develop and implement a plan to maintain the health of the industrial base given the anticipated shift within the industry from development to production.

Operational

Lead Systems Integration Role:* By acting as LSI for programs, we envision NAWCAD creating and delivering high-quality products for the warfighter that specifically meet needs, are affordable, and are timely.

Rapid Acquisition:* We envision a holistic cultural shift in terms of how the Command operates in regard to risk acceptance and empowerment in support of rapid acquisition to meet customer

* One of six Major Strategic Thrusts addressed in the body of the NAWCAD Strategic Plan

needs in a more timely and consistent manner. By 2025, we anticipate that DoD has developed a dual acquisition system: the "Deliberate" system and the "Rapid" system as suggested in the *Defense Science Board's Task Force on Fulfillment of Urgent Operational Needs (July 2009);* that ASN(RD&A) has established a 'lessons learned' database which documents rapid acquisition benchmarking and best practices for use by all services to maximize probability of successful acquisition and delivery of urgent requirements; that NAVAIR has established a Rapid Acquisition Team similar to the U.S. Air Force's "Big Safari" Team composed of highly experienced and trained individuals to assist customers with planning and executing rapid acquisition strategies to support the warfighter with acceptable risk; and that NAWCAD has collaborated with NAVAIR Headquarters in developing and implementing formal Rapid Acquisition guidance via a NAVAIR Instruction, policy directive, and/or guidebook.

Enterprise Knowledge Infrastructure: We envision an enterprise knowledge infrastructure that provides for technologies to support mobile communication processes of the organization's workforce, which is increasingly dispersed and needing to share secure, real time data and to readily distribute knowledge artifacts. The year 2025 will have resolved the challenge of competing technologies to create, share, and exchange (knowledge) work in a collaborative environment across locations, anywhere and anytime, while still being business process aware. The future will utilize bio-metrics on a secure platform - no more Common Access Card - to access dumb terminals where business intelligence (BI) will enable the translation of data into information services that exist "in the cloud" on Internet Protocol (IP) based networks. The deployment of Next Generation "everything" will take information technology to a new level that is difficult to imagine today. Biologically-based security measures and advances in mobile, "virtual" networked communications enable collaborative working and learning across locations, anywhere, anytime.

Business Models/Processes: NAWCAD will exemplify "thought leadership" through implementation of the attributes of a complex adaptive system, rapidly and affordably responding to current and anticipated customer requirements using leading edge knowledge, tools, skills, and abilities. Business Models must remain flexible and agile, working seamlessly across organizational boundaries, leveraging a wide range of specialists and integrators. A more dispersed workforce and the pressures of rapid acquisition, enabled by virtualization and collaboration tools, will produce organizational forms that are more dynamic and fluid within established business processes and practices.

Partnerships: We envision expanded partnerships by NAWCAD in performing its role as the DoD leader in RDAT&E of naval air systems for the U.S. and its allies. Project teams composed of engineers and scientists from across DoD and industry leverage each other's unique capabilities and facilities to get the job done. Work is performed in virtual workspaces where information can be shared real-time from anywhere in the world. Partnerships are essential for program execution and span intra-service, inter-service, intra-governmental, industry, academia, and coalition partners in support of national security objectives.

Systems Integration and Planning Enterprise Team (SIAP ET): NAVAIR's 2010 Commander's intent directed establishment of an Integrated Warfighting Capabilities (IWC) Enterprise Team "to identify, establish and maintain the necessary skills, capabilities, networked infrastructure, and tools to ensure our programs deliver fully-integrated, interoperable and sustainable capabilities, as well as to inform OPNAV resource decision-making." NAWCAD supports the establishment and maintenance of NAVAIR's capability to provide IWC through a standing independent organization. The SIAP ET thrust area is focused on developing the organizational framework and OPNAV relationships for such an organization to achieve NAVAIR's intent. The developed SIAP ET supports

program and resource sponsor developmental planning activities by leveraging across the enterprise to facilitate rigorous planning and analysis during critical early stages of program formulation. The proposed framework addresses cross-PEO interdependencies and System of Systems up-front, and provides a framework for early integration of the requirements engineering process with the OPNAV capabilities based need determination process.

Information Assurance (IA) and Cyber Defense: IA/Cyber Defense, sometimes referred to as Cyber Domain Awareness, addresses operational threats in Cyberspace. The very technologies that empower us to lead and create also empower those who would disrupt and destroy. The IA/Cyber Defense thrust area evaluates the current state of NAVAIR's Cyber Domain and develops a cohesive Cyber Domain strategic plan that enables NAVAIR to reduce the Total Cost of Ownership for Cyber Defense and increase NAVAIR Cyber Domain situational awareness. As part of a broader Cyber Domain Awareness strategy, NAWCAD will capture Cyber Domain capabilities across all lines of business to ensure safe and secure systems that support the warfighter; treat cyberspace as an operational domain to organize, train, and equip so that NAWCAD can take full advantage of cyberspace's potential; align the NAWCAD Cyber Domain Strategy with the NAVAIR strategy as part of a federated strategy with U.S. government departments and private sector partners to identify Cyber Domain capability gaps and ascertain potential solutions to those gaps; employ new defense operating concepts to protect NAVAIR networks and systems focusing on "domain awareness" via technology rather than the manual, stove-piped processes of the past; and couple emergent technologies and Cyber Defense. In this last area, mobile device convergence and next generation Web 3.0 technologies have created new capabilities that the Cyber Defense community must meet. Our challenge is to achieve flexibility in emergent technology areas without sacrificing our Cyber Defense posture.

Appendix C: Future State Themes and Relationships