A State of Defense

War in the 21st Century  Former Secretary of Defense Donald H. Rumsfeld

American Security Post 9-11  U.S. Senator Daniel R. Coats

Business of Defense  Indiana Lt. Gov. Becky Skillman
Welcome to the Mid-America Defense Conference

Unmanned systems and robotics are fundamentally changing the trajectory of warfare. A study by the Teal Group predicts that worldwide spending on Unmanned Aerial Vehicles (UAV) alone is expected to top $89 billion over the next ten years, and this growing technology sector is estimated to create 23,000 new U.S. jobs by 2025.

Indiana is strategically and geographically positioned to become a leader among states in the UAV market. Acting as a one-stop-shop facilitating collaboration between state, federal, and private interests, the National Center for Complex Operations (NCCO) allows both public and private entities “best-value” access to Indiana’s unique wealth of real operating environments for UAV research and development, testing and evaluation, and training. The NCCO, serving as the Heartland’s center of excellence for unmanned systems, actively promotes the success of both government and industry clients by providing cost-saving opportunities for innovation in this emerging marketspace. Indiana boasts a significant collection of restricted airspace over a broad range of landscapes and terrain, and is the proud home of a true national asset, the Muscatatuck Urban Training Center. MUTC is America’s only brick and mortar, full-scale urban environment allowing Unmanned Aerial Systems to operate with full-spectrum capabilities.

And while the Hoosier State is well-equipped to support UAV operations, it enjoys expansive R&D, T&E, and training capabilities for all types of unmanned systems and robotics and their associated technologies. NCCO not only promotes the defense-related growth of these technologies, but encourages collaboration for their use in crossover markets, to include agriculture and emergency management.

Given all of these attributes and more, Indiana is the perfect location for the Mid-America Defense Conference, “The Future—Unmanned Systems and Robotics”. By bringing together distinguished, senior-level government and military officials, industry leaders and subject matter experts from academia to discuss the future of this dynamic growth sector, this conference will spark new ideas, technological innovation and collaborative relationships. The NCCO welcomes you to participate in this foundational event focused on a rapidly growing sector that is so critical to our great nation’s defense, security and economy.
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On most of the 218 trips - 23 to Iraq and Afghanistan alone – and 748,840 miles I traveled over my recent six years as Secretary of Defense, I had the opportunity to spend time with our troops stationed around the globe. Above all else, they are dedicated. They voluntarily risk their lives in dangerous corners of the world to defend our freedom and our way of life, and I was grateful to be able to look them in the eye and personally tell them how much their service is respected and appreciated.

There was something extraordinary about those wearing the uniform and serving far from family and loved ones. Each encounter left an impression, but one of the more memorable was a small group of men I met in a bombed out shelter at Bagram Airbase, Afghanistan in 2001. They were the Special Forces who had been involved in the assault on Mazar-i-Sharif.

From the moment they landed in Afghanistan, these warriors began adapting to the circumstances on the ground. They had beards and scarves. They rode Afghan horses that had experience running into machine gun fire. They used pack mules to transport equipment across some of the roughest terrain in the world, riding in the darkness, often along narrow mountain trails with drops so sheer that, as one soldier put it, “it took me a week to ease the death-grip on my horse.” I asked how many of them had been on horseback before. The hands of less than half of those in the room shot up.

As they linked up and trained with anti-Taliban Northern Alliance forces, they quickly learned from their new allies about the realities of war in Afghanistan. They assisted the Afghans with weapons, food, and supplies. And they began to plan an audacious assault on the Taliban’s stronghold in the country’s north, Mazar-i-Sharif.

On the appointed day, U.S. Special Forces called in air-strikes with laser designators. The bomb blasts would be the signal for others to charge. When the moment came, they signaled the targets to coalition aircraft above. They looked at their watches. Two minutes and 15 seconds, 10 seconds – and then, seemingly out of nowhere, precision-guided bombs began to land on Taliban and al-Qaeda positions. The explosions were deafening. The timing was so precise that, as the soldiers described it, hundreds of Afghan horsemen came riding out of the smoke, down on the enemy. Some Afghans carried rocket-propelled grenades; some had fewer than 10 rounds for their weapons, but they rode boldly – Americans, Afghans, towards the Taliban and al Qaeda fighters. It had been described as the first U.S. cavalry attack of the 21st century.

After the battle one American soldier described how an Afghan fighter motioned for him to come over and began to pull up the leg of his pants. He thought he was going to see a wound. Instead, he looked down and saw a prosthetic limb. The Afghan had ridden into battle with but one good leg.

What won the battle for Mazar-i-Sharif and set in motion the Taliban’s fall from power was a combination of some quickly developed relationships between a handful of CIA operatives and the Northern Alliance leaders; the ingenuity, skill, and courage of our Special Forces; the most advanced, precision-guided munitions in the U.S. arsenal delivered by U.S. Navy, Air Force and Marine aircrews; and the courage of the battle-hardened Afghan fighters. That day on the plains of northern Afghanistan, the 19th century met the 21st century, and they quickly defeated a dangerous and determined adversary—a remarkable achievement.

When President George W. Bush called me back to the Pentagon after a quarter-century and asked me to lead a transformation of the Department, he knew I was an old-timer; though, I doubt he ever imagined that his Defense Department
would bring back the cavalry. But this is an example of what asymmetric warfare in the 21st century demands.

Here we are in the year 2012, having fought major conflicts in Iraq and Afghanistan and sent our forces to help fight against terrorist groups from Colombia to Djibouti to the Philippines. These distinctly different conflicts make clear that a revolution in military affairs is about more than building new high-tech weapons, though that is certainly part of it. Foremost, it showed the importance of new ways of thinking and new ways of fighting against unconventional enemies.

What was revolutionary and unprecedented – or transformational, as it is called in the Pentagon – about the assault on Mazar-i-Sharif was not the new technologies or capabilities that were successfully employed, but rather the revolutionary way they were mixed with older capabilities and techniques. Coalition forces took existing military capabilities—from the most advanced laser-guided weapons to the antique, 40-year-old B-52s updated with modern electronics to the most rudimentary, a man on horseback—and used them together in novel ways, with devastating effects.

Today’s warfare requires our military leaders to think differently and develop and fashion the kinds of forces and capabilities that can adapt quickly to new challenges and to unexpected circumstances. The ability to adapt is critical in a world where surprise and uncertainty are defining characteristics of our new security environment.

During the Cold War, we faced what eventually – over the decades – became a fairly predictable set of threats. We knew a good deal about the adversary – the Soviet Union – and its capabilities, and we fashioned the strategies and capabilities we needed to successfully deter them. We built a nuclear arsenal and entered the jet age with supersonic fighters. We built nuclear-powered submarines and ships and the first intercontinental-rage bombers and missiles. We massed heavy forces in Europe, ready to repel a Soviet tank invasion over the northern German plain, and adopted a strategy of containment—sending military aid and advisers to destabilize Soviet puppet regimes and support friendly nations threatened by Soviet aggression.

For almost half a century, that mix of strategy, forces and capabilities and their deterrent effect allowed us to keep the peace and defend freedom. But the Cold War is over and the Soviet Union is gone—and with it, the familiar security environment to which our nation had grown accustomed. As we painfully learned on September 11th, the challenges of a new century are not as predictable as they became during the Cold War. Instead of the Soviet threat, America found terrorists could take commercial airliners, turn them into missiles, and use them to strike the World Trade Center and the Pentagon, killing thousands?

September 11, 2001 was jarring for America. We realized that not only were we dealing with the challenges posed by armies, navies and air forces of other nations, but we were also facing networks of extremists that were operating in ungoverned areas in countries we weren’t at war with. We were dealing with radical Islamists who didn’t wear uniforms, who didn’t carry their weapons openly, and who didn’t have a recognized command structure. We were dealing with radical Islamists who were able to take advantage of the technological advances of other countries and use those lethal weapons to kill, not military forces, but innocent men, women and children instead of uniformed military personnel.

Terrorists can attack at any time, in any place, using any conceivable technique. And the reality is that it is physically impossible to defend at every moment of the day and night, in every location and against every possible technique. Consequently, President George W. Bush concluded properly, along with Congress, that our country would have to put pressure on terrorists around the world rather than simply trying to defend against them. The U.S. needed to try to defend against them, to be sure, but it would also be necessary to put pressure on terrorist organizations around the world and to treat countries that knowingly harbored terrorist organizations as complicit with terrorists. That major shift in approach was significant. I don’t think anyone at the time would have dreamed that a decade later there wouldn’t be another successful major attack on America. Many attacks have been deterred or defeated here in the United States since then, but no major attack has succeeded thanks to the strategy that was adopted.

Even so, the challenge in this new century remains a difficult one: to defend the American People against the unknown, the unseen, and the unexpected. To accomplish this, we have to continue to put aside comfortable ways of thinking and planning—fashion new approaches—so that we continue to successfully deter and defeat adversaries that may not have yet emerged.

Even before September 11th, the senior civilian and military leaders of the Department of Defense were in the process of doing just that. With the Quadrennial Defense Review, a major report required by the Congress, we took a hard look at the emerging security environment and came to the conclusion that a somewhat revised defense strategy was needed. We decided to move away from the “two major-theater war” construct for sizing our forces, an approach that called for maintaining two large occupation forces, capable of marching on and occupying the capitals of two aggressors at the same time and changing their regimes.

We moved away from the “threat-based” strategy that had dominated our country’s defense planning for nearly a half-century and adopt a “capability-based” strategy. This strategy focused less on who exactly might threaten us or where we might be challenged, and more on how America might be threatened and what we might need to do to deter and defend against such threats. So rather than building U.S. armed forces around plans to fight this or that country, we examine our vulnerabilities, asking, as Frederick the Great did in his General Principles of War, what design would I form if I were the enemy? We then began to fashion U.S. forces as appropriate to deter and defeat those threats.

We knew that because the U.S. had unparalleled land, sea and air power, it made little sense for potential adversaries to try to build up forces to directly compete with our strengths. They learned from the Gulf War in the 1990s that challenging
our armed forces head-on is unwise. So rather than building competing armies, navies and air forces, adversaries will likely seek to challenge us asymmetrically, by looking for our vulnerabilities and building capabilities with which they can, or at least hope, to successfully exploit.

For example, they know that an open society is vulnerable to many forms of terrorism. They suspect that U.S. space assets and information networks are vulnerable. They know that America’s ability to project force into the distant corners of the world where they live depends, in some cases, on vulnerable foreign bases.

The task is then to try to close off as many of those avenues of potential attack as possible. The U.S. needs to prepare for new forms of terrorism, to be sure, but also attacks on U.S. space assets, cyber-attacks on our information networks, cruise missiles, ballistic missiles, nuclear, chemical and biological weapons. At the same time, the U.S. needs to build up our own areas of advantage, such as our ability to project military power over long distances, precision-strike weapons, and space, intelligence and undersea warfare capabilities.

The challenge in the early portion of the 21st century is to defend our cities and our infrastructure from new forms of attack while being able to project force over long distances to fight new and perhaps distant adversaries. To do this, the need is for rapidly deployable, fully integrated joint forces capable of reaching distant theaters quickly and working with coalition air and sea forces to strike adversaries swiftly and with devastating effect. We and our allies need improved intelligence, long-range precision strikes, and sea-based platforms to help counter the access denial capabilities of adversaries.

The goal must not be simply to fight and win wars; it must be to try to prevent them. The task is to find ways to influence the decision-making of potential adversaries, to deter them not only from acting against our interests, but also from building dangerous new capabilities. Just as the existence of the U.S. Navy dissuades at least some from investing in competing navies – because of the cost – we must develop new assets, the possession of which will discourage adversaries from attempting to compete.

We need to change not only our capabilities, but also how we think about the threats. All the high-tech weapons in the world will not transform U.S. armed forces unless there is a transformation in the way our forces think and train—the way they exercise and the way we plan. September 11th taught America that the future holds still unknown dangers, and that we fail to prepare for them at our peril. The challenge is to make certain that, as time passes and the shock of what befell us that day wears off, we do not simply go back to doing things the way we did before. The war on terrorism, the continuous struggle against radical Islamist, has cause America to rethink our circumstances and to put that new thinking into action.

It is clear that our forces recent experiences in Iraq and Afghanistan do not offer a model for the next military campaign. Preparing to re-fight the last war has been a mistake repeated throughout much of military history, and one that must be avoided, even as we learn important lessons from recent experiences that may apply to the future. A few of those lessons may be worth some attention:

First, wars in the 21st century will increasingly require all elements of national power: economic, diplomatic, financial, legal, law enforcement, intelligence, as well as overt and covert military operations. Clausewitz said “war is the continuation of politics by other means.” In this still new century, many of those means may not be military.

Second, the ability of forces to communicate and operate seamlessly on the battlefield will be critical to success. In Afghanistan, the joint teams of U.S. Special Forces and CIA operatives on the ground, working with Navy, Air Force, Army and Marine pilots in the sky to identify targets, communicate targeting information, and coordinate the timing of strikes resulted in devastating consequences for the enemy. The difference between what we were able to do before U.S. Special Forces were on the ground and after they were on the ground was dramatic. In short, effectiveness in combat will depend heavily on
"Jointness," that is, how well the different branches of our military are able to communicate and coordinate their efforts on the battlefield. Achieving jointness in wartime requires building that jointness in peacetime. Our forces will need to train like they will fight.

Third, accepting whatever help from any country on a basis that is comfortable for them and allowing them to be the one to characterize what it is they may be doing to help our coalition instead of our characterizing if for them, enables us to maximize both their cooperation and the coalitions against the enemy.

Fourth, wars can benefit from coalitions of the willing, to be sure; however, they should not be fought by committees. The mission must determine the coalition — the coalition must not determine the mission. If it does, the mission will be "dumbed down" to the lowest common denominator.

Fifth, defending the American people and our country’s interests requires prevention, and sometimes preemption or more conversely anticipating self-defense. Defending against terrorism and other emerging 21st century threats requires that pressure is put on the enemy. The best, and in some cases, the only successful defense, is a good offense.

Sixth, rule out nothing. The enemy must understand with clarity that the U.S. will use every means at its disposal to defeat them, and that the coalition is prepared to make whatever sacrifices are necessary to prevail. To the extent the United States is seen as leaning back, the deterrent is weakened, and enemies become persuaded they can engage in acts to our detriment.

Seventh, having good intelligence and getting U.S. Special Forces on the ground early dramatically increases the effectiveness of air campaigns. In Afghanistan, precision-guided bombs were not effective until we had forces and eyes on the ground to tell the bombers where to aim.

Finally, our government needs to be straight with the American people, to tell them the truth. And when government officials cannot tell them something, they need to tell them that. The American people can understand what is needed to get the job done, that war is not easy and it is hard and ugly. But they must know that — good news or bad — their government will tell it to them straight. Broad bipartisan public support must be rooted in a bond of trust, of understanding and common purpose.

There is much to learn from the first wars of the 21st century, the first wars of the information age, but one cannot, and must not, make the mistake of assuming that terrorism is the only threat. Threats in the future may indeed come from terrorists, but there are also cyber-wars and traditional, state-on-state conflicts that can threaten the United States.

And perhaps the most important lesson to be learned today is that it would be a disastrous mistake if the government were to take an ax to the nation’s budgets – intelligence, State and Defense – America has done every war of the 20th century. And each time it was later regretted.

The pending threat of the defense sequester would cut an additional $500 billion from national defense over the coming decade, on top of hundreds of billions in cuts already made by the Obama administration. If the sequester happens, America’s military will be unable to have the 21st century capabilities needed to deter our adversaries. After years of grinding conflict, it can be easy to fall prey to the comfortable fiction that the tough business of defense is over. But the threats are there — and the weaker America is, the less stable and less safe the world will be.

Defense spending is now 19% of federal outlays and declining. This is the lowest percentage since before World War II. At approximately 4% of GDP, the defense budget is dwarfed by the cost of Social Security, Medicare and Medicaid, which exceed 10% of GDP. Even if a president brought home every troop in Iraq and Afghanistan tomorrow, tore down the Pentagon, shuttered the CIA and the national security agencies of government, and pink-slipped the three million men and women defending the country, it would not solve America’s financial woes.

One can argue that we’ve gotten away with the mistakes before. But the critical difference today is that the proliferation of biological, chemical and even nuclear weapons tells us that America’s margin for error is considerably smaller today. It is not in doubt that our nation’s current fiscal challenges will have an impact on our nation’s military and defense capabilities. In any organization as large as the Defense Department, there are things to be cut and efficiencies to be achieved. The most dramatic savings, however, will be found by challenging outmoded ways of thinking and transforming the Department Defense into a more nimble organization better able to confront the asymmetric threats of the 21st century. The assault on Mazar-e-Sharif shows what can be achieved when creative, forward-leaning thinking is brought to bear. The task for today’s generation is not only to be innovative but to remain vigilant, for vigilance is the price of liberty and nothing is more precious.

Donald H. Rumsfeld served as the United States Secretary of Defense from 1975-77 and from 2001-06. This article is adapted from a 2002 speech on transformation given at the National Defense University, and a 2011 op-ed in the Wall Street Journal.
American Security Post 9-11

By U.S. Senator Daniel R. Coats

September 11, 2001 is a day that changed the course of America forever. On that fateful Tuesday morning, nearly 3,000 of our citizens lost their lives in a senseless act of terrorism.

I was in Berlin that day as the newly installed U.S. Ambassador to the Federal Republic of Germany. It was my second day on the job. The first day was spent touring the Embassy, meeting my new staff and receiving my first security briefing.

On September 11, I received a distinguished visitor named Ernst Cramer, the longtime editor of Axel Springer newspapers. Cramer had a remarkable life. His Jewish family was held captive at the Buchenwald concentration camp where the then 17-year-old Ernst escaped to a farm in Mississippi.

After the Japanese bombed Pearl Harbor, Cramer enlisted in the U.S. Army to help defeat the regime that was destroying his native country and threatening his family. His skills as an interpreter led him to be among the first to arrive in Normandy and eventually to Buchenwald where he discovered that Nazis had exterminated his family.

Cramer remained grateful for the American rescue of Germany all these years and he was regaling me with stories and insights of US-German relations before he concluded his presentation with this comment: "Before I leave, I need to share with you the greatest threat facing America and the West in this new century: it is the rise of fundamentalist, Islamic terrorism."

As I watched Cramer depart the Embassy, my staff hurriedly approached me with the news that the first plane had struck the World Trade Center.

In the midst of the heartbreak and wreckage of 9-11, the world also witnessed what is America’s greatest strength. Firefighters, nurses, police officers, first responders and local residents worked around the clock to rescue and care for those injured. Food, clothing and monetary donations poured into affected areas from all over the world.

In Indiana, Hoosiers stepped up and gave generously their time and resources to help a grieving nation rebuild. And across our country, young men and women made the selfless decision to join our Armed Forces and wear the uniform in hopes of preventing an attack from ever occurring again.

That fateful Tuesday morning changed the way we think about life in America. It changed the way we travel; it changed the way we govern; it changed all of our lives – with some sacrificing more than others. The tragic events of September 11 resulted in a more vigilant nation and a more prepared and proactive government. Congress put aside political partisanship to work together with the administration and its departments to strengthen national security and intelligence efforts. Today, we face another major potential attack on our country. This attack is not a hijacked plane or bomb, although that remains a threat, rather it is a cyber attack.

As a member of the Senate Intelligence Committee, I know that the threat of a cyber attack is real and far-reaching. A major attack on our cyber systems could shut down our critical infrastructure – financial systems, communications systems, electric grids, power plants, water treatment centers, transportation systems and refineries – that allows us to run our economy and protect the safety of Americans.

"It is imperative that Congress pass cyber security legislation this year given the threat of cyber attacks against our government and key sectors of our economy."

U.S. Senator Dan Coats

Every day, American businesses are victims of cyber intrusions and the threat and sophistication of these attacks continue to grow. Earlier this year, FBI Director Robert Mueller warned that soon “the cyber threat will post the number one threat to our country.”

The week before an August recess – particularly during an election year – will always be filled with partisanship in Wash-
ington. But we really hit a low point this year when the Senate Majority Leader rushed a cyber security bill to the floor under strained circumstances. One-fifth of the U.S. Senate – both Republicans and Democrats – met every day for nearly two weeks to iron out our differences on cyber security legislation. And with the active participation of 20 senators representing both parties and key committees of jurisdiction, we came close. Unfortunately, politics threw a wrench in our plans before a negotiated settlement was reached.

I remain hopeful and I plan to keep working with my colleagues to find the right balance between government and industry, standards and incentives, and free markets and national security. We need cyber security legislation that provides flexibility, preserves personal liberties and protects our country from a widespread cyber attack.

Let us learn from the lessons of September 11 and not wait for a major strike before we act. We must work together – Democrats and Republicans, Congress and the White House, government and the private sector – to make our country a safer and more prosperous place.

Daniel R. Coats is a United States Senator representing the State of Indiana

Navy Announces USS Indiana

April 17, 2012 – Secretary of the Navy Ray Mabus announced that one of the next Virginia-class attack submarines will be named the USS Indiana. Secretary Mabus noted the designation was in honor of the State of Indiana’s military bases which “support our national defense and provides men and women who volunteer to serve our country.”

The selection of Indiana, designated SSN 789, is the third ship to bear the state’s name. It also furthers the rich heritage formed by the Naval Surface Warfare Center-Crane, IN, the Navy’s premier engineering, acquisition and sustainment organization supporting our maritime warriors.

Senator Dan Coats (R-Ind.) issued the following statement in response to the Indiana honor:

“I join all Hoosiers today in proudly welcoming USS Indiana to the world’s greatest Navy,” exclaimed U.S. Senator Dan Coats. “As the third U.S. Navy ship to be named after the Hoosier state, USS Indiana honors our state’s strong naval heritage and dedication to maintaining freedom of the seas. Although not a coastal state, Indiana is a significant contributor to the U.S. Navy’s mission and home to Naval Support Activity Crane, one of the largest naval installations in the world. Today Indiana and the thousands of Hoosiers who have served in the U.S. Navy celebrate the latest addition to the Navy’s fleet.”

Secretary Mabus noted that the prior ships carrying USS Indiana name stood as defenders of freedom on the water. Now the new ship “will represent the latest and greatest technology ever assembled to submerge below the surface and project power forward.” These next-generation attack submarines will provide the Navy with the capabilities required to maintain the nation’s undersea supremacy well into the 21st century. They will have enhanced stealth, sophisticated surveillance capabilities, and special warfare enhancements that will enable them to meet the Navy’s multi-mission requirements.

Each Virginia-class submarine is 7,800-tons and 377 feet in length, has a beam of 34 feet, and can operate at more than 25 knots submerged. It is designed with a reactor plant that will not require refueling during the planned life of the ship, reducing lifecycle costs while increasing underway time. The subs possess the capability to at-tack targets ashore with highly accurate Tomahawk cruise missiles and conduct covert long-term surveillance of land areas, littoral waters or other sea-based forces. Attack submarines’ Special Operation Forces seek and destroy enemy submarines and ships, execute Intelligence, Surveillance, and Reconnaissance (ISR) missions, and engage in mine warfare.

“lt’s a proud and happy day for the nation’s most patriotic state,” said Indiana Gov. Mitch Daniels. “We celebrate this news on behalf of all those Hoosiers who have served in the uniforms of the Navy and Marine Corps, and also those now working at the Naval Surface Warfare Center Crane Division, whose enormous contributions were one of the reasons Secretary Mabus made the decision he did.”
When Col. Joe E. Rameriz, visited the Muscatatuck Urban Training Center in 2010 he remarked, “People have tried to explain this, but you can’t really grasp the capability until you see it first hand, this is big… we are spending millions trying to build this, and you already have it in Indiana.” Echoing the same fascination with the rest of the state’s defense industry, the Indiana Business Resource Center declared, “The prominence of the defense industry in Indiana may be one of the most important untold stories of the past decade.” Only now is that story beginning to fully unfold.

Indiana’s Asset Base

In 2001, Indiana had fewer than 400 defense contractors whose total contracts valued at $1.8 billion. By 2010, 1,136 Hoosier businesses had received 9,889 federal defense contracts amounting to $4 billion, a rate of growth nearly twice as great as the increase in total U.S. defense contract dollars. Over that same period, Indiana attracted a total of $47 billion in defense contracts. And these dollars translate into good jobs. Jobs directly supported by these contracts had an average salary of $64,000 in 2010 while manufacturing jobs had an average salary of $90,000. Moreover, for every 10 jobs with an Indiana defense contractor, an additional 11 jobs were created throughout the state.

Comprising the foundation of Indiana’s defense dollar magnet are the state’s hard assets. Muscatatuck Urban Training Center is considered the largest, fully functional real brick and mortar urban training environment in the United States. Muscatatuck offers the only site in the nation where unmanned systems can fly in restricted airspace and collect data from an urban environment. Its counterpart Camp Atterbury is one of the premiere training and mobilization facilities in the country. NSWC-Crane is the world’s third largest Naval installation and pumps a massive $2 million into the Indiana economy every day. The technology that comes out of Crane can be found on the nation’s toughest warfighters; on nearly every Naval ship, submarine, missile, and aircraft; and in every branch of the military. Taken together, these installations, also known as the Indiana Test Bed, provide unmatched training and testing capabilities for the nation’s armed forces, law enforcement and homeland security.

Indiana is also home to the Jefferson Proving Ground, Hulman Field, Grissom Air Reserve Base, the 181st Intelligence Wing, and the 122nd Fighter Wing of the Indiana National Guard.

Helping to fuel the industry are the state’s many defense contractors. Big hitters like Raytheon, BAE Systems and ITT have set up shop in the state but so have smaller, lesser-known tech firms like Simulex, Odysian Technology and Next Wave Systems. Hoosiers will also be pleased to know homegrown firms like Eli Lilly and Cummins are among the state’s largest defense contractors. Some of these contractors have coalesced around the hard assets and comprise clusters, or hot beds of innovation and development. These can be found in and around Indianapolis, Fort Wayne and the southern Indiana installations. According to Northeast Indiana Regional Partnership director John Sampson northeast Indiana has an especially robust defense tech cluster because it “is home to more than 4,300 employees working at Fortune 100 companies and other technology and related manufacturing operations.”

Indiana’s universities are also adding significant value to America’s national security while drawing in big defense dollars for the state. In 2010, Purdue University attracted a whopping $7.9 million in contracts due in large part to the Institute for Defense Innovation and its six centers of excellence. Indiana University is nationally recognized as a leader in instruction in all of the strategic languages and is the only institution to be awarded three DoD National Security Education Program Language Flagships in Chinese, Swahili, and Turkish. Moreover, the university’s impressive work in cyber security and information assurance have won it recent attention from the National Science Foundation in the form of a $4.3 million grant. Notre Dame’s world-renowned research
on nano-magnetic logic has attracted many defense contracts. The university is conducting cutting edge research on the transmission and computation of data using magnetic fields, rather than electrical currents. Indiana State University is one of the only universities in the country that has a major or even a minor in unmanned aerial systems and human capital development. Other academic institutions that have attracted defense dollars include Rose-Hulman, Trine University, Taylor, Ball State, Vincennes, and Valparaiso.

While Indiana's seventy-six colleges and research universities provide highly trained and talented graduates that are attractive to defense companies, the state's education advantages go beyond the post-secondary level. Indiana's K-12 STEM programming and the presence of the highly-acclaimed Project Lead The Way give the state a further edge on developing a highly skilled labor force. Already, we have more than 61,000 defense industry jobs and over 6,400 engineering and technical defense workers. The increased investment in Indiana's defense industry signals a greater need for higher human capital—which Indiana can provide—and consequently higher wages for the target labor force.

Investing in Our Future
All told, Indiana's thriving but relatively quiet defense industry will continue to be a major economic engine even as the nature of warfare shifts to include untraditional threats, irregular warfare and increasingly dynamic challenges. With this in mind, Governor Daniels and I have tried to support the warfighter since taking office by investing in our assets here in the Heartland.

Governor Daniels and I both have shown our support for the $12 million Battery Innovation Center at the WestGate@Crane Technology Park. Though the center's defense-related research will benefit from its close proximity to NSWC-Crane, the center is also geared for commercial applications. According to the Indiana-based Energy Systems Network, the global market for advanced batteries is nearly $50 billion. Economists predict double-digit annual growth over the next decade driven by increasing adoption of electric vehicles, the implementation of smart electric grid technologies, and other applications for flexible energy storage.

In further support of the WestGate Technology Park, our administration has worked to build a southern extension of I-69 that will better connect the state's central hub with the assets in southern Indiana including Crane. At the groundbreaking of the center, Governor Daniels told the crowd, “There are a lot of reason to see [the I-69] project through. By listening to folks here I came to understand and believe deeply that the future growth of this facility was the top one such reasons.”

Passing the Torch. Providing Continuity.
As our administration transitions out of office, we have set up an organization to provide continuity of strategy and to bolster economic development in the state while adding muscle to the U.S. military. In early 2012, I announced the creation of the National Center for Complex Operations to oversee Indiana's economic development strategy as it relates to the defense industry. The NCCO acts as a “one-stop-shop” to connect state, federal, and private interests with services, programs, training and testing capabilities that will serve the U.S. armed forces and government agencies at all levels. In essence it is a portal that expedites and facilitates the relationship between parties on both sides of the fence. The NCCO has identified five specialty areas that mesh particularly well with Indiana's defense asset base. These are: Special Operations, Energy, Modeling, Simulation, Cyber Readiness, and Unmanned Aerial Systems (UAS). It is UAS that the NCCO is focusing on initially.

Since its recent inception, the NCCO has started to develop an impressive track record. In response to the FAA search for six UAV test sites, Indiana has teamed up with Ohio to attract the attention of federal dollars, which will go towards developing the proper regulations for unmanned flight. Taken together, Indiana's restricted airspace coupled with Ohio's robust defense sector provide our states with a competitive edge. Most recently, the NCCO brokered a business deal with its first customer, BAE Systems' Unmanned Aircraft Group. BAE Systems is a multi-billion dollar company and will bring a mutually beneficial relationship to Indiana's growing UAV industry.

Looking Ahead
Past conversations about national security have drawn people's attention to the coasts, but with the role of high technology in today's military we have the opportunity to shift focus to the Midwest, especially Indiana. While the notorious sequestration is cause for concern, the programs that funds are likely to flow to include unmanned systems and cyber-security, both of which are strengths of our state. National defense and homeland security will be provided with unmatched advantages because of Indiana's progressive, low-cost business environment, world-class research capabilities, technological innovation, engineering excellence, and manufacturing expertise. More importantly, Hoosiers will benefit directly from the good jobs created and the influx of wealth that will occur if we continue to support our troops through the innovation and manufacturing that we do best.
In 2002, Secretary of Defense Donald Rumsfeld called on service members and the defense industry to help transform the military. This transformation would, in broad terms, entail high-tech combat systems, reliance on air forces, and small, nimble ground forces. What that looked like in practice at the time was anyone’s guess. But by the following year one man took on the task of manifesting Rumsfeld’s 21st century military and leading it into combat.

General David Petraeus has been called the most consequential military officer since Eisenhower; certainly he is the most celebrated. From the halls of West Point to the commanding heights in Iraq and Afghanistan to his recent appointment as Director of the Central Intelligence Agency, Petraeus has crafted a legacy as an innovator and the quintessential soldier-scholar-statesman. Indeed, he wrote the book on 21st century warfare.

In All In: The Education of General David Petraeus, Paula Broadwell tracks the influences that shaped the thinking and work of Petraeus across his life. She intersperses biographical vignettes against the backdrop of his year in command of the forces in Afghanistan. Supported by hundreds of interviews hours with the general as well as with his closest confidants, family and colleagues, Broadwell finds that Petraeus was heavily influenced by his education, top-brass mentors and by personal experiences in Haiti, Bosnia and Central America. The result is an account one-part biography, one-part layman’s guide to Petraeus’ greatest contribution to the U.S. Armed Forces—the Counterinsurgency Field Manual.

Petraeus began his rise to superstar status with the publication of the Counterinsurgency Field Manual in 2006. For this groundbreaking work, he was sent to Iraq by President George W. Bush to implement his counterinsurgency (COIN) ideas. As commanding general of the Multi-National forces, Petraeus oversaw the “surge” of 30,000 additional troops, ultimately turning the tides of war in Iraq.

Three years later Petraeus returned to theater, only this time in Afghanistan. After the Rolling Stones debacle, President Obama replaced General McChrystal with Petraeus as Commander of U.S. forces in Afghanistan. With only one year before the draw down, Petraeus began to implement counterinsurgency operations across Afghanistan.

Petraeus’ military doctrine outlined in the COIN manual is a dramatic shift from the military establishment’s reliance on heavy machinery. Borrowing heavily from lessons learned during the Vietnam War, COIN is a hearts-and-minds approach to warfare requiring light, quick forces dedicated to winning the peace. As Petraeus writes in the manual’s foreword, “Soldiers and Marines are expected to be nation builders as well as warriors” and must be ready “to be greeted with either a handshake or a hand grenade . . . ” In short—balance.

The tenets of COIN are simple, but highly uncharacteristic of traditional military doctrine. At its core COIN boils down to focusing on protecting the citizens rather than destroying the enemy. In her book Broadwell writes, “The key to victory lay in protecting the indigenous population, not just in killing the enemy. That was the insight Petraeus stressed over and over. Killing the enemy was certainly part of his counterinsurgency doctrine—a key part. But he knew only too well that, without the support of the Afghan people, you could never kill your way out of an insurgency.”

In a 24-point memo to the forces in Afghanistan, Petraeus laid out the imperatives of counterinsurgency. At times his letter reads more like a sermon or like a seminar on corporate leadership rather than a Patton-esque speech one might expect from a general. What is astonishing is that many of the principles transcend their use in theater and can be applied to communities, businesses, NGOs, and civilian life and leadership.

**Secure and Serve the Population.** The decisive terrain is the human terrain. The people are the center of gravity. Only by providing them security and earning their trust and confidence can the Afghan government and ISAF prevail.

**Live with the People.** We can’t commute to the fight. Position joint bases and combat outposts as close to those we’re seeking to secure as is feasible. Decide on locations with input from our partners and after consultation with local citizens and informed by intelligence and security assessments.

**Help Confront the Culture of Impunity.** The Taliban are not the only enemy of the people. The people are also threatened by inadequate governance, corruption, and abuse of power—recruiters for the Taliban. President Karzai has forthrightly committed to combat these threats. Work with our Afghan partners to help turn his words into reality and to help our partners protect the people from malign actors as well as from terrorists.

**Help Afghans Build Accountable Governance.** Afghanistan has a long history of representative self-government at all levels, from the village shura to the government in Kabul. Help the government and the people revive those traditions and help them develop checks and balances to prevent abuses.

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Pursue the enemy relentlessly. Together with our Afghan partners, get our teeth into the insurgents and don’t let go. When the extremists fight, make them pay. Seek out and eliminate those who threaten the population. Don’t let them intimidate the innocent. Target the whole network, not just individuals.

Identify corrupt officials. President Karzai has said, “My government is committed to fighting corruption with all means possible.” Help the government achieve that aim. Make sure the people we work with work for the people. If they don’t work with partners to enable action, or we will appear to be part of the problem. Bring networks of malign actors to the attention of trusted Afghan partners and your chain of command. Act with your Afghan partners to confront, isolate, pressure, and defund malign actors—and, where appropriate, to refer malign actors for prosecution.

Foster lasting solutions. Help our Afghan partners create good governance and enduring security. Avoid compromises with malign actors that achieve short-term gains at the expense of long-term stability. Think hard before pursuing initiatives that may not be sustainable in the long run. When it comes to projects, small is often beautiful.

Money is ammunition; don’t put it in the wrong hands. Institute “COIN contracting.” Pay close attention to the impact of our spending and understand who benefits from it. And remember, we are who we fund. How we spend is often more important than how much we spend.

Walk. Stop by, don’t drive by. Patrol on foot whenever possible and engage the population. Take off your sunglasses. Situational awareness can only be gained by interacting face-to-face, not separated by ballistic glass or Oakleys.

Act as one team. Work closely with our international and Afghan partners, civilian as well as military. Treat them as brothers-in-arms. Unity of effort and cooperation are not optional.

Promote local reintegration. Together with our Afghan partners, identify and separate the “reconcilables” from the “irreconcilables.” Identify and report obstacles to reintegration. Help our partners address grievances and strive to make the reconcilables part of the local solution, even as we work with our partners to identify and kill, capture, drive out, or “turn” the irreconcilables.

Be first with the truth. Beat the insurgents and malign actors to the headlines. Preempt rumors. Get accurate information to the chain of command, to Afghan leaders, to the people, and to the press as soon as possible. Integrity is critical to this fight. Avoid spinning, and don’t try to “dress up” an ugly situation. Acknowledge setbacks and failures, including civilian casualties, and then state how we’ll respond and what we’ve learned.

Manage expectations. Avoid premature declarations of success. Note what has been accomplished and what still needs to be done. Strive to under-promise and over-deliver.

Live our values. Stay true to the values we hold dear. This is what distinguishes us from our enemies. We are engaged in a tough endeavor. It is often brutal, physically demanding, and frustrating. All of us experience moments of anger, but we must not give in to dark impulses or tolerate unacceptable actions by others.

Be a good guest. Treat the Afghan people and their property with respect. Think about how we drive, how we patrol, how we relate to people, and how we help the community. View our actions through the eyes of the Afghans and, together with our partners, consult with elders before pursuing new initiatives and operations.

Consult and build relationships, but not just with those who seek us out. Earn the people’s trust, talk to them, ask them questions, and learn about their lives. Inquire about social dynamics, frictions, local histories, and grievances. Hear what they say. Be aware of others in the room and how their presence may affect the answers you get. Cross-check information and
make sure you have the full story. Avoid knee-jerk responses based on first impressions. Don’t be a pawn in someone else’s game. Spend time, listen, consult, and drink lots of tea.

**Empower Subordinates.** Resource to enable decentralized action. Push assets and authorities down to those who most need them and can actually use them. Flatten reporting chains (while maintaining hierarchical decision chains). Remember that it is those at tactical levels—the so-called “strategic sergeants” and “strategic captains”—who turn big ideas in counterinsurgency operations into reality on the ground.

**Win the Battle of Wits.** Learn and adapt more quickly than the enemy. Be cunning. Outsmart the insurgents. Share best practices and lessons learned. Create and exploit opportunities.

**Exercise Initiative.** In the absence of guidance or orders, figure out what the order should have been and execute them aggressively.

*All In* also offers important lessons from Petraeus' transformational leadership style. According to Petraeus, the “four big tasks” of a strategic leader are getting the big ideas right, communicating those big ideas, overseeing their implementation, and capturing best practices and lessons to reapply. Petraeus used these tasks throughout his military career including Afghanistan. Broadwell writes that upon arriving in Afghanistan Petraeus laid out his three big ideas: One: that the military couldn’t win the war alone. Two: that the U.S. forces were in Afghanistan to win. And three: that U.S. forces have an enduring commitment, but it might evolve as authority is transferred to the Afghans. He continued to communicate these concepts throughout his time in Afghanistan. Other lessons we learn from Petraeus include the importance of mentoring and listening to good ideas throughout the entire chain of command.

General David Petraeus’ efforts in Afghanistan have not won the same acclaim that his surge in Iraq did. As forces are withdrawn from the country, time may better shine light on how effective COIN actually was on an Afghan landscape. Whatever story history tells, Petraeus remains the soldier-scholar-statesman that wrote the book on 21st century warfare and institutionalized it. The lessons laid out in *All In* and others will provide the subject of study for generations to come.

Some of these lessons are being put to practice and refined in the Heartland. Major General Omer “Clif” Tooley of the Indiana National Guard is a key agent in helping to sustain COIN operations. As Commanding General of Camp Atterbury—Muscatatuck Center for Complex Operations, Tooley is working to develop the facility into a Joint Interagency, Inter-governmental, Multinational and Non-Governmental training and testing center capable of meeting the national security requirements of the 21st century. Camp Atterbury—MCCO is considered the largest, fully functional real brick-and-mortar urban training environment in the United States. Together the two facilities provide a realistic training and testing environment for the full spectrum of complex needs required by the 21st century warfighter.

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**NSA Crane:**

The Crown Jewel of Indiana’s Defense Asset Base

**By Duane Embree**

Just last year Naval Support Activity (NSA) Crane celebrated its 70-year anniversary. On Dec. 1, 1941 Crane was dedicated and began operations just six days before the bombing of Pearl Harbor. Crane’s initial role as an ammunition depot was set against the backdrop of WWII and a nation facing uncertain times.

The Navy chose to develop the area because of its Midwest location and rural landscape, which made it the ideal location as an inland, secure setting for producing, testing and storing ordnance. NSWC Crane, the largest activity at Crane, evolved from that foundation in ordnance to become a national leader in sensors, electronics, electronic warfare, strategic systems and special missions. Recently Crane has been involved in everything from the discovery of the Higgs Boson to the repair of “Old Iron Sides.” Above all, though, NSA Crane works to equip the warfighter with the most advanced capabilities they need to get the job done.

Located in southwestern Indiana, NSA Crane is actually home to two major defense assets: the Crane Army Ammunition Activity (CAAA) and the Naval Surface Warfare Center (NSWC), Crane Division, as well as a major Naval Fleet Inventory Supply Center (FISC). With 100 square miles, NSA Crane is the third geographically largest Naval Base in the world and boasts a low risk, low encroachment location. As an economic juggernaut that pumps $2 million into the state economy per day, NSA Crane is a key National Defense asset and the crown jewel in Indiana’s arsenal of Defense and National security assets.

The Crane Army Ammunition Activity is a premier government owned and operated producer and supplier of conventional munitions to the fighting ground sea and air forces. CAAA has a mission to store, ship, produce, renovate and de-
militarize conventional ammunition, missiles and related components to meet contingency requirements in support of the warfighter. Employing over 800 skilled ordnance production, logistics and transportation experts and a strong fleet of local trucking companies, CAAA takes advantage of Indiana as the crossroads of America to quickly deliver ordnance to the warfighter worldwide.

The 3,000 highly skilled scientific, technical and business professionals of the Crane Naval Surface Warfare Center partner with over 2,000 support contract personnel to provide research, development, acquisition, and in-service technical support for sensors, electronics, electronic warfare and special warfare weapons for the Navy and across the Department of Defense. With more than 50 years with the Navy’s ballistic missiles and more than 30 years with the Air Force’s strategic missiles and an essential role through 2080, NSWC Crane is indispensable to the Nuclear Triad by ensuring 100% operational readiness and effectiveness of the missile systems. It accomplishes this through:

- Designing and testing critical trusted electronics.
- Radiation hardening expertise to ensure electronics’ functionality in extreme atmospheric conditions.
- Leadership and expertise in anti-tamper capabilities and protection against counterfeit parts.
- Designing, building, and maintaining highly reliable power and energy systems.

With the DoD’s largest concentration of Electronic Warfare expertise, NSWC Crane is the Navy’s Center of Excellence for air, ground, undersea and surface electronic warfare elements. This includes Signals Intelligence (SIGINT) and IO systems and provides distinct and essential capabilities in microwave technologies RDT&E and sustainment; radar components sustainment; and infrared countermeasures and pyrotechnic RDT&E and sustainment.

Furthermore, NSWC Crane is the Center of Excellence for Special Operations Weapons and Weaponry, developing and ensuring safe, reliable and effective weapons, munitions, and electronic systems for Special Operations and Expeditionary Forces with emphasis on the most elite warfighters. Crane provides distinct expertise in rapid development, evaluation and fielding of:

- SOF peculiar weapons and ammunition.
- Hand emplaced and man-portable anti-personnel and anti-material munitions.
- Electro-optic and visual augmentation sensors and laser markers.
- Explosive detection, and personnel and vehicle scanning.
- Expeditionary command and control systems.

The Naval Support Activity Crane partners with Camp Atterbury and Muscatatuck Urban Training Center, Indiana colleges and universities, and state and local governments to define a new model of innovative development and deployment of National Defense and Security capabilities. Combined with a nationally recognized high quality of life, local communities strongly committed to national defense, and a cost of living 22% below the national average, Naval Support Activity Crane and the Indiana arsenal of Defense and National Security assets are indispensable to the nation as a low-cost/high-value destination of choice for defense and national security.

Duane Embree retired from Federal service as the Senior Civilian and Technical Director of the Naval Surface Warfare Center Crane Division. He now serves as the National Director for Military and Defense Initiatives for Ivy Tech Community College, where he leads workforce training and economic development initiatives across the Defense sector. He was awarded the Department of Navy Distinguished Civilian Service Award and appointed a Sagamore of the Wabash by Indiana Governor Mitch Daniels.
We are well positioned here in Indiana to take advantage of opportunities in what is really a major shift in how our nation approaches security. The National Center for Complex Operations (NCCO) is a new way of addressing national security needs. But before going into detail on that, I want to look at the bigger picture. This is my read on the environment we are in as well as the risks, dangers and opportunities.

First, a word about my day job. I serve as Commander of the Camp Atterbury—Muscatatuck Center for Complex Operations. Our purpose is to provide the nation with the most realistic, fiscally responsible, contemporary operation environment possible to prepare to protect the homeland and win the peace.

Background
The entire U.S. defense structure—how we do business, how we deploy capabilities, and how we create capabilities—is a model built on lessons learned from WWII and embodied in the 1947 National Security Act. Our defense structure is a monolithic organization based on a business model borrowed from heavy industry, that is, from industries like automobile production. Equipment became the centerpiece of readiness and everything else revolved around it including the manning, how it was operated, and how it was maintained.

Using a business model from heavy industry, we created an elongated program to develop readiness over a period of seven years. First, we predicted what the environment would be 10 years out. Then we identified what equipment would act as solutions to that environment, and then we went through a two-year process of modifying equipment. Once everybody was happy with the equipment solutions, we entered into a five-year resourcing model, which is the budget process. That’s the model the Department of Defense (DoD) has worked with since 1947. But during the last 10 years of conflict, there was a realization that that model was no longer relevant or responsive. For instance, 95 percent of the technology that was actually bought and sent to theatre never made it into the hands of the soldiers. The system was not designed to do that.

It’s going to get ugly over the next few years as historians get a hold of the last 10 years and start looking at the money that we threw at the problems and all of the system failures. It wasn’t necessarily a failure of leadership as much as it was an old business model being thrown against temporary problems.

Forming a Strategy to Better Address Today’s Realities
First at Muscatatuck and now with the formation of the National Center for Complex Operations, we are making the future happen now. We use the term complex in our title because the underlying reality is based on the science of complexity. Right now we are experiencing what complexity theorists call a “dancing landscape,” which is basically a complex of changing interdependencies and interactions between agents and bureaucracies. The NCCO works with those of us “inside of the fence” to unleash a new business model that allows us to rapidly adapt to the changing environment, or dancing landscapes, to maintain a competitive edge.

Through the NCCO, we are bringing together some of the inherent strengths of bureaucracy and the inherent strengths of the commercial world. The commercial world adapted some time ago and so we organized around their structures. Current programs are acquiring equipment not for 10 or 20-year programs but for four-year programs with the expectation that technology and related value-added processes will change.

NCCO uses a business model that allows us to change with the environment, change models, and maintain responsiveness against the new requirements.

Muscatatuck is the physical plant for a 21st century capability. It consists of four components and two activities. The four components are land/terrain, airspace, electromagnetic atmosphere, and a human dimension. The two activities are training and testing. Those elements comprise the operating space for the 21st century. If someone doesn’t address those four areas they are in a situation where they can’t pull off a solution.

Those of us in uniform represent “inside the fence” capabilities. We are a 21st century operation environment platform. We reach out and grab folks who have applications that need to reside within our environment in order to function effectively. First of all, we bring in things that are relevant to our operating environment and also that have synergy with other applications. Within that framework, we look at the businesses and the opportunities within the national security arena and divide those two things up into two big worlds. One world is the conventional, traditional interstate conflict. The other is non-state conflict, that is, the state of persistent engagement. This involves threats to the Homeland and other types of non-state threats in the world.

Bureaucracy always runs to interstate conflict solutions because its equipment centric—ships, tanks. That’s where they are trying to go right now by elevating China and Iran as potential threats.

The Evolution of Modern Warfare and the Dancing Landscapes of National Security

Bureaucracy and major contractors are running to that arena because that’s where the comfort zone is and that’s where they focus on. We’re going into the other half—into the world of persistent engagement, nontraditional, nonstate threats and actors, the world of special operations, the world of cyber warfare.

In business we are running after what is called the long tail of a power group. Most businesses run over to the big name 15 percent programs. We’re going for the 85 percent small programs. That is the environment where we are most relevant and where we have a niche dealing with folks who rapidly adapt. To them, asymmetric is the normal way of interacting. They are best at rapid adaptation technology. Strategy, tactics, procedures, organizations everything has to be rapidly adaptable because it’s playing out in a dancing landscape. You’re making decisions and other people are making decisions--it forces you to be rapidly adaptable. A big bureaucracy cannot do that.

So what we’re doing is creating a system, a capability, a business model that allows us to rapidly adapt to this particular spectrum of capabilities.

The way money moves has changed too. The big programs trying to build heavy equipment have a longer process. But everybody else out there is looking at moving money differently. There are a few characteristics: programs tend to be short lived, program directors are being squeezed as budgets go down, and they have to produce quickly under cost and with all these other parameters that are out there now in an environment where resources are being squeezed.

Our program managers that are coming in and using our space have to reach out into the private sector to get their support whether its logistics or training. With orders quickly changing from Afghanistan to places like Nicaragua, units need to turn on a dime. Our private sector model is fast and thus relevant to such dynamics in contrast to the existing contracting system.

And to further complicate things, Washington no longer passes budgets at the beginning of the fiscal year that continue under the resolution authorities. New programs and new start-ups cannot even begin their activities until a budget passes so delays mean that contractors may lose a quarter of the year and need to operate on a quarter of the budgets they’re used to. So we have the systems in place that rapidly commit money and can move money to get what they need in order to do their job.

These new realities signal a shift in national security operations from East Coast to the Midwest. The NCCO is in position to leverage this change for the betterment of the forces we send to battle and the economic prospects of our state.

MG Omer “Clif” Tooley, Jr. is the Assistant Adjutant General of the Indiana National Guard with duty as the Commanding General, CA-MCCO. He is responsible for guiding the development of the Camp Atterbury Joint Maneuver Training Center, including the Muscatatuck Complex, into a Joint, Interagency, Intergovernmental, Multinational and Non-Governmental training and testing center capable of meeting the national security requirements of the 21st Century.

These remarks were adapted from MG Tooley’s remarks at Sagamore Institute December 2011.
With talk of unmanned systems and cyber-security, it’s clear that warfare has changed. What might not be as apparent, though, is how these strategic currents influence the American Midwest. A place once overlooked in national security conversations, the Midwest is beginning to catch the attention of national players in defense. Indiana, in particular, is making a name for itself. Through a unique suite of defense assets, the state provides an optimal environment for developing and testing capabilities for the 21st century warfighter. And few know the dynamics of this narrative better than Vice Admiral Mike Bucchi.

Following his commission in June 1970, Vice Admiral Mike Bucchi completed flight training and was designated a Naval Aviator on October 1971. The rest of his intense operational career was marked by significant achievements. For instance, he was the first East Coast fleet pilot to fire a Phoenix missile; he served as an instructor at Top Gun; and he was the Operations Officer for Fighter Squadron Thirty-One during its first year as an F-14 squadron.

He was assigned to Commander, Fighter Wing One with additional duties as Special Intelligence Officer to the Commander in Chief, U.S. Atlantic Fleet Strategic Support Team, and then served as Readiness Officer for the Commander, Tactical Wings Atlantic.

VADM Bucchi then moved on to serve as first Executive Officer, then as the thirty-fourth Commanding Officer of Fighter Squadron Thirty-Three. His command tour was followed by appointment as F-14 Fighter Readiness and Adversary Officer at Commander, Naval Air Forces, Atlantic. In 1990, he became the Deputy Commander, Carrier Air Wing (CVW) Eight, and participated in Operations Desert Shield, Desert Storm, and Provide Comfort. During those operations he logged over thirty combat missions and more than one hundred combat flight hours. Following graduation from National War College, Vice Admiral Bucchi commanded Carrier Air Wing Three from late 1992 to mid-1994.

He has completed various Mediterranean, Indian Ocean, and Persian Gulf cruises aboard USS John F. Kennedy (CV 67), USS America (CV 66), and USS Theodore Roosevelt (CVN 71), amassing over 6,000 total flight hours and more than 1,000 carrier arrested landings. VADM Bucchi was promoted to Flag rank in June 1994 and then assigned as the Deputy U.S. Military Representative to the North Atlantic Treaty Organization Military Committee in Brussels, Belgium. In June of 1996 Vice Admiral Bucchi became Commander, Carrier Group Six, homeported in Mayport, Florida. In December 1996, he assumed additional duties as Deputy Commander, Joint Task Force Southwest Asia until March 1997. Vice Admiral Bucchi then became the Chief of Naval Air Training on December 15, 1997 and received his third star en route to his assignment as Commander, U.S. Third Fleet and the Director of the Navy’s Sea Based Battle Lab. Vice Admiral Bucchi completed his last active duty tour as Commander of the United States Third Fleet on 28 May 2003.

His awards include the Distinguished Service Medal, Defense Superior Service Medal, Legion of Merit, Bronze Star with Combat “V,” the Defense Meritorious Service Medal, three Meritorious Service Medals, three Strike/Flight awards with Combat “V,” the Joint Service Commendation Medal, five Navy Commendation Medals with Combat “V,” the Humanitarian Service Medal and various campaign and unit awards.
On June 16, 2003 Mr. Bucchi started work at Ocean Systems Engineering Corporation (OSEC), a high-tech software company whose corporate office was located in Carlsbad, CA. He joined OSEC as the Chief Operation Officer and Executive Vice President and later became President of the Company on March 1, 2005. After OSEC was acquired by Apogen Technologies, a QinetiQ North America company, Mr. Bucchi became a Senior Vice President for the Mission Solutions Group where he led the Navy Business Unit in Southern California.

Mr. Bucchi is presently employed with Concurrent Technologies Corporation as Executive Technical Director with a primary focus on helping NSWC Crane grow strategically. He also serves as the Vice Chairman & Treasurer for the National Center for Complex Operations’ Board of Directors.

Sagamore Institute spoke with Vice Admiral Michael Bucchi to better understand the evolution of modern warfare and the economic potential these changes bring to Indiana.

Let’s start by having you introduce yourself.

My real name is Toney Michael Bucchi, but I’ve always gone by Mike or Michael. Shortly after I entered the Navy I received a call sign, though. As it turned out, I had a tendency to smile when people were shouting at me, so before long I had a new handle, “Smiles.” That name stayed with me throughout my military career. In fact, a lot of my acquaintances still send me notes and refer to me as Smiles instead of my real name.

Following my commission in June 1970, I completed flight training and was designated a Naval Aviator in October 1971. I instructed in advanced jets just over two years and was selected to go be a TOMCAT driver and was one of the first “new bloods” (A new guy without any fleet experience, yet) to get into the F-14 TOMCAT. It was a brand new machine when I first got my wings. I flew the F-14 TOMCAT as my primary airplane and accumulated over 3,000 hours in that particular aircraft. During my last two fleet tours of duty, I was dual qualified in both the F-14 TOMCAT and the F-18 HORNET.

I’ve done a lot of aircraft carrier work, too. Most of my deployments were east coast, although we ended up over in the Pacific in a couple of those. I’ve flown over 6,000 tactical hours and have over 1,000 arrested carrier landings. If you’re a C-130 pilot, 6,000 hours isn’t that much, but if you fly a pointed-noise, fast mover that’s a pretty good number to have.

I had command of Fighter Squadron Thirty-Three. I was the Deputy Air Wing Commander, Air Wing Eight, during Desert Shield, Desert Storm and Provide Comfort. Then after National War College I was given command of Carrier Air Wing Three. While deployed during my Air Wing tour, we supported operations off of Bosnia. I was selected for Flag (Admiral) while I was still the Air Wing Commander.

I had my first Flag Officer tour as Deputy U.S. Military Representative to the NATO Military Committee over in Brussels, Belgium. I worked for a great three star Army General named Tom Montgomery who happens to be from Indianapolis. So I’m right here at his doorstep. He actually attended IU here in Bloomington.

I left Brussels and was given command of a carrier battle group, Carrier Group Six, out of Mayport, Florida. My command ship was the USS John C. Stennis. I went on from there to be the Chief of Naval Air Training in Corpus Christi, Texas for nearly three years. I got my third star as I left there to go command the Third Fleet in San Diego. I retired June 1, 2003 out of that particular job.

Can you give us an idea of your duties as Commander of Third Fleet?

In essence, the Third Fleet Commander is responsible for anything from our West Coast to the international dateline. He gets a lot of traffic, message traffic, etc. regarding different kinds of players in and out of those particular waters. Now if we were invaded from the West, the Third Fleet Commander would be the commander of the joint task force, at least the maritime piece of that. That’s part of his job; however, I did not lose that much sleep over that particular possibility.

The main function of the Third Fleet Commander is to train the carrier battle groups and the amphibious ready groups—we call them carrier strike groups now—to prepare them for deployment.

While I was at Third Fleet I had five carrier strike groups and five amphibious ready groups that we trained on a varying deployment schedule. As I ended my time at Third Fleet, I had four of my carrier battle groups and four of my Amphibious Ready Groups deployed in support of Operation Enduring Freedom and Operation Iraqi Freedom.

So basically the Third Fleet Commander has operational control of the aircraft carriers, the air wings that belonged to those aircraft carriers, the ships that belong to those strike groups and all the people that belong to those entities. Now once we deploy them, and they cross over into the operational environment of another fleet commander, then we switch reporting responsibilities from one operational commander to another. In this case, we would “chop” them from Third Fleet Commander’s operational control to either the 7th Fleet Commander or the 5th Fleet Commander, depending on what was going on.

Considering both the positives and the negatives, how has the United States military transformed since you entered the service in 1970?

The military has grown by leaps and bounds since I entered. That really should not be a surprise when you pause and just think about how technology has changed in those 42 years; it’s a pretty awesome thing.

And our military has grown accordingly. The military today is a lot more connected with technological aids that give the war fighter greater situational awareness. They can actually see a lot of stuff that we couldn’t in those early days. We now have the ability to communicate not only at strategic levels but also all the way down to the boots on the ground. Much has changed on the technological front.

But the greatest weapon we’ve got is our people. And that’s what I really want to underscore. They have never been any stronger, and they have never been anymore capable. The education level of our men and women in uniform is very high today.
As a little side note: When I was the commander of Fighter Squadron 33, I was given what had been a recruiting poster, and I had it framed and hung on the wall. It was a picture of an American sailor with an American flag flying draped in the background and the caption on that picture said, “Back home they think that I am God’s gift to man . . . and he is.” Well I would say that held true when I was the commanding officer of Fighter Squadron 33 and it still does today when we look at our young people that wear the uniform regardless of what service they are in.

**How have national security needs evolved since you flew in Desert Shield, Desert Storm and Provide Comfort?**

Well that’s an interesting question. Talking in particular about Desert Storm, I think we had begun to realize as a nation that we couldn’t go at it by ourselves. President Bush worked very hard to form up a great coalition. We learned that in order to do these kinds of operations in the future the U.S. would have to rely on combined armed forces from other nations both from a military and political standpoint—Those two are always working side by side together.

In addition to that, we started to approach things differently from what we had in the past. Prior to Desert Storm the word “joint” had been thrown around for quite some time. People gave lip service to it, but it was not a way of life for us. Coming out of Desert Storm, we came to the realization that we all have to be truly “joint” as we approach these kinds of conflicts in the future. We cannot be out here alone and unafraid, so to speak. Our needs have evolved to include combined forces with “joint forces.”

The other significant change that came was the absolute reliance upon smart weapons. We wasted a lot of dumb ordnance during Desert Storm, which we were releasing from high altitudes. In some instances, we had winds in excess of a hundred knots. If you’re going to drop from 30,000 feet with that kind of wind it is almost impossible to hit pin-point targets. So the smart weapons made a name for themselves. Coming out of Desert Storm we all began to target pinpoint, very small and specific targets that required the use of smart weapons.

Another one that has really jumped out in the last couple years is how our nation uses Special Forces. That’s been a growth area. And I’m proud to say we have people like Adm. Bill McRaven, our SOCOM Commander, leading these forces on a daily basis. He gives us assurance that they will get the job done right the first time around.

**And why do you see Special Forces becoming more relevant?**

It’s because of the increase in irregular warfare we’ve been dealing with in the last 5 to 10 years. It is very difficult to fight those battles with conventional forces. The way Special Forces train really gives them the ability to take on irregular combat situations.

Normally when we think of Special Forces we think of what we in the Navy call our SEALS, “Snake Eaters.” They are the ones with black stuff all over their faces and grass all over their heads so you can’t see them in the grass. Although they do those kinds of missions very well, they also have the best nation building skills. So when you have that particular combination, they are our go to people for the irregular-type warfare.

**Where do you see national security heading with the de-escalation of Operation Enduring Freedom and Operation Iraqi Freedom coupled with the looming budget cuts?**

Well clearly the budget is on everybody’s mind for good reason. The economy is very important to the stability of the nation. The warning note is that the U.S. cannot afford to take the path the Soviet Union did in the late 1980s. They basically bankrupt their country through escalated spending, and we just cannot afford to go down that path. So clearly there are a lot of good reasons to be concerned about the budget.

As the timeline progresses, there is a lot of uncertainty with what our nation’s civilian leadership is going
to expect out of their military. As our military forces pull out of Iraq and Afghanistan, one thing we are going to have to do is reconstitute the force and our resources, which we have used so heavily in the last ten years. At the same time, we're still faced with a very dangerous and unstable world so we can't think that we're just walking away from that type of situation. It may not be in Afghanistan and it may not be in Iraq, but rest assured it will be somewhere because the bad actors are just not going to go away on their own. The current Strategic Guidance makes it pretty clear that we have our hands full for a long time.

In order to be successful we're going to need both a strong offense and a strong defense. What I'm really trying to say is we have to be very good at conventional warfare—the kind guys like me grew up with, trained for etc—but we also have to be very good at the irregular warfare piece at the same time. Although we're coming out of Afghanistan and Iraq we have to realize that those things aren't going to just go away. We have to face realities here, and we have some hard decisions to make. But another factor that I would weave in here is that of deterrence: How do you prevent a crisis from developing? How do you keep from getting out of control so a situation doesn't spread into a conflict? I would say you must have a credible force in order to have deterrence as an option.

I know many times, while an aircraft carrier was deployed to the Mediterranean or the Pacific Ocean, the admiral would get a command, to reposition to the coast of some particular country that was having a problem. That was to show the flag of force. Of course, often we would conduct operations off the carrier to ensure they knew that we were there.

Point being, the nation can use those carrier strike groups and those assets—diplomatic tactics really—to show force deterrence. But that only works if you have a strong force. Bottom line: the United States must keep a strong and credible military. I was struck by what Chief of Naval Operations said when they worked up the maritime strategy for the Navy, Marine Corps and Coast Guard. One of the statements that he personally made was that they believe preventing wars is as important as winning wars. You don't have to fight wars if you can prevent them from every occurring. So deterrence is very important. And I say all this to point back at that budget theme. We have to protect the economy and not let it fall, but at the same time, we must have a great military force that can prevent bad actors from doing the things that they want to do to this nation or any other nation.

Q: Now these proposed budget cuts, if they happen, do you see these as temporary in nature or is this over the long-term?

A: Well from all indications, this is going to be for the long term. I was looking at some of the budget material that's out there and at least until 2017 we are going to be faced with this situation. I would say it's not going to happen overnight. We're going to have to be in this thing for the long haul to get it under control. And the theme that seems to emerge has to do with the resources that we have at our disposal. Better efficiency and better effectiveness of those resources—"E2"—is the new emphasis.

U.S. Representative Todd Young

Todd Young is the U.S. Representative for Indiana’s 9th District and a fifth generation Hoosier with an impressive track record in military, academic and public life. After graduating high school, Young enlisted in the U.S. Navy and reported for duty in Newport, Rhode Island. In May 1981, he received an appointment from the Secretary of the Navy to Attend the United States Naval Academy in Annapolis, Maryland.

Upon graduating from Annapolis, Young trained as a rifle platoon commander at The Basic School in Quantico, Virginia, where he qualified as an expert rifleman. In 1996, he completed the Naval Intelligence Officer Basic Course in Dam Neck, Virginia. Young then led the intelligence department of VMU-2, an unmanned aerial vehicle squadron based in Cherry Point, North Carolina, where he participated in various military operations, including counter-narcotics activities in the Caribbean, and was trained in Anti-Terrorism/Force Protection.

Young spent a year in London, England attending the University of London’s Institute of United States Studies. As class president, Young regularly advised IUSS’s Chairman, former British Prime Minister Margaret Thatcher, on student concerns. In 2001 Young received his MA in American politics.

As a U.S. representative Young has worked hard as an advocate of Indiana’s defense industry. In an interview with WTHR he said, “As a member of the Armed Services Committee, I’ve tried to highlight the work being done at places like Crane and Camp Atterbury and Muscatatuck Urban Training Center and Indiana University to make the argument that the nation’s defense work can be done more cheaply and efficiently right here.”

Young said, “Indiana has a real value proposition to make to the nation when it comes to defense jobs, and I hope to continue working with state leaders to define exactly what that is.”

In an interview with Green Banner Publications he said, “There are some regional specific things we are working on,” he said. “One of the under-appreciated parts of Indiana’s economy and one of our best opportunities to attract good paying jobs is in all things defense. The average defense job, defense supported job in the state of Indiana pays approximately $20,000 more than the average wage in the state. The average defense manufacturing job also pays $20,000 more. These are the kind of jobs we need to retain in Indiana and possibly grow more.”

Indiana’s major defense installations are within and around Young’s 9th District. “We have Crane, which serves a mulch-county region in terms of employment and most of those counties are in the 9th district,” he said in the Green Banner interview. “We have Muscatatuck in Jennings County, but that is an incredible economic development opportunity and we have Camp Atterbury in Johnson County, which will soon be in Indiana’s 9th District. There is controlled airspace across Southern Indiana. The FAA has designated a certain amount of air space in the southern part of our state as being acceptable to unmanned Arial vehicle use. There is a possibility that we can get Southern Indiana as one of the few areas in the country certified and that could lead to defense contractors moving in. These are all things with my position on the Armed Services Committee that I can not only keep my eye on, but I can also help advance some of these things.”

When he was assigned to the subcommittee on Seapower and Projection Forces he made mention of NSWC Crane. “Even though it lies just outside of our district borders, the Crane Naval Warfare Center has a huge footprint inside the 9th District and employs hundreds of our residents.” He continued, “The Seapower Subcommittee deals with issues directly related to the work they do there, and I look forward to working with their military leaders through the subcommittee process.”

He concluded by saying, “Similarly, I look forward to working with leaders at Camp Atterbury and Muscatatuck Urban Training Center as issues that affect them come before the full Armed Services Committee, and with Indiana University concerning their numerous partnerships with both Crane and Muscatatuck.”
What programs do you think will get increased funding and which do you see experiencing cuts?

Well it’s not that easy to just pick it apart, but I would say that a sure winner is that of unmanned systems. It is listed as a winner for both the Navy and the Air Force, which includes the Marine Corps as well.

I think that is a very good thing for the state of Indiana. Right now the NCCO is working very hard with the state for Indiana to become one of the six FAA unmanned system test sites. Another area that’s likely to gain funding is cyber warfare and cyber security. And of course that’s another one of the focal areas for the NCCO. So despite some of the cuts, all in all I’d say from an Indiana perspective, the gains in the budget for unmanned systems and cyber would probably be good for the state.

As we look out to the next ten years what do you see as the biggest threat to the United States? Are we talking a conventional threat or are we talking irregular threats?

In the next ten years I would be more worried about what could happen to us from the cyber side. But I think we need to be very careful on the conventional side too.

Let’s say we decide to take our aircraft carriers to a low number. It takes a long time to reconstitute that type of force. If the U.S. is going “down the slope” one way and a rising power is coming up the hill on the other side, the U.S. may have difficulty reversing course once that rising threat finally catches its eye. If we get too low we won’t have the time or the resources to pull ourselves back up to where we need to be. That’s one of the things I’m always worried about. I don’t want us to be so focused on the short-term piece that we let the long-term get away from us.

Turning our attention to Indiana specifically, what gives our state the edge for developing and testing unmanned systems?

We feel it’s the three or four major assets we have in the state. We have a unique set of defense assets in Muscatatuck Urban Training Center (MUTC), which is state-of-the-art. It’s really one of the most realistic, real-world training centers in the U.S. It has all kinds of human assets. It has a full spectrum capability for testing sensors. And you have the ability to train in a very realistic way. You get nearly immediate feedback through the capabilities they have such as video taping and recording with play back capability.

We also have Camp Atterbury Joint Maneuvering Training Center right next door to the MUTC. We have Crane, the Navy’s third largest base with obvious R&D advantages and other capabilities right here. And of course over at Terre Haute we have the 181st Intelligence Wing. So we have some unique assets that pull all of this together here in the state.

As a matter of fact, the more important point is the synergy. It isn’t just any one of those assets, but it’s the synergy of all of those netted together. We are trying to do that now. That is what makes our asset base such a powerful thing for the state of Indiana and for this nation.

Can you give me a sense of how significant Crane and the WestGate is to contributing to America’s armed forces?

Crane is kind of a unique place in that if you come out to NSA Crane and look around it’s not going to be populated with a lot of individuals wearing a uniform. Many of the people that that work here have been on active duty or reserve. This is more of an R&D facility and S&T. In other words, this is where the smart work is done on items that are of interest to the warfighter.

What you have at NSWC Crane is an industry team made up of various contractors working alongside a team of government employees. The two working together provide the warfighter with increased capabilities from the Strategic Missions side to Special Operations Support to advancing our Electronic Warfare capabilities, whether that be on an airplane, a ship, or underneath the water. Crane serves not only just Navy, but also the other services including the rapid turn-around support for Special Forces.

When you look at what Crane has to offer the warfighter, it’s the ability to have a problem identified in theater that gets sent back to the States. Crane then gets to work with the government side and the industry side, and sometimes in a matter of a few days we have a solution. We can get a quick fix that we are able to push back to the warfighter. There are numerous examples of Crane executing a very fast, a very quick turn-around—where an issue that happened on the battlefield gets resolved in less than a week.

At the same time you have some things that just take a lot of time to work through. I think a good example is the next generation of jammers: that is something that doesn’t happen overnight. There are a lot of brain cells working together daily to make sure that the timeline is on schedule and that we will be able to provide to our war fighter the next-gen jammer that is going to make a tremendous difference out on the battlefield.

How does the commercial sector help to bring all these assets together?

That’s what we are trying to do with the NCCO. We are trying to be a catalyst for pulling all these things together. We call it a one-stop-shop. Another way you can think of it is as a single portal for the state and industry to use that goes down to those assets. Basically, the NCCO allows contractors to hit one single button to get what they need. It also works in reverse. Let’s say that one of these special assets wants to advertise what they have. They can come back up the line too.

Indiana is the place where we can do the things that this nation needs to get done at a lower cost with greater value added. Comparing the cost of using similar facilities on the East or West coast, we can do it for less here in Indiana. We have a much better business environment for the companies that are trying to come into the state.
Q For those who may not know, how does the private sector interface with those inside the fence to develop those solutions?

A It can go one of two ways: Let’s say that industry, through its own research and processes, identifies a shortfall or requirement that needs to be resolved. They can actually bring those to their government counterparts, present their case, and if the government buys into it then there is a process of getting a request for proposal. The different contractors then submit a proposal. That proposal then goes through a process of review to try to get the best value. Then the contract is awarded. Usually that work is not just a contract job or a government job, but usually it is a combination of both the local government and the contractor working together then to fulfill that requirement. Now it can be that the government knows there is an issue that needs to be resolved. They can push out a request for information for the contractors to take a look at or they can go straight to a request for proposal and get a proposal back through the same process and award based on that.

Q As someone who has spent time both in the private sector and the military, what challenges do you see each side facing when they interface with each other to develop those solutions?

A First of all I would say both sides have to approach solutions as a team. The abilities of industry and government provide the scenario for a perfect marriage. We both need each other in order to provide the needs for the war fighter.

And having been on both sides of the fence, I think many of us on both the contractor side and those in the government wore a uniform on active duty, though many do not have that active duty or reserve experience. Either way, there is a great inner desire to make sure we equip the war fighter with what he needs in a timely fashion. For many, we have been on the other side, deployed and needed something that maybe we couldn’t have gotten our hands on. We understand the urgency, and we know that we are dealing with life and death matters.

Whenever our Special Forces pull that trigger in a split second decision, the reason he is pulling the trigger is because he needs to take the enemy out. We cannot afford failure. We cannot afford for that weapon to misfire and not accomplish its mission. We look at it as lives on the line. It’s a 24/7 thing. It used to be us out there, but now it’s ours sons, daughters, grandsons and granddaughters. We as a team cannot afford to fail whatsoever.

Now, are there challenges out there? Absolutely. But the key is we have a higher mission and calling, on both sides of government and industry to work together to achieve what takes precedence. Like I said, it’s really like a family affair and more like a marriage than anything else.

Q How does NCCO help bolster that relationship? What function does it play?

A First of all we are going to try to be a matchmaker so that we can bring the various government pieces together with the pri-
We are going to be using a portal concept so that we can strategically connect the buyer and the seller together. The second thing is that we will also serve as a promoter for Indiana businesses and the service providers to both the government and private industry side to try to bring the two together. So we are going to be a matchmaker, and we are going to promote the services that we have available to industry and government.

What comprises Indiana’s competitive advantage in unmanned systems?

The real operating environment is what makes Indiana a center of excellence for unmanned systems. Sensors, payload development, integration, testing and training with an emphasis on the strategic, tactical and scientific utilization are the ingredients that have converged in Indiana for unmanned systems. Indiana also recognizes strategic values and can offer that to the defense, intelligence, law enforcement, homeland security, and scientific communities. So it is not just the DoD that’s interested. There are a host of communities now yearning for unmanned systems. It is definitely a booming area.

Additionally, Indiana’s assets include the only brick and mortar full-scale urban environment there is in Muscatatuck. There we can bring in the unmanned systems to operate in a full spectrum environment.

As a pilot and as an instructor at Top Gun how do you view the proliferation of unmanned aerial systems, in particular?

Well you know, when I was a young lieutenant at Top Gun as an instructor, I probably would have laughed at you if you would have asked me that question. When I was a lieutenant in the mid-1970s we had not seen or been exposed to this particular technology at all. But now, as the environment has become more complex the addition of these unmanned aerial vehicles is really, truly a welcomed capability. Anything you can add to the mix to increase your probability of success, which also improves your probability of survival, is a plus. It is really looked at in a favorable fashion.

The one thing you have to remember about the fighter business is that there are no points for second place. Anything that ensures I don’t come in second, I am going to say is a good thing!

We have covered a lot of ground, but is there anything else you would like to add?

Some of the hard questions that have to be debated and resolved might be: What does constitute a credible force? What is the right mix when we look at the size of the force and the kind of force we are looking at? What are the technologies that are going to be required? What capabilities must we have? How much risk can we afford to take? And with each and every one of the risks we may list, what mitigations do we have at our disposal to rectify the situation that we see developing? So we have some tough challenges out there.

I mean look at the priorities for this 21st century, which really come out of the recently published Strategic Guidance. To have a sustaining U.S. global leadership in a challenging global security environment here are some of the missions we have to cover:

Counter terrorism and irregular warfare; deter and defeat aggression; project power despite anti-access/aerial denial challenges, counter weapons of mass destruction, operate effectively in cyber space and space, maintain a safe and secure nuclear deterrent, defend the homeland and provide support to civil authorities, provide a stabilizing presence, conduct stability and counter insurgency operations, conduct military and disaster relief.

You could probably pick two of those and have your hands full. That list, which comes out of the Strategic Guidance, basically says that our armed forces have to be very capable and very agile. Quite a significant task when you wrap that with the budget and the economy.

So as we debate all these questions that will determine what type, kind and size of military we are going to have, there must be a minimum cut off—a point where you just can’t go any leaner.

Thank you for taking the time.

Thank you.
In Consideration of Unmanned Systems for Security, Markets and Citizens

By Brig. Gen. Jeffrey Hauser and Dr. Richard Baker

O
n the eve of WWI, the Royal Flying Corps commissioned English professor A.M. Low to develop a pilotless aircraft. Momentarily setting aside his work on radar, he succeeded in conceiving a pilotless, remotely-controlled aircraft. But due to engineering challenges with the radio gear, the vehicle was never flown in combat.

Since then Low’s original conception has advanced far beyond what he could have imagined. Fast-forward nearly one hundred years, and Low’s concept has not only been used extensively in combat but is taking to the skies in innumerable civil applications.

Unmanned aerial systems, popularly known as drones, are here. They signal a profound change in the nature of warfare as well as growth potential in the commercial market. On one end of the spectrum, Brookings Institute Senior Fellow Peter Singer explains that drones fundamentally change the “who” of war. For the history of mankind, advancements in wartime technology have been about the “how.” At the other end, the usage of unmanned aerial vehicles (UAV) in journalism, agriculture, law enforcement and even by DIY hobbyists opens up the skies to the market.

A study by the Teal Group predicts that the worldwide market for UAVs will reach $89 billion over the next ten years with the United States making up a lion’s share of that market. Most of those dollars will be comprised of defense-related spending. In FY2011, the U.S. Department of Defense (DoD) requested $6.1 billion for UAVs and is expecting another $24 billion through 2015. In tandem with the funding increase, the U.S. has significantly grown its UAV arsenal over the last ten years. In 2000, the DoD had 50 UAV in its inventory; today there are over 7,000.

The UAVs in the U.S. inventory range from the four pound Raven capable of flying at 50 knots below 1,000 feet to the Global Hawk weighing in 25,600 pounds capable of flying at 400 knots for over 30 hours at 65,000 feet. Of course there are also the Predator and Reaper systems used widely in Afghanistan, Iraq, Pakistan’s Federally Administered Tribal Areas, Yemen and Somalia.

Even with the looming budget cuts and their potential impact on the DoD (an estimated $500 billion over the next 10 years), UAVs are likely to continue to attract defense dollars. In an early 2012 address, Secretary of Defense Leon Panetta made clear that funding for UAV would not be cut and in some cases will increase. This allocation of funds only makes sense to DoD bookkeepers. For the MQ-1B Predator, the whole shebang—aircraft, ground station, satellite link—costs $20 million. The Reaper, only $53 million. Compare that with the cost of one F-22 at $143 million.

The civil side of the UAV market has not expanded as fast as the defense side but does include dozens of civil applications, nevertheless. According to a 2011 study by the Teal Group, world civil UAV production is forecast to comprise $296 million of the $3.4 billion in 2011 global production value. By 2020 that number is expected to grow to $498 million of global production value, which is anticipated to climb to $8.8 billion.

According to the Federal Aviation Administration (FAA) there are some 100 U.S. companies, academic institutions and government organizations developing over 300 unmanned aerial systems (UAS) designs with applications in law enforcement, fire fighting, border surveillance, disaster response, photography, wildlife monitoring, meteorology, agriculture, news coverage, mapping and even personal use. Right now you can buy an AR Parrot Drone fully equipped with an HD camera controllable with an iPad for about $300. There is also a large DIY hobbyist community of amateur UAV enthusiasts chomping at the bit for access to airspace.

To date commercial use of UAV technology has been restricted to testing and demonstration because of the technology’s outpacing of regulatory frameworks. That is expected to change soon, however. In 2011 and early 2012, Congress passed a series of bills calling for four to six sites in the United States where UAS would be tested for integration into the National Airspace System. Some of the regulatory challenges the FAA must overcome include:

- Safe designation of non-exclusionary airspace for integrated manned and unmanned flight operations in the national airspace system;
- Certification standards and air traffic requirements for unmanned flight operations at test ranges;
- Addressing both civil and public unmanned aircraft systems;
- Ensuring the program is coordinated with the Next Generation Air Transportation System; and
- Verification of the safety of unmanned aircraft systems and related navigation procedures before integration into the national airspace system.

In light of the FAA’s search for test sites and the proliferation of UAV technology, regions like the Midwest now have access to Federal monies that have traditionally been funneled to the coasts.

For instance, Indiana has teamed up with Ohio to hopefully win one of the FAA test sites and attract Federal dollars for UAS testing. Indiana offers 280 square miles of restricted airspace, 1,300 square miles of military operating airspace, over 100,000 acres of real estate under restricted airspace, a Joint National Training Center with complex urban training, a 4200’ runway under restricted airspace and a national test network for communications support. To boot, Camp Atterbury and Jef-
ferson Proving Grounds in south central Indiana are some of the only restricted airspace locations in the eastern half of the United States.

“We know that Indiana’s premiere assets including Muscatatuck Urban Training Center (MUTC) and Camp Atterbury Joint Maneuvering Training Center (CAJMTC) coupled with access to restricted airspace complement what Ohio brings to the table,” said National Center for Complex Operations Executive Director Matt Konkler.

Muscatatuck’s collocation with Jefferson Proving Ground (JPG) allows UAVs to fly in safe and restricted airspace over a defense installation, using sensors to monitor training exercises involving not only uniformed personnel but civilians from local, state, federal and international organizations. JPG’s ranges are also of value for testing existing and future weapons capabilities associated with UAS. Already Indiana is home to the 181st Intelligence Wing (IW), which provides processing, analysis and dissemination of ISR data collected by UAVs around the globe.

For Indiana, it is anticipated that by winning the test-site designation, new jobs will be created by contractors who locate or expand their presence in the two states and from spin-off jobs created by the growth. From an economic development standpoint, pursuing the joint partnership is a win/win proposition for both states. Already Indiana recently attracted BAE System Unmanned Aircraft Programs Group, which is poised to set up shop in the Hoosier state soon.

Considerations for the Future
The proliferation of UAVs is not without controversy, however. The 30,000 UAVs expected to take to U.S. civil airspace have many citizens, understandably, worried. UAV opponents have voiced concerns about the ease of hacking these systems, the frequency of crashes, the further dehumanization of war, and most prominently the serious privacy violations that could accompany widespread UAV usage. Most famously, UAV critic Charles Krauthammer declared that the first American citizen to use a 2nd amendment weapon to bring down a drone would be considered a folk hero. The naysayers aren’t luddites, and their concerns represent how the rapid pace of technological advancement has put serious tension on society to catch up.

Moore’s law suggests that our technology doubles its power capacity just about every 18 months and will continue to do so. According to Peter Singer, if Moore’s law holds true, within twenty-five years our technologies will be a billion times more powerful than they are today. “The best illustration I can give of how fast technology has gone, how much it’s changing, and what’s possible in war or not,” says Peter Singer. “One of those little greeting cards that you open up and plays a song has more computing power than the entire US Army had when the Vietnam War started. That’s technology’s impact on the world.”

Here are a few examples of what that translates to in the near-term: Boeing won a contract with the Pentagon to develop a solar-powered UAV that is expected to stay aloft for five years. Five years. The UAV, called the SolarEagle, is scheduled to take flight in 2014. Moreover, there are UAVs being developed at the University of Pennsylvania that can swarm, fly in complex formations and even play tennis.

The ability of technology to enhance our daily lives and improve our national security presents us with wide ranging opportunities. At the same time, the rapid rate of change warrants caution, especially as technology outpaces regulatory frameworks. Domestically we will need proper regulations and licensing in place to protect privacy and satiate security concerns while allowing the market to flourish. Abroad, our engagement must be tempered by careful consideration of the moral and ethical limits on the capabilities of 21st century warfighter.

Engaging those unsettled by the technology will be crucial to tackling the tough questions about proper usage and ensuring citizen-serving innovation. How will these systems enhance our lives without infringing on privacy? How might this technology further enable terrorists and those states that would want to harm the United States? Whether or not we all agree on the mere existence of these systems, one thing is for certain: they are here, and we must use them wisely.

As with every other significant technological leap forward, philosophers, policymakers, priests and citizens will have to shape the trajectories of unmanned systems, applying laws and moral restrictions where necessary. Technology is plowing ever faster forward. And because of it our nation becomes ever more secure while the market continues to flourish. Yet citizens must discern how best to integrate UAVs into their lives and not drown out in the wave of progress.

Brig. Gen. Jeffrey Hauser is an assistant professor of aviation technology and serves as the Director of Unmanned Systems of Indiana State University’s Department of Aviation Technology.

Dr. Richard Baker is the Director for the Center for Homeland Security and Crisis Leadership at Indiana State University and is a member of ISU’s Department of Aviation Technology.
SAY "CHEESE."

THE FIRST DAY GLOBAL HAWK TOOK FLIGHT, I FELT LIKE ONE OF THE WRIGHT BROTHERS.

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Boiler Up... Way Up: 
A Glance at Purdue’s Contribution to America’s Space Program

By Alan W. Dowd

With the recent passing of Neil Armstrong—the man fellow astronaut Gene Cernan described as "a world icon, a national hero of unimaginable proportion"—fresh attention has been paid to the place that helped shape and prepare this humble man for his historic mission. Before Armstrong tested rocket planes at speeds of 3,989 miles per hour, before he made that 238,900-mile journey to the moon, before he took man’s first step on another celestial body, he was, in his own words, a “white-socks, pocket-protector, nerdy engineer” at Purdue University.

The following is but a glance—and a fleeting one at that—of Purdue’s countless contributions and connections to mankind’s dream of exploring the heavens.

Iron Discipline
Purdue proudly calls itself the “cradle of astronauts,” and rightly so. "Purdue alumni have flown on about 37 percent of all human U.S. space flights" (Purdue). Only MIT and the military academies can claim more astronauts. Purdue notes that 22 of its graduates "have been selected for space travel, including the first and last astronauts to walk on the moon”—Armstrong and Cernan.

In addition to unfurling Old Glory on the moon, Purdue astronauts have lived on the International Space Station (ISS), visited Russia’s Mir space station, orbited the earth thousands of times, fixed orbiting satellites and telescopes, and flown rockets and spaceships with iconic names like Mercury, Gemini, Apollo, Eagle, Columbia, Challenger, Endeavour, Atlantis and Discovery. Even casual students of space flight will recognize those last five names as space shuttles. More than 40 of the 135 space shuttle flights had at least one Boilermaker on board (Purdue).

Astronauts, by definition, are exceptional individuals. Indeed, fewer than 500 Americans have been to space. So, to try to highlight the exceptional among the exceptional is an exercise in splitting hairs. Still, some in Purdue’s fraternity of astronauts have set themselves apart. Any discussion of this exclusive fraternity must begin and end with Cmdr. Neil Armstrong.

Armstrong graduated from Purdue with a degree in aeronautical engineering in 1955. What most people don’t know about Armstrong—among the most famous human beings in history—is that he had to put his college career on hold in 1949, when he was called to active duty. As a Navy pilot, Armstrong flew 78 combat missions over Korea. That cockpit experience would serve him well when he began his journey toward the heavens. Armstrong was a test pilot on the X-15 rocket-plane, screaming across the skies above NASA’s Flight Research Center in Edwards, California, at other-worldly speeds. Indeed, Armstrong could fly anything. NASA notes that he “flew more than 200 different models of aircraft, including jets, rockets, helicopters and gliders.”

Armstrong became an astronaut in 1962 and was assigned as command pilot for the Gemini 8 mission. In 1966, Armstrong performed the first docking of two vehicles in space. All of that prepared Armstrong for Apollo 11, the first manned lunar landing, in 1969. After returning from his famous stroll on the moon that began with “one small step,” Armstrong, in the typical understated fashion of a Purdue engineer, downplayed the historic achievement, matter-of-factly explaining that “Pilots take no particular joy in walking” (Brinkley).

After interviewing Armstrong a decade ago, historian Douglas Brinkley described the Purdue alum as “immune to fame.” Armstrong was merely a dutiful pilot and Purdue University-trained engineer who performed his NASA tasks competently. This wasn’t a pose. What mattered to him was old-fashioned public service, iron discipline” (Brinkley).

“The imprint he left on the surface of the moon is matched only by the extraordinary mark he left on ordinary Americans,” President Barack Obama said after Armstrong’s passing. Republican presidential nominee Mitt Romney offered a poetic remembrance of this most-famous Boilermaker. "The soles of Neil Armstrong’s boots on the moon made permanent impressions on our souls and in our national psyche…I don’t doubt for a second that Neil Armstrong’s spirit is still with us: that unique blend of optimism, humility and the utter confidence that when
Astronaut Eugene A. Cernan, pilot of the Gemini 9A mission is photographed inside the spacecraft by the command pilot, astronaut Thomas P. Stafford during flight. (NASA)

Armstrong's Apollo 11 landing. Years earlier, Cernan flew on Gemini 9 and became the second American to walk in space. Then, in December 1972, Cernan sat in Armstrong's seat and commanded Apollo 17, America's last manned mission to the moon. "I no longer belonged solely to the earth," wrote Cernan, the last man on the moon. "Forever more, I would belong to the universe.”

NASA provides a wealth of details on other notables in Purdue's astronaut fraternity:

- John Blaha (M.S. 1966) has logged 161 days in space, serving as the commander on two shuttle missions. Richard Covey (M.S. 1969) flew on the shuttles Discovery, Atlantis and Endeavour, and served as pilot on the first flight flown after the Challenger disaster.

- Michael McCulley (M.S. 1970) helped deploy the Galileo spacecraft on its journey to explore Jupiter from the shuttle Atlantis. In a similar vein, Gregory Harbaugh (B.S. 1978) flew on a special shuttle mission to service the Hubble telescope, participated in the shuttle's first docking mission with the Russian Space Station Mir and logged more than 18 EVA hours—NASA shorthand for “extra-vehicular activity.”

- Mark Polansky (B.S. and M.S. 1978) was part of a record-setting mission on ISS, which saw 13 astronauts working aboard the station representing all five ISS partners. Speaking of international missions, David Wolf (B.S. 1978) participated in joint shuttle-Mir missions; spent 128 consecutive days in space, arriving in space on one shuttle and returning to earth three shuttle missions later; and made several space walks, serving as "lead spacewalker" on some missions.

- Few Americans realize that many shuttle missions were strictly military missions, some of them highly classified. Mark Brown (B.S. 1973) flew several shuttle missions, including some that carried special Department of Defense payloads. Likewise, John Casper (M.S. 1967) carried classified Department of Defense payloads into space aboard Atlantis in 1990. In addition, Jerry Ross (B.S. and M.S. 1970) carried Department of Defense payloads into space as well as "the heaviest civilian satellite ever launched by a shuttle," according to NASA. "Ross supported the Space Shuttle Program as an astronaut from before the first launch in April 1981 to the last landing in July 2011. He also supported the International Space Station Program from its inception through the completion of assembly of the ISS in 2011" (NASA).

- Of course, not all of the missions flown by Boilermaker astronauts ended with a safe splashdown or a picture-perfect touchdown. Some ended in tragedy. Gus Grissom (B.S. 1950) was one of the original Mercury astronauts—the seven men immortalized in the film "The Right Stuff". He flew into space in 1965, serving as command pilot on the first manned Gemini flight. Chosen to serve as command pilot for Apollo 1, Grissom was killed on January 27, 1967, in a fire that destroyed the command module. Roger Chaffee (B.S. 1957) died alongside Grissom, as did Ed White. "The astronauts were the first American spacemen to be killed on the job and ironically, died while on the ground," The New York Times reported a day later, grimly adding, "They were trapped behind closed hatches.”

Reaching Up and Out

Recent years have seen Purdue continue its enduring partnership with NASA. Indeed, an army of Purdue engineers and scientists have helped design, build and shepherd NASA’s rockets from the blackboard to the stars.

Purdue recently participated in NASA’s Constellation University Institutes Project (CUIP), a consortium of universities that collaborated with NASA to test the rockets designed for the Constellation program, which was canceled by the Obama administration in 2010.

Purdue aerospace engineering students are building an engine for Project Morpheus, NASA’s planned mission to deploy an unmanned lab and robotic equipment on the moon. “The students already have spent a year and a half designing and analyzing their engine and now are building the prototype,” the school reports.

Purdue professors are operating zero-gravity labs, working on plans for a future lunar outpost, developing solutions for space-vehicle assembly, experimenting on new rocket technologies, and overseeing special wind tunnels "capable of running the world needs someone to do the really big stuff, you need an American.”

Aptly, it was fellow Boilermaker Gene Cernan who offered the eulogy at Armstrong’s memorial. Cernan, a 1956 Purdue graduate, wasn’t with Armstrong when the Eagle landed. But he circled the moon on Apollo 10 in May 1969, in a trial run for Armstrong’s Apollo 11 landing. Years earlier, Cernan flew on Gemini 9 and became the second American to walk in space. Then, in December 1972, Cernan sat in Armstrong’s seat and commanded Apollo 17, America’s last manned mission to the moon. “I no longer belonged solely to the earth,” wrote Cernan, the last man on the moon. “Forever more, I would belong to the universe.”
Neil Armstrong speaks to the crowd celebrating the dedication of Neil Armstrong Hall of Engineering on Purdue's West Lafayette campus. (Purdue University)

quietly at hypersonic speeds” (Purdue). Tomorrow’s aircraft and weapons—as evidenced by the scramjet technology being tested by the Air Force—will rely on hypersonic rockets that can skip across the upper atmosphere and cruise at speeds in excess of Mach 6, perhaps as fast as Mach 15.

Always with an eye on tomorrow, Purdue reaches out to grade-schoolers interested in space through the Purdue Space Day (PSD) program, an educational outreach effort geared toward students in grades 3-8. Since the program’s launch in 1996, more than 5,400 grade-school students have participated, with some 1,700 Purdue students serving as mentor-instructors. PSD provides “an entire day’s worth of space, science and engineering centered activities...at no cost to the participants” (Purdue). PSD is highlighted by the participation of a Purdue astronaut. The astronauts talk to tomorrow’s astronauts and aeronautical engineers about shuttle missions, Mars missions, lunar landings, robotics and astronomy.

A Special Place
All of this invites an interesting question: How does a land-grant college in the middle of America, conceived as a place “to teach such branches of learning as are related to agriculture and the mechanic arts,” make such an outsized contribution to America’s space program? To be sure, it has lots to do with the exceptional science and engineering programs at Purdue—programs that have been cultivated by forward-looking policymaking, engaged alumni, path-breaking scholars and visionary partnerships. In the heady days of the space race, for instance, Purdue partnered with the Air Force Academy to bring dozens of cadets to Purdue for accelerated master’s degrees (Wallheimer).

But there’s something more to this picture than great academics. Purdue University is a special place. While so many other American institutions dismiss American exceptionalism as old-fashioned or politically incorrect, while other colleges ban the Star Spangled Banner and expel military recruiters, Purdue University celebrates America as an exceptional and great country.

In 1966, for example, amid the tumult surrounding the Vietnam War, a local newspaper publisher encouraged Purdue University’s marching band director “to get some patriotism into these kids,” as the Purdue Bands website unapologetically explains. The band director responded with these simple but stirring words, which would be “spoken over an arrangement of ‘America the Beautiful’” during the following home football game:

I am an American. That’s the way most of us put it, just matter-of-factly. They are plain words, those four: you could write them on your thumbnail, or sweep them across a bright autumn sky. But remember too, that they are more than just words. They are a way of life. So whenever you speak them, speak them firmly, speak them proudly, speak them gratefully. I am an American!

The band director figured it was a one-time deal. But in response to strong popular demand, and after the tribute was presented before a national TV audience during the 1967 Rose Bowl, “I Am an American” became a permanent pregame football tradition at Purdue University.

More than four decades later, Purdue fans and visiting fans alike are invited to read the words of “I Am an America” during the pregame festivities of every home game. When the crowd roars those last four words, it’s a reminder that what unites us is bigger than what divides us—something the men and women of Purdue’s astronaut fraternity know from firsthand experience.

Strong Words
Perhaps that helps explain why Armstrong and Cernan expressed such deep concern about the end of the space shuttle program in 2011 and consequent end of America’s manned spaceflight program.

Each shuttle was built for 100 missions. Discovery, the oldest of the now-retired shuttles, flew just 39. It was the loss of Columbia that altered NASA’s plans to fly shuttles into the 2020s. As the human and economic costs of manned space flight increased, public interest and public support decreased—and so did funding. A gap then emerged between the end of the shuttle and the beginning of its successor program. Under the Bush administration’s plan, that gap had a defined endpoint of 2015 (Dale). The Bush administration proposed phasing out the shuttle to divert resources to the Constellation program, which would use the best of the shuttle and Apollo programs to carry Americans beyond low-earth orbit.

Joined by fellow Apollo astronaut Jim Lovell, Armstrong and Cernan wrote an open letter in 2010 expressing strong support for continuing Constellation as planned. Constella
tion “was endorsed by two presidents of different parties and approved by both Democratic and Republican congresses,” they wrote. “To be without carriage to low-earth orbit and with no human exploration capability to go beyond earth orbit for an indeterminate time into the future,” the Apollo trio added, “destines our nation to become one of second- or even third-rate stature” (Armstrong, Cernan and Lovell).

But President Obama canceled Constellation and flat-lined NASA spending. NASA funding was just $17.8 billion in 2012, and the White House requested less for 2013. Today, NASA outlays amount to less than 0.5 percent of federal spending. By way of comparison, in the early 1960s, NASA accounted for about 1.1 percent of federal spending. The result: The greatest space-faring power on earth is stuck on earth, and NASA is paying Russia $753 million to deliver Americans to and from ISS. Putting on a brave face, NASA chief Charles Bolden said Washington’s spending plan for NASA “requires us to live within our means,” which is what Americans expect of their government.

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In 2011, the normally-reserved Armstrong openly criti-
ized Washington for a “substantial erosion of the United States’ historically highly regarded space industrial base” (Houston Chronicle). “The leadership enthusiastically assured the American people that the agency was embarking on an exciting new age of discovery in the cosmos,” Armstrong said. “But the realities of the termination of the shuttle program, the cancellation of existing rocket launcher and spacecraft programs, the layoffs of thousands of aerospace workers and the outlook for American space activity throughout the next decade were difficult to reconcile with the agency assertions” (Houston Chronicle).

Given that he had taken pains to stay out of the spotlight for decades, Armstrong’s words spoke volumes.

Yesterday and Tomorrow
“I think we’ll always be in space, but it will take us longer to do the new things than the advocates would like, and in some cases it will take external factors or forces which we can’t control,” Armstrong said—external factors like threats from some rising power or the recognition that, in President Kennedy’s words, “no nation which expects to be the leader of other nations can expect to stay behind in the race for space.”

After all that Purdue’s sons and daughters have accomplished and sacrificed in space, it’s troubling that Kennedy’s words from September 1962, when Russian rockets ruled the heavens, are true again. “To be sure, we are behind, and will be behind for some time in manned flight,” he conceded. But Kennedy knew the space race was far from over, and he knew America could close the gap—and would one day take the lead. “We do not intend to stay behind,” he promised.

Purdue University helped America keep that promise in the closing decades of the 20th century—and if America asks, Purdue will do so again in the 21st century.

Alan W. Dowd is a Sagamore Institute senior fellow.

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Photo captions for page 12 and 13
Astronaut Neil A. Armstrong, Apollo 11 mission commander, at the modular equipment storage assembly (MESA) of the Lunar Module “Eagle” on the historic first extravehicular activity (EVA) on the lunar surface. Astronaut Edwin E. Aldrin Jr. took the photograph with a Hasselblad 70mm camera. Most photos from the Apollo 11 mission show Buzz Aldrin. This is one of only a few that show Neil Armstrong (some of these are blurry). (NASA)

One of the first steps taken on the Moon, this is an image of Buzz Aldrin’s footprint from the Apollo 11 mission. Neil Armstrong and Buzz Aldrin walked on the Moon on July 20, 1969. (NASA)

All pictures are courtesy of NASA.

Boilermaker
A larger-than-life sculpture aimed at inspiring students to pursue their dreams while connecting the campus to its early history in flight was recently unveiled outside a Purdue University residence hall named after the famed aviator Amelia Earhart.

Earhart worked at Purdue from 1935-37 as a career counselor for women students and an adviser to the Department of Aeronautics. She encouraged women to follow careers in whatever field they chose during a time when opportunities for women were limited and most studied home economics.

The first woman to pilot an airplane across the Atlantic and holder of many aviation records, honors and awards, Earhart was recruited to Purdue by then-President Edward Elliott, who was impressed by her spirit of adventure as well as her message to women.

“She represents better than any other young woman of this generation the spirit and courageous skill which may be called the new pioneering,” Elliott said.

In April of 1936 an Amelia Earhart Endowment Fund for Aeronautical Research was created with the Purdue Research Foundation. The fund purchased the $80,000 Lockheed Electra that became known as Earhart’s Flying Laboratory.

With navigator Fred Noonan, Earhart disappeared July 2, 1937, near the tiny Howland Island in the Pacific Ocean while attempting an around-the-world voyage aboard the Flying Laboratory.

“Amelia Earhart personified the determination, the strength of will to achieve and the ingenuity that has and will continue to inspire generations,” Purdue President France A. Córdova said. “Purdue, its faculty and graduates have played an incredible role in the history of flight, from Cliff Tupin who worked with the Wright Brothers, to Amelia Earhart, to astronauts Virgil ‘ Gus’ Grissom, Roger Chaffee, Neil Armstrong, Gene Cernan and Drew Feustel who was the latest Boilermaker in space aboard a shuttle mission to the Hubble Space Telescope.”

The George Palmer Putnam Collection of Amelia Earhart Papers—the world’s largest compilation of papers, memorabilia and artifacts related to the late aviator—is housed in the Purdue Archives. Palmer was Earhart’s husband.
Hoosiers born and bred in Indiana are likely familiar with the vestiges of the state’s involvement with the Civil War, but they may not be aware of how significant Indiana’s contributions actually were. When news of war reached Indianapolis by telegraph on April 12, 1861, 12,000 volunteer soldiers converged on the city within the first two weeks. During the course of the war 200,000 Hoosiers volunteered to fight—7,200 troops were killed or wounded and 18,000 died of disease.

The casualties Indiana experienced were unfortunate, but their honor is written down in the stories of some of the most pivotal battles of the Civil War.

Produced by WFYI and the Indiana Historical Society in tandem with the Lilly Endowment and the National Endowment for the Humanities, *Well Done, Indiana* is a tribute to Indiana’s contributions to the American Civil War. The title for the documentary derives from a personal note U.S. Secretary of War Edwin Stanton wrote to Indiana Governor Oliver P. Morton commending Hoosier contributions to the war. “Well Done, Indiana,” Stanton penned.

*Well Done, Indiana* recalls the significant military and political contributions Hoosiers made to the Civil War including: the Indiana 19th at Gettysburg, Maj. Gen. Lew Wallace holding off Confederate forces at Washington, Indiana’s 28th regiment at the Battle of the Crater, and Hoosier minutemen fighting off Morgan’s Raid across southern Indiana.

Giants in their Tall Black Hats
When commander John Gibbon inherited the 19th Indiana regiment it was an undisciplined, unkempt unit. As a way to instill discipline, Gibbon dressed the men in the unique uniforms that have since distinguished them in Civil War history. Under his direction, the Indiana 19th donned their tall black hats and long blue coats.

But the 19th’s contribution to Civil War history goes much deeper than its characteristic regalia. After the regiment’s establishment in Indianapolis on July 29, 1861 the Indiana 19th went on to fight at Second Bull Run, South Mountain, Antietam, Fredericksburg and Chancellorville before heading to Gettysburg in June 1863. For their war-forged performance in battle alongside their Midwestern counterparts, they earned the name the Iron Brigade.

In August 1862 the Hoosiers went up against Stonewall Jackson at the Battle of Brawner’s farm where they were outnumbered three-to-one. For nearly two hours the Hoosiers and other Midwesterners held their position against the Confederates until both sides disengaged by mutual consent. They lost a third of their own men in that battle.

As the Iron Brigade marched toward Gettysburg in June 1863, C.A. Stevens remarked that the group looked like “Giants in their tall black hats.” At Gettysburg a force of 288 Hoosiers from the brigade bolstered the Union cavalry. As the fighting waged on they were flanked by enemy troops. But instead of pulling back, as military convention would suggest, the Hoosiers turned to fight and ended up pushing the Confederates back momentarily. During that day, the Confederates mounted five separate attacks on the Midwestern troops. For their refusal to yield, the brigade suffered some of the highest casualty rates in the war. Nevertheless, the Iron Brigade’s dogged determination delayed the Confederates long enough to allow 80,000 Union troops to arrive, preventing General Lee’s troops from taking the high ground.

Savior of Washington, D.C.
General Lew Wallace was a Hoosier officer who was known for his levelheadedness in battle. *Well Done, Indiana* quoted Wallace saying, “My greatest personal satisfaction was due to the discovery of the fact that in the confusion and feverish excitement of real battle I could think.” For his battle-tested clarity of mind he became a Major General at the age of 34.

At the start of the Civil War Gen. Lew Wallace took command of the 11th Indiana Volunteer Infantry. And at the battle of Ft. Donaldson he told the men, “you’ve been wanting a battle boys. Here it is. Hell’s before you.”

In April 1862 Wallace led troops into battle at Shiloh, but...
due to a tactical miscommunication he misstepped and caused numerous casualties. Though the Union won the day, 13,000 soldiers were lost in battle. Following the engagement, Wallace bore much of the blame in the press. Consequently, he was relieved of his command and returned to Indiana. It wasn’t until March 1864 that he was asked to return to service.

That spring Confederate troops under the command of General Jubal Early were moving toward Washington, D.C. At the request of General Grant, Gen. Lew Wallace and a band of 5,800 untrained troops took up arms to delay Confederate forces. Wallace knew he couldn’t win the battle, but his objective was to delay the Confederates long enough to give Grant the time to reinforce Washington. Wallace’s troops withstood five separate charges. Though they were outnumbered two-to-one, they were able to hold off Confederate forces long enough to allow General Grant to send reinforcements.

For his service, Secretary of War Edwin Stanton called Wallace to Washington and told him that he saved Washington. Likewise, Gen. Grant wrote that Wallace had achieved more by means of a defeat than most men achieve by a victory.

Heroes Carved in Ebony
When Indiana Governor Oliver P. Morton issued a request for volunteers, 600 African-American soldiers answered his call. The Indiana 28th was the only black Hoosier regiment, and they are perhaps best known for their bravery at the Battle of the Crater.

On July 30 1864, Union forces stormed the Confederate stronghold at Petersburg, VA. In order to drive into Petersburg, Union troops had to assault the Confederate works and breach their line. To that end, Northern troops dug a tunnel under the Confederate works and blew it up. One observer described the resulting explosion: “The earth began to shake as though the hand of God intended a reversal in the laws of nature. This grand convulsion sent both soil and souls to inhabit the air.” The explosion left an enormous crater in place of the Confederate works. As the Union line pressed forward, troops poured into the crater instead of going around, creating chaos in the lines.

In preparation for the operation, the 28th Indiana Regiment, as part of the 9th corps, had trained for a solid month to lead the assault through the resulting crater. But due to political concerns Gen. Grant refused to let the black division lead the assault. As a last resort, they sent in the black division, which went ripping into battle.

More than 4,000 lives were lost in the Battle of the Crater. The 28th alone suffered 50 percent casualties. For their valiant performance, Union Commander Colonel Henry Thomas rec

Reflections

Assault on the Home Front
In July 1863, a detachment of about 2,500 cavalry, under Brigadier General John Hunt Morgan, broke off from the Confederate Army to make an incursion into Indiana. Morgan’s Raiders, as they were known, crossed the Ohio River south of Corydon, Indiana. From there they pillaged the towns of Corydon and Salem.

Governor Oliver P. Morton called for volunteers to muster a militia to oust the Confederate invaders. Back from the battle of Shiloh, Maj. Gen. Lew Wallace was chosen to lead a 1,300 man deployment. Wallace and his troops prepared for battle along the Muscatatuck River, but Morgan turned east. On his route he attacked Dupont, Versailles and Sunman. For six days Hoosiers battled the Confederate raiders on their own soil—the only major attack in Indiana during the Civil War. On July 1, 1863, Morgan’s raiders left the state at Harrison near Cincinnati.

Conclusion
After experiencing the triumphs and tragedies of the Civil War, Hoosiers would continue to answer the call to service for their country through every major war fought by the United States. Since 9/11 alone, 15,900 Indiana citizen soldiers have deployed on active duty.

With each war, Indiana enshrines Hoosier sacrifice in monuments across the city of Indianapolis. In fact, today Indianapolis is second only to Washington, D.C. for the number of monuments and acreage dedicated to veterans. The city is also home to the national and state headquarters of the American Legion. Even as the dynamics of war have changed beyond what Civil War soldiers could have imagined, troops raised from the same Hoosier soil continue to answer the call.
Arsenal of Democracy
By John Thompson and Chad Pittman

In one of his fireside chats delivered on December 29, 1940, President Franklin Delano promised to help the United Kingdom fight Nazi Germany by giving them the military supplies rather than troops. He called this strategy his “arsenal of democracy.”

His promise could be fairly questioned on its merits. In the year before Pearl Harbor, America has the 18th largest Army behind such nations as Holland and Hungary. The U.S. Navy and War Departments struggled to adequately supply the fight in World War I and congress was unmotivated to spend spare resources following a decade of the Great Depression. Churchill may very well have wondering what, if any, value would come of FDR’s words.

Over the course of the next year, two remarkable things happened: one tragic and the other magnificent. Of course the tragedy occurred on December 7, 1941 attack on Pearl Harbor which turned our nation from bystanders to active participants in the war effort. Without much notice, the preceding year between FDR’s promise to arm the Allies and the Pearl Harbor attack, American production of war materials had already gained pace with Nazi Germany.

Indeed, by the end of World War II, 70% of the Allies wartime material was produced in American factories. It would become one of the greatest private sector achievements of the 20th century.

Aware that the solution did not reside within Washington, DC, FDR called American business to come to the rescue. It was an unusual request. FDR had used criticism of industrial America to win his first two president elections. He campaigned vigorously with the message that business had caused and then furthered the Depression.

Now he found himself on the phone with Henry Ford’s former right and current head of General Motors asking William “Big Bill” Knudsen to take an unpaid position in his administration rallying American business to do something it had never done before: make tanks, war planes and other materials necessary to win the war effort.

Knudsen’s response was an immediate “yes” and the results are staggering. In merely a handful of years, American business went from standing still to constructing 280,000 war planes, 8,800 warships (including 5 aircraft carriers per month), 86,000 tanks, 3.5 million trucks, 2.5 million machine guns and 41 billion rounds of ammunition.

To underscore the ingenuity of the American private sector, consider that the machine guns were produced by such companies as Remington Typewriter, National Postage Meter and the Rock-Ola juke box manufacturing company. Virtually every war plane that was built used designs in company drawers prior to WW II. The TBM Avenger flown by George H.W. Bush was built by Knudsen’s old company, General Motors.

This remarkable story is vividly captured in a book by historian Arthur Herman called Freedom’s Forge. It is also a prologue to the State of Indiana’s story captured in the preceding pages. To reach a new state of military readiness in the 21st century, Indiana business has risen to the occasion.

In Lt. Governor Skillman’s article, you read that state economic development can be a helpful companion to enhancing our nation’s security. As she notes, our state had fewer than 400 defense contractors in 2001 with total contracts valued at $1.8 billion. By 2010, 1,136 Hoosier businesses had received 9,889 federal defense contracts amounting to $4 billion.

For every 10 jobs with an Indiana defense contractor, an additional 11 jobs were created elsewhere in the state. Defense-related economic activity in Indiana generated $375 million in federal revenues in 2010 alongside $240 million in state and local collections.

Indiana business stands ready to help protect our state and nation. It is the highest form of public-private partnership and we are grateful to be able to add a new chapter to a proud American tradition.

John Thompson is a board member of the Indiana Economic Development Corporation and chairman of the National Center for Complex Operations. Chad Pittman is executive vice president of the Indiana Economic Development Corporation who served a one-year deployment in Iraq with the Indiana Army National Guard.

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