Director of
INNOVATION
Innovation Beyond Imagination™

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One-on-One with the Chief of Naval Research, RADM Nevin Carr

As we reported in the March Innovation Newsletter, RADM Nevin Carr became the Chief of Naval Research (CNR) in December of 2008. Dr. Schuette, the Director of Innovation (DoI) recently had a chance to sit down with RADM Carr and gain his perspective on innovation; here is what he had to say:

Dr. Schuette: The Office of Naval Research (ONR) is the science and technology (S&T) leader in the Department of the Navy (DoN), and is expected to provide innovative solutions to Naval needs, what do you see as the challenges for ONR in this task?

RADM Carr: First of all, ONR does a great job of identifying innovative solutions, developing and managing the innovation process, and getting innovative technologies out to the operational Navy and Marine Corps. But I have to say that innovation comes with risk, and what I mean by that is innovation isn't always something that the Warfighter is able to integrate into their systems and CONOPs easily. Sometimes it is disruptive or more costly, or requires modifications to our normal way of doing things. Disruptive technologies often require disruptive CONOPs - this can amount to irregular warfare in our favor. So we have to work harder to transition innovation, and we have to work hard at reducing the barriers for the Warfighter to accept it.

Dr. Schuette: Where do you believe innovation can have the biggest impact for the current/future challenges we face in national security and peacekeeping around the world?

RADM Carr: The first thing that comes to mind is the area of autonomy. There is a lot of work going on in that area here at ONR and throughout the Navy, Marine Corps, and DoD for that matter. We are trying hard to understand what we can deliver in terms of capabilities and how we can employ those capabilities in ways that fundamentally change the way we operate. This is one area where the S&T community is truly leading the Navy and Marine Corps. I know the Chief of Naval Operations (CNO) is focused on it because I am helping him understand our current capabilities - near term things we think we can deliver in the next five years, as well as the kinds of things we think we can do in the 2020 timeframe.

Dr. Schuette: Are there any S&T areas where you are seeing a particularly high level of innovation, or where we should be expecting increased innovation in the near future?

RADM Carr: Autonomy is a great example of how the S&T community tries to deliver a capability, but in the process of doing that we have to further the frontiers of science in a range of areas. For example, to deliver autonomous systems we need to improve our understanding of cognition, perception, and we have to build computational cognitive models. At the same time, we need to develop small, robust, and long lasting energy options for these systems which leads to new types of batteries and energy storage and conservation technologies. And then there is the really tough problem of dealing with all of the data we hope to gain from the autonomous systems of the future. To take that data and turn it into actionable information for the Warfighter, we have to overcome the challenges in large data fusion and extraction. Autonomy is really challenging us across the different science disciplines and we are working across ONR to overcome those challenges and deliver these capabilities today and in the future. It's not just about replacing one person with one machine - it really changes everything.

Dr. Schuette: What role do you see industry and academia playing in innovation for the Navy and Marine Corps?

RADM Carr: They are our partners in innovation. ONR does not conduct research; it sponsors and manages it. We have to go out and find innovation in industry, universities, and government laboratories and focus that on our Navy and Marine Corps needs. I believe that small businesses and students in our universities are some of the most innovative resources we have in meeting the challenges of our naval mission. That is why we are such strong supporters of the Small Business Innovation Research or SBIR program. The Navy has been the leader in the DoD in working with small business to transition innovative technologies to the fleet and force.

I have also made it a priority to improve our communication with industry and academia and make sure they understand where we are going, what we are interested in and how they can participate. We will be holding a forum on Energy this fall. It will take place at the Hilton in Tysons Corner October 14-15. You can sign up to participate at **http://www.onr.navy.mil/conferences/naval-energy-forum/.**

Dr. Schuette: You have spent most of your career at sea and in OPNAV. Now that you are at ONR, what would you want to tell our Warfighters about ONR?

RADM Carr: ONR and the people that work here are working very diligently to bring you solutions to the challenges you face today; provide you with the capabilities you will need tomorrow; make your life as a service member better; and, most of all, help tilt the Warfighter odds in your favor. One of the things that has impressed me the most is the dedication and talent of the people at ONR. I am proud to be apart of this amaing team. And if you need our help, let us know and we will do everything we can with S&T to help you.

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Innovation: In Search of the Dragon

by Neal Thornberry, Ph.D.,
ONR Innovation Chair, Graduate School of Business & Public Policy
Naval Post Graduate School, Monterey, California

Large organizations are increasingly in Search of a Dragon called innovation. At first reading, you probably wonder why I would refer to innovation as a dragon since in our western culture dragons are typically thought of as mythical, scary creatures that breathe fire and look to cause trouble among human kind. But In the Far East, Dragons are revered for their assumed gifts of size, power, and agility.

Large organizations, whether they are in the public or private sector can only sustain real innovation if they are dragon–like. But large organizations have a unique ability to kill innovation and creativity while they are simultaneously trying to engender it. The causes for this type of irony are many, but include some of the following:

» **Asking for risk taking, then shooting the first risk taker who makes a mistake**
» **Telling people to think up new ideas and then ignoring them**
» **Having so many bureaucratic rules and regulations that would-be innovators either get worn out or run out in trying to get a new idea through the system**
» **Command and control structures that reward obedience and conformity over new thinking which challenges the status quo**
» **Leadership that demands loyalty over objectivity**
» **Pushing people for 10-12 hours a day at work and then asking for creativity**

And the list goes on. Being Dragon-like is hard. Large organizations like the Navy or IBM for that matter need structure and organization or there would be chaos. And you can't have a flat 350,000 person Navy or it would be impossible to get a final decision. But with size and organization come rules, regulations, policies, procedures, and processes. While some of these elements may engender innovation, many do not.

Yet innovation remains near or at the top of the strategic to-do list for both the CNO and the CEO. The Navy, for example, is under increasing pressure to create readiness at less cost. With decreasing resources, innovation will have to play a key role in helping the Navy to creatively manage a shrinking resource base while simultaneously innovating in their warfighting capabilities. And it is much the same in the private sector. No company that I know of is trying to do less with more. Proctor and Gamble, for example, dealt with a decreasing R&D budget by opening a web portal that invites new ideas from around the globe and promises a potential partnership if an innovator comes up with a great product idea for the company.

DRAGON DENS OR DRAGON SERUM

Our understanding of how large organizations develop and sustain innovation is in its relative infancy. We are about where quality control research was 15 years ago. There is no Lean Six Sigma for innovation, but current organizational strategies for engendering innovation fall within two general categories. I refer to these efforts as trying to either build Dragon Dens or Injecting Dagon Serum

By Dragon Dens, I am referring to organizational structures that are purposely built to generate innovation. ONR, INTEL, IBM, and the United States Coast Guard (USCG) for example all have organizations within the larger organization that are tasked with innovation as their main mission. INTEL has a product development group whose mission is to create new technologies so that they can find new homes for more of their micro chips. The USCG Innovation Council reports into the Commandant, and is tasked with creating and leveraging new technologies so that they can protect our waterways more effectively and efficiently. And IBM has structured themselves around three different types of businesses that are lead, managed, and funded differently. Old mature businesses are managed by mature and traditional metrics like profit and return on investment. Fast growing businesses within IBM are measured on market share and growth, and the new fledgling businesses built around innovative technologies or new markets are measured on project management milestones for the first three years rather than profitability or breakeven analysis. IBM went to these three different horizon businesses when they realized that they were killing all their unproven babies by requiring a payback within one year. It may not sound right but many large organizations realize they have to structure innovation to make it work in a sustained manner.

Much of my job as the Innovation Chair involves dispensing Dragon Serum. This approach to innovation attempts, through education, to spread innovation around an organization like the Navy to a point where innovation begins to be ingrained in the culture. In our Executive Education Programs at NPS, we expose literally hundreds of Officers nd Senior Executive Service members each year in the art and science of innovation, especially the leadership behaviors they need to practice to develop a more innovative culture within their specific commands. For example, I am currently working with the new leadership of Navy Installations (CNIC) help them utilize innovation as a tool for bringing about some major changes within that organization, especially around the area of creative asset management.

Another part of using Dragon Serum to increase organizational innovation is to find folks who bring the serum already installed somewhere in their DNA. The USCG for example, recruits some of their more naturally entrepreneurial officers to serve a tour of duty in their innovation council. And these "intrapreneurs" are expected to work mostly full-time on innovation not as just an add-on to their day job. And the Council will intervene if a boss tries

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to rebalance their person's priorities away from innovation. The USCG model also demonstrates that Dragon Dens and Dragon Serum are not mutually exclusive.

SUSTAINABILITY

So how well do these two approaches work? The results are mixed. As I mentioned earlier, our understanding of organizational innovation is still in its infancy so we are learning by trying different models. It is clear as of this writing that there is no common code or universal application of approaches to innovation like in Lean Six Sigma. And companies like P&G or the USCG constantly have to tweak their approaches.

However, there are some emerging trends that point to the power of a combined model of Dragon Dens and Dragon Serum as being the most efficacious so far. It is clear that just hoping for innovation or telling people to be innovative is not enough. Some structuring of innovation is necessary. But you must also have people who are motivated to try new and different things without losing their heads in the process. And we know that we can help inculcate this kind of mindset through education or we can select it.

THE ISSUE OF CULTURE

In my next installment, I will address the issue of organizational culture and innovation. Does an organization like the Navy want innovation everywhere or just in some places? And what type of innovation does the Navy want? In ONR, we are clearly focused on the S&T side, but the Navy may also need "business model" innovation if it is to successfully deal with a very innovative, agile, and clever enemy. And I will also address the interesting question of whether innovation can change a culture or whether the culture has to change to allow innovation.

Department of the Navy

Dr. Delores M. Etter Top Scientists and Engineers of the Year

Awards Ceremony

With more than 35,000 scientists and engineers, the Department of the Navy established the Dr. Delores M. Etter Top Scientists and Engineers of the Year awards to honor those who reach superior technical achievements and to promote continued scientific and engineering excellence. The award is presented annually to Navy civilian and military personnel for exceptional scientific and engineering achievement.

The Honorable Sean Stackley, Assistant Secretary of the Navy for Research, Development and Acquisition, honored 34 scientists and engineers at the Third Annual Dr. Delores M. Etter Top Scientists and Engineers of the Year awards ceremony at the Pentagon on May 19.

As the invited speaker, Dr. Etter gave an inspiring and challenging keynote, emphasizing the importance of Science, Technology, Engineering and Mathematics (STEM) development across the K-12 age groups. According to Dr. Etter and others who are beginning to focus on addressing the trends that indicate younger people are not taking an interest in STEM subjects, "I think we are in danger of losing our technical edge."

Sean J. Stackley, assistant secretary of the Navy, Research, Development and Acquisition, right and Dr. Delores M. Etter, former ASN RDA, left, present George Frank Stimak, ONR, Brian Fitzpatrick, Denis Colaha, and Jacob Kephart, with the 2008 Department of the Navy's Top Scientists and Engineers of the Year awards during a ceremony held at the Pentagon - U.S. Navy photo by John F. Williams / RELEASED

Dr. Etter is currently the Distinguished Chair in Engineering Education at Southern Methodist University (SMU). There she is focusing on a number of projects to teach and stimulate innovation throughout the engineering department. Her secondary mission in conjunction with SMU is to reach out to the K-12 age groups and find ways to get the kids interested in STEM. As she wrapped up her motivational address, she left the award winners and their families with a challenge, "The most important thing we can do is engage young people. Bring them into the labs, let them see the projects you are working on; these opportunities change lives."

The following scientists and engineers were awarded for their outstanding contributions:

George Stimak, ONR
Dr. Eric Allman, NRL
Dr. Alexander Efros, NRL
Dr. Steven C. Erwin, NRL
Dr. Richard Fischer, NRL
John Grant Howard, NRL
Clay Kirkendall, NRL
Dr. Robert Jansen, NRL
Dr. Berend T. Jonker, NRL
Dr. Hedi Mattoussi, NRL
Dr. Robert A. Meger, NRL
Dr. Jerry R. Meyer, NRL
Dr. Jonathan Neumann,NRL
Dr. Joseph Penano, NRL
Dr. Bernard Phlips, NRL
Dr. Phillip Sprangle, NRL
Dr. Antonio Ting, NRL
David M. Fonzi, NSWC-Panama City
Sadie Grage, NUWC-Newport
Thomas A. Wettergren, NUWC-Newport
Dr. Donald Rule, NSWC-Carderock
Dr. Francisco Santiago, NSWC-Dahlgren
Dr. Kevin A. Boulais, NSWC-Dahlgren
Brian Fitzpatrick, NSWC-Carderoc
Denis Colahan, NSWC-Carderock
Jacob Kephart, NSWC-Carderock
Dr. John Asvestas, NAWC-AD
Dr. Oliver Allen, NAWC-AD
Dr. Saad Tabet, NAWC-AD
Stephen Yankovich, NAWC-AD
Larry Venetsky, NAWC-Lakehurst
Heidi L. Buck, SCC-Pacific
Nicholas W. Freje III, SCC-Pacific
Vincent McDonald, SCC-Pacific

TECHSOLUTIONS:

It All Starts with our Sailors and Marines

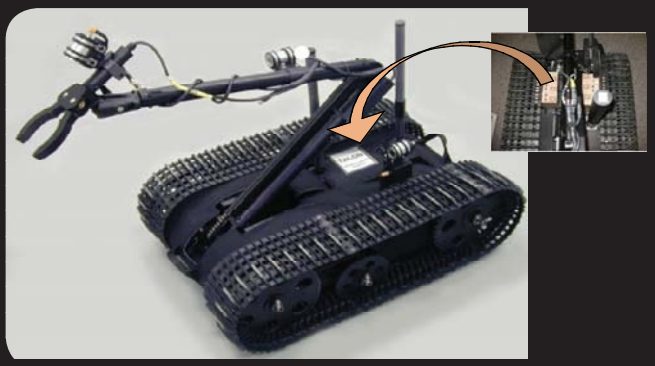
The credit for a new, innovative technology solution typically goes to the scientists and engineers who develop the technology or the sponsors who fund it. But what about the Sailor or Marine who came up with the idea in the first place? The ideas that create such unique, innovative technologies typically originate in the minds and experiences of our Sailors and Marines. The men and women who are out there at ground level operating the technology perhaps have the best understanding of what tools and gadgets will help keep them safe and fulfill the mission at hand.

The TechSolutions process begins when a Sailor or Marine submits their S&T need request via the TechSolutions website. From there the TechSolutions team and Science Advisors validate the request. The request is then vetted to the NRE in search of solutions with short white papers submitted to TechSolutions from the NRE as a result. Proposals are evaluated by a team made up of the TechSolutions team members, ONR Codes, SME's, and the Sailor or Marine who submitted the request. The projects are funded with TechSolutions dollars and they are expected to be completed within a 12 month period with a deliverable and a demonstration to the Sailor or Marine's command.

A recent example of a great idea/need brought to TechSolutions' attention by a Sailor or Marine was from a Staff Sergeant (SSgt) at II MEF 8th Engineering Battalion. The SSgt works with the Talon EOD Robot (pictured right) and requested that TechSolutions develop a cheaper alternative to the existing large custom battery. The performers for this TechSolution were Penn State Applied Research Laboratory and Naval Surface Warfare Center Carderock. The solution was four to six BB-2590 batteries replacing the current battery, a new battery cradle and docking bay, and a built-in battery health monitoring capability. The robot can now run for almost 9 hours (on six BB-2590s), 23% longer than with the custom battery. Batteries can be hot-swapped without having to shut down and reboot the robot.

The SSgt and other Talon EOD Robot operators are now more confident in their equipment readiness, they have replacement batteries readily available and they have eliminated the single-purpose robot battery charger. To submit a TechSolution request, please visit their website at: **www.onr.navy.mil/innovate/techsolutions** or email the team at: **techsolutions@onr.navy.mil.**

Above: Completed TechSolution - a new battery for Talon EOD Robot
Below: Photo illustrating the location of the new battery on the Talon EOD Robot



Science and Engineering Technology Conference / DoD Tech Expo

Dr. Larry Schuette, DoI, and Dr. Joseph Lawrence (ONR's Director of Transition), and members of the DoI staff attended the 10th Annual Science and Engineering Technology Conference/DoD Tech Expo in Charleston, SC from April 21-24. One afternoon of the conference was dedicated to Navy S&T with presentations from Dr. Schuette on "Innovating for the Future," and Dr. Lawrence on "Naval Open Architecture." The last session of the conference focused on DoD Independent Research and Development and included a talk from the CNR, RADM Nevin Carr.

One of the new aspects of the conference this year was the opportunity to sign up for one-on-one conversations with Service representatives. Both Dr. Schuette and Dr. Lawrence participated in numerous one-on-ones with industry, academia, and government partners on a wide range of topics and technologies. During each of these one-on-one sessions, conference participants could discuss any topic or program that interested them and get feedback or answers to questions from the Directors.

These exchanges were beneficial for the conference participants as well as the Directors. "These types of events are great opportunities for us to learn more about the work being done by our Industry and Academia partners and allow us to find collaboration opportunities where feasible," said Dr. Schuette. In order to remain on the cutting edge of S&T, both Directors recognize the importance of keeping open lines of communication with partners spanning the S&T community.

SWAMPWORKS

Program Hosts Disruptive Commercial Technology Workshop

Pictured Above:
The Chief of Naval Research, West Point Cadets, and USNA Midshipmen. They provided the digital native perspective on DCT.

On March 26th, the DoI sponsored a Disruptive Commercial Technology (DCT)workshop. Seven organizations that were funded in late FY08 presented their findings of commercially available technologies that were considered by the teams to be disruptive in military or social applications.

The teams included Juniors and Seniors from the US Naval Academy and the US Military Academy at West Point, and engineers and experts from the Naval Undersea Warfare Center, the Naval Surface Warfare Centers at Carderock and Dahlgren, the Naval Post Graduate School and MIT. The overall results of this study were not unexpected and highlighted the resourcefulness of technology seekers and the availability of technology from a broad range of sources.

Dr. Schuette, was very impressed by the work of the students and engineers, saying, "The DCT Challenge was a great success. We watched students; young engineers and experienced scientists provide their perspectives on commercially available technologies. There truly is a difference between the digital natives and non-natives!"

Historic Accounts of Naval Innovation: RADAR

Before the development of radar, Navy ships could track other ships or aircraft only by using optical techniques, sound ranging, or primitive radio direction finding. New methods of detection and ranging were necessary. In the autumn of 1922, the Navy Research Lab (NRL), made the first detection of a moving ship by radio waves and, as a result, discovered the radar principle. Eight years after the initial discovery of the radar principle, NRL scientists noted that the reflections of radio waves from an airplane could also be detected.

From 1930 to 1940, NRL explored the use of radio for detection and ranging, and in 1935 the Committee on Naval Appropriations of the U.S. House of Representatives allocated $100,000 to NRL for the development of radar. This led to NRL's invention and development of the first U.S. radar, the XAF (installed on the battleship USS New York in 1939), and led eventually to its commercial production form, the CXAM. By the time of Japan's attack on Pearl Harbor, 20 radar units were in operation on selected vessels. These radars contributed to the victories of the U.S. Navy in the battles of the Coral Sea, Midway, and Guadalcanal.

For more information about NRL's developments in radar, please visit this link: **http://www.nrl.navy.mil/content.php?P=RADAR**

*This information was taken from NRL website and has been approved for inclusion in the newsletter

In 1939, the battleship USS New York (BB-34) receives the United States' first radar, the XAF, developed by NRL.

DoD Techipedia - DoI Page!

The Director of Innovation now has a presence on DoD Techipedia! We have begun utilizing DoD Techipedia as a means for increasing our communication with other DoD agencies and employees. For all of you who are DoD employees and contractors, check us out at **https://www.dodtechipedia.mil/dodwiki/x/mQVGAQ**

DoD Techipedia is based on wiki technology and therefore relies on collaboration and contributions to share and disseminate information.

DoubleShot BattleStation Communicates Situational Awareness to Warfighters in OIF on a single touch screen display

USMC convoy experiments with the Double Shot technology while on assignment in the dessert.

Imagine you are the lead vehicle in a convoy and you spot a suspicious hazard and need to communicate the location quickly to the vehicles behind you. The first step is to identify where you are using a military GPS device that provides 10 digits that represent the MGRS (Military Grid Reference) on a LCD screen. You then need to estimate revised MGRS coordinates to compensate for the distance and direction from you to the hazard. The next barrier is to verbally communicate the revised MGRS over a radio that is at best marginal, let alone have the radio time to describe the situation. Or with a touch of a DoubleShot screen, you can instantly compute and transmit the MGRS co-ordinates over a radio with text messaging and receive a confirmation that the message has been received.

The DoubleShot "BattleStation" has been referred to as Blue Force Tracker on steroids. It has been successfully used in Iraq for a variety of "situational awareness" purposes, including counter sniper functions. DoubleShot provides the warfighter with full 360° "situational awareness" from all available digital information fused on a single display. The warfighter is able to command and control devices such as a weapon station directly from the touch screen. Mission Planning and Analysis tools enable the warfighter to utilize the acquired and archived data from all onboard digital sensors, electronics, or analog imaging systems.

This program is one of several Small Business Innovative Research (SBIR) and SwampWorks collaboration success stories. According to Dr. Tom McKenna, a Program Officer in the Division of Human and Bioengineered Systems at ONR, "the DoubleShot program is a great example of a successful SBIR program that the SwampWorks program leveraged to create a new capability." Starting in 2004, a small company, Doubleshot, Inc. began work under an SBIR Phase I award to create a system that would provide Improvised Explosive Devise (IED) situational awareness. They went on to gain both Phase II and Phase III SBIR awards.

The DoubleShot system was introduced into theater by the Marine Corps Warfighting Laboratory, and the Rapid Equipping Force used the DoubleShot Platform to create the Vanguard counter sniper system. Under SwampWorks, advanced real time image processing, sensor technologies, navigation, and fusion capabilities are being researched for potential integration. The benefit of a full system integration approach multiplies the effectiveness of any single new technology advance.

In total, well over 100 DoubleShot systems and 24 Vanguard counter-sniper systems were fielded in Operation IRAQI FREEDOM and Operation ENDURING FREEDOM and DoubleShot is providing in-theater support. Future plans are to integrate this system with other new sensor technologies that may benefit from available real time image processing and advanced archiving capabilities.

*Tom McKenna, featured in the article to the right was the Double Shot Program Officer.

Meet Tom McKenna

ONR Program Officer, Code 34, Warfighter Performance Department

Q1. What do you do here at ONR; what projects/ programs do you typically work on?

Tom McKenna: I am a Program Officer in Code 341, Human & Bioengineered Systems Division (a division in the Warfighter Performance Department). My basic research programs are in computational neuroscience, bio-inspired autonomous systems, human-autonomous system interaction, human motion analysis for activity recognition and biometrics. My applied programs are in bio-inspired undersea vehicles, human-centric imaging systems, and intelligent video surveillance.

Q2. How long have you worked at ONR? During that time, have you been in the same position? If not, what other areas/codes have you worked in?

McKenna: I have been a Program Officer for 21 years. I have been in the same division throughout, although the division changes its name every few years. I have been acting Division Director at various times, but I have resisted the temptation to move into SES because I really enjoy working directly with leading scientists and engineers. I have had collaborative programs with every code at ONR and several codes at NRL.

Q3. What is the current major project you are working?

McKenna: The two largest efforts are Intelligent Video Surveillance and Bio-Inspired Autonomous Systems. Intelligent Video Surveillance was a Future Naval Capabilty (FNC) product that recently came to a successful completion and demonstrated the ability to automatically track all of the watercraft in a harbor, show geo-registered tracks in real time from virtual overhead view and provide alerts and clips to watchstanders based on violations of rules or abnormal trajectories. We are continuing to develop this technology into the video forensic area and we are also now looking at automated analysis of submarine periscope imagery. In the autonomous system area we are developing new bio-inspired undersea vehicles with significant new capabilities and also developing the area of cognitively-compatible human-autonomous system interaction for ground and air vehicles.

Q4. Who are you collaborating with on that project?

McKenna: In intelligent video, I work closely with Code 31 (Steve Brooks and Behzad Kamgar Parsi) and 30 (Martin Kruger) within ONR. In autonomous systems, a lot of new collaborations were facilitated by the Autonomous Systems Innovation Summit and I expect an ONR wide focus in this area to persist and generate some significant synergies. Autonomous Systems really requires advances in many different scientific and technical domains.

Q5. What do you like most about work at ONR?

McKenna: There are a lot of differences between being an academic researcher and being an ONR Program Officer. In academia, one tends to be confined to one small specialty area and your products are publications, which are read by a small community. At ONR, one is no longer the primary creator, but you can foster, encourage, nudge, and even lead researchers into new directions, across the boundaries of disciplines and see the science being turned into real technology. I also find satisfaction in producing technology that protects warfighters.

Q6. What do you think qualifies something for being considered as innovative?

McKenna: In the scientific arena innovation is shown by impact on the scientific community. Do people pick this up and investigate further? Do they have stronger explanations for phenomena? In technology, the innovation emerges in the actual demonstration of new capabilities. It has to be so compelling that the organizational barriers come down and it makes it to the field.

Q7. In what ways do you think the Navy is innovative?

McKenna: The Navy shows that it values innovation by resourcing ONR and the Navy labs. The ONR style of letting Program Officers develop new scientific threads shows the organization's commitment to the future, to a Navy after next. Investments in science and technology really create options for the future. When new challenges arise, you need some technology options in hand or you're ready for rapid development.

Q8. If you could have unlimited resources, what project/ program would you invest in, why?

McKenna: If I had major resources I would develop truly intelligent autonomous systems.

Q9. Where do you see the future of your area of expertise heading?

McKenna: I see autonomous systems that can operate in virtually any environment and perform tasks with the agility of animals or humans. We are moving toward a future Hybrid Force that combines humans and autonomous systems into a single force that maximizes the special abilities of each.

Dr. Tom McKenna
ONR Program Officer, Code 341
Human & Bioengineered Systems Division

ONR International Lecture Series
Innovation in China: A Decade of Change

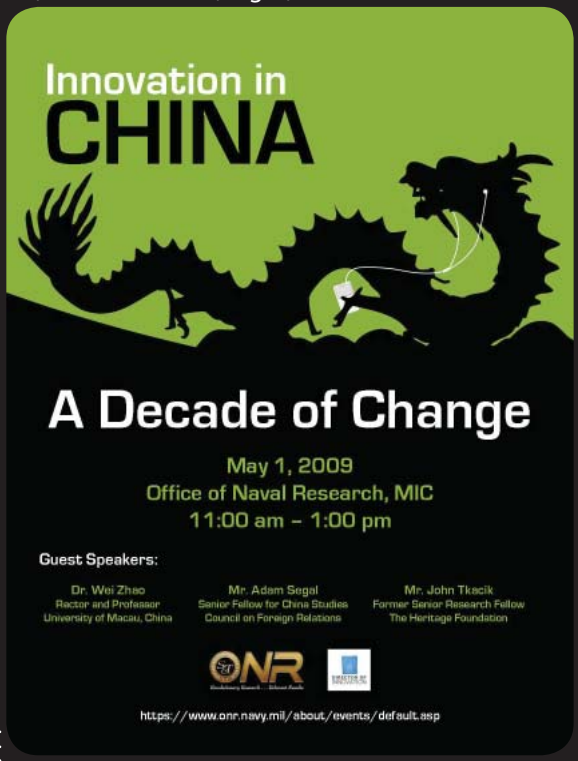
A distinguished panel of experts hosted by ONR shared their perspectives on Friday, May 1st on the cultural and political factors influencing technological innovations in China.

Pictured Above: Top Left, Dr. Adam Segal; Bottom Left, Mr. John Tkacik; Right, Dr. Wei Zhao

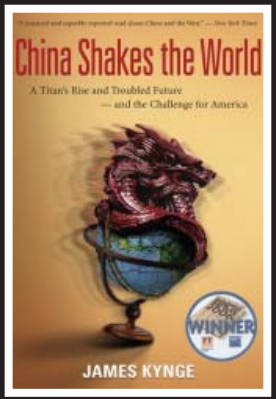
The event, "Innovation in China: A Decade of Change," offered forecasts for the future as well as expert recommendations for how U.S. scientists, engineers, entrepreneurs, policy-makers, and others can remain active in global S&T development. The event is part of ONR´s ongoing effort to open the aperture and increase the breadth of ideas in the S&T community.

"As we look at the world and how it is changing, we recognize that now is the time to engage at the strategic level and develop how we might influence, or be influenced by these global shifts," said ONR Director of Innovation, Dr. Larry Schuette.

Each panelist presented a unique vantage point on China´s S&T development. Speakers included: Dr. Wei Zhao, Rector and Professor at the University of Macau in China; Dr. Adam Segal, the Maurice R. Greenberg Senior Fellow in China Studies at the Council of Foreign Relations; and Mr. John Tkacik, a retired 24-year veteran of the U.S. Foreign Service and State Department. The views expressed by panelists represented their personal experience and insights.



Recommended Reading:
China Shakes the World: A Titan's Rise and Troubled Future and the Challenge for America BY JAMES KYNGE



Published in 2006, James Kynge's assessment of the situation in China is both authoritative and eye-opening. Booklist reviews his work as, "Kynge demonstrates how China's thirst for jobs, raw materials, energy and new markets--and it's export of goods, workers and investements--will dramatically reshape world trade and politics."

Financial Times and Goldman Sachs selected Kynge's book as the 2006 Business Book of the Year Award. The FT and Goldman Sachs award is presented annually to the book that has provided the most compelling and enjoyable insight into modern business issues.

Spring 2009 ONR Distinguished Lecture Series Wraps Up with an Inspiring Talk from Dr. William Phillips

Dr. William Phillips, an ONR-funded Nobel Prize-winning physicist, delivered the final lecture at ONR´s Spring Distinguished Lecture Series on May 19. Phillips´ compelling presentation, titled "Time, Einstein and the Coolest Stuff," highlighted the importance of basic research and ONR´s legacy of support for innovative scientists.

Among the attendees at Phillips´ lecture were Dr. Delores M. Etter, former Assistant Secretary of the Navy for Research, Development and Acquisition, and the CNR.

"Dr. Phillips´ Nobel Prize-winning work is an excellent example of the type of investments ONR makes in basic research," noted Etter. "In particular, his achievements punctuate the vital importance of a long-term approach to developing future science and technologies (S&T) that are based upon solid fundamental research."

Dr. Phillips is a pioneer and leading researcher in laser cooling and trapping of atoms at the National Institute of Standards and Technology. His fundamental studies were used to develop applications for new kinds of physics measurements and processes such as high resolution spectroscopy, atomic clocks, atomic collisions, atom optics, bio-molecular interactions, and atomic-scale and nano-scale fabrication.

Phillips asserted, "ONR is different among the federal S&T organizations because it gives science a chance. A program officer with vision can say ´I think this is a great idea and I´m going to fund it.´ The recognition of the importance of basic research in support of mission goals can lead to mission success where a more tightly focused vision might not." He summed it up by saying, "ONR´s style has intrinsic and high value."

Ultimately, Phillips and two colleagues were awarded the 1997 Nobel Prize in physics. His work has yielded many relevant naval applications, in particular precision time-keeping, navigation and quantum information, including unbreakable encryption.

"Dr. Phillips and his colleagues were the first to clearly slow down atomic motion with light, and the first to construct a trap for neutral atoms. Both of these pioneering accomplishments were made possible with support from the Office of Naval Research, which was given at early stages of his scientific career," said Dr. Charles W. Clark, ONR´s Atomic and Molecular Physics program manager, who has funded some of Phillips´ more recent research.

Since 1946, ONR has funded the world´s premier engineers, physicists, mathematicians, oceanographers, meteorologists and thousands of other scientists as they conduct revolutionary research in support of U.S. forces and allies. These investments in discovery and invention (D&I), innovative naval prototypes (INP) and future naval capabilities (FNC) have yielded a myriad of state-of-the-art technologies over the long-term.

"The ability of ONR to be able to support high-risk, long-term research efforts without requiring external peer review enabled the breakthroughs by Dr. Phillips that created a whole new field of research," noted Dr. Bobby Junker, head of ONR´s Command, Control Communications, Computers, Intelligence, Surveillance, and Reconnaissance (C4ISR) department. In November 1979, Junker was the ONR program officer who initiated funding for Phillips´ research on laser cooling and trapping of neutral atoms.

ONR is unique among S&T organizations in that program officers have access to all three phases of developmental funding: Basic Research (6.1), Applied Research (6.2) and Advanced Technology Development (6.3). This enables the full spectrum of an idea to be pursued from discovery to deployment.

Dr. Phillips hurls a balloon frozen by means of liquid nitrogen into the audience during his demonstration.

THE ONR DLS WILL START BACK UP IN THE FALL - SO KEEP YOUR EYES OPEN FOR MORE INFORMATION IN THE NEXT NEWSLETTER.

NSWC Carderock's
Center for Innovation in Ship Design

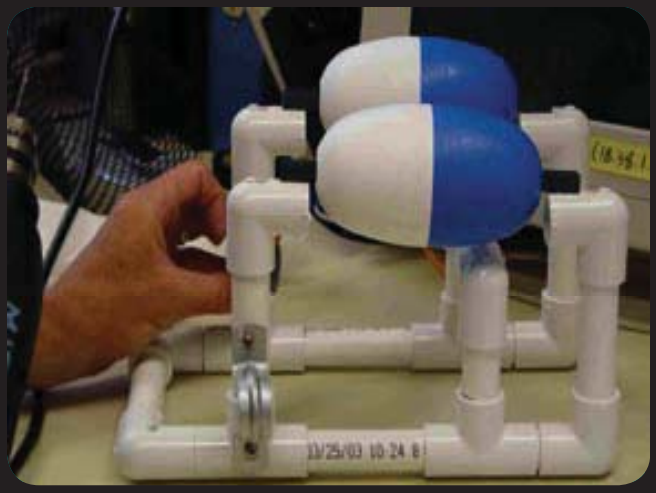
At the Naval Surface Warfare Center, Carderock, the Center of Innovation in Ship Design (CISD) is working to increase innovation today and in the future. Most people don't know that the CISD is housed at the Carderock facility alongside the huge water tanks used for testing new ship designs. CISD staff are quietly working with our future Naval Engineers, often starting with children who are still in elementary school. Their goal – ensure that we maintain and improve our capabilities in ship design. Naval Engineering was designated a National Naval Responsibility by ONR in 2002, that means that the Navy has a unique role to play because if they don't ensure that Naval Engineering remains a national capability, no one else will.

So how do you ensure we have capabilities in Naval Engineering? Start getting kids interested in it very young, mentor young scientists as they go to school, and offer interesting real life challenges to summer interns and international visiting professionals. All of this is happening at CISD, and it is paying real dividends to the Navy.

One example is the "flip ship" project where a team of students from multiple engineering disciplines worked for ten weeks on the problem of at sea transfer. When you need to move material from one ship to another at sea, a wide range of challenges exist. The students were asked to try and create a stable crane that would overcome some of those challenges. They leveraged the "flip ship" design which uses a ballast system to submerge a large portion of the ship underwater, increasing its stability. By applying the same principal to a crane, the students were able to eliminate much of the pitching associated with the wave action, resulting in a much more stable and functional crane.

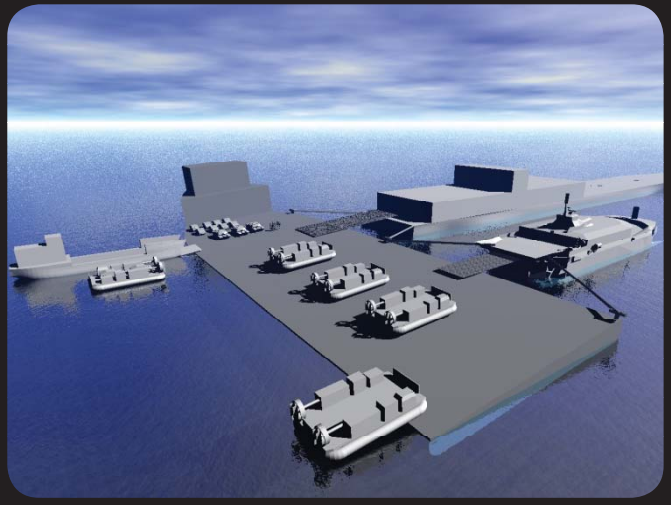
The design was so successful that they returned to school and completed work sponsored by ONR and used the project as their senior capstone project. Engineering is an experienced based skill set that is best developed through real life projects, CISD is playing a critical role by providing that experience to our next generation of Naval Engineers.

Please visit CISD's official website for more information: http://cisd.dt.navy.mil/



Pictured Left:
Sea Perch. A Remotely Operated Vehicle (ROV) used to teach students Naval engineering principles
More info at http://seaperch.mit.edu/

*Sea Perch is managed by ONR Program Officer, Ms. Kelly Cooper



Pictured Right:
Intermediate Landing Platform Project. A multi-year, multi-team project leading to Mobile Landing Platform Program

DIRECTOR'S CORNER

by Dr. Larry Schuette

Innovation Beyond Imagination™

The meaning behind the ONR Office of Innovation's trademarked slogan, "Innovation beyond Imagination", means many things to many people. For some, it is an open and transparent statement for the way in which we best position ourselves to be innovative. For others it is a magical, Disneyesque way of saying shoot for the stars. And there are some that think it does not fit well within the structured, hierarchical, cautious Navy system. Our intention behind choosing this slogan is to recognize that innovation knows no boundaries and that in all fields of employment and in all organizations, the challenge is to go beyond one's natural instincts and truly think of things in a non-traditional way – that is where the magic of innovation lives and thrives.

Since we are a Naval organization, we will consider innovation from the Navy's perspective. To the Navy, innovation transpires when we find and champion innovation within the research community. There are two key words in that last sentence that make this first step towards innovation difficult. The first word is "find" the second word is "champion". Within every large organization, you risk missing where the innovation and discovery happens. There are many tools now-a-days that are making it easier for people to disseminate their creative ideas. These tools help with unblocking the much needed transparency and linking up scientists with other scientists to further develop those creative juices. Here at ONR we host a number of summits, lecture series, and symposia in an effort to do just that – open the aperture and allow for the exchange of ideas that lead to the innovation.

The second word that is important to Naval innovation is "champion". Okay, so not every "eureka" or "aha" moment is going to evolve into the next big thing but we need to welcome and nurture the ideas that our program officers are bringing to the table. As a manager, I recognize the importance of evaluating the proposal and aligning the S&T with our strategy as an integral part of the ONR leaderships' job. I also recognize that without the fine work of our creative program officers, we would be without our jobs - so it's important to keep an open door policy. It's my job to help bring those great ideas to harvest, to champion them, to fund them, to support them when the Pentagon and the Hill comes a calling.

In order to do these two things well we must understand how we do business, how we fight, and how we operate and employ. This is exactly why we bring on board guys like Dr. Neal Thornberry, the ONR Innovation Chair at the Naval Postgraduate School. His job is to educate NPS students about how to best conduct business that allows for and enables innovation. He teaches Naval operators the business end and they in return educate him from their own experiences and perspectives. This kind of collaboration and cross pollinization has to be fostered across the Navy and ultimately, across DoD.

THE FUTURE OF INNOVATION IN THE NAVY

There are two major problems that block us from reaching our innovative potential: First, we need to be better at understanding, finding and nurturing innovation. And secondly, we need to be better at acquiring the innovation and pushing it out to the operators. How can we take a more innovative approach to developing processes that allow this to happen? Is setting up a new process or office that focuses on these problems a good solution? Feel free to send any ideas, comments, or questions to:

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CHECK OUT DR. SCHUETTE ON THE PENTAGON WEB RADIO AND THE PENTAGON TV CHANNEL:

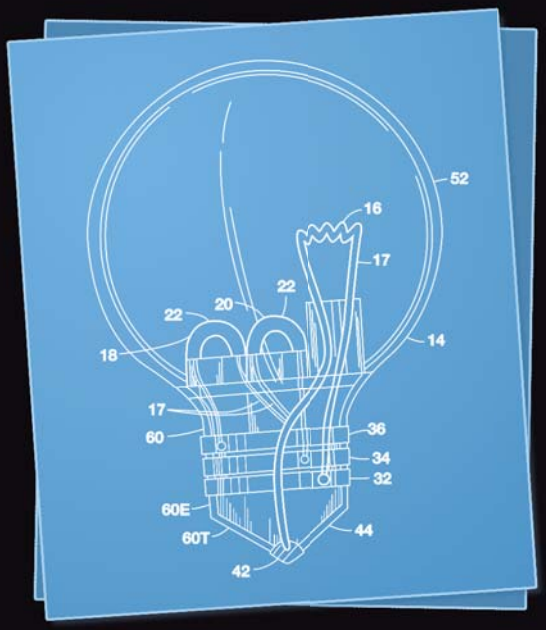
http://www.blogtalkradio.com/Armed-withScience

-and-

http://www.pentagonchannel.mil/

click on the 'Around the Services' episode for 26 May 2009. The 'Going Green at Sea' segment starts the show.

DIRECTOR OF INNOVATION



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