

## **Chief of Naval Operations**

### **Adm. Gary Roughead delivers remarks at**

### **2011 AUVSI Unmanned Systems Symposium and Exhibition**

**August 19, 2011**

**Admiral Roughead:** It is really is good to be here. I was so pleased to see the response that the symposium generated and the number of people who have signed up for the week. I think it's indicative of the interest, the passion, and the promise that unmanned systems of all varieties portend for the future.

The last time I was with you I talked about how I believed unmanned systems would continue to move into the spotlight and today I'd like to spend a little bit of time addressing our view and the approach that we have taken and the expectations that we have on our plate.

There's no question, those of you who follow national security issues and defense issues, that warfighting and fiscal realities I believe are going to drive us more rapidly and in a much more focused way beyond our traditional platforms and to the inclusion of unmanned systems.

I think that clearly in the Navy's case without the work and the commitment that our Office of Naval Research has done over the years and kind of kept the pot stirred, if you will, we would not be in the position where we are today. But clearly it was that sustainment of ONR and then in the last couple of years in the case of the Navy where we've reorganized ourselves, we've relooked at how we wanted to come at unmanned systems, how we moved many of those programs into our N2/N6 or the Director for Information Dominance, I don't believe that we would have been able to achieve the things that we have done.

But it's also important to acknowledge the contributions, the interest and the competence of the technical community, of academia, and how they have been able to bring that intellectual power to bear in the world of unmanned. There is no question that industry deserves great credit for continuing to pursue many of the initiatives that we see operating in the battle space today.

But I'd like to touch a little bit on how we see unmanned systems operating and what I have been referring to during my time as the Chief of Naval Operations: operating in that way that we can provide the nation with the best offshore options that are available to the Commander-in-Chief. Those offshore options are very active today, they're very busy today. And I would submit they're very pivotal today.

A few months ago I was giving some remarks and someone asked me about the Maritime Strategy that we had issued about four years ago. Was it still relevant? Did it still matter in the world in which we live today? That was on the eve of our operations into Libya. I knew we were going into Libya, it was not in the public domain. But as I tried to formulate the answer I just had this vision of our Navy at that moment in time.

As some of you may know, when we laid out our Maritime Strategy we said that we would be a force that was forward. We would be a deterrent force. We would project power. We would control the sea in the areas where we needed at that moment in time. We would conduct maritime security operations and we would provide humanitarian assistance and disaster response.

On that particular evening our ballistic missile submarines were on patrol as the nation's most survivable deterrent force. Two aircraft carriers were in the Middle East as changes were sweeping through that area. Not a bad conventional deterrent force. We were forward in every ocean of the world and on every continent. So those two capabilities were checked. We were moving ships and submarines in position to make the initial attacks into Libya that took down the air defense system with our ships and with our submarines. Those ships and submarines were also providing sea control in the area off Libya.

If you went farther east you were able to see the United States Navy working with friends and partners in the Somali Basin, attacking piracy in that area. Maritime security.

Then the Ronald Reagan on its way to a combat deployment in the Middle East within 24 hours shifted over and was providing humanitarian assistance to the people of Japan in the wake of the tsunami there.

So my answer to the gentleman that asked me the question was yes, it is relevant, it is active, it is viable, and it does provide those offshore options that the nation will need in the years ahead, and it's able to be done without any footprint ashore.

I'm often complimented for our Navy because of how fast we are able to respond. And we are able to respond quickly because of the great skill and competence and initiative of our Sailors who are deployed today, about 65,000 of them. But the key to that speed of response is also the fact that we are always there. We are present in every ocean of the world. We are standing by in those areas where conflict or disorder is likely to occur, and it's that presence that gives the nation the speed that will become increasingly important.

But in all of those things that I just talked about I think it's important to recognize that in all of the operations that we conducted, our communications were not challenged, the command and control of our forces were not challenged, and there was

no real threat to our ability to access those areas. So we in a way were never challenged in how we wanted to operate and what we wanted to do in those particular circumstances.

Those days are not always going to be the case. There will be challenge. There will be systems that will be arrayed against military forces that want to be able to come into an area, that will challenge the command and control, that will challenge our ability to gain access. And for that reason I believe unmanned systems will play an even larger, more critical, and more crucial role in the years ahead, particularly in those contested environments.

That's not to say that what we're doing with our unmanned systems today is not important, is not relevant, and is not having an impact. I cite our Broad Area Maritime Surveillance (BAMS) aircraft demonstrator that we sent to the Middle East a couple of years ago just to see how it would work. It has yet to come home. It's not broken. It's just that no one wants to let it go because of the value that it provides in sensing the battle space there.

With our Fire Scout unmanned helicopter. We deployed that two years ahead of its initial operating capability date. I think that is a significant step and it's an important step that I'll talk about later. And in fact although that system for the Navy was procured to operate off of our ships, it is operating ashore in Afghanistan and there is an additional demand for more Fire Scouts to support operations there.

Without those initial deployments, those early deployments, we wouldn't have been able to get those systems in the hands of our operators, in the hands of our Sailors, so that we could learn operationally how to use unmanned systems.

We've made good use of shallow water mine hunting systems in the vicinity of Iraq and the waterways there as we participated with our Iraqi friends in opening up the waterways and the harbors that are absolutely critical to their economic viability.

We've also used them extensively in underwater searches, for example a helicopter off the coast of San Diego. I also had the great pleasure of going to Woods Hole Oceanographic Institute and seeing the work that they're doing there and how they used leading edge technology to find the flight data recorders from the Air France flight that disappeared in mid-ocean without any specific locating information. We were able to use those systems in that regard.

Then of course our oceanographic community is using gliders in very extensive ways that are increasing our awareness of the underwater battle space.

But even with all of that I think it's true to say, and I won't sugarcoat anything, that many of our unmanned systems still operate on the periphery of naval operations. Indeed, I would say many of all of the unmanned systems operate on the periphery of all

of the operations which we conduct. They clearly are not optimally integrated into our ships, into our squadrons, and into our concepts of operation. But I think that the pace of development, the culture that we tend to have within the military, indeed within any large organization, and the need to this point are why we have not seen that optimal integration. Those are the three things that in my time in doing this I've seen as the impediments.

But I do believe as I alluded to earlier, that the growing anti-access area denial capabilities that we see coming on, the importance of the activity in the undersea domain will cause us to have to focus and to put more energy and more purpose into bringing the systems to bear because, quite frankly, we don't have the time to let things languish along and find their way into our operations at a comfortable pace.

We also can't allow the work that we do, the experimentation that we do, the research that we do with unmanned systems, to be viewed solely as an unmanned problem. That was one of the reasons, the main reason, indeed, why we pushed the early deployments of some of our systems. Because while we can go ahead and look at the technological needs that we need and look at how well does the system itself work, it is so important and so important to me that we get these systems in the hands of the operators so that they can blend them into the operations and into the environments and learn from that because there's an operational level of learning that has to go on in addition to the technical level of learning.

I also believe that we don't have time to treat how we think about and how we move information around as an afterthought to the system. That has to be part of the architecture which we envision and that we reimagine how these systems are going to play into the battle space. And from the outset, I have always believed that it's not a question of unmanned systems and manned systems and how do we program for and buy and develop and research in those two individual lanes. For me it's been an issue of looking at the battlespace in which we will operate and then looking at the optimal blend of manned and unmanned and how does each complement the other and not take away from the other. Those are the things that we have to think about.

So our approach has been one that has looked at unmanned systems that allows us to move forward with systems and concepts and ideas that have a great deal of commonality, but then that we can take some of that and tailor it off and perform a certain mission. Whether that's in the Large Diameter Unmanned Underwater Vehicle (LDUUV), the Persistent Littoral Undersea Surveillance System, and some of the air independent propulsion work that we're doing, I think that that allows us to take some of those systems that have broad commonality, but then we can also parse them down into the needs that the operators may have.

I also would say that we've pressed quite hard on bringing the X-47B into our thinking in the Navy. My staff knows that on the first flight of the X-47B I was like an expectant father. As in all cases when systems like that are fielded, you may get ready

to fly, then there will be a little glitch that you'll prudently and wisely and appropriately want to check out that may delay the flight a few hours, it may delay it a day. I was on pins and needles and I have no idea why it was that particular event in my tour as the Chief of Naval Operations that caused me to be so focused, so excited, and so enthusiastic. Probably because in my mind it truly does portend a significant change in the advantages and the power and the versatility of naval carrier aviation. Because if we can blend the unmanned on an aircraft carrier and the manned on an aircraft carrier, we've changed the dimension of carrier naval aviation in a way that has not happened in decades.

But I would also say that as an organization, and I alluded to this earlier, that culturally we are often slow to adapt. We tend not to want to pull these innovative solutions into the way that we do things. We struggle to answer needs in new ways, even though we know there's a compelling argument to get these systems out there. And that's why I believe the approach that we've taken, the reorganization and the great young leaders, some of whom you see here in the audience today, are the ones that will carry us forward.

I would also say that we get wrapped up a lot in our defense procurement process. That if an industry doesn't bring new ideas to us because we don't ask for them, I think that that reveals an acquisition system that doesn't accept failure and is not eager to learn from its mistakes, which I think is a huge shortcoming of our system. Failure is not bad. Not learning from the failure is bad, but failure is not bad.

Resistance in getting to what I call speed to fleet. How quickly can we get systems out there? And the time that it takes us collectively to get an idea into a system, get it out into the fleet, I think represents, again, a risk-averse culture and an old set of processes that aren't geared to the age in which we live.

I believe it's also worthy to note that even though we have had the Fire Scout deployed from a ship, the Fire Scout deployed ashore in Afghanistan to the rave reviews of the troops there that are using it, that the item of note was that a Fire Scout was shot down in combat. A negative. All of the positive tend to be glossed over. All of the lessons that we were able to learn by deploying two years early, to shape our thinking for the future - that seems to be minimized. I believe that that is indicative of thinking and processes that are not helpful to our future.

I also believe that we have a belabored operational test and evaluation regime. That from time to time more often tends not to be able to deliver the integrated and the interoperable systems that we're going to need. Again, kind of a stovepiped look at how we're bringing systems into play and not being able early on to determine the interoperability issues and solutions and the integration challenges that we know we will face. We have to think differently about how we do that. Because if we fail, what happens is those systems get put on the backs of our Sailors and they are the ones that

have to struggle through the process. They are the ones that have to fight through the inability for systems to work together.

I think that more of us in uniform and those of us who are in the department can do a better job of articulating requirements, stating those requirements, and working closely with the research community and with industry to make sure that we get those systems delivered quickly and can work our way through rapid fielding. Because it's so important at this time, because I really do believe that in few times in history have we been presented with technological opportunity in the way that we are today, particularly in the area of unmanned systems, and where we haven't shifted our operational thinking and our operational construct. We have to get our heads around that and make sure that we're addressing that in the right way.

I think to just close with a couple of points that remain of great importance to me: you all were there last year when I cast the net widely to continue the pursuit of high density underwater power. That clearly is something that will be a game-changer for us, and I encourage and I thank all of those who have been part of bringing options to the Navy so that we can look at what the best way ahead is. And just in the short time that we have been advocating for increased power, we have seen the times rise markedly and we need to continue to do that.

I think that there should be increased attention paid on the use of open architecture and how we can take advantage of that, again, to increase the rapid fielding of these systems. And as I've always said from the very beginning, there is no such thing as an unmanned system. There will always be people in the loop, in the process, in some numbers in some way. The environment which we are going to be in - whether it's the risk environment, the nature of anti-access strategies, or the fiscal environment that we are going to be in - we cannot afford to simply take an operator out of a vehicle, and declare victory when we put 50 additional people in the back room. The cost of people in the future will only continue to rise and we have to make sure that the systems we're putting together, the integration, the interoperability, takes advantage of how do you bring down the number of people associated with operating the systems which we will bet on for the future.

But I would say that with all of the challenges and with all of the rubs and shortcomings that I have highlighted, I do believe that we in the Navy have reimagined our future, we have restructured ourselves, and we have put the right leadership in place to take us there.

Again, I appreciate the work that is done in all dimensions of this exciting area that will help us deliver on that promise of technology. That promise of technology that is not an end into itself, but the technology that must be integrated into how we will take our forces into the future, how we will take our forces anywhere on the planet where we want to go for the good of the nation, and operate in an integrated, in a safe, and in an effective manner with our friends and partners, wherever they may be.

I thank you very much for your time. I thank you for your efforts. What I'd like to do now is just open it up for a few minutes on any questions that you may have. Thank you very much.

[Applause].

**Question:** Sir, at the beginning of your speech you said you think the budget climate will drive development of some of these systems. I wonder if you could elaborate on that, particularly in light of what you said at the end there about having to make a kind of a business case for reducing the number of personnel.

**Admiral Roughead:** I think the budget environment will drive the development as long as we see them as an integrated force with our manned systems.

For example, and I'll use the underwater world as where I've put a lot of effort and a lot of thought recently. I believe that unmanned underwater systems become extensions to the submarine, can become extensions to aviation, manned or unmanned, as far as sensing the battle space. So if you were to ask me if you can extend your sensing area with unmanned systems my initial reaction is we can get there more cheaply than if I have to buy many of the more manned systems. That also reduces the risk to personnel. And it also reduces the cost of those personnel that we may have to have out who have limited duration, unlike unmanned systems do, that can be more persistent in the battle space. So that's where I think that as we look at how do we want to structure the fleet, how do we want to build the programs, that I believe we can get more bang for the buck by integrating the unmanned into the manned networks.

**Question:** Dr. Robin Murphy, Center for Robot Assistance Search and Rescue.

The Navy have of course has such a wonderful humanitarian history of disaster relief, particularly with medicine and transport of supplies. What do you see the role of the unmanned underwater vehicle use there for disasters?

**Admiral Roughead:** I think, for example, you can use the unmanned underwater systems to sample water in the event of a disaster not unlike what we saw in Fukushima, where as you all saw in the press there were concerns about contaminants. There is no question that as you conduct a major humanitarian assistance operation, whether it was the tsunami off of Indonesia. I recently returned from Chile where I spent some time in their hydrographic office, where the bottom of the ocean shifted so much, and as you're trying to close and bring in significant amounts of aid and you don't know what the bottom is like anymore, what the depths, are, I would rather be able to send in some unmanned systems that can sense that bottom, can map the bottom, can provide the information that tells us where to go, where not to go. I think that can be huge.

I would say those are some of the areas that show great promise. And quite frankly, the technology is there today to be able to do that.

**Question:** Thank you, sir, for coming to speak to us. My name's Greg Piseki from Dragonfly Pictures. We develop autonomous rotorcraft. I'm interested in your thoughts on particularly shipboard aircraft, the trade between larger, more capable, more costly aircraft versus more plentiful, less costly, more autonomous aircraft.

**Admiral Roughead:** Thank you. I think that was one of the other areas where a couple of years ago we made another decision that is reflected in our programs that you see today. There was early on, I believe, in what I would call the explosion of unmanned air systems, that everyone wanted to get into the game of the most active system at the time. And as I was looking at our budget and I was looking at the capabilities that we had and I began to look at the future that we would encounter, for me it became important that we in the Navy focused on our strength which is coming from the sea.

So we were investing in airborne systems that required us to be ashore, that required us to have additional manpower structure to be ashore, that required us to be able to train those people in how you live ashore. We're pretty good at living at sea. We've been doing it for a while now and we're kind of comfortable there as well.

So we made the decision that the unmanned systems that we would pursue with the exception of BAMS would come from the sea. Because as I mentioned in the beginning of my remarks, that off-shore option is going to become increasingly important. It's going to become increasingly important for two reasons. The introduction of anti-access area of denial strategies and systems where there will be an effort to keep military forces out of a particular area; and naval forces that off-shore option allows you to move, to flex, to change to a different axis. But it's also going to be important politically, because I believe the future will be one where the sensitivities of sovereignty, a nation's desire to control its own land, to be able to focus on that which is there, that the idea of large footprints ashore, bases ashore, improved facilities ashore, may not always be guaranteed as we have become used to over these past years.

So the ability to have these mobile U.S. sovereign bases, whether you call them aircraft carriers or in the case of rotorcraft whether it's a small destroyer that allows that rotorcraft to use as its landing field just a small spot in the ocean, I think that's going to become increasingly important.

The question on the different sizes and the costs relative to those sizes will be one in my mind of tradeoffs in payload and in endurance, and that's how we'll look at that future. But the fact is that we have a lot of air fields in the Navy that have very small landing areas. That's where the rotor aircraft comes into play. Can we get more payload? Can we get more range? Can we get more speed? That's where I think we have to go. But the vertical landing and takeoff will continue to be important to us

because of the large number of landing fields that we field in the Navy that's sovereign U.S. territory, that we don't have to ask for overflight rights, that we don't have to ask for basing rights, that we don't have to ask for access. It's there, we can put it where we want it.

**Question:** Admiral Roughead, I'm David Place. I support Admiral Beeman out at 3<sup>rd</sup> Fleet. I've been an operator in UASes since the early days of VC-6 and the Pioneers. And first of all a compliment, sir. Over the last 20 years you have by far been the most impressive and motivational CNO when it comes to the employment of unmanned systems and I applaud your initiative, sir.

**Admiral Roughead:** Thank you very much.

**Question:** Now I'll ask a question or two, if I could.

First of all, from your perspective how would you like to see the acquisition process improved to expedite the development and fielding of unmanned systems? And on the fielding side, could you share with us your thoughts on how, you mentioned BAMS, the Fire Scouts. We do Scan Eagle detachments on board ships, but what are your thoughts about how we can expedite more forward deployed forces?

**Admiral Roughead:** Thank you.

First off I would say that we really need to take a look at -- this is now in the acquisition systems -- I think we need to take a look at how we can better engage with, collaborate with industry early on. I think we fence ourselves away. My experience has also been that even though our friends in industry say we'd like to collaborate more, when I say I'm going to bring Company X and Company Y into the room along with Company Z, then even industry kind of gets a little sensitive because of proprietary information and the like and I can understand that. But I think the fiscal environment that we're going to be in, we've got to figure out a way to be able to do that and we have to take a look at the constraints, both official and cultural, that inhibit that from happening.

I would also say that we should look at ways to work our way through the operational test and evaluation process faster, with less cost. I don't for a moment get cavalier about safety issues for our people or effectiveness, but I really do think that we have bureaucratized that process fairly well. And we have to think on how we move things more quickly.

I'll cite the example of what we wanted to do with the next role of the unmanned carrier aircraft, where we put a challenge out to our Navy and to the department writ large and indeed to industry, where we said we would deploy a squadron, squadron yet to be defined as far as number goes, on an aircraft carrier, to operate by 2018. There was a time in our country when we elected to put a man on the moon in ten years and it

became a passion, it became a matter of national pride. In the case of putting a squadron of unmanned aircraft on a carrier in eight years, it was deemed too fast. I think that we've got to get ourselves out of that mindset of too fast to conform to a process as opposed to saying we can do this, and then we mobilize the resources that we have and the intellectual power that we have and the industrial agility that we have to do it. But instead, we have retreated to a bureaucratic process that in my mind is an inhibitive.

I'll stop there because I can feel myself getting a little pumped up here.  
[Laughter].

**Question:** Good morning, sir, Matthew Fletcher, University of Washington, Political Science.

I was wondering --

**Admiral Roughead:** You're right at home here, aren't you? With all these techies.

**Question:** Not really, sir. [Laughter]. It's been very interesting.

I was wondering in addition to the technical, strategic and doctrinal changes the Navy is spearheading, what sorts of efforts has the Navy engaged in to provide new guidelines for providing legal and ethical framework for integrating unmanned systems into the new battle space?

**Admiral Roughead:** One of the things that we've done and I don't want to inflate this bigger than it is. But when we created our way ahead in what we're calling information dominance, the restructuring of our staff in the Navy to the Director of Information Dominance; the reactivation of the 10<sup>th</sup> Fleet for Global Cyber Operations; and the organization of all of our people in the Navy who deal in the world of information into an information dominance core, those are the three things that tended to be the main points of this strategy, of our way ahead. But there's an obscure thing that we did that many people are not aware of. That is that within the Office of the Judge Advocate General we created another element in there that deals with the law and from that law how we deal with rules of engagement which really get to the ethics, the escalation, de-escalation mechanisms in conflict to be able to begin to think our way through that.

Because I think whether you're talking in unmanned systems or in terms of cyber activity, we're putting a lot of effort, a lot of talk, a lot of money into the technical side and we're not looking enough at the policy side which gets to your question.

So by creating and then educating people in this new area of warfare and the rules of warfare, was how we came at that.

I think that the more complex of the two clearly is the cyber dimension, simply because of the body of laws that we deal with and how do you work your way through that. I think in many cases that we're making a bit more out of the ethics of unmanned than I see and I look forward to having more time to explore that on my own, but I think that we're making a little bit more of that than it probably should be at this point.

**Question:** Sir, Colonel [inaudible] from [inaudible] Sweden. Thank you for taking the time to come here and talk to us.

I have a question regarding the Arctic. Sweden right now is the chair of the Arctic Council. Can you maybe elaborate a little bit on what the Navy, what challenges you see in the Arctic and the opportunities for unmanned systems. The Arctic is getting a lot of attention, especially for energy right now, and of course it's always been a strategic area.

**Admiral Roughead:** Thank you very much. I would also say that the Arctic is getting a lot of attention in the Navy. About three years ago we established a task force on climate change, not just to address the Arctic but the changes that will take place around the planet and how does it affect the maritime domain, where will it induce potential sources of conflict, where will it provide potential areas of cooperation?

But the Arctic is one that we have had significant focus on these past couple of years, and I think initially, as I see it, the first press-up in that region will be for fishing as the fish follow the colder water and go up there, and this will then lead to questions of how do you monitor and how do nations enforce their rights in the regimes and the Arctic areas?

There will also likely be increased search and rescue activity, so to the question that was posed earlier can you use unmanned systems to enhance your ability to sense and respond to search and rescue?

As you get into the next step which I think is going to be the exploration and mineral extraction and oil and gas extraction, how do you make sure that you're able to monitor the environmental issues? I think unmanned systems can provide great information so that we can better understand what we're doing to the environment as many of these activities are taking place.

Then our estimate is that in about 25 years you'll have a viable and a profitable transportation route across the top of the planet. I call it the opening of the fifth ocean. There, what sort of communication schemes do you need? What sort of sensing schemes do you need? And I believe that even as we look at an opened Arctic the conditions up there are still going to be harsh, challenging, and it's still going to be quite cold, which will challenge the human dimension to be able to operate up there for any great length of time. Again, I think this is an area where unmanned systems can play.

Not necessarily as a system of military capability, but one of sensing and information and communication that in that harsh environment it will be the optimum way to approach the problem. But clearly, a very focused area for us and I appreciate the leadership and the intellectual effort that is taking place on behalf of your country in what is truly going to be an extraordinary moment in the history of mankind as that ocean opens. It's the first ocean to open since the end of the Ice Age which I consider to be a pretty big deal.

Thank you very much. Thanks for the work that you do. I look forward to following the great work of this organization and all who are involved in unmanned systems.

Thank you.

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