

Joint Air and Space Power Conference 2006

General Hobbins' Remarks

Distinguished guests, Ladies and Gentlemen,

It is always good to hear what NATO senior leadership is thinking with regards to the future of the alliance. To the JAPCC, I want to say "great job" so far with the conference and congrats on your achievement of full operational capability as a NATO centre of excellence on the first of this month. Keep up the good work. To the attendees of our conference, I say welcome. Welcome to Kleve, may you have a memorable stay while you are here.

Welcome to the conference on unmanned aerospace capabilities. A conference that will challenge you to think in new ways when it comes to aerospace power.

And welcome to NATO's premier air event on unmanned systems. At no other event in NATO will you see these airmen, these leaders of air power, and hear them discuss the important issues of unmanned systems like you will hear and see over the next day and a half.

At first, I have three goals. The first is to set the stage. I will talk about history because it teaches us lessons and prevents us from making repetitive mistakes. I will also talk about the situations of today, as they show us what we are doing and where we need to improve. And finally, I will talk about the future, specifically about the flight plan for unmanned systems in NATO and how it will help us determine the important steps we need to take to get to our desired end state. I intend to challenge you and get you thinking in ways that you may not have thought before. As I make my remarks today, I would like you to keep in mind a few overarching ideas.

First, unmanned aircraft are only one part in several different complex systems. For example, unmanned aircraft are large contributors to the overall intelligence, surveillance and reconnaissance architecture. So I ask you to keep in mind that what we are talking about at this conference makes sense in the context of the larger, more complex systems and architectures.

A second overarching idea is that NATO has the ability to set standards. We set standards for training, for image sharing, and for data streams. If NATO sets solid standards for UAS, if we do this right, then not only will NATO nations follow the standards, but we can expect non-NATO nations to do the same. Setting standards: this is a powerful tool.

The third overarching idea is that NATO is an organization run by consensus. Success, therefore, is best achieved when we all agree on a way forward. Achieving consensus is a goal of this conference.

When I was flying over here I began to think about if we will ever move to completely unmanned commercial passenger aircraft. I asked myself, could this happen one day? Would you be willing to fly here from your home, without a pilot in the cockpit of that very airplane? When that happens, we will have enough confidence to go completely unmanned—however, I don't think that is going to happen anytime soon, but what we are doing here at this conference is the first step. As many of you already know, the development of unmanned aircraft systems is strikingly similar to the development of manned aircraft systems.

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Like aviation in WWI, unmanned aircraft systems were developed to improve the view of the battlefield. Manned aircraft started with a reconnaissance role and then moved quickly to one of attack. This eventually led to the creation of specialized bombers and fighters.

UAV development is very similar - first for intelligence on the enemy and battlefield, then the ability to attack targets from the air. It began with laser designation, moved to ground attack, and finally air-to-air engagements.

During WW II, Airpower was segregated, stove-piped, and separated by nation, branch of service, and mission. Pursuit aircraft wouldn't fly with bombers. Italian aircraft wouldn't fly on missions with German ones. Navy aircraft would not fly in formations with Army aircraft. Organizations were built around types of aircraft – fighter command, bomber command, tactical air command.

They deconflicted by staying out of each others way. It made sense at the time, but when the organizations had to work together, it was very difficult. The solution became synchronization in time and space. Deconfliction and synchronization continued during the Korean and Vietnam Wars and it wasn't until Desert Storm that we first had true integrated airspace. Air forces around the world shared combat airspace in an integrated and interoperable manner. On the commercial side, in both the US and Europe, commercial airspace became integrated because it had to. Standards were established allowing everyone to share airspace around the world. In today's environment we cannot afford deconflicted airspace, we have too many aircraft that fly at different altitudes, operated by different services and nations. We must become integrated. (Quote Buchanon). Before we look at the issues and challenges of today, let me first take a more detailed look at unmanned aircraft.

In the United States, the first known use of remotely piloted vehicles occurred in the late 1930s when a business called the radioplane company developed a series of radio controlled model aircraft that were then used as targets for anti-aircraft artillery training. The first aircraft was the RP-1 in 1935. The OQ-2A was ordered in great quantities in 1941 by the US Army. In 1952, the Northrop Company bought out the radioplane company and a new series of aerial targets was developed. The most well known was the Falconer aerial target that was used into the 1960s.

Early on, it was hoped that drones and remotely piloted vehicles could aid in combat operations. Small aircraft, such as the Bikini in the 1960s and Pointer in the 1980s were developed to aid small units to "look over the hill". Maritime forces developed the "dash", the drone-anti submarine helicopter, in the 1960s and 'Project Blackfly' in the 1970s to support submarine warfare and seaborne reconnaissance. Throughout the 20th century though, one theme was central to all of the unmanned aircraft, they were mainly for reconnaissance, surveillance and target acquisition missions. There were very few developments in unmanned combat aircraft systems. But things were about to change, as some significant transformations were taking place at the end of the century.

The global picture on unmanned systems changed dramatically. To begin, the cost of electronics continued to decrease. Diodes, transistors and mother boards could be bought for less and less. Second was the dramatic increase in computing capability. As predicted by Moore's law, computing capability on micro chips was doubling about every 18 to 24 months. Moore's law is still holding true today. The author of Moore's law, semiconductor engineer George Moore, predicts that this doubling can continue until around the year 2017.

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Next is miniaturization, including the development of micro mechanical machines. Composites have been great contributors to weight reduction and the reduction of radar cross section. Now, the best part has been that all of this small, affordable computing capability is being combined with greatly improved communications and sensor capabilities. New doors have opened up for unmanned aircraft systems. Along the thinking of Alvin Toffler, we have taken the step from the industrial second wave into the information third wave. The information age had now found its way to military unmanned aircraft systems. It was perfect timing too. The military was looking for ways to conduct persistent, long-loiter, low-observable C3ISR operations. We needed situational awareness at the tactical, operational, and strategic levels of war. We needed a powerful force multiplier for the soldier who was fighting the “3 block war” as well as the air platforms that were gathering the critical information for every warfighter. The unmanned aircraft provided the means to exploit the new, non-linear battlespace.

The results of the changes can first be shown in the proliferation of UAS funding and numbers of models. According to the US Department of Defense UAS roadmap that was published in August of 2005, there are 32 nations developing or manufacturing more than 250 models of UAVs. Some 41 countries are operating over 80 types of UAVs. The United States alone has over 18 types and is operating three thousand unmanned aircraft.

As you can see by this chart, the spending on such systems was somewhat flat from 1992 to 2001, approximately 3 million dollars per year.

Since 2001, the growth has been tremendous. Overall, unmanned aircraft spending is expected to grow ten-fold in the 10 years from 2001 to 2011.

What other type of system can you think of in the military that has its funding increase by one thousand percent in 10 years? Growth is not limited to the United States. The growth of unmanned aircraft systems is occurring around the world. The chart reflects world-wide spending and includes both military and civil aircraft. From the year 2000 to 2010, unmanned aircraft are expected to grow from 4% of total funding for all aircraft, to 31%. The abundance of money has also led to growth in manufacturing. In just 4 years, there has been a 33% increase in the number of manufacturers.

Why is there so much growth? Why are nations spending millions or billions of euros on unmanned aircraft? One of the main reasons is that people are discovering the many different missions that unmanned systems can accomplish. Similar to how manufacturing has become more and more robotic, aircraft missions can be automated also. As I mentioned before, early in the development of unmanned aircraft, the emphasis was on reconnaissance, surveillance and target acquisition missions. In the most recent version of the United States road map for Unmanned Aircraft Systems, the list of missions has expanded to include 27 different missions. JAPCC research has found at least 10 additional missions to date.

I would like to ask you to take a look at this list. It is truly amazing the ways that unmanned systems are being employed. What other missions are there that we haven't thought of yet? In the words of Donald Rumsfeld “there are the knowns..., the known unknowns... and the unknown unknowns.” Certainly in the future of Unmanned Aircraft Systems, there are more missions out there; we just haven't figured them out yet. At present, 17 NATO nations are known to have operational UAVs, with more nations in the process of obtaining such capabilities. Since the JAPCC only used open source documents to compile these numbers, we believe there are even more systems and aircraft than summarized here.

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There are more than 60 additional models in development and there are also the non-NATO UAVs that may join NATO nations in coalition operations. In other words, there are a lot of unmanned aircraft flying around. It is a hobby of many. So, with all of these aircraft flying around, what are the major issues and problems that NATO has to deal with?

Grouped into four main subjects, the issues are air space management, command and control, integration and interoperability, and force development. Let me begin with an accident that occurred in August '04, over Kabul. A German UAS was collecting ISR while an Afghan Airbus 300 with 100+ passengers made a landing approach. The ATC failed to follow SOPs and these aircraft nearly occupied the same airspace. Fortunately, a mid-air collision was avoided by the quick reactions of the Afghan pilot and a bit of luck. The aircraft missed each other by a mere 15 meters. Unfortunately, the air turbulence caused an unstable flight attitude and the UAV crashed. On the topic of crowded airspace, NATO faces numerous problems. Three significant problems are crowded combat airspace, national airspace rules, and segregated airspace.

Most of the hundreds of unmanned aircraft systems are operating in the same airspace..., below 15,000'. The block of airspace from the surface to 3,000' is crowded with tactical UAVs and helicopters. In southwest Asia there have been three collisions between UAVs and helicopters. Operating UAVs in combat zones in the central Asia is one thing but there are significant hurdles to operating UAVs in the airspace of the multiple nations of the NATO alliance.

Included in the hurdles are 1) see and avoid requirements, 2) air worthiness requirements, 3) communications requirements, 4) already crowded airspace, 5) different national requirements within NATO, and 6) the psychological concerns or the acceptance of having unmanned systems flying over their homes and cities. History shows that there is a tendency to want to segregate airspace and even the development of aircraft. But, in a world where conflict is non-linear, when there are 'hot pockets' of non-friendly forces mixed with friendly forces and non-combatants... our old linear conventions must change.

Although segregated airspace may be more convenient at the tactical level, it causes seams and inefficiencies in the support to these same forces at the operational level. The goal should be to continue the transformational trend: To integrate airspace and avoid measures to segregate, coordinate, or synchronize. It is widely known that military forces naturally lead efforts in disaster or crisis situations. Most of the time, the reason the military becomes the leader is because it has the ability to conduct effective C2. It is extremely important that unmanned aircraft systems be connected to the military C2 network. Commanders need to be able to assimilate, task, prioritize, analyze, fuse and interpret UAV products, in real time. This means that they must be connected to our combined air operations centers.

Unfortunately, this is not the case right now. In large part, the problems are created by the structure established for C2 of unmanned aircraft systems. For air and space power, we need to get primary command and control, and even development under a single institution / road map. The goal must be to integrate manned and unmanned aerial systems, land, maritime, air, and space, and across the NATO alliance, to achieve the desired effects. Great effort must go towards meeting the needs at the tactical level that drive the proliferation of unmanned systems today. Otherwise, we face dividing and

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segregating the command and control of unmanned aircraft systems like we did in the past to manned aircraft.

Segregation can provide for more direct control of assets in some situations, yet the inefficiencies this creates by not orchestrating tasking and information sharing is unacceptable and will hinder effective use of alliance assets... making the guy in the street's mission more difficult. Integration must go beyond airspace. It must go to the core of operations. Currently, the proliferation of unmanned aircraft systems is focused on local reconnaissance to aid the soldier in the field. While this benefits the individual soldier, more can be done.

The information from these individual systems could and, I contend, should populate the global information grid, to the maximum extent possible. Systems of systems can provide the appropriate information at the right time to those who need it. This would correspond to improve situational awareness at all levels of warfare. Large amounts of data are already moving around the battlespace. Only through integration and interoperability efforts, such as NATO's ISR interoperability architecture, can we hope to share the right data. Many of the NATO standardization agreements are currently attempting to achieve the much needed interoperability. Nations are agreeing to basic protocols but it is more difficult to get them to build to such standards. The goal is for all assets to be connected. The final question here is what information should these systems provide to and take from the shared resources? This needs to be addressed now so industry can tackle the technical challenges.

As we operate the unmanned systems in the military environment, who is developing the tactics, techniques and procedures that are so valuable to operations? Who is writing the concepts of operations and the doctrine? These procedures and concepts are desperately needed to effectively employ the hardware.

Fleet development is another area of concern for the research of the JAPCC. We need to ask such questions as 'what are our nations doing to develop our unmanned aircraft over the long term?' When it comes to procurement and transformation plans we should ask, 'who is ensuring that the world's air traffic control systems corresponds to the air platforms' and 'are they all going to match with the corresponding ground control systems?' If the hardware can't talk, then the people can't talk. Development of the right hardware is therefore critical.

A critical aspect of unmanned aircraft systems is that of trained personnel with relevant expertise and skills to effectively employ unmanned aircraft. Therefore, as we look to the future, we should address the force development of our people. We need to grow UAS architects, operators and maintainers.

This requirement drives militaries to ask the question, what kind of people should we recruit for UAS operations?

Should we follow the traditional methods of recruiting, or should we go to x-box game conventions and look for the kid with the green hair? Getting the right people and keeping them will be the key to the growth of future unmanned aircraft operations. Let me begin by saying that NATO has many organizations working various issues related to unmanned aircraft systems, and this is a good thing. Nevertheless, not many people are aware of all that is happening.

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The organization with the largest responsibility and the most accomplishments is the Joint Capabilities Group for UAVs formed in 2005 from three separate UAV groups that were air, land and sea focused. Many good products have come from this group or its predecessor organizations. The Flight in Non-Segregated Air Space Working Group is working on ways for military aircraft to fly in civil air space. The Joint UAV panel is working doctrine and related issues. Since 2002, STANAG 4586 has established the detailed requirements for unmanned aircraft related interfaces: data link, C2, and human control interfaces. An additional STANAG is nearly complete regarding interoperable command and control data links for NATO UAV interoperability. There are at least ten other STANAGs related to unmanned aircraft systems, including a STANAG on UAV operator medical standards and a STANAG for UAV operator training. Requirements are also outlined by NATO in various documents. In addition to the requirements list here, NATO has also issued "NATO staff requirements" documents for both high altitude and medium altitude, long endurance aircraft. Additionally, research has been conducted by NATO's research and technology agency and the NATO consultation, command and control agency. As you can see, NATO is doing a lot to work the various issues.

The future for NATO looks interesting. The Alliance Ground Surveillance (AGS) system is under development and represents the first-ever integrated manned-unmanned aircraft system. Its synthetic aperture radar will be able to detect moving ground targets. The AGS is expected to have an initial orbit capability in 2012, with an IOC in 2013 and FOC about 3 years later. AGS industries are a transatlantic consortium led by Northrop Grumman and Airbus. As you can see, NATO is heading straight into the unmanned realm and is leading the way with this first-ever type of system. As NATO transforms itself so that it can meet the needs of tomorrow. What NATO needs is to handle unmanned aircraft just as if they were manned. We need for unmanned aircraft to act like manned aircraft. We need unmanned aircraft to be tasked like manned aircraft. We need unmanned aircraft to fly in strike packages with manned aircraft. We should be capable of flying both manned and unmanned platforms together, to include multiple unmanned airframes controlled by one operator. And we need commanders to have the confidence that unmanned or manned, it doesn't make a difference as they are equally effective. For this vision to occur, the current efforts of NATO, although impressive, do not get us there.

So, work began earlier this year to develop a UAS flight plan for NATO, an attempt to pick up all the puzzle pieces, see if they fit together and to determine which pieces were missing. More specifically, the objective of the JAPCC flight plan for UAS in NATO is to review UAS in NATO, find out where NATO has gaps in its capabilities or issues that need to be addressed, and suggest the organizations best suited to solve these problems.

The goal is to put all these puzzle pieces together into one coherent picture. This flight plan also seeks to find the missing puzzle pieces and in some cases, it makes possible recommendations as to how to rectify the identified shortfalls. The flight plan doesn't get us to our long-term vision, but it gets us moving in that direction with a shared and common understanding. This is the objective of the flight plan.

In modern, network centric, deployed operations, unmanned aircraft systems are essential members of an increasingly complex team. The demand for spherical situational awareness is increasing, and thus so is the demand for ISR. In combat, the demand for Type II Close Air Support is increasing. This is when a forward air controller does not have actual eyes on target himself, but he uses someone or something else to guide the combat aircraft onto the target. Adding ROVER to today's fighter / JTAC combination lends value to the UAS. In just about every area imaginable, unmanned aircraft systems are

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contributing. Land and air operations are leading the way with the most systems and experience. While maritime systems are close behind in their efforts to conduct sea missions such as persistence surveillance and anti-submarine missions.

To fill the demands of the military, the systems come in a wide variety of shapes and sizes, from micro UAVs like the wasp weighing less than half a pound, to the high altitude airship with a volume of 5.2 million cubic feet. These capabilities have created an insatiable appetite for Full Motion Video. Our commanders want to have that “unblinking persistent eye” so they can have continual situational awareness. However, just because we have the capability does not make the system effective; knowing how to employ it does. We must consider if its use will hinder or enable operations and how it will affect the transfer of data across the network. If we use our systems smartly, and work towards fusing them we can, to some degree, automate our exploitation, analysis, and dissemination processes. It will also allow us to historically compare collection and allow for predictive analysis – taking advantage of that 4th dimension...time. This will give our commanders more time and more options to make effective decisions.

Let me end with the observation that I’ve just covered a lot of material. The world of unmanned aircraft systems has become complex and intricate. More and more nations are acquiring systems and operating them in ways they never imagined. From our world-wide contacts, it is clear that non-NATO nations are looking for answers to the same problems that NATO has. Many nations seem to think that if NATO can come up with an answer, it should be good and they would like to do the same thing. NATO is more than a collection of nations that share the desire of common defense. NATO is a recognized world leader in military standards. From airfields to fuels, from our phonetic alphabet to link-16, we are the largest and most interoperable of any group of nations in the world.

Let’s take that expertise, talk about the issues facing unmanned aircraft systems, ask the tough questions, and make the flight plan a document worth reading, worth supporting. Let’s solidify NATO as a leader in UAS standards.

I thank you for your time this morning and now I am interested in taking your questions.