Helping defence weather the storm 100925.wav

Dave Whelan: [00:00:00] My name is Dave Whelan. I am a caption manager with BAE Systems in Space and Mission Space and Mission Systems sector back in the US. Luckily, I'm doing a pretty good job of capture. I'm still here giving a speech here at the at the show today. I'm going to talk to you a little bit about how we're made up at BAE Systems, at the Space and Mission Systems sector, and then we're going to talk a little bit about military weather what's near to our Department of Defense. There's a lot of stuff being a part of military space, which is my group that we can't talk about because it's classified. But we do have a few programs, one of which being the military's interest in weather. So, I want to talk briefly about how we're broken up at the Space and Mission Systems, we have five main groups sort of broken into three, starting with tactical solutions. Tactical solutions are essentially our antenna group. They do RF front end apertures, mostly antennas that are if it's an antenna that you can tell it's an antenna, they do not make it.

Dave Whelan: [00:01:22] Our ground systems group does a lot of data analytics as well as provide ground solutions for space-based systems. They recently won a contract for the US government, where they're trying to put together all the missile warning ground solutions together under one big umbrella. So, there's a common operational picture so they're focused on that. In the space hardware we have civil space, a colleague of mine spoke yesterday about what they do. They reach anywhere from looking into deep space at stars to looking at the Earth and Earth observations. They do things like climate change and monitoring the air quality and all sorts of different neat science and physical atmospheric effects on the Earth as well as out in space. We have all the instruments on the Hubble Space Telescope come out of this group and then the James Webb, we also built the mirrors for that as well. National space can't talk a lot about what they do. Their customers mostly within the US government. And then the military space we are focused strictly on the Department of Défense, where we have restricted programs and then we have a couple of open programs. Cover a wide range of products amongst those five groups, anywhere from ground-based receivers and radars to seekers on warheads to antennas on aircraft all the way up to in the space world. We do spacecraft, we do payloads and again, the payloads can be looking to the stars. They could be looking to the Earth. They could be doing a civil mission. They could be doing a military mission or an intelligence mission. We also do Datalinks and a wide

range; bottom line is there's a lot of technologies that we cover at BAE Systems. Covering focusing now on weather, I'm going to talk more about how the Department of Defense and why they care about weather. But we do have a wide range of systems that we've been doing since the 70s, starting with back a while ago, we did a mission for the Navy. This was altimetry, important in understanding undersea warfare as well as surface warfare going all the way around across a fun trivia note. The Worldview satellites, we built the actual spacecraft, not the payload, but your Google Maps that you get online. That comes from the worldview spacecraft moving all the way around. We have instruments on a number of civil aircraft doing various measurements of imagery, measurements, ozone measurements, you name it, we can do it. And then moving across to GMI. The reason I point this out, this system was a predecessor to this system, and this is the one I'm going to talk a little bit about today and again, why the military is so interested in the DoD weather. Why is the military interested in weather? The military relies on a number of relationships with our civil partners at the National Oceanographic Administration, but they also have their own satellites. They have satellites for about 60 or 70 years and the Defense Meteorological Satellite program and the reason they care is because the weather affects all aspects of military operations. So, they cover all aspects despite being an all-weather force and weapon systems can penetrate, you know, whatever the conditions may be. You still have to have good weather predictions in order to not only protect the resources and the personnel, but also the enhance the performance of the weapon systems themselves. A lot of military weather it's not so much is it going to rain tomorrow or how cloudy it will be, it's really about extracting the data out of the atmosphere or under the sea either way, and developing that information, putting it into decision aids but then increase weapon performance or radar performance. So obviously it covers a wide range, why they're interested. All sorts of aspects of military operations, including space monitoring. As yesterday, you may have heard about how solar flares affect communications on the ground as well as satellites in the sky. Then obviously we have undersea capabilities with anti-submarine warfare, land warfare, Arctic, it all speaks for itself. I was lucky enough to be the weather, the senior weather guesser, when we went into Afghanistan and Iraq back in the early 2000. I was really a flier in the Navy, how I got that job is beyond me, but it worked out. So, narrowing the focus down onto why DoD is interested in the weather and how they go about acquiring their weather satellites. About 12 years ago, they came up with a list. They basically knew that their program for 60 years was coming to an end, and they had to do something about it. Again, they have relationships

with other agencies, even allied countries, to share weather data, but they needed to do more. So, 12 years ago, our joint staff put together a list, they racked and stacked 12 of the gaps that they wanted to fill and they came up with, we have sort of a pinwheel effect of it, but focused mostly on measuring the atmosphere, understanding ocean winds, tropical cyclone movement, and then imagery of the clouds, which is a big one for ISR impacts and stuff. So, we this is how we got started with the platform I'm about to introduce you to. But this came this is a follow on to what we got weather system microwave follow on. Essentially what we did after they came up with their stack, we bid a mission. The weather system follows on from microwave imagery. It fills six of those 12 gaps. It covers ocean surface vector winds, which again, I can attest to. So, this instrument is out there to help monitor the ocean winds, wind speed, direction, and figure out so that it helps us redirect the ships which direction they avoid. Typhoons, avoid the heavy weather, heavy seas. Also, the sea state will also dictate impacts to undersea warfare operations as well. We also with this instrument are measuring sea ice, soil moisture, we're measuring snow depth. All those things apply with the sea ice characterization that applies to submarine operations up in the Arctic. The soil moisture and the snow depth apply to land forces and trafficability. How can they manoeuvre through the ground with their armoured vehicles? We also have a sensor I'll talk about. So, this one we built, and by the way we built the entire spacecraft, the payload, everything. We had the entire mission Prime, we do everything about the mission, and we send the data down to a Navy ground site. But we did all the software and the algorithms for it. But this sensor here, this was an interesting one. The government gave it to us to put on board. It's called an energized charged particle sensor. And essentially what it's doing is it's measuring the charged particles around the spacecraft. And that is to determine not only understanding the space weather environment around the spacecraft, but also if something goes wrong with the spacecraft, is it a hardware failure or is it a weather failure, or is it something else? And this is something the military had looked at putting on a number of spacecrafts. They have sort of fallen short of that, but we're still putting it on ours as part of their mandate. This is the main reflector. It's a 1.8m. It's a onetime deployment and then this mission is at 800km so it's in Leo Sun, and it'll just continue to fly for the next five years. As far as the space and mission systems sector, what we're responsible for, again, was we built the spacecraft, we're in order to build two. The first one launched about a year and a half ago in March of 24 and we are building the second one as we speak now and that will be launching in the

not too distant future. And this again, this is just a passive radiometer. That's really about it in a nutshell. Unless there's any questions.