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Paul Thies: When it comes to aviation-based supply drops, it's not a simple matter of pushing things out of airplanes and hoping they land where you want them. It's a highly advanced and precise science that demands a number of technical and theoretical proficiencies. Hello, I'm your host, Paul Thies, and on this episode of *If Win*, we discuss the art and science behind aviation airdrops with chief engineer Jeff McCoy, and product manager Jeff Cusato, both of the Jacobs Software Engineering Center.

Jeff and Jeff walk us through the Jacobs airdrop solution, which allows us and Allied Air Forces to execute high-

schools or whatnot, you certainly don't want to be dropping a tank on top of a school or something crazy like that.

Jeff Cusato: Exactly. We try to build this software to give them a couple of scenarios so they poke and prod depending upon what's important to them, because like you just said, what could happen? What's the chances of the wind pattern shifting until something is no longer- an unideal situation shows up? Should I change my altitude, drop lower? Can I go higher and stay away from things on the ground?

Can I attack from a different run in a different heading, write a different way into this area? If I have to not drop because something happened, we were just too far shifted, our course was off by a little bit, what's the best way to re-attack? Do I turn left? What are my options in front of me? If we're trying to- given that there's terrain, there's weather, there's ground positions of enemies and friendly. Again, how do we give them tangible data so they can make smart decisions when they are disconnected and decentralized from the larger Air Force?

Paul: Now, Jeff McCoy, how is this solution, this airdrop solution, how is it different from anything that might be offered out up there by the competition?

Jeff McCoy: Well, to date the solution that we have that Jeff just described is customized over many years with the DOD principally the Air Force and the Army. We've worked over the years very closely with the government and the end users, very tight relationships. We have end users that come into our office and they're in their flight suits and they're talking to our developers, and it really customized and tailoring to the mission that the Air Force has with the Army drop getting the stuff out of the people and cargo out onto the ground.

We've really been the go-to people for that in that environment. There are other tools and use in other arenas, but ours is specialized and fairly sophisticated as Jeff pointed out to this particular mission. In our development, I guess our direct competitors are other enterprise contractors in our mission planning arena. There's several, four, or five other developers that work in our environment in terms of developing mission planning tools and they support some of the same aircraft we support, C-17 and C-130Js have airdrop missions. We are doing things for the C-17 and C-130Js and other contractors are as well.

Airdrop data does get loaded to those aircraft and sometimes it's data from our tool that they integrate in other systems. At any time, other people can pick this up and provide solutions, but it really takes a lot of domain knowledge and understanding. It's not something you're going to pick up overnight. It takes a while to develop this stuff and have an understanding of all the parameters that we've been discussing. I'd say one benefit that we have over the competition is that it's not just the software that we've built, but it's maintaining it in the field and supporting the users in their missions. If there's an off-drop issue or, "Hey, we're not hitting our target for some reason, what's going on? Is it the weather? Is it drop zone? Is it software? Is it the aircraft?" All these things?

They'll come back to us and we'll investigate, we'll run data analysis. We'll study the situation. Our team members have gone out there and watched drops. Again, working with the end users, "Hey, this one time this happened to me, why did that

happen?" We have that continuing relationship. It's not just us selling a product or anything here, it's an ongoing relationship, and providing domain expertise is one of our discriminators working with our users.

We continue to be the go-to people there. In fact, other tools out there, we've been approached to, "Hey, can we integrate this into our solutions?" We understand our users' challenges and constraints and we've had a longstanding relationship, but that's not to say that there's no competition. I think our future outlook is that we'll have to really watch things as payload and delivery systems change and modernize over time.

This is an area of a lot of technology improvement, things are getting more precise. You've got Pizza Hut able to deliver things on drones or Amazon or whatever it might be. Now our competition might turn out to be OEM manufacturers who own the hardware and the delivery system and the software and all the other parameters. This is an evolving field. It's modernizing over time and we have to keep our spear sharp here.

Paul: No, that's very interesting. Now Jeff Cusato, you and Jeff McCoy both mentioned sov3(s86G] TJ164.18595.2 841.8 reW*nBTgv3(s86-38Je4(o-3(o)5r70 0 F869 0 595W*#

this is something I like to talk about a lot, about the Air Force National Guard does is my favorite thing. It's called Operation Christmas Drop. There's even a Netflix movie. I don't know if it's well done or poorly done. I haven't watched it.

It happens every year around Christmas to some of the remote islands in Micronesia. The Air Force has been doing it since like 1952 and they do it with a lot of their ally partners as well. It's a pretty cool thing to read about. They're going out there and dropping these big cases of utilities and supplies to these remote islands. That's always a great thing to note that the software's being used for something like that.

Paul: Jeff McCoy, can you tell us a little bit about the team that's involved in the conception design, and construction of airdrop? I imagine there's a variety of disciplines that go into the manufacturer or something like this. Can you tell us a little bit about the types of professionals that have to be involved to pull something like this off?

Jeff McCoy: Definitely multiple disciplines involved in this. Our current airdrop team is around 23 people fairly small, tight-knit group. It's about 15 software developers and software testers operating as development teams. It also includes a support staff that includes subject matter experts. Some are crew members who have been doing drops on those same aircraft that we support and that's how we get some of the smarts and understanding of how some of this works.

Security engineering, of course, systems engineers who are also domain expertise provide domain expertise, DevOps, technical writing for the end users, here's some help information for using the software, those kinds of things. All those different disciplines come together and basically, we're end

which of the new technologies will reach their way to the field, but our job is application developers will be to create those tools for the aircrews to use to make those decisions when perhaps they're isolated and without communication. Every week it's about trying to anticipate what they need and provide that type of insight so again, they can make better decisions.

Paul:

We are actively engaged with our user right now and our customer to move forward in the new arena that seems like it's coming here. The other thing we're doing in other areas is we also, JSEC is involved in not just airdrop, but we support a lot of aircraft platforms for air mobility command in the Air Force, as well as other platforms across the DOD, helicopters, cargo jets, air fuelers, tankers. A lot of what we do is load aeronautical data onto those aircraft platforms. It's not just airdrop data, it's also mission data, routes of flight, which airdrop has to interface with. What's my route of flight approaching that drop zone? How do I exit the drop zone? Where do I refuel