Department of Defense Bloggers Roundtable With Alex O'Ree, Computer Scientist, CERDEC Command and Control Directorate, Systems Engineering and Architecture Branch; Christopher Shin, Computer Scientist, CERDEC Command and Control Directorate, Systems Engineering and Architecture Division; Ron Szymanski, Chief Architect for Software and Technology, CERDEC Command and Control Directorate Via Teleconference Subject: Communications-Electronics Research, Development and Engineering Center (CERDEC) Time: 10:02 a.m. EST Date: Tuesday, November 15, 2011

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PETTY OFFICER WILLIAM SELBY (Office of the Secretary of Defense for Public Affairs): OK, I'd like to welcome you all to the Department of Defense's Bloggers Roundtable for Tuesday, November 15th, 2011. My name is Petty Officer William Selby with the Office of the Secretary of Defense Public Affairs, and I will be moderating the call today. Today we will be discussing how the U.S. Army Research, Development and Engineering Command's Communication and Electronics Center, CERDEC -- well, they discuss how they have successfully executed multiple projects to enable efficient, rapid information sharing across disparate joint networks and mission command systems, in particular their success during a recent multiservice limited- technology experiment.

On the line we will have Alex O'Ree, computer scientist in the Systems Engineering and Architecture Branch; Christopher Shin, computer science -- scientist in the Systems Engineering and Software Architectures Branch; and Ron Szymanski, chief architect for software and technology in the Command and Control Directorate at CERDEC.

Before I go any further, Ron, Mr. Szymanski, did I say your name correctly?

RON SZYMANSKI: It's spot-on. Perfect.

PETTY OFFICER SELBY: Roger that. Thank you, sir.

And a note to the bloggers on the line: Please remember to clearly state your name and blog or organization in advance of your question, respect our guest's time, keeping your question succinct and to the point, and please place your phone on mute if you are not asking a question.

With that, to our speakers, if you have opening statements, the floor is yours.

MR. SZYMANSKI: Sure. So this is Ron. I'll start.

So, what you are going to hear today is a description and sort of lessons learned from a number of efforts that we've undertaken to explore interoperability issues, not only inside the Army, but across joint systems and networks. And really our -- we have three main goals that we were -- we were looking at and really any interoperability problem, and really it's increased the quality of information shared, increased the efficiency at which it's shared, and decreased the speed of that information flow.

And when you look at all these different domains or system-to-system architectures, they all have unique problems that require unique solutions. So what we've done is we've taken a sort of a case- by-case approach and applying technology based on the needs of the domain, which may vary when you're looking at a joint kind of level excursion, which Chris and Alex will talk about in a minute, as well -- and get down to sort of system level and lower echelon and even down to, you know, (accompanying ?)-soldier level. The overall goals are the same, but again, the approach and technology used varies depending on the needs of that echelon.

And overall, you know, C2D, the command and control directorate, which is the group that we all work for, the overall mission of that organization is targeted at knowledge management and information processing and information flow. So, you know, we're uniquely qualified to sort of look at these types of problems in different domains and see which technologies could be applied to meet those needs and, again, you're going to hear a couple examples of those today. And with that being said, I'll turn it over to Chris and Alex, and they can jump into the multi-service LTE excursion.

CHRISTOPHER SHIN: Hello, my name is Christopher Shin; I work for the U.S. Army CERDEC Command and Control Directorate here at Aberdeen Proving Ground.

I just wanted to give you a little history of our involvement with the fiscal year '11 Multi-Service Limited Technology Experiment. Our former C2D director was the Army senior representative to the Office Secretary of Defense for the command and control community of interest. That was established by Dr. Linios (ph), the director of defense research and engineering.

The Navy has conducted the limited technology experiment over the past few years. And for fiscal year '11, Army and Air Force were asked to participate in the joint experiment. The overarching theme is to utilize service-oriented architecture to overcome some of the technical gaps between the command and control systems.

So in the past, we have supported these Army CIO/G6, the Chief Information Office, for the past about six years on SOA initiatives, and developed an expertise in the area. And so within that time frame we developed a reference architecture and implemented two SOA stacks, the first being the AE SOAF, Army Enterprise Service-Oriented Architecture Foundation, which is primarily a stack based on commercial software products. We also developed a SOAF-A Lite, which is a Service-Oriented Architecture Foundation Army Lite version, which has similar capabilities of ASOF, but is based on open-source software. So our goal is to really utilize SOA technologies to enable rapid capability, development and deployment, and also to leverage SOA techniques to expedite information sharing between stovepipe systems.

On the same token, Navy has an equivalent set of SOA capabilities based on open-source products, similar to, I guess, AE SOA -- I'm sorry, SOAF-A Lite. And so some of the challenges that the MSLTE was looking to overcome are in the areas of interoperability, which includes the, you know, information sharing across the capital-S services between the Army, Air Force and Navy, and those systems using different message formats and protocols.

Also, for the quality aspect, what we're trying to do is reduce the human error by process automation, thus resulting in a more reliable result. For efficiency, services were developed based on standards that could be reused to form new capabilities. And I guess the bottom line is why reinvent the wheel. For speed -- so enables a rapid development and deployment of new capabilities into the hands of the war fighter quicker.

So that being said, Alex, my colleague, will cover some of the more intricate details of the Multi-Service Limited Technology Experiment.

Alex.

ALEX O'REE: Hello, and this is Alex O'Ree. And I also work with Chris Shin.

In FY '11 CERDEC C2D participated in a joint classified experiment with Navy SPAWAR -- that's the Space and Naval Warfare Systems Command -- and Air Force research laboratories. The name of the experiment was the Multi-Service Limited Technology Experiment, which focused on using service-oriented architecture technologies to help address a number of problems across all military branches -- interoperability.

The ability for the Army, Navy and Air Force systems to communicate and interoperate is a critical function of joint operations. In this aspect -- so enabling technologies is a critical component for bridging the gap between different stovepipes and enterprise levels.

C2 -- or CERDEC C2 -- excuse me -- was asked to participate not only because of our expertise in SOA -- that's service-oriented architecture -- and software development, but also for the expertise in

the integration of multiple systems, including COTS -- common off- the-shelf -- GOTS -- government off-the-shelf -- and open-source products.

I believe Chris just recently talked about SOAF-A Lite, which contains a large number of different open-source products, as well as some GOTS products. And the integration between all those helps provide a framework for providing and securing SOA-based capabilities.

The MSLTE specifically target integration across a wide range of products, and COTS, GOTS and open-source software, command and control capabilities, our existing command and control capabilities, protocols and different message formats. The experiment was successful, by looking at -- both inside the directory for in-house technologies and out, and helped to prove not only that SOA is a key enabling technology, but that C2, as C2D, has the expertise to implement, execute and solve the problem.

There are three high-level goals: increase interoperability between the services -- that's big "S" -- using different protocols; increase the speed, using automated mechanisms of mediation between different message formats; which in turn increase the efficiency and quality of data by helping to reduce human involvement and thus human error.

The experiment focused on a number of key problems, including examining the behavior of web services and different messaging protocols over a DIL network, which stands for "disconnected, intermittent and limited." It is an important issue because of the -- of unreliable communications that can span across all military branches, especially in tactical environments.

C2D participated in two operationally relevant threads, the first being airspace management. Currently fielded technologies for airspace management for the Army is from PM Aviation's product, TAIS, the Tactical Airspace Integration System, which enables operators to request airspaces for tactical operations. Once entered, TAIS sends an airspace control measure request to the Air Force's -- to the Air and Space Operations Center Weapons System, AOCWS, which then, after some amount of time, deconflicts and returns a resultant set of joint airspaces.

P&M Aviation, along with Air Force Research Labs, AFRL, brought to the LTE the latest engineering releases of both components, which significantly reduces this time by automating much of the process. C2D was able to even further enhance TAIS -- that's the Tactical Airspace Integration System -- by incorporating SOA technologies offered on SOAF-A Lite in conjunction with the Navy's Force Discovery Service to help enable something called "dynamic discovery."

Dynamic discovery is -- it essentially provides a federated phone book-like mechanism between the Army, Navy and Air Force systems that can help provide the location of components at runtime. This significantly reduces human error by eliminating the need for someone to quite literally pick up the phone and call someone and say, where's the service located, and manually type it in. One of the key points of this

is that this was done without modifying the TAIS product itself. Dynamic discovery is also very important because of the ever- changing network conditions and especially with geographic locations of deployed units.

C2D also has an in-house product called Open Enterprise Service Management or Open ESM. This was also used to provide near real-time status monitoring and metrics collections for web service resources -- I'm sorry, for web resources and web services, which quickly alerted operators when a problem occurred. Open ESM uses a collection of agents, which can be integrated into many different systems without changing or having access to the source code.

The second thread that C2D participated in was the sharing of situational awareness data, namely friendly, neutral and hostile position reports. The Navy, Air Force and Army all use different messaging protocols and message formats from -- which clearly highlights the need for a mediation mechanism between these different formats and to bridge different communication protocols. During this thread, C2D was able to integrate a wide range of existing products to help enable this, including the Navy's Force Discovery Federation framework, which facilitated and automated network handshakes and establishes messaging tunnels based on demand and network prioritization.

Also integrated were systems such as PEO STRI. That's the Program Executive Office for Simulation, Training and Instrumentations. Their product's called OneSAF, which is a real- world battlefield simulator. This in turn provided data for PM Mission Command's data dissemination service, a SOA-based message distribution system. Also used was a number of other in-house C2D products such as GECCO, the Geospatial Environment for Command and Control Operations.

This product is a situational awareness and visualization tool which displays current unit positions on a Google-based map, and of course the previously-mentioned Open ESM. Finally, SMART, the Semantic Mediation for Army Reasoning and Teamwork, was used to provide a mechanism to translate Army battle-command systems data format from DDS to and from Navy and Air Force-readable formats.

And with that, I'm going to pass the torch on to Ron.

MR. SZYMANSKI: Thanks, Alex.

So again, Ron Szymanski. Alex and Chris did a great job of talking at the joined system-to-system service level, interoperability issues and solutions in that domain. And I'm going to take some time to discuss SMART, as Alex alluded to, and some other capabilities we're looking at to target system-level and down to soldier-level interoperability issues.

So SMART -- again, Semantic Mediation for Army Reasoning and Teamwork -- is a solution that we've developed over the past couple years to look at how to -- information can be better shared between both commercial off-the-shelf -- COTS -- and government off-the-shelf -- GOTS -- solutions. And what we found is there's a number of mixed

technologies out there in different domains, and not all of them are sharing information as efficiently, as quickly as could be done.

And Chris mentioned before the problem of manual data entry and copying and pasting and errors related to those kind of tasks. So what we did with SMART and another product called Universal Collaboration Bridge, UCB, was look at how we could automate some of those processes to take information and -- specifically in some cases from text chat systems. So what we found is that there's a lot of information being shared in basically free texts, instant messaging kind of systems that then need to be copied and put into forms or put into databases, which is done, again, by a -- by a manual process. So we combined SMART and UCB to automate that process, reduce the amount of time to process information and reduce the amount of error involved in processing those data entries, basically.

And finally down to the company level, and then we're sort of wrap up and open up to questions. There's a new program coming out called I-DECIDE -- brand-new FY '12 start from C2D. It's Integrated Decision Enhancing Capabilities in Dynamic Environments. And what that program is targeted at is company-and-below information-sharing. So again, we've talked to the joint and service level with LTE with Chris and Alex. We've talked to SMART and UCB, which is system-level, and GOTS and COTS integration, interoperability.

What I-DECIDE really is targeted at is individual soldier information-sharing, so how can we better prepare the soldiers for making them -- you know, giving them more situational awareness, more information on the battlefield, giving them higher-quality tools to execute their missions. So it's providing things like proactive decision support and proactive alerting, increased collaboration, potentially giving them access to expert data, expert systems to those users that aren't expertly-trained, so putting capabilities in their hands that give them access to all those information flows, but not just access to the information, but access to it so it's relevant to their mission.

So just to wrap up -- and I know we threw a lot at you, and then we're going to open it up to questions in a second. But we've targeted solutions in joint multiservice system-to-system level, high- echelon interoperability we've targeted solutions, integrating COTS and GOTS at, you know, middle-echelon and system-level. And we're kicking off new efforts to target soldier-level interoperability and information-sharing, again, all in the vein of increasing the quality, increasing efficiency, decreasing the amount of -- the time it takes to process that information. And ultimately, the end goal is, you know, reduced stovepipes and increasing our interoperability.

So again, I know we threw a lot at you. But we got plenty of time for questions if we want to dive into some of these efforts a little more in detail, or other issues. And I'll just -- I'll just sort of leave with this thought. You know, we're always open to sort of looking into new problem areas and new approaches and new technologies, and obviously open to new collaborators and other ways we could sort of share what we've done and our knowledge with other organizations.

So with that being said, I'm -- you know, we're open to questions.

PETTY OFFICER SELBY: Thank you very much, sir. And David, you are first on the line. You can go ahead with your question.

Q: Hi, it's David Axe with Wired. Can you tell me what any of this has to do with JTERS or WIN-T, which I've understood to be the Army's previous efforts to sort of reduce communication stovepipes and increase the ability of individual soldiers and units to talk to each other and to the other military branches?

MR. SZYMANSKI: So -- well, I guess first of all say that we're not communications, you know -- you know, radio experts. That's another group in CERDEC. But those solutions -- my understanding is those solutions are targeted at, you know, increasing the communications capabilities -- so, you know, basically putting radios in the hands of soldiers and increasing the available bandwidth. Those are obviously radio solutions.

And then what needs to happen is, OK, I need software solutions, which is what we build -- (inaudible) -- those networks so that, you know, those radio solutions will give me coms, but how do the software systems and applications then share information? You know JITRS and WIN-T aren't solving those kind of problems.

Q: OK. All right. Well, thank you very much.

PETTY OFFICER SELBY: And Tom.

Q: Ah, yes. My name is Tom Goering from Navy Cyberspace, navy.cs.com. First, I'd like to say thank you for the work that you all do. I think that you -- ultimately helps keep the United States military as the most powerful and effective military our world has ever known -- not only that, I think you save lives, and I thank you for that.

The question is, when you're -- how does the information that's being come in by multiple commands, by multiple services -- how is it triaged to be able to determine what information is going to utilize that process (or first ?) to be able to forward that information? How is priority set on the information coming in I guess is probably the best way to ask the question.

MR. SZYMANSKI: Well, I guess there's sort of two ways to answer question, I guess. And again, we're not -- we're not coms people, but I'll take the coms sort of answer, my understanding of the coms anyway, and then I'll probably refer to, you know, maybe some other coms folks in CERDEC.

But I know there are -- there are quality service sort of layers inside of the coms network that systems can use to basically set flags on their data, to say, OK, this is party one, party two, party three, and then the networks can then process it accordingly. So that's a network

layer capability. Again, I'm not an expert in that. I don't know if you guys have done anything on the software side to deal with those -- I'm pointing to Chris and Alex now, sorry. MR. O'REE: The -- this is Alex O'Ree. In the context of the Multi-Service Limited Technology Experiment, the -- that was addressed, to an extent. The Navy provided a product -- I don't recall the name of it off the top of my head, but it provided a prioritization schema based not only on location but on what the type of data it is. And it was able to use that to prioritize things from a -- almost from a network-packet level so that the most important data got through to the correct people when it was most appropriate. I don't know if that really answers your question, but --

Q: Well, it does. And I figured you guys would probably try to figure it out somehow, and thank you very much for that answer.

MR. SZYMANSKI: And just to follow up, there's another effort -- and again, I'm not an expert on this because it's a coms-related thing, but we can get more information -- that I believe is looking at how to correlate the mission plan with information that's relevant at certain times in the mission. So if I know where units are going to be or I know what the objectives and goals are, I could potentially, you know, change the prioritization level of different categories of information depending on what the needs during that time in the mission are. And we could follow up on that. But that's another -- I believe it's another CERDEC initiative, and we'll get more information on that.

Q: Well, thank you.

PETTY OFFICER SELBY: And Gail.

Q: Yeah, Gail Harris with the Foreign Policy Association. I had more of a big picture-type question that may be beyond what you're -- would like to talk about, but I don't understand why we still have this interoperability problem. You know, most of the units I'm sure that you're working with are part of the U.S. Central Command AOR. And it would appear to me that -- at least what Central Command used to be -- if you're going to J6, let's say, if you're going to operate in their AOR in order to do -- like, for instance, in order to do the battle damage assessment report, this is the software program we've identified that you all need to have to work with.

You know, why is the Navy -- you know, like for perhaps one service has a solution and Central Command would say, OK, this is the solution we're going to use for this moment in time. So if you need to do this type of work, this is the software and hardware programs you need. And my understanding is DISA is supposed to be working to -- from an upper level to fix this problem. And I understand the acquisition problems, what -- you know, developing new systems, and I understand why it's desirable. In fact, I've done it myself when I was in the service; (you ?) used commercial technology. But in terms of cybersecurity, there is some issues with using off-the-shelf technology that you don't know what might be embedded in a particular system by a potential enemy. So like I said, this might be beyond what you want to talk about, but it seems to me like this is a problem of interoperability that we've been

working on forever, and I don't understand why we -- I think you guys are doing fantastic work, but I just don't understand why we aren't further along in solving this problem.

MR. SZYMANSKI: So I sort of have two half-answers, I mean. So the one is certainly at the R&D level we don't really, you know, dictate policy or probably can't answer those questions either. But there certainly in our experience -- and it's not just unique to the Army, it's across the board with commercial and other domains as well -- there is actually an interesting report that came out of Carnegie- Mellon Software Engineering Institute -- oh, man, four or five years ago, maybe. It's called Ultra Large-Scale Systems.

And it's a neat study they did on sort of looking at really extremely large systems and system-of-systems, and certainly Army system-of-systems and DOD joint system-of-systems are one of those examples. And what they found is that as much as, you know, sort of standards are great to strive for, they're almost unrealistic in a (painting ?), because you're always going to have new technology and old technology, always going to have a mixture of things you built and things you didn't build, and you're leveraging and modifying or adopting. So things are always in change and always in flux, so it's very hard to have one sort of standard that's universal and consistent throughout any life cycle of any system-of-systems.

Q: Well, I agree, but, you know, the thing that you can do -- it doesn't have to be the same, it just has to be interoperable. And if you have one organization that sets, OK, you know, you can have a different system but it has to be interoperable with what we've got in our AOR, and that's not an impossible problem. And I understand that technology changes at the speed of thought. It's just frustrating to me to hear that there is still -- that we still are, you know, going around and haven't fixed this.

(Pause.) You know, what I'm saying is that, OK, you know, having a group that's deploying to the Central Command AOR and you know what you have to do in terms of the big picture; you got to have C2, you got to have intelligence, you got to be able to share information with all the services and up and down the chain of command. And if you have a different system, it is not that big a problem, if it's different from what's deployed, to put up a software patch to make it interoperable, in that usually you're planning these things far enough out that the 6's at the various levels up and down the chain of command say, OK, here's the standards that you're going to need, that those are the kind of things.

And like I said, I don't mean to beat up on you guys. I think you're doing a fantastic job. It's just frustrating to me to see that there's not better coordination before these units deploy to the AOR.

MR. SZYMANSKI: Right. So, just to go back -- so when you mentioned a software, you know, fix, that's basically what we are -- we've done and we are doing, continuing to do. So things like SMAR and work we've done for the Multi-Service LTE are software-bridging

techniques to fix just what you said. And in fact, we've taken an approach beyond sort of the standard point-to-point in our ability solution, which is, you know, what normally happens, which works great but ends up being a huge problem when you have multiple systems.

So we've taken an approach to do sort of a one-to-many bridging solution so I can build that software bridge from one system to multiple systems quickly and easily. And that's what the work that we've been doing really is -- the foundation of that work is.

Q: OK. Thank you.

MR. SZYMANSKI: Yep. You're welcome.

PETTY OFFICER SELBY: And Michelle (sp). Michelle (sp), are you there? (No response.) We can go on to Jared.

Q: Yeah, hi, guys. Thanks for doing this. So as the previous questioner alluded to, these non-interoperable systems is a kind of problem people have talked about for years. I guess I have two questions. You know, you called out a number of programs, a number of efforts you're working on. Do you guys see your work as being able to collectively provide comprehensive answers to the entire stovepipe problem across DOD? And, you know, two, how ready is all the stuff you're working on to actually operationalize and deploy and get out there and solve these problems?

MR. SZYMANSKI: OK. So this is Ron again. So I guess I'll answer the second question first. So how ready is it. So there are solutions like -- you know, SMART and UCB I alluded to before, that are being transitioned to -- (inaudible) -- this year, and actually have part already been transitioned and will be fielded shortly. So those will solve, again the interoperability system level solutions, particularly right now, by targeting the mission command environment, because that's who we're most closely aligned with.

So those are being transitioned. And in fact, SMART's already been beta-tested with the unit for operational testing as well.

To the first question, the comprehensives, I think -- I think, again, what I mentioned before is, as far as the approach towards interoperability, it is definitely comprehensive across the system-to-systems and joint environment. And what I mean by that is, again, you know, what we've found in the past is that there's a lot of point-to-point mapping solutions -- so system A to system B, and system A to system C, and those kind of things. And yet, with very complex -- you know, these wacky sort of webs of interoperability that are very difficult to change, cost a lot of money to change and are -- you know, can't be changed rapid enough.

So the approach we've taken with the -- (inaudible) -- and some other efforts is this sort of bridging solution, this one to many; so to bridge to system A, and bridge to system B, and bridge to system C; so I can have multi-system interoperability for a lower cost that can be

changed much more quickly. So that approach is definitely comprehensive that can be -- and we've applied that to many different domains now over the past couple of years, and it's worked out really well.

And you guys want to jump in here? OK.

MR. O'REE: I think you ran it ahead.

MR. SZYMANSKI: OK. So does that answer the question or --

Q: Yeah. Yeah, basically. I guess, just to follow up, you know, you said standards are great to strive for but they're unachievable. Did -- do I -- I mean, do I take that to mean that this interoperability challenge is going to be with us forever and you're always going to need to build bridging solutions from, you know, IT stovepipe to IT stovepipe, forevermore?

MR. SZYMANSKI: So I guess -- I guess I'll backtrack. I don't think standards are unachievable; I think standards on a global scale are unachievable. I think, you know, no -- if you tried to sort of make a "one size fits all," you end up with a "one size fits none" kind of thing. So I think standards work well for certain environments but, you know, it's very difficult to apply one single standard. Certainly in the Army when you're -- when you're working across echelons with different bandwidth capabilities and processing capabilities, different needs, different systems, a mixture of GOTS and COTS, you know, it's very difficult to find one single solution that works completely across all system of systems.

So I think -- I think in small domains standards work really well. And what happens when you start crossing domains is when you get into these problems of, OK, now what do I do? Do I use system A's standard because that seems to work well, but then I've got to sort of make some accommodation on system B because I have to adopt what they've been using, or do I use some universal standard, do I use some sort of bridging solution?

Oh, yeah, so I think there are multiple approaches, and it really depends on -- it's sort of a case-by-case situation. And I certainly didn't make the -- I don't want make the impression -- and if I did say this, then I'll -- then I'll clarify it -- that, you know, standards work well. And I -- and I wasn't trying to say that standards don't work well and we should drop trying to achieve any kind of standard.

I just think they -- standards, you know, when they don't work well, it is across everything. You know, "one size fits all" rarely works. So that's what I was trying to say.

Q: Understood. Thanks very much.

MR. SZYMANSKI: Yeah.

PETTY OFFICER SELBY: Thanks. And Michelle, are you still there? (No audible response.) Maybe she's just recording.

Back around to David. David Axe? (No audible response.)

All right, we'll go back to Tom.

Q: I have heard everything I needed to hear. I think you guys are doing great. And I have no more -- further questions. Thank you.

PETTY OFFICER SELBY: Roger that. And Gail?

Q: No, again, thank you for your time, and for breaking it out in baby-talk for us. I'm a -- what do they call it? -- a digital immigrant.

PETTY OFFICER SELBY: (Laughs.) And Jared, did you have any follow-ups?

Q: I'm all set. Thanks again, guys.

PETTY OFFICER SELBY: Roger that.

Well, that was a very insightful roundtable. And with that, if you have any closing comments, to the speakers, you can go ahead with those now. Thank you. MR. SZYMANSKI: No, I think we're all set. We appreciate everybody's time. And like I said, if you have any follow-up, (Ed Rick's ?) here, and you have the contact information. So thanks again.

PETTY OFFICER SELBY: Roger that. Thank you very much, for everybody on the line and everybody who participated today. And if you have any -- if you want to see everything that's posted about this bloggers roundtable you can visit us at dodlive.mil, where you'll be able to see the story based on today's call, along with source documents such as the audio file and a print transcript.

Again, thank you to everybody on the line. This concludes today's event, and feel free to disconnect at this time.

MR. O'REE: Thank you so much.

PETTY OFFICER SELBY: Thank you.

END.