

TRANSCRIPT OF INTERVIEW WITH STEVE FULTON CO-FOUNDER NAVERUS
DEVELOPER OF RNP FLIGHT PATHS FOR ALASKA AIRLINES
INTERVIEWED BY CHRISTINE NEGRONI IN HARTFORD, CT AUGUST 26, 2010

CN: So as I understand it, you created the RNP procedures for Alaska, is that right?

SF: I initiated the program at Alaska and actually developed the technology while I was there. We had a difficult environment to work in, and that was all of south east Alaska. But our focus initially was Juneau (JNU). It's the state capital and it's the hub of our southeast Alaska operations, and it was really difficult for us to operate in and out of due to the limitations of existing ground-based navigation technology.

So I had an airplane, a Boeing 737 that had all of this tremendous potential and you could say it was really like a quantum leap or an order of magnitude improvement in its ability to navigate over the previous generation of airplane.

We had GPS on board, we had flight management computers - which are made by GE - and so that airplane came into our fleet and the question was what operational processes and criteria could I use to establish a new standard that these new airplanes could use and take full advantage of their potential? And so it was about a 2 year program. It started really in earnest in the end of 1994 and it flew in '96 for the first time. May of 1996 was the first passenger flight.

CN: So in essence the airplane led the technology?

SF: The airplane is the core of this future plan. So were in this transition from an older system where you had all of the navigation infrastructure outside of the plane on the ground and you had a receiver on the airplane. To, as we go forward, were putting more of the infrastructure, the navigating capability on the airplane and it takes it with it. So it's that airplane-centric capability that you correctly said is the new thing about performance based operations and the navigation piece of the next gen airspace modernization.

CN: I'm also wondering if the parallel between Alaska and Tibet. They were able to do it in Tibet because there was no legacy infrastructure. But it is harder to make these kinds of advances here in the northeast U.S. with so much existing infrastructure, yes?

SF: What we have typically seen, and the US is where it started, but as we went to Canada and we went to the South Pacific, New Zealand, Australia and then into China, and now in South America, Cuzco, each of these first instances of the deployment of technology are in remote, terrain-constrained locations.

And it's a place where everybody gets around the project - all the stakeholders including the regulator, the air traffic people, the airline people and we understand together what the requirements are going to be to deploy this in that country, because it's not anymore about just the technology it's about the human processes of change.

You've got to have an initial project and something that's a driving force - a motivator that's kind of simple in its communication of its need and its opportunity for giving a solution. But very quickly in each of these instances we translated from those remote areas to bring in the technology into more complex airspace where there are not any obstacles at all. It could be very flat country and the idea here is we use the same technology to fly through not *literal* canyons or mountain valleys but through the *airspace* canyons and valleys which are defined by airspace limitations from - maybe airports nearby or noise sensitive locations around the neighborhood. So we can take that same adaptive flexible approach that we use in the mountainous areas to bring it in and use it as an air traffic technology.

So now back to the US. Starting here in the United States as an application for complex places in Juneau, throughout our southeast network, the challenge in the US is that our airspace is more complex. We handle more traffic than any other place in the world and so we're in transition globally from the ground-based to the aircraft-based system. But in the US, just like everywhere else, you have to continue to operate the airspace while you're improving it, while you are upgrading it. We don't have the luxury of flipping a switch overnight and all of a sudden we've got a new one. We've got to operate while we improve or upgrade.

SF: So it's something that's important to recognize. There are complexities that are more unique to the US than some of these other countries that make it more difficult. GE is working with the FAA and we're bringing lessons from, in particular, Australia because Australia is doing a great job of taking this technology to air traffic.

CN: It's complete right? It's complete in Australia?

SF: It's at 17 airports, we finished in June of 2009 a contract with Air Services Australia to begin a deployment to all 28 jet airports so we're in the process of building that and like what we saw at Bradley, (BDL) those flight procedures would be for everybody to use in the airspace, whereas the original work that was done in the 17 airports that are there now were done for Qantas and they were private use for Qantas use. So the airspace went through a transition like what we're seeing in Hartford here at Bradley

CN: I wondered if the real navigational challenge wasn't airspace as much as dealing with a bureaucracy like the FAA. which has such a huge people-intensive, technology-intensive...

Right, recognizing that our challenges aren't so much technical they're more on the human, management of change process through human organizations.

Looking at the FAA and complexity of the airspace it of course has an organization that's fairly complex to operate. The FAA, if you talk to people at the top of the FAA they are completely 100% onboard with all of the things we know we need to do. And what they're seeing outside of the United States, they want to do here.

They have the challenge of communicating that down through a very complex bureaucracy so everybody at all the levels and all the work groups have the same understanding of the technology and the same vision and kind of where we're going and so it's a bigger challenge than a simpler country with less infrastructure.

CN: Is Naverus' goal to take over and become the airspace infrastructure provider like Lockheed does for flight services?

SF: Our goal, and this is what we're communicating to the FAA and to the community right now is to offer our services to the FAA and we expect we will work alongside existing FAA resources. The FAA has the capability to do what we already demonstrated here at Bradley. In fact they have a number of them around the country already. The message that we're communicating today is we're ready; we're here to bring commercial private enterprise resources into the work because we understand it's going to be quite massive.

Look at it from an airline perspective, their understanding that there's going to be significant investment in airborne equipment to be able to participate in this upgraded air space and as they make those investments they want to make sure there's a return on what they've invested.

CN: In other words, a route to fly?

SF: That's right, so we want to get procedures deployed and we want to make sure that as we deploy, features of those procedures are also optimized to maximize the return on the efficiency opportunities, the environmental opportunities and so forth.

CN: Does it mean that some airlines that do not have their own proprietary RNP does that mean that now they don't need to make that investment themselves? They can basically piggy back?

SF: You put your finger right on it. That's the news from today. So a company can engage a commercial company like GE Aviation and on behalf of what their interests might be but also it might be part of the infrastructure a procedure could be deployed that would serve their needs but also be available for use for the greater good.

CN: Or they could wait 5 years and have it be in place without their input.

SF: Whatever the time scale is. So the FAA has priorities, so one airport may be a different time scale than another depending on the FAA's own internal schedule for when they'll do the work.

CN: Is there some reason to believe that Southwest's RNP or American's RNP or Alaska's RNP is going to give them some sort of efficiency edge that the publicly available RNP will not give them?

SF: That's our belief. The DNA of GE Aviation and in particular Naverus is always focused on performance. We want to get the safest procedure that delivers the highest performance measured in terms of a number of parameters; minimized fuel burn, minimize the noise impact, minimize emissions, minimize the flight time, try to reduce the flight time as much as possible. Increase capacity at airports, reduce delays, lower minimums on approach just like we did here at Bradley. That's our focus. That's our passion. That's our DNA.

In the work that we've done outside of the United States, there's a demonstrable advantage when you have engaged a commercial company like ourselves who has focus on that objective. It all has to be to the safety standard, that's the first point. Safety standard is understood and it can't be compromised, but within that safety standard there's things that can be done to improve the operation of the procedure, to improve the efficiency and this is what the industry is saying they want. 'Yes we want procedures, we want lots of them. We want sooner rather than later but we also want them to deliver maximum return on our investment. They need to provide a benefit.'

CN: Prior to the commercial development, when the FAA programmers were the only ones doing it, how may were they bringing online?

SF: They put on quite a few. There's a little more than 200 that are in service. I haven't followed their delivery performance.

CN: So from the time they began until now that's about 200?

SF: I think its 200.

CN: Over what period of time?

SF: Uh, it would have been since probably, 2004. That might have been the first one. The first one was at Washington DC, the FAA produced it at Washington National. (DCA)

CN: Because of 9-11?

SF: That was the original initiative behind that, but as it became more obvious there was an opportunity to keep that runway operating in lower weather, the technology grew and then it became the driver.

That airport of course was closed. We thought we could use the technology we already had in Alaska to get the security we needed but that actually became a non event because they opened the airport and they had procedures to provide the security.

CN: With Naverus, what is your projection of how many airports your company can do in the next 6 years?

SF: So we built a company, that is we started a startup company. We always had this understanding that there were going to be thousands of procedures required. To do whatever work in whatever country we were going to be called, given the opportunity to work on, so we built processes, systems, created tools, trained staff to produce a large scale number of procedures and the rate is always changing because we're continuing to add to our capability and we've actually not fully tested it yet, we've actually not maxed out our full capacity but we're growing.

Our ops people would be able to tell you better than I could what our production rates are and we do have numbers; I just don't know them right now. But in general let me just say the objective is we want to produce high volumes of procedures at the required quality levels - meaning producing the highest levels of performance at the lowest cost. That's the objective

CN: Is anybody saying, either you or the FAA, 'We would like to have RNP procedures at all of the commercial airports in the United States by 20... something or other'?

SF: Yes, 2020 is the date they're looking at for next gen, so presumably next gen 2020 is fully in place you would presume that the flight procedures, infrastructure would be there to deliver the benefit that the next gen program is claiming.

CN: Is that do-able?

SF: Yes, absolutely. Oh yeah, there's no question about that. We've gone across the country of Canada, 22 airports in a relatively short - maybe 24 month period. We've done similar things in Australia. Admittedly you've got to remember the complexity issues. In order to get the types of procedures that deliver benefit it takes more than just a quick overlay. This has been the concern.

An overlay you understand is 'We're just going to duplicate a procedure that's already there'. So to be able to take full advantage of the opportunities that technology provides and work

within the constraints the environment represents; I talked to you a little bit about the airspace constraints, environmental concerns, neighborhoods - places you don't want to fly airplanes, so taking all of those considerations into account, it takes a period of time that is TBD per project.

It's not something you can say, 'We can produce you know, 45 procedures a month,' because we have categorized within our own company, airports by complexity. So we have like a category one, category two, category three airports, and so forth and the more complex of course take longer.

But the idea is to get in there again with that focus that you're going to get the benefits the technology offers within the constraints that are there. So our understanding is we've got a large scale capacity. We've demonstrated that. We haven't tested it to the limit yet but we've demonstrated our fairly large deployment ability in these different countries. We now have a mechanism, this qualification by the FAA to provide procedures like we have at Bradley today and so we're looking for now, the commercial mechanism that would give us the opportunity to help the FAA. That's what's missing for us right now.

CN: Somebody to call you up and say, 'Here's a contract.' That's the goal?

SF: Yeah. Customers could be airlines, airports, communities, could be the FAA. The FAA, of course you would look to as maybe the natural entity that would be the customer because they operate all the airspace. But we're prepared to respond to any need because we now have this ability, this qualification.

CN: And that explains the hoopla that you want to generate here at Bradley International?

SF: Yeah, yeah.

The system we have today is a system that has a controller manually bringing airplanes in to a line, a straight line onto a runway, an airplane will be vectored through radio commands onto a beam that's communicated or transmitted from the ground and once you're on that line, the controller is making sure that everybody has the right sequencing and that's how the system works. So everybody

Everybody comes from the same direction. So if you come from the southeast northeast, southwest or northwest you come over four corner posts typically, you enter into some large circular or half circular pattern to get into this big long single file line to the runway. And the reason why we've done it that way, is two reasons. We have the beacon technology from the runway, the physics of it is there is a transmitter that you have to fly either directly to or from it so you have to fly a straight line - a runway line and the other thing is the air traffic techniques, the way its managed, you have a human is literally looking at, and if you have airplanes zinging

in from lots of different directions, it exceeds the ability of the human controller to ensure that everything, and the timing and so forth is all going to work out.

The future we're making is that airplanes are going to come into a merge point and that merge point could be very close to the runway, maybe 1 mile, maybe 2 miles from the end of the runway. And assume that this, let's take the environmental piece out of it. Let's say it's a desert island with a runway. You have an airplane coming from a particular airport, from a point on the compass to get the optimum efficiency you'd want to keep that airplane aligned on the straight line run to the destination until it had to make whatever adjustment to line up with the runway.

So you would build knowing what scheduled flights are, you would build a number of transition routes to this straight-in segment that would be runway aligned just before you touch down. In a way that would have airplanes merging at a point close to the runway and that sequencing would be done on *time*, not by a ground controller. So the machine-to-machine communication, the ground machine the airborne machine would be working and confirming the times and you have airplanes coming together in perfect harmony.

That's where we're headed, that's what next gen is. If you look at the concept of operations for the US it's called four dimensional trajectory operations. And it's exactly the same thing, it's called the SSAR plan in Europe.

So if you look at where we're going and you leave the paradigm behind today of a single flight procedure from a single direction, this is where you'll understand were talking about literally thousands of flight procedures because the efficiency is purely a function of; to what extent, how can we tailor or optimize the arrivals so that we get the minimum track miles between the two airports, the arrival and departure airports.

CN: When flights change, you have to modify those RNP routes?

And that is another part. This is adaptive. These are almost living networks. So we have, as part of the work we do in other countries, we have a service. You can talk about what we are deploying more like a communication, kind of a fiber optic network where you're designing, building, deploying and operating this network. And just like a fiber optic network, the network is beside the point it's the content, the value is the content coming through that network. The value is optimization of flights through this network of flight paths.

Just as you said, we know already because of our experience in Brisbane, which was the first where it was deployed, there were constant changes. The community gets engaged because they have a more full appreciation of what the opportunities are. They start getting input from the working levels about how little changes can be done to optimize the operation a little bit

more. So we offer to our customers, in the opportunity we have to serve the airspace providers in these other countries. (This is the FAA here, but in other countries it's would be another organization.) As we offer our services to that other organization, we have what's called an optimization service, recognizing that these networks aren't static you don't just build something. Today of course when you mount or install a ground facility, a beacon, you're pouring concrete around it it's kind of where it's going to be for the next 10 or 20 years. It doesn't change.

CN: So this is like Pratt & Whitney Engine's service contract?

SF: Power by the hour. Sure. Like that.