Robert Pearce -- First plenary Talking points for ICNS Conference

Beginning of opening talk

We find ourselves at an important juncture. With the publication of key planning documents over the past several months, both NextGen and Sesar have achieved a level of definition that allows us to take next steps. Substantial resources have been planned and budgeted in both Europe and the United States. So, I think it is critical to turn the problem on its head and really come to agreement on how we are going to achieve these very complex undertakings. I'll focus my comments on NextGen, but I certainly believe there is applicability to Sesar.

Complexity is a key concept here. NextGen is by no stretch of the imagination a well-bounded system and no amount of effort will make it one. For example, the scope of NextGen spans multiple public and private enterprises – such as FAA's air traffic organization and FAA's safety oversight organization, the airlines, military aviation, general aviation, and airport operators. We have new entrants, such as military and civil sector UAV operators, and on-demand air taxi operators. And all of this interacts with constantly evolving US and global economies. So drawing a line around a specific set of things and organizations and problems that is NextGen and a specific set of things and organizations and problems that is not NextGen is impossible.

From a capability perspective we want to build new functionality, such as trajectory-based operations, that span system components; near to long-term time scales; and, from individual aircraft operations to the patterns of aircraft flows across the NAS. And these capabilities interact with policies, such as "rules of the road" – is it "first come, first served" or "best equipped, first served?" This implies complexity and non-linearity in system interactions and emergent system behaviors. Airlines will interact with the system based on their own proprietary business needs. So, for example, the best trajectory solutions to route around weather or the priority of the aircraft will likely vary from airline to airline making the system behavior difficult to predict in advance.

In our world, as the system evolves, the environment within which the system exists will evolve as well. For example, issues such as noise, local air quality and global climate change will evolve and therefore the constraints

associated with those issues will evolve. In fact, we are having a spirited debate within the JPDO as to how to handle environmental constraints. I think we all agree that environmental constraints will increase, but there is no agreement what those constraints are going to be and how they will be imposed. At the same time drivers such as technology will advance. For example, according to a recent forecast by Scientific American, by 2020, the average $1000 computer will have the equivalent processing power of the human brain and by 2030 it will have the equivalent processing power of 1000 brains. So, conditions within which NextGen will operate will change in ways that cannot be predicted in advance and therefore it is not possible to have a set of unchanging requirements.

That last example of the computer forecast reminds me of Thomas Watson's famous forecast that with the growth in processing power, one computer would be all we needed in the future. He had no idea how many future uses would be made of the computer and how computers would be embedded in nearly every part of our lives. The lesson here is that until users start using new NextGen capabilities, we can't know all the ways the capabilities will be used.

So, because of the inherent complexity of NextGen, it is simply unrealistic to believe that system needs, alternatives or solutions can be fully anticipated in advance or that they will not change in substantial ways over the lifecycle of implementation.

But there is good news as well. The starting point for NextGen is already built so we don't have to predict, model and interface every component as if you were building a new aircraft or spacecraft. For all the reasons I just gave, that would be impossible for NextGen. However, we can scope the approach to key functions and interfaces and model the macro impacts those changes make. This is a manageable approach, but still very challenging.

This is the approach JPDO has taken. The Integrated Work Plan that you will hear more about is not a plan in the traditional sense of the word, but rather a database of operational improvements or functional components that can be configured to meet the implementation strategy.

The big burning question then is "what should our strategy be?" "How would it be prioritized?" As I've said, even a simplified scope approach is still a challenge in a system that is inherently as complex as NextGen. So,

let’s take a page from Laurence Peter – he’s the guy that came up with the Peter Principle as well as many other insightful ideas. He once said “some problems are so complex that you have to be highly intelligent and well informed just to be undecided about them.” Knowing that the people in this room are both highly intelligent and well informed, I’m going to ask that if you have made up your mind as to the right implementation strategy for NextGen, to become undecided for a little while. I’ll come back at the end of the plenary to suggest a strategy going forward.

End of opening talk