HUMAN AND ORGANISATIONAL FACTORS Q&A

PERFORMANCE BASED NAVIGATION (PBN) ROUTES

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1. What is a significant change planned within your organisation that has relevance to human and organisational performance?

We are planning to implement Performance Based Navigation (PBN) routes across a significant amount of our lower airspace. PBN is *"Area navigation based on performance requirements for aircraft operating along an ATS route, on an instrument approach procedure or in a designated airspace"* (ICAO PBN Manual, Doc 9613). New satellite technology offers the potential to design more direct and more efficient routes. In the en-route phase, this navigation technology allows aircraft to follow a flight path with increased accuracy without the need to navigate using ground-based beacons. In the departure and arrival phases, PBN allows for the design of routes that are deconflicted, with reduced need for tactical ATC interventions.

In the air, enhanced technological systems reduce manual inputs by flight crews. On the ground, the change will reduce radiotelephony (RT) load and transfer certain tasks such as radar vectoring from controllers to airborne systems. But controllers are expected to monitor these aircraft.

We have done smaller scale changes in the past, but we are now looking to do so for a much larger proportion of lower airspace in conjunction with airports across the UK.

2. Why is this change necessary? What is the opportunity or need?

Apart from the last years due to the COVID-19 pandemic and other events, air traffic has continuously increased over the last several decades. In the UK, we have very complex airspace due to the limited physical airspace available to us to work with, and significant levels of air traffic (2.6m in 2019). So, for us, traffic increase also means more complexity and so we are always on the lookout for new ways to increase our capacity.

As noted by CANSO (2015) for ANSPs and controllers, *"PBN reduces controller workload due to: Decreased dependency on tactical radar control; Potential introduction of flight path monitoring/alerting tools for controllers; Reduction in complexity and variability of procedural approach control; Lower dependency on radiotelephony (RTF) with decline in incidents caused by read-back/hear-back issues."*

PBN has been identified as one of the ways to improve not only capacity, but also safety and efficiency.

3. What are the main obstacles facing this change?

Changing the nature of tasks performed by people in a system to include more monitoring activities is not new, and neither are the challenges this brings. One of the main issues is how to ensure the human who is responsible for monitoring remains in the loop when things go wrong, and the human is then required to take control. This can also be seen with automated systems when, in some circumstances, control is transferred back to the human. The issue with this is when the person does not understand what the machine was doing and what action is required before being required to take full control. Similar examples are found within the aviation industry, where the pilots have struggled to understand what the technology was doing and why, and subsequently diagnose and address the issues.

With PBN routes, ATC will do much less tactical radar control. Adequate measures are necessary, however, to ensure that the ATC system can identify and address conflicts for situations where controllers need to intervene. Controllers need to understand what is happening, the tasks they'll continue to perform themselves, and what action is required of them should they need to intervene.

4. What is the role of front-line practitioners? How is their expertise incorporated into change management?

In the aviation industry, we pay a lot of attention to our safety performance, how to continually improve it and learn lessons associated with changes to our operation. This is no different and the same processes apply. Frontline staff are involved in safety and human error assessments, and all changes are validated by our controllers, who need to feel comfortable and confident in their use and application.

5. What do they think about the change?

Operational staff appreciate the expected workload reduction in the relevant sectors. However, there are potential implications for complexity in areas where controllers have to intervene with radar vectors or other actions.

Read more

CANSO (2015, March). *Performance-based navigation: Best practice guide for ANSPs.* https://canso.org/publication/performance-based-navigation-best-practice-guide-for-ansps/

NATS (2021). *The future of airspace.* https://www.nats.aero/airspace/future/

SKYbrary (2021). *Performance based navigation.* https://skybrary.aero/articles/performance-based-navigation-pbn