Tech notes is a newsletter produced by the CATCA Technology Committee for the purpose of providing information to CATCA members regarding technology, current and future, in NAV CANADA.

Central Flight Data Processor and Airspace Capacity Manager
Written by Pedro Vicente, CATCA Technology Branch

The company has identified as one of its three strategic initiatives moving to trajectory-based operations (TBO) a concept which allows aircraft to fly to their destination with minimal intervention based on a pre-determined four-dimensional flight path viewed in its entirety. Key to this is understanding all the constraints and limitations in the network to reduce or remove the number of changes to an aircraft's speed, heading, or altitude for example based on local airspace and traffic conditions as one example. The company describes this as 'Similar to the way an app like Waze uses historical and real-time road traffic data to optimize your driving route and avoid delays'.

The company began a project a couple of years ago to look at options for a viable flight data processor (FDP) to deploy as a central system, processing flight data for the entire country rather than the current model of seven separate FDPs, one for each FIR. In addition, options for 'Network Management' type systems, those that allow the user to view, manage, and coordinate airspace capacity and demand and apply traffic management and flow initiatives when needed were explored. After a one-year evaluation of the Indra iTEC and iACM systems an agreement was reached to develop and deploy them together as the NAV CANADA network management system also referred to as NMi.

Finally, the iTEC system was further studied to determine if it would be a future solution for the eventual replacement of the CAATS system in operational use across the country today. For the time being the CAATS system will remain in service and will communicate with NMi, therefore initially most of the impact of the upcoming systems will be behind the scenes.

What does this mean for controllers?

For controllers the use of the NMi is largely transparent in, most cases the systems currently used i.e., CAATS will communicate with the NMi and the NMi will communicate with the CAATS systems but for the most part this will be automated and not impact how ATC interacts and operates with their systems.

Some potential changes are meant to enhance situational awareness as the NMi is being designed to provide information to the controllers on their displays which allows them to see which aircraft are under air traffic flow management (ATFM) measures, for example a reroute may be required. The NMi will notify the correct CAATS site at a time prior to the route change being required. The controller with jurisdiction of the flight will be able to access a window on CAATS to see what the changes are and why they are required. In other cases, controllers will be able to see more aspects of the aircraft's trajectory than they are able to view now. Examples include speed and altitude changes along the route, potentially the location of top of climb and top of descent, etc.

Flights that have negotiated and agreed on a trajectory in advance with the NMi will be displayed to the controller ensuring intervention on that flight is kept to a minimum. An agreed trajectory is one where an airline has submitted a request to fly along a certain route including altitudes and speeds. The NMi has processed that trajectory and identified all the possible constraints along the way, for example an active special use airspace (SUA), a congested sector, or an area of

severe weather and has notified the user of these. The user then has the opportunity to modify the trajectory in a way as to avoid these. Eventually through a set of automated exchanges the trajectory is developed with no constraints or includes tolerable constraints, and the systems 'agree' on the trajectory. When the flight departs it will be aware of this agreed trajectory and so will ATC via communication between NMI and CAATS.

For ATC supervisors and controllers alike an interface to the NMi (workstation or dashboard) will allow constant monitoring of airspace capacity and traffic demand throughout the day using up to date data from all CAATS sites and the FAA's TFMS, this includes the current view and the planned view, i.e., what the demand looks like if measures were to be put in place. Furthermore, there is the ability for supervisors to communicate with and coordinate directly with the traffic management units on any issues that come up or any planned measures, restrictions, etc.

NMi and ATC

Indra the software provider has many years of ATC systems development and deployment in many parts of the world. They have partnered with NAV CANADA to modernize our Air Navigation Service to support initiatives such as TBO. The central FDP and airspace capacity manager are just the first steps on this path. While much of this development effort is focused on modernizing systems and technology a large amount of effort is being applied to ensure that the systems integrate well with the people working the traffic, this includes changes, where needed, to the CAATS systems. The NMi is scheduled for deployment across the country sometime in 2028.

Comment from CATCA Technology Committee

Although the new technology seeks to reduce the impact on controllers, there remains a considerable cost as we progress. Our engineering and OSR resources are limited, and as they are redirected to the new project, it will become increasingly challenging to secure fixes and improvements for those continuing to work with CAATS.

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If you have questions or would like more information about ATS technology or CATCA technology roles, please contact any member of the CATCA Technology Committee or email techcommittee@catca.ca

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Technology is a useful servant but a dangerous master. ~ Christian Lous Lange