Industry Category Winner

Performance Based Navigation (PBN) Data Analytics

The MITRE Corporation's Center for Advanced Aviation System Development (CAASD)

The Federal Aviation Administration frequently needs the answers to enterprise-level questions such as which instrument flight procedures are being used in the National Airspace System (NAS), by whom, how often, and what are the operational benefits. Getting these answers was a manually intensive process, requiring an analyst to process data from a wide range of sources with different formats and precision and then integrating to draw conclusions. This limited the ability to answer the full range of questions. For example, it was not possible to maintain an up-to-date picture of the operations, to observe trends, to quantify steady-state and transitory behavior, and to infer system-wide effects and impact due to changes at one airport.

The objective of MITRE's Center for Advanced Aviation System Development's (CAASD) Performance Based Navigation (PBN) Analytics project was to address these issues by automatically integrating the wide range of source data to enable descriptive, predictive, and proscriptive analytics. The PBN analytics team considered the full system engineering of data analytics. They developed algorithms—extensible and optimized for querying data models; methods for efficiently running on a distributed computing architecture; and analytic tools for accessing, visualizing, and reporting results. The open source Hadoop technology and associated tools were adopted and extended by the project to include MapReduce, Pig, Avro, Tableaux, and Matlab. The team also put into place methods for reviewing algorithms and code, monitoring for performance, instituting governance, and conducting exploratory research across the organization.

Using the PBN Analytics enhancements CAASD can now provide automated, customized reports that utilize multiple years of data with metrics produced in near-real time. This is of high value to the FAA since they are now able to respond back to Congress, the Office of Management and Budget, and airlines/industry with data that shows quantitatively the agency's progress in implementing a PBN route-based system along with the associated benefits.