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PASSUR Aerospace, Inc.

In The Know

PASSUR ARIVA DATA—SIGNIFICANT MILESTONES

PASSUR has achieved several significant milestones in the continuous enhancement of its ARiVA Global Feed data service, marking two years since its inception. These milestones include:

Over 9,000 Unique Aircraft Tails: PASSUR has secured contracts for daily, real-time operational flight support for more than 9,000 aircraft tails, representing over 100 airlines globally.

Integration of Extensive ADS-B Network: The integration of the largest combined terrestrial ADS-B sensor network, boasting over 72,000 individual sensors, ensures unparalleled global reliability, coverage, and redundancy.

Leveraging Aireon® Global Satellite Network: PASSUR has integrated the Aireon® global satellite network to provide comprehensive space-based ADS-B coverage, including operations-grade surveillance of any airfield in the world.

Advanced Flight Prediction Technology: Utilizing cutting-edge Machine Learning (ML) and Artificial Intelligence (AI), PASSUR delivers early and actionable forecasts of key flight milestones, proven to be at least 15% more accurate than any other source through multiple independent airline studies.

Global Flight Status Information Integration: PASSUR integrates global FlightEvents™ data, including Out/Off/On/In ("OOOI") and related information, with synthetic logic to ensure comprehensive and accurate data.

Support for Aeronautical Charges and Aviation Risk Assessment: PASSUR's data is configured to facilitate the capture, audit, and billing of Aeronautical Charges globally, alongside real-time aviation risk assessment, intelligence gathering, and law enforcement support.

Learn about the innovations and capabilities that have made this astonishing growth possible as this story continues with 'The Power of ARiVA data architecture' on page 3.

"Becoming mission-critical for numerous airlines, airports, flight operators, and public agencies, while supporting multiple additional industry use cases, are milestones worth celebrating."

INSIDE THIS ISSUE

HIGHLIGHTS

- The innovations and capabilities have made PASSUR's astonishing growth possible
- ADS-B surveillance at all altitudes
- View and interact with Visual NOTAMs and our MobileVue display in the Communicator Portal
- Outperform both ANSPs' and airlines' predictions by utilizing advanced forecasting techniques, including machine learning.

AWS MIGRATION—WHAT IT MEANS

PASSUR recently completed our systems migration onto Amazon Web Services (AWS), allowing us to continually expand our aviation data services and collaborative decision-making tools for airports and airlines. PASSUR also joined the AWS Partner Network (APN) as an independent services vendor (ISV).

The migration to AWS provides numerous benefits to PASSUR and our customers. Leveraging AWS's services and infrastructure brings key advantages in deploying and managing our data services and software applications, such as scalability, security and reliability.

With AWS, we can enhance our responsiveness to the fast evolution and application of artificial intelligence (AI) and business learning (BL) processes and rapidly expand our network of critical aviation industry data sources and volume.

"Leveraging AWS's services and infrastructure brings key advantages in deploying and managing our data services and software applications, such as the scalability, security, and reliability of AWS".

ASHEVILLE AIRPORT EXTENDS ARIVA GATE MANAGEMENT

PASSUR recently completed a contract extension to provide gate management services on Common Use gates for an additional three years at Asheville Regional Airport (AVL).

In recent years, AVL has experienced remarkable growth, symbolized by the construction of a new airport terminal beginning in late 2023 for this key hub, connecting the western North Carolina region to the world. Following the commencement of the largest construction project in AVL history, the airport proudly marked yet another record-breaking year in 2023, showcasing continued and remarkable double-digit growth. In 2023, an impressive 2,246,411 passengers traveled to or from AVL, a 22.2% increase over 2022 figures, catapulting the airport's annual passenger count beyond the historic two million mark for the first time ever.

The ARiVA Gate Management System is a key surface management capability for AVL - especially during the construction period of the new terminal. PASSUR ARiVA will manage the daily gate assignments of all scheduled commercial flights arriving to, or departing from, AVL. The service includes PASSUR monitoring and updates to gate demand, capacity, and assignments, including dynamic changes due to Irregular Operations (IROPs), such as weather or aircraft delays.

AVL customers will also receive accurate gate assignment information for flights through the existing integration between ARiVA and the AVL Flight Information Display System (FIDS) with the current arrival and departure gate information. PASSUR will also coordinate with AVL and designated airline personnel on any Gate or recommended Remain Overnight (RON) assignments.

The PASSUR-AVL extension contract runs through 2026 with multi-year options.

"PASSUR is excited to continue to serve AVL as a valued partner in delivering our ARiVA software and services to meet expanding operational needs while experiencing phenomenal growth."

THE POWER OF ARiVA DATA ACHITECTURE

PASSUR recently announced it had reached an important milestone: we now have more than 9,000 aircraft under contract for our ARiVA Global Feed (AGF) data service, providing real-time operational support for more than 100+ air carriers worldwide. This was achieved in just over two years, from the when the service was first launched.

The innovations and capabilities that have made this astonishing growth possible are built on a major investment in data technology: aggregating multiple, disparate global sources of data; fusing them into a single comprehensive "truth" about flights, airports, and airspace; and creating hundreds of "digital microservices" out of that unified data to support an almost unlimited number of operational and business use cases (requirements) and user personas (functional roles).

Examples of digital microservices range from predicting gate arrival times, alerting for holding, diversions or ground delays, tracking extended taxi delays, advising on airport status, or calculating billable weight by flight.

This new data architecture has been stood up over the past 2.5 years, and it now powers PASSUR's data and software services with a single common global data engine. This global data platform enables:

- **Global Deployments:** any flight, airport, or airspace in the world can be activated.

- **Standard Configurations:** most deployments are completed by simply activating the right combination of data and/or software services from a library of hundreds of stored configurations.

- **Cross-Platform Consistency:** regardless of which PASSUR product or service is subscribed, the identical accurate, timely, actionable data is reflected in all user functions.

- **Reliability and Redundancy:** with so many different global data sources fused, PASSUR data offers extraordinarily high uptime, failover, and mission critical reliability.

- **Scalability:** PASSUR's data and products are hosted in the AWS cloud, which allows for instant and seamless adding or shrinking of capacity as needed to meet our customer's dynamic data and software needs, on a day to day or even minute by minute basis.

- **Expandability:** the same core data and software capabilities support requirements in operations (flight, airport, airspace); finance (aeronautical fees and charges); and environment (noise and emissions).

The sheer volume, diversity, and detail of the global "data lake" we've created means that we can support – from a single source – a huge variety of real-time aviation operations requirements that previously would have required contracting and connecting with dozens of individual data providers and sources. This means faster time to deployment, quicker realization of benefits, and clearer business cases. And because we store so much of that data, it supports an equally large number of post-operational requirements – like competitive performance analysis, financial auditing, safety replays and reviews, and environmental compliance monitoring.

Faster time to deployment, quicker realization of benefits, and clearer business cases

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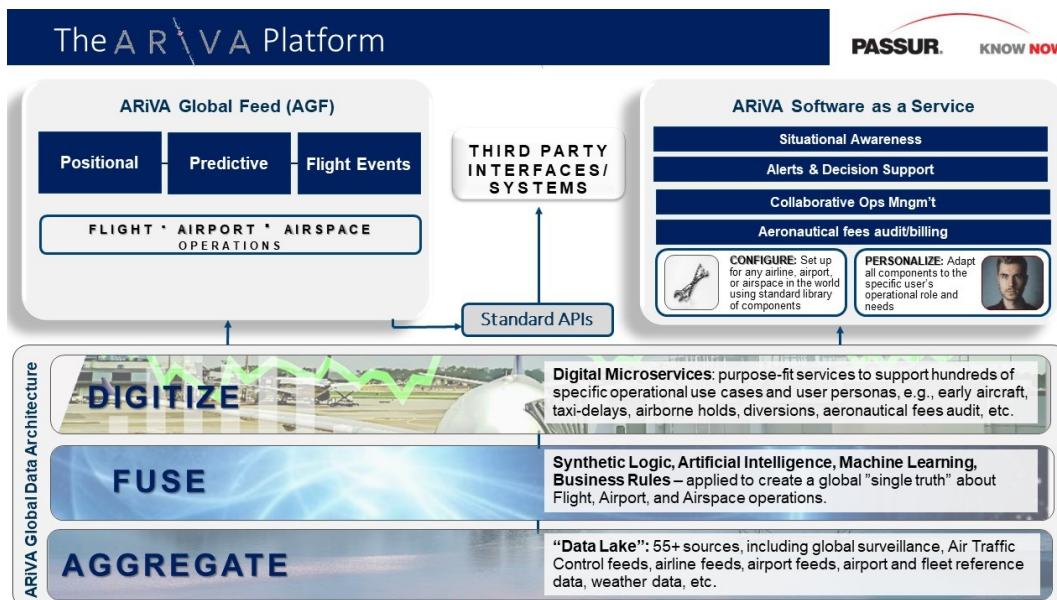
VTU-20 VMAT External Enclosure with Integrated Antenna Assembly

ENHANCE YOUR AIRPORT'S AIRCRAFT AND VEHICLE TRACKING

PASSUR is excited to announce the deployment and support of our dual-band (978MHz and 1090MHz) networkable ADS-B receiver. This advanced technology provides comprehensive ADS-B surveillance at all altitudes, including on the airfield surface, ensuring unparalleled situational awareness for your airport.

Elevate Situational Awareness with ARiVA Surveillance Data

By integrating ADS-B data with PASSUR's ARiVA Surveillance Data, our ARiVA, OpsVue, and MobileVue software applications offer enhanced situational awareness across both movement and non-movement areas of the airfield, and capabilities for decision support and airfield workflow. This fusion of data sources gives airport and airline users a more complete and accurate view of their operations, as well as tools to optimize them.

ADS-B Vehicle Tracking for Your Airfield

Airports can enhance their tracking capabilities by deploying these receivers alongside Vehicle Movement Area Transponders (VMATs). PASSUR's VTU-20 VMAT is fully FAA compliant, providing accurate, real-time tracking of surface vehicles and significantly boosting operational situational awareness and safety.

Aircraft equipped with ADS-B IN can detect VMAT-equipped vehicles on the airport surface, and vehicle movement data is seamlessly integrated into PASSUR software products, ensuring comprehensive airport-wide situational awareness for operations management personnel, ramp tower staff, and vehicle operators.

VTU-20 VMAT Specifications

The VTU-20 VMAT is designed for easy deployment with a compact external enclosure featuring an integrated antenna assembly and an in-cab controller. The enclosure can be magnetically or hard-mounted on vehicles, providing flexibility and convenience.

Stay ahead with PASSUR's cutting-edge surveillance technology and ensure the highest level of operational efficiency and safety at your airport!

PASSUR News Summer 2024

KEY BENEFITS

- **Dual-Frequency Reception:** Captures both ADS-B frequencies (978MHz UAT and 1090MHz).

- **Enhanced Safety:** Integrates with other sensors and data sources for safer operations.

- **Customizable Integration:** Tailors to unique system requirements.

- **Data Gap Filling:** Addresses low altitude and surface data deficiencies.

- **Flexibility:** Portable design for both stationary and roaming coverage.

- **Improved Accuracy:** Boosts quality, accuracy, and reliability of vehicle and flight tracking data.

- **Seamless Integration:** Works with PASSUR's comprehensive application suite.

Innovative Features

- **Deployable Sensor:** Local deployment for low altitude ADS-B coverage.

- **Self-Contained Design:** Includes receiving antenna, GPS, and a cellular modem communication device, all in a compact form.

- **System Safety Compliance:** Meets stringent safety requirements, including remote maintenance monitoring.

READY TO UPGRADE YOUR AIRPORT?

PASSUR's ADS-B Receivers and VMAT Units are suitable for airports of all sizes, enhancing situational awareness and improving airfield safety.

For more information, please contact us at sales@passur.com.

PRODUCT UPDATES

PASSUR Communicator Now Integrates Visual Flight Tracking and vNOTAMs

You can now view and interact with Visual NOTAMs (vNOTAMS) and our MobileVue display in the Communicator Portal. This new integration provides increased real-time airfield status information to all your stakeholders across the Airport.

Right: The Falcon vNOTAMs solution provides a real-time graphical display of FAA textual NOTAMs (Notices to Airmen) and FICONs (Field Condition Reports) from the Federal NOTAM System (FNS) for a particular airport on an airfield map to provide an intuitive visual representation of current and future airfield conditions.
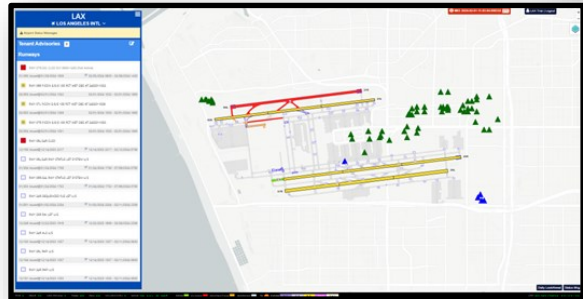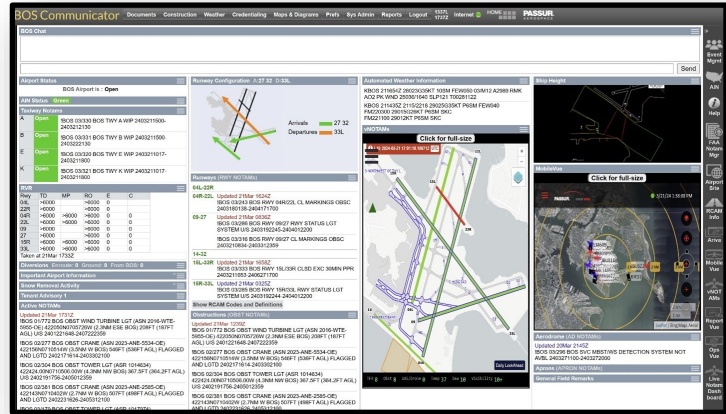
Left: The NOTAM and FICON information from Falcon vNOTAMs are also integrated for display as a layer in PASSUR's MobileVue map displays for full situational awareness.

Below: Airport Status floating windows.
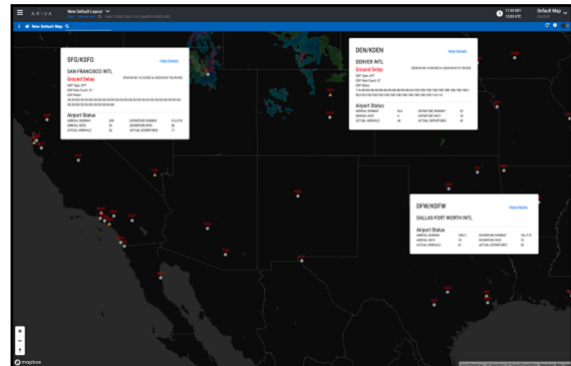
Airport Status and Alerts Now Available

The Airport Identification feature in ARiVA maps has been renamed to 'Airport Status and Alerts.' When this feature is enabled, users can now click on the circular dot next to any airport and a window will open which displays the following status information:

- Arrival and Departure Runway Configuration
- Called Arrival and Departure Rates
- Actual Arrivals and Departures over the last 60 minutes (i.e., Rolling 60 minutes).

Note that these airport windows are floating and can be moved around within the map component. Also, they will update automatically when information changes so there is no need to open/close or refresh manually. Multiple airport windows can be open simultaneously.

For major airports in the US and Canada, the following active alerts will be displayed.
- Airport Closures (full and partial)
- Ground Delay Programs and Associated Information
- Ground Stops

Also, when alerts are in effect, the circle icon near each airport will turn into an alert icon. When alerts clear or expire, the alert icon will revert back to a circular icon.

Note: Airport Status and Alerts in ARiVA consolidates a number of automatically populated fields from FAA SWIM with calculated fields from PASSUR's flight database. The purpose is to display alerts and information related to closures, ground stops and ground delay programs, as well as general status items like arrival and departure called/actual rates and runway configuration. This feature contains some global airports, but for now, the richest data, especially for alerts, is limited to the US NAS. For airports that we do not currently have information for, N/A will be displayed. We plan to evolve this feature in partnership with our customers.

PRODUCT UPDATES

PASSUR Takes Next Step in FAA TFDM System Integration with ARiVA

PASSUR has already integrated into our ARiVA platform Traffic Flow Management System (TFMS) data, a decision support system for planning and mitigating demand-capacity imbalances in the NAS, and Time-Based Flow Management (TBFM) data, a decision support system for metering based on time to optimize the flow of aircraft.

The next evolution of the FAA's NextGen decision support is Terminal Flight Data Manager (TFDM), a new decision support system for airport surface management/ and automated ATC tower functions (Electronic Flight Strips (EFS).

PASSUR Aerospace has participated in the FAA TFDM Testbed for the past 4+ years and recently announced that it is now receiving data from TFDM Terminal Publication (TTP) service via SWIM. This will enable PASSUR to publish Flight and Flow Data information as planned, seen, and forecasted by the FAA in our ARiVA platform.

PASSUR will be able to provide our airport and airline customers full integration with the TFDM system through ARiVA. With ARiVA's platform flexibility, airport and airline users will be able to configure multiple map, table, and dashboard workspaces to visualize the TFDM data in any manner they choose to ensure efficient operations.

PASSUR will provide airport and airline customers full integration with the TFDM system through ARiVA.

Example ARiVA TFDM Layout
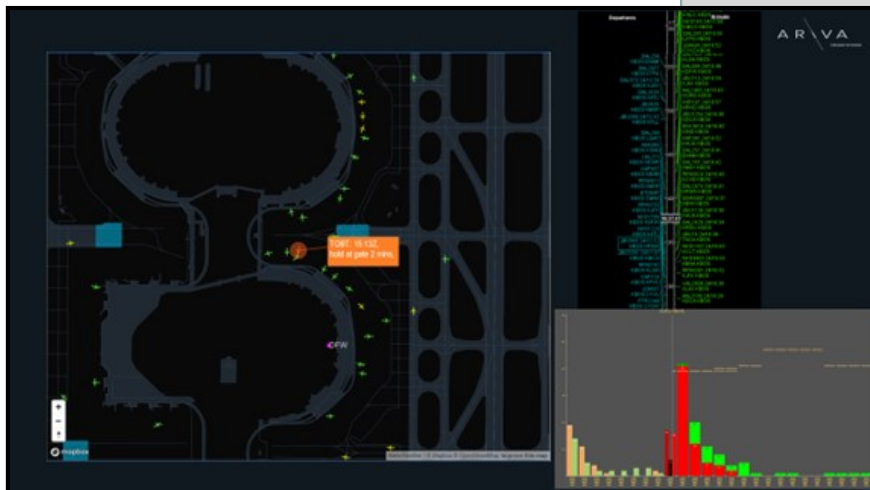
TFDM DATA ELEMENTS TO BE AVAILABLE IN ARIVA FOR ENHANCED AIRFIELD RAMP CONTROL AND AIRLINE NETWORK MANAGEMENT.

Airport information
- Airport configuration, including start/end times, current and scheduled
- Runway arrival and departure rates
- Runway closures, region closures, gate region closures

Flight Delay
- Departure delay
- Actual departure time
- Delay start and end times
- Impacting condition

Individual Flight Data
- AOff, AOn, AOut, AIn
- Movement area entry/exit times
- TOBT, TMAT
- Estimated spot times (Ramp, transit times)
- Actual, predicted runways
- TMI ids associated with flight
- Flight state

Surface Metering
- TMAT adjustment time
- Reclamation window
- Queueing type
- Metering resource constraint
- Number of flights affected
- Average and max hold times
- Predicted queue lengths
- Metering parameters e.g., optimal numbers in queues

Post Operational Metrics
- Departure and arrival counts
- Off block accuracy
- Transit times: ramp, hold area, queuing times
- Target and actual metering times
- Prediction accuracy

INDUSTRY NEWS

SITA's 2023 Air Transport IT Survey Report presents findings from research that reflects the perspectives of more than 250 senior executives from airlines and airports. The report delves into their current technological landscape and outlines future investment priorities within the air transport sector. It reveals a consistent upward trend in IT expenditure for both airports and airlines, with investments reaching an estimated US$10.8 billion and US$34.5 billion respectively in 2023.

Key insights from the report highlight Business Intelligence (BI) as the primary focus of technology investment for airlines over the next three years, with 73% of them embarking on significant BI initiatives. Additionally, nearly two-thirds of airports and airlines are actively collecting and integrating data. With the emergence of generative Artificial Intelligence (AI), there is a growing interest in leveraging AI and machine learning to extract insights from this data.

You can download the SITA 2023 Air Transport IT Survey here.

By 2026, more than 90% of airlines intend to implement IT solutions to enhance the efficiency of flight operations and aircraft turnaround times.

NEW TOOLS TO IMPROVE AIRPORT SITUATIONAL AWARENESS

The FAA has outlined plans for the deployment of **Approach Runway Verification (ARV) technology** at multiple airports across the United States. ARV offers controllers both visual and audible alerts when an approaching aircraft is aligned to land on an incorrect airport surface, or potentially even the wrong airport altogether.

Typically, when an aircraft nears the airport, controllers grant landing clearance for a specific runway. However, there could be instances where the pilot aligns with an adjacent runway or taxiway instead. In such cases, ARV will promptly alert the controller if the aircraft is not aligned with the instructed runway surface.

ARV stands as one of the three surface situational awareness solutions within the FAA's expedited surface safety portfolio. The other two components are the Runway Incursion Device (RID) and the Surface Awareness Initiative (SAI).

The agency aims to deploy ARV at additional facilities nationwide throughout the remainder of the year and into 2025, with early adoption already underway at Austin Bergstrom International Airport (AUS).

The development and implementation of these technologies are integral parts of the FAA's strategy to mitigate near-miss incidents following last year's Safety Call to Action. In tandem with technological advancements, the FAA is also bolstering safety measures by expanding its air traffic controller workforce, upgrading tower simulator systems in facilities nationwide, hosting regular runway safety action team meetings, and investing millions into enhancing runway lighting and surface infrastructure at airports across the United States.

You can read the FAA's announcement here.
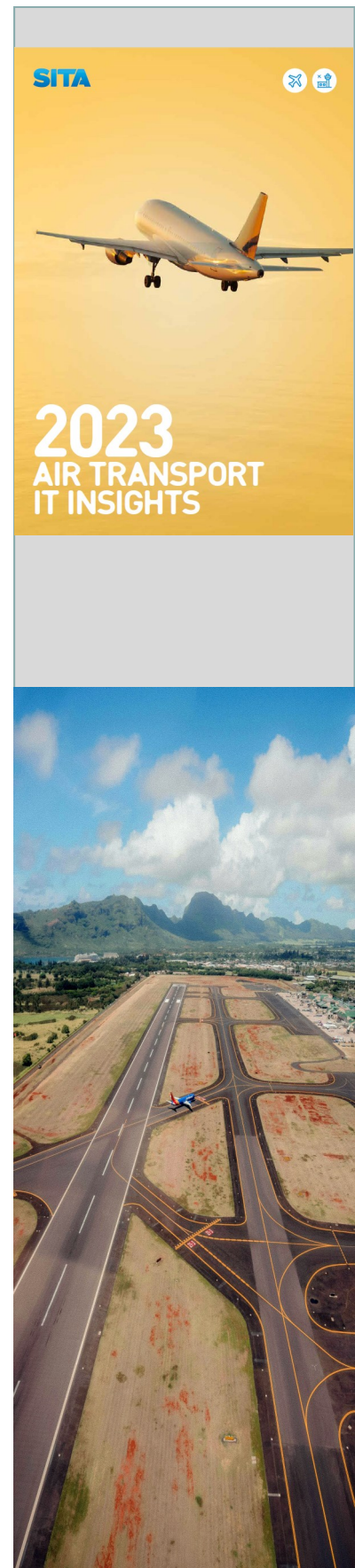
PASSUR x-ETA: IT'S ALL ABOUT THE TIMING

Airline operational personnel rely on Flight Information (FLIFO) within Flight Operations Systems (FOS) and Passenger Service Systems (PSS) to manage aircraft arrival, departure, and overall scheduling. However, current Estimated Time of Arrival (ETA) information inaccuracies lead to numerous operational challenges.

The joint industry FAA SWIFT analytics team has identified that FAA systems can have up to five competing ETAs feeding airport systems, complicating the choice of the most reliable source.

Inaccurate ETAs detrimentally affect airlines in various ways:

• Inefficient resource allocation both above and below the wing, disrupting task prioritization and resource allocation.

• Unmet arrivals at gates causing passenger delays and misconnections, unnecessary fuel burn, and degraded on time performance.

• Deployment of support personnel on unnecessary assignments.

Airlines and airport operators can achieve operational efficiencies.

PASSUR x-ETA technology provides accurate Estimated On (EON) and In (EIN) times, leveraging aircraft location, airspace conditions, and historical data.

It outperforms both ANSPs' and airlines' predictions by utilizing advanced forecasting techniques, including machine learning.

By incorporating PASSUR's predictive technology, airlines and airport operators can achieve operational efficiencies, including savings in fuel, turnaround time, and reductions in misconnected bags, passengers, and crew.

For example, improved arrival time forecasting by x-ETA could save a Tier 1 airline over $1 million annually through fuel savings, operational efficiencies and passenger goodwill.

X-ETA Process

The arrival time forecasting process starts with filed flight plan, aircraft performance, forecast weather/ATC performance and historical performance under similar conditions. Using these conditions an initial landing time (EON) time forecast is made.

Once the aircraft has reached stable altitude, x-ETA heuristic and machine learning algorithms use live and historical fused flight tracks, as well as amended flight plans to forecast estimated landing times (EON).

Simultaneously to forecasting EON times, x-ETA uses the forecast EON times, airport configuration, arrival runway and arrival gate information to predict the taxi-in time.

The forecasted EON and taxi-in times are then used to provide a timely, accurate and actionable gate arrival time that the airline operations staff and customers can use to make different decisions that have a material and measured impact on key metrics like turn time, connections, and on-time performance.

PASSUR's estimated On and In times are consistently better than other sources such as ANSPs and flight management systems.

THE BENEFITS OF ACCURATE ETAS

• Early alerts for significantly early or late aircraft, minimizing disruptions.

• Timely resolution of gate conflicts, preventing post-landing disruptions.

• Enhanced decision-making regarding passenger and baggage handling, reducing delays and misconnections.

• Improved readiness for aircraft reception, leading to smoother operations and happier passengers.

• Optimal staffing and route planning, enhancing efficiency.

• Better management of fueling and catering operations, preventing delays.

• Enhanced predictability during irregular operations (IROPS).

• Reduced erroneous notifications to passengers and stakeholders.

WHAT MAKES PASSUR PREDICTIONS UNIQUE?

Global Data Aggregation the largest aggregation of global terrestrial and satellite surveillance - 55+ data sources.

ARiVA Fused Scheduler correlates data feeds to ensure a single, 'master truth' that's consistent, deconflicted, reliable, and standardized across all ARiVA data and software services.

Synthetic Logic 'fills in' missing data elements that may be missing from original upstream sources, needed to support downstream predictions, alerting, flight and airport status, decision support.

Historical Data 10+ years of stored global flight, airport, and airspace data.

Machine Learning continuous training based on the interaction between pattern recognition and business rules.

Gate-to-Gate Forecasting predictions based on gate-to-gate trajectory, rather than runway-to-runway – considering the impact of the airfield ground operation on the forecasted arrival time.

Subject Matter Expertise the knowledge base for effective data cleansing, feature definition. Our knowledge enables us to develop and deploy better predictive models more effectively.

July 21-23
AAAE Hub Winter Ops & De-icing Conference
Pittsburgh, PA USA

August 11-14
Florida Airports Council
Miami, FL USA

August 19-21
AAAE Tech & Ops Symposium
San Jose, CA USA

September 7-10
ACI-NA Annual Conference
Grand Rapids, MI USA

September 22-24
National Airports Conference
Ft. Lauderdale, FL USA

September 23-26
ACI Customer Experience Summit
Atlanta, GA USA

If you are going, we would be delighted to meet you. Let us know at sales@passur.com

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PEOPLE @ PASSUR

Curt Vogel recently assumed the position of Vice President of Finance and Administration at PASSUR. In this capacity, he exercises executive oversight of the company's financial operations and directs the management of revenue, forecasting, customer contracts, and key external engagements.

Curt brings a wealth of experience to his role, including comprehensive expertise in commercial and operations management, business development, and finance. His background includes extensive involvement in commercial management, negotiations, forecasting, strategic planning, and cross-functional collaboration within major technology organizations operating in the global air transport industry.

Previously, Curt held significant positions at SITA, serving as the Director of Mergers and Acquisitions, as well as the Director of Commercial Operations for the SITA Passenger Services System division.

Ken Perez joined PASSUR in February as a Customer Success Engineer. In this role, he spearheads project management, implementation, and ongoing support for our field systems.

Ken closely collaborates with contractors and field technicians to guarantee seamless operation of client systems throughout deployment stages. Moreover, he plays a pivotal role in liaising with clients to ensure they possess the necessary tools for leveraging PASSUR software platforms effectively, proactively identifying and addressing any issues or required modifications.

Ken also works hand in hand with the sales team to facilitate a smooth transition from purchase to the planning and execution phases of the proposed solution.

With a decade of experience in the aviation industry, Ken has held client-facing roles at companies such as Vector Airport Systems and AeroCloud Systems. His background encompasses customer support, leadership of systems and implementation teams, as well as business development.