Compilation of Answers from Selected ATD-2 Industry Workshop Questions on SWIM

Question	Workshop Topic	Submitted Question	Answers from the ATD2 Team (Mar 2020, unless otherwise noted)
1	Panel: Preparing for the Transition to TFDM and a Data-Driven NAS. Perspectives from Industry and FAA leaders	Will airlines be able to manage their own pushback during surface metering? What interface will TFDM provide?	Surface metering is only implemented when needed due to demand exceeding capacity. During metering, flights are assigned a TOBT and TMAT to manage the flow of departures to the runway. The TMAT is the time that the departure should enter the AMA. The TOBT is the recommended pushback time to comply with the TMAT. While the goal is to hold on the gate, it is recognized that there are cases where the departure cannot hold for operational reasons such as a gate conflict. Airlines have the option to take the hold at the gate, hold in the ramp, or hold in the AMA.
2	Panel: Preparing for the Transition to TFDM and a Data-Driven NAS. Perspectives from Industry and FAA leaders	Mentioned many times today, What FAA and NASA did to ease the use of SWIM? We tried couple of times and could not translate the data coming through.	The feeds are challenging to get started with, and we relied on a lot internal subject matter expertise and data analysis along with the resources provided by the FAA. NASA has shared its lessons learned for processing SWIM data. That information can be found here: https://aviationsystems.arc.nasa.gov/atd2-industry-workshop/fuser/Fuser-Data-Processing_85328166.html The FAA SWIM office hosts regular SWIFT meetings to provide information about SWIM to industry. They have hosted SWIM developer workshops to help get SWIM consumers connected. The FAA SWIM office also provides a jump start kit for connecting to SWIM through SCDS (https://scds.swim.faa.gov/)
3	Panel: Preparing for the Transition to TFDM and a Data-Driven NAS. Perspectives from Industry and FAA leaders	How airlines and airports are going to work hand in hand to feed data into the TDFM, terminal and airside operations?	CDM airlines provide surface flight data elements to the NAS through the TfmData Request/Reply interface. This includes data EOBT, gate, and intent information. Additionally, ramp closure information can be shared directly to TFDM through the TFCS interface. The Surface CDM Team (SCT) CDM subgroup has worked to enable airports to participate in the sharing of CDM data. At a TFDM site, the expectation is that airlines and the airport authority will agree on local procedures and data sharing responsibilities.
4	'Fuser in the cloud' overview and latest updates/needs	How did you identify your Business Rules (e.g. how do you determine precedence of hierarchal rules and what's authoritative?)	A combination of subject matter expertise and analysis. In many cases, the rules were born from a lot of data collection and analysis.
5	'Fuser in the cloud' overview and latest updates/needs	From NASA ATD-2 experience, what's your recommendation on storing SWIM data in the Airlines' internal data warehouses? Given these XML messages are quite deep and there are many different messages, are relational databases still effective in storing them? Any other ideas on database design?	We store the raw xml archives for playback and reprocessing. From there, we developed flattened database schemas in postgres. Some feeds like TFMS and SFDPS have a lot of messages, so we generally created a table per message time. We used Mongo in some cases to inspect the data to confirm which values were truly present. With that said, our primary database is the fuser database which blends all that data together. We use our SWIM databases primarily for back tracking issues.
6	'Fuser in the cloud' overview and latest updates/needs	Is the ATD-2 Fuser the first and only Fuser in the NAS right now?	I would not say it's the first and only. It's very mature and pretty robust and designed to be general purpose. However, other companies have likely developed similar capabilities to support their needs.
7	'Fuser in the cloud' overview and latest updates/needs	What is the data latency, inherent in this fusion process?	From the time we receive the data to the time it leaves the Fuser, it is generally under 2 seconds.
8	'Fuser in the cloud' overview and latest updates/needs	How does the Fuser differ from the Flight Object concept?	I believe the Flight Object concept is mainly about the definition of a common Flight Object. In that regard, it is similar to the schema developed for the Fuser. However, I don't believe the Flight Object project has developed the parsers, matching, and business rules to fuse all the data and make it available.
9	Future surface decision support overview (with ATD-2 demo)	If there are discrepancies in data from multiple sources, do you have a hierarchy as to which one you use?	Yes, we do have a hierarchy of data sources for some data elements. The Fuser processing and mediation rules are described here: https://aviationsystems.arc.nasa.gov/atd2-industry-workshop/fuser/Fuser-Architecture-Overview_84377881.html. The ATD-2 team presented the Fuser mediation and processing rules at the SWIFT meeting on May 22, 2019. The SWIFT presentations are here: http://connect.lstechllc.com/files/SWIFT_ATD2_Consolidated_20190521v2.pptx. The team also recapped the processing and mediation rules at the ATD-2 Industry Workshop during Session 1A: 'Fuser in the cloud' overview and latest updates/needs. The Workshop slides and recording are here: https://www.aviationsystemsdivision.arc.nasa.gov/atd2-industry-workshop/presentations.html.
10	Future surface decision support overview (with ATD-2 demo)	For flights with multiple flight plans, are you flight matching using logic similar to what TFMS does or do you have your own rules	The ATD-2 fuser logic for handling multiple flight plans is similar to TFMS, but we do not have documentation on the TFMS logic, so we cannot be sure that it is identical. The ATD-2 fuser tracks all pre-departure flight plans associated with a flight. The most recently updated flight plan is assumed to be the current one. When a flight plan is cancelled, it is removed from consideration and can no longer be considered the current flight plan.

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11	SWIM-Fused data products used by ATD-2 analysts for quantifying NAS performance and benefits (part 1)	What in these reports is internal for NASA development/analysis purposes, and how much goes back out over SWIM (if anything)?	None of the flightSummary data developed for ATD-2 is sent directly back out over SWIM. It is produced using data from SWIM as well as from the ATD-2 system. However, the ATD-2 system itself does generate data that is sent out over SWIM using the TFDM Terminal Publication (TTP) data feed. Documentation for this is available at https://nsrr.faa.gov/services/nasa-ttp/documents.
12	Opportunities for Mobile Applications in the 3T environment	What type of security is needed for secure two-way data exchange via mobile apps? Can SWIM IAM accommodate security reqs?	Please contact Craig Johnson (MITRE), cmjohnson@mitre.org, or Ernie Stellings (NBAA), estellings@nbaa.org
13	Opportunities for Mobile Applications in the 3T environment	Are there any security constraints in place to prevent a flight from inpersonating a other flight?	Please contact Craig Johnson (MITRE), cmjohnson@mitre.org, or Ernie Stellings (NBAA), estellings@nbaa.org
14	Opportunities for Mobile Applications in the 3T environment	Seems that poor data quality could negatively impact demand predictions and surface programs. How to enforce data quality?	Please contact Craig Johnson (MITRE), cmjohnson@mitre.org, or Ernie Stellings (NBAA), estellings@nbaa.org
15	Opportunities for Mobile Applications in the 3T environment	If this rolls out nationwide and we have, say, thousands of users, can SWIM scale to accommodate a large user base?	Please contact Craig Johnson (MITRE), cmjohnson@mitre.org, or Ernie Stellings (NBAA), estellings@nbaa.org
16	Opportunities for Mobile Applications in the 3T environment	Are there any consequences to prevent a pilot from spamming the system with updates?	Please contact Craig Johnson (MITRE), cmjohnson@mitre.org, or Ernie Stellings (NBAA), estellings@nbaa.org
17	New TFDM Terminal Publication (TTP) SWIM data, how to sign up and how to benefit from it	Will this data feed be supported with multiple 9's of availability. If airports and airlines are being asked to utilize this data and make operational changes based on it, it needs to be highly available and supported	This is really a question for TFDM and SWIM. Please contact the CSIT group, csit@faa.gov, or Doug Swol, christopher.d.swol@faa.gov
18	New TFDM Terminal Publication (TTP) SWIM data, how to sign up and how to benefit from it	Do you know what are the performance/capacity needs for future SWIM infrastructure to support 89 TFDM sites?	This is really a question for TFDM and SWIM. Please contact the CSIT group, csit@faa.gov, or Doug Swol, christopher.d.swol@faa.gov
19	Panel: Discuss early results of ongoing evaluation of Trajectory Options Set (TOS) with Surface for Metroplex departures	What coordination is being done with adjacent ATC facilities to let them know these flights are being rerouted?	3/20/2020: The routes for the reroutes offered in ATD-2 are Coded Departure Routes (CDR). CDRs are pre-coordinated and publicized routes that have been coordinated across all applicable adjacent centers. As a result, these routes can be filed by the flight operator and/or be used by ATC when the need arises. If weather or some other factor prevents the use of these routes, the routes can be made unavailable in the ATD-2 system through a filtering process.
			9/5/2019: Answered during meeting (Kenny West, ZFW STMC) Not much being done right now. Doesn't seem to have much of an impact. It's just a few flights a day, so is pretty seamless.
			9/13/2019: Additional answers post-meeting The onus is on ZFW TMU to assess whether alternative routes are available and the number of flights that would be acceptable. So far, the number of flights that were rerouted has been too small to impact other centers. The limitation on leveraging reroute opportunities would be driven by competing demand/capacity imbalances across routes and nm differences with filed routes. The surface layout of the airport may also influence the ability to sequence of departures. However, since the decisions to reroute typically take place before push, the flight may be sequenced based on its alternative routing.
20	Panel: Discuss early results of ongoing evaluation of Trajectory Options Set (TOS) with Surface for Metroplex departures	Is this solution utilizing RAPT to understand the potential weather impacts? Or is this focusing on NTML?	The ATD-2 system is not using RAPT, or any other logic to assess weather impact on departure routes. However, such algorithm could be a useful complementary capability to help to determine restrictions. The ATD-2 system currently relies on restriction entries made in the NTML system.
21	Opportunity for formulation input into NASA's future aviation plans (with NASA ATD and ATM-X projects)	Will the TFDM use a "fused" SWIM feed? If it is not the current Fuser will one or both of those be made available to users?	TFDM has developed its own flight data fusion capability to meet the specific needs of TFDM. The TFDM flight fusion has incorporated lessons learned from ATD-2. The ATD-2 Fuser is currently going through a process to make the source code available. The ATD-2 Fuser documentation is currently available here: https://aviationsystems.arc.nasa.gov/atd2-industry-workshop/fuser/Fuser-Data-Processing_85328166.html

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22	Opportunity for formulation input into NASA's future aviation plans (with NASA ATD and ATM-X projects)	Operators would like to make flight adjustments further in advance to limit customer impact (customer rather be canceled or swapped 3 hrs in advance rather than 30mins). The problem with predictions this far out is reduced certainty. Can a congestion service include probabilistic values to help better determine the range of potential impacts? Probabilities for various AAR for a time window could be very beneficial for instance.	Yes. The follow on work that NASA is considering which was initially introduce at the workshop and is now called Digital Services for Aviation (DS4A) seeks to use the best data available from SWIM (and potentially other sources) to provide the best predictions of future demand possible at various look ahead times. NASA's approach is to continue to collect input from the aviation community on which service(s) have the highest priority. It is unclear at this time if services that address this specific question are at the top of the list or a separate need. In some cases the demand/capacity imbalance (congestion) may be so large that these decisions can be made hours in advance with low risk or high confidence in the action providing benefits. In other cases, the uncertainty associated with the decision may not provide conclusive evidence that a change is warranted. The ATD-2 team is using the confidence in the prediction in its Phase 3, Stormy 20 work in such a way that the probability distribution function is communicated along with the prediction. The power of this is that each recipient of that information from the Operator groups can make their own decision on re-routing based upon their own business rules. For instance, if the Operator would like to make for sure there is a 90% probability of saving 10 minutes, they can use the information communicated to them to do so. If another Operator has a different threshold, they can use the same information being communicated with differing thresholds. Thus, the predictions do not have to be perfect to be usable in everyday operations. However, the more accurate the predictions are, the deeper the benefits will be given the higher confidence to achieve a certain threshold.
23	Opportunity for formulation input into NASA's future aviation plans (with NASA ATD and ATM-X projects)	If the Fuser is on the cloud, are we limited to your business rules? What if we wanted to change the business rules?	The Fuser-in-the-Cloud currently uses the ATD-2 processing and mediation rules. One benefit of this is that all consumers are working from the same data set. But we recognize that there may be missing data elements of interest or cases were the rules could be improved upon. We are open to suggestions to changes.
24	Substituting flights in TFDM with SWIM	Josh Gustin mentioned that building two-day exchanges (like here) on SWIM can be a very long process. Why is this the case?	Please contact Josh Gustin, Joshua.Gustin@faa.gov, or CSIT group, csit@faa.gov
25	Substituting flights in TFDM with SWIM	Will TFMS, TFDM and TBFM exchange data with each other through SWIM? Or is it point-to-point?	Please contact CSIT group, csit@faa.gov