

CROSS ORGANIZATION SEMANTIC SERVICE AND MORE ...

*Semantic Web for Air Transportation (SWAT)
Interest Group*

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Washington DC

Agenda

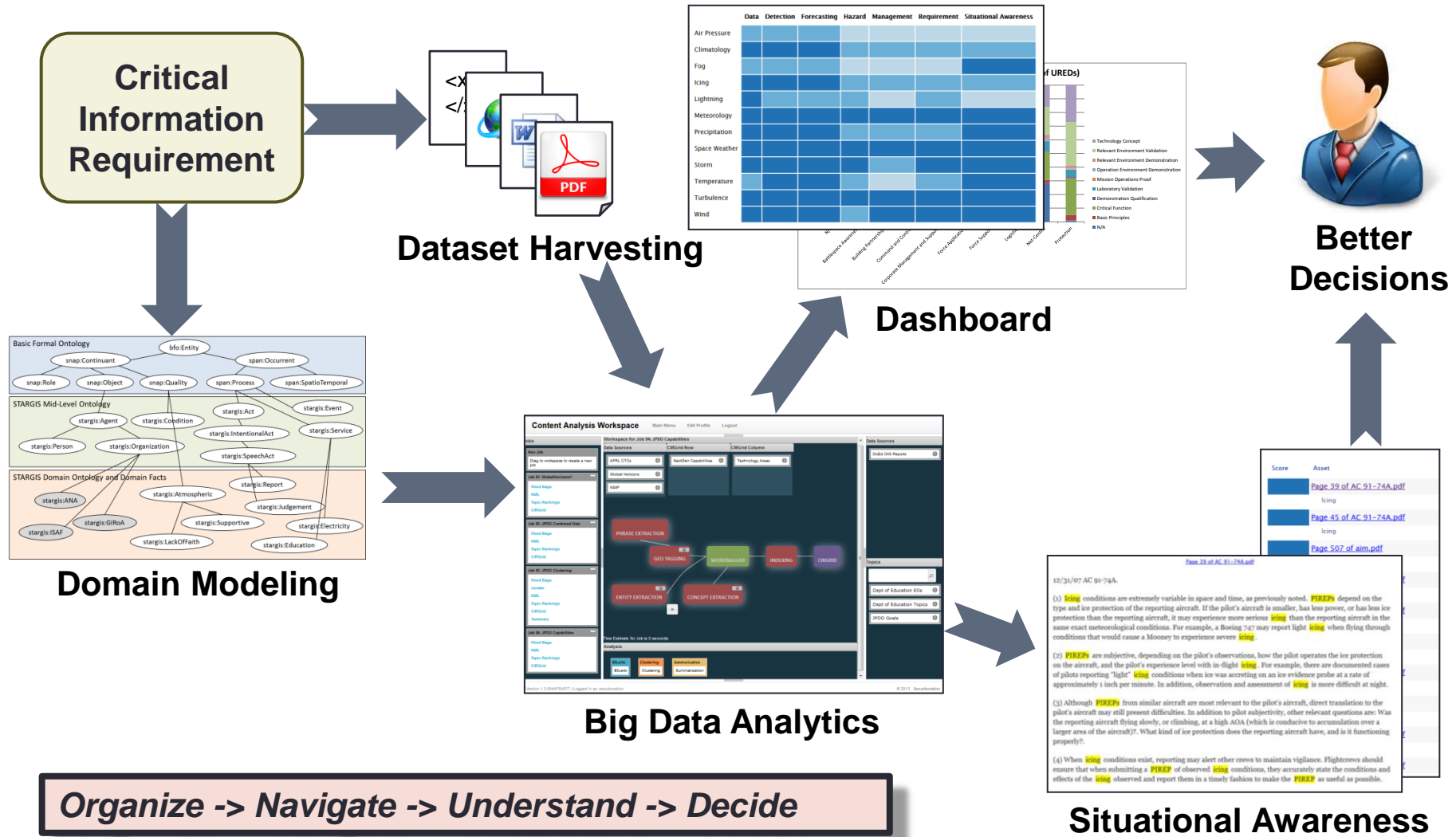
- Overview
- Cross-Organizational Semantic Services (CrOSS)
- Semantic Decision Support Tool (SDST)
- Summary

Overview

- **Leverage Semantic Web Technologies**
 - Provide actionable intelligence
 - Enable information discovery across organizational boundaries
 - Reuse existing data sources and services
- **Address Operational Problems**
 - Context-driven Decision Support for Pilot (Semantic Decision Support Tool)
 - Collaboration and Alignment of NextGen Activities (CrOSS)



CrOSS : Informs Decision Making



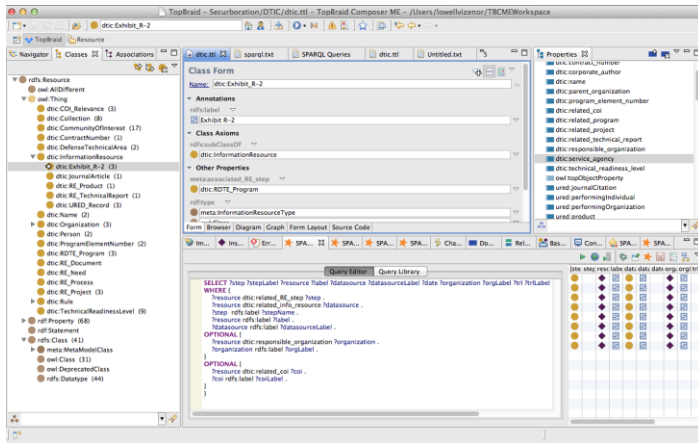
Use Case: UAS Regulations

- Critical Information Requirement:
 - What guidance involving pilot actions in hazard conditions needs to be reviewed for integration of UAS into the NAS?
- Datasets:
 - Federal Aviation Regulations (FAR) ~16 MBs
 - 2013 Aeronautical Information Manual (AIM) ~ 8 MBs
 - FAA Advisory Circulars (AC) ~34 MBs
- Scale:
 - ~12,000 pages of regulatory guidance
- Domain Modeling
 - 3 Aviation Hazards: Icing, Lost Comms, Turbulence
 - 3 Pilot Functions: Avoid or Mitigate, Pilot Aviation, Pilot Communication

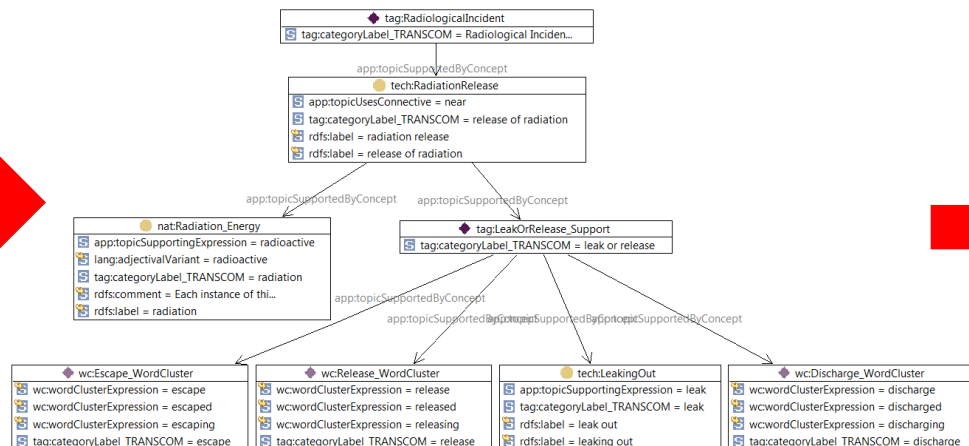
CrOSS Topic Authoring

Ontology Editor

Topic File



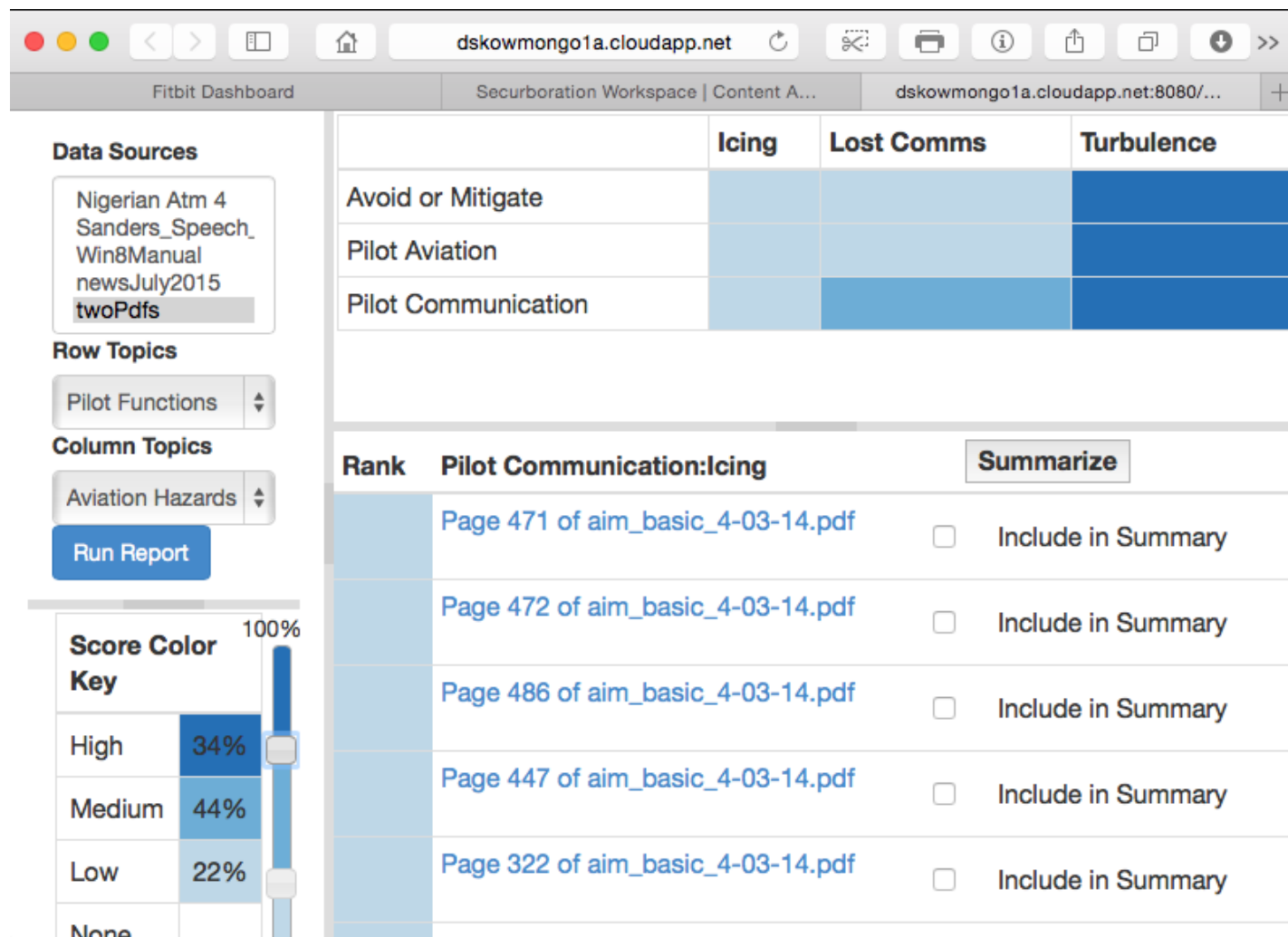
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Topics defined
in the ontology

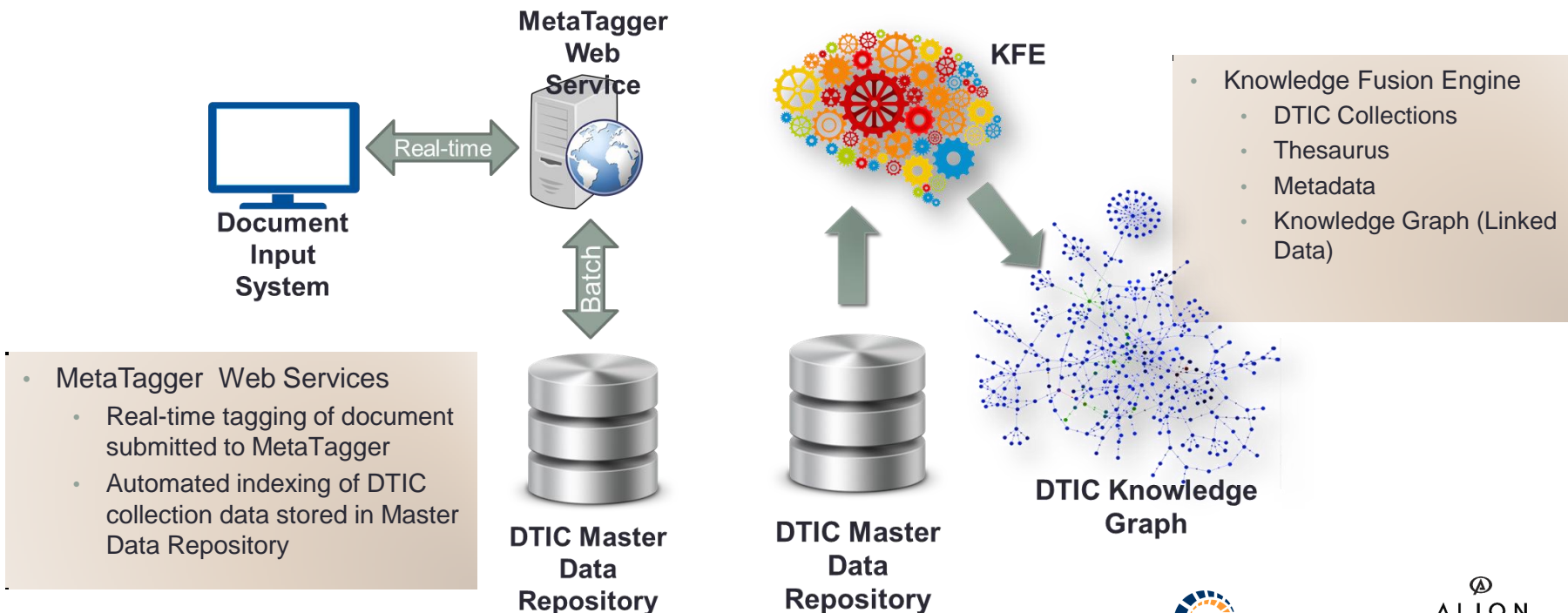
Topic file
generated
from ontology

CrOSS Content Analysis Results



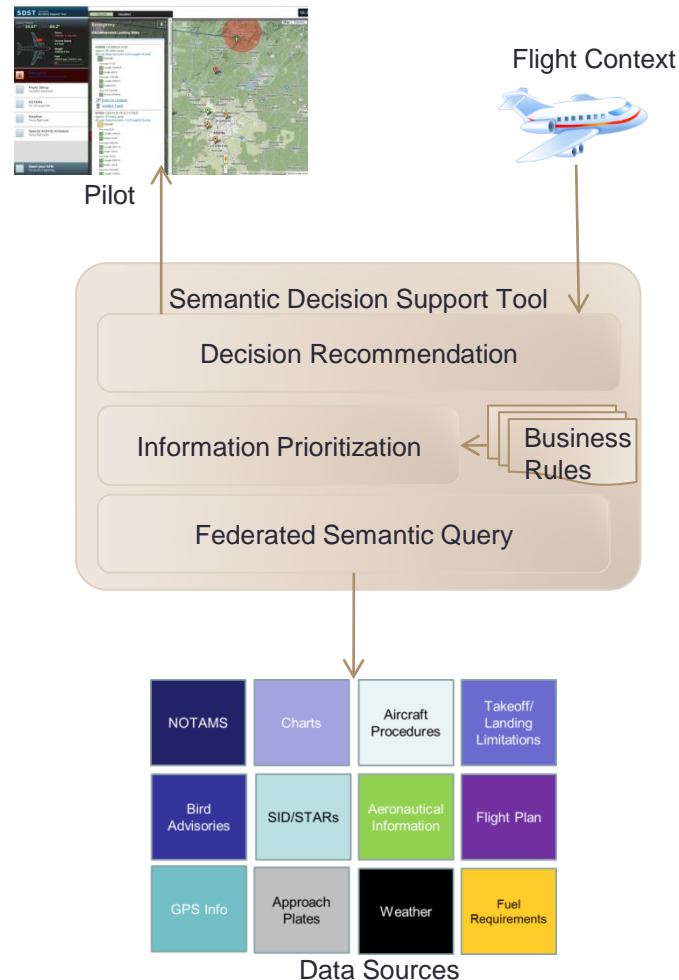
CrOSS Today

- Content Analysis Workspace hosted on Defense Technical Information Center's (DTIC) Production Environment

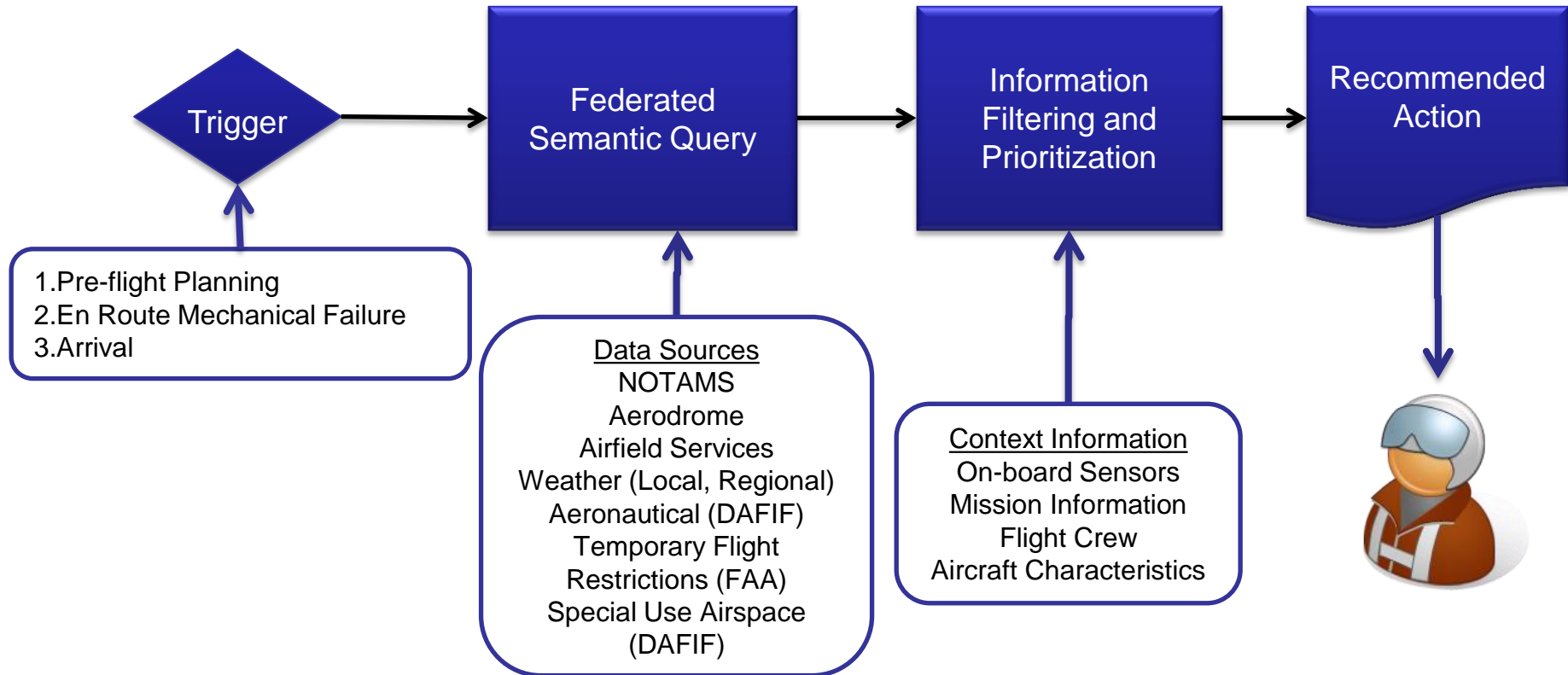


Semantic Decision Support Tool (SDST)

- Sponsored by Air Force NOTAMS office and NextGen Joint Planning and Development Office (JPDO)
 - Currently Deployed in the NextGen Prototyping Network (NPN)
- Addressing Information Overload Challenges Pilots
 - Information to the right people at the right time
 - Improve safety and efficiency
- Context-based Information Prioritization and Decision Support
 - Federated semantic query across multiple data sources
 - Flexible business rules based on SPARQL
 - Context-based decision support



SDST Scenario



SDST Demonstration

SDST Semantic Decision Support Tool

Current Position: LAT 34.67° LON -84.2°

Status: **ENGINE 1 FAILURE**

Ground Speed: 0.0 mph

Weight: 500000.0 lbs

Fuel: 2800.0 gal (19040.0 lbs)

Emergency Recommended Landing Sites

Flight Setup
Aircraft & waypoints

NOTAMs
For all waypoints

Weather
Along flight path

Special Activity Airspace
Along flight path

Open your EFB
Electronic Flight Bag

Emergency Recommended Landing Sites

KMG E DOBBINS ARB
Approx. 55 miles away
Minimal Requirements: 0.0 ft long/0.0 ft wide.

Overall

- Runway 11/29
- Length 10000 ft
- Width 300 ft
- Runway 11R/29L
- Length 3500 ft
- Width 60 ft
- Service Facility
- Active Military

KPDK DEKALB PEACHTREE
Approx. 55 miles away
Minimal Requirements: 0.0 ft long/0.0 ft wide.

Overall

- Runway 9/27
- Length 3363 ft
- Width 150 ft
- Runway 02R/20L
- Length 6001 ft
- Width 100 ft
- Runway 16/34
- Length 3967 ft
- Width 150 ft
- Runway 02L/20R
- Length 3748 ft

Map Satellite

AIR TRAFFIC CONTROL SDST

semantic.alionscience.com:9091/sdst/atc/IAD

Emergency Make Contact

IAD
CAT VFR
VIS 7.0 mi
WIND 4.0 kt from 100.0°

21:31:02

Track 1	Track 2	Track 3	Track 4	Track 5
LAT 33.38° LON -77.07°	LAT 33.91° LON -77.44°	LAT 33.83° LON -77.47°	LAT 33.5° LON -77.45°	LAT 33.51° LON -77.58°
Status: ENGINE 1 FAILURE	Status: NORMAL	Status: NORMAL	Status: NORMAL	Status: NORMAL
Fuel: [Progress Bar]	Fuel: [Progress Bar]	Fuel: [Progress Bar]	Fuel: [Progress Bar]	Fuel: [Progress Bar]

SDST Semantic Decision Support Tool

Current Position: LAT 38.26° LON -121.93°

Status: **NORMAL**

Weight: 500000.0 lbs

Fuel: 28000.0 gal (190400.0 lbs)

Visibility (miles): 7.0

Flight Setup
Aircraft & waypoints

NOTAMs
For all waypoints

Weather
Along flight path

Open your EFB
Electronic Flight Bag

ROBERT GRAY AAF
GRK / KGRK

MVFR
Flight Category

Resources

- En-route Chart
- RNAV_(GPS)_RWY_33(AP)
- VOR-A(AP)
- RNAV_(GPS)_RWY_15(AP)
- VOR-DME_RWY_15(AP)

11 More...

NOTAMs

Relevance rating: High

KGRK - RUNWAY 33 SEQUENCED FLASHING LIGHTS IN CONTINUOUS OPERATION UNTIL FURTHER NOTICE. POC MR CRAWFORD AT (254)

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SDST Next Steps

- Work Started on Context-based Aeronautical Information Delivery (CAID) Service for Air Traffic Control
 - Focusing on Air Traffic Control
 - Sponsored by FAA and Air Force

Summary

- Leverage Semantic Technologies to Capture Enterprise Knowledge
 - Ontology Development
 - Business Rules
- Establish Scalable Infrastructure for Knowledge Processing
 - Text Analytics
 - Big Data
- Develop Solutions to Address Operational Challenges
 - Mine information across document collections
 - Context-driven information delivery