



# Big Data Analytics for Time Critical Mobility Forecasting

**datAcron**

Project Overview for  
ComplexWorld 2016

Data Science in Aviation Workshop  
Cologne, September 2016

**datAcron**

datAcron project is funded by the European Union's Horizon  
2020 Programme under grant agreement No. 687591.



# Project Background – EU Funding

- datAcron is an EU H2020 funded Project, under call ICT-16-2015 “Big Data Research”:
  - “(...) Collaborative projects to **develop novel data structures, algorithms, methodology, software architectures**, optimisation methodologies and language understanding technologies **for carrying out data analytics**, data quality assessment and improvement, prediction **and visualization tasks at extremely large scale and with diverse structured and unstructured data**. Of specific interest is the real time cross-stream analysis of very large numbers of diverse, and, where appropriate, multilingual, multimodal data streams (...)”
- ~150 proposals, ~10 accepted= ~7% success rate

# Project Background – Alignment

- Technological developments will be validated and evaluated in user-defined challenges that aim at increasing the safety, **efficiency and economy** of operations concerning moving entities in the **air-traffic management (ATM)** and maritime domains:
  - Introducing novel methods to detect threats and abnormal activity of **very large numbers of moving entities in large geographic areas**.
  - To advance **the management and integrated exploitation of voluminous and heterogeneous data-at-rest (archival data) and data-in-motion (streaming data)** sources, so as to significantly advance the capacities of systems to promote **safety and effectiveness** of critical operations for large numbers of moving entities in large geographical areas.

# Project Background – Consortium

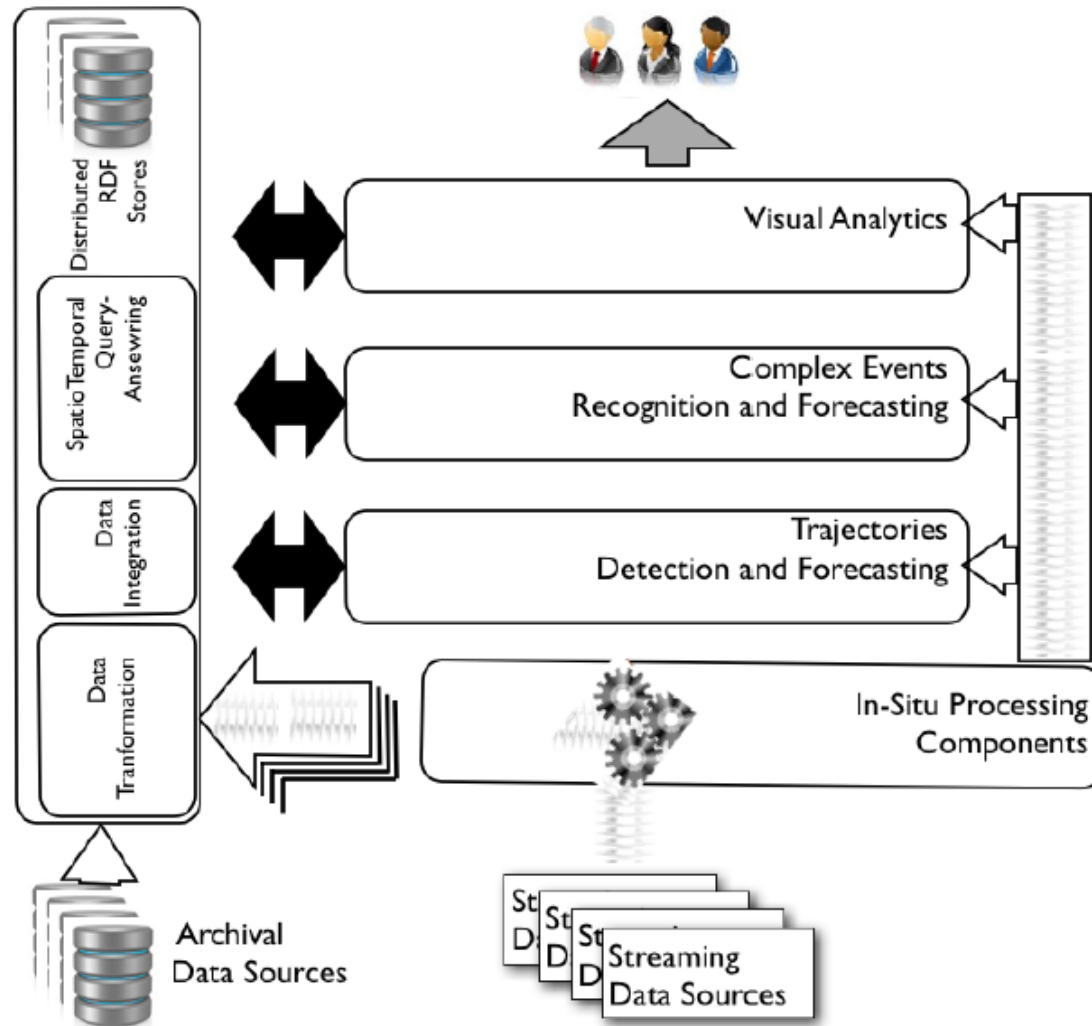


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# datAcron main Objectives

- Scalable integration and management of data from disparate and heterogeneous sources.
- Real-time detection and forecasting of **trajectories**.
- Real-time **event** recognition and forecasting.
- Real-time interactive analytics.

# datAcron high level architecture



# ATM use-case scenarios

dataAcron ATM use case aims to demonstrate how Big Data technology can help to increase the predictability of the ATM system (or decrease the uncertainty) thanks to a **better trajectory and event prediction and forecasting**. This improvements will lead to both better resource optimization of the ANSP's and more revenue (efficiency) for the Airlines. **The intensive use of historic and real time data for trajectory prediction and forecasting is the key enabler** for these improvements. Two groups of scenarios will be used for the experiments in this use case:

- Flow Management Scenarios
- Flight Planning Scenarios

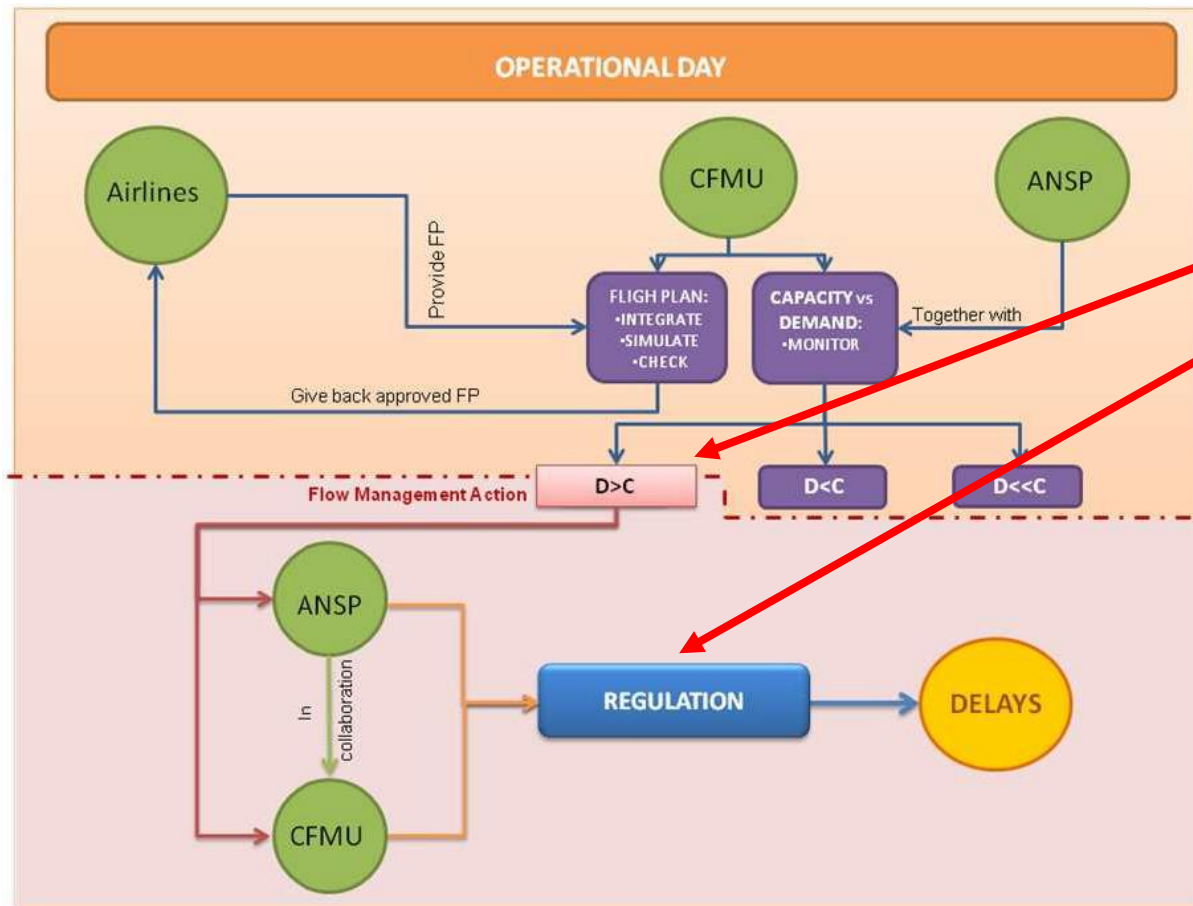
[D6.1 Aviation Use Case Detailed Definition](#) is available in project website.

# ATM use-case scenarios

- Flow Management scenarios main objective is to allow better planning of the demand and capacity balance which will lead to less delays. Detection and forecasting of regulations and detection and forecasting of negative unbalance will be used to resilience assessment.



# ATM use-case scenarios



Events to detect and forecast:

- D>C
- Regulation
- Resilience (as situations where D>C does not imply Regulations)

# ATM use-case scenarios

- Flight planning scenarios main objective is to enhance the trajectory prediction to avoid plans prone to great deviations the day of operations. Detections of patterns in real final flights deviated from the original flight plan will be used to detect the flight plans with less probability to be fulfilled.

# ATM use-case scenarios

(FPL-EIN105-IS  
-B763H-E3J4M2SRVWX/HB2U2V2G1  
-ZZZZ1200  
-N0400F100 DENUT UL610 LAM UL10 BPK UN601 LESTA UP6  
MIMKU/M082F320 NATB YAY/N0464F320 N186B YR/N0462F340 DCT NOTAP  
DCT TVC PMMS  
-KORD0700 KATL  
-STS/ATMX/MARSA FLTCK PBN/A1C3L1 NAV/GBAS SBAS DAT/NO  
SPECIFIC DESIGNATORS SUR/ADDITIONAL INFO DEP/MALAHIDE  
5327N00609W DOF 080622 TYP/2F15 3F5 DLE NTM0130  
ORGN EBBDMFP PER/A TALT EIDW RMK/PRESSURISATION PROB  
UNABLE ABOVE F120)

New Field or Element  
New or Modified content

Digits in Field 10a & b  
Up to 20 chars in Field 10b I

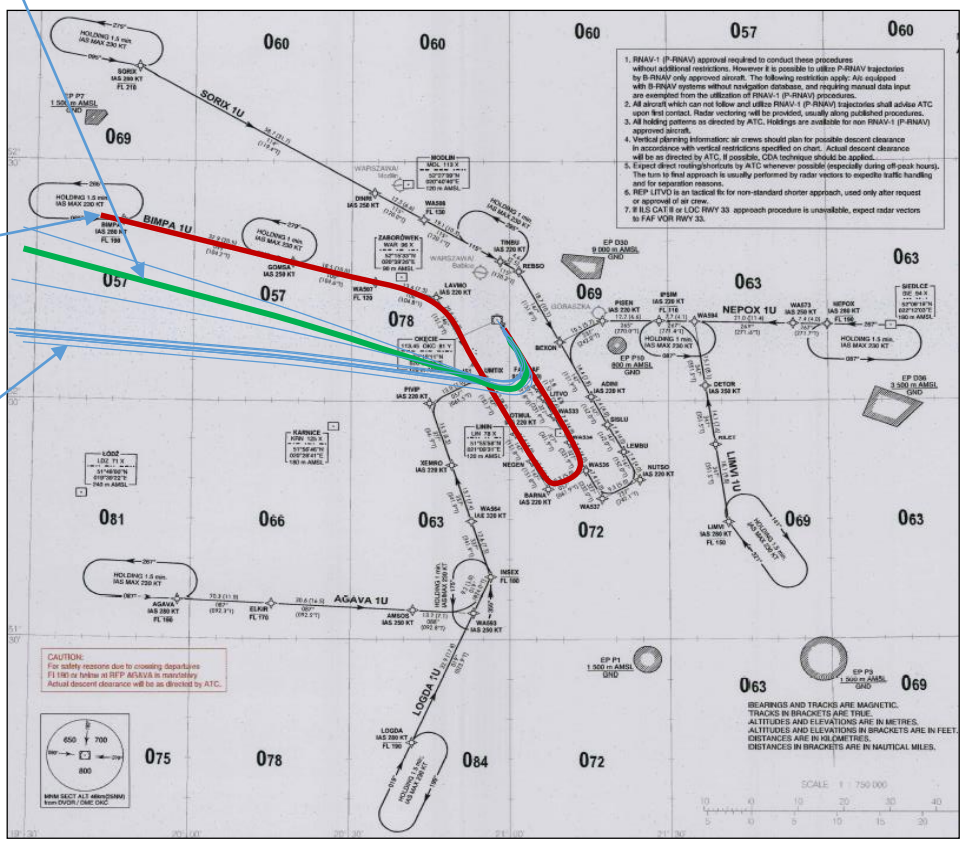
DatACRON  
Trajectory  
prediction

Historical data +  
context data

Model Base  
Trajectory  
prediction



Surveillance Data



# ATM use-case data

Both scenarios leverage the analysis of historic and/or real time data related to:

- Flight Plans
- Context ATM data
- Surveillance data
- Weather data
- Flow Management data
- Synthetic trajectories

Weather	NOAA
Radar	IFS
	ADSB
	DDR
Airspace	DDR
Network Management	CFMU
Synthetic Trajectories	Synthetic Trajectories
Aircraft Identification	Aircraft Identification
Flight Plan	Network Manager
	DDR
Context Information	Network Manager

[D6.2 Aviation data preparation and curation \(interim\)](#). is available in project website.

# ATM use-case Interest Group

- You are welcome to join the ATM Use Case interest group.
- Just sent an email to receive updates on project progress specially related to the ATM scenarios and give feedback (NDA signature needed):

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# datAcron on-line

- Website:

<http://ai-group.ds.unipi.gr/datacron/datacron>

- LinkedIn group:

<https://www.linkedin.com/groups/8495216>

- Twitter

[@datacron\\_eu](https://twitter.com/datacron_eu)



Thanks!