

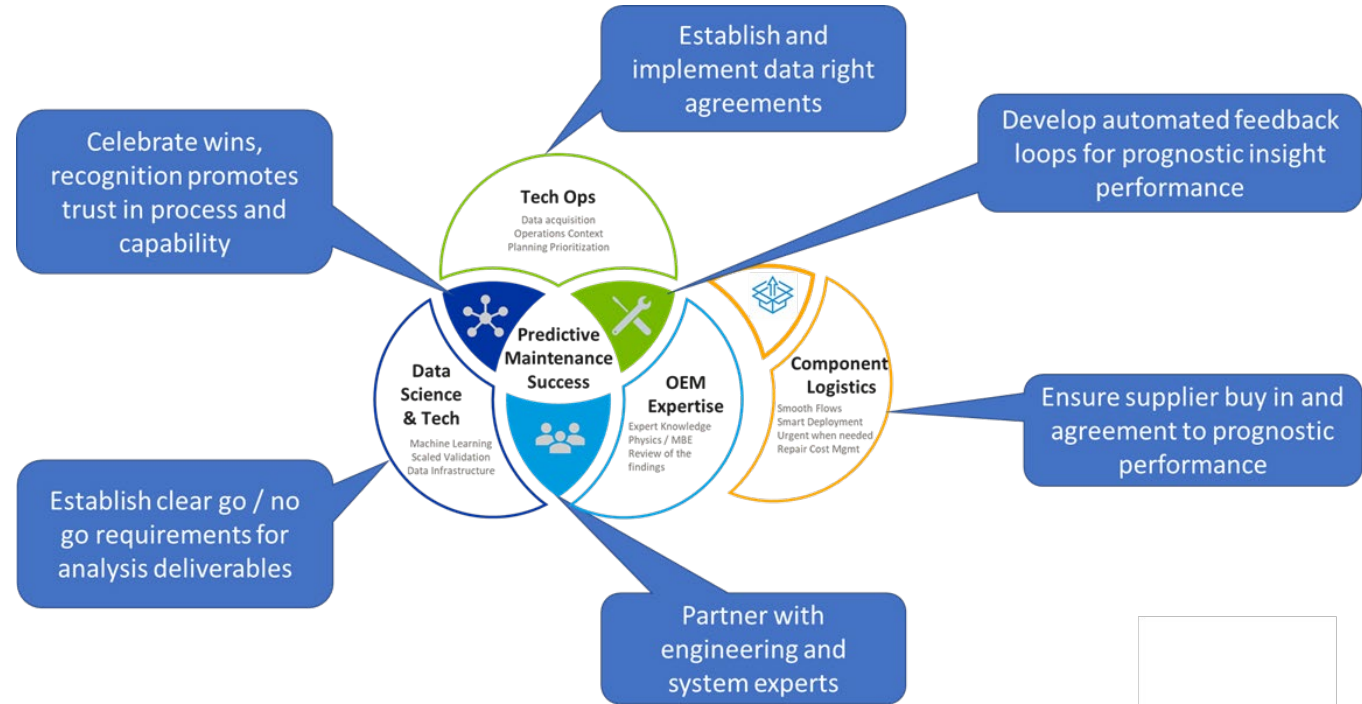
Predictive Maintenance Successes & Lessons Learned

Opportunity:

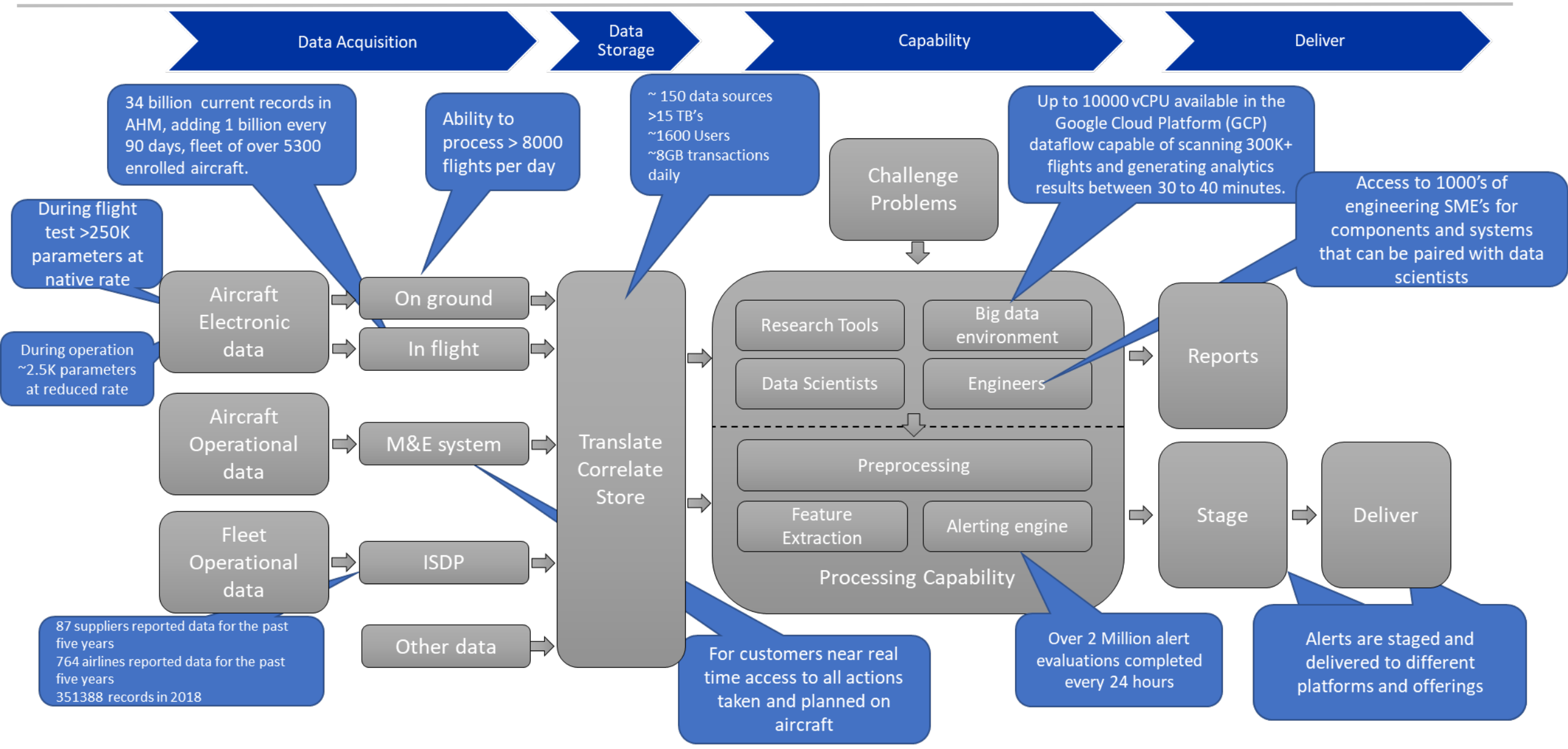
- There are many issues to be solved
- There are many approaches that can be used
- They look a little different from each perspective
- We need to right size each one

Challenges:

- Ease of access to aircraft data
- Data sharing policies
- Intellectual protection policies



Capability to Enable Predictive Maintenance



787 Cabin Air Compressor Predictive Maintenance

Behavioral & Removal Model Combination

Modeling Results Currently :

- In test set, predicted 7 failures out of 13, i.e. 54%.
- 30-60 days prediction window before failure
- Generalizing to multiple operators to validate results

Damage Severity Score Model

Modeling Results Currently:

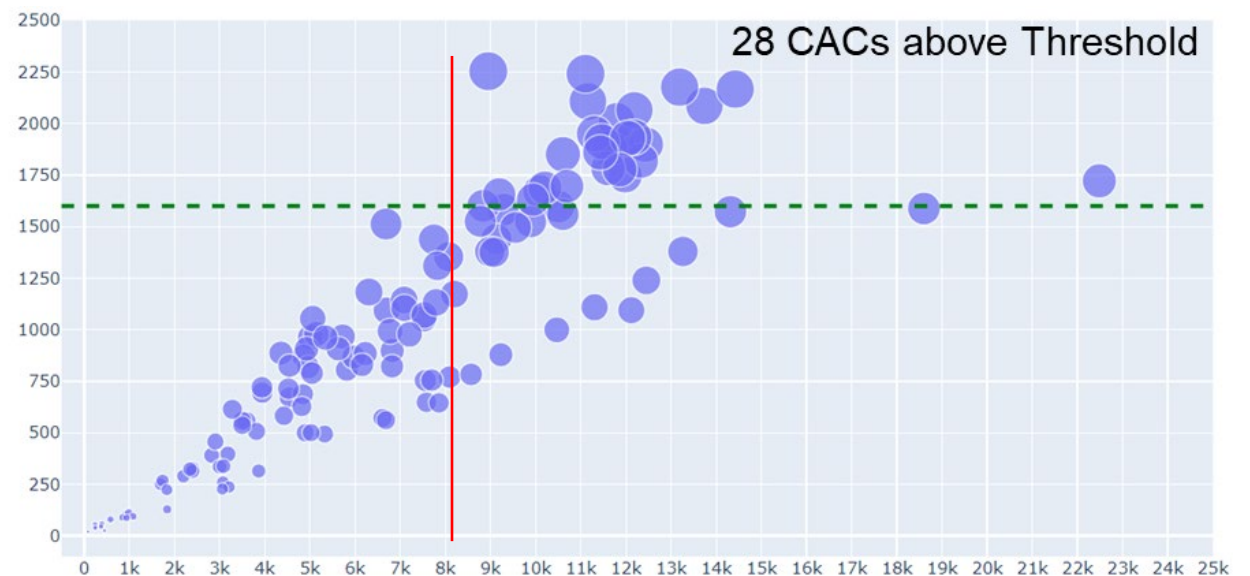
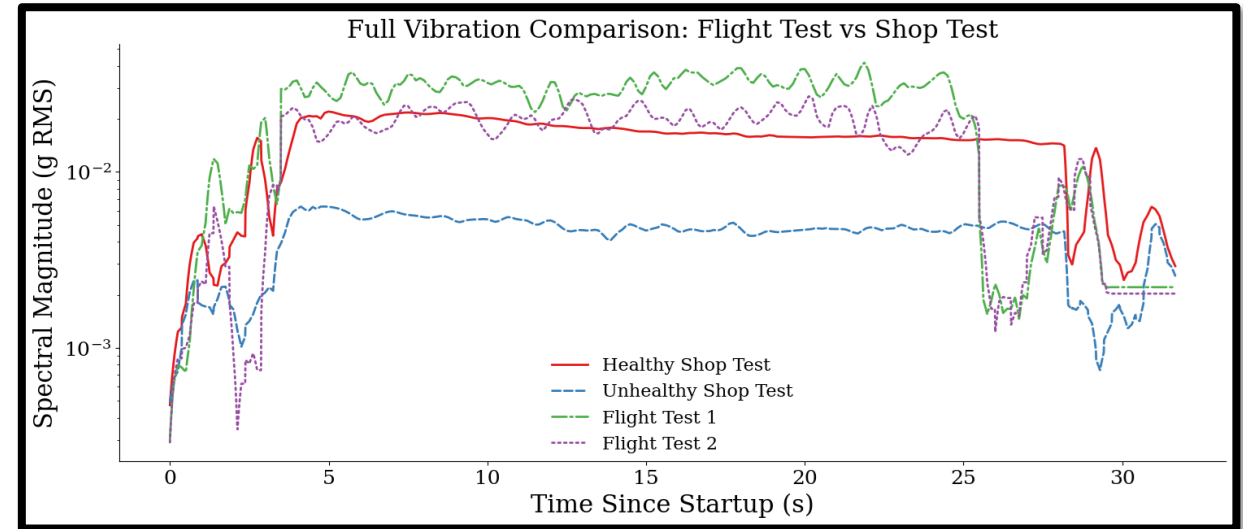
- 33% accuracy and 10% false positives on train data
- Use fault messages & SFR data in Modeling as a next step

Vibration Health Check

- Completed shop test and flight test accelerometer tests to prove out healthy vs un healthy air bearing, O-rings
- Collaboration with 2 airlines
- Will supplement CAC prognostic for early component degradation

CAC Bearing Failure / Pack Leak Research

- Issue Pack leak causes lower pressure and water/ice issues, CAC surges, result in ACM & CAC damage
- From 2022 Sensor data analysis, one new sensor is being added to the CAC.
 - New motor cooling exhaust sensor will be added to new design.
- Creating new CAC shutdown report with improved higher sampling rate.



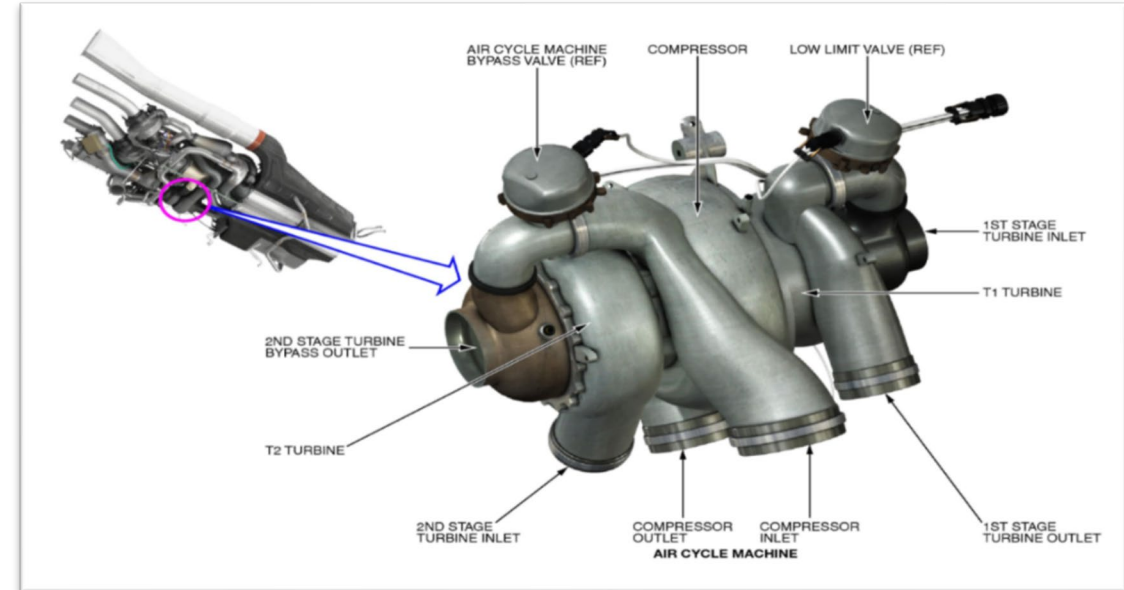
787 Air Cycle Machine

Problem Statement:

Air Cycle Machine, component of air conditioning system, failure can lead to significant delays, extensive component repair costs. Early warning and torque/audio/visual check can help avoid schedule interruptions and reduce repair costs.

Results:

- 66+ Alerts in 2023
- Operator feedback on 33 alerts (31 removals)
- Precision of 0.74 and recall of 0.55.



Warner Robins Air Logistics Complex

Panel 6: A Fireside Chat: PHM Successes and Lessons Learned



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Overview



- **Explore the issues, barriers, and lessons learned that have evolved across the many eras of PHM related activities including: requirements generation, capability benefits, ROI, justifications; development; validation & verification; policies; expanding applications; integration: implementation; operations, sustainment; enterprise-wide perspectives.**



Air Force Sustainment Center Strategic Plan 2024



<https://www.afsc.af.mil/About-Us/Strategic-Plan/>

- This plan is built upon four principles that act as our north star.
 1. Produce to Promise.
 2. People Make It Happen.
 3. Process is How We Do It.
 4. Prepare for Competition and Future Warfighting.





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- **The four core arms of AFWERX – AFVentures, Spark, Prime and SpaceWERX – serve to expand the defense industrial base for advanced technologies, empower Airmen and Guardian talent, and drive faster technology transition to operational capability.**



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