



SWISS and AVIATAR Cooperation

Maintenance Cost Conference

SWISS is the airline of Switzerland and connects Switzerland with the world. We are “Made of Switzerland”.

105



35 long-haul, 67 short-haul Aircraft (incl. Edelweiss Air)



> 140'000

Flights operated

16.9



Million Passengers



> 9100

Employees

110



84 European & 26 intercontinental Destinations

LUFTHANSA GROUP

1

Group

AVIATAR - an independent platform for the entire aviation industry

AVIATAR as a product by
Lufthansa Technik

AVIATAR currently used for
> 1000 AC

19 Applications
currently on the platform
and **> 20 more** in
the pipeline

Cooperation with **several
partners**



Open

Welcome to airlines, MROs,
OEMs and lessors.

Modular

Any Selection you need from
the expanding range of great
applications

Neutral

Independent platform that
aligns to user's specific,
technical requirements.

The core applications of AVIATAR set the basis for a thoroughly modular platform



Predictor Plugins

Optimized maintenance events and predicted component failure by automated analytics.



YOUR BENEFITS

- ✓ Knowledge about the future occurrence of a fault
- ✓ Decrease of operational incidents
- ✓ Reduction of consequential costs
- ✓ Automatic trigger of maintenance instructions



Condition Monitoring

Fleet's condition monitoring with real-time data of all aircraft.



YOUR BENEFITS

- ✓ Real-time condition on aircraft or fleet level
- ✓ Data access to each aircraft and components
- ✓ Automated documentation of faults and alerts
- ✓ Direct link to your maintenance system



Reliability Management

Automated reliability reports boost the efficiency of an airline.



YOUR BENEFITS

- ✓ Individual KPI Dashboard
- ✓ Identification of areas of improvement
- ✓ OEM-independent and unbiased information
- ✓ Your choice to enable Benchmarking

AVIATAR fitting SWISS's strategy towards digitalization and using new technologies where promising

SWISS at forefront of adopting (certain) new technologies, i.e.

- Amongst the first ones to implement Electronic Log Book
- RFID tagging of emergency equipment and now further expanding
- Implementation project for AMOS mobile ongoing



Use of innovation one of the pillars of our strategy

- Improve maintenance processes and eliminate paper (efficiency)
 - Increase planning and operational stability (prevention / prediction)
 - Optimize supplier and stock management (reporting / steering)
- ***Cost reduction with positive impact on quality***



Lots of **information available** to optimize your operation and with this cost, but:

⇒ Need to make most of available data and **extract relevant part**

⇒ Find ways to **reduce complexity** (nr. of data sources and applications)

AVIATAR transforms your most common pains into benefits



Pains

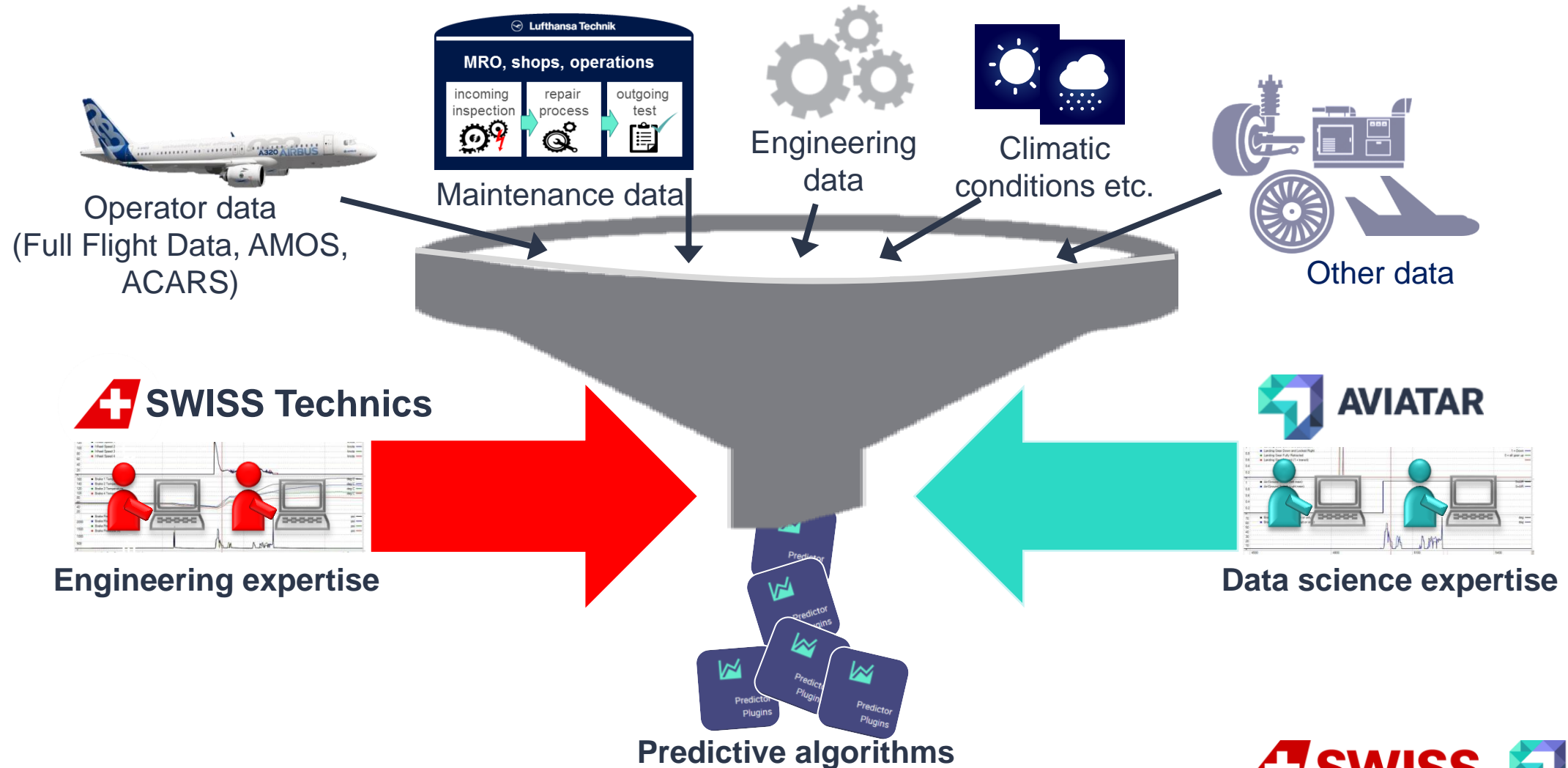
- 👎 **Unscheduled maintenance events**
- 👎 **High consequential costs of unexpected events**
- 👎 **Increased number of tools** saving available data
- 👎 **Paper-based MRO documentation**

Gains

- 👍 **More reliable** fleet operations
- 👍 **Reduced** consequential **costs** by **prediction** and **prevention**
- 👍 Full transparency and access to data in **one tool**
- 👍 **Optimized** maintenance and repair **processes**

AVIATAR's predictive algorithms connect multiple complex data lakes

Knowledge combined with various data is our unique advantage



Component failure can be predicted today by simply defining lifetime thresholds...



... but only the integration of profound MRO data will actually optimize the future lifetime of a component !

1 Component Repair /Removal

- Trouble shooting
- Reason for removal
- Expected fault
- TSI



2 MRO data

- Detailed removal information
- Measuring data (e.g. actual MTBUR)
- Quantified test results
- Workshop reports

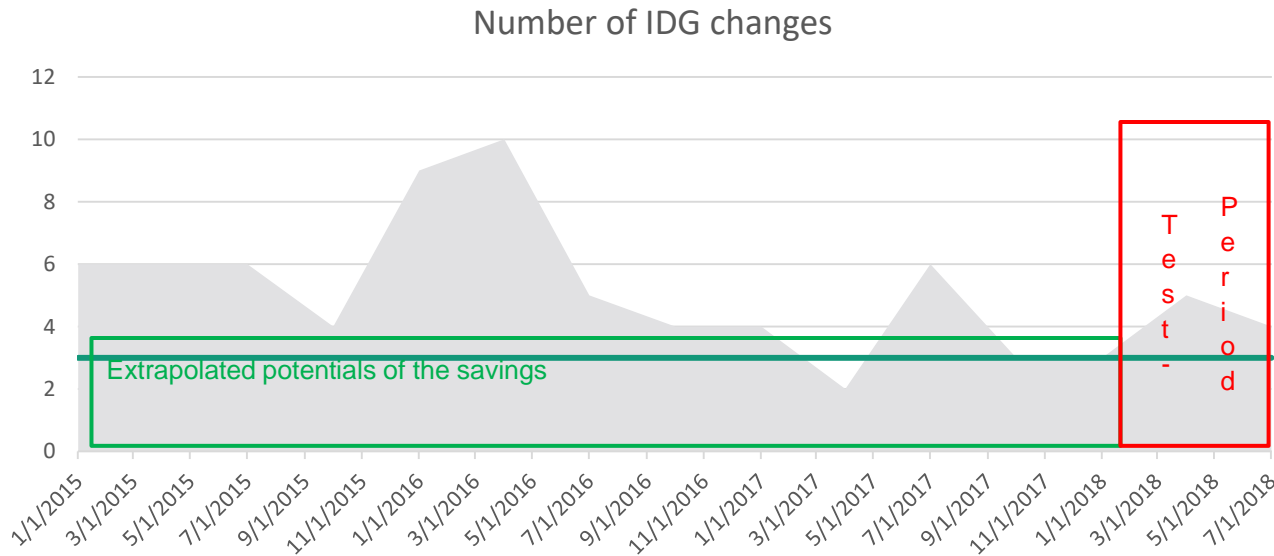
3 Repaired component

- Optimized TAT
- More effective maintenance
- Tasks related to fault indications



Predictive maintenance measures are only effective if they a) take component MRO data into consideration and b) result in the derivation of proactive measures in future component MRO!

Use Case IDG monitoring implemented at SWISS



Predictor plugin developed, which

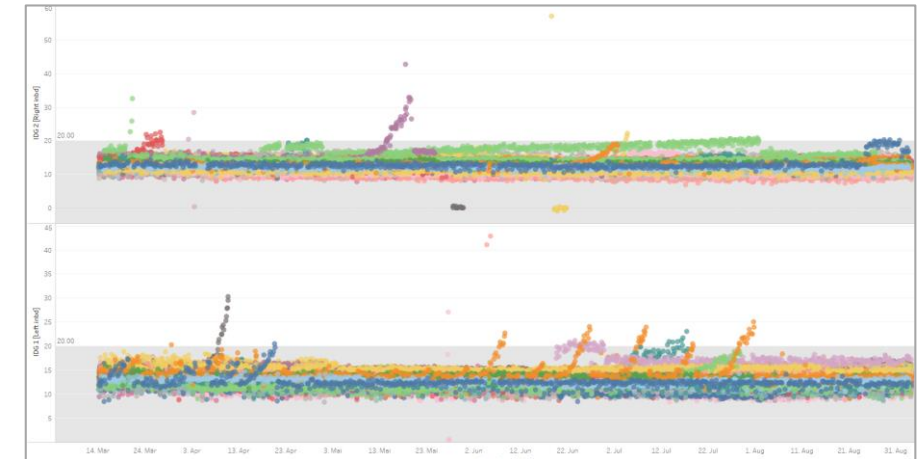
- Warns before IDG failure
- IDG oil service (on wing) resolves issue

- Avoid unexpected ground time
- Avoid effort of changing IDG and cost of overhaul

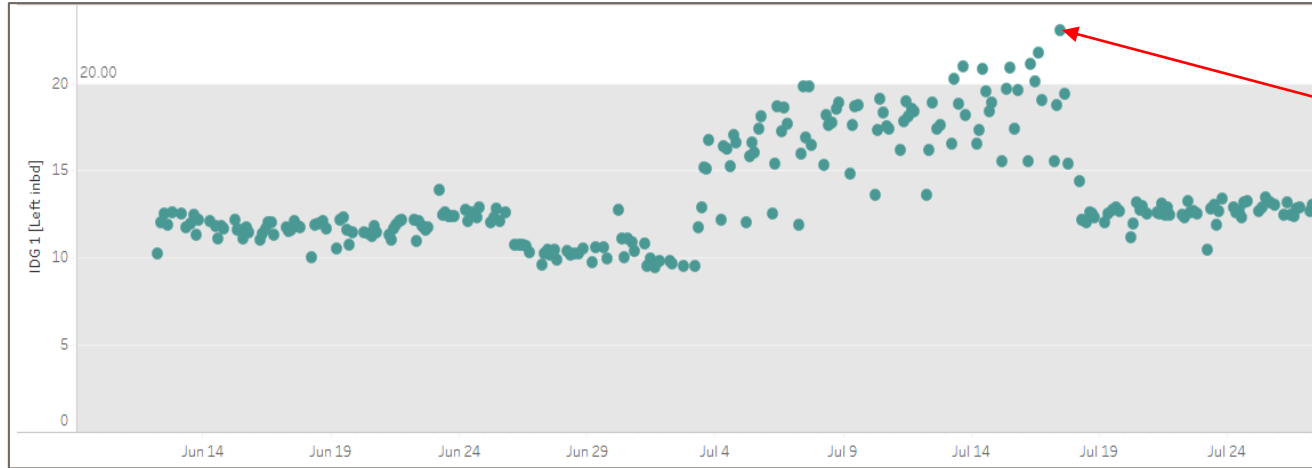
Figures

1 st test period Jan to Mar 18:	3 IDG changes prevented (46%)
2 nd test period Apr to Jun 18:	2 IDG changes prevented (36%)
3 rd test period Jul to Aug 18:	3 IDG changes prevented (35%)

- Expect being able to avoid ca. 1/3 of all IDG changes

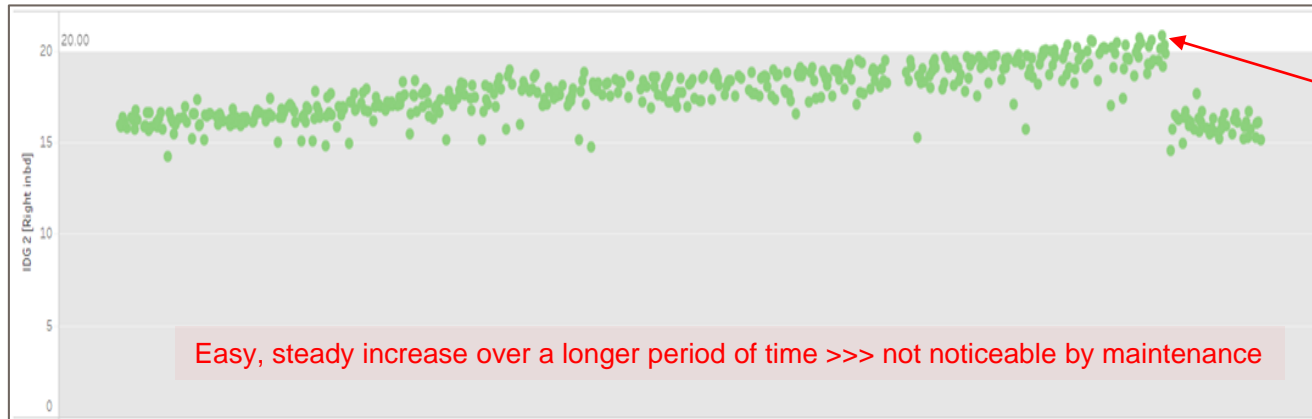


Predictor plugin able to detect different patterns and learning out of “experience”



Error image 1 of IDG temperature rise detected

- FOUND IDG1 OVERFILLED, 1Q, SNIFF CHECK PERF SATIS. SERVICE PERF
- Behavior back to before oil fill...
- No operational impact, no IDG change

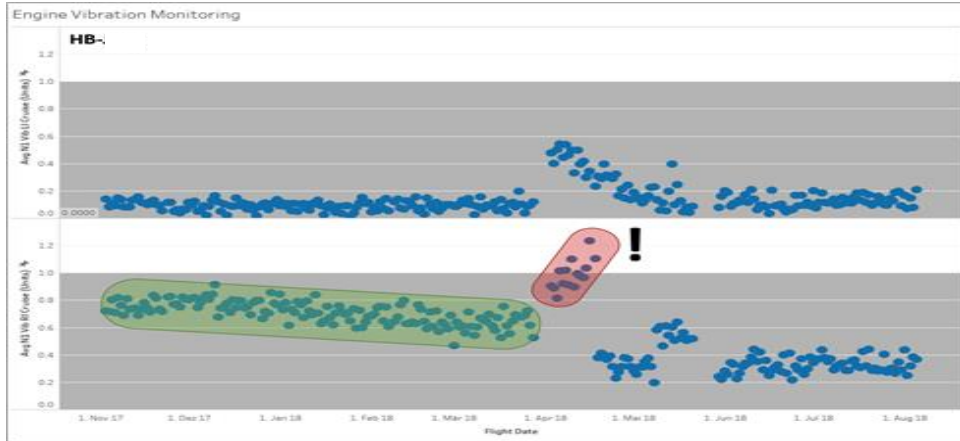


Error image 2 of IDG temperature slow rise

- REMOVE AND IDG CHARGE AND SCAVANGE FILTER ELEMENT ACC LINKED TASKCARD. DRAIN AND REPLENISH IDG OIL SYSTEM
- Behavior back to normal

Use Case 2: Engine vibration monitoring

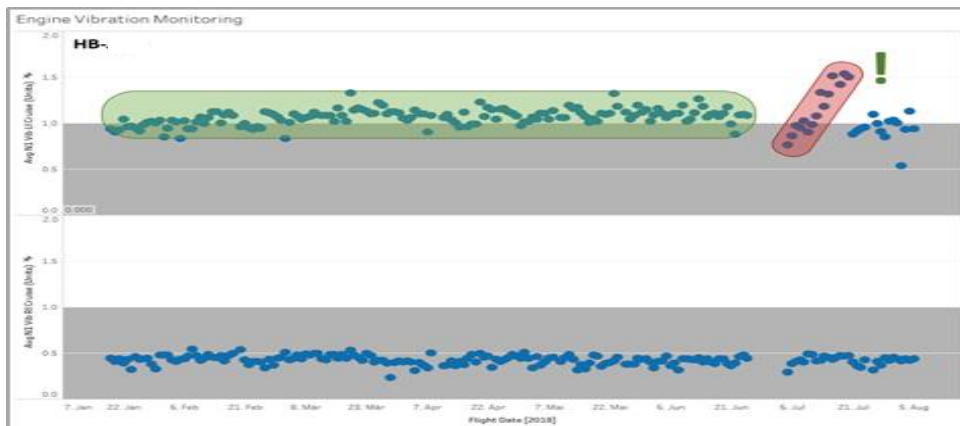
HB-XX1	16.04.18	ENG 2 high N1 vibration	AOG case in Brazil
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Case description

- 1st April vibration in limit, see green area
 - 2nd to 15th April, vibration rises up to 1.4 and finally to 7.4 dot's
 - 16th April, aircraft AOG due to engine vibration out of limit, station GIG
- Flight cancellation and high effort to fix (incl. ferry flight back to home)
- With engine vibration monitoring the case could have been planned and steered

HB-XX2	20.07.18	Engine Vibration Monitoring Short Term Trend	Fan trim balancing WO 57351465; further increase of VIB level prevented
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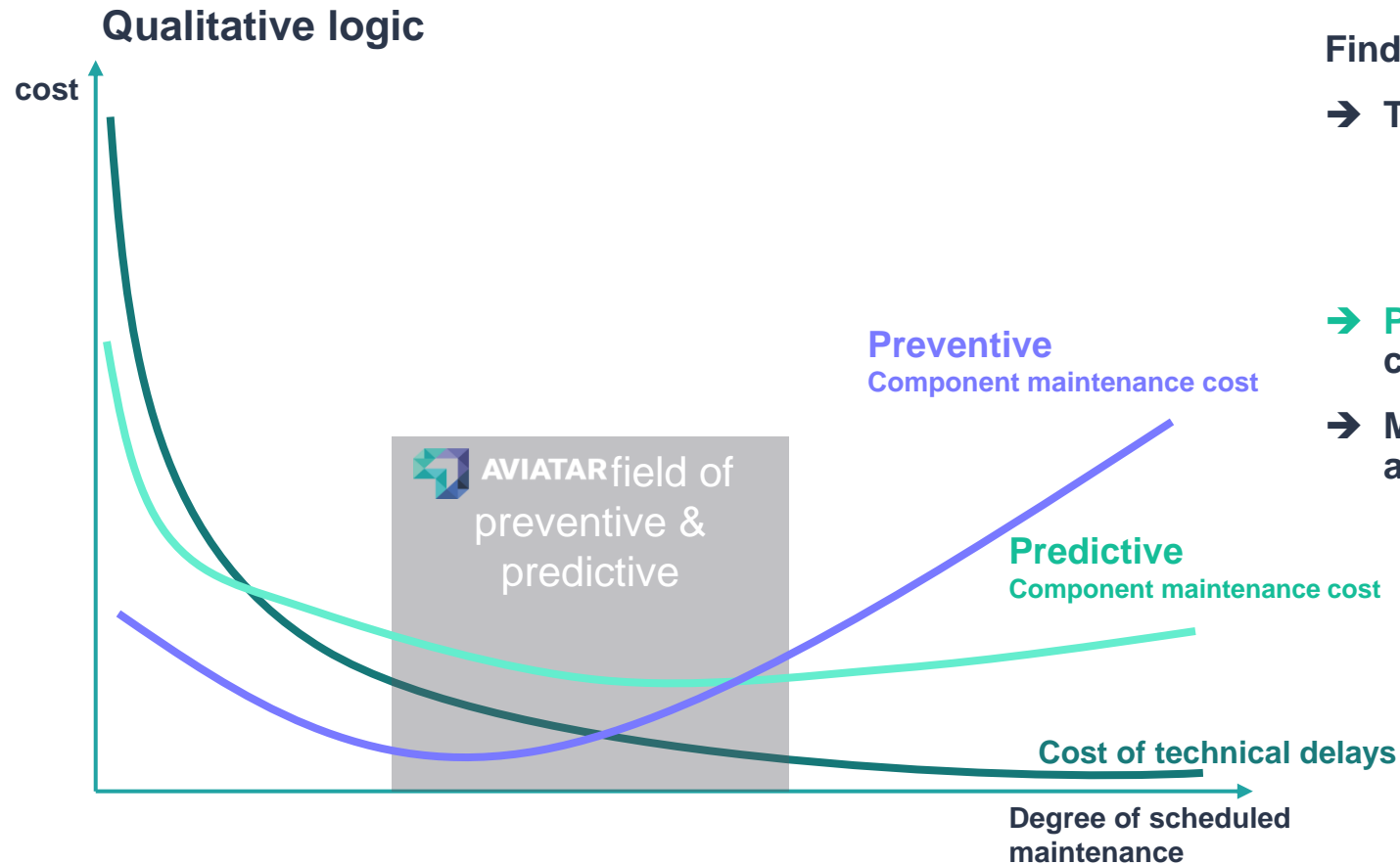


Case description

- EHM trend shows increasing Engine#1 N1 vibrations during cruise
 - Fan trim balancing planned and performed on Engine#1
- No operational impact
- Potential further damage on engine prevented

Prediction and Prevention will lower the overall costs

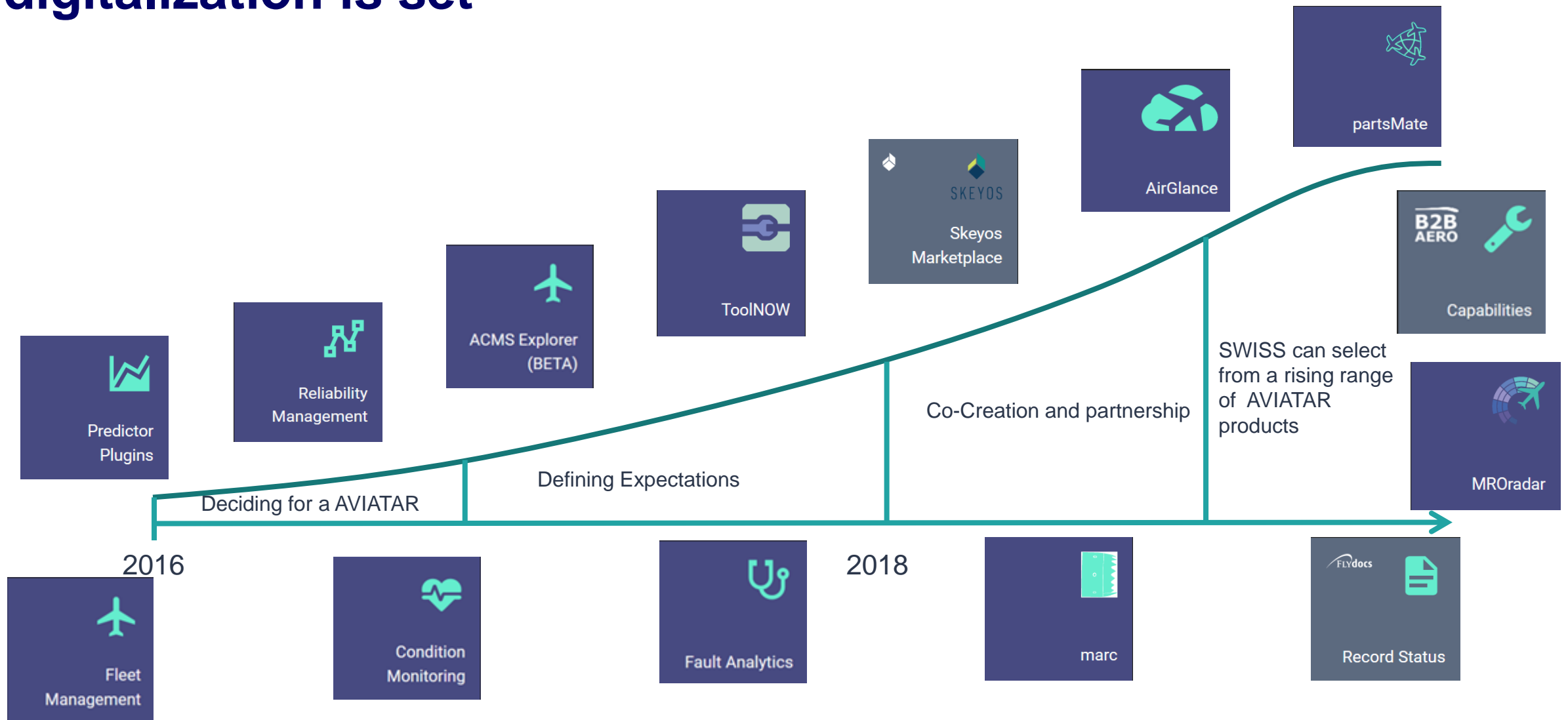
With Aviator we will find the optimal cost solution for any airline



Find the optimal point of prediction and prevention within

- Too short **prevented** MTBR will maximize
 - Line Maintenance cost
 - Logistic cost and hassle
 - Component Workshop Repair and overhaul cost
- **Prediction** can help to lower overall cost for components which have an impact on flight operation
- MRO Know-How is key for cost efficient prevention and prediction

The foundation for a long lasting partnership in digitalization is set

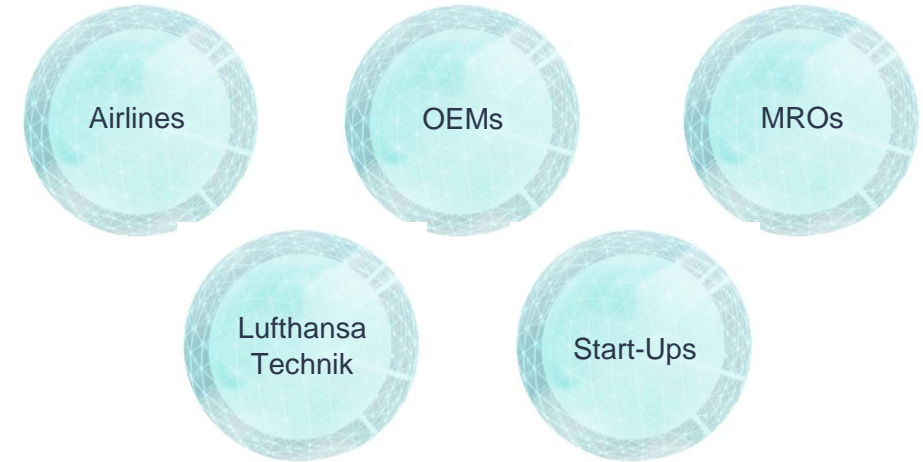
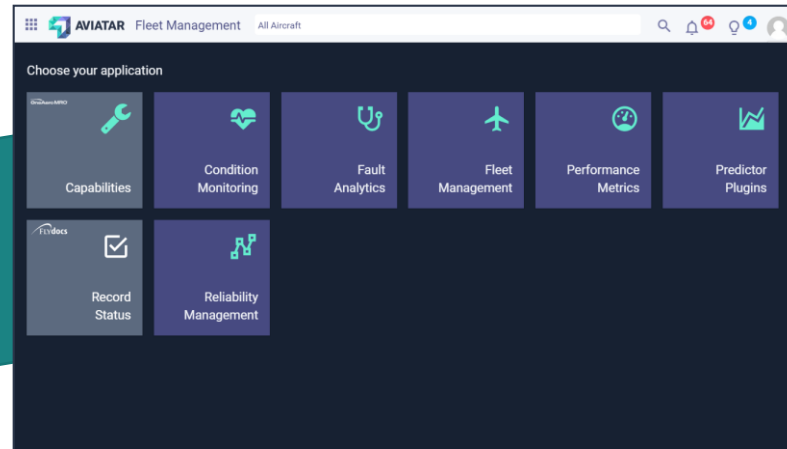




JOIN THE FUTURE WITH AVIATAR.

AVIATAR is a rising platform integrating own and partner developments

October
2017



August 2018

