

neo4j
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MANUFACTURING & AUTOMOTIVE GERMANY

See what others miss: Revealing hidden risks in Airbus' supply chain with Graph intelligence

July 02 from 09:30 -14:30 | Design Office NOVE, Munich

Register Now:
<https://events.neo4j.com/graphtalkmanufacturingde>

Jan Frieling
Service Line Manager Data Driven Transformation
Cimpa



See what others miss: Revealing hidden risks in supply chains with Graph Intelligence

July 2nd, 2026



The world is how we shape it*



- **Introduction**
- **Aviation**
- **Supply chain challenges in aviation**
- **How to address challenges with Graph Intelligence**
- **Collaboration with neo4j**
- **AMA & Discussion**

Who am I?



Jan FRIELING

Service Line Manager

- Based in Hamburg
- Data Driven Transformation
- Virtual Product Management
- Building Information Modeling
- Data & Live Intelligence
- Air Traffic Management

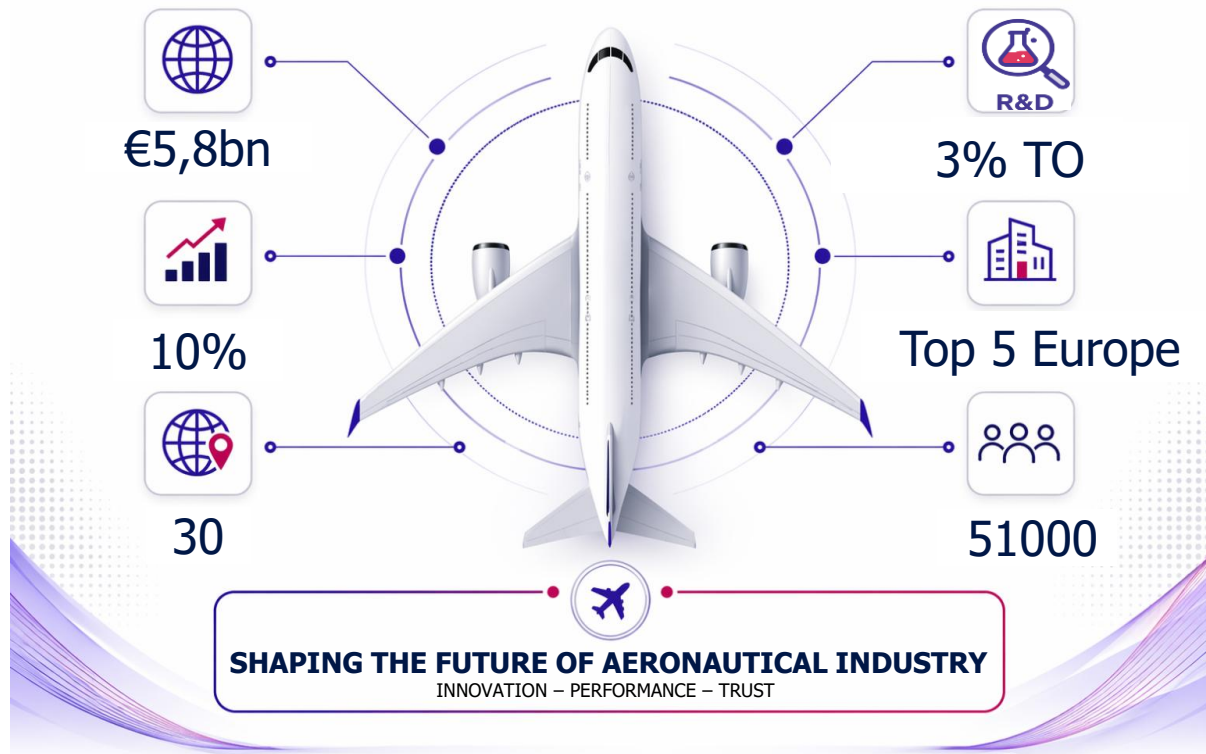
Experience

- Transnational Team, Project & Program Management
- Engineering Process, Methods & Tools
- Supplier Integration & Assessments
- Information Technology

Background

- 11 years Sopra Steria / CIMPA
- 10 years Airbus Group
- Business Information Science
- Self Employed SME IT Consulting

Sopra Steria Group



A reliable Group

- Focus on sovereignty
- Public, Banks & Insurances
- **In the Top 5: European digital services companies**

SOPRA STERIA Aeroline vertical

- 10,7% of Group Revenue in Aeronautics

Aeroline's biggest customers:

AIRBUS

AIRBUS
HELICOPTERS

AIRBUS
DEFENCE & SPACE

DASSAULT
AVIATION

THALES

NAVAL
GROUP

SAFRAN

MBDA

edf

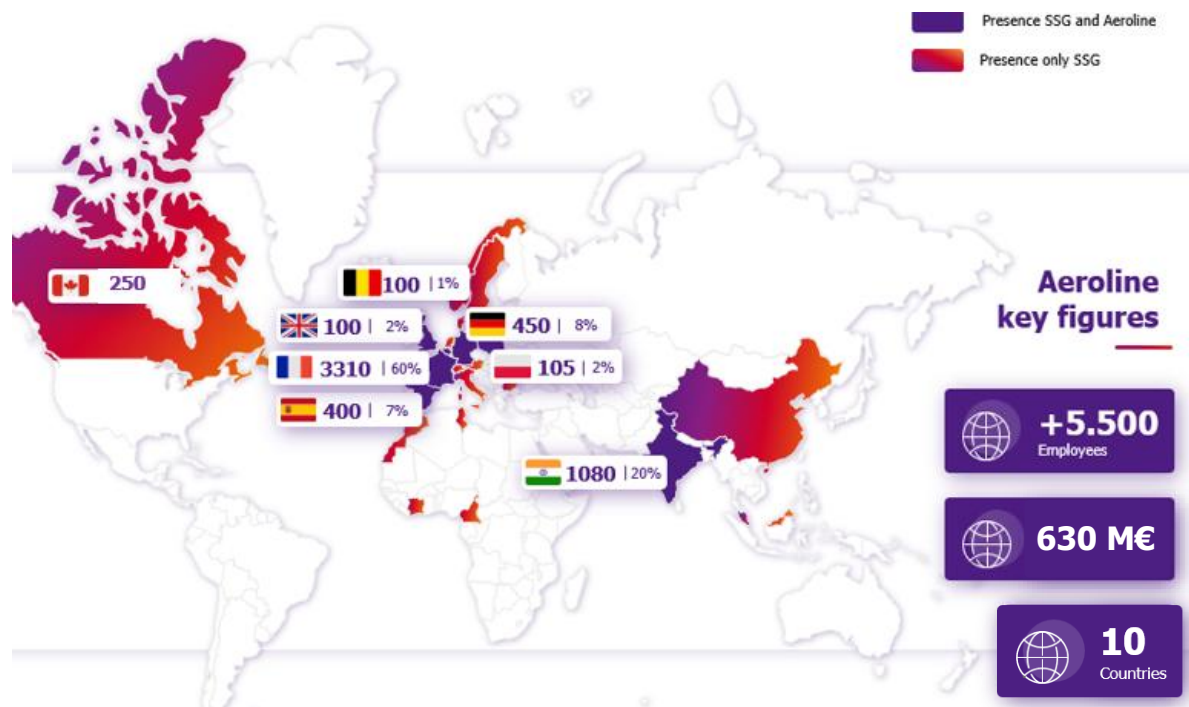
Rte
Le réseau
de transport
d'électricité

DGA

arianeGROUP

Both **Organic and external growth** ahead to better balance **geographical and business footprint**

Aeroline Vertical of Sopra Steria Group



Selected Partners



Aeroline & CIMPA

CIMPA is part of Aeroline:

- PLM & Digital Engineering Specialist – CIMPA is Aeroline's center of excellence for Product Lifecycle Management (PLM), engineering processes, digital continuity, and product data management across aerospace, defense, transportation, and energy industries
- End-to-End Transformation Partner

Aeroline's latest acquisitions:

- Strategy: Boost our Aero, Space and Defense sector +3200 employees
- Daher Industrial Services
- DPS (Digital Product Simulation), Starion, Nexova, and CS Group

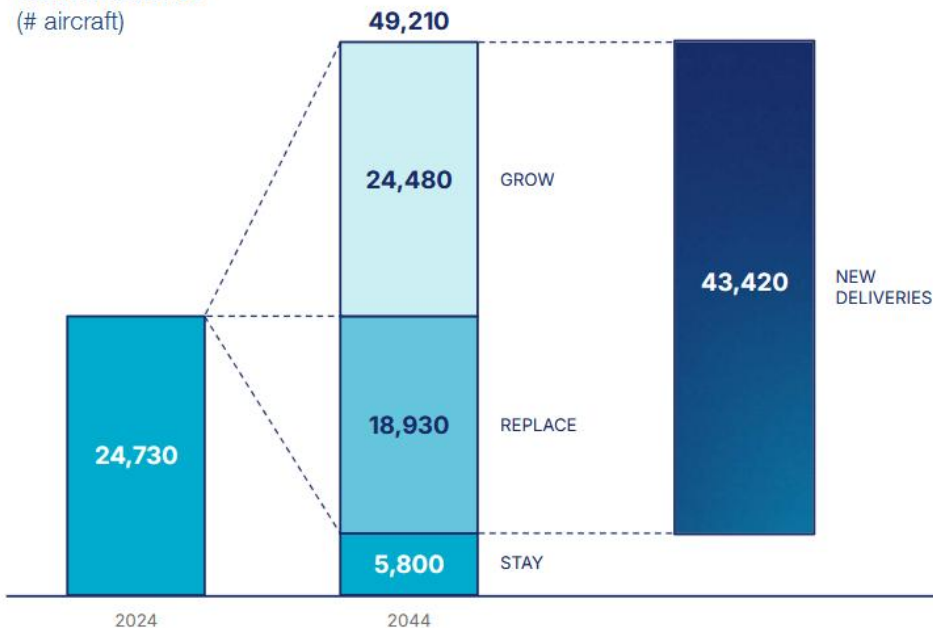
Our Aeroline Business Lines

- Engineering
- Manufacturing & Supply Chain
- Customer Services
- Air Traffic Management
- Corporate Services

Aviation: Huge Backlog ahead

Demand for 43,420 passenger and freighter aircraft

Fleet in service
(# aircraft)



Source: Cirium May 25, Airbus GMF 2025
Notes: Passenger aircraft (≥ 100 seats), Freighters with a payload above 10t
Figures rounded to nearest 10 | totals rounded separately



Fleet will **almost double** in the next 20 years

Higher proportion of new deliveries (~44%) will **replace** older, less fuel-efficient aircraft

AIRBUS

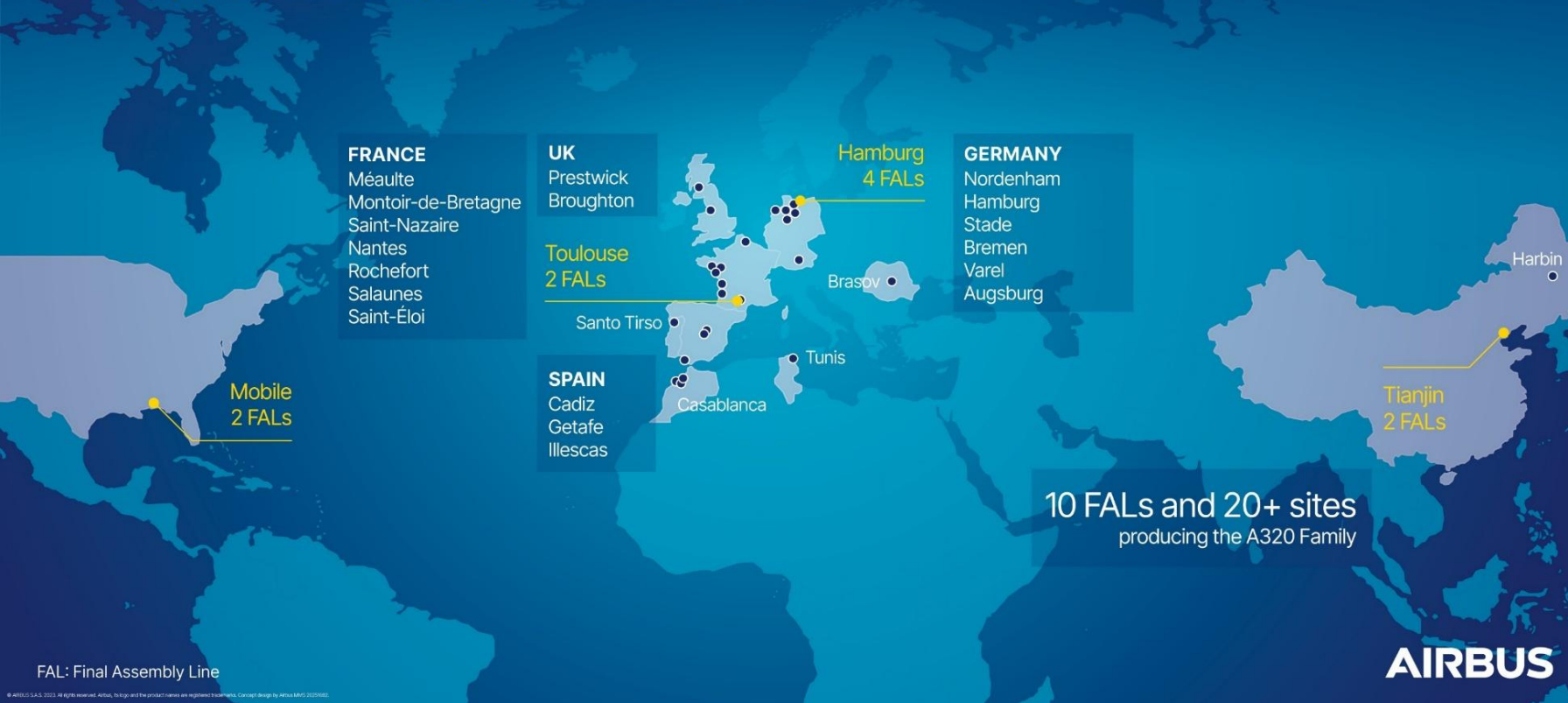
Biggest Backlogs

- **Airbus: 9037 A/C**
- **Boeing: 6100 A/C**
- **ORACLE: >\$638bn**
- **NVIDIA: >\$500bn**

A320 – Single Aisle Family

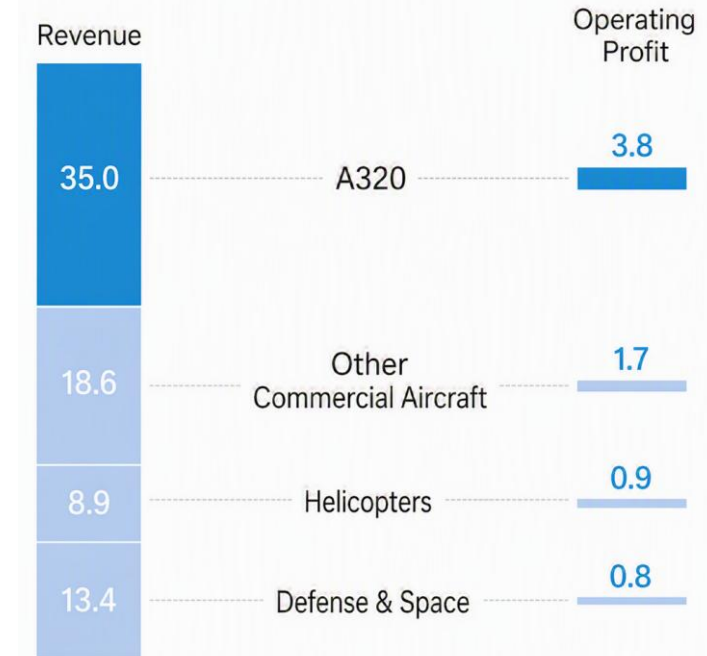
A320 Family industrial footprint

Powering up our production capacity to meet worldwide demand



PRODUCT PORTFOLIO ISSUE

Airbus depends on the economic success of the A320 (2025, EUR billion)



Source: Company data, J.P. Morgan, own research
Chart: Andre Piron

<https://www.airbus.com/en/newsroom/stories/2025-10-ramping-up-a320-family-production>

Wirtschaftswoche 30.06.2026

Quiz



- How much is a A320 leasing cost per year? (**long-term average, incl. engines**, without crew)
 - **\$2M - \$3,5M p.a.**
- How much is the leasing cost for 2 engines (for an A320) per year, **now**?
 - **\$4,8M p.a. (April 2026)**

-> A single component disrupts the established business case



Airbus Supply Chain

SMBC Aviation CEO urges Airbus to resolve supply chain issues

Investing.com | Editor Vlad Schepkov | Stock Markets
Published 26/01/2026, 18:14

Airbus (EADSF) Faces Delays in A320neo Deliveries Due to Supply Chain Issues

GuruFocus News
06/07/2026 23:55

Airbus seeks Pratt & Whitney damages over engine delays, sources say

By Tim Hephner
March 19, 2026 11:17 AM GMT+1 • Updated March 20, 2026

Supply chain issues delay

Report: Airbus Escalates Dispute With Pratt Over Delayed Engine Deliveries

The company is looking for compensation over the holdups.
Zach Vesile • Thursday, March 19, 2026 at 04:40 PM ET

Revealing hidden risks in supply chains

1Q26 Deliveries shows an Airbus engine oddity

@ADDISON SCHONLAND, ERNEST AIRVAL • APRIL 1, 2026 1 MINUTE READ



Airbus Slams Pratt & Whitney for Holding Back Output Plans

Airbus is said to push back some plane deliveries as supply chain strains persist

Jun 07, 2026, 5:23 PM ET | Airbus SE (EADSF) Stock, EADSY Stock, BA Stock, RTX Stock | By: Rob Williams, SA News Editor

Boeing, Airbus struggle to deliver planes as supply chain woes persist

AFP February 23, 2024
Sopra Steria company

AIRBUS PRESSURES PRATT & WHITNEY OVER ENGINE DELAYS AMID RECORD BACKLOG

Dispute exposes risks to Airbus as supply constraints persist

Airbus blames Pratt & Whitney as A320 ramp-up stalls and rate 75 slips further

Airbus has again pushed back its A320 production ambitions, with CEO Guillaume Faury blaming Pratt & Whitney engine shortages for limiting deliveries and slowing the ramp to rate 75.

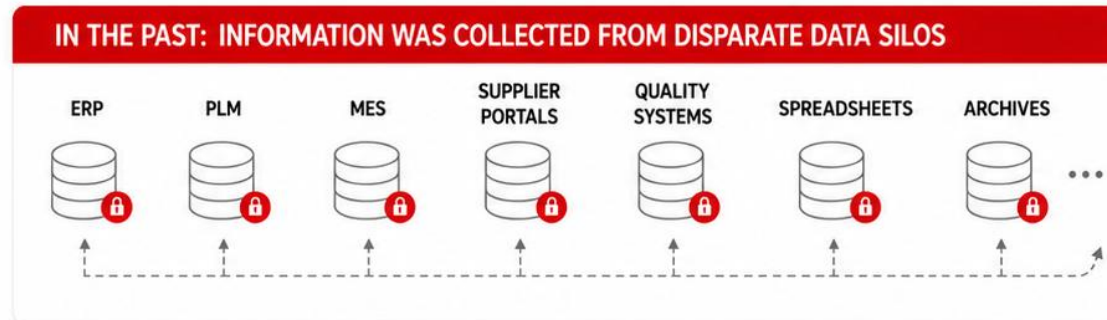
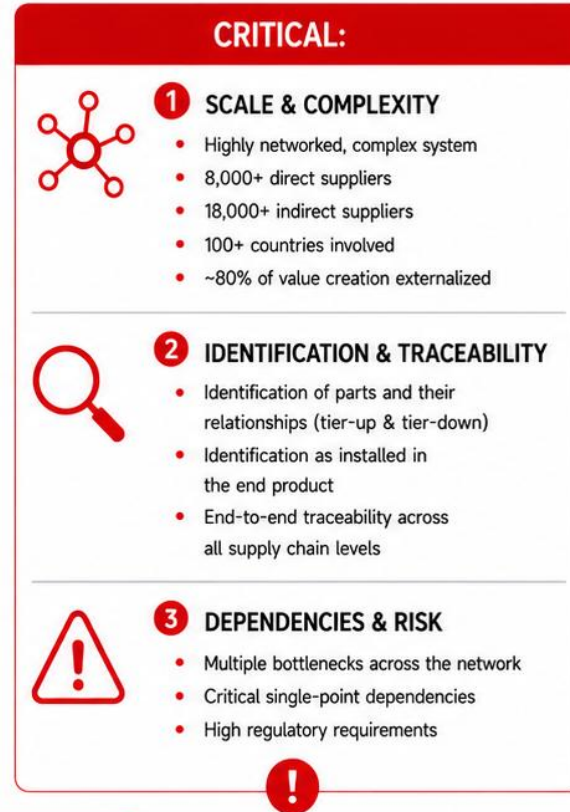
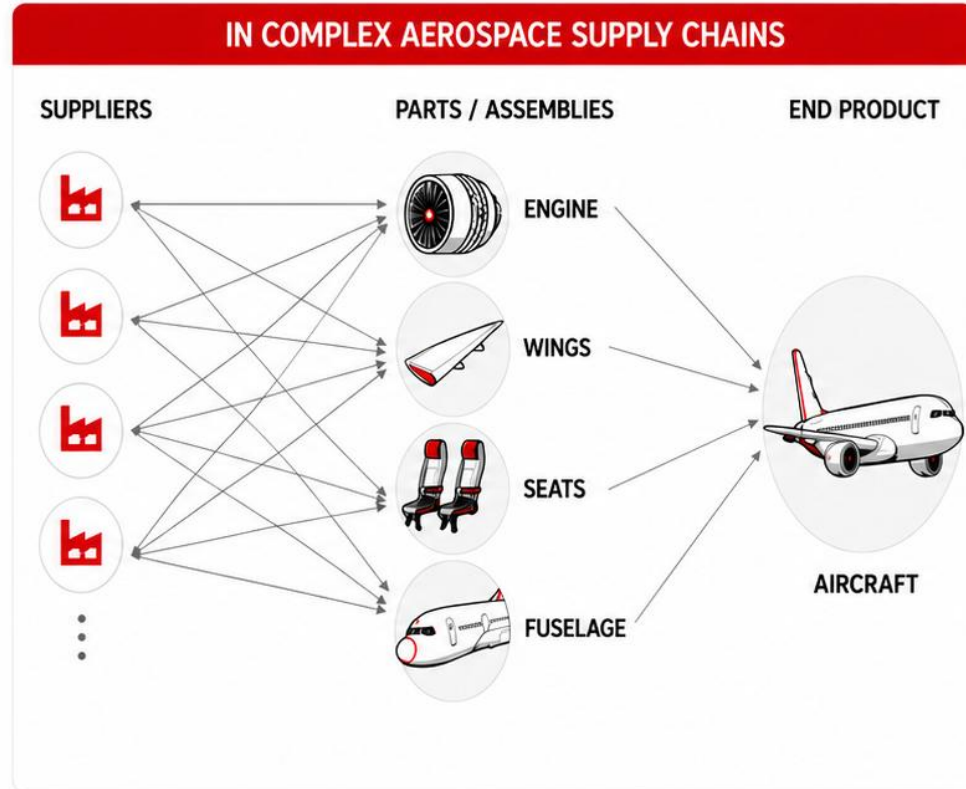
Supply Chain Challenges Despite Strong Delivery Numbers



Airbus warns some customers of further delays, sources say

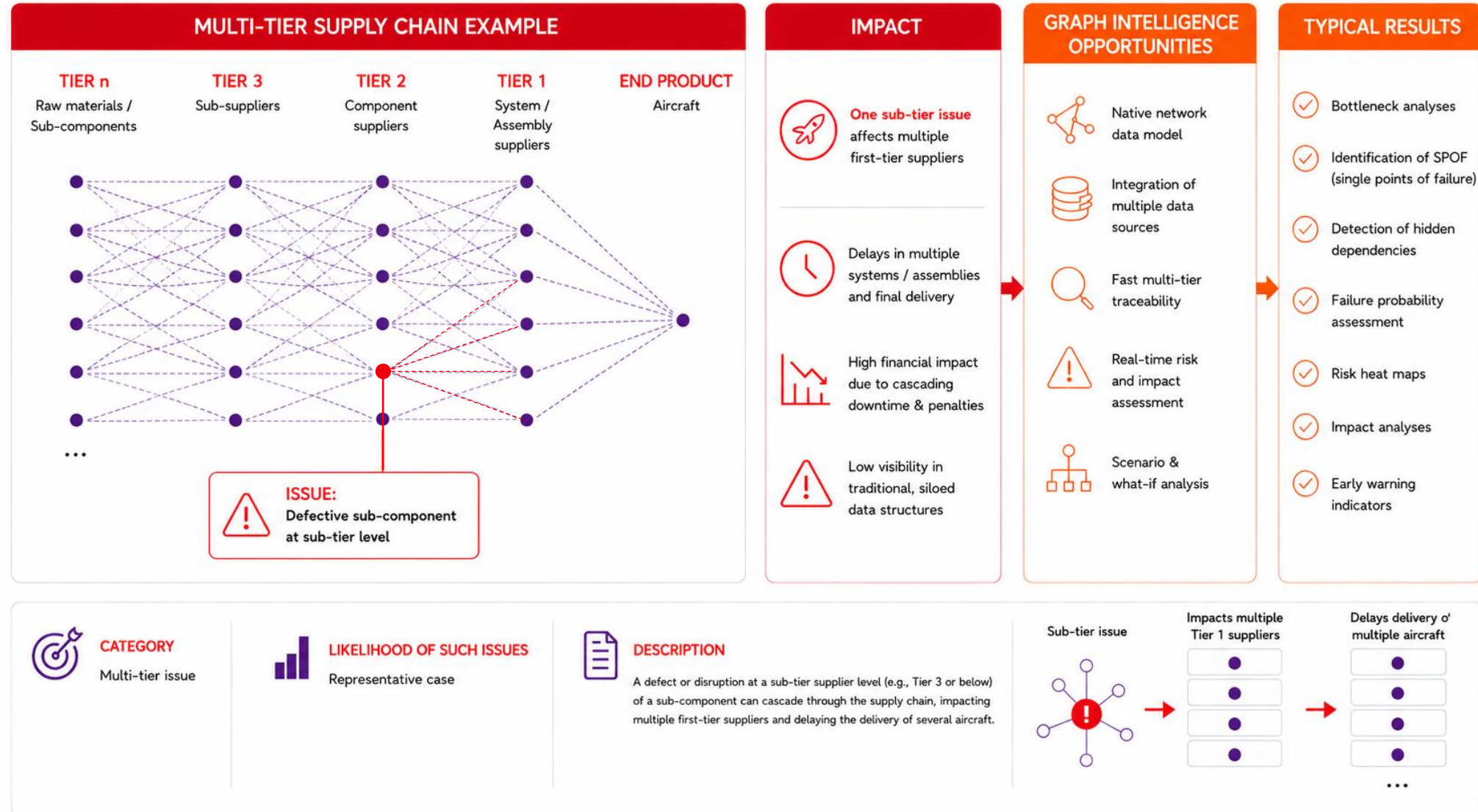
Published by Global Banking & Finance Review
Posted on May 20, 2026

Problem description



- ⊗ Delayed decisions
- ⊗ Increased risk for the entire organization
- ⊗ Competitive disadvantage

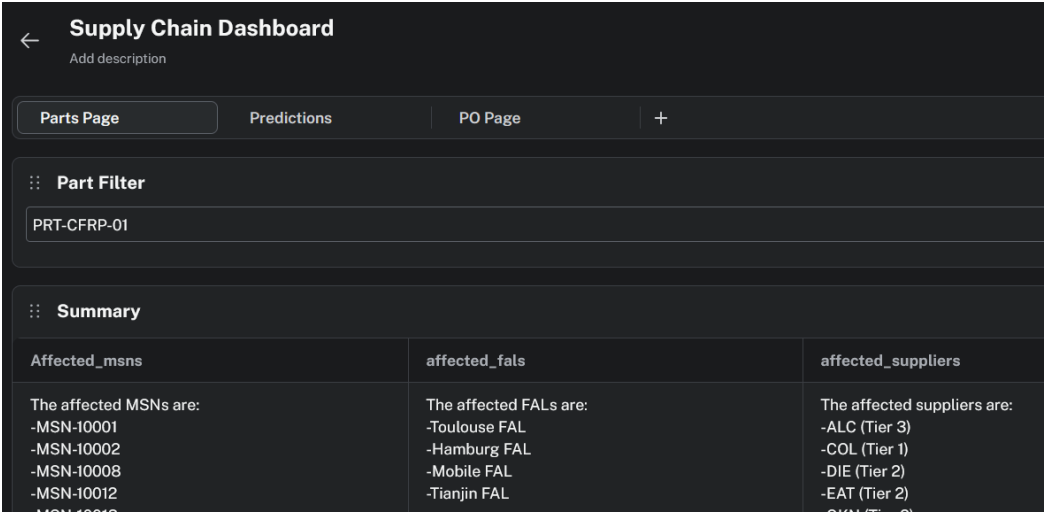
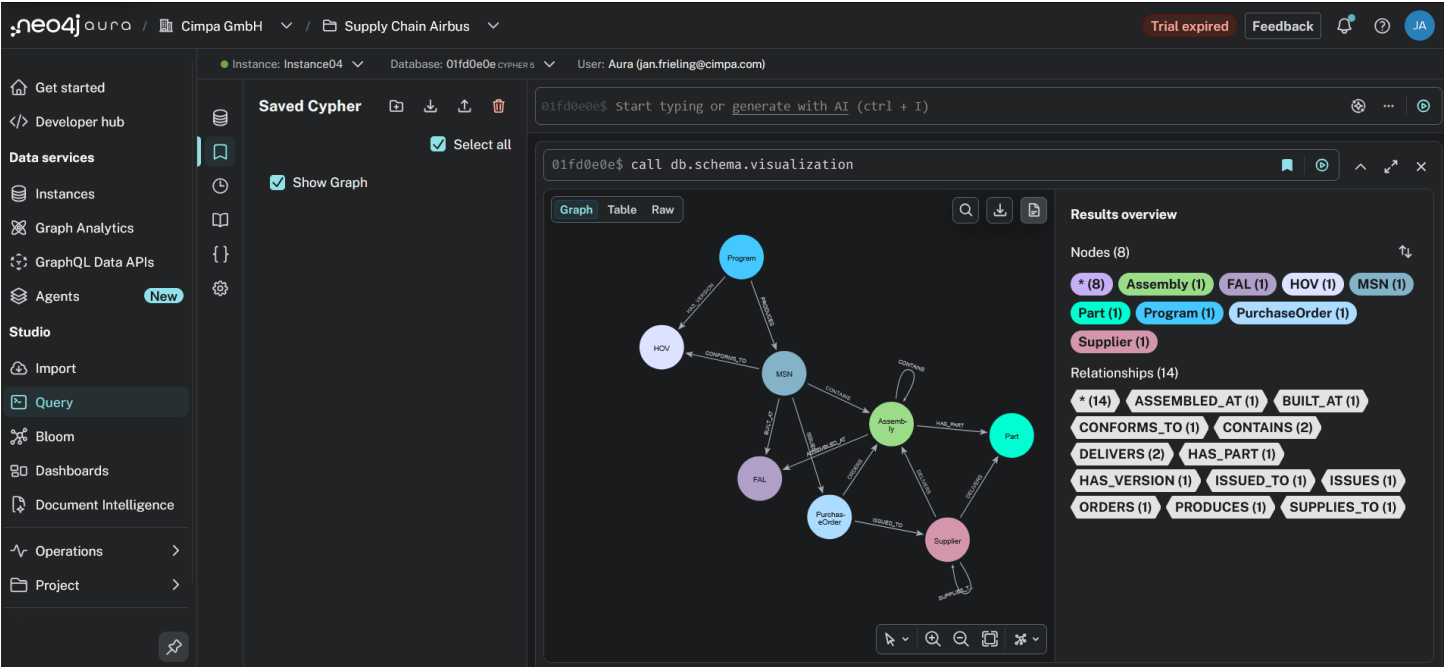
Proof of Concept – Generic Solution



Live Demo

neo4j aura

PoC with sample data



AeroTrace

Web-based Dashboard taking data from neo4j

PoC with sample data

AT AeroTrace (This App is using test data)

DefectsFleetSuppliersPurchase orders

Live data · Neo4j Aura

AS

Titanium Hi-Lite Fastener · 10 aircraft in active build affected

click to view

Active defects

Quality issues currently impacting aircraft in production or in service.

Open defects

2

2 critical, 0 watch

Aircraft impacted

31

10 in build, 19 in service

Open POs to review

20

across 3 suppliers

Defect register

click a defect to view full traceability

Titanium Hi-Lite Fastener

PRT-FAS-TI-01 · Titanium Ti-6Al-4V

Urgent

Batch 2026-Q2 contamination — non-conforming hardness values detected (Rockwell C below spec). AD-2026-007 issued; full traceability required for all installed units.

Aircraft affected

29

In active build

10

Supplied to

DIE · T2EAT · T2GKN · T2LAT · T2LIE · T2

Carbon Fiber Composite Panel

PRT-CFRP-01 · CFRP

Urgent

Voids detected in composite layup of supplier batch H-2026-04. Ultrasonic inspection mandatory before installation; potential structural integrity concern.

Aircraft affected

21

In active build

7

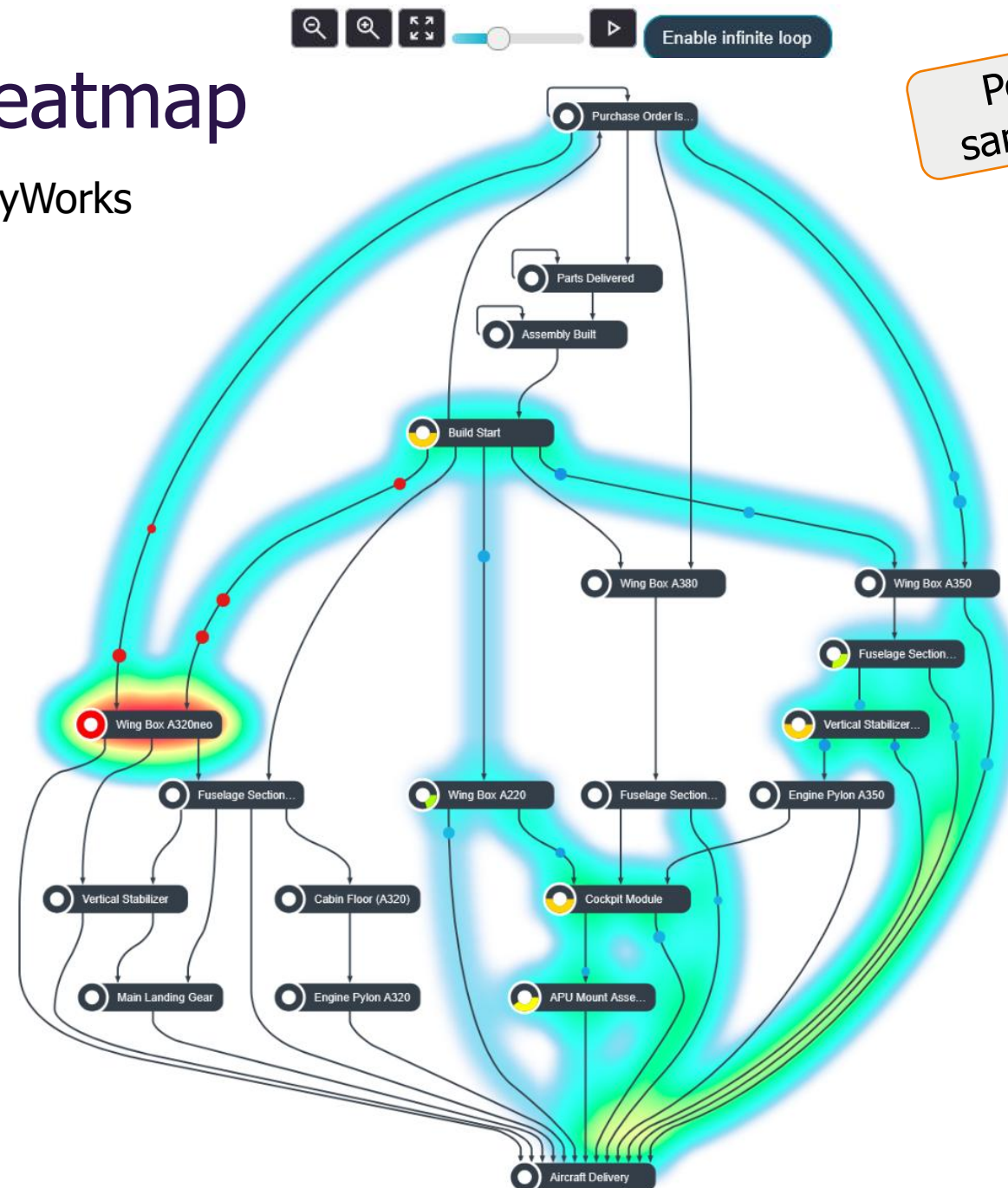
Supplied to

STE · T1EAT · T2GKN · T2

13 |

Process Flow Heatmap

Visualising Bottlenecks with yWorks



MSNS WITH ISSUES

As of 1. Sept. 2024

MSN-10001/Lufthansa

Parts Delivered

MSN-10004/easyJet

Assembly Built

MSN-10007/Lufthansa

Assembly Built

#4

Msn: MSN-10007

Operator: Lufthansa

Status: in-service

Fal: Toulouse FAL

⚠ Delayed by bottleneck:

Assembly Built (1. Apr. 2024 – 1. Aug. 2024)

MSN-10008/British Airways

Assembly Built

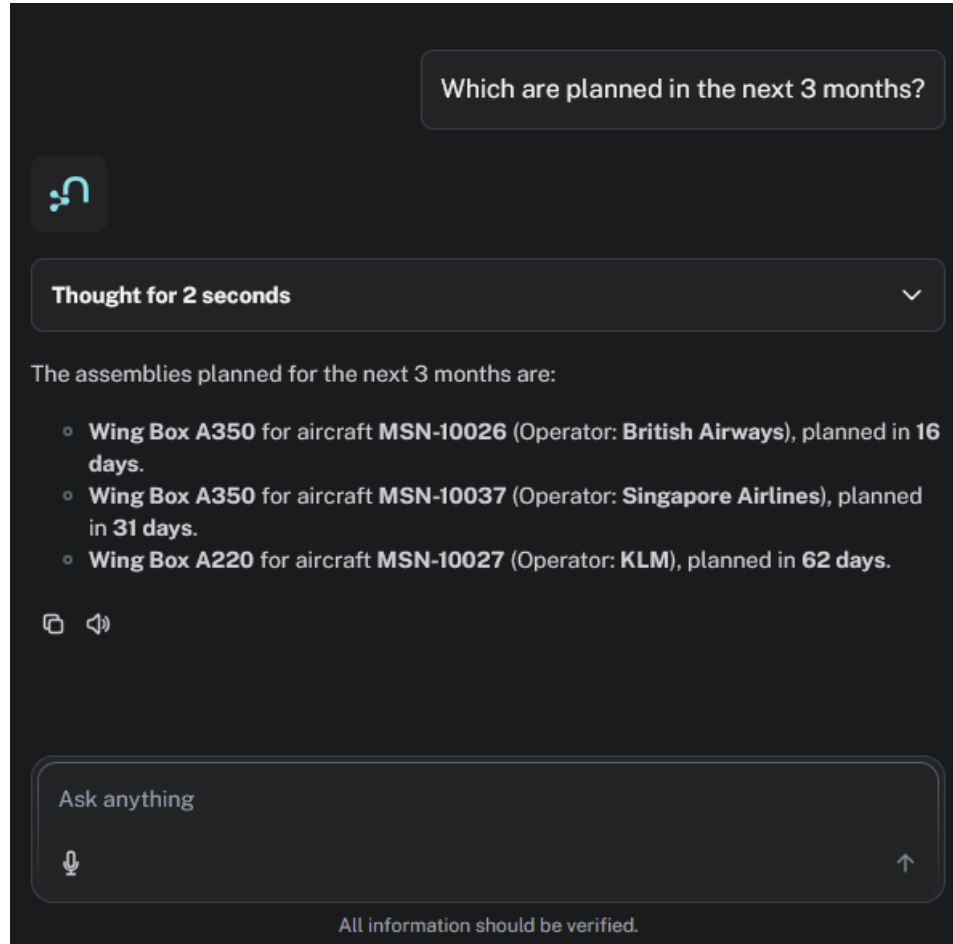
MSN-10009/British Airways

Assembly Built

Agents

Chat with your data

PoC with
sample data



Which are planned in the next 3 months?

Thought for 2 seconds

The assemblies planned for the next 3 months are:

- **Wing Box A350** for aircraft **MSN-10026** (Operator: **British Airways**), planned in **16 days**.
- **Wing Box A350** for aircraft **MSN-10037** (Operator: **Singapore Airlines**), planned in **31 days**.
- **Wing Box A220** for aircraft **MSN-10027** (Operator: **KLM**), planned in **62 days**.

Ask anything

All information should be verified.

Wrap up

We covered ...

- ... ways to **build a global supply chain** for the aircraft industry
- ... ways to **determine the impact of a defective part** across the supply chain
- ... ways to **assess a supply chain** for its risks and vulnerabilities
- ... a solution that pinpoints the **critical impact** directly
without requiring manual extensive effort / data analysis

The use of neo4j's Graph Intelligence Platform improves your supply chain management

Aeroline & neo4j

- **Global Partner Agreement** with Sopra Steria and its affiliates (as CIMPA) since November 2022
- NDA being part of the agreement
- Joint collaboration with the Aeroline, Telco, Government, Automotive, Manufacturing, Food & Beverages, Finance verticals
- 30+ neo4j certified Professionals (CIMPA & Sopra Steria)



Bootcamp for 32 developers



Zoom on



Engineering Copilot



the future digital data-sharing backbone
for the aerospace supply chain

airnavX

AIRBUS

- The solution gives the possibility to each airline to browse and search into their A/C maintenance and flight OPS manuals (AMM).
- The aeronautical documentation refers to different domains (operational procedures, engineering, maintenance and troubleshooting) following different norms (ATA, S100D).
- All this documentation is under aeronautic authority certifications and must be provided according to restrictive accesses.
- 20,000 Users - 100% digital

INA

Telefónica

INA – Intelligent Network Analyzer

- Digital twin of a mobile / physical networks
 - Network performance and traffic data analysis
 - Simplified network planning through simulation
 - Root Cause Analysis & Infrastructure Monitoring

40%

Up to 40% reduction
of maximum utilisation
through traffic
optimisation

100M

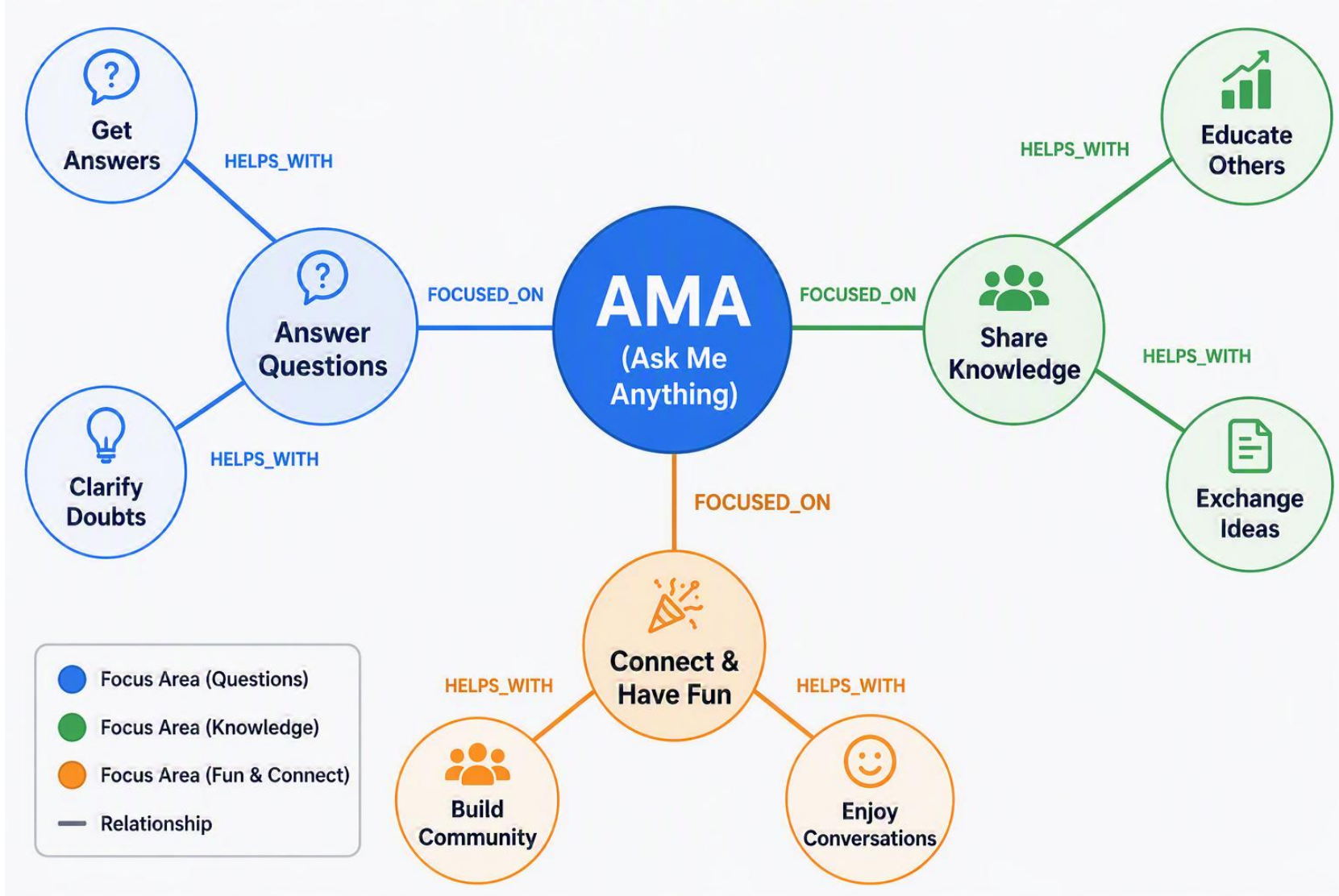
Almost 100 million
network elements
stored in graph DB

2 years

A productive
INA system in use
at a German
telecommunications
provider

~300

Current daily
tool users

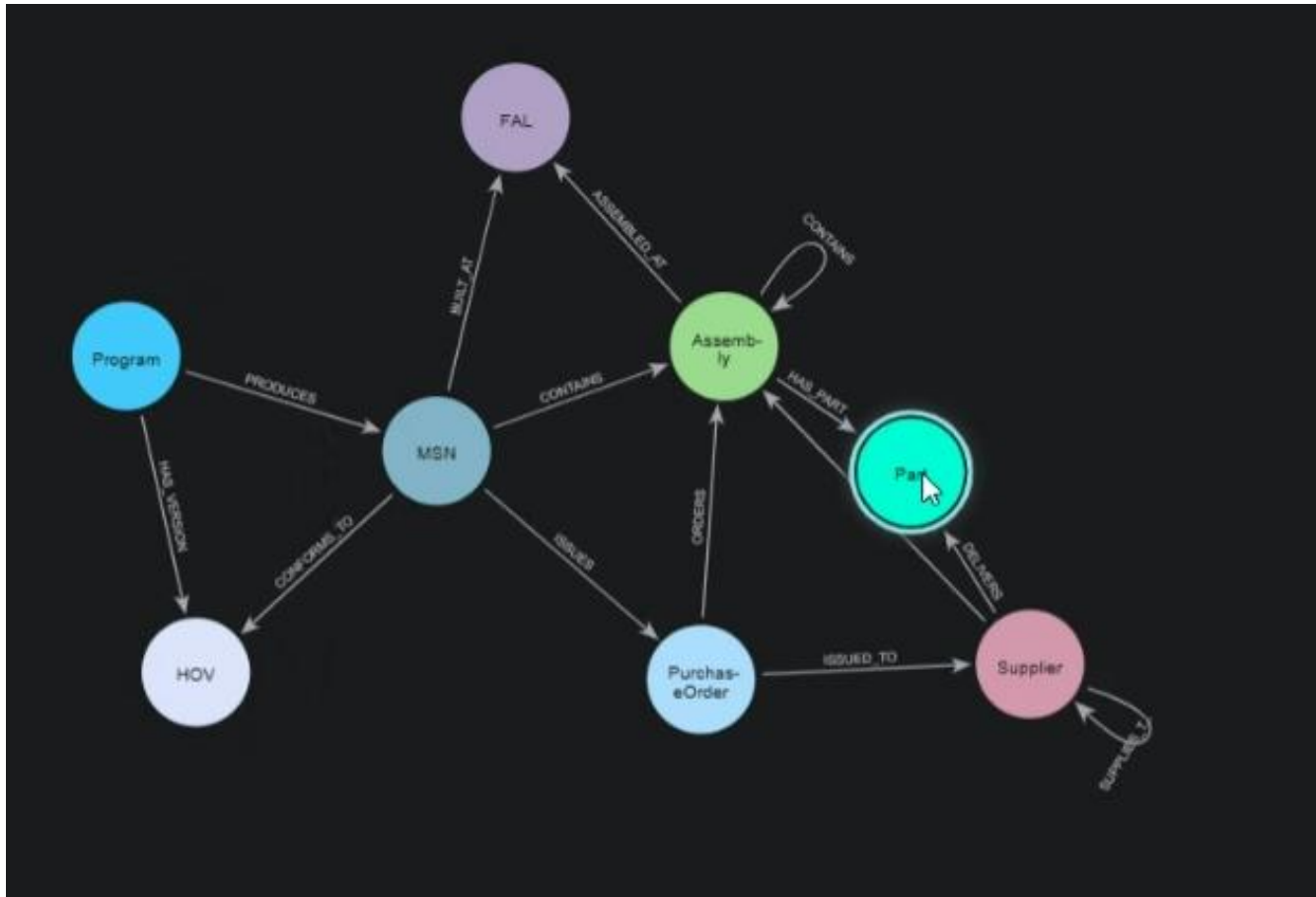


“...there are ***no veterans***— only people willing to lean in.”
Kevin McCullagh

BACKUP & Appendix

PoC – Example with 8 nodes

Setup of Database Structure

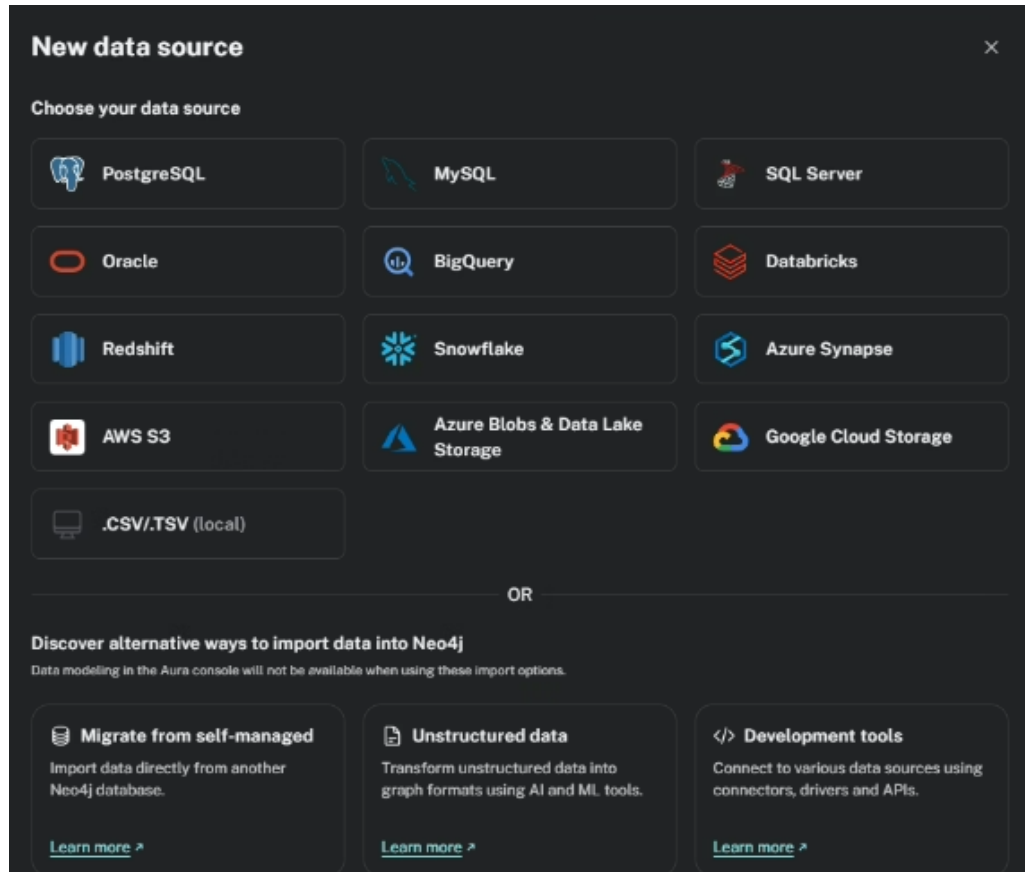


Graph model with 8 Nodes connected by well-defined relationships:

- **Program:** aircraft family (A220, A320, A350, A380, etc.)
- **HOV:** Head of Version, the customer-specific configuration of a program (engine choice, cabin layout)
- **MSN:** Manufacturing Serial Number, an individual aircraft
- **FAL:** Final Assembly Line, the physical site where the aircraft and major assemblies are built
- **Assembly:** a wing box, fuselage section, cockpit, etc. (major or sub)
- **Part:** fasteners, sheets, cables, paint
- **Purchase Order:** commercial transaction tying an aircraft to a supplier
- **Supplier:** companies across Tiers 1, 2 and 3

Data import

Unstructured Data will get structured



Several Data Bases and COTS tools can be connected directly for im-/and export!

Available data sources in neo4j to link data with the platform and start building the Graph model

Cypher Query – Data Model at a Glance

Setup of Supply Chain based on Data & Structure

Purpose of the Script The script builds a complete, interconnected picture of the Airbus value chain in a single run – from aircraft family down to individual fasteners and their suppliers.

What the Model Captures

6 Programs (A220, A320, A330, A340, A350, A380) as the top level

19 Customer Configurations (HOVs) – airline-specific variants

5 Final Assembly Lines (FALs) in Toulouse, Hamburg, Tianjin, Mobile, and Mirabel

31 individual aircraft (MSNs) with build and delivery dates

23 Assemblies (wing, fuselage, cockpit, landing gear, ...) including sub-assemblies

15 Parts (titanium fasteners, CFRP panels, hydraulic lines, ...)

18 Suppliers in a multi-tier hierarchy (Tier 1 / Tier 2 / raw material)

25 Purchase Orders with quantities and values



```
Search phrase *
show po

Use $ to create your parameters.

Description
show the full graph for po id PO-10013-WB-A320-01

Cypher query *
MATCH (po:PurchaseOrder {po_id: 'PO-10013-WB-A320-01'})

// Direct neighbors
OPTIONAL MATCH (msn:MSN)-[r1:ISSUES]->(po)
OPTIONAL MATCH (po)-[r2:ORDERS]->(asm:Assembly)
OPTIONAL MATCH (po)-[r3:ISSUED_TO]->(supplier:Supplier)

// From the MSN
OPTIONAL MATCH (prog:Program)-[r4:PRODUCES]->(msn)
OPTIONAL MATCH (msn)-[r5:CONFORMS_TO]->(hov:HOV)
OPTIONAL MATCH (msn)-[r6:BUILT_AT]->(fal:FAL)

// From the ordered Assembly – full BOM
OPTIONAL MATCH (asm)-[r7:ASSEMBLED_AT]->(asm_fal:FAL)
OPTIONAL MATCH bom = (asm)-[:CONTAINS*0..]->(child:Assembly)
OPTIONAL MATCH (child)-[r8:HAS_PART]->(part:Part)

// From the Supplier – tier hierarchy
OPTIONAL MATCH (supplier)-[r9:SUPPLIES_TO]->(higher:Supplier)
OPTIONAL MATCH (lower:Supplier)-[r10:SUPPLIES_TO]->(supplier)

// Alternate suppliers for the same assembly
OPTIONAL MATCH (alt:Supplier)-[r11:DELIVERS]->(asm)
WHERE alt <> supplier

RETURN po, msn, asm, supplier,
       prog, hov, fal, asm_fal,
       child, part,
       higher, lower, alt,
       r1, r2, r3, r4, r5, r6, r7, r8, r9, r10, r11,
       bom
```

Card list (0/37)

Cypher Query – Data Model at a Glance

Setup of Supply Chain based on Data & Structure

The Connections That Create the Value

Program → Configuration → Aircraft → Assembly Line → Assembly → Part → Supplier → Purchase Order. Every relationship carries attributes such as installation date, lead time, or unit price.

Business Value This network enables instant answers to questions such as:

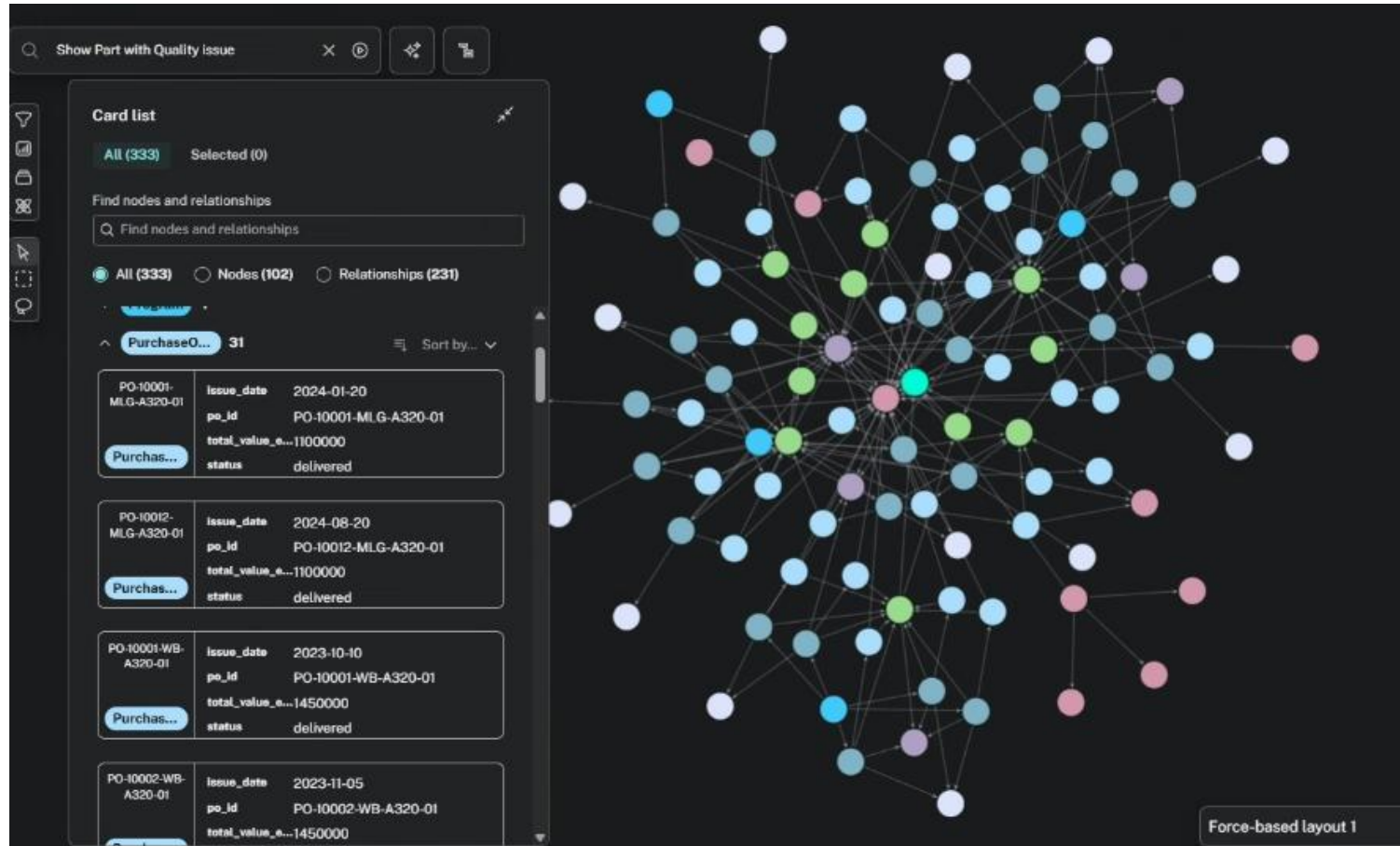
"Which aircraft are affected if a supplier fails?"

"Which assembly lines depend on which tier-2 supplier?"

"What is the total order volume per program?"

Result in graph

Identification of a part within Supply Chain and its impact

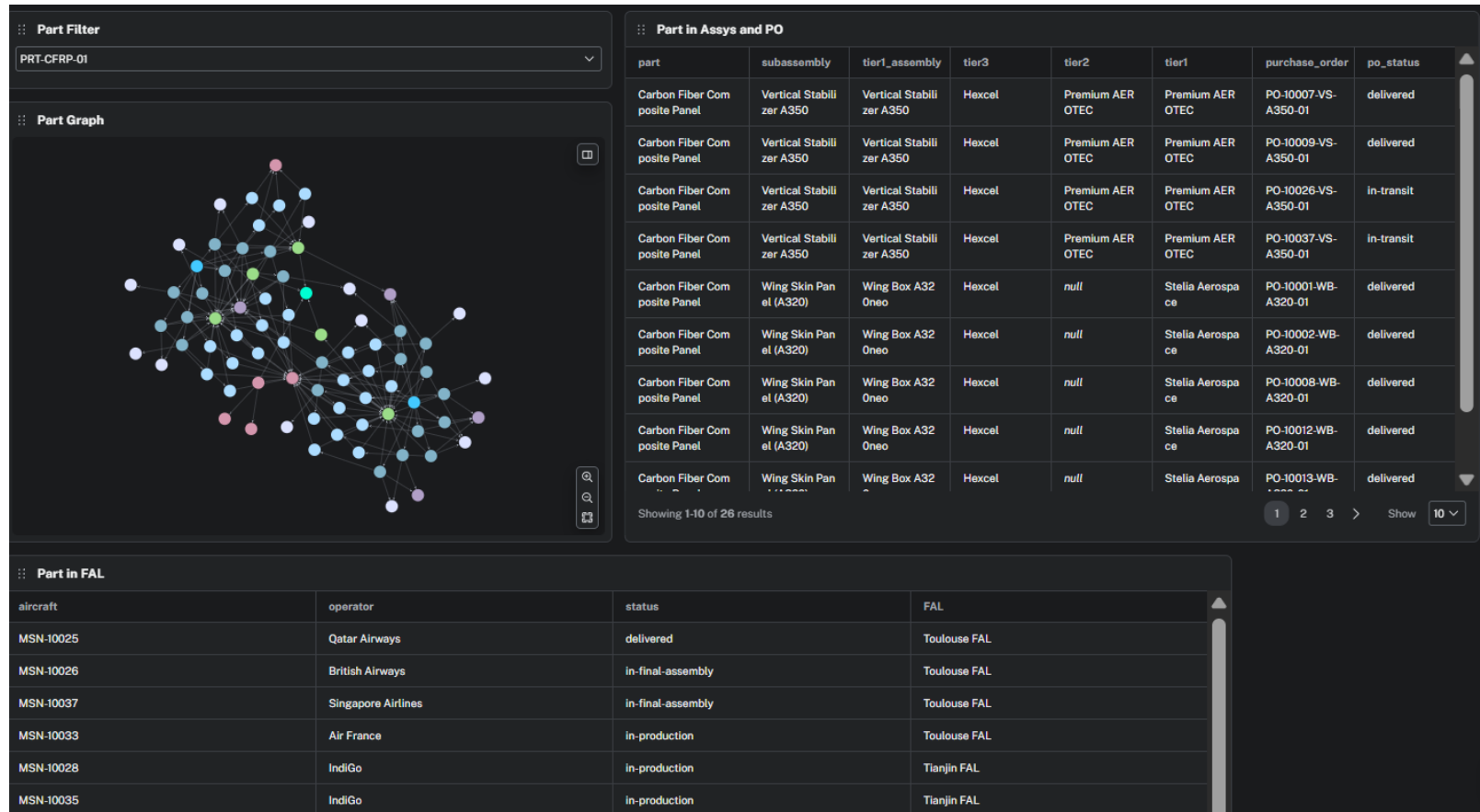


Example of a defect part traceability:

- **Force-based graph** view of the defective part and all its dependencies in the supply chain
- **Card list panel** exposes the metadata of every affected node
- **Cypher** resolves the full multi-hop traversal in seconds, outperforming equivalent SQL queries that would require many JOINS across the same data
- **Nodes** are colour-coded by label, making the supply-chain hierarchy readable at a glance

Result in report / dashboard

Overview for export and analysis of Part



- **Reports** can be shown in Neo4j dashboard as a customizable analytics page built from saved Cypher queries
- **Multiple cards** rendered side by side, all driven by the same underlying graph data, combining a visual and a tabular perspective on the same defect.
- **Graph card** shows the full supply-chain network around the part selected in the filter
- **"Part in Assys and PO" table** lists every assembly containing the part, along with the suppliers involved and the purchase orders affected
- **"Part in FAL" table** shows all aircraft (MSNs) containing the part with their status and the final assembly line where each is built

Prediction

Analysis of Supply Chain

Critical Parts				
part_id	name	material	supplier	is_defect
PRT-CFRP-01	Carbon Fiber Composite Panel	CFRP	Hexcel (T3)	true
PRT-WIR-AS-01	Aerospace Wiring Harness	Copper/Tefzel	Collins Aerospace (T1)	false
PRT-PAINT-01	Aerospace-Grade Paint	Polyurethane Paint	Liebherr-Aerospace (T2)	false
PRT-AL-7075-01	Aluminum 7075 Sheet	Aluminum 7075-T6	Alcoa (T3)	false
PRT-BRK-AL-01	Aluminum Bracket	Aluminum 2024	Alcoa (T3)	false
PRT-COMP-NUT-01	Composite Nut	Composite/Steel	Precision Castparts Corp (T3)	false
PRT-WIR-FB-01	Fiber Optic Cable	Fiber Glass/Polymer	Thales (T1)	false
PRT-RIV-HS-01	Hi-Shear Rivet	Aluminum	Liebherr-Aerospace (T2)	false
PRT-HYD-LINE-01	Hydraulic Line	Stainless Steel	Eaton Aerospace (T2)	false
PRT-LED-LIT-01	LED Lighting Module	Polycarbonate/LED	Diehl Aerospace (T2)	false

Showing 1-10 of 12 results

Suppliers with more than 3 Top tiers suppliers					
supplier	tier	country	supplies_to_tier	num_customers	customers
GKN Aerospace	T2	UK	T1	4	[Safran, Spirit AeroSystems, Premium AEROTEC, Stelia Aerospace]
Alcoa	T3	USA	T2	5	[Latécoère, GKN Aerospace, Liebherr-Aerospace, Diehl Aerospace, Eaton Aerospace]
Precision Castparts Corp	T3	USA	T2	5	[Latécoère, GKN Aerospace, Liebherr-Aerospace, Diehl Aerospace, Eaton Aerospace]

Prediction tables answering 2 main questions:

- **“Critical parts” table:** Which parts are supplied by only one supplier?
- **“Suppliers with more than 3 Top tiers suppliers” table:** Which suppliers whose failure could take several Tier 1 suppliers out of operation at once?

Contact



**Jan
FRIELING**

Service Line Manager
DE – Data Driven Transformation
Agency Hamburg

jan.frieling@cimpa.com

+49 151 16862980



aeroline OFFERS

Manufacturing & Supply Chain

To secure a sustainable ramp-up, let's join our
Manufacturing & Supply Chain 5.0 journey:
Resilience, Sustainability & Human Centricity.

MANUFACTURING

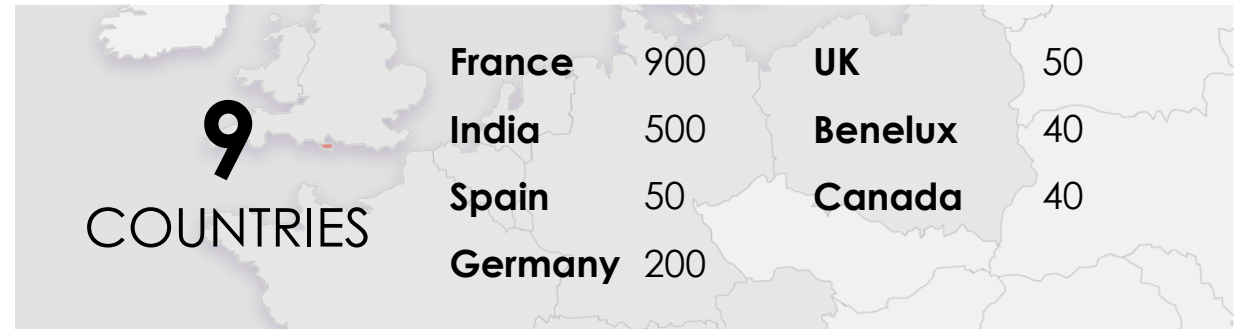
SNAPSHOT

We optimise the present, shaping the future by **digitising and transforming** the manufacturing industry.

Customers



Other Verticals



Key figures (Aeroline)

+1750 Number of people

+15 Key Accounts

Main Domains



CHALLENGES & STAKES

Digital services & solutions:
from extended supply chain to connected machines in a plant



Ramp up
improvement

- Enhance efficiency and operational excellence through **digitalisation**, **Lean 6Sigma**, and **SAP S/4HANA** transformation.
- Optimize resource usage and **decision-making** with AI, digital twin, **dynamic allocation**, and **simulation**.



Supply chain
resilience

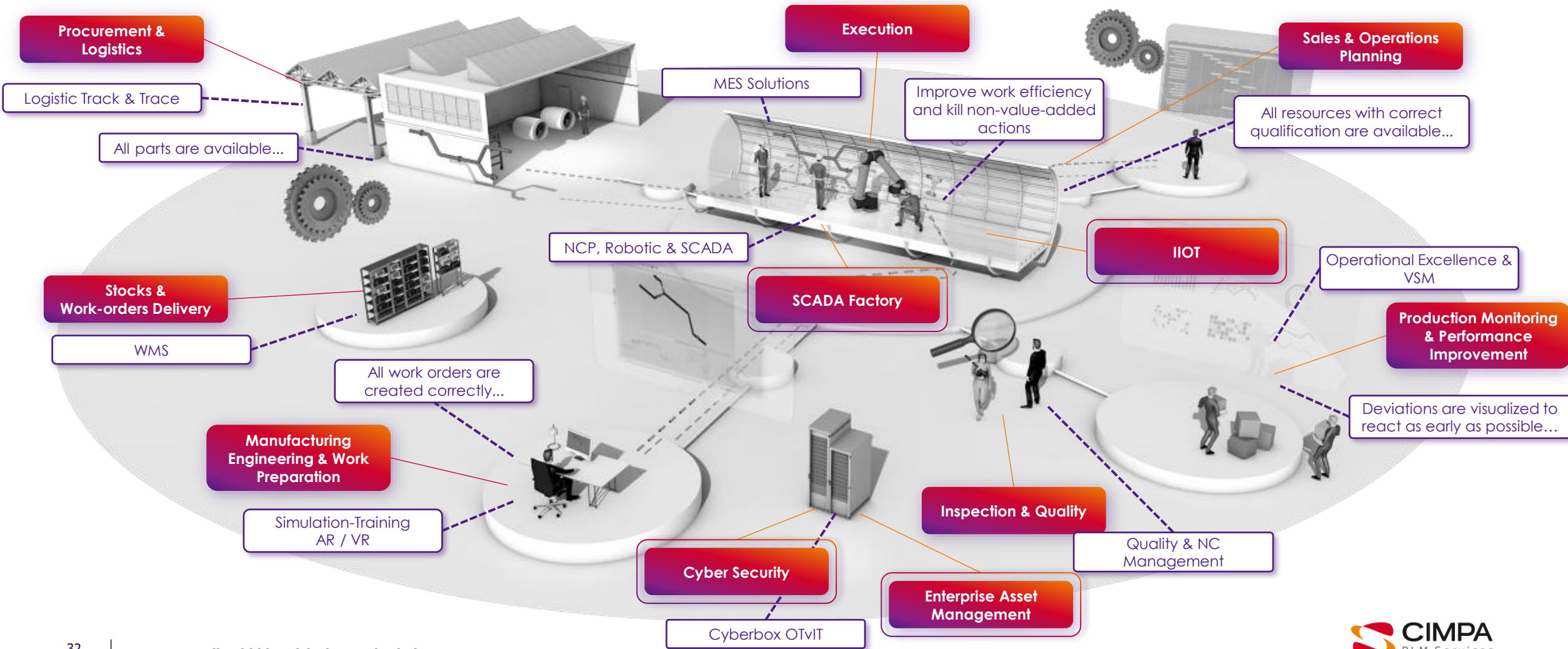
- Digitalise and implement reliable E2E supply chain planning with **shared supply data** and **sovereign cloud based** on Gaia-X.



Safety
prevention

- Use non-intrusive AI computer vision for **product and human safety** and prevent risky situations.
- Enhance cyber safety with a **dedicated manufacturing cyber team** and a non-intrusive OTvIT Cyber box.

OFFERING





OFFERING

GO TO S/4HANA WITH A/DSIGN

Aligning business needs with implementation based on the aeronautics industry best practices: from our SAP setup via Signavio modelling tool.

DIGITAL GO, LOOK & SEE

Auditing and sharing a diagnostic and actions to improve your efficiency based on a concrete business case.

DIGITAL TWIN & SIMULATION

Improve your capacity to take the best decision based on simulation and AI using a digital twin related to your end-to-end production lines including the real constraints.



Let's join our
**Manufacturing & Supply
Chain 5.0 journey**

SUSTAINABILITY FOOTPRINT

Integrating carbon impact in your industrial planning and continuous improvement.

OPERATIONAL EXCELLENCE DIGITALISATION

Optimising your reactivity to detect the issues to focus on thanks to a VSM tool, highlight the best-balanced scenario and track to maintain continuous improvement.

AI & COMPUTER VISION FOR SAFETY

Secure safe behaviors in a factory thanks to a map of your unsafe behavior zones.

PLANT CYBER SECURITY

Boosting the deployment of Cyber Security in Industrial Environments for business resilience through an end-to-end offer.

Four Domains

covering the whole Manufacturing scope of activities

Main customers



Operational Excellence

Operational Excellence regroups activities dedicated to

- **quality improvement:** Lean, VSM, Gemba, Airbus Operating System,

Design to Manufacturing, Costing, Sustainability & LCA

- **performance management** : from missing part management to operation optimization

Manufacturing Engineering

From product definition, **define, prepare and distribute data required for production:**

Digital mock-ups, documentation, process definition and simulation, AR and VR environments...

Manufacturing business knowledge and advanced skills in manufacturing data handling technologies are key assets

Business Operations

Provide added-value for **complex manufacturing processes implementation:**

Architecture definition and deployment of advanced CAD/CAM solutions, development and integration of specific automated and robotized processes, automation of composite materials manufacturing processes, numerical control programming

High level of technical and business expertise on complex manufacturing processes organized in agile centers of competences

PM&T & Shopfloor support

Fully exploit the potential of digitalization for operations & shopfloor :

Business analysis, Equipment connectivity, Digital Solutions PoCs, IT interface for specification, deployment and support of digital solutions.

Reactive teams, integrated to customers business model & processes, with advanced technical skills and aware of production context

Main customers



Main customers

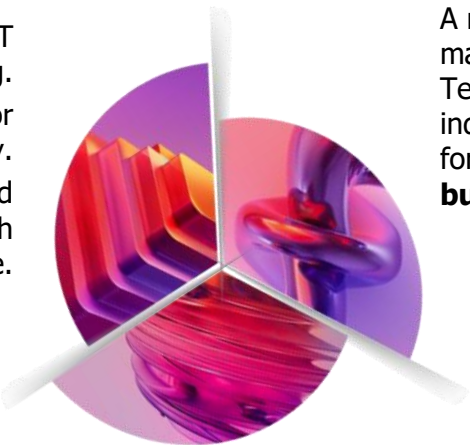


Three Pillars

to produce added-value on the entire of the value chain

Technical Skills

A demonstrated **technical expertise** in IT technologies applied to manufacturing.
Dedicated **center of competences** for optimal projection and reactivity.
Staying at the forefront of skills and technologies thanks to partnerships and high **R&D** rate.



Business Knowledge

A **rich history (+30 years)** in manufacturing business for aeronautics.
Technical teams composed by passionate individuals, in direct link with customers for an **optimal understanding of business needs**.

A robust ecosystem

Software editor partnerships



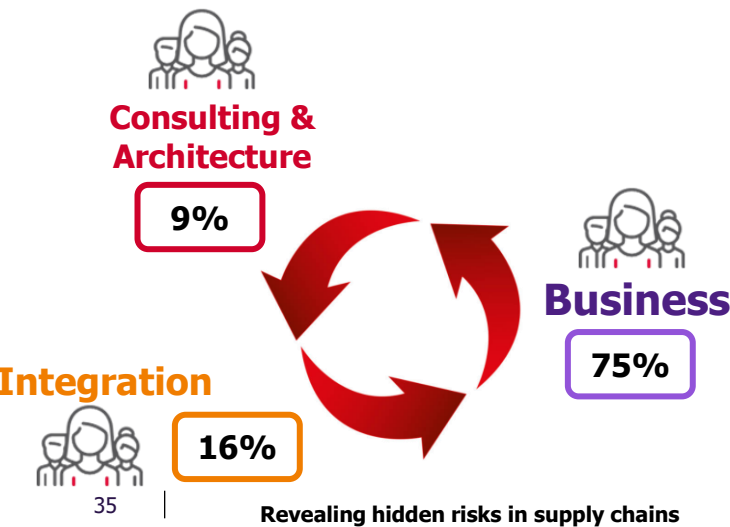
SIEMENS



Labs and institutional Collaborations



Value Chain Covering



Proximity & Service

Teams are **integrated to customers business processes** for fluid execution and maximum reactivity.
Centralized management of support and services, **distributed operations** across different locations.

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CIMPA GmbH. Notkestr. 9 . 22607 Hamburg. Legal Domicile: Hamburg. Registration Court: Amtsgericht Hamburg HRB 99372. General Managers: Christian SCHOLZ, Andreas SONGIN, Alexander POPKES, Antonio SUELS

