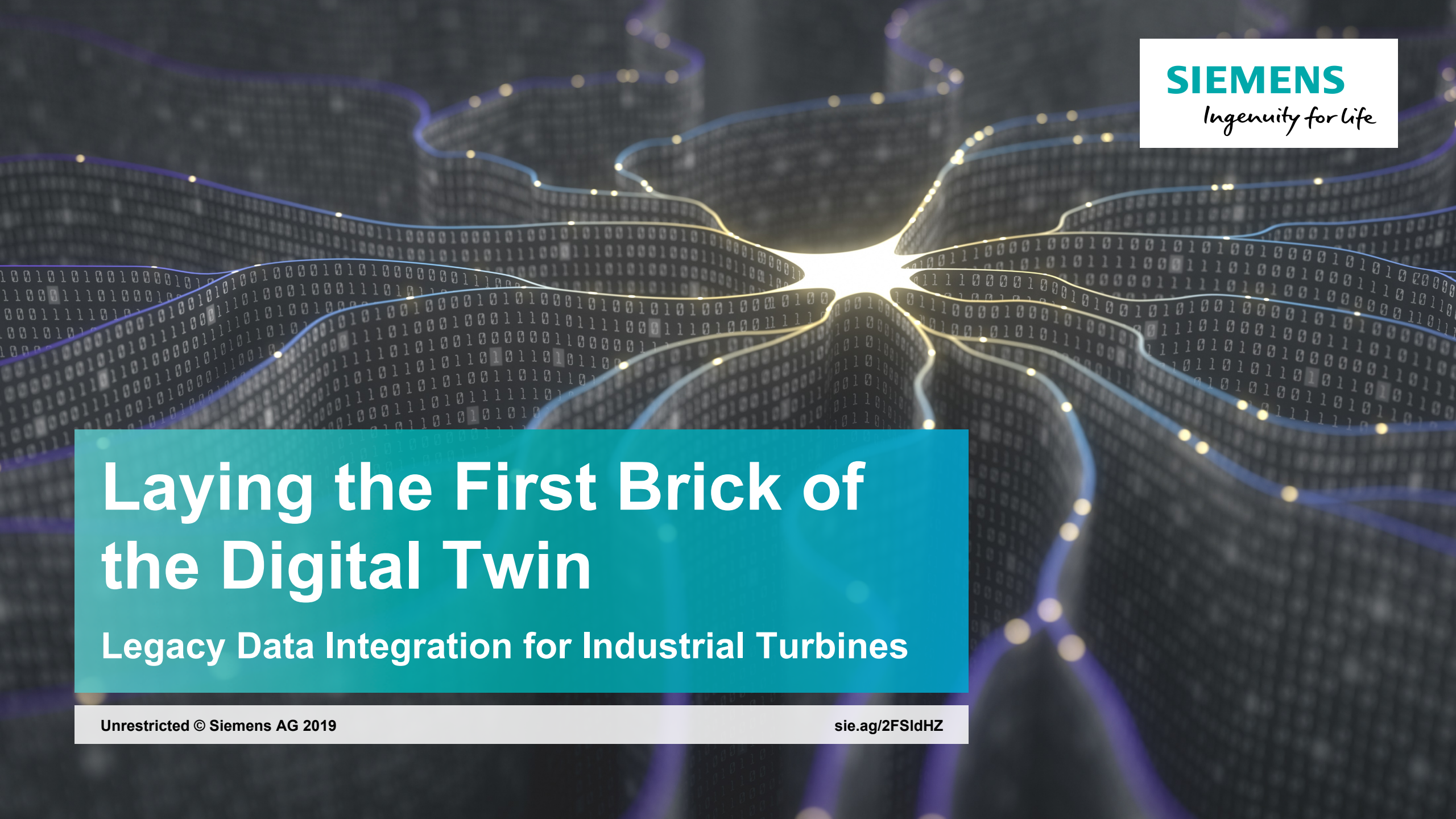

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Laying the First Brick of the Digital Twin

Legacy Data Integration for Industrial Turbines

sie.ag/2FSIdHZ

Digital Twins are ubiquitous at Siemens

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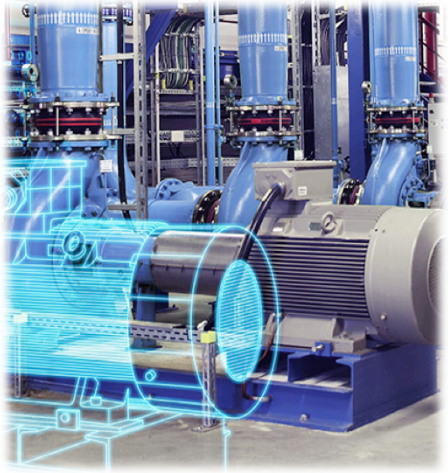
- Building structure & installed devices
- Improved building management, value-add services (e.g. space utilization)



- Drive structure & specs, simulation models
- Optional transfer & re-use of simulation models across fleets

- Machine skills and product specification
- Automated production planning (especially small lots)

- Turbine structure, TCS config, customer data, event data, …
- Data democratization (access for domain users), simplified monitoring and dashboarding

Legacy data integration for industrial turbines – Speeding up business with twins for the installed base

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Problem space

- One product line, two fleets, **several hundred legacy units**
- Mix of **own design** (core turbine) **and purchased systems** (auxiliaries)
- Relevant **information split across heterogeneous sources**:
  - Engineering BOM (SAP), configuration management (DB)
  - Design documents (scanned docs; tables and technical drawings)
  - Workshop reports (scanned docs; free text and tables)

Get Clean

Developing a (semi-)automated **cleansing and migration service** for existing data to create a basic Digital Twin

Stay Clean

Implementing **new way of working** to have the basic Digital Twin up-to-date for all machines at any time

Goal

- **As-maintained BOM** of fleet
- in **legacy SAP system**
- as a means to
  - **simplify data access**,
  - **increase** service operations **efficiency**, and
  - enable **new digitalization services**

Legacy data integration for industrial turbines – Close interaction between business and tech is key

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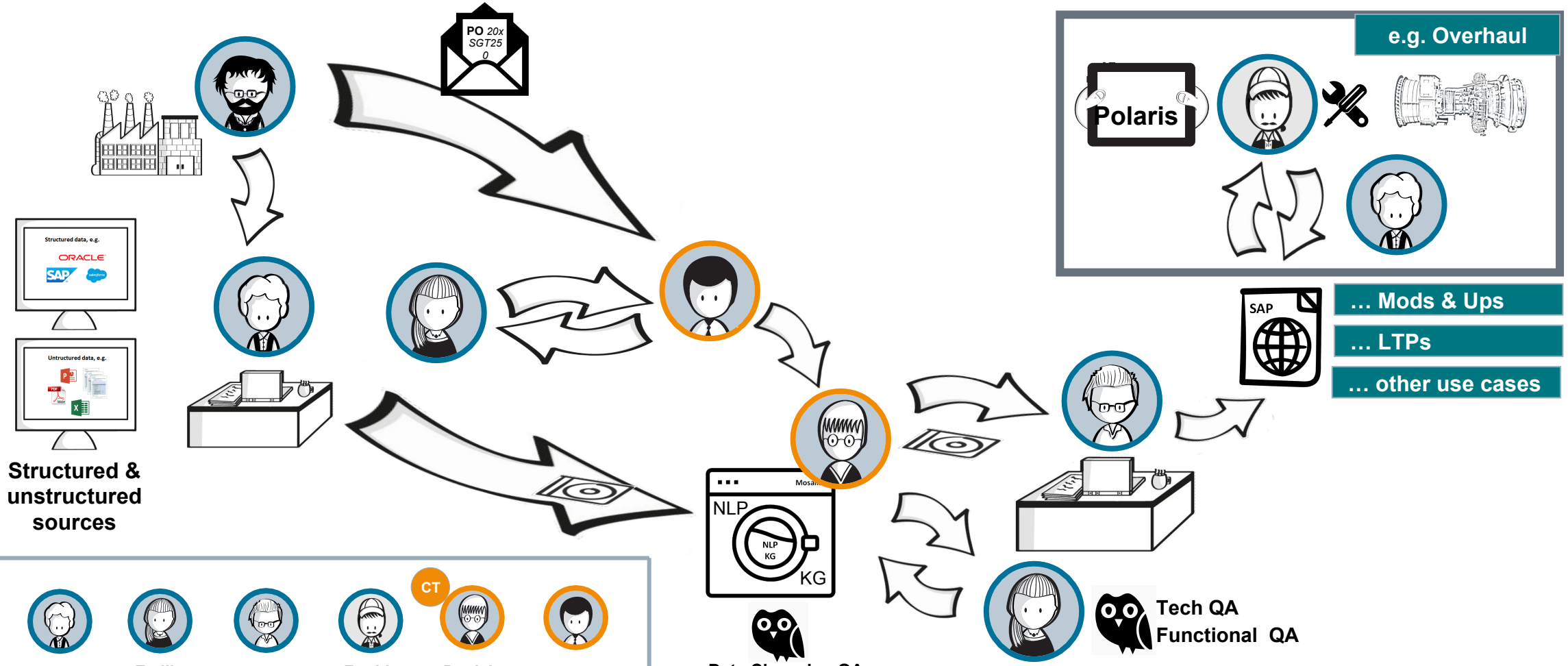

Legacy data integration for industrial turbines – Extraction from (partially scanned) documents

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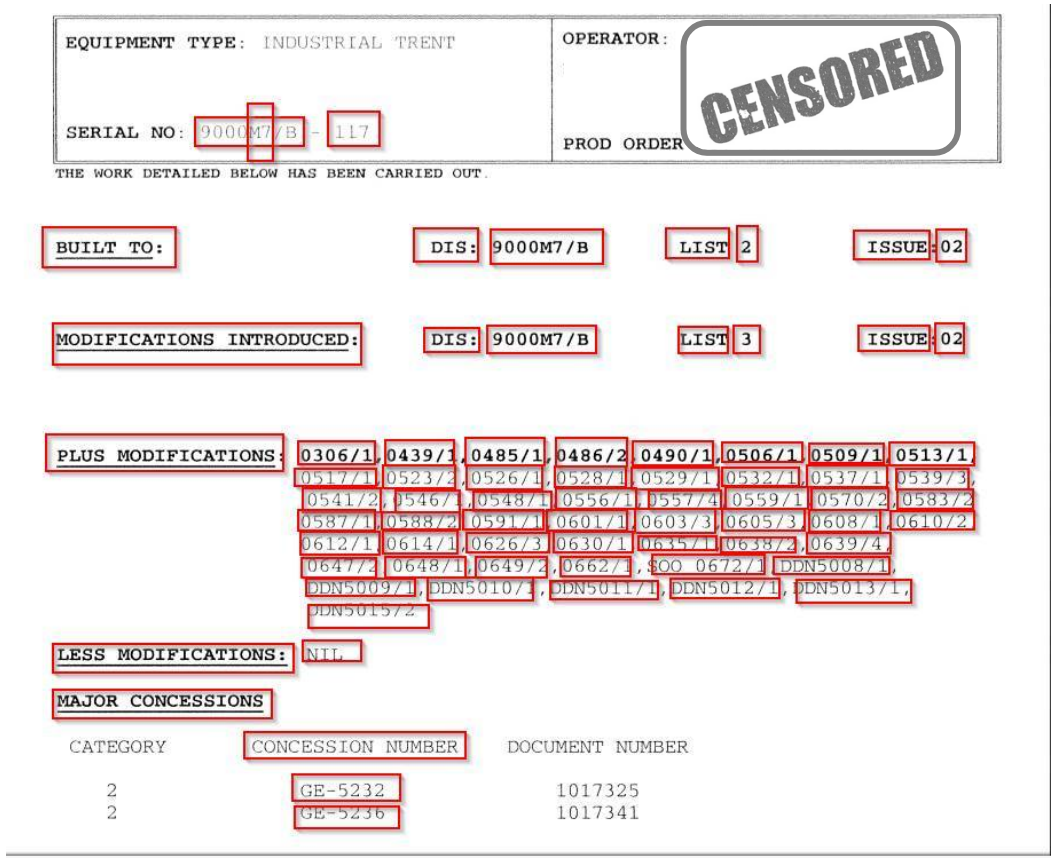


EQUIPMENT TYPE: INDUSTRIAL TRENT

OPERATOR: CENSORED

SERIAL NO: 9000M7/B - 117

PROD ORDER

THE WORK DETAILED BELOW HAS BEEN CARRIED OUT.

BUILT TO: DIS: 9000M7/B LIST 2 ISSUE: 02

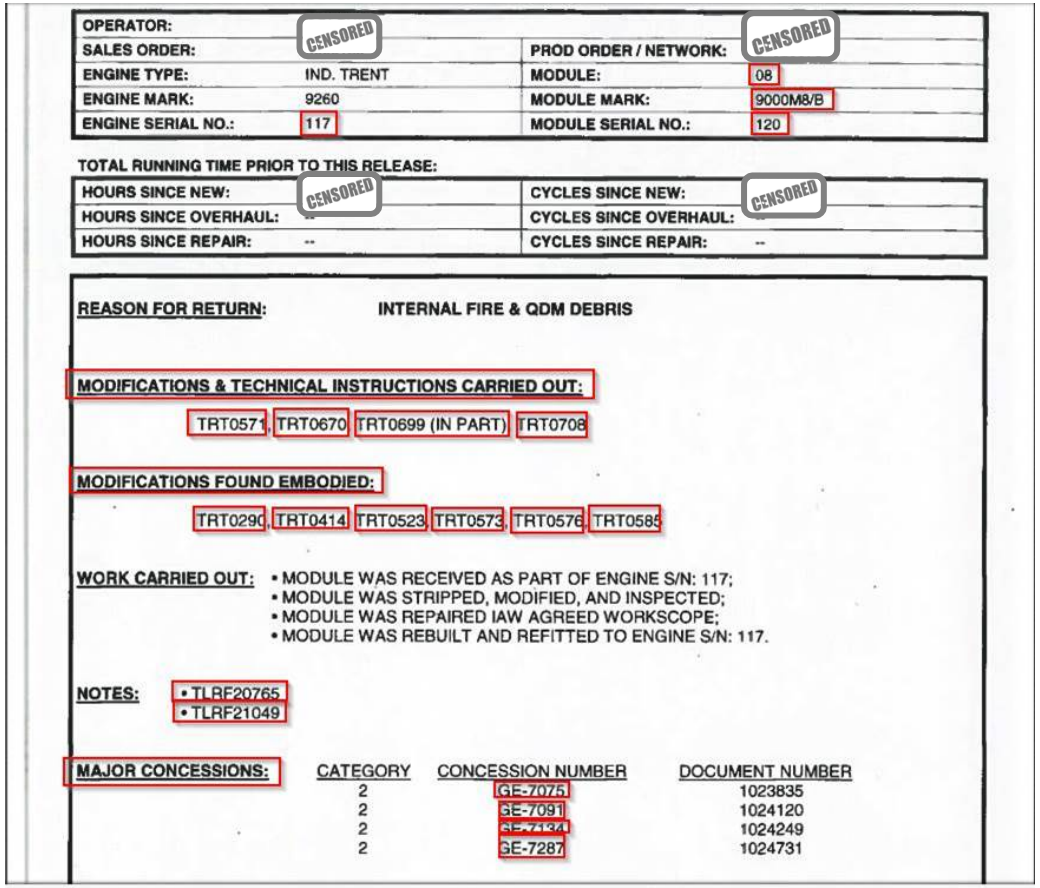
MODIFICATIONS INTRODUCED: DIS: 9000M7/B LIST 3 ISSUE: 02

PLUS MODIFICATIONS: 0306/1, 0439/1, 0485/1, 0486/2, 0490/1, 0506/1, 0509/1, 0513/1, 0517/1, 0523/2, 0526/1, 0528/1, 0529/1, 0532/1, 0537/1, 0539/3, 0541/2, 0546/1, 0548/1, 0556/1, 0557/4, 0559/1, 0570/2, 0583/2, 0587/1, 0588/2, 0591/1, 0601/1, 0603/3, 0605/3, 0608/1, 0610/2, 0612/1, 0614/1, 0626/3, 0630/1, 0635/1, 0638/2, 0639/4, 0647/2, 0648/1, 0649/2, 0662/1, SOO 0672/1, DDN5008/1, DDN5009/1, DDN5010/1, DDN5011/1, DDN5012/1, DDN5013/1, DDN501572

LESS MODIFICATIONS: NIL

MAJOR CONCESSIONS

CATEGORY	CONCESSION NUMBER	DOCUMENT NUMBER
2	GE-5232	1017325
2	GE-5236	1017341



OPERATOR:	CENSORED		
SALES ORDER:		PROD ORDER / NETWORK:	CENSORED
ENGINE TYPE:	IND. TRENT	MODULE:	08
ENGINE MARK:	9260	MODULE MARK:	9000M8/B
ENGINE SERIAL NO.:	117	MODULE SERIAL NO.:	120

TOTAL RUNNING TIME PRIOR TO THIS RELEASE:

HOURS SINCE NEW:	CENSORED	CYCLES SINCE NEW:	CENSORED
HOURS SINCE OVERHAUL:	--	CYCLES SINCE OVERHAUL:	--
HOURS SINCE REPAIR:	--	CYCLES SINCE REPAIR:	--

REASON FOR RETURN: INTERNAL FIRE & QDM DEBRIS

MODIFICATIONS & TECHNICAL INSTRUCTIONS CARRIED OUT:

TRT0571, TRT0670, TRT0699 (IN PART), TRT0708

MODIFICATIONS FOUND EMBODIED:

TRT0290, TRT0414, TRT0523, TRT0573, TRT0576, TRT0585

WORK CARRIED OUT:
- MODULE WAS RECEIVED AS PART OF ENGINE S/N: 117;
- MODULE WAS STRIPPED, MODIFIED, AND INSPECTED;
- MODULE WAS REPAIRED IAW AGREED WORKSCOPE;
- MODULE WAS REBUILT AND REFITTED TO ENGINE S/N: 117.

NOTES:
- TLRF20765
- TLRF21049

MAJOR CONCESSIONS:	CATEGORY	CONCESSION NUMBER	DOCUMENT NUMBER
	2	GE-7075	1023835
	2	GE-7091	1024120
	2	GE-7134	1024249
	2	GE-7287	1024731

Legacy data integration for industrial turbines – Extraction from P&I diagrams (1)

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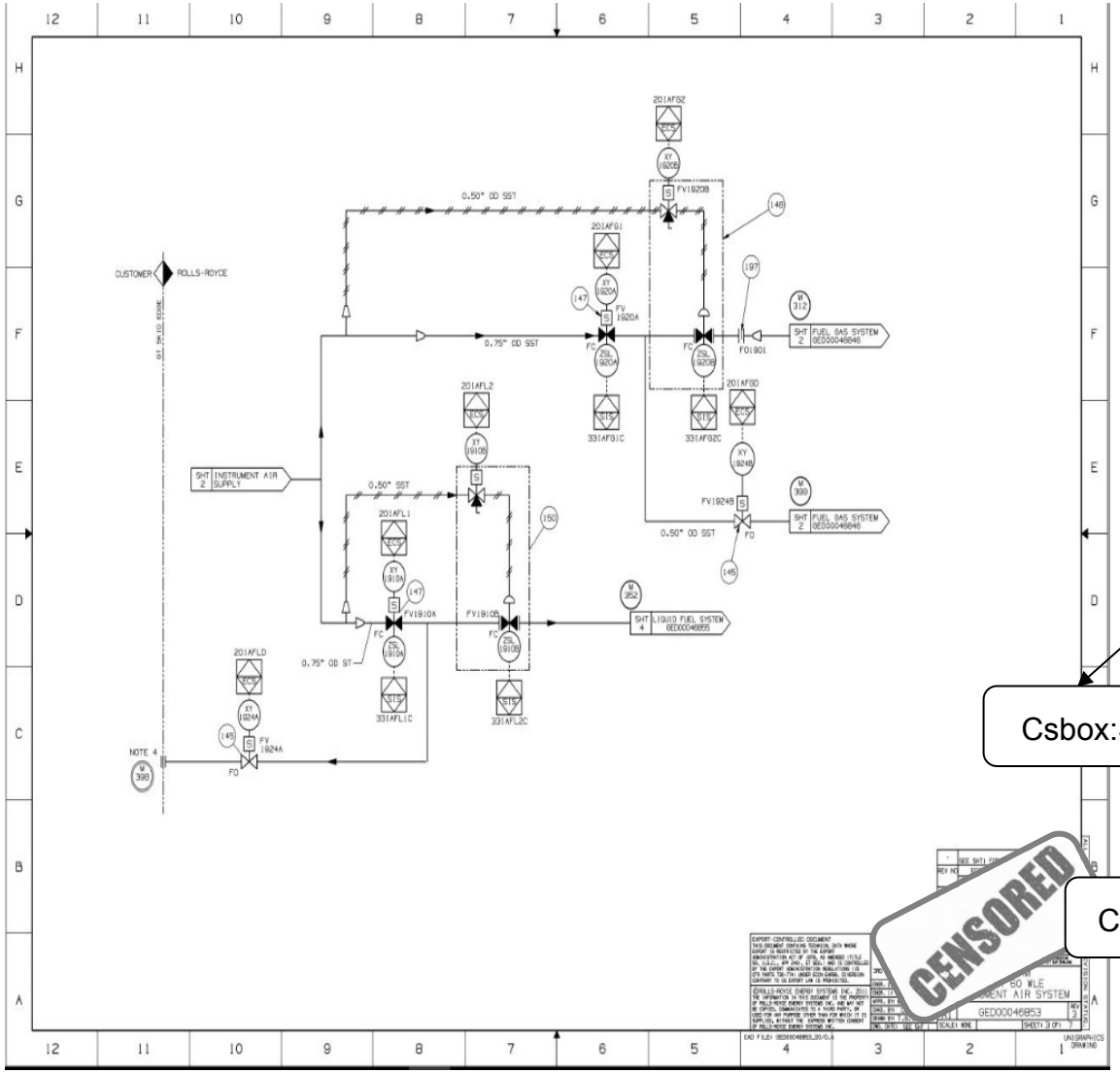

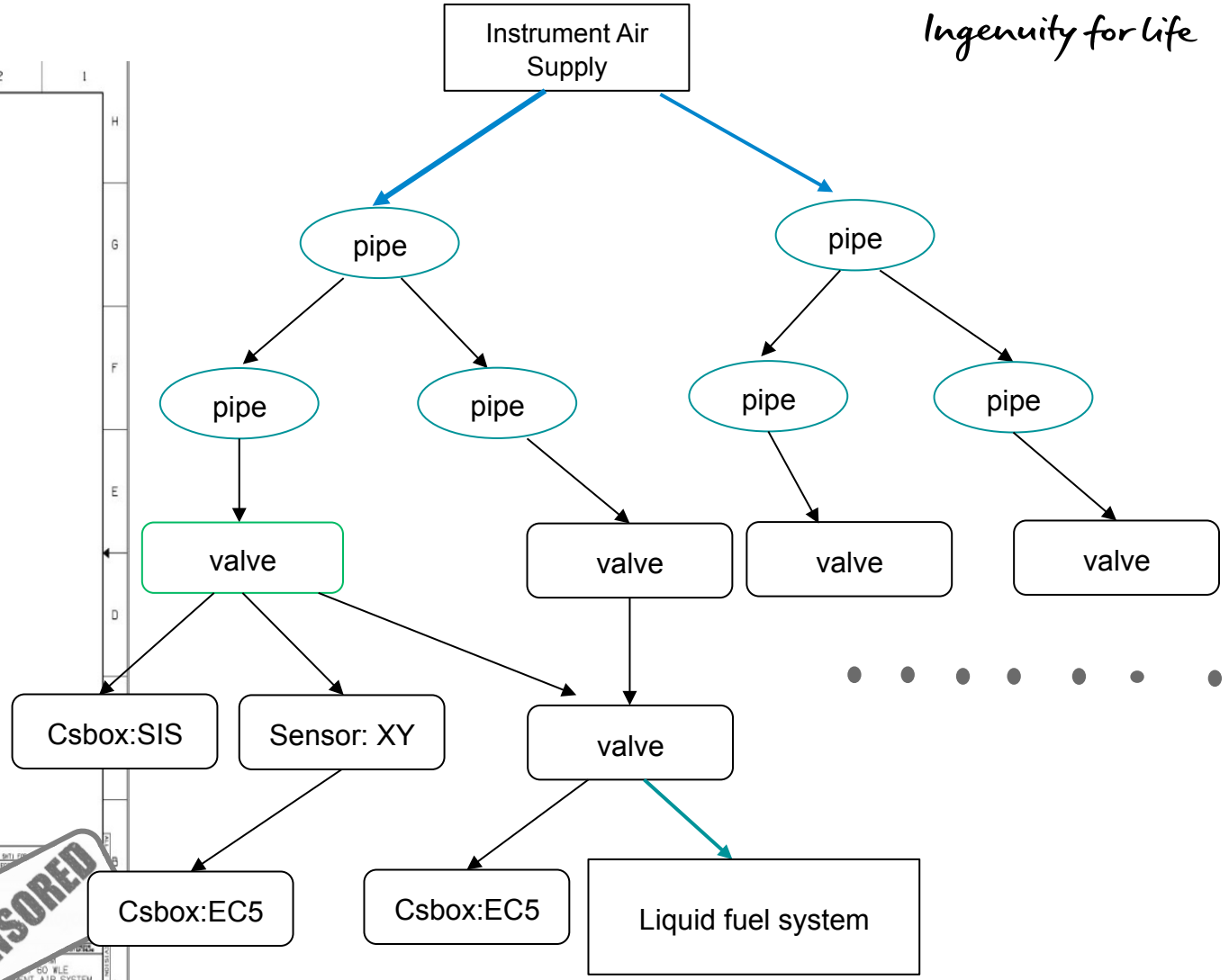

Legacy data integration for industrial turbines – Extraction from P&I diagrams (2)

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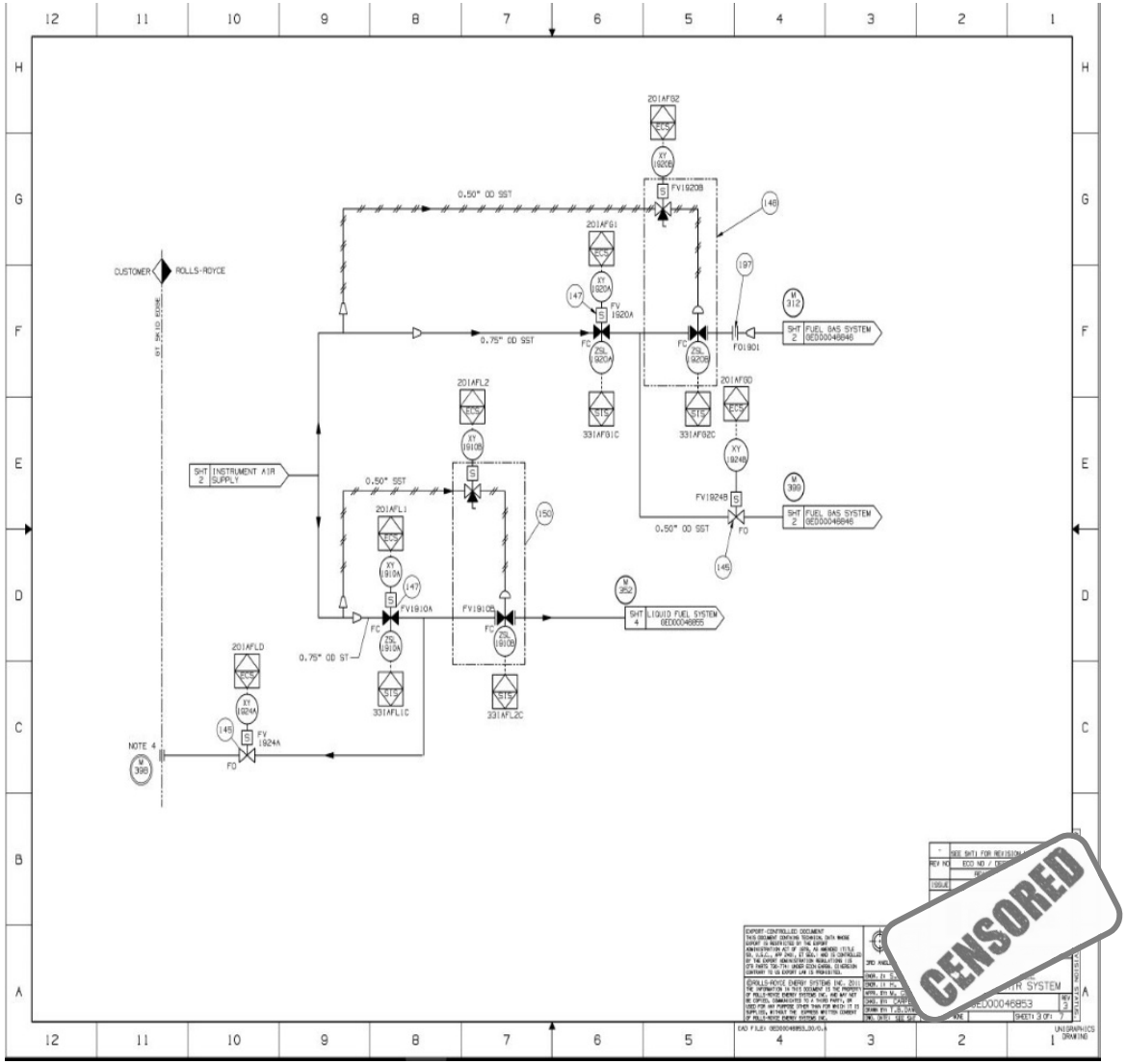

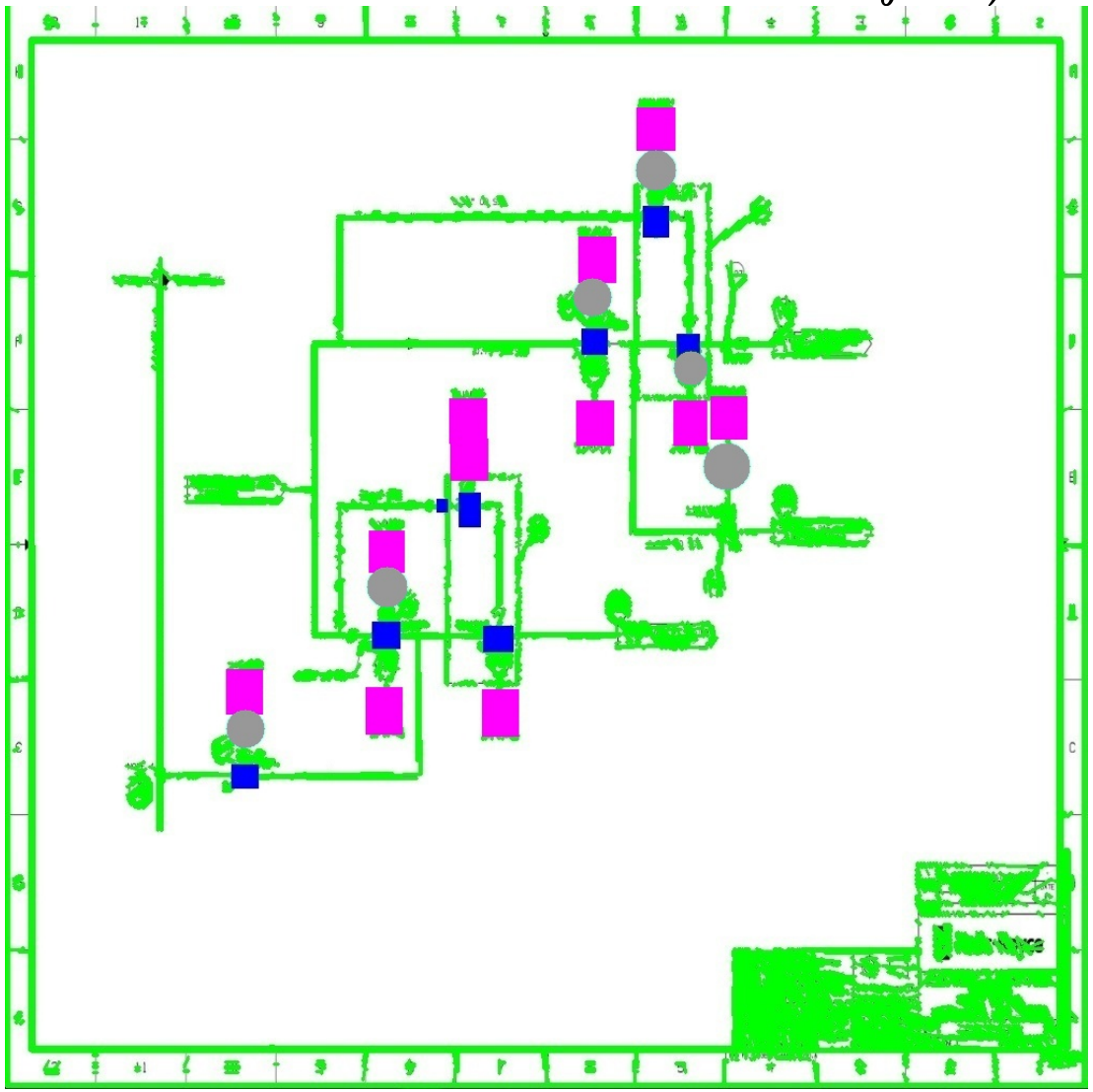

Legacy data integration for industrial turbines – Extraction from P&I diagrams (3)

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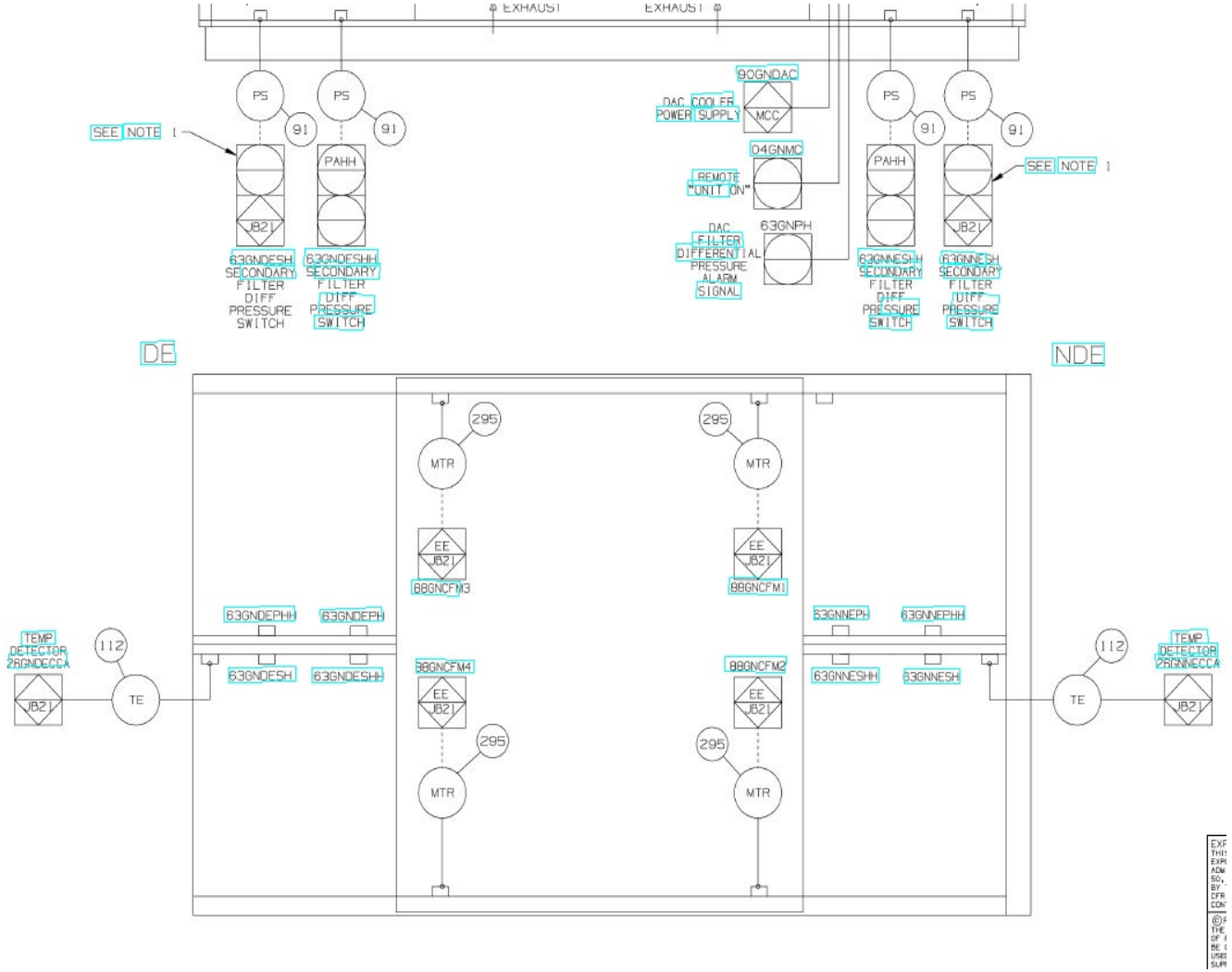

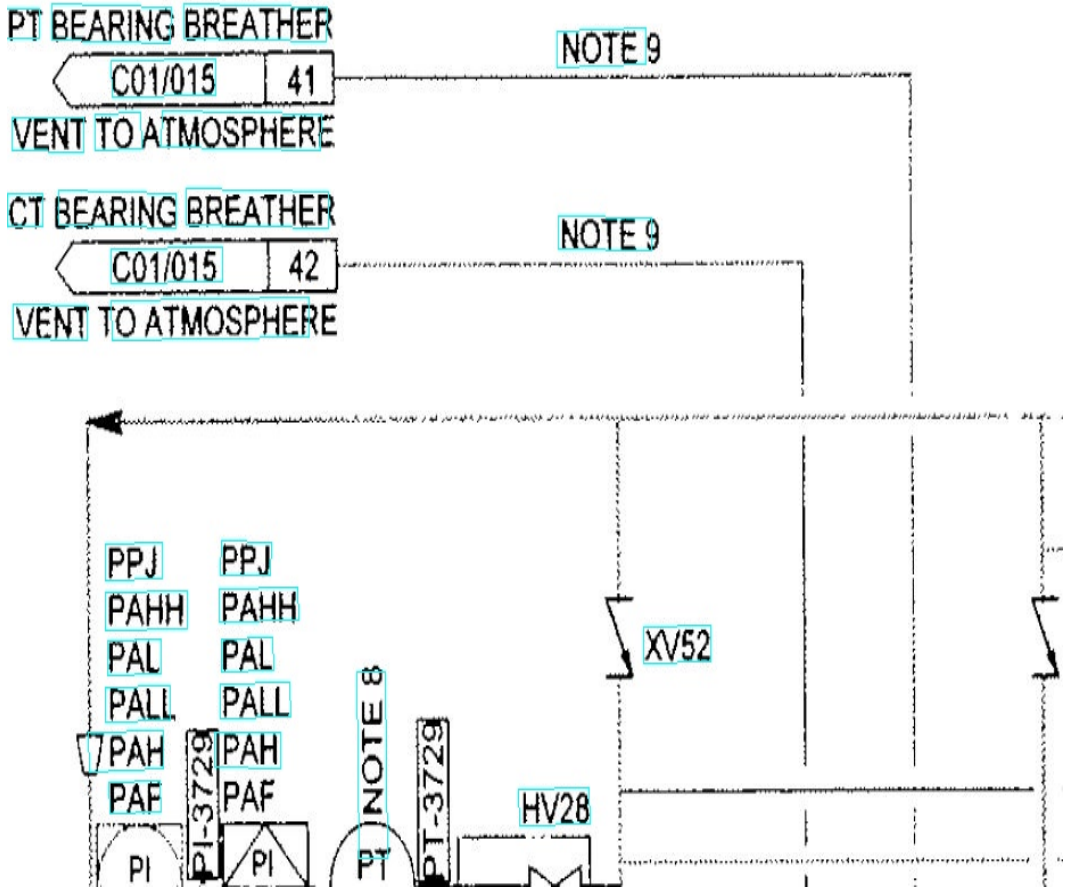

Legacy data integration for industrial turbines – A complex data integration task

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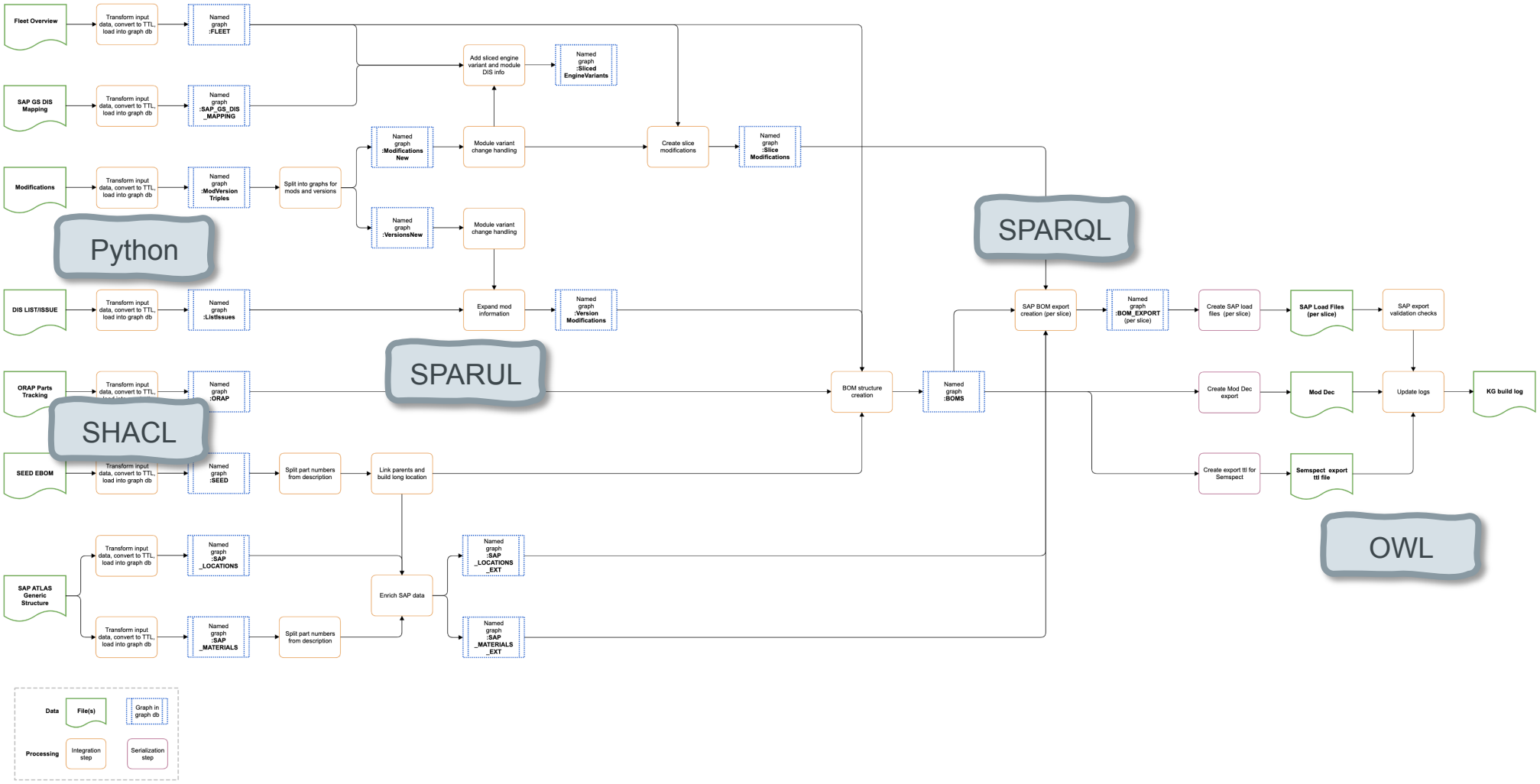

Legacy data integration for industrial turbines – We have reached our goal, but we're not done yet!

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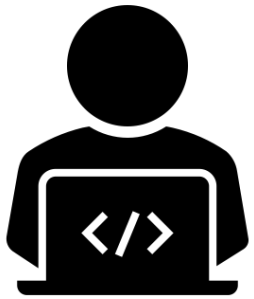
How much semantics is needed?



Capturing expert knowledge in actionable form?

Communicating about "the graph" with SMEs?

Meet Vincent and myself at the tables to discuss more ☺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Thank you!

Who is Thomas Hubauer?

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Portfolio Manager “Knowledge Graph & Semantics”
with Siemens Corporate Technology

PhD in computer science at University Lübeck
(application of abductive inference to industrial diagnostics)

Interests include logics, databases, ML, neurobiology, …

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twitter: @thomas_hubauer