



Self-service analytics and ML for ENR process engineers

Rafael Pacheco, Stojan Maleschlijski, SAP
Session ID #83125

About the Speakers



**RAFAEL
PACHECO**

Data Scientist, SAP

Rafael is part of the SAP's Global Data Science Team based in US. He is specialized in time series analysis, machine learning and data science in the O&G industry. Rafael holds a PhD in Applied Mathematics from Arizona State University, USA

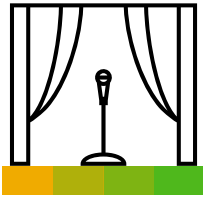


**STOJAN
MALESCHLIJSKI**

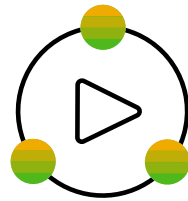
Data Scientist, SAP

Stojan is part of the SAP's Global Data Science Team. He is an expert in the application of data science, machine learning and image processing algorithms. Stojan holds a PhD in Computer Science from University of Heidelberg, Germany

Agenda



ML and
Analytics



Demo from
the O&G



Q&A

ML&AI ADOPTION ACROSS INDUSTRIES



47% of 2135 respondents surveyed by McKinsey for the 2018 Global Survey AI Adoption by Industry and Function said they have implemented **at least one AI technology**

Source: AI adoption advances, but foundational barriers remain, McKinsey report, 2018, URL

Business functions in which AI has been adopted, by industry,¹ % of respondents

	Service operations	Product and/or service development	Marketing and sales	Supply-chain management	Manufacturing	Risk	Human resources	Strategy and corporate finance
Telecom	75	45	38	26	22	23	17	15
High tech	48	59	34	23	20	17	21	17
Financial services	49	26	33	7	6	40	9	14
Professional services	38	34	36	19	11	15	16	11
Electric power and natural gas	46	41	15	14	19	14	15	14
Healthcare systems and services	46	28	17	21	9	19	18	13
Automotive and assembly	27	39	15	11	49	2	8	6
Travel, transport, and logistics	51	34	32	18	4	4	2	3
Retail	23	13	52	38	7	9	8	0
Pharma and medical products	31	31	27	13	28	3	6	4

¹This question was asked only of respondents who said their organizations have piloted or embedded at least 1 AI capability in 1 or more functions or business units. Respondents who answered "don't know" or "none of the above" are not shown. For telecom, n = 77; for high tech, n = 215; for financial services, n = 306; for professional services, n = 221; for electric power and natural gas, n = 54; for healthcare systems and services, n = 67; for automotive and assembly, n = 120; for travel, transport, and logistics, n = 55; for retail, n = 46; and for pharma and medical products, n = 65.

McKinsey&Company

YET COMPANIES STRUGGLE TO MANAGE THEIR DATA

65%

of organizations can't analyze or categorize all the data they store

68%

Of IT professional believe their organizations are failing to carry out all procedures in line with data protection laws.

1%

Of the data created by the Oil and Gas industry generates value

54%

Of companies know where all of their sensitive data is stored.

89%

Of companies admitted the ability to analyze data effectively would provide them with a competitive edge in their industry.

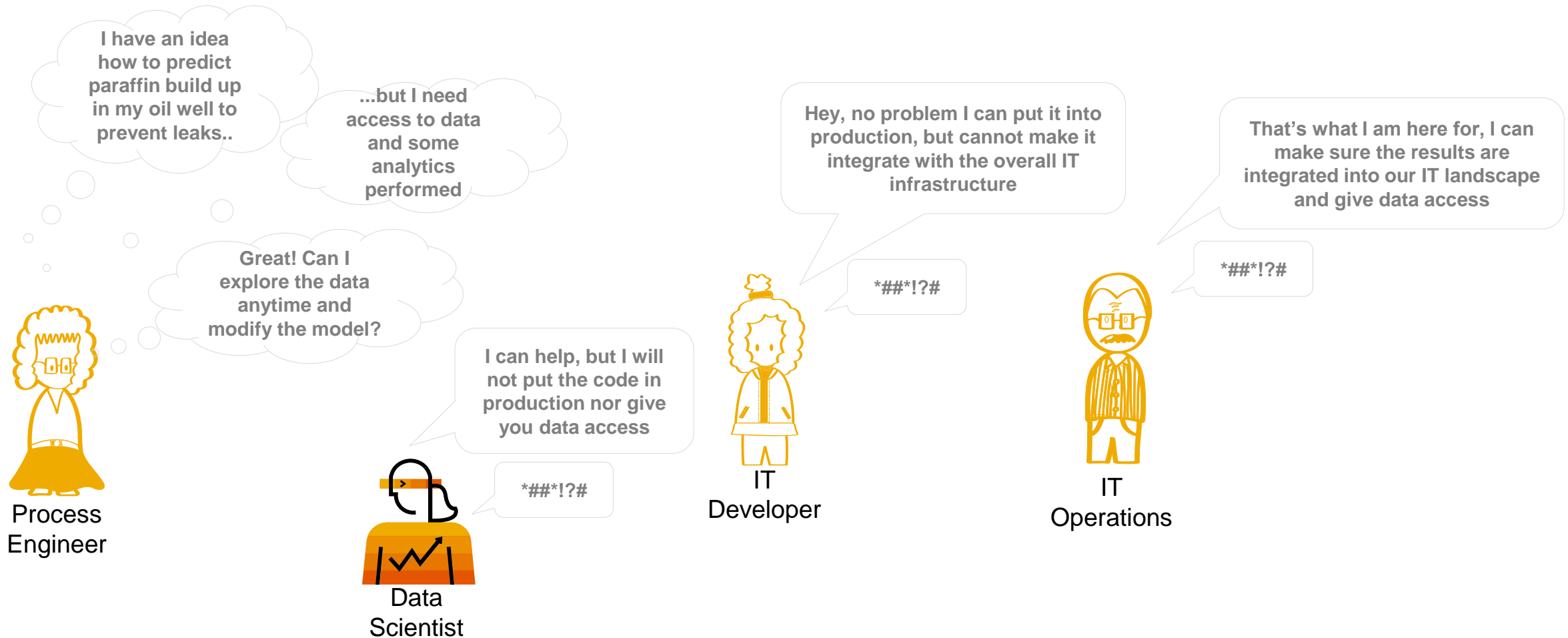
Source: Gemalto research reveals businesses collect more data than they can handle, 2018, URL

Question...

How can asset-intensive and manufacturing industries be enabled to overcome challenges, initiate change and monetize on data?

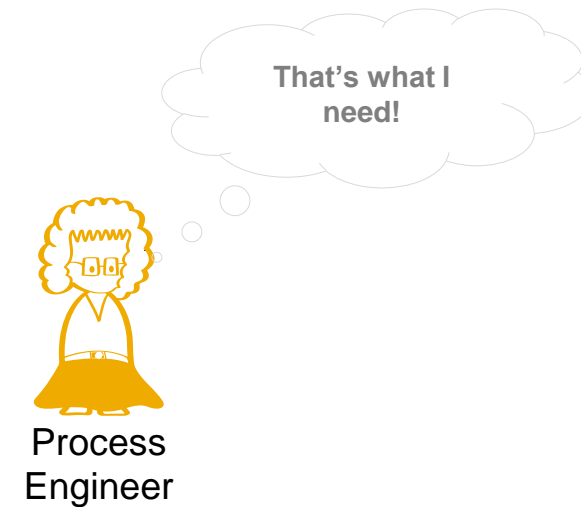
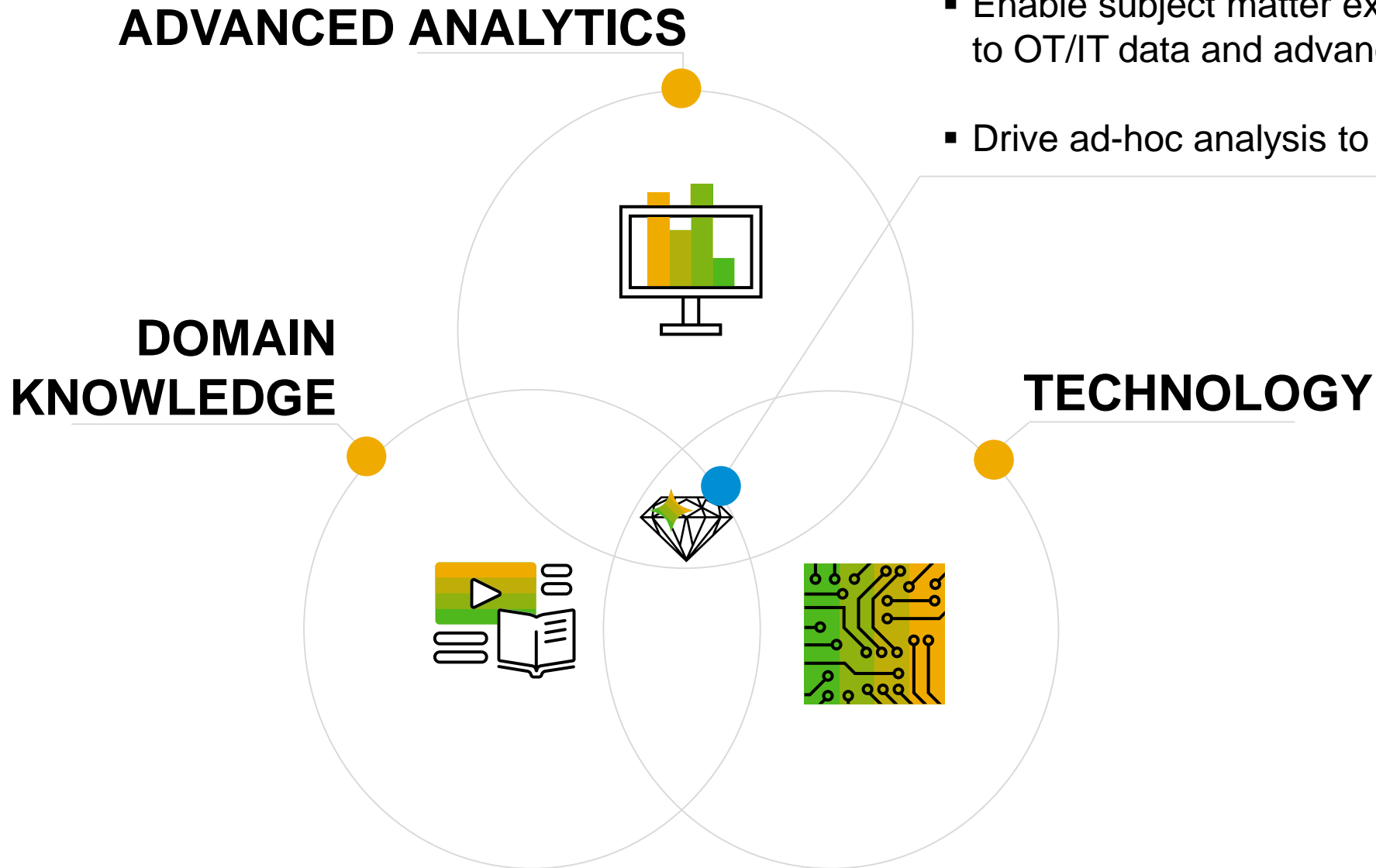


INNOVATION EVENTUALLY MEETS OPERATIONS



Answer...

- Allow the convergence of Operations Technology (OT) and Information Technology (IT) data
- Enable subject matter experts to self-service access to OT/IT data and advanced analytics
- Drive ad-hoc analysis to accelerate data into value



With SAP HANA Platform and SAP Analytics Cloud...

Enable real time IT/OT convergence
and ad-hoc self-service analytics



Process
Engineer

Using SAC, I can
independently explore
trends, build models
and extract insights.
Great!



Visualization &
Applications

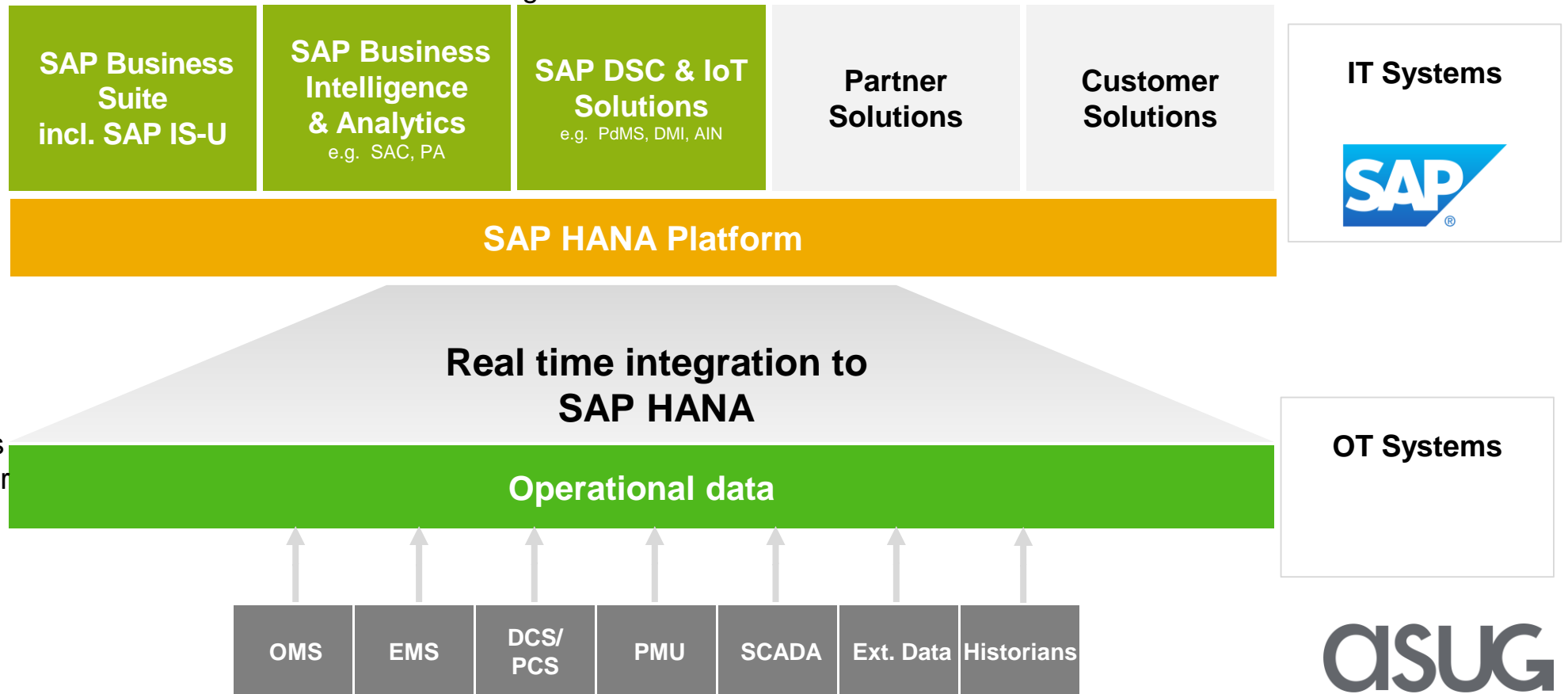
I can combine
OT&IT data in
the HANA
platform.
Amazing!



Process
Engineer



Data Sources



A group of four men in business attire are gathered around large digital screens in a modern office or conference room. The man on the far left is seen from the side, wearing a dark suit and glasses. The other three men are looking at the screens, which display various data visualizations including bar charts and line graphs. The word "Demo" is overlaid in a large, white, outlined font across the center of the image. The background is dark with some ambient lighting.

Demo

Demo – Early detection of tubing leaks



Process Engineer

Objectives



Showcase how enabling subject matter experts (here: process engineers) allows the creation of machine learning models to predict equipment failure



Show how the ad-hoc analysis can be used to gain understanding on the physical process

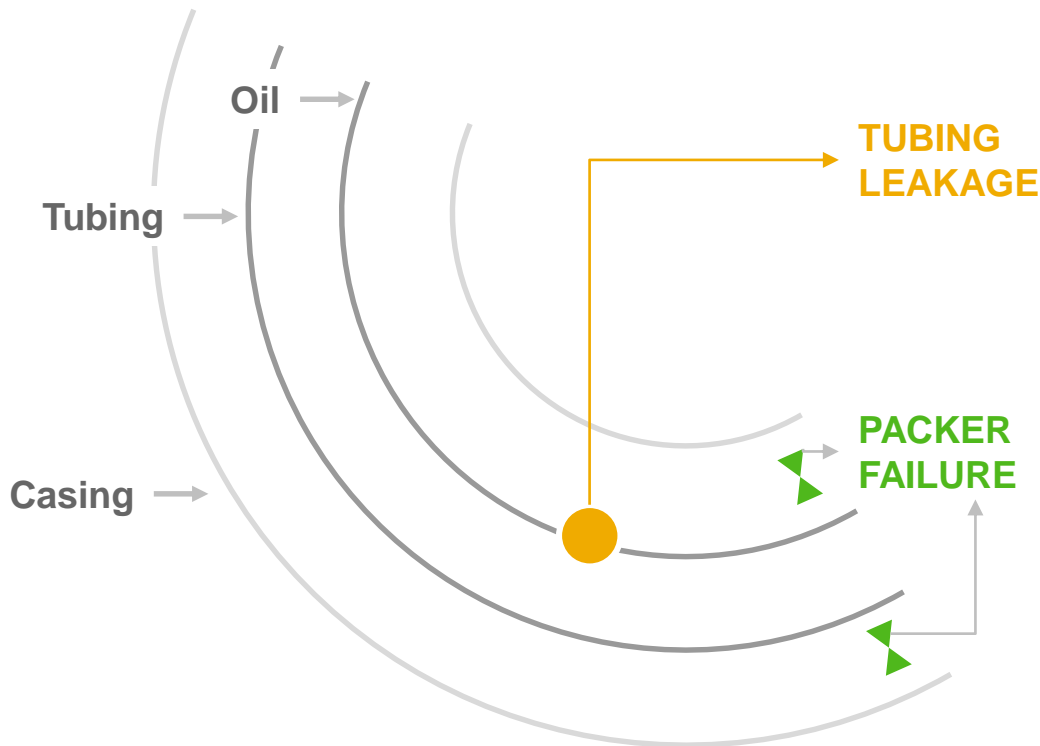


Demonstrate the advantages of combining OT and IT data



Technical use case description

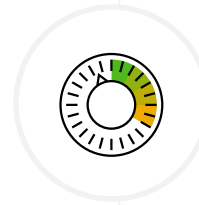
Objectives: Predict tubing leakage



SCHEMATIC



Casing leaks in injection wells can result in undesired fluid injection, while leaks in completion components of production wells often decrease production rates and increase water cut.



Leaks in casing, tubing and packers can increase annulus pressure, putting well operations at risk



Casing leaks result in cross-flows behind casing, which can lead to unpredictable reservoir performance

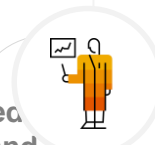
Dataset



Sensor data: e.g. Oil flowrate, temperature, etc.



Maintenance records: Last maintenance, preventive maintenance compliance, cost, etc.



Annotated: Each time point, when the equipment failed is annotated

For this I have collected historical sensor (OT) and maintenance records (IT) data and labelled all the occasions when there was a tubing leakage

I would like to investigate the drivers for this leakage

I have noticed that the tubing of the oil well leaks often times

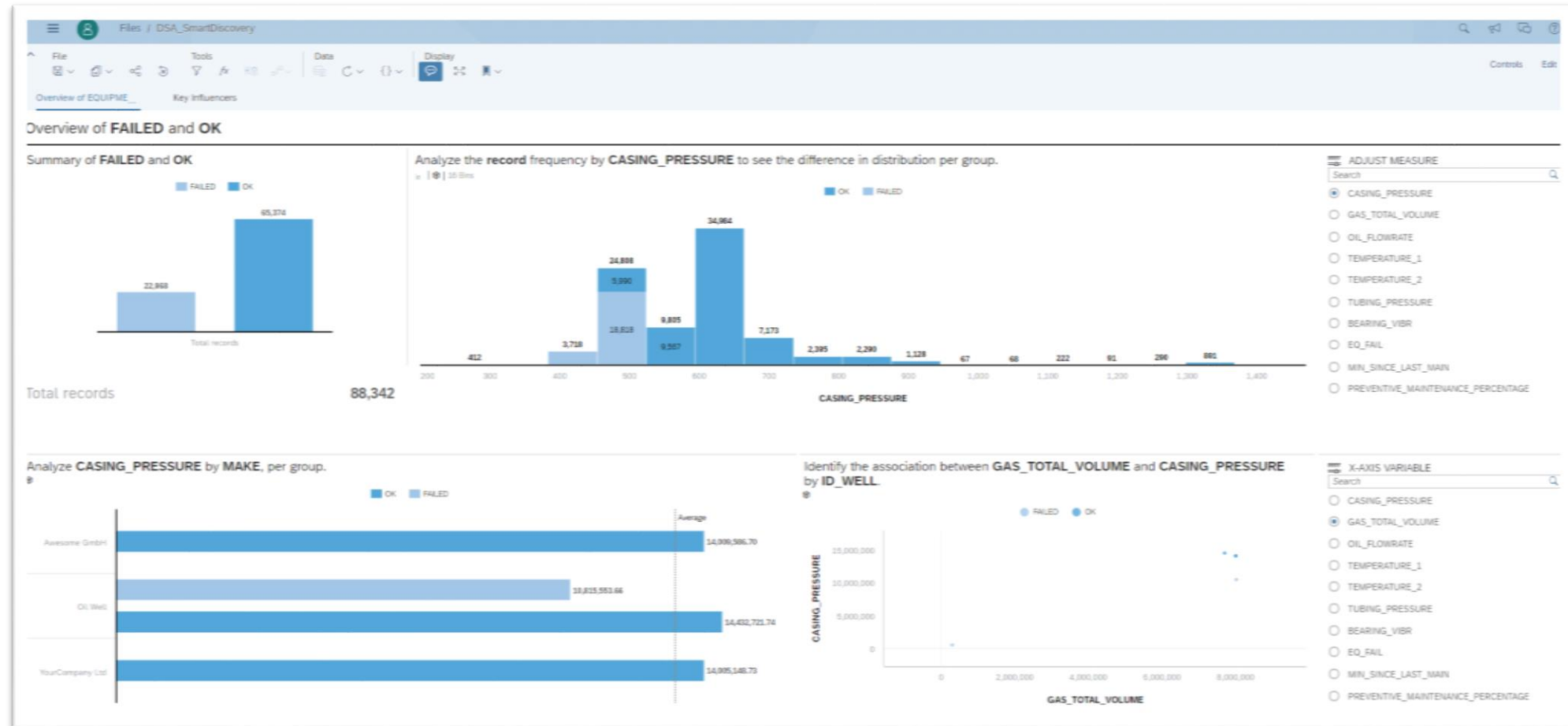
I will go into SAC to investigate what were the driving parameters for the leakage

And finally, I will create a classification model to predict whether a failure will occur in the next 6h or not



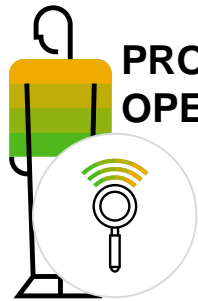
Process Engineer

Demo



Integration

VISUALIZATION



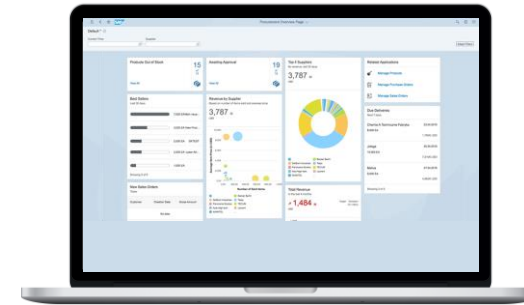
PROCESS
OPERATOR

Process monitor



EXPLORATION

Self-service analytics



SAP® Analytics Cloud



PROCESS
ENGINEER

PRODUCTIZATION

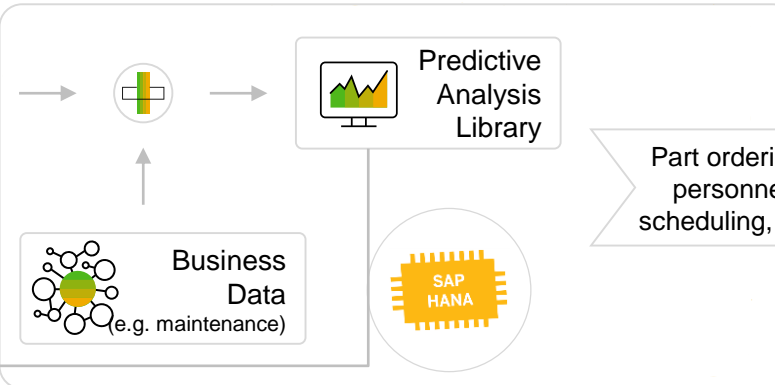
Assets



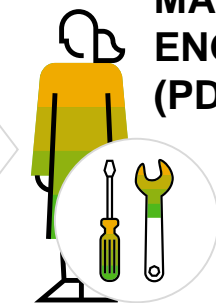
OT Data Source

Cleansed data

Prediction



Part ordering,
personnel
scheduling, etc.



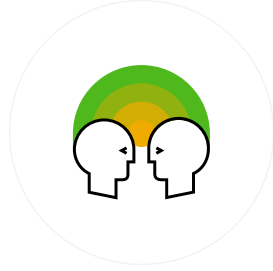
MAINTENANCE
ENGINEER
(PDMS)

asug

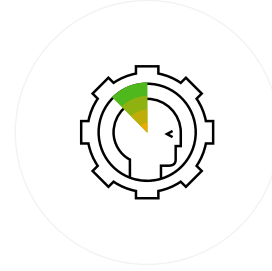
Key take-aways



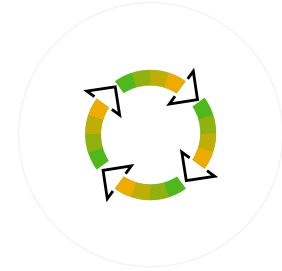
Data Science/ Machine Learning Automation tools will become regular **commodities** that you don't even need to know how to code to use them



Providing **ML** and **DS capabilities** to **SMEs** to be consumed in a **self-service** manner opens up new possibilities for data monetization



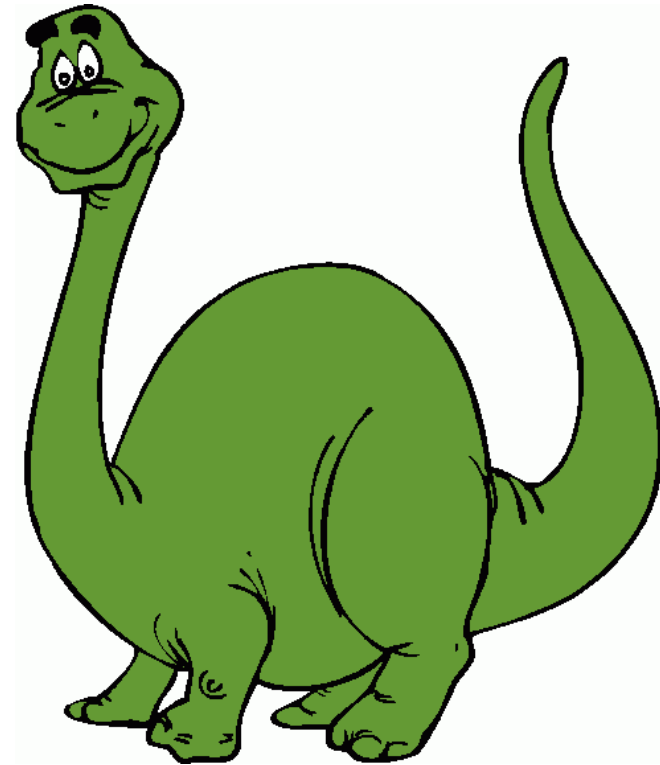
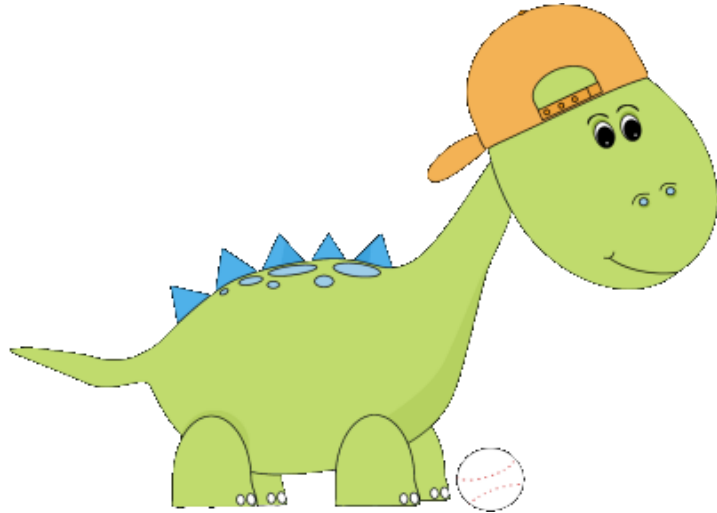
Combining OT and IT data creates an augmented data set, which **enhances** the **performance** of **ML models**



SAP HANA platform combined with **SAP Analytics Cloud** provide tools to **explore** and combine **data**, to **develop**, **consume** and **deploy ML models** to users with **different** levels of **ML expertise** (from beginners up to advanced)

Thank you!

You know what, Allan?
I feel, that the jobs of
the future will be in
the Oil and Gas
industry!



Take the Session Survey.

We want to hear from you! Be sure to complete the session evaluation on the SAPPHIRE NOW and ASUG Annual Conference mobile app.



Presentation Materials

Access the slides from 2019 ASUG Annual Conference here:

<http://info.asug.com/2019-ac-slides>

Q&A

For questions after this session, contact us at
Stojan.Maleschlijski@sap.com and Rafael.Pacheco@sap.com

Let's Be Social.

Stay connected. Share your SAP experiences anytime, anywhere.

Join the ASUG conversation on social media: **@ASUG365 #ASUG**



Appendix