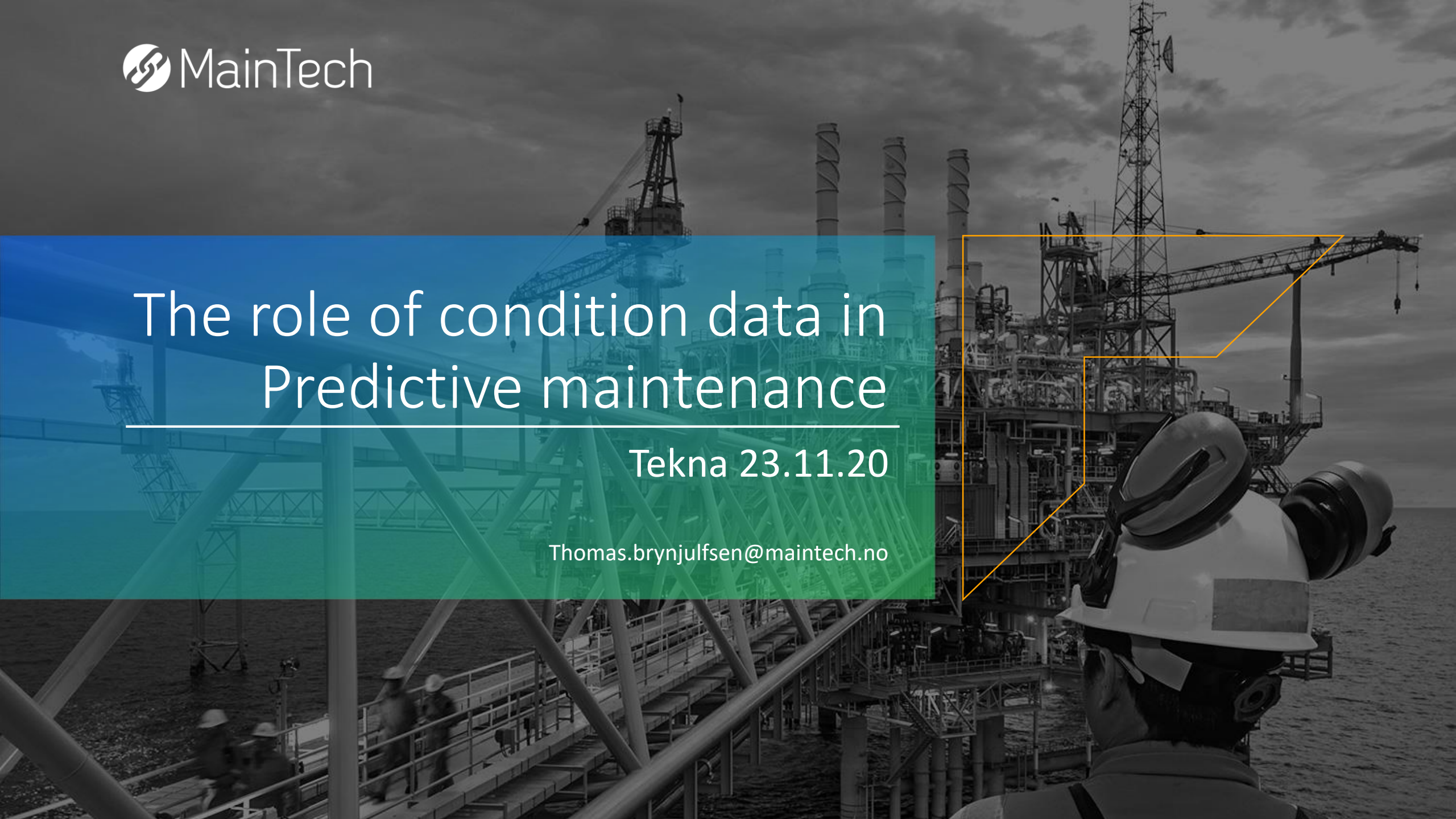


The role of condition data in Predictive maintenance

Tekna 23.11.20

Thomas.brynjulfsen@maintech.no



Agenda

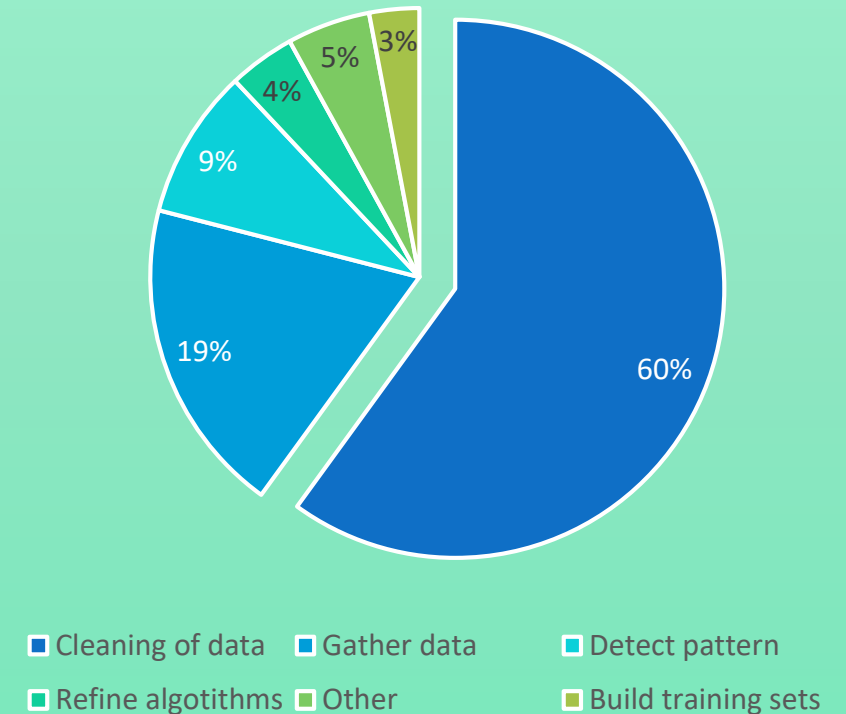
- Data quality
- Failure data
- Condition data

Data quality

- Data quality: The degree that the data fulfills its requirements
- Data quality from a predictive maintenance perspective:
 - Data that contains the information needed to quantify the current state, and predict a future state.
- Data quality is essential for Condition based and predictive maintenance and for trust in predictions.
- By setting up the system for data gathering and by having a clear strategy for data quality, the time spent for data collection and cleaning can be reduced significantly
- For data intended for maintenance use, a detailed failure description log, should accompany the process data.

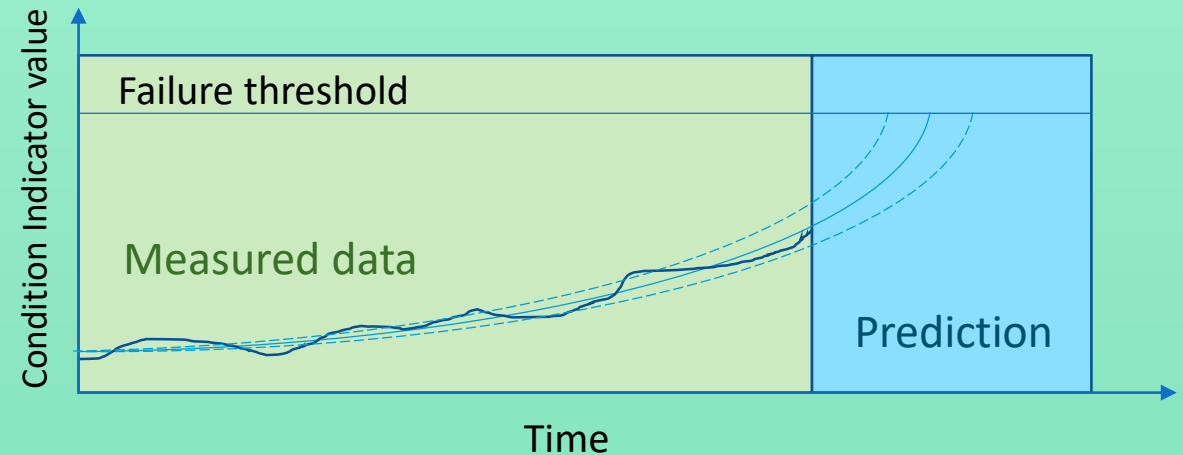
Data scientist time spent

(Forbes 2016)



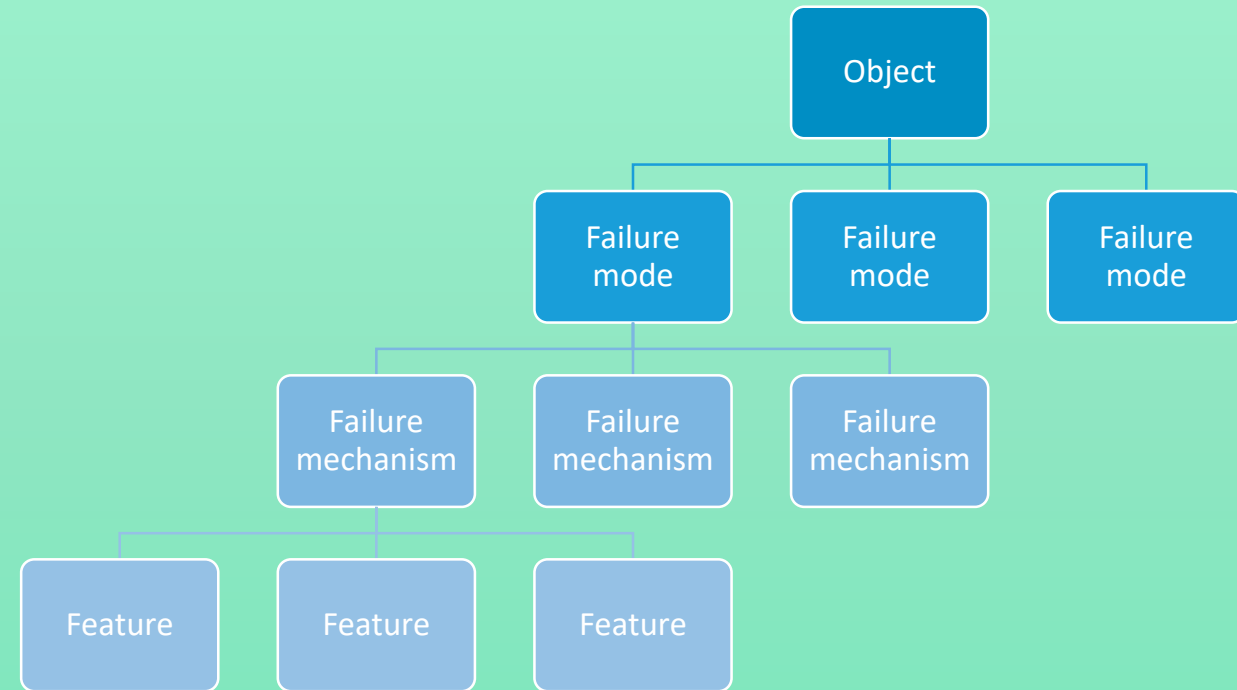
Data quality

- What are you trying to predict?
 - Inability to perform function?
 - Breakdown?
 - Unavailability?
- A wide variety of scenarios can lead to a loss of function.
- Each scenario can have different set of features that can be used for predictions
- Vast amounts of data to be analyzed



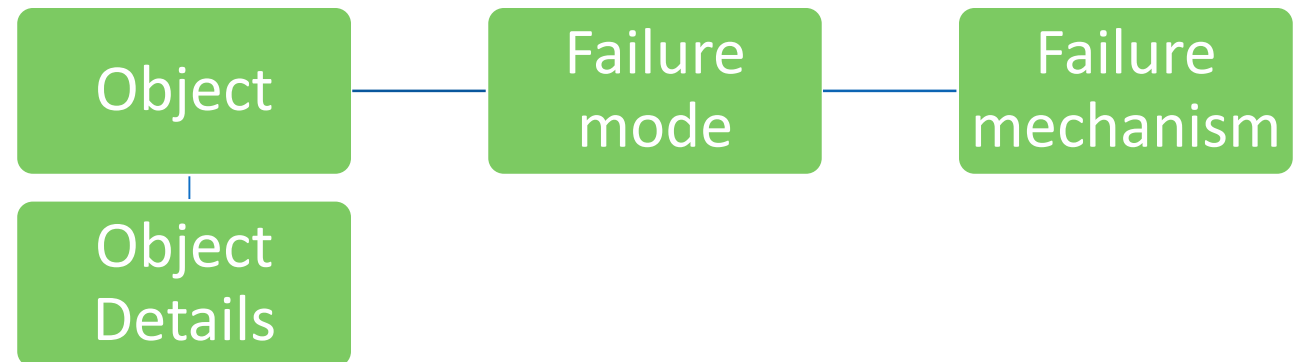
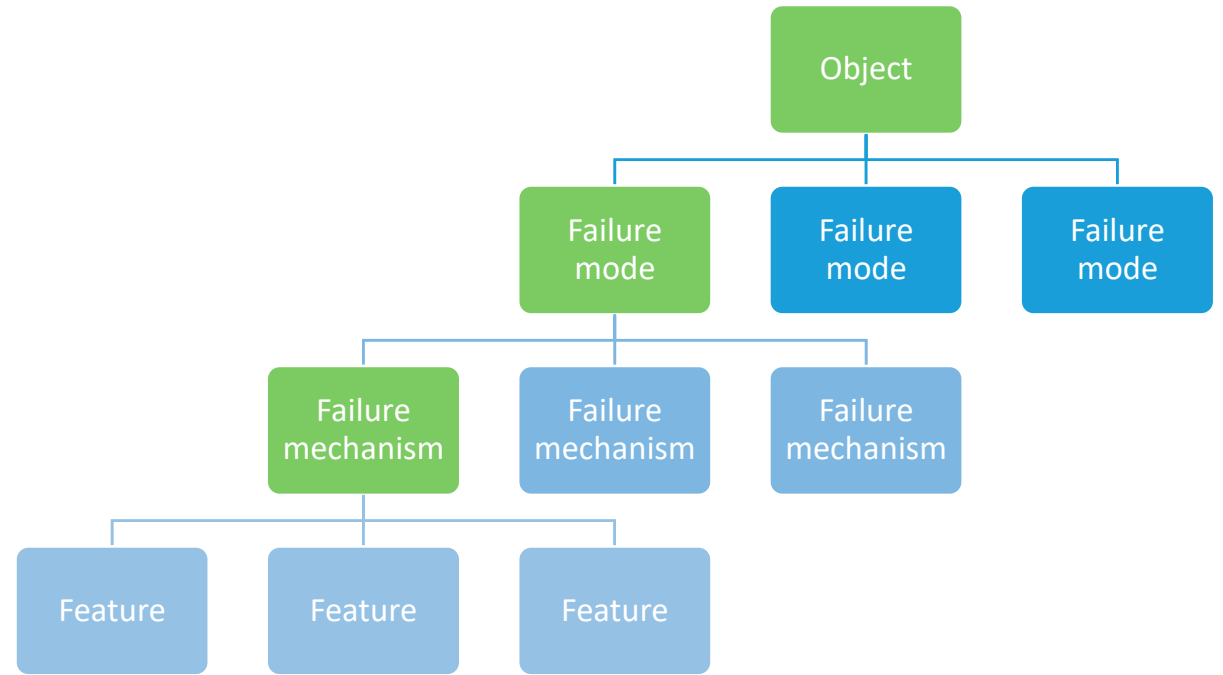
Failure data

- Maintenance analysis:
 - Failure Mode: Failure to perform its intended function: e.g. Fails to discharge fluid
 - Failure Mechanism: Seized bearing
- Each Mechanism has distinct features



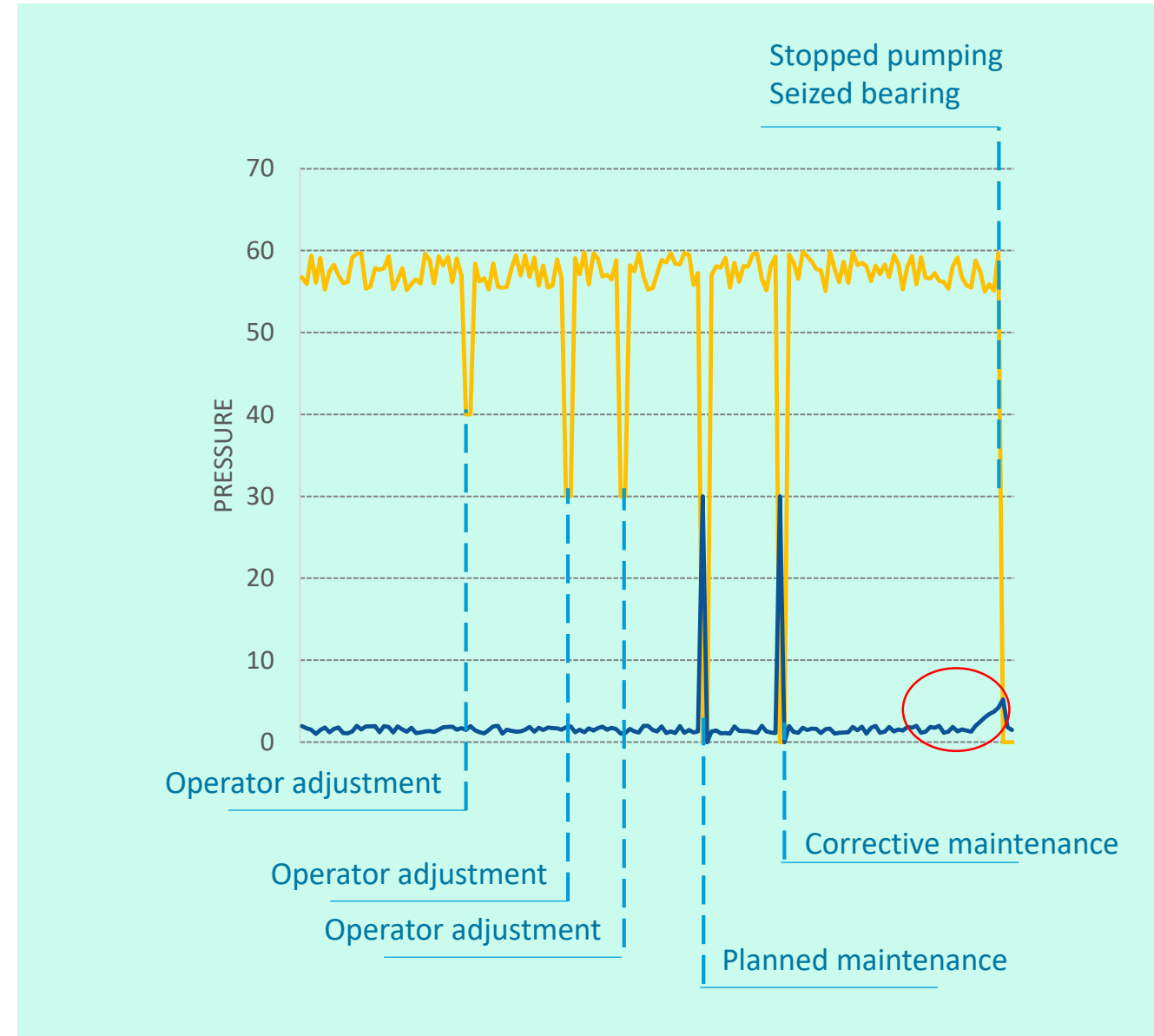
Failure data

- Failure Log
 - Exact time
 - Tag
 - Failure Mode
 - Failure Mechanism
- Failure rate
- Library of failure data for each object type/failure mode/failure mechanism
- Maintenance strategy



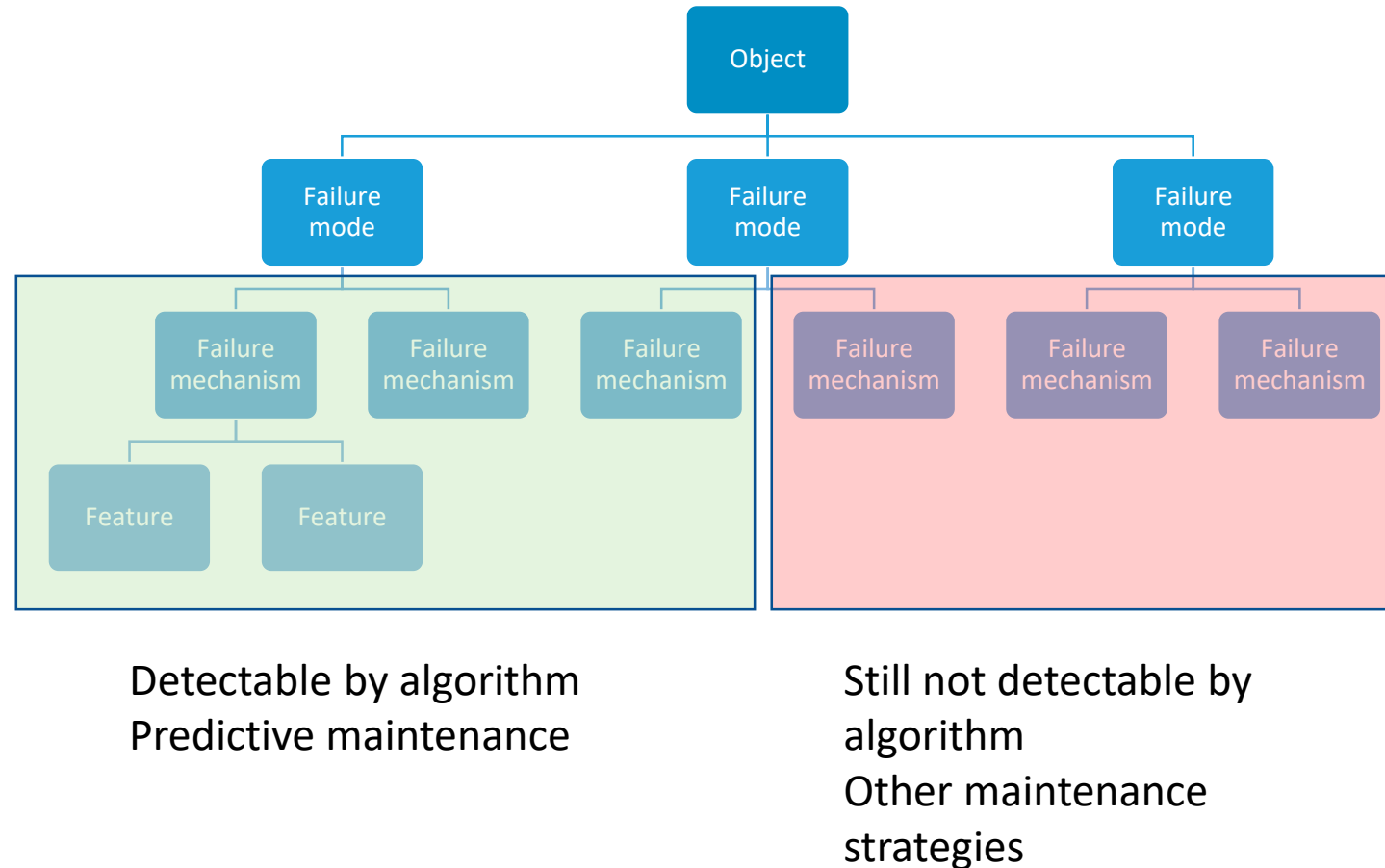
Logging incidents

- Scenario:
 - Fails to discharge fluid
 - Seized bearing
 - Symptoms: Vibrations
 - Underlying cause of failure: Lack of/degraded lubricant
- Preparations for Machine learning and big data analysis:
 - Describe failures/link to Failure mode analysis/log time.

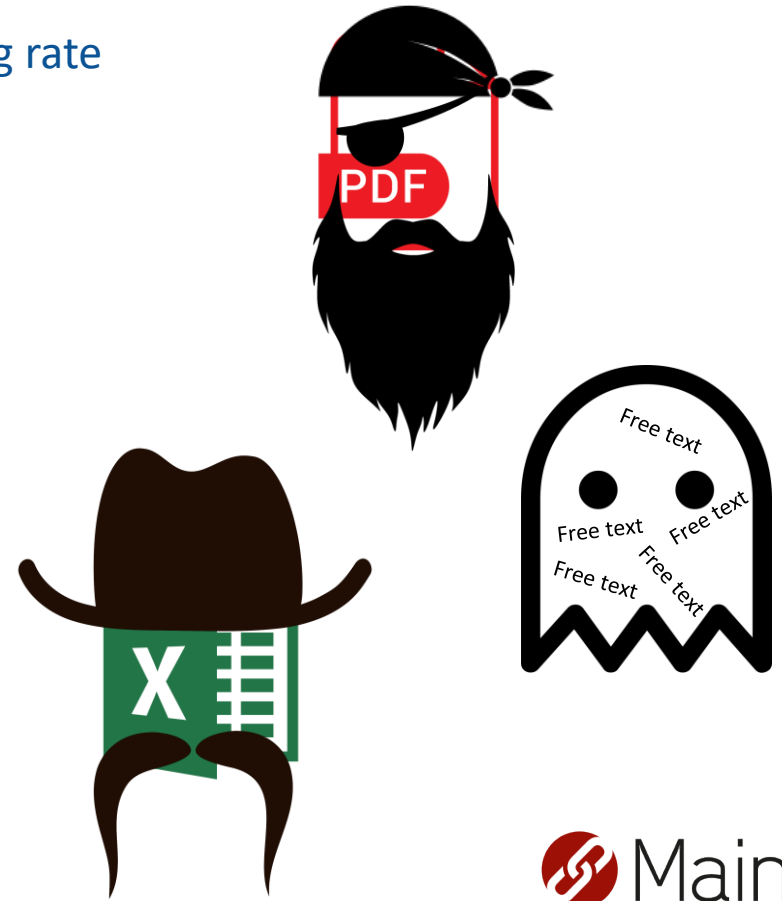
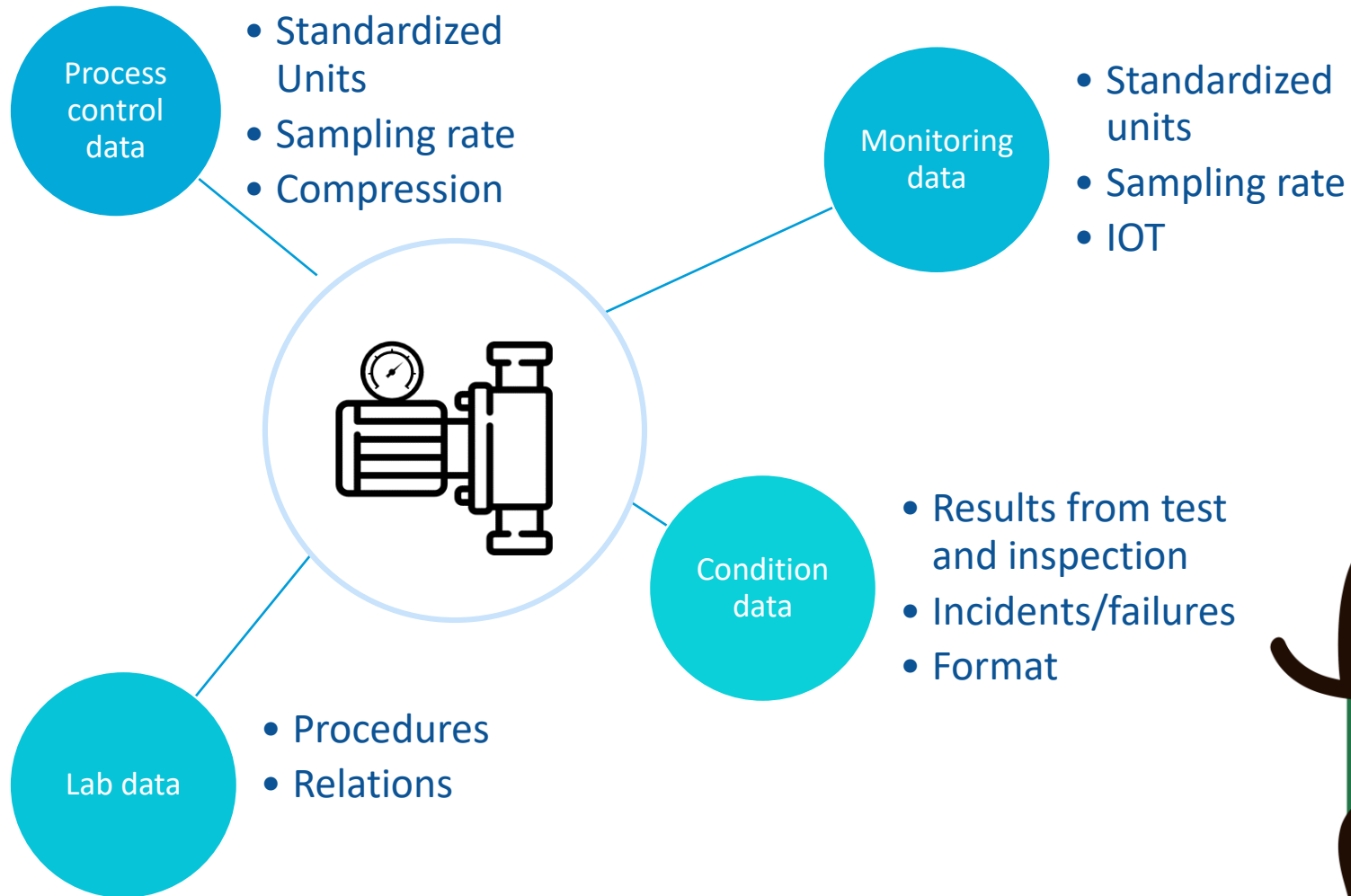


Prediction limitations

- From maintenance analysis
 - FMode: Fails to discharge fluid
 - FMech: Seized bearing
- Each Mechanism has a distinct feature
- Overview of which failure mechanism has been detected.



Data Sources



Condition data

- Data that contain information to describe condition
- Results from tests and inspection
- Qualitative data.
- Predefined forms, data saved to database.
- Make sure data requirements are met
- Data suitable for trending

?



Free text:

Pump in good condition. No signs of degradation. Test successful.

Predefined forms:

Unit Condition	Good	↓
Oil quality	Average	↓
Sign of vibrations	No	↓
Test Result	Successful	↓
Test time	27	s

Summary

- Manage your failure and condition data
- Define the requirements of the data
- Define strategy for condition and maintenance data gathering
- Relate failure data/condition data to process and sensor data



**Dykker blei
helten – redda
unike data i
kamp mot
klokka**