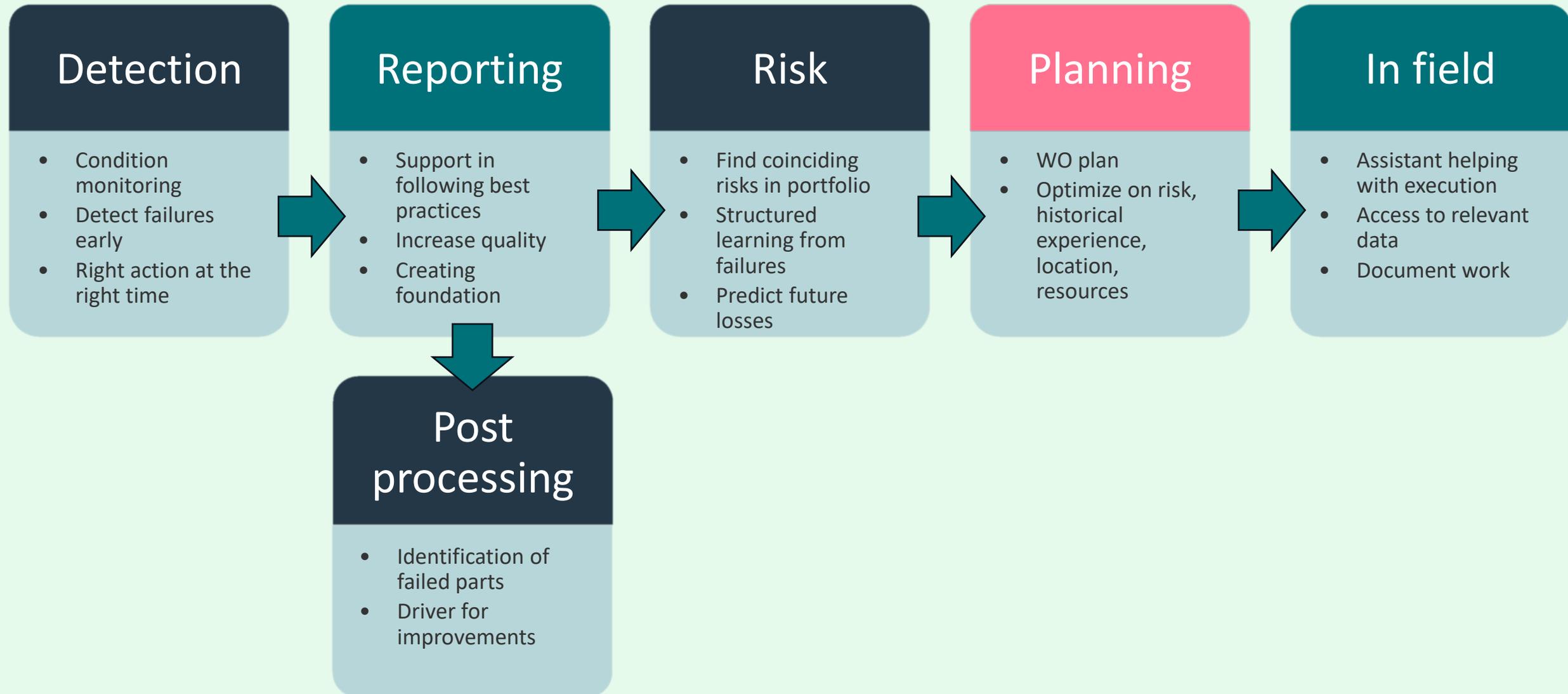


# AI in maintenance management in Equinor





# Failed parts – AI





I AI failed parts

## What's the challenge?

“Identify which parts that fails in reported equipment failures”

### Current situation:

- No structured field in the failure reporting
- Describe how we perceived the failure but not what actually failed

### Why do we need to know?

Company's ability to measure the effect of maintenance (§49 Aktivitetsforskriften)

- Optimize PM program
- Robustification of equipment
- Optimized spare parts evaluations
- Reduce CM hours and Production loss
- Root Cause analyses

### Screenshot from failure reporting in SAP

The screenshot displays the SAP failure reporting interface. At the top, there are input fields for Notification (47919675), M2, Start problemer, Notific. Status (NOCO ORAS), RIVE, and Order (26556545). Below this is a navigation bar with tabs: Notification, Long text, Documents, Location data, Dates, and Activities. The main content area is divided into several sections:

- Reference object:** Functional loc. (empty), Equipment (10290525), Assembly (empty). Description: DIESEL ENGINE FOR PLATFORM DECK NORTH ENGINE,DIESEL,3412 DITA,CATERPILLAR.
- Responsibilities:** Planner group (POM / 1220), Platform D&V; Main WorkCtr (IMOCRL / 1220), TMC Kran og Løft; Person Responsi (empty); Reported by (empty); Notif.date (27.03.2024 08:53:08).
- Effect on the system:** Failure Impact (D Dead (CrF)).
- Start/End Dates:** Required End (10.04.2024), Priority (High), Breakdown (checked).
- Item:** Detect Mthd (PMDM-020, 10, ISO Other - ISO Other); Failure Mode (PMMO-060, OTH, ISO Cranes - ISO Other); Fail Mech (PMMC-020, 4.0, ISO Electrical failure - ISO General).

At the bottom right, there are fields for Entry, 1 frm, and 1.



I AI failed parts

## How can AI help?

### Current situation:

- Requires substantial manual work and/or simplified word searches
- Results in non-automated equipment failure reports with limitations

### Ambition:

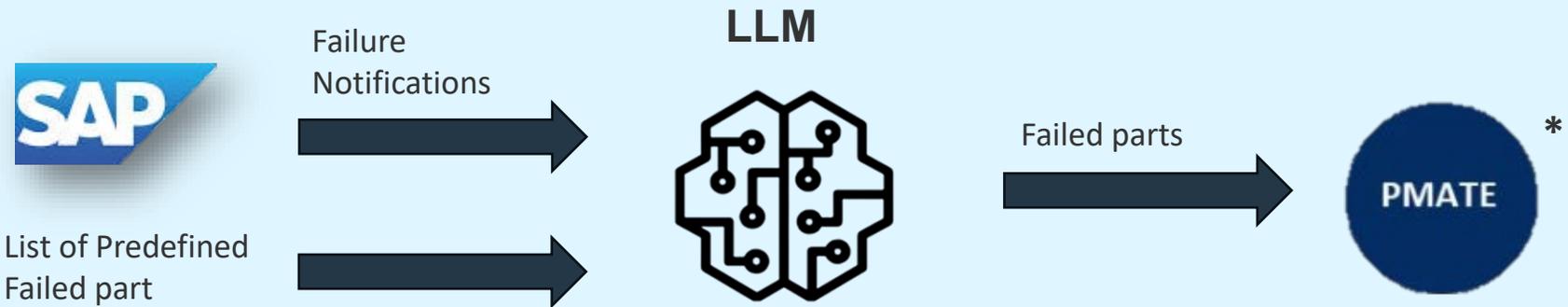
- Automated equipment failure reports by use of AI
- More efficiently
- Higher accuracy

Part / Assembly	Count of Notifications	% Distribution
Uspesifisert	1416	58 %
Vifte	171	7 %
Rele/Vern/Sikring/Kontaktor	146	6 %
Kjølemedie	91	4 %
Avgang/kobling/Endehylse/Nipler/Plugg	76	3 %
Kretskort/IO-kort	72	3 %
Jording/Isolasjonsresistanse	71	3 %
Pumpe	53	2 %
Bryter	47	2 %
Tyristor	43	2 %
Hengsler/Dør/Dørlås/Hendel	39	2 %
Display	37	2 %
Kondensator	33	1 %
Filter	30	1 %
Sensor/Indikator/Måler	22	1 %
Diode	19	1 %
Celle	17	1 %
Trafo	17	1 %
Ventil	14	1 %
...	...	...
Grand Total	2460	100 %



AI failed parts

# How to solve?



<p>44418210</p> <p>1 [SEP] me-vessels [SEP] [SEP] no [SEP] effluent treatment, storm water [SEP] brudd i vestre aksling på slamkontainer [SEP] hoist, equipment [SEP] [SEP] container trolley [SEP] m [SEP] [SEP] vessels, miscellaneous equipment [SEP] a 2 [SEP] 2016 [SEP] 3.0 [SEP] hammerfest lng [SEP] 1 year [SEP] 64 [SEP] 0 [SEP] ppmec [SEP] beskrivelse av feil: påbegynt brudd i aksling, fungerer ennå men begynner å bli tungt å flytte på slamkontainer. lyd av aksling når vi prøvde å flytte kontainer idag med halvfull kontainer.</p> <p>utstyrsplassering: slamkontainer rom sør 1 2 p&lt;&gt;id nummer/dokumentreferanse/bilder:</p> <p>mulig feilårsak: er denne akslingen hul inni?</p> <p>innspill til valg av løsning?: burde være solid aksling, ikke hul inni. det blir mye vekt i fulle kontainere.</p> <p>risiko/konsekvens hvis ikke utført: om den knekker helt kan ikke kontainer brukes fordi sar ikke får mulighet å tømme den om de ikke kan trille kontainer ut av kontainer rom.</p>	<p>aksel</p>	<p>top1</p> <p>Classification: aksel</p> <p>Reason: Rapporten beskriver et påbegynt brudd i akslingen på slamkontainerens tralle, som fører til lyd ved bevegelse og at den blir tung å flytte. Dette peker direkte på svikt i aksel-komponenten.</p> <p>Confidence: 70%</p>	<p>top2</p> <p>Classification: lager</p> <p>Reason: Symptomer som ulyd ved forflytning og at det er tungt å rulle kan også stamme fra slitte/skadde lager, selv om teksten primært peker på akslingen.</p> <p>Confidence: 15%</p>	<p>top3</p> <p>Classification: akselkobling</p> <p>Reason: Dersom en kobling/forbindelse på akslingen er svak eller defekt, kan det gi lignende symptomer. Teksten nevner også usikkerhet rundt akslingens oppbygning (hul/solid), som kan relateres til en svak koblings-/forbindelsesdel.</p> <p>Confidence: 10%</p>
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AI failed parts

## Example

Notification	45691787	M2	Expander Trippet må sjekkes
Notific. Status	NOCO ORAS		CRTE
Order	24790218		

Wordsearch short text only

Uspesifisert



LLM - Notification incl. long text

**top1**  
Classification: sikring/vern/rele  
Reason: Feilen skyldes at en automatsikring (vern) hadde løst ut, som førte til at expander trippet og ga alarmer. Dette peker direkte på svikt i vern/sikring.  
Confidence: 55%

**top2**  
Confidence: 20%

**top3**  
Confidence: 15%

Notification long text conclusion

Det var en automatsikring F16 i 20ZC101 PD01 som hadde falt ut. Denne forsyner 2 stk powersupplyer i ES03



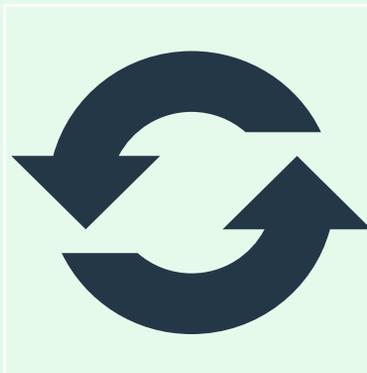
equinor

Production loss risk



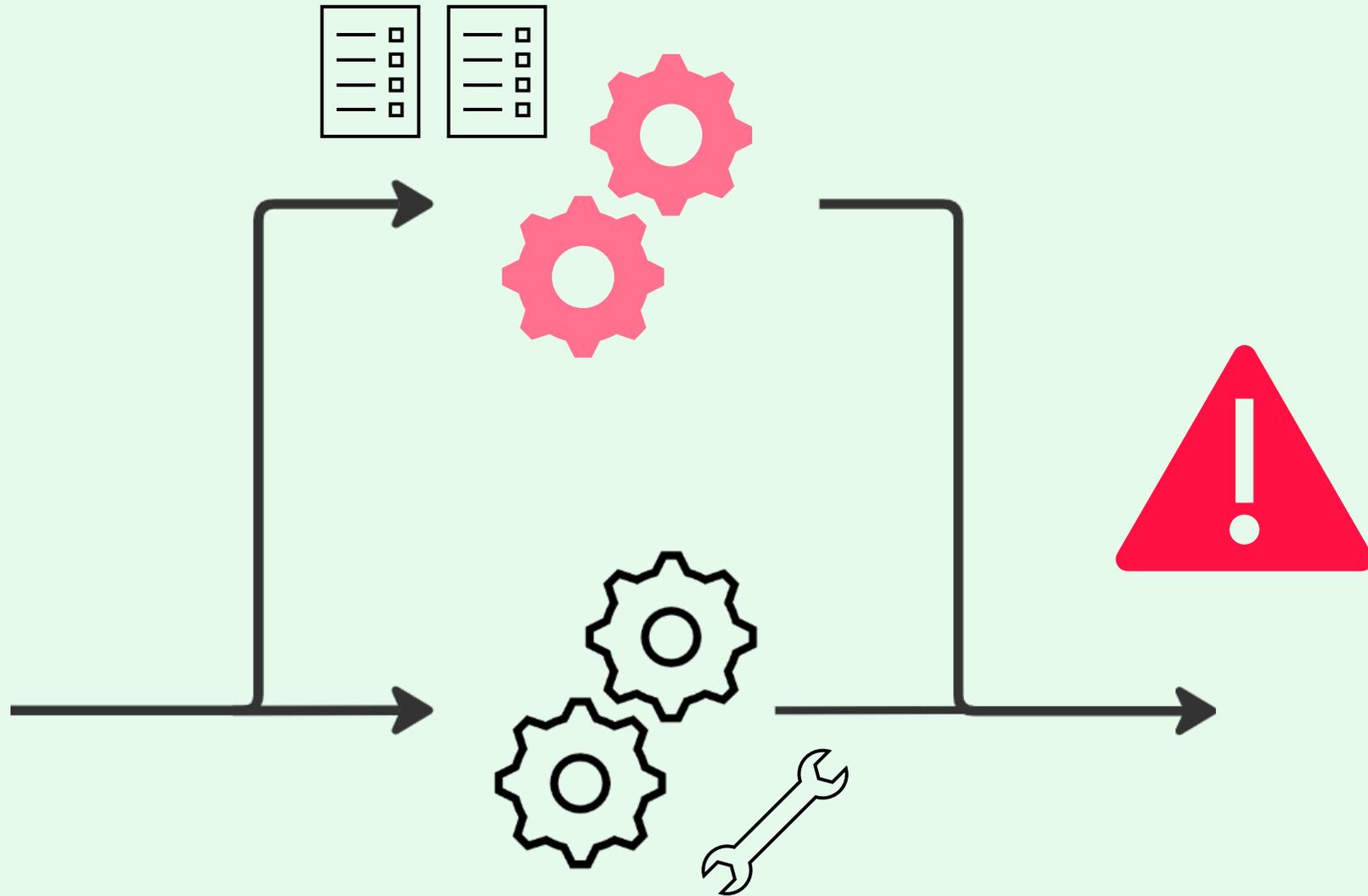
Unplanned losses

Few black swans

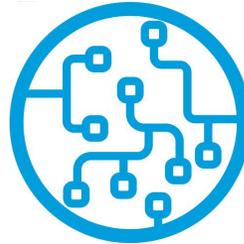
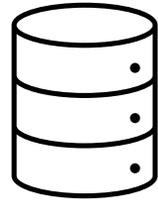


Repeating patterns

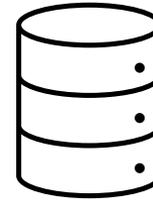
# Prevent trip



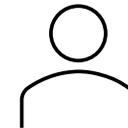
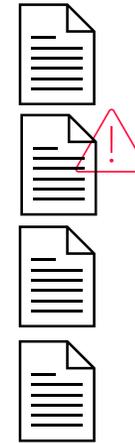
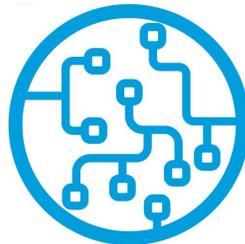
## Training



PEPR



## Inference







# AI in maintenance management in Equinor

by Kristine Tomte Knutsen av Olav Landstad

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