Future of CUI Management

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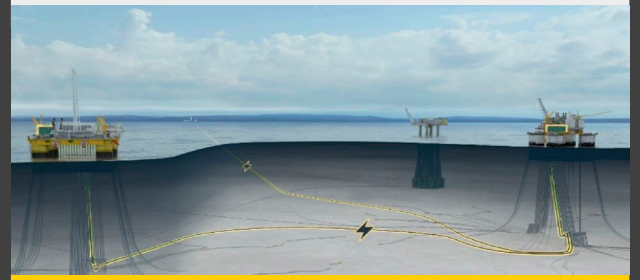
Shell in Norway

A high graded portfolio delivering value with less emissions into the next decades

Annual production of 40+ bcm gas



Troll
Norway's Super Producer

Subsea Compression

Ormen Lange
Technology Frontrunner

Exporting ~15% of Norwegian gas

Nyhamna
Digitalisation Lighthouse

First ever cross-border CO_2 transport & storage as a service

Northern Lights
Global CCS Pioneer

Gas to Europe

Ownership in the two biggest gas fields on NCS, representing 40% of Norway's gas export

In house Gas Sales and Optimisation capabilities

Mastering the full Upstream value chain

Activities from Exploration to Decommissioning

Capable and experienced partner, operator and TSP

Ability to explore and develop new business areas

Flexibility in portfolio and organisation to maintain a healthy funnel of Clean Energy opportunities

Part of the Shell Group

Global capacity and expertise to innovate

Numbers from 2024. Troll illustration © Equinor, Northern Lights image © Northern Lights JV

Nyhamna

- Startup in 2007
- Import from Ormen Lange and Polarled
- 130 km of insulated carbon steel
- 40 km are Very High/High PoF Water Wetting
- Well understood internal corrosion mechanism

Current CUI Approach — Static RBI (RP -G109)

- Assumes everything is wet
- Inspections are derived from Criticality ranking
- Current approach is qualitative and not quantitative
- The RBI is a Risk management tool requiring large amounts of data and data management.
- This results in approximately 85% False-Positive inspection rate.
- Staying on the current path Nyhamna will likely be forced into an area based de-lagging strategy.

Future Approach — Dynamic RBI

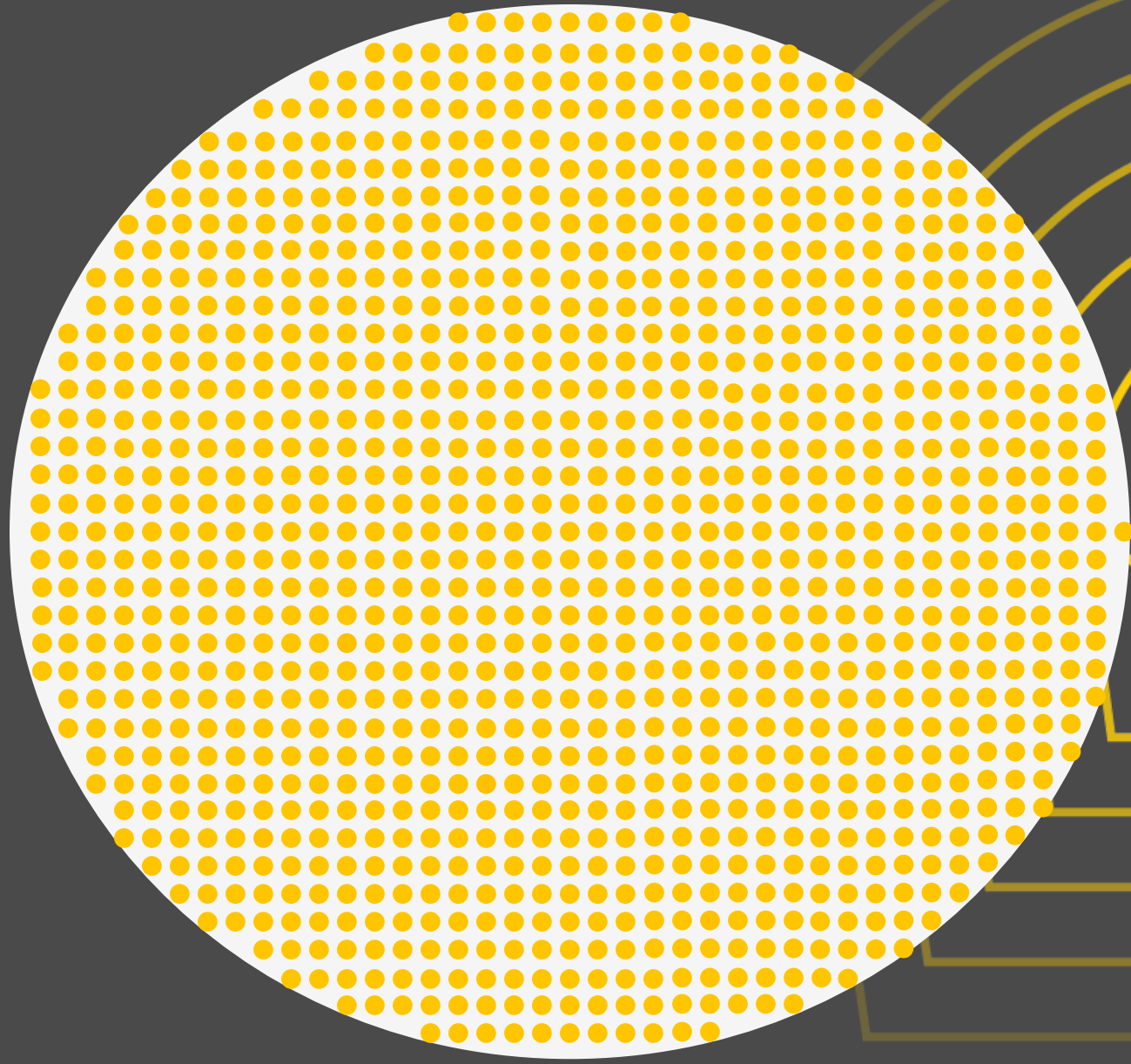
Continuously updates risk levels using real-time inspection, sensor, and analytical data.

It replaces static, calendar-based programs with a live, data-driven view of where risk is changing.

By integrating all data into the digital twin, it directs inspections AND maintenance to where they actually matter.

Current CUI Approach — Static RBI (RP -G109)

- Total circle and yellow dots represents all insulated pipes at Nyhamna
- Site scope is generated from RBI Criticality (PoF x CoF)
- With todays tools it is very challenging to impact site scope (reduce line criticality)
- Current approach is driving us to put most efforts into activities which at large are safe and there is no ongoing CUI (i.e. 85% of all inspections are not reporting CUI findings).



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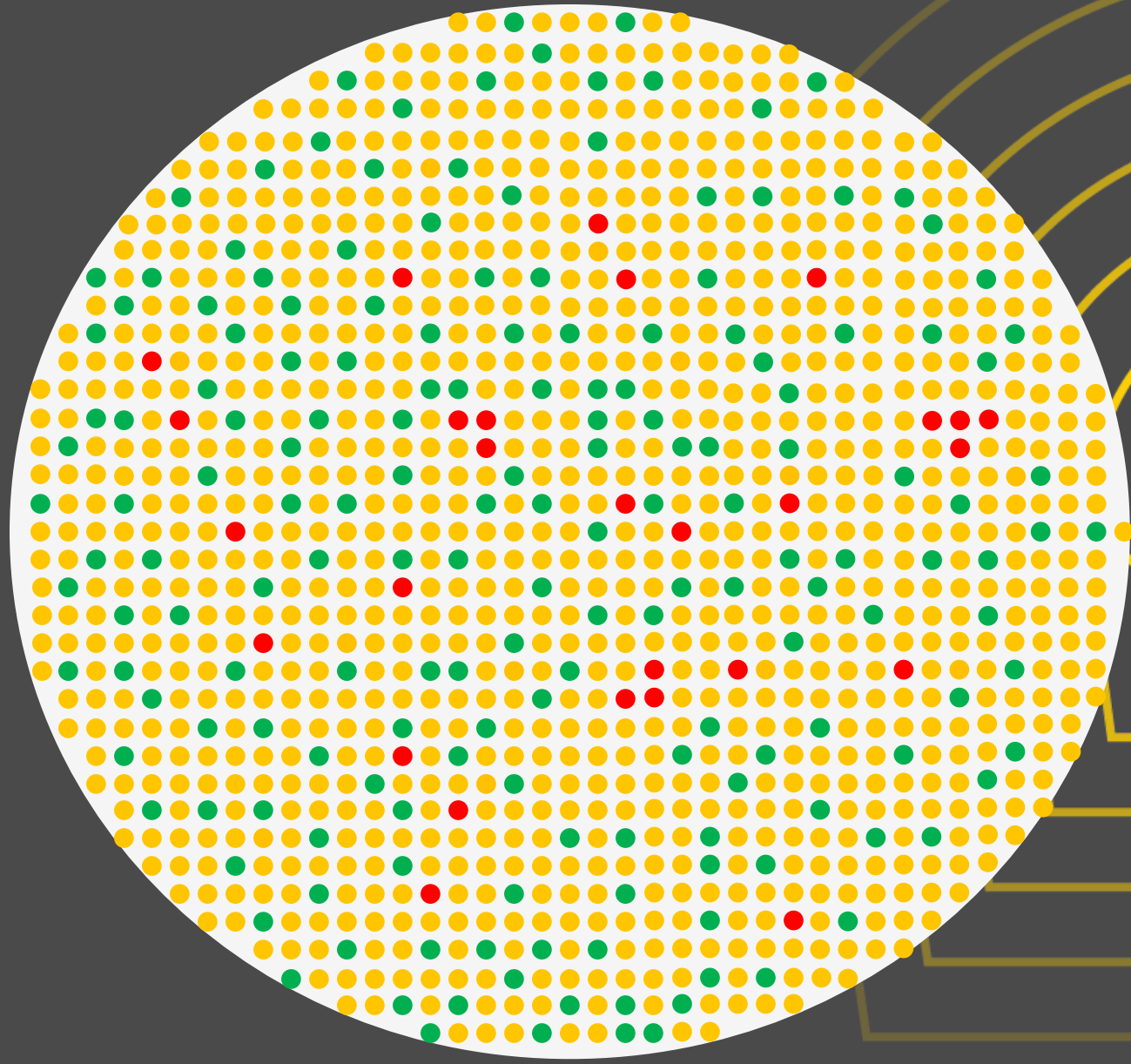

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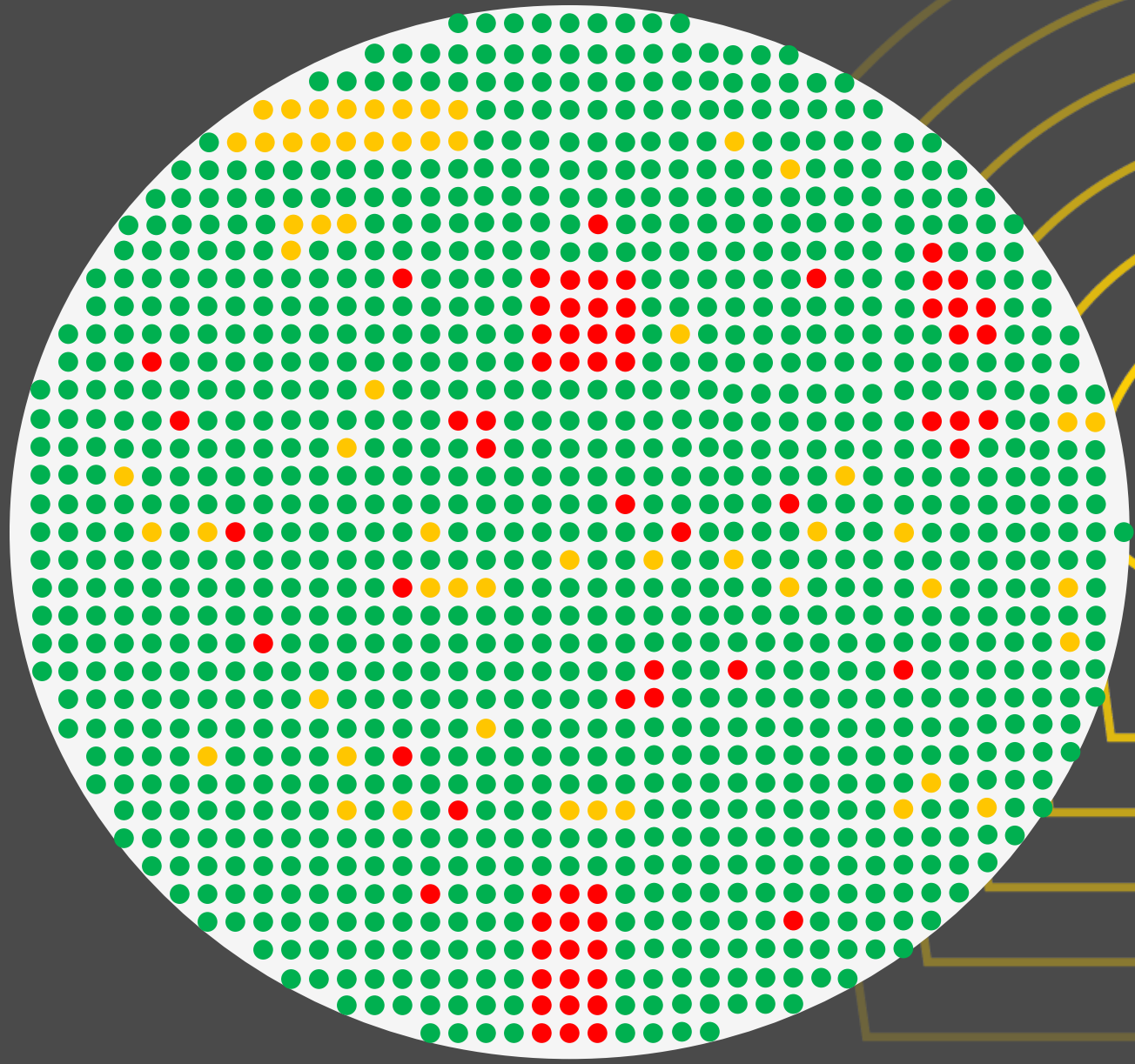


Dynamic Risk Based Integrity Tool

External & Internal

IMS

Line - Tag

Consequence

DNV RP G109

Probability

$PoF_{CUI} = f(PoF_{material}, PoF_{coating}, PoF_{water\ wetting}, PoF_{design})$

$PoF_{CUI} = f(PoF_{CUI}, COF$

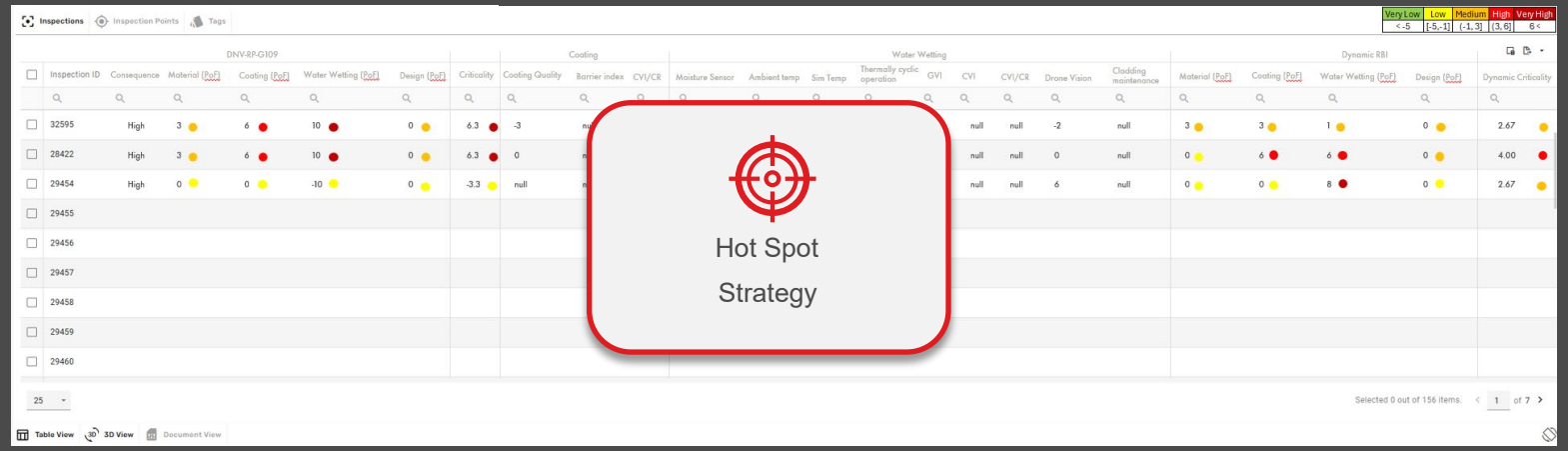
Confidence factor

Shell internal RBI

w-IMS

PoF x CoF = Criticality/Risk

Confidence factor



Previse Technologies

KONGSBERG

maintech.

GASSCO

Contextualization

Machine Learning

Artificial Intelligence

Machine Vision

Simulation/Degradation

Inspection Feedback

GVI/CVI

Advanced NDT

Drones

Robotics

Instrumentation

Water Sensors