

AI based LLM will ease the introduction of robotics

by Svein Ivar Sagatun Dr.ing, mba

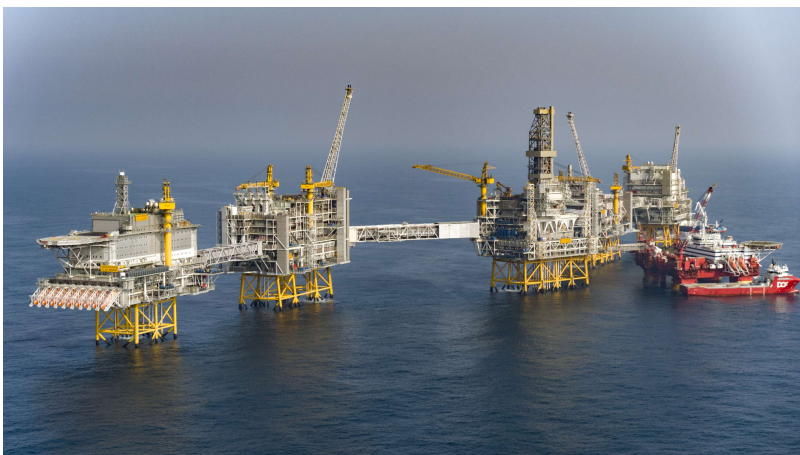
Generative AI in inspection and maintenance (I&M): Learnings
across sectors, low-hanging industry use cases, and future
challenges and opportunities - ADRA Nov 5th 2024





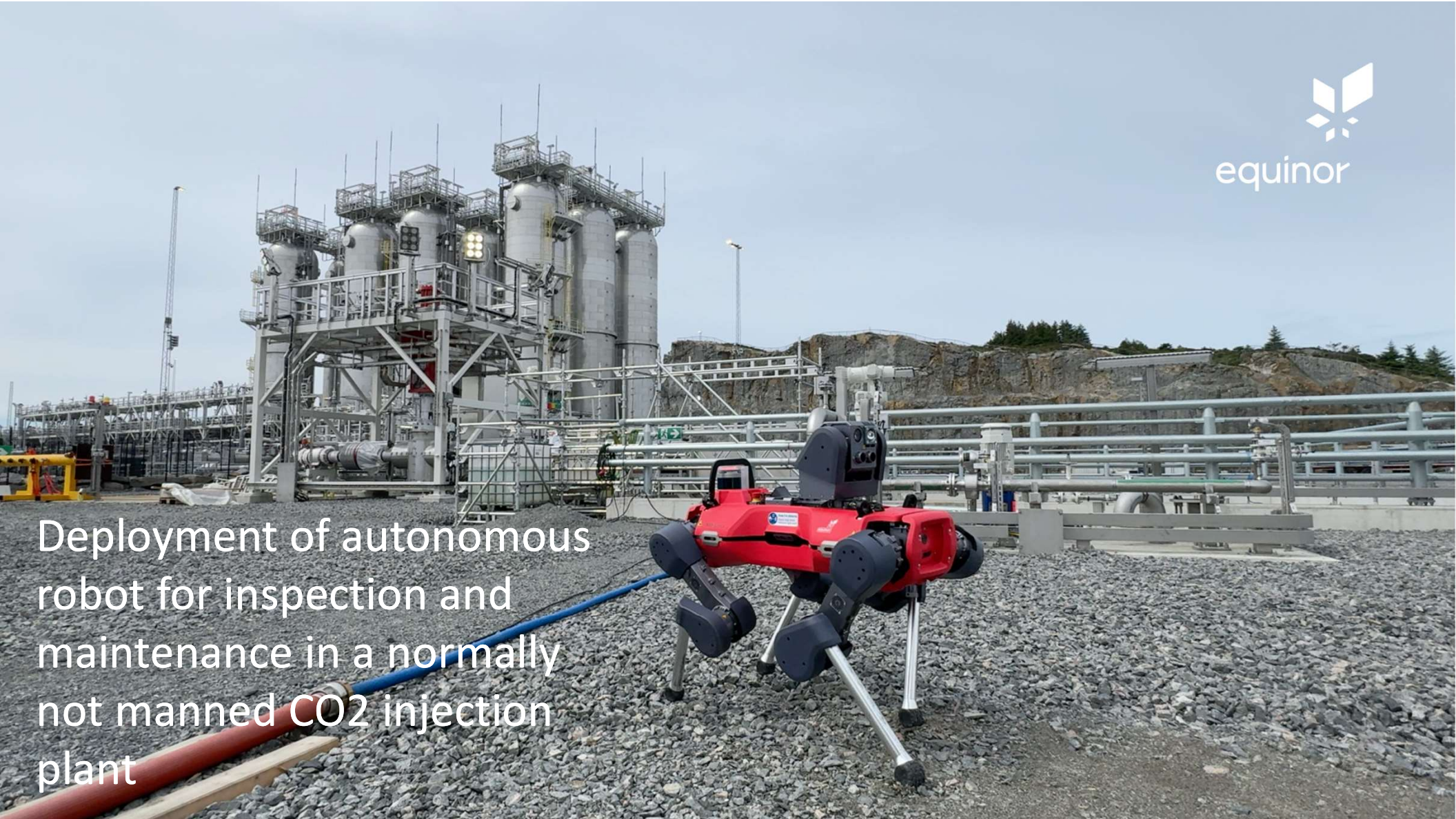
What is EQUINOR ?

Equinor is the operator of the world largest offshore wind farm Dogger Bank in the UK.

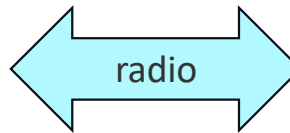


Norway supply approximately 30% of all gas used by Europe and Equinor is by far the largest operator in Norway.

Deployment of autonomous robot for inspection and maintenance in a normally not manned CO₂ injection plant



Current solution: Control room operator communicate with an operator in the field



© Equinor ASA

This presentation, including the contents and arrangement of the contents of each individual page or the collection of the pages, is owned by Equinor. Copyright to all material including, but not limited to, written material, photographs, drawings, images, tables and data remains the property of Equinor. All rights reserved. Any other use, reproduction, translation, adaption, arrangement, alteration, distribution or storage of this presentation, in whole or in part, without the prior written permission of Equinor is prohibited. The information contained in this presentation may not be accurate, up to date or applicable to the circumstances of any particular case, despite our efforts. Equinor cannot accept any liability for any inaccuracies or omissions.

Current solution for robot in operation: Mission programming software available in the control room



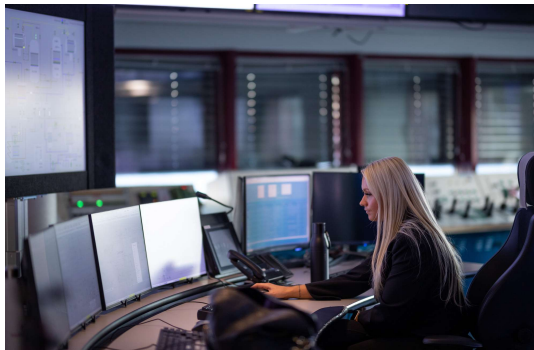
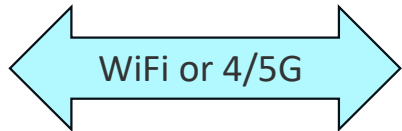
Robotoppdrag Johan Sandrup

Oppdragske

Ingen oppdrag i ka

Kommende oppdrag

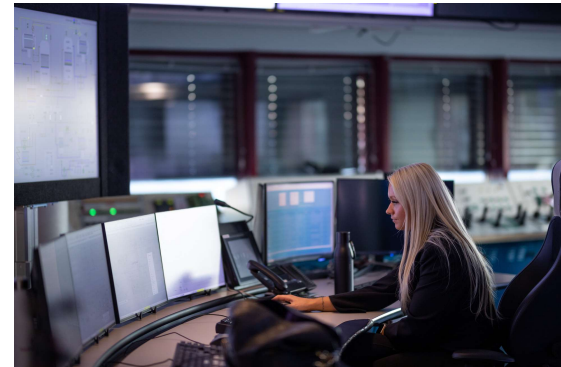
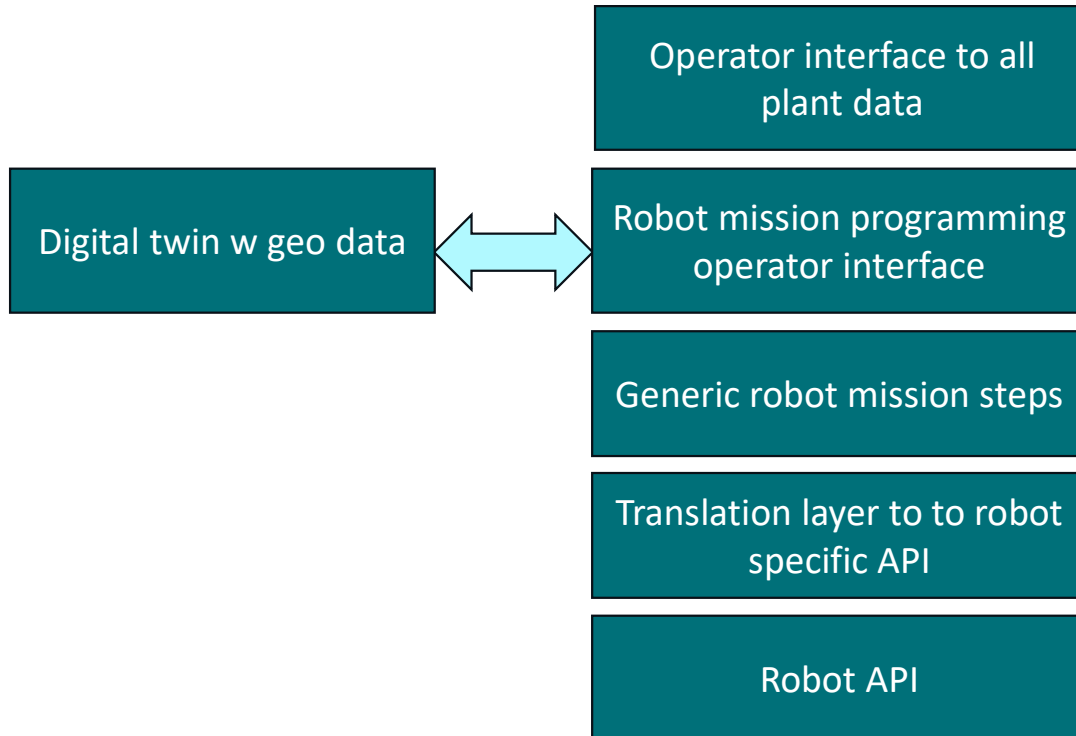
Navn	Overbilde	Antall teger	Estimert kjøretid	Pris	Legg til oppdragske
Ventiloppdrag Ser. C567	B567	1 teger	1 time	14.00.23	
Kompressorhus B235	B235	1 teger	1 time	18.00.23	
Ventiloppdrag Ser. B234	B234	20 minutter		09.10.23	
Kompressorhus C235	C235	20 minutter		15.10.23	
Ventiloppdrag Ser. B233	B233	45 minutter		16.10.23	
Ventiloppdrag Ser. C236	C236	45 minutter		08.06.23	
Ventiloppdrag Ser. C236	C236	45 minutter		09.02.23	
Ventiloppdrag Ser. C236	C236	45 minutter		05.03.23	



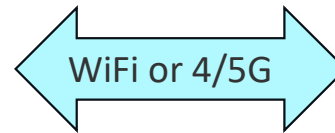
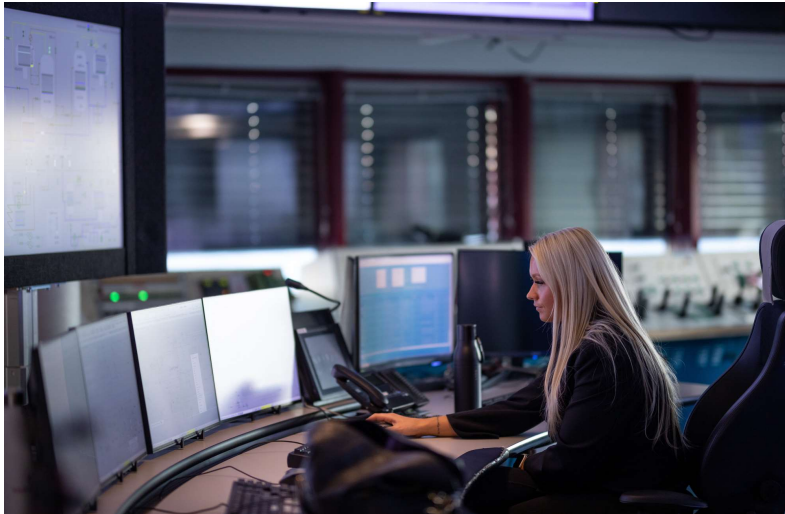
© Equinor ASA

This presentation, including the contents and arrangement of the contents of each individual page or the collection of the pages, is owned by Equinor. Copyright to all material including, but not limited to, written material, photographs, drawings, images, tables and data remains the property of Equinor. All rights reserved. Any other use, reproduction, translation, adaption, arrangement, alteration, distribution or storage of this presentation, in whole or in part, without the prior written permission of Equinor is prohibited. The information contained in this presentation may not be accurate, up to date or applicable to the circumstances of any particular case, despite our efforts. Equinor cannot accept any liability for any inaccuracies or omissions.

SW stack for current solution using robots



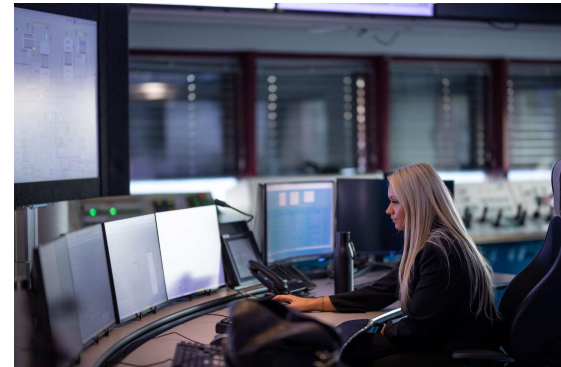
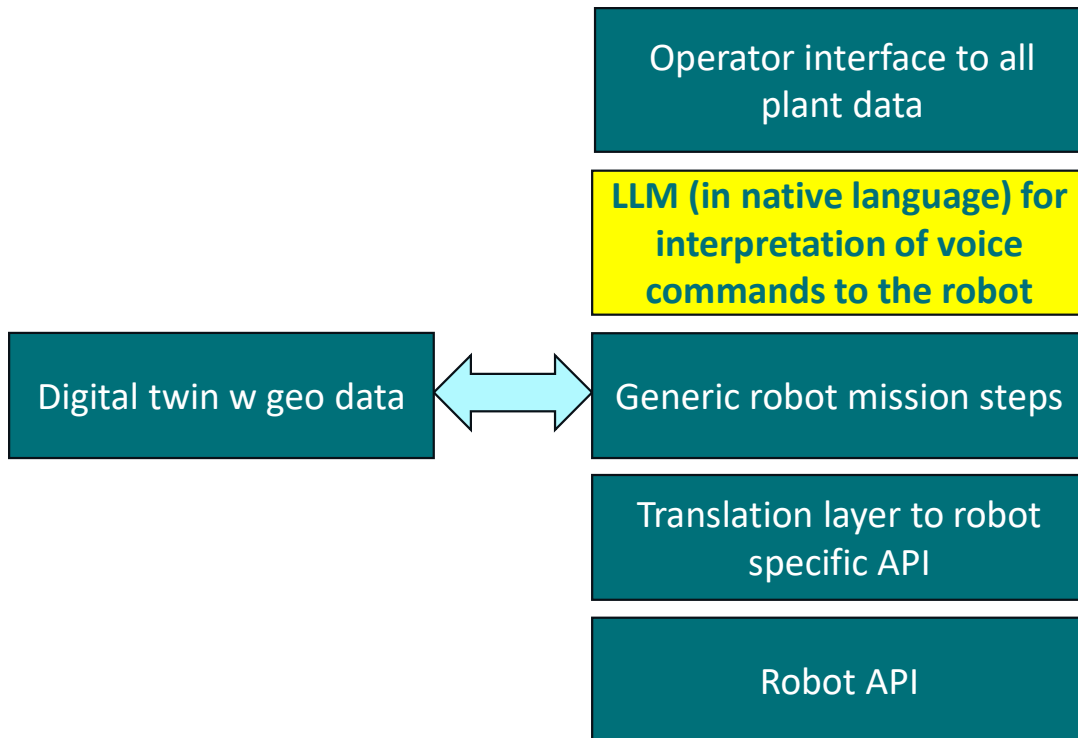
Desired state: The robot can interact directly with the control operator
(voice control)



© Equinor ASA

This presentation, including the contents and arrangement of the contents of each individual page or the collection of the pages, is owned by Equinor. Copyright to all material including, but not limited to, written material, photographs, drawings, images, tables and data remains the property of Equinor. All rights reserved. Any other use, reproduction, translation, adaption, arrangement, alteration, distribution or storage of this presentation, in whole or in part, without the prior written permission of Equinor is prohibited. The information contained in this presentation may not be accurate, up to date or applicable to the circumstances of any particular case, despite our efforts. Equinor cannot accept any liability for any inaccuracies or omissions.

Proposed SW stack: The mission programming component can understand the voice control



Key insight of the use of AI & LLM in the widespread introduction of robotics



- Change management is hard – technology easier
- Voice commanded robots will significantly lower the barriers to widespread use of robots
- Voice controlled mission programming adds value to the use of robotics in inspection and maintenance by reducing complexity of robot user interface (mission programming, fleet management) and need for operator training.
- Voice control must be in the user's native language. Example: in the Energy industry on the Norwegian Continental Shelf, the use of the Norwegian language in operation is regulated by law due to safety.



Autonomous Inspection Robots

EQUINOR TDI Asset Autonomy Robotics and Drones

© Equinor ASA

This presentation, including the contents and arrangement of the contents of each individual page or the collection of the pages, is owned by Equinor. Copyright to all material including, but not limited to, written material, photographs, drawings, images, tables and data remains the property of Equinor. All rights reserved. Any other use, reproduction, translation, adaption, arrangement, alteration, distribution or storage of this presentation, in whole or in part, without the prior written permission of Equinor is prohibited. The information contained in this presentation may not be accurate, up to date or applicable to the circumstances of any particular case, despite our efforts. Equinor cannot accept any liability for any inaccuracies or omissions.