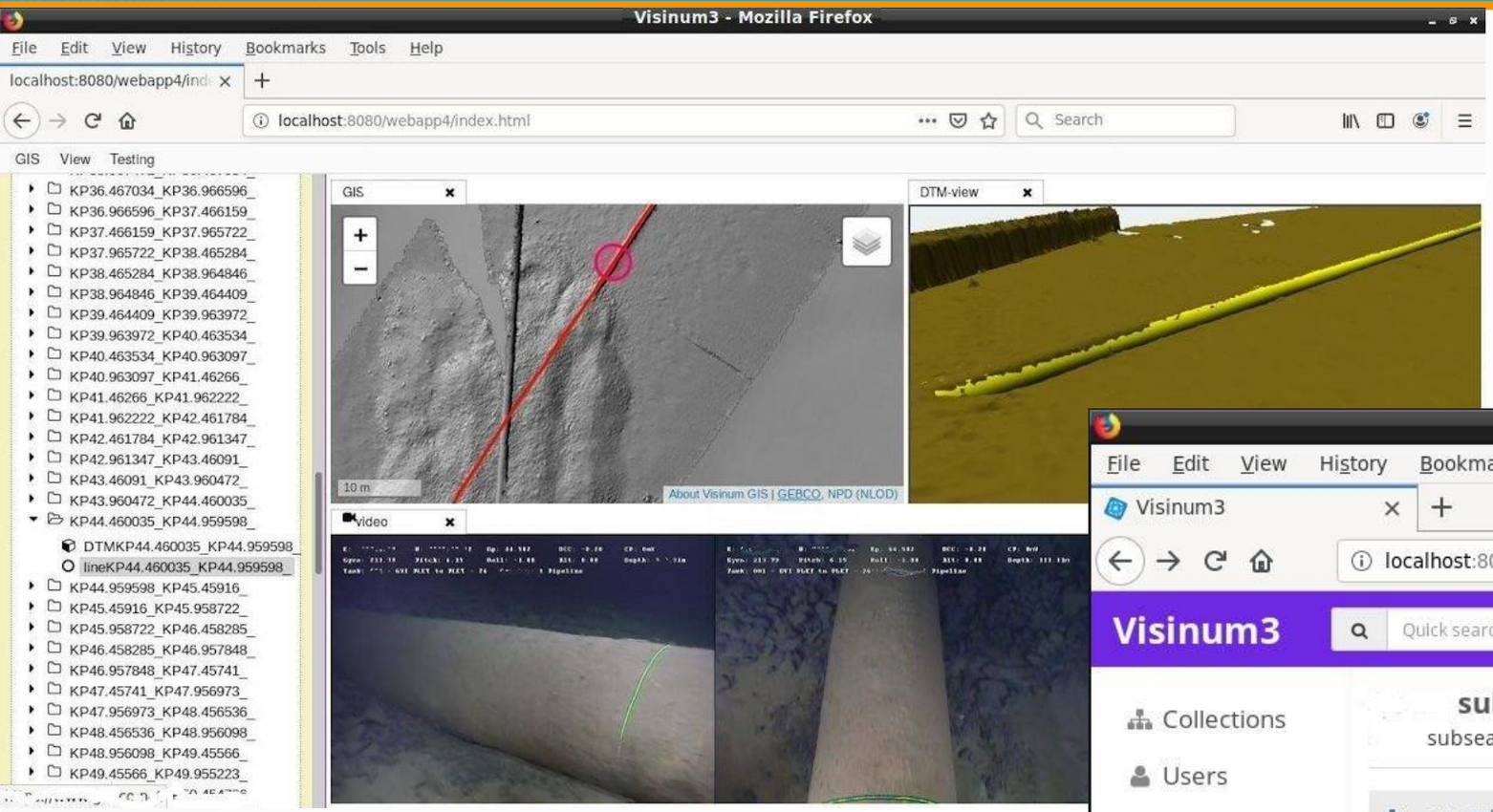
Beyond visualisations: realising the full value of subsea data

Stephen McEntee

The future subsea digital toolbox
2019-10-31 Aberdeen

Introduction

- Subsea / pipelines engineer
- 20+ year's experience, Aberdeen and Norway
- Pipelines/risers design, offshore project engineer, pipelines design coordinator
- Startup company Qwilka
  - Visinum data management & analytics platform
  - Unstructured engineering data
  - Manage, extract value from video, images, MBES, lidar etc.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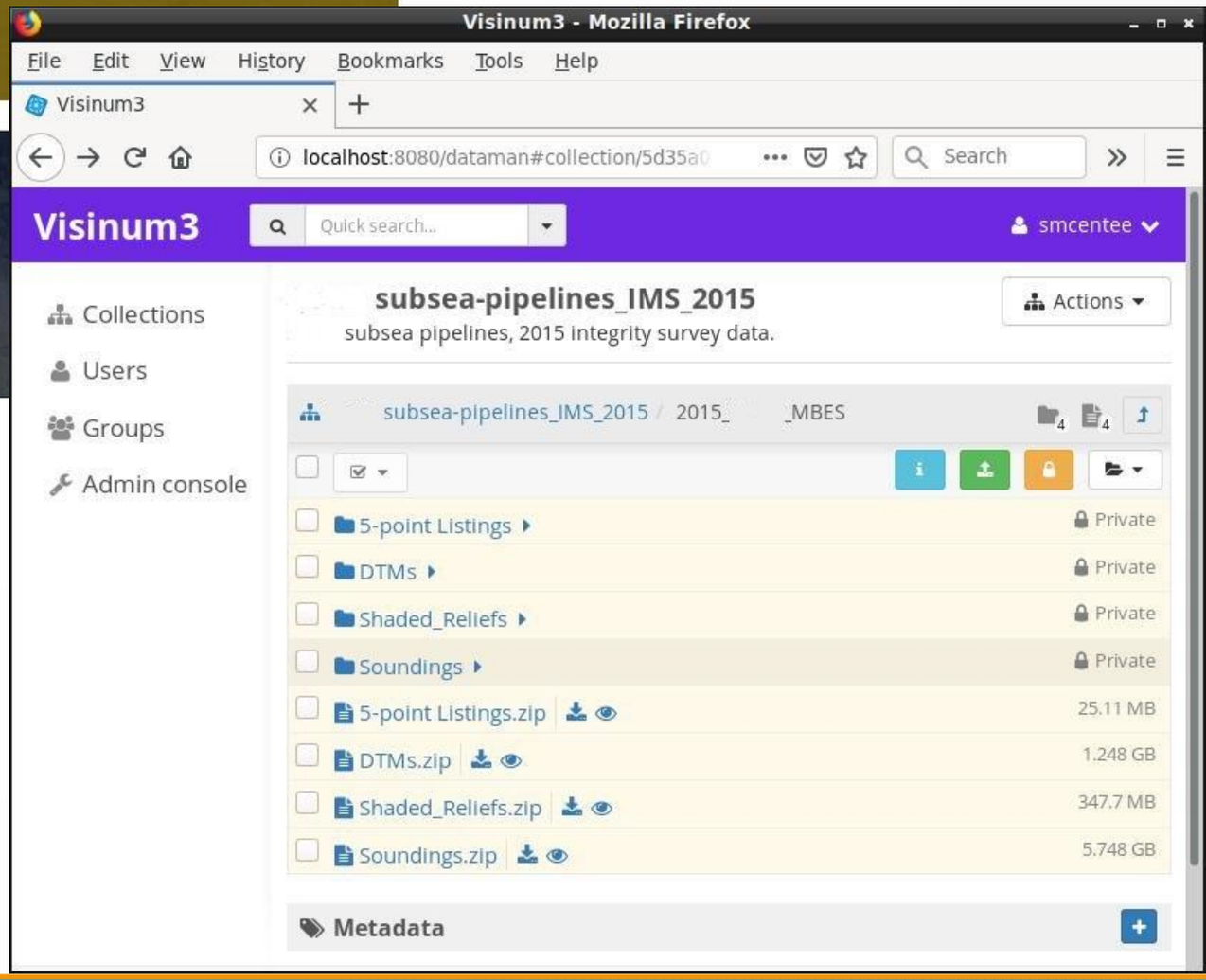
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Objectives

- To review recent developments in the digitalisation of subsea / pipeline engineering
  - Examine the historical context
  - Present ideas on how to obtain more value from data and new technologies
  - Discuss possible future developments
- Present the subsea engineering viewpoint

Recent developments

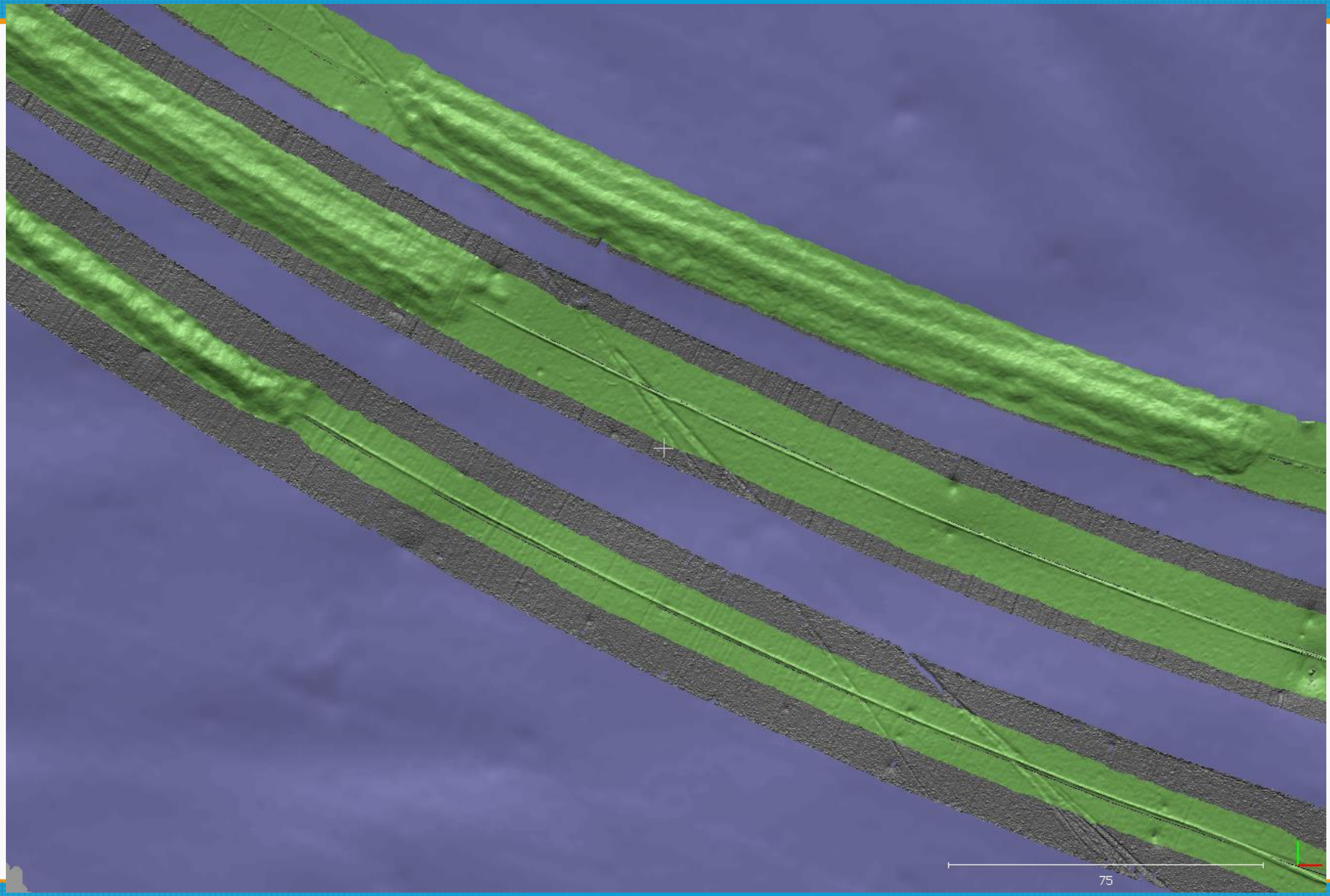
- “Lower for longer” oil price is leading to transformation in oil & gas
- Technology is a major part of the transformation
- New developments in subsea
  - AUVs, USVs, faster surveys
  - machine learning, computer vision
- Improvements in visualizations and data access
- Significant cost reductions in integrity management

New Challenges

- New technologies offering new kinds of data
  - better data resolutions (better outcomes)
  - huge volumes of data (data management issues)
- Challenge integrating data into engineering
  - goal is to maximise value from data
- If pipelines are ALARP, why do more?
- Data has the potential to offer more than integrity:
  - realistic risk evaluation -> lower opex
  - better understanding of infrastructure -> lower capex

Pipeline engineering

- Pipeline engineering is primarily «design-driven»
  - Mainly based on simple engineering theory
  - Data from well testing, metocean, seabed survey is condensed into the *design basis*
  - Completely deterministic process, any uncertainties covered by “conservative” assumptions
- Robust but over-engineered infrastructure (high capex)
- Maximise production uptime
- Minimize operational risks (ALARP, lower opex)
  - Eliminate risks, if possible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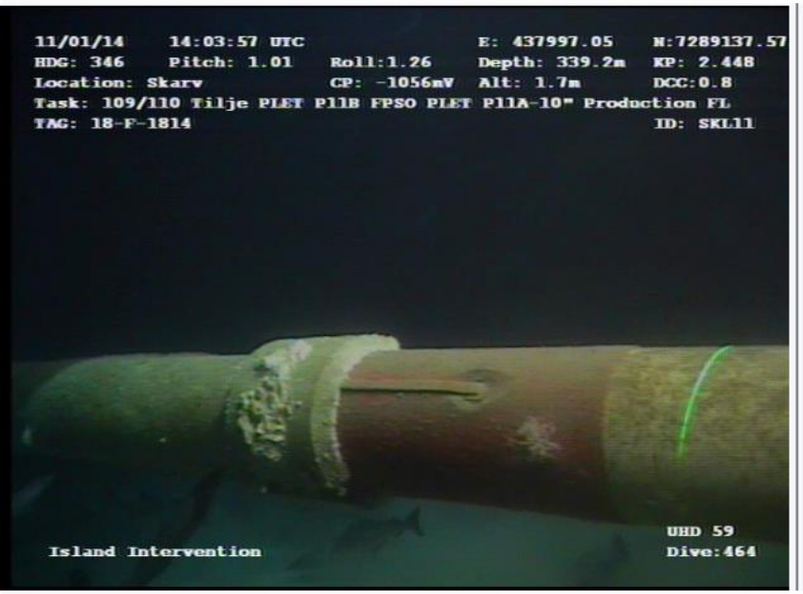
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“The design process needs to be made more efficient, less costly, and less time-consuming … it is not beyond reason to think of design being made essentially automatic, and the design being documented automatically.”

Palmer & King, Subsea Pipeline Engineering (2008)

Developments & Opportunities

- Pipeline design is being automated
  - moving from the desktop to the data centre
  - moving closer to the data
- Opportunity to transform subsea engineering
  - from «design-driven» to «data-driven» engineering
  - reality-based, utilising data and field observations
  - realistic evaluations of risks
  - better understanding of infrastructure behaviour

How to realise value from subsea data?

- "Why Data Science Fails in Oil & Gas?"
  - perception that potential is not being realised
- Couple «physics-based» models to data science
- Probabilistic evaluation of risk based on data
  - move away from deterministic, conservative approach
- Inverse methodologies
  - start with the answer (the data) and analyse back to the definition
  - reveals information about the real status of the system

What is needed?

- Data accessibility
  - most subsea data is “siloed” & confidential
  - commercial and legal barriers
  - need-to-know approach will not deliver
- Growing trend towards “open” data
  - OGA National Data Repository
  - incident reporting - safety flashes
  - AkerBP “data liberation front”

What is needed?

- Context as well as data
  - enables risk comparisons and physics-based approach
- Collaboration
  - more data and context means better outcomes
- Trust
  - need to have confidence to share data
  - “general infrastructure information normally uncontentious” OGA Reporting and Disclosure of Information 2019
- Subsea engineers thinking like data scientists
  - or train data scientists as pipeline engineers?

Concluding remarks

- Subsea has a choice on how to proceed:
- Use new technology to achieve incremental improvements and some cost reductions
  - but basically, continue as before
- Transform subsea engineering and realise the full value in subsea data
  - reduce risks
  - maximise economic recovery

Thank you for listening!

https://qwilka.github.io/