



THE VALUE OF ACADEMIC INDUSTRIAL PARTNERSHIP

...OR “HOW DO WE ALL BENEFIT THE MOST”

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Jesper Tychsen - TotalEnergies

WHO IS SPEAKING....

- **Jesper Tychsen**
- **Structural engineer, MSC Aalborg University**
- **Maersk Oil & TotalEnergies 1993 to present...**
- **...except 1-year (2010) in DONG Energy**

- **Technical focal point towards DHRTC/DOTC within:**
 - **Structural integrity**
 - **Environmental loads**
 - **Risk based methods (e.g. inspection planning for fatigue cracks)**
 - **Structural response, monitoring, etc.**

FRAMING: BACKGROUND

- DUC North Sea structures: >50 platforms, installed since 70'ies
- The first platforms not even designed for North Sea operation (no North Sea code)
- Typically designed for 25 years service period...
- ... most structures now expected to operate two times longer
- Technical "impact" of DUC production history:
 - Early **structures designed for Gulf of Mexico operation** => **technical "innovation pressure"**
 - **"Tight" chalk reservoirs** – drilling tech development adds lots of reserves => more wells + more equipment added to existing structures => **technical "innovation pressure"**
 - **Seabed subsidence** (seabed is sinking) => lower air gap below deck => risk of extreme waves reaching the deck (resulting in high platform loading) => **technical "innovation pressure"**
 - **Knowledge of extreme wave loading** evolving over time => what we learned in school is not sufficient => higher extreme waves + higher particle velocities => higher loading than included in design => **technical "innovation pressure"**
 - **Knowledge of everyday loading** and related response – long service period and historically simple and uncertain fatigue prediction methods => hampering correct integrity assessment => **technical "innovation pressure"**

Due to the size of the investment and the historic evolvement of production and knowledge => we are married to tech innovation to ensure continued integrity

FRAMING: STATUS

The past 25 years Maersk Oil and TotalEnergies have devoted a high degree of high focus on tech development within areas related to structural integrity:

- **Extreme loading and response:**
 - **Tyra Subsidence I** (1999-2012): Ultimate strength, pushover, transient response, reinforcement
 - **Tyra II (2013-15)**: New wave knowledge, probability of collapse => total rebuild of Tyra field currently ongoing
 - **AWARE (2016-present)**: New wave knowledge, probability of collapse, "Code Wrapper" design approach – all SECE elements exposed to extreme wave loading
- **Long-term integrity management:**
 - **Primarily fatigue integrity** (optimizing in-service inspection)
 - **RBI** (4th generation implemented – 1st generation late 80'ies)
 - **Focus shifting** from "*running the RBI machine*" to "*ease of use*" and "*quality of method*"

State of the art and beyond code requirements – but developed under excessive QC requirements (i.e. full 3rd party certification) => high TRL level at end of development. Note: High level of multi-discipline challenges (structural, met-ocean, hydrodynamics, geotechnical, pipelines, fatigue, risk....)

THE INGREDIENTS UNDERLYING A PARTNERSHIP

...STRICTLY SUBJECTIVE☺

University:

- Research topics of interest largely directed by technical management (professors etc.). Potential for hobby horsing☺
- Focus on framing, idea development and showcasing (TRL 1-3)
- Few industry experienced staff
- High variability in tech topic knowledge level
- Current KPIs: Publications, hit rates, quoting rates, etc. However, industry support has some foothold!

Concerns:

- Risk of hobby horsing (research which will never find an end-user)
- Inherent scepticism if externals are guiding the direction of research
- Can/will tech management truly fight to solve externally defined goals... or just say so to obtain funding for own goals?

Industrial:

- Bulk of problems and challenges
- Manning restrictions and stretched staff
- Focus on day to day problems
- High variability in technical knowledge level
- New knowledge and technology may end up being costly
- Solid business cases required for investment

Concerns:

- No time or experience to work with change
- Management comfort at keeping industry standard
- May consider research as an inherently costly and risk full business case
- Short time horizon management

THE FERTILISERS FOR SUCCESS

– STRICTLY SUBJECTIVE



"Trust"

University:

- Openminded, we want to learn, attitude and embrace multi-discipline interaction/learning
- See the "beauty" in solving given multi-discipline problems, interact to define projects in core areas
- Align with industry partner on how project success looks
- Redefine KPIs to match a case with industry involvement
- Learn the industry standard – otherwise it will be hard to improve it
- Plan to achieve highest TRL
- Willingness to suppress hobby horsing

Industrial:

- Get involved
 - Listen
 - Understand
 - Explain
 - Support
 - Implement
- Get to know the team, understand KPIs, skills and "desires" of partners
- Align with university partner on how project success looks
- Sufficient tech (multi-discipline) skills to understand and ask the QC related questions
- Allow time to interact (KPI)

THE VALUE OF INDUSTRIAL PARTNERSHIP...

....can be everything from **headache..**

... as academia does not work with what they want and industry feels they are loosing time and money as academia is only interested in the budget to keep hobby horsing...

to a **success story...**

... where multiple disciplines and skills come together in the benefit of all to develop a unique solution no-one would be able to do on their own

END OF PRESENTATION

Thanks!