

DEMO Technology Challenges

Hindrances when introducing new technology

Risk Level

- **Within subsea the easy wins are taken, now we need technology within**
 - Large bore -high flow potentials
 - HP/HT -risk for seal washout and thermal expansion
 - Difficult fluids- material selections?
 - Long distance and deep water-flow assurance
 - Complex wells/smart controls-costly repairs
 - Subsea process-electric high power current under water!
- **Oil companies are becoming more risk advert as we have had too many equipment failures**

Why do we have equipment failures?

- **Lack of proper requirements for:**
 - **Drilling, installation, intervention and Operational loads normal and accidental loads**
 - **Fluid properties at start-up and during operations not understood, e. g. corrosion, fatigue etc.**
- **Lack of proper qualification testing and test facilities**
- **Difficult to get experience in one application prior to use new enabling technology in more demanding applications since different licenses are involved.**
- **Wrong material or process selected**

Lack of available qualified personnel

- **New technology need operational input from end user**
 - **Operational experience is difficult to transfer to design input**
 - **Experienced personnel from oil companies are busy on other tasks**
- **Teams are not permanently manned with representatives from all parties involved**
 - **Unfinished design basis**
 - **Design reviews not detailed enough**
 - **Not total by ins from all parties involved**

Timing

- **It takes time to develop and test new technology**
- **Marketing must hit the right field case**
- **Support from DEMO on several stages is wanted**
- **Promoting new technology -marked access when bid competition is ongoing?**

Cost

- **Prototypes are costly to develop and test**
- **Pricing the first items is with no cover margins**
- **Delays and overruns are commonly seen**
- **Original cost estimates are often optimistic**
- **How to calculate and allocate cost on reliability when operational loads are not identified?**
- **Operators gives in practice little value on Life cycle cost -- example ISS**

Integrated Well Satellite : IWS

- **HARDWARE SAVINGS**

No integration : No hardware cost reduction

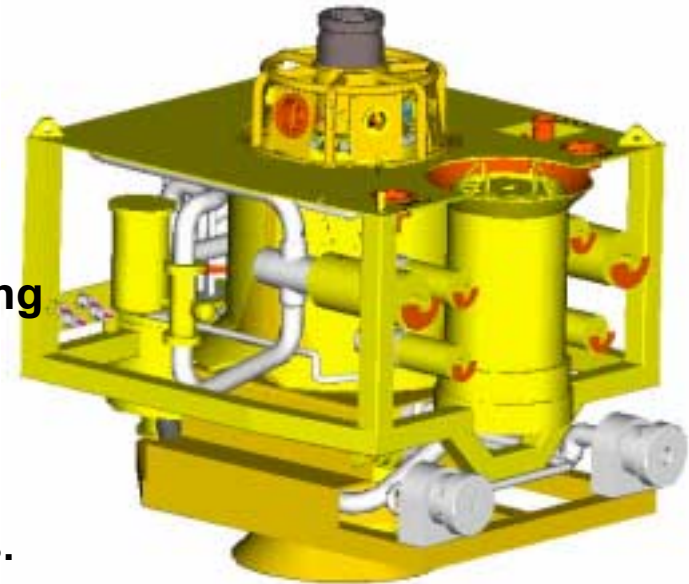
- **INSTALLATION SAVINGS**

Possible saving due to drillthru or wet parking

- **OPEX SAVINGS**

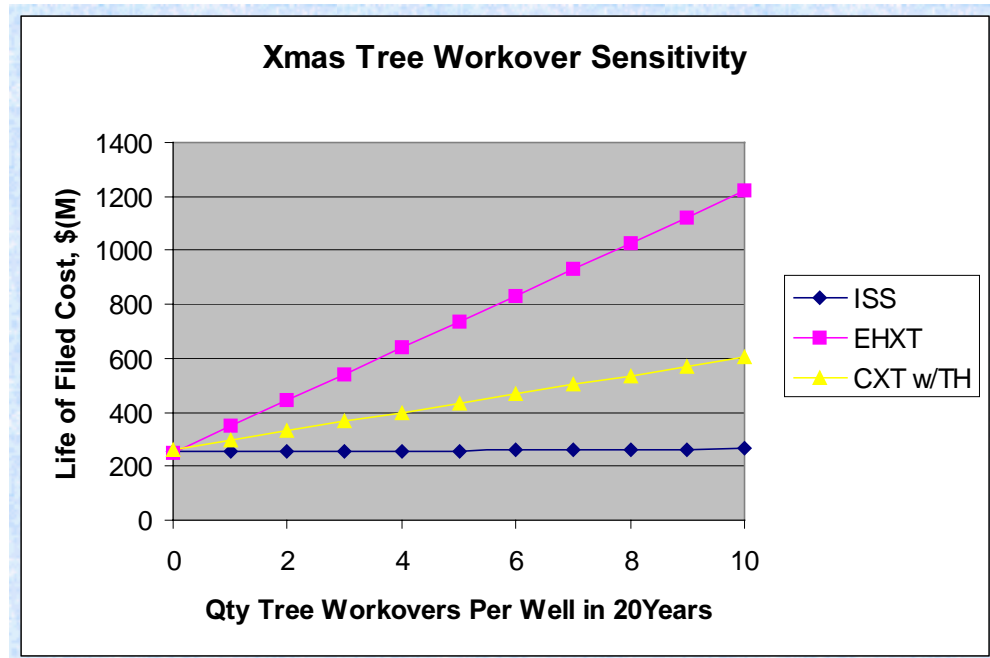
IWS demonstrates significant OPEX reductions.

- **Due to independent tree / tubing retrieval**



Tree Workover Sensitivities

- Tree Workover main ISS benefit
- HXT most expensive (MODU)
- CXT next (Cap / Plugs)
- ISS is least expensive - ROV closes valve, retrieve tree.
- However, no tree workovers, no real difference between systems
- For base case 2 per well, ISS
 - 43% (\$190M) less than EHXT
 - 22% (\$76M) less than CXT



Positive approach to overcome hindrances!

- **The DEMO initiative with industry and authorities together is very good! Can be even better, needs to be continued to bring concepts from research to industrialised status.**
 - **More power and commitment to DEMO members**
 - **Supply industry representatives to sit in the TSC?**
 - **Better NPD participation**
- **Competition between oil companies on a as used/installed basis-New blocks as rewards!**