TechnipFMC

Increased Safety & Efficiency from a Dedicated Light Well Intervention Vessel on Deepwater Subsea Wells

A Truly Integrated Service Delivery

09 August 2017

Agenda

Introduction to Light Well Intervention

Pros and Cons + alternative

Latest Generation LWI vessel & equipment

Types of Services run

Additional Future Services

Q&A

TechnipFMC

RLWI History

1987: BP first RLWI campaign in the North Sea

Mature technology with 28 years of continuous track record

Highly efficient and effective

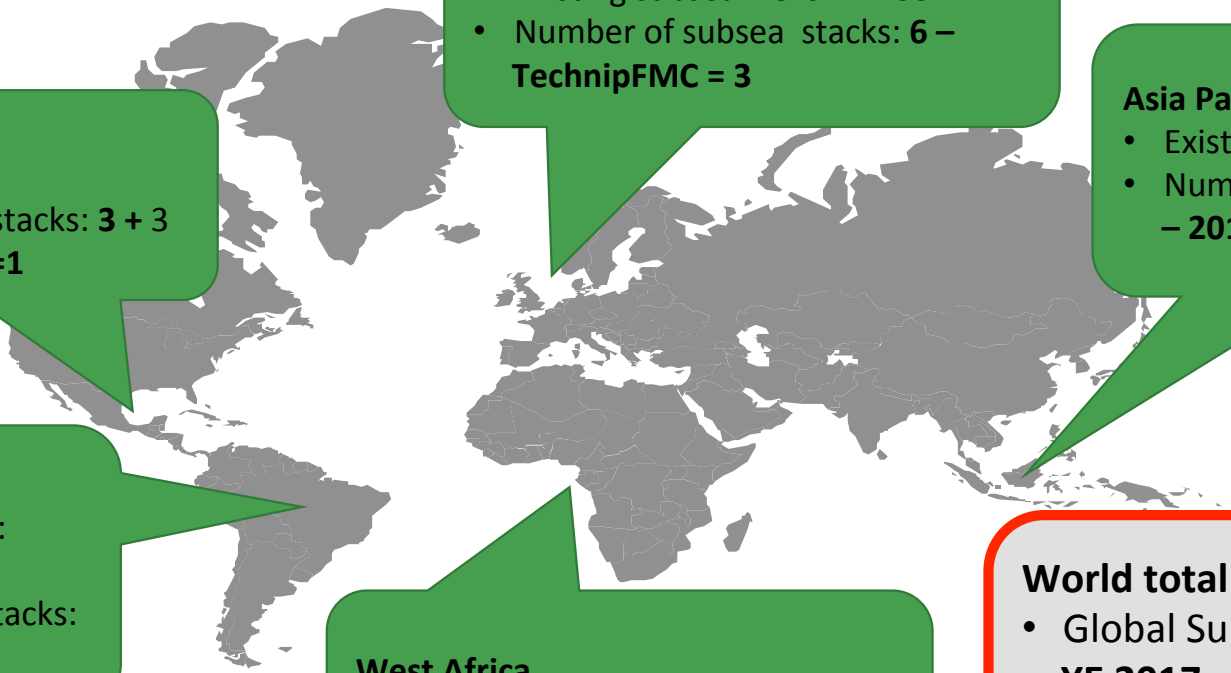
Deepest RLWI job: 8,200 ft (2,499m) in Gulf of Mexico

More than 1,300 wells intervened on

More than 3,300 runs into the well (just by FMC Technologies and Island Offshore)

Global LWI Market

Source: Quest Offshore; Infield Systems database
Data for global flowing wells @ end 2017



North Sea
- Existing subsea wells: **~2700**
- Number of subsea stacks: **6 – TechnipFMC = 3**

Asia Pacific
- Existing subsea wells:**~950**
- Number of subsea stacks: **2 – 2017 FMC = 1**

Gulf of Mexico
- Subsea wells: **~1100**
- Number of subsea stacks: **3 +** 3 x 3" **– TechnipFMC =1**

Brazil
- Existing subsea wells: **~1700**
- Number of subsea stacks: **0**

West Africa
- Existing subsea wells: **~1600**
- Number of subsea stacks: **0**

World total
- Global Subsea wells: **>8000 by YE 2017**
- Number of available (large bore) subsea stacks; **11**

TechnipFMC

Key Components for RLWI

DP2/3 Intervention vessel (+ROVs)

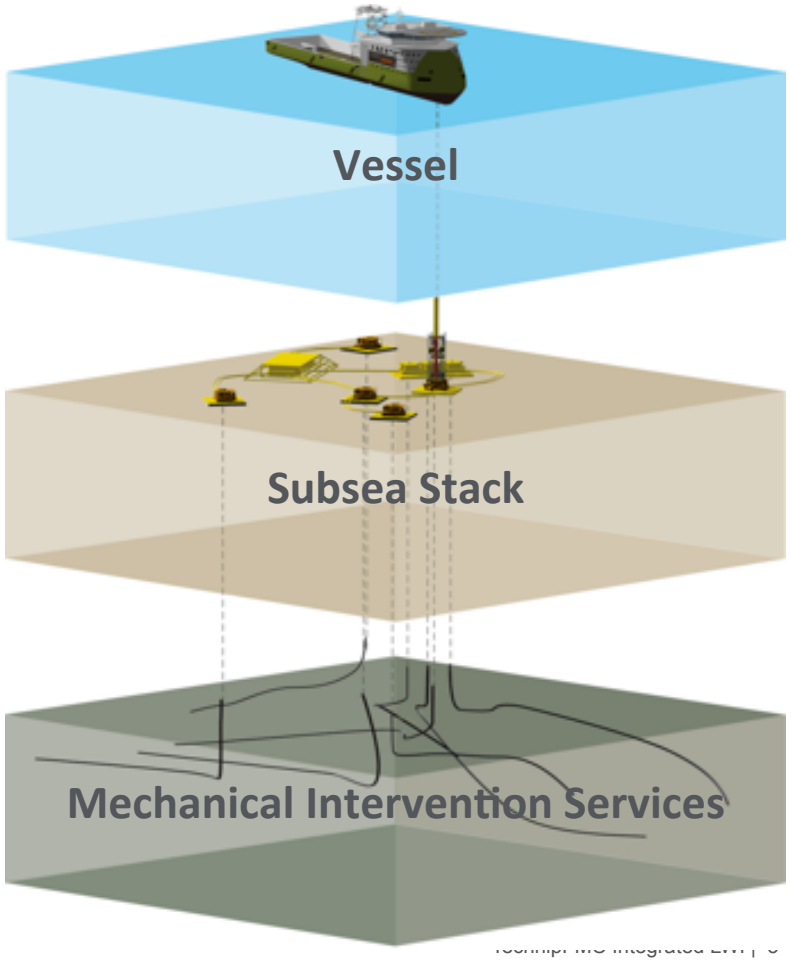
- 100-150M$, 2 yrs lead time

Subsea Stack

- 30-80M$, 1.5-2 yrs lead time

Mechanical Intervention services

- Continually developing; ENABLER for the utilization of subsea non-rig based intervention



APAC Integrated, Purpose Built RLWI System

300 T. Module Handling

250 T. AHC Crane

Built-in Fluid Tanks

Pressure Control He
(PCH)

r Pac

r Pac

acka

Christmas Tree (X

fety Joint

ver Circulation
Model (LCM)

Intervention Options

Conventional Drilling Rig (CAT C)

Pros

Depth only limited to rig capacity

Full pumping capability

Can run all interventions (WL, CT, Pipe)

Can pull/run completions

Well-known deployment/ access technology

Cons

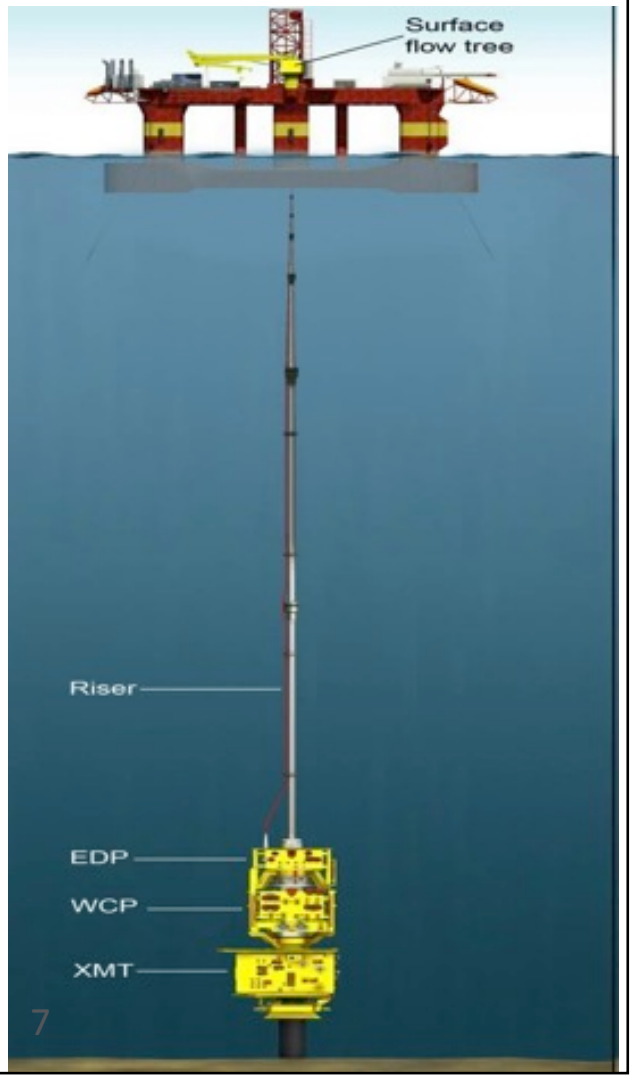
High day-rate and total spread cost

Needs to be reconfigured for work over

High mob/demob costs- impact economics for interventions

Over-kill for e-line interventions

Not able to drill when using for intervention.



Intervention Options

Riserless Light Well Intervention (CAT A)

Pros

Light, cost effective, flexible intervention setup

Mobilize, deploy & move between wells quickly

80-90% of intervention requirements on e-line

Vessel used for additional activities (Stimulation, Installation, P&A etc.), increases economics for intervention

Depth capability can reach >95% of global wells

Cons

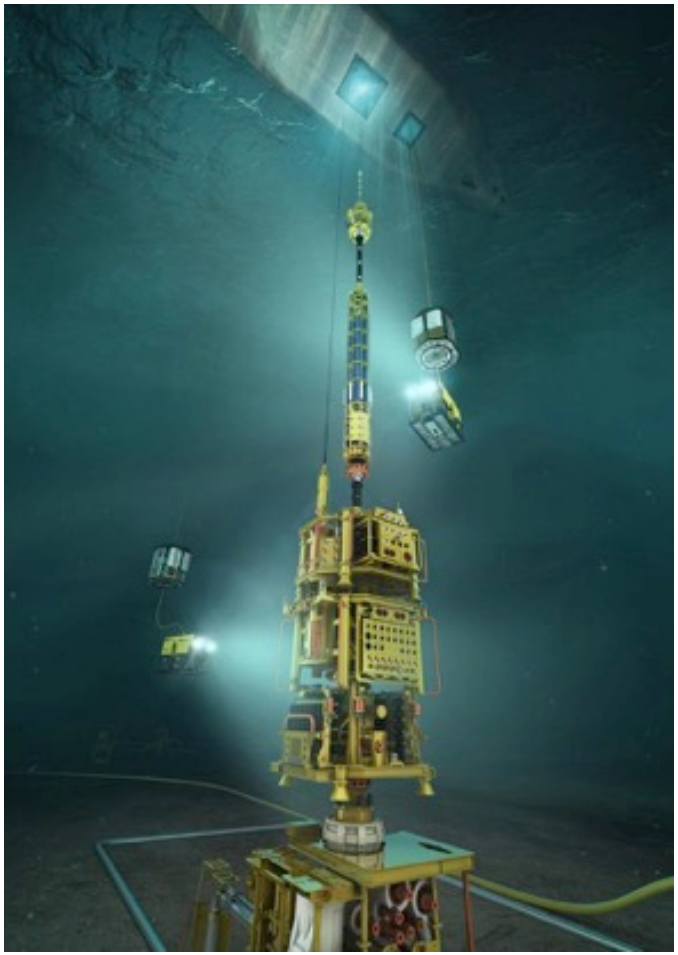
Limited number of subsea stacks worldwide (11)

Limited in volume of fluid to inject

Cannot run CT (today)

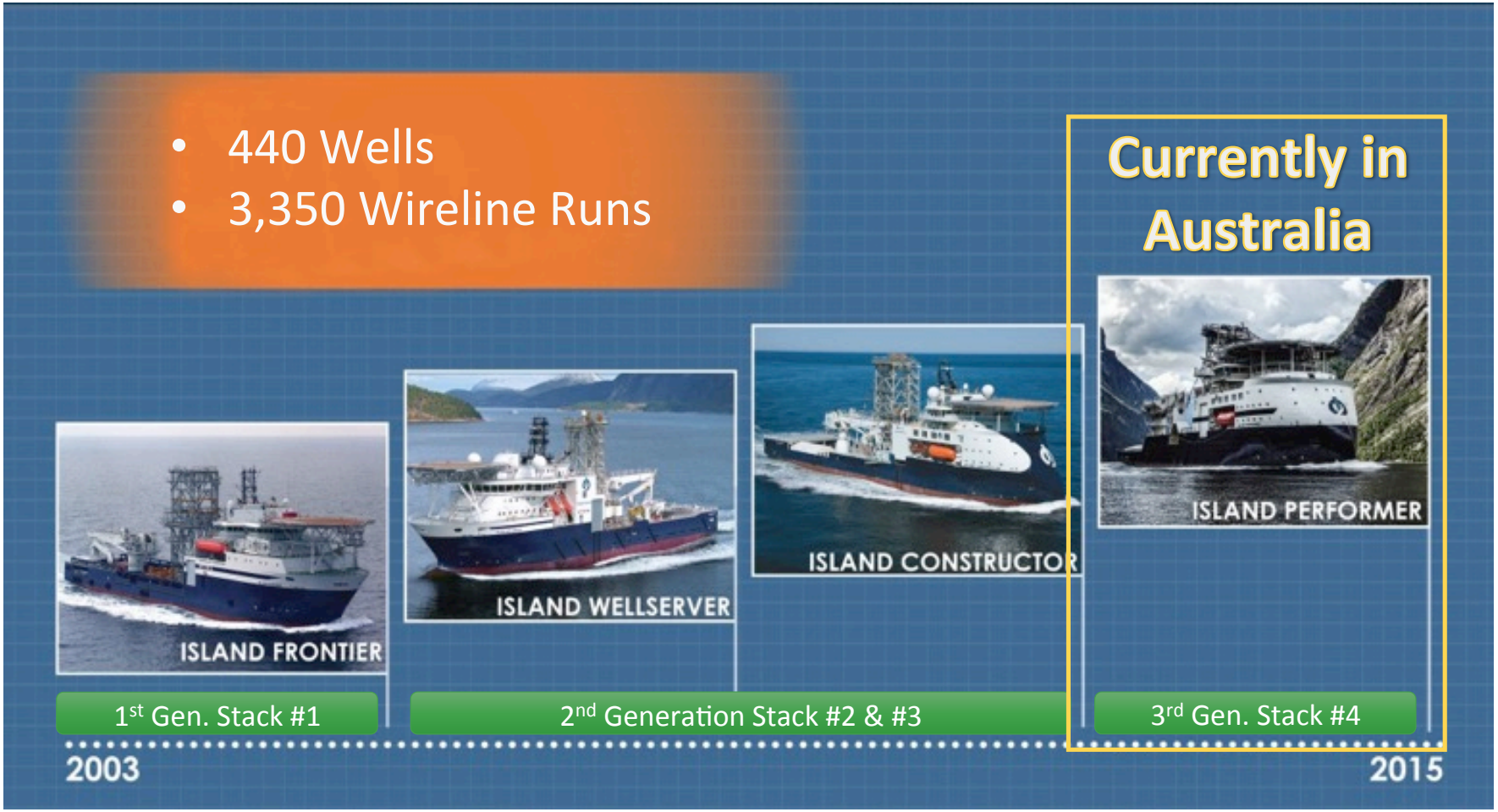
Cannot pull pipe (today)

Operators not all locally aware of technology and services possibilities



TechnipFMC

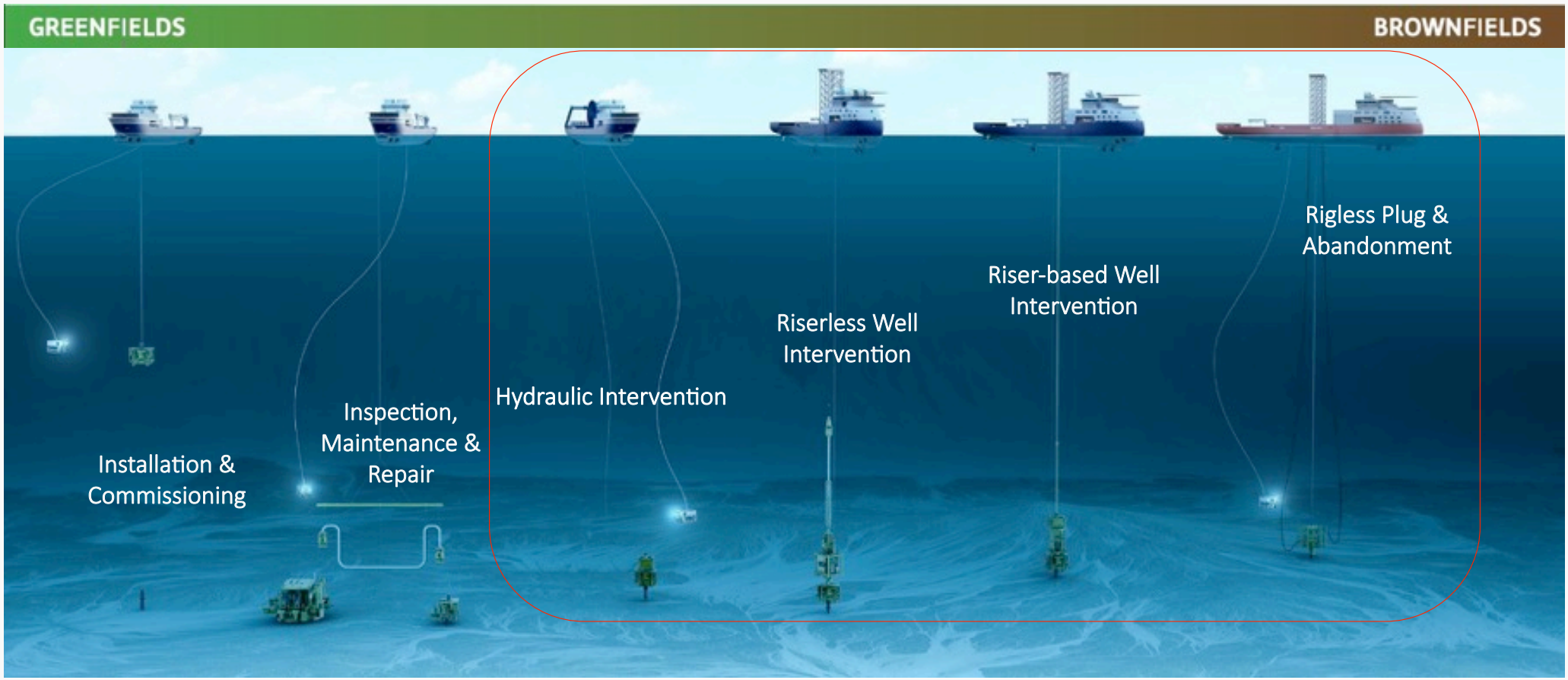
Latest Generation Vessel & Stack now in Australia



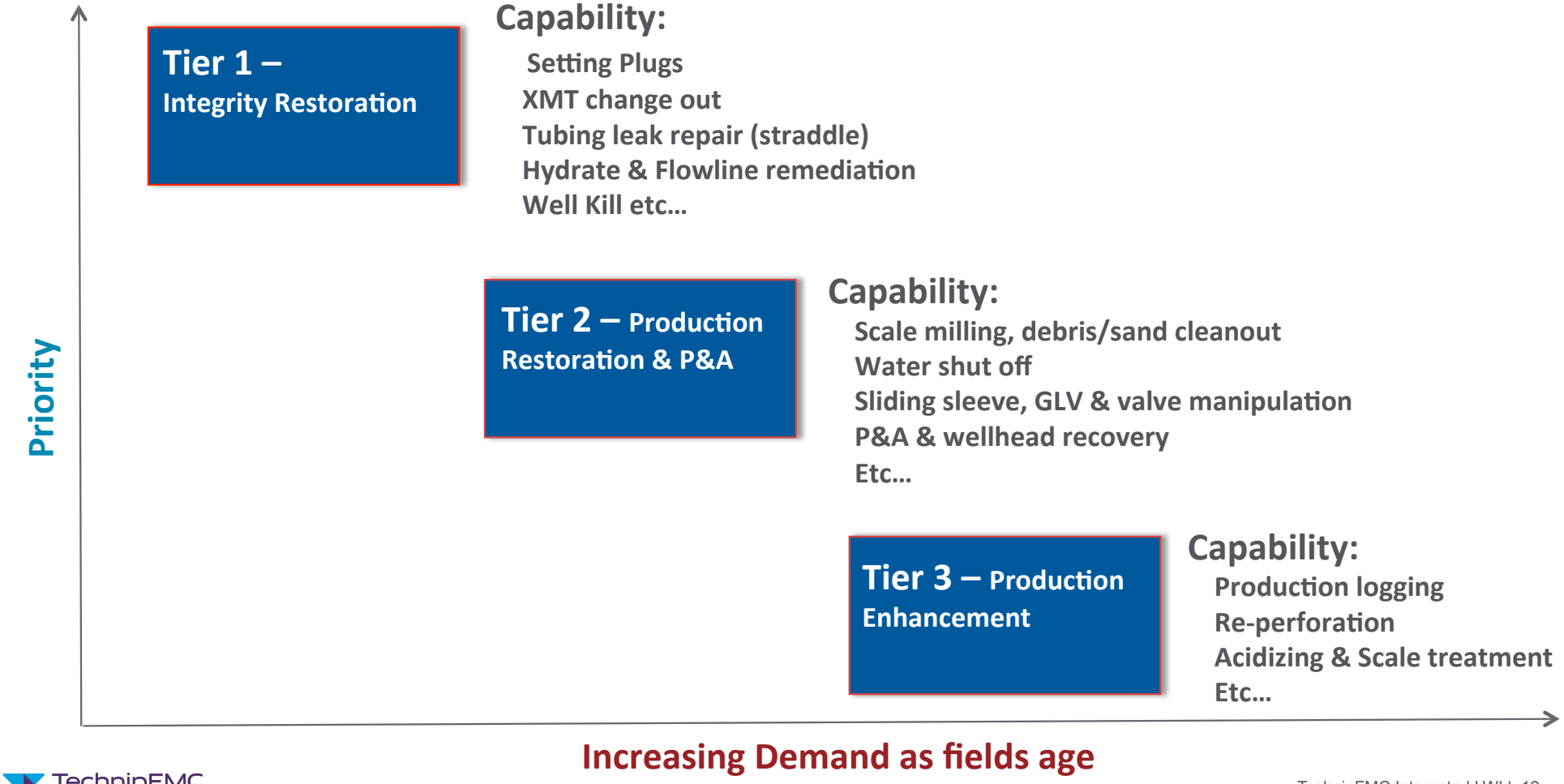
Benefits of Fully Integrated Vessel

- Safer
  - Skidding system avoids lifting
  - Automated deployment avoids manual handling
  - Integrated shutdowns (Bridge/Control cabin/Back deck)
  - Vessel management system based on Well Intervention
- Shorter Mob/Demob
- Faster to respond to well integrity issues
- Higher Operational Efficiency & continued improvements w same crew & procedures
  - Lower total job costs to Operator
- Requires minimal Operator resources to manage
- TechnipFMC committed to expand services into APAC
  - Can provide full service with well services subcontracted

Economies of Scale with multi-capable vessel & equipment

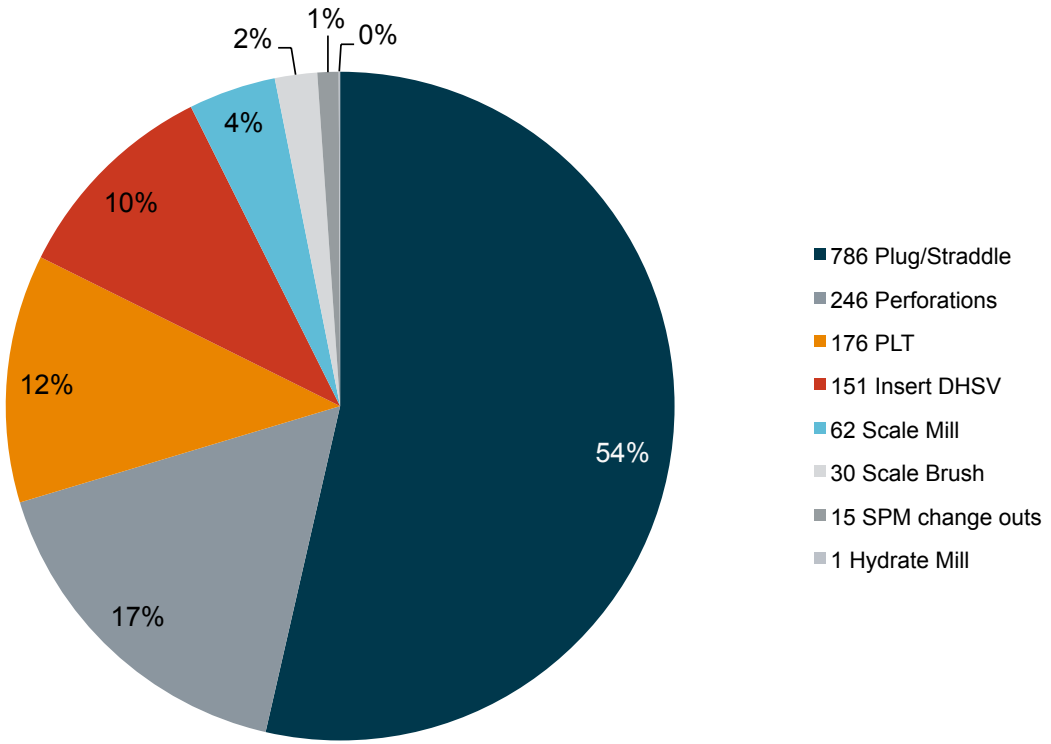


Intervention Priority & Capabilities



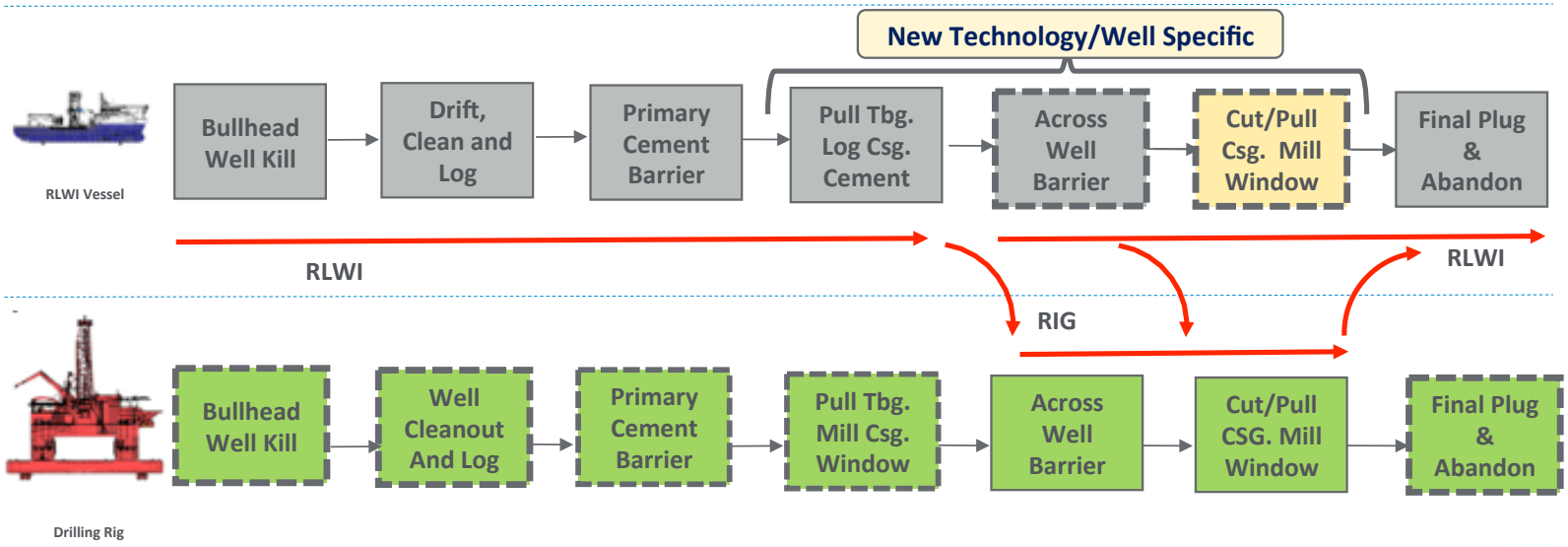
Typical RLWI Applications

- Zone isolation (plug/straddle)
- Perforating
- Data gathering (PLT)
- Milling and removal of scale
- Well barrier re-establishment prior to rig work over (XT change out)
- Well Clean Up
- Chemical Spotting
- Inspection/repair
- Camera inspection
- Change-out of gas lift valves
- Sleeve operations – DIACS valves
- Caliper logging
- Fishing on e-line
- Temporary P&A operations of subsea wells



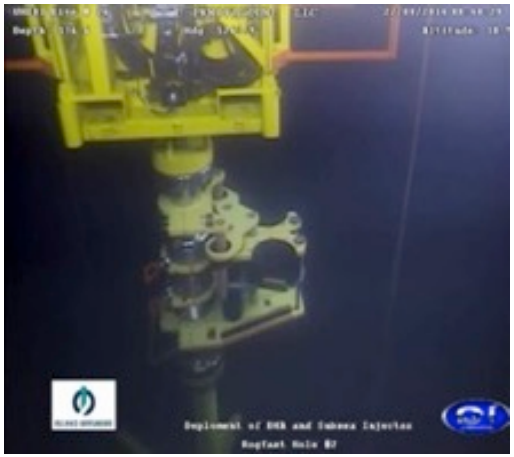
P&A Operations

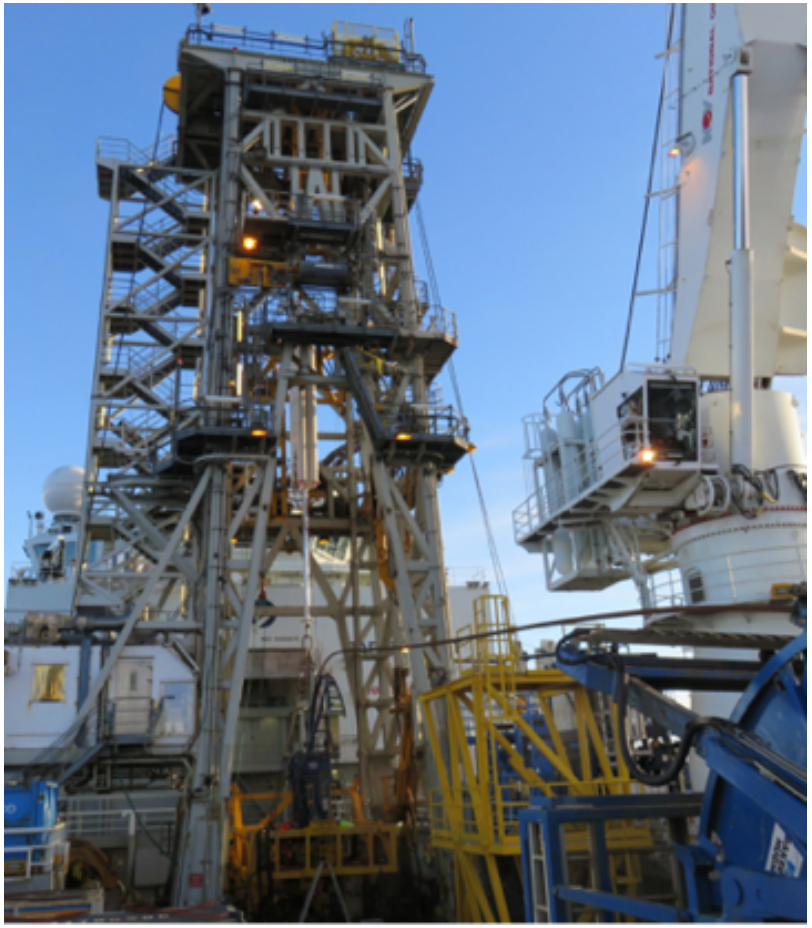
- RLWI Vessels are capable of a variety of P & A related operations which can reduce Rig time.
- Drilling Rigs are currently needed for pulling or milling Casing
- Options available for B & C annular cementing from RLWI vessel
- Wells must be assessed on a case-by-case basis
- Splitting workscope has been best practice by operators in the North Sea and GOM.

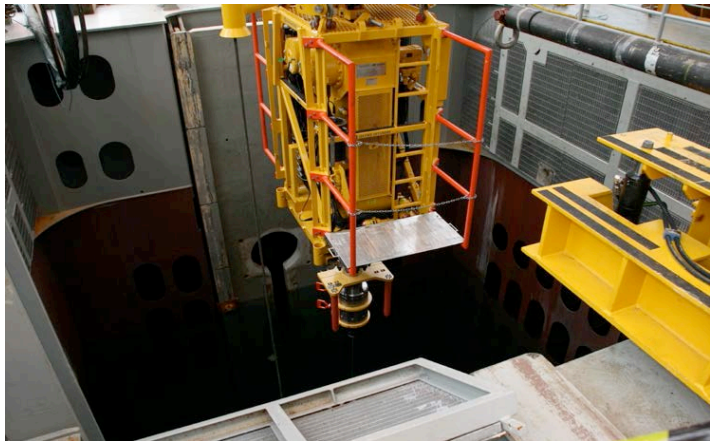


Deployment of Additional Services

Open Water Coiled Tubing on Island Performer

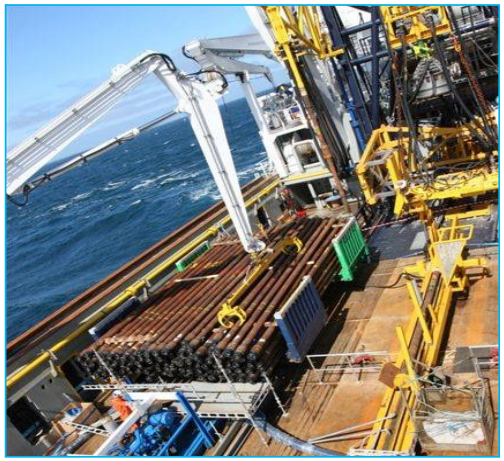






Pipe Handling from Island Performer Intervention Vessel

240T tower to run 6 5/8” or 8 5/8” casing riser or Drill pipe

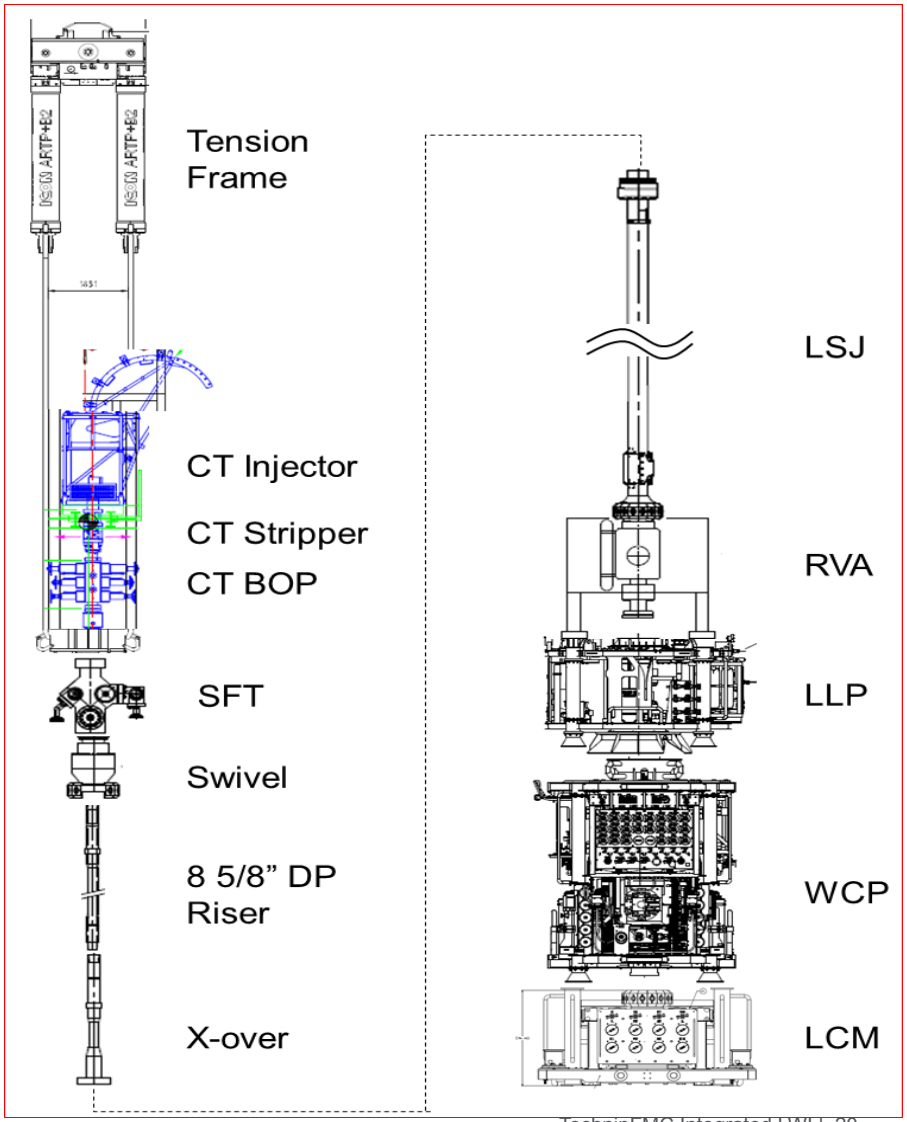


Convertible system from Vessel

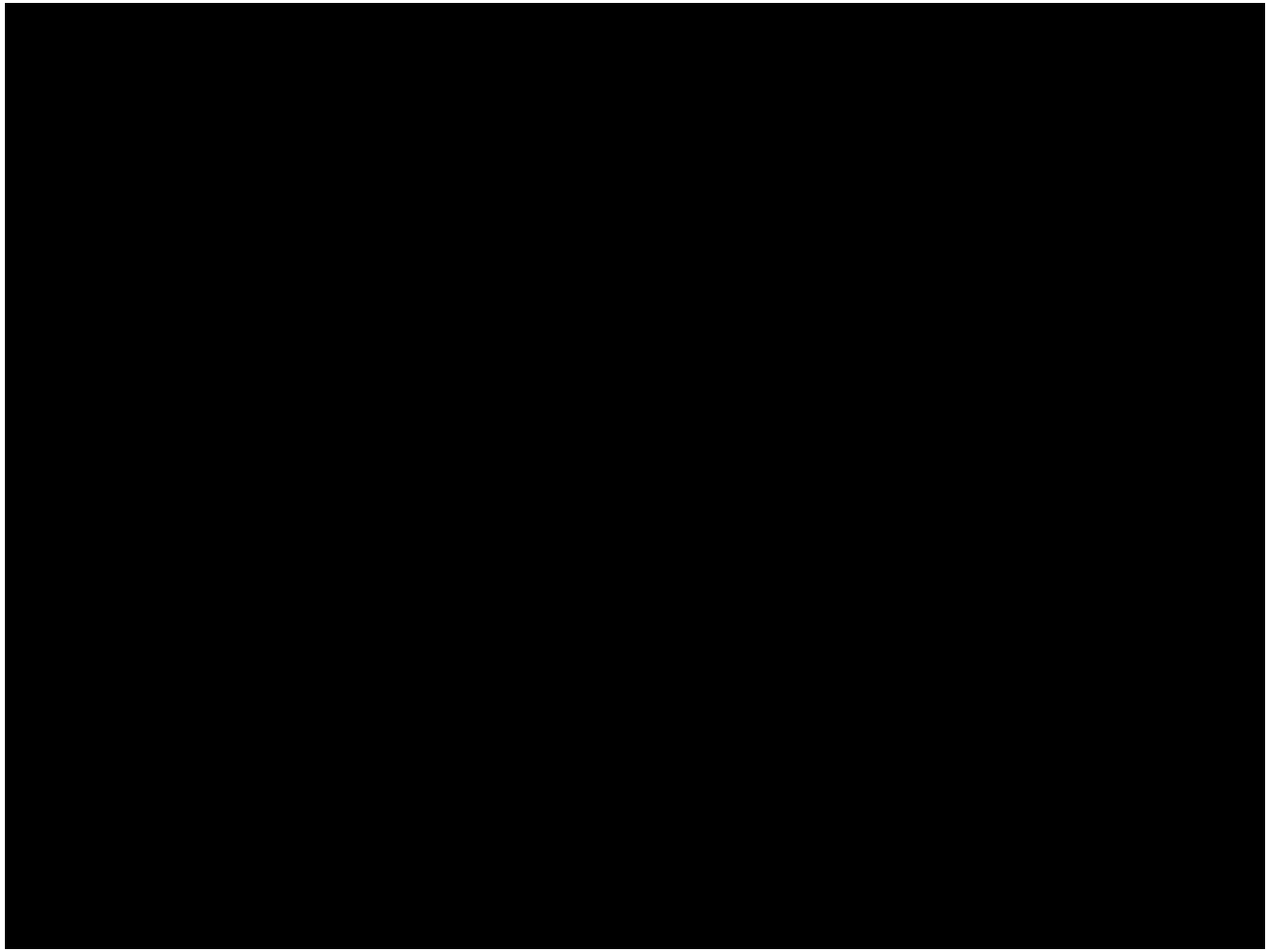
Agreed requirements:

- Minimum change to existing equipment
- Maintain safety functions and propose equipment safe to use
- Meet typical RLWI needs – flushing, hydrate prevention, grease injection
- Utilize standard casing joints vs specialty riser joints
- Enable easy integration on vessel
- Water depth capability 150m – 1500m
- CTLF designed for optimal WL/CT operations

Lessons Learnt from pipe handling on other vessels



Pipe Handling from monohull vessel



Island Frontier
106m LOA
Dead weight 4700 Ton
Deck area 945m2
Tower 70 T AHC
Crane 140T AHC
DP3

Island Performer
130m LOA
Dead weight 7300 Ton
Deck area 1400m2
Tower 140T AHC
Crane 250T AHC
DP3

The first Step to making a Step-Change

https://www.youtube.com/watch?v=JZFNqOxaJVY

Step 2 Oil & Gas Open Water Coiled Tubing Drilling

https://www.youtube.com/watch?v=nGp7gGGn4n0

Conclusions

RLWI is a mature technology

- 28 years of field experience
- > 1,200 wells
- FMC > 3,300 runs (4 vessels in last 10 years)
- Industry > 5000 runs & 2,500m maximum water depth

Integrated RLWI Services from dedicated vessel

- Safer
- Shorter Mob/Demob + faster response
- Higher Operational Efficiency
  - **Equipment in state of readiness**
  - **Same crews**
  - **Lower total job costs to Operator**

TechnipFMC is expanding Integrated System to Australia in 2017

- Flexible with ability to run multiple services

TechnipFMC are developing other unique solutions for cost effective vessel based interventions (P&A, Riser from vessel etc)

In Australia now – 2023 +

QUESTIONS

bevan.morrison@technipfmc.com

www.technipfmc.com