Time to Market and Subsea Developments: smart architectures, standard components, frame-agreements, keys to fast successes

Gianluca De Molli

Co-authors: Alin Baciu, Luca Bravi, Gianfederico Citi

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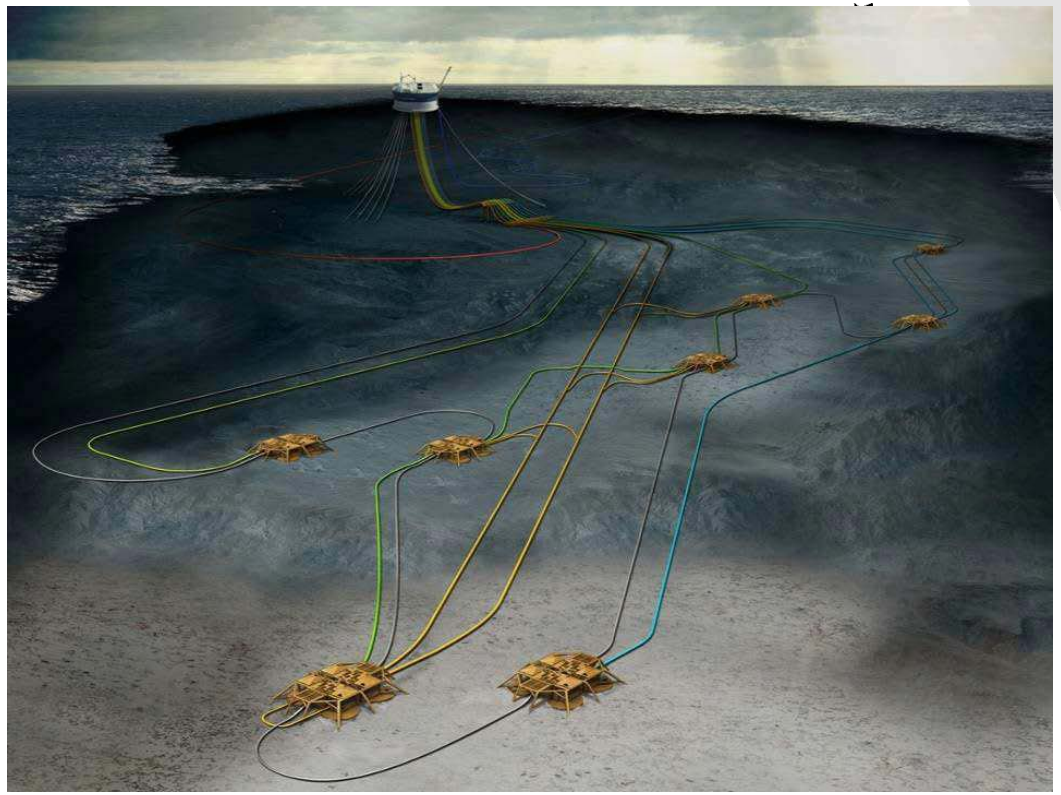
Goliat (Norway)

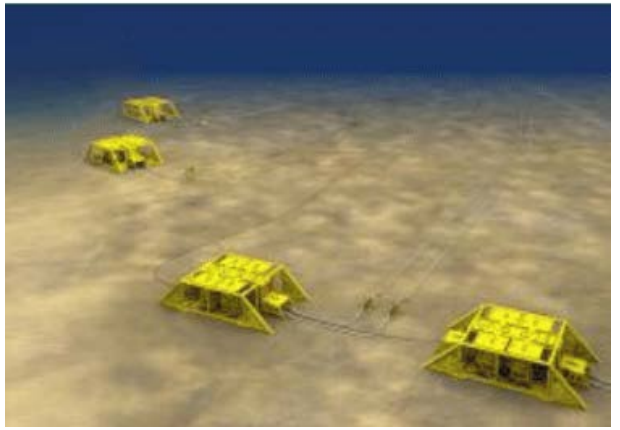
FID: 2009/2011
FO: Mar16

60 months execution

Project summary:

- *Value: NOK 2,3 billion*
- *Water Depth: 360-430 m*
- *22 wells (11 OP, 9 WI and 2 GI)*
- *8 manifolds with overtrawlable structures*
- *20 km steel tube umbilicals*
- *Tie-back to FPSO*





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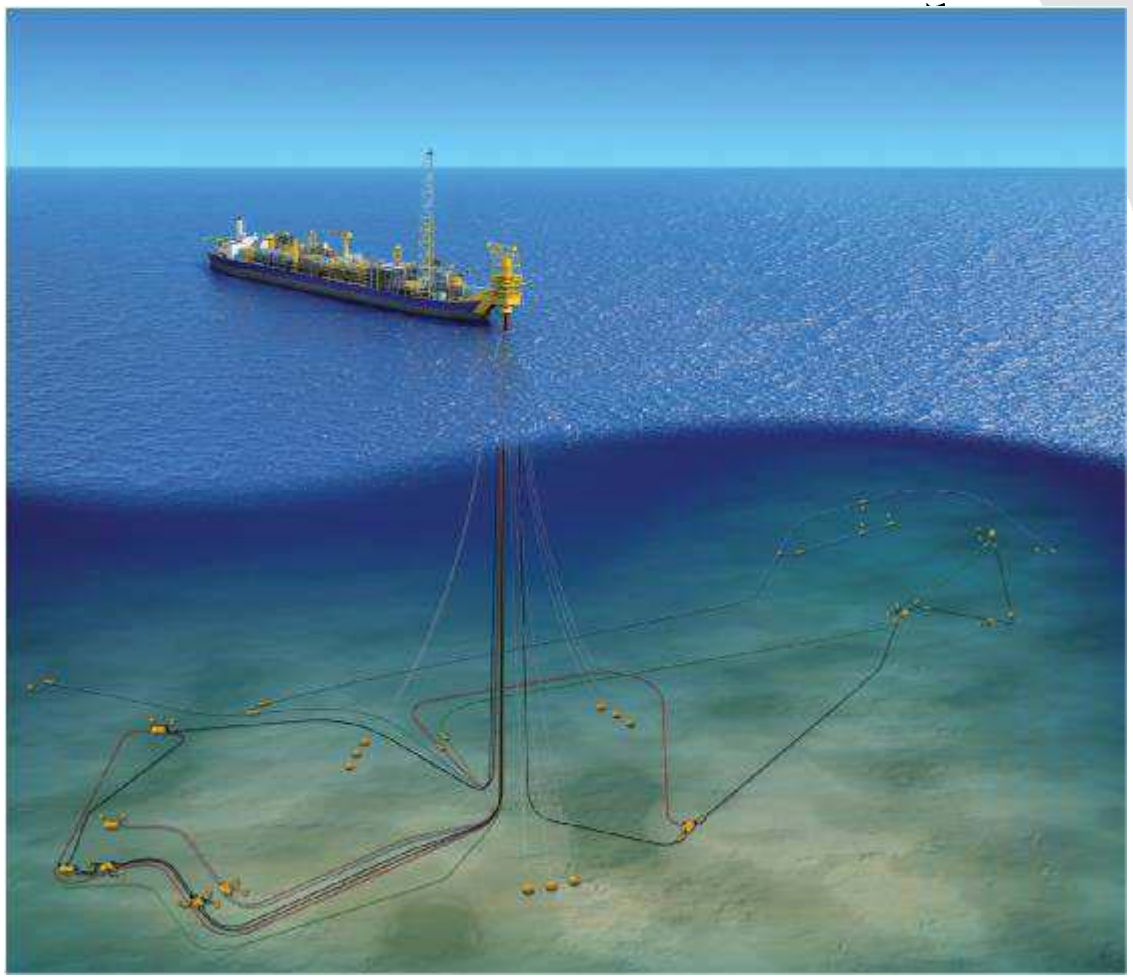
West Hub (Angola)

FID: Nov10
FO: Nov14

48 months execution

Project Summary:

- *Several fields tied back to Turret moored Ngoma FPSO*
- *Water Depth up to 1500 m*
- *Sangos:*
  - *5 OP & 4 WAG*
  - *3 prod. & 2 WAG manifolds*
- *Chinguvu*
  - *2 OP & 1 WI*
  - *1 prod. manifold*
- *Mpungi*
  - *6 OP & 4 WI*
  - *2 prod. manifolds*
- *Ochigufu*
  - *2 OP & 2 WI*
  - *1 prod. manifold*



... and additional Project phases are still ongoing ....

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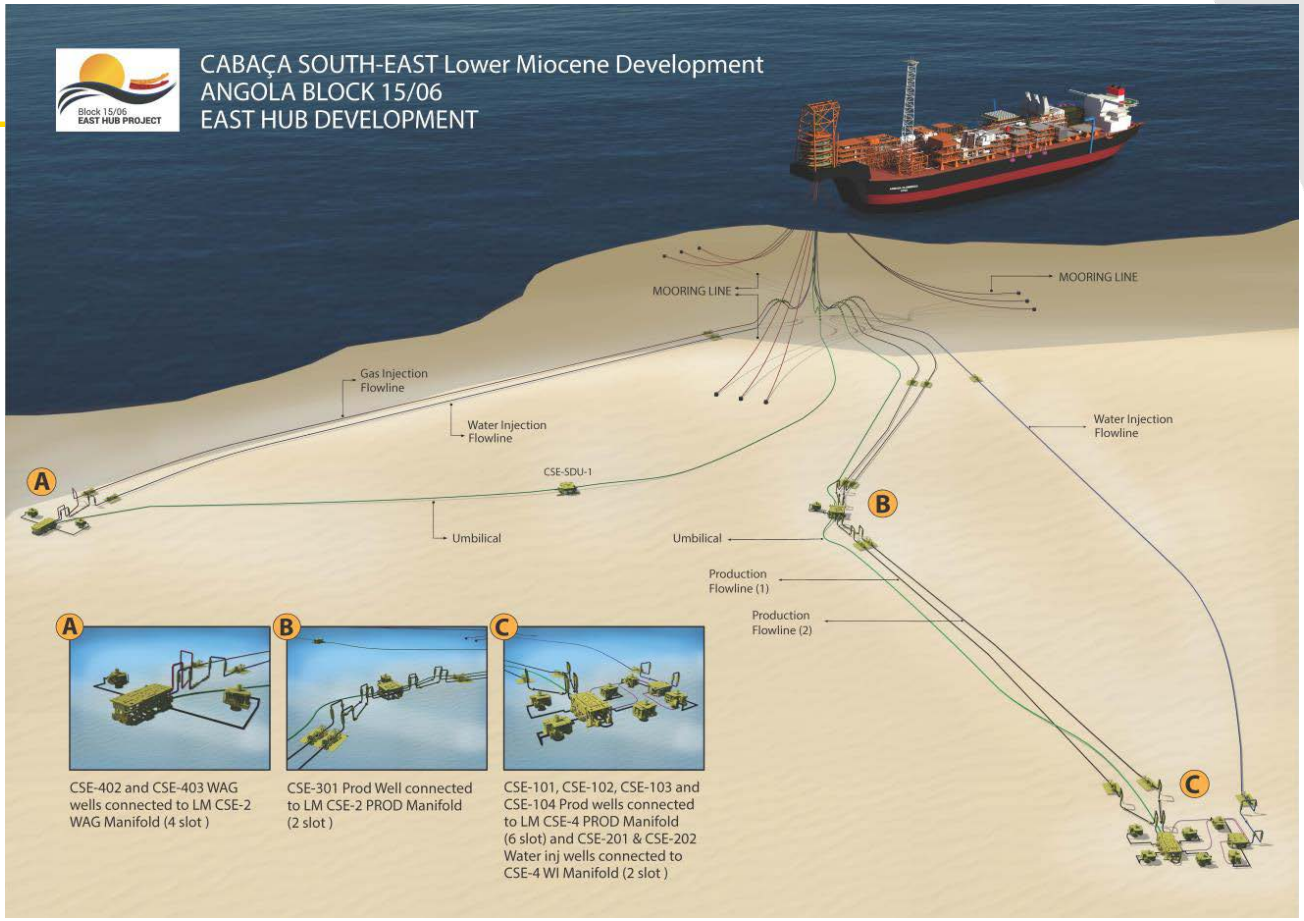
East Hub (Angola)

FID: Dec13
FO: Feb17

39 months execution

Project Summary:

- *Discovery in 2009*
- *Water Depth: 450 - 550 m*
- *5 OP, 2 WI & 2 WAG wells*
- *4 subsea manifolds with integrated SDU*
- *2 main umbilicals*
- *5 Flexible risers*
- *Tie-back to Turret moored Armada Olombendo FPSO*



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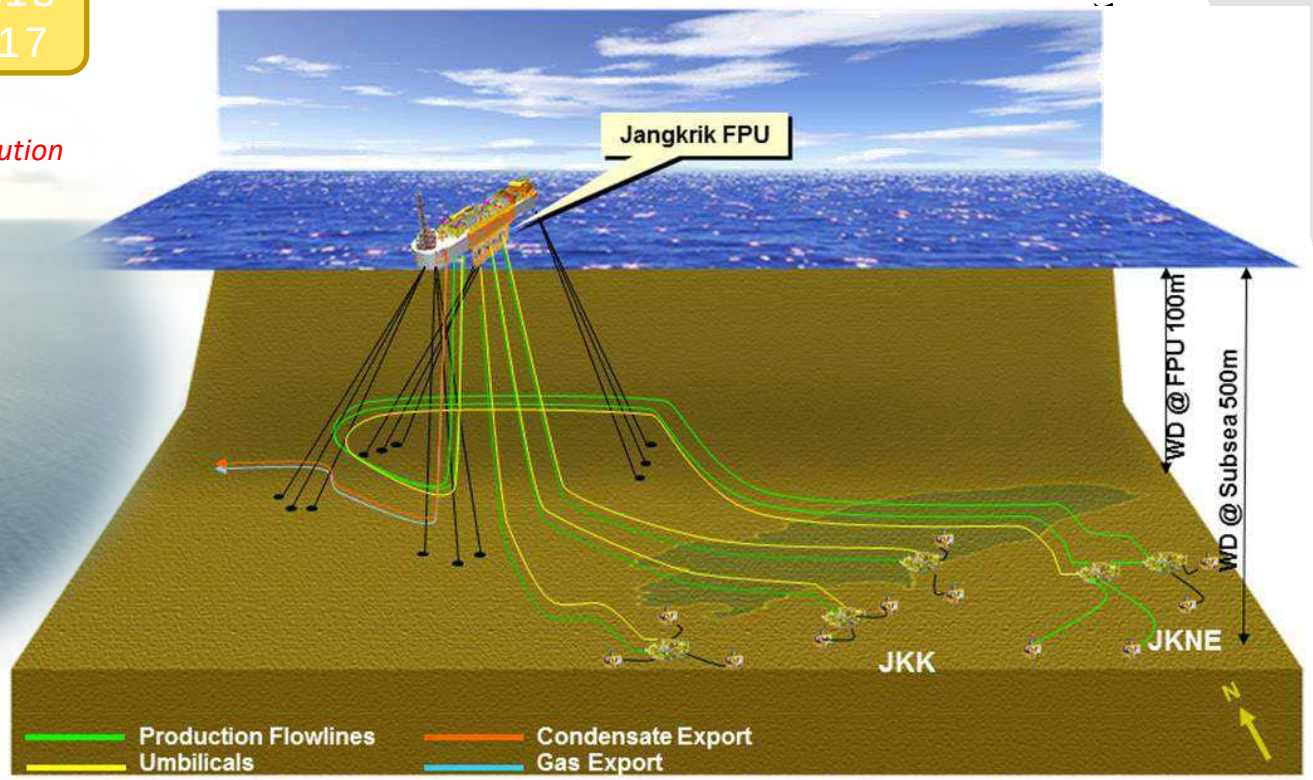
Jangkrik (Indonesia)

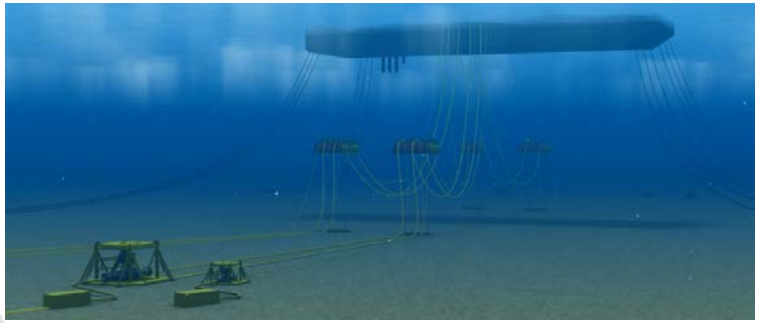
FID: Dec13
FG: May17

41 months execution

Project Summary:

- *Value: 2.5 B$*
- *Water Depth: 500 m*
- *11 Gas prod. wells*
- *5 manifold*
- *4 flexible risers*
- *Flexible and rigid lines*
- *4 Middle Water Arches*
- *Production and SSIV umbilicals*
- *Tie-back to FPU*





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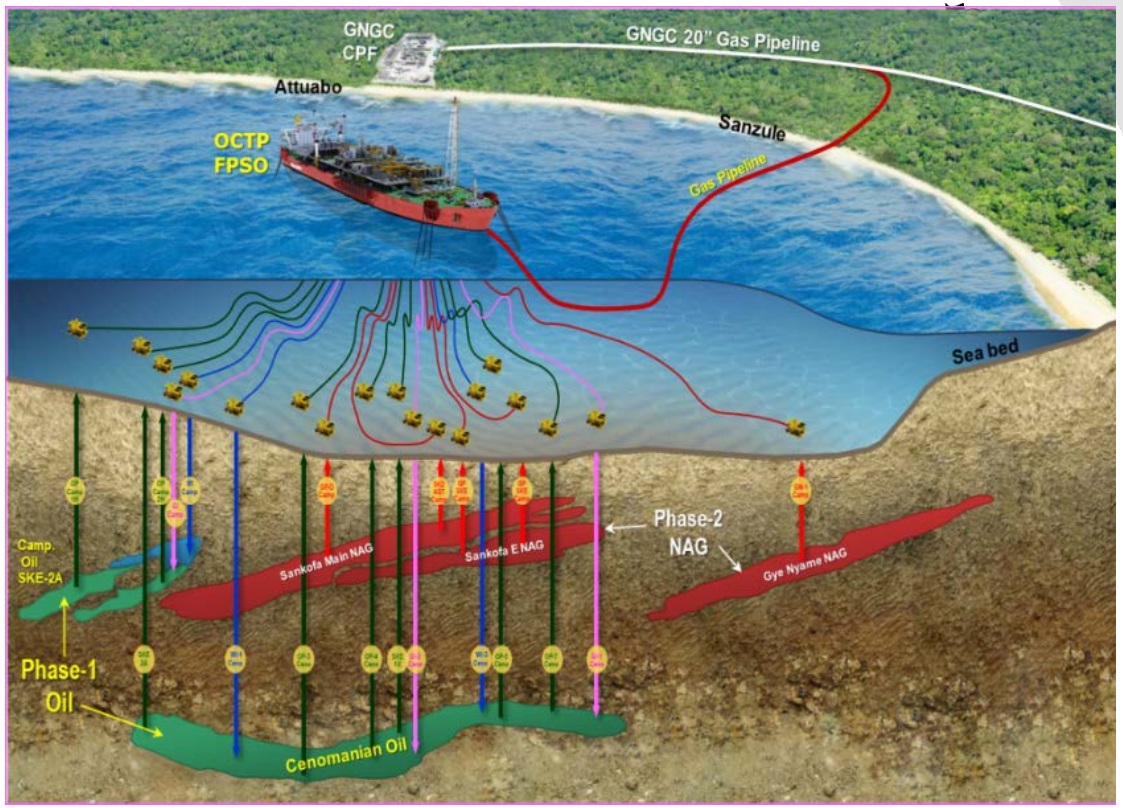
OCTP (Ghana)

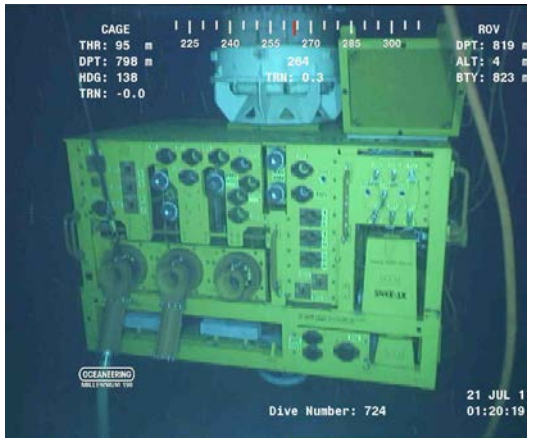
FID: Dec14
FO: May17

29 months execution

Project summary:

- *19 wells (8 OP + 3 WI + 3 GI + 5 Gas prod)*
- *Tie-back to spread moored FPSO*
- *Topside Oil and Gas production treatiment*
- *First Oil in just 25 months after contract award of SPS package!*





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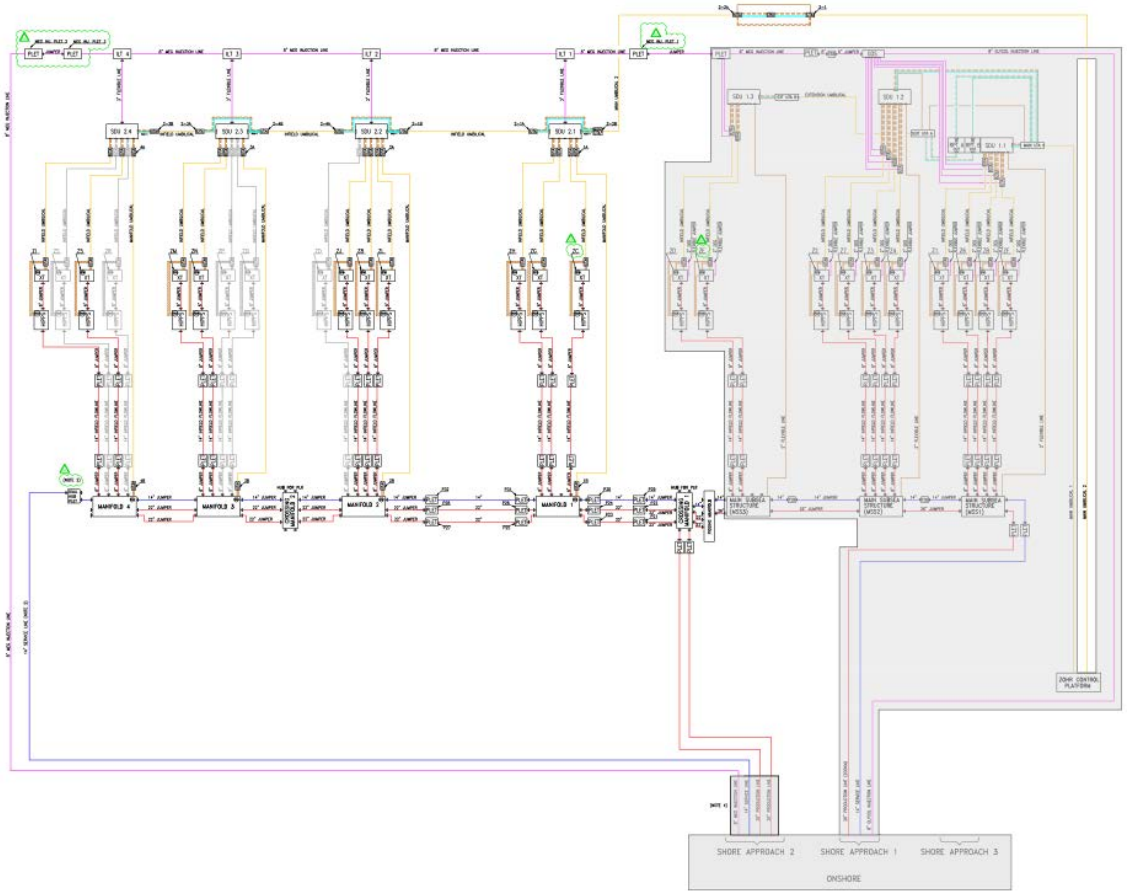
Zohr (Egypt)

Discovery: Aug15
FID: Feb16
FO: Dec17

22 months execution

Project summary:

- *25 gas production wells in total*
  - *10 accelerated start up (phase 1)*
  - *10 rump up to plateau (phase 2)*
  - *5 late life (phase 3)*
- *Subsea HIPPS per each well*
- *2 main umbilicals 160 km each from control platform*
- *7 production manifold manifolds*
- *2 crossing manifolds*
- *1 pigging manifold*
- *Receiving facilities onshore*
- *MEG injection from onshore facilities*



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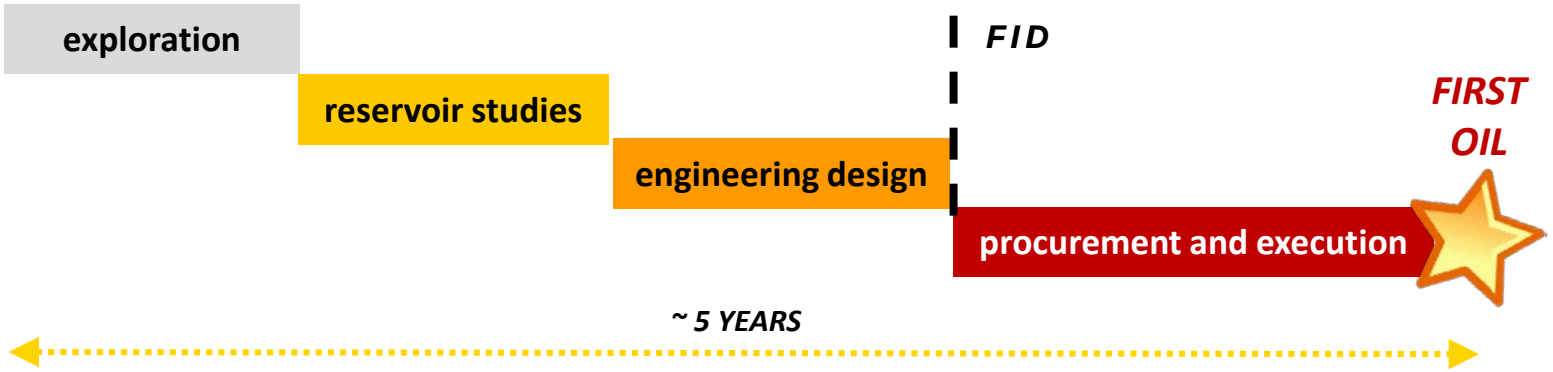
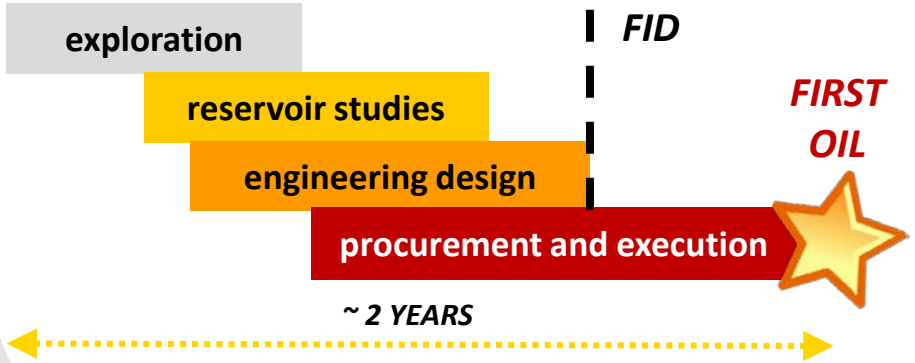
Develop efficiently subsea projects 1/3

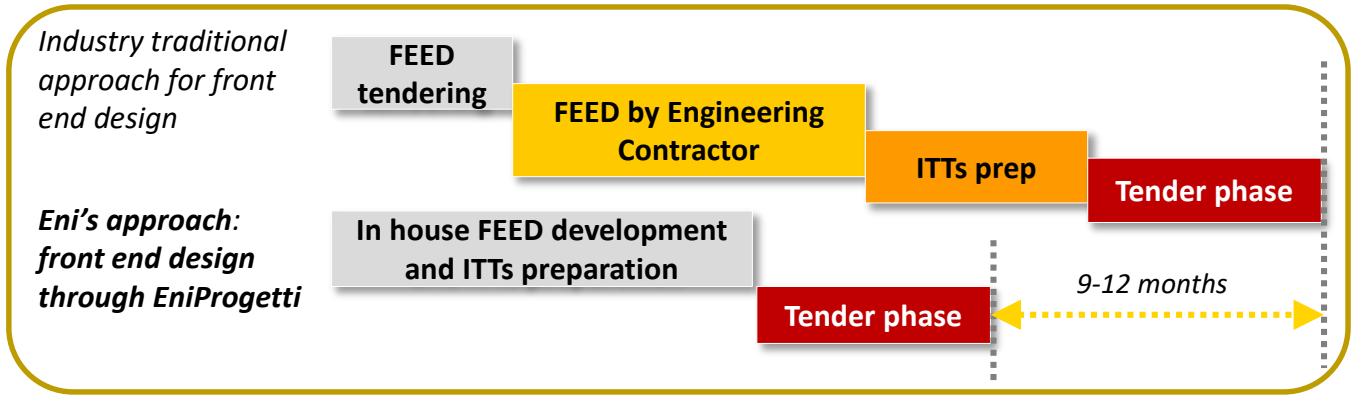
Traditional project schedule



Eni phased / fast track project schedule



- *Strong integration from exploration to start-up thanks to leading edge technology*
- *From a sequential to a parallel approach*
- *Project phasing to reduce subsurface risks*
- *3D reservoir models before exploration well for critical projects*
- *Continuous reservoir updates and scenarios' analysis*



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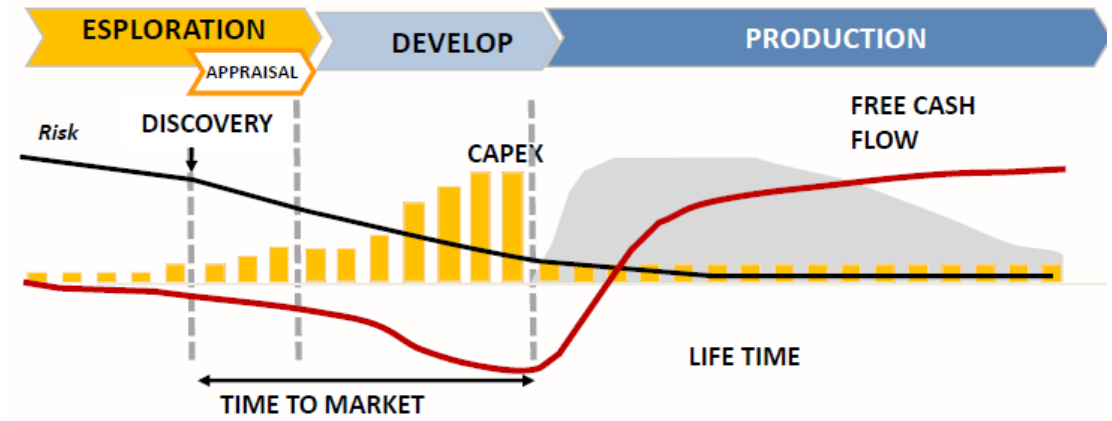
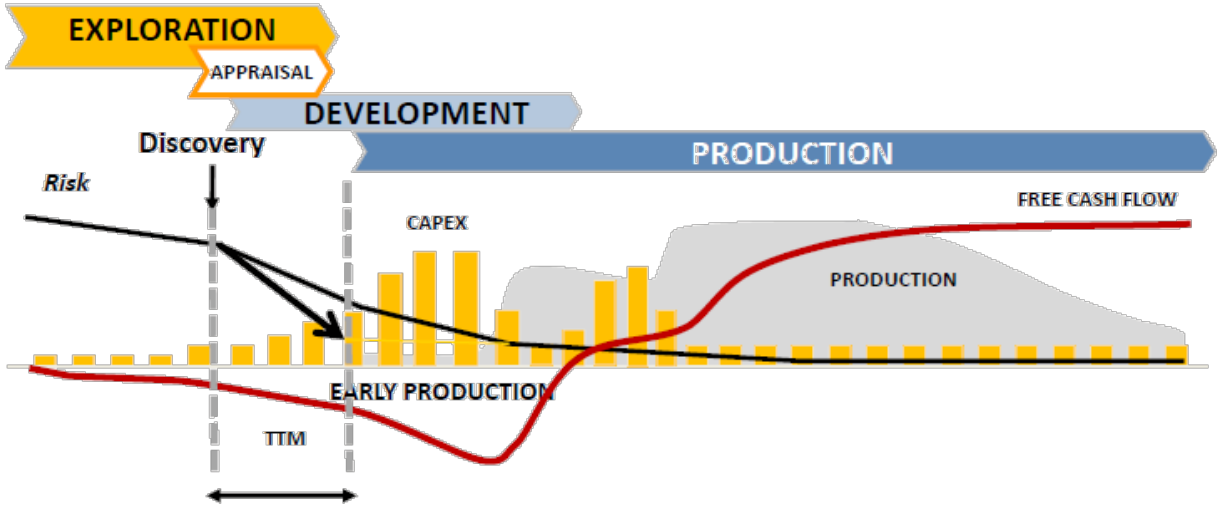
Develop efficiently subsea projects 2/3

Traditional project schedule



- *Exploration, Development and Production in sequence*
- *The upstream phases follow the exploration and appraisal period*
- *Negative cash flow last up to the first oil*

Eni phased / fast track project schedule



- Development starts in parallel to appraisal with maximum flexibility to handle any reservoir outcome.
- Cash flow anticipation due to anticipated early production to improve project profitability.
- Subsequent development phases still ongoing while previous project phases are in production.
- Time To Market minimized

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Develop efficiently subsea projects 3/3

All recent projects have one thing in common: having gone into production in record time. Projects implemented, or being implemented, thanks to significant savings in terms of both time and costs.

INTEGRATION BETWEEN EXPLORATION AND DEVELOPMENT

It is important to work in parallel. Already during the exploration phase it is possible to gather and **maximize the necessary information** to improve the engineering of the project and reduce the time to get to the final investment decision (FID).

All this is possible thanks to a combination of factors: technological elements and essential skills for the **management of uncertainty.**

DEVELOPMENT IN PHASES

This makes it easier to organize the production infrastructure. Projects are carried out step by step with the use of existing systems to anticipate cash flow and collect useful information for the definition of the final development plan.

This approach was successfully applied in the development of the Marine XII, Nooros, OCTP and West Hub production fields.

SYNERGIES WITH EXISTING ASSETS

The strategy of conduction exploration activities in the vicinity of fields in production (called **“near field exploration”**) and close to going into production (“**incremental exploration**”) enables Eni to maximise synergies with existing and future plant and infrastructure.

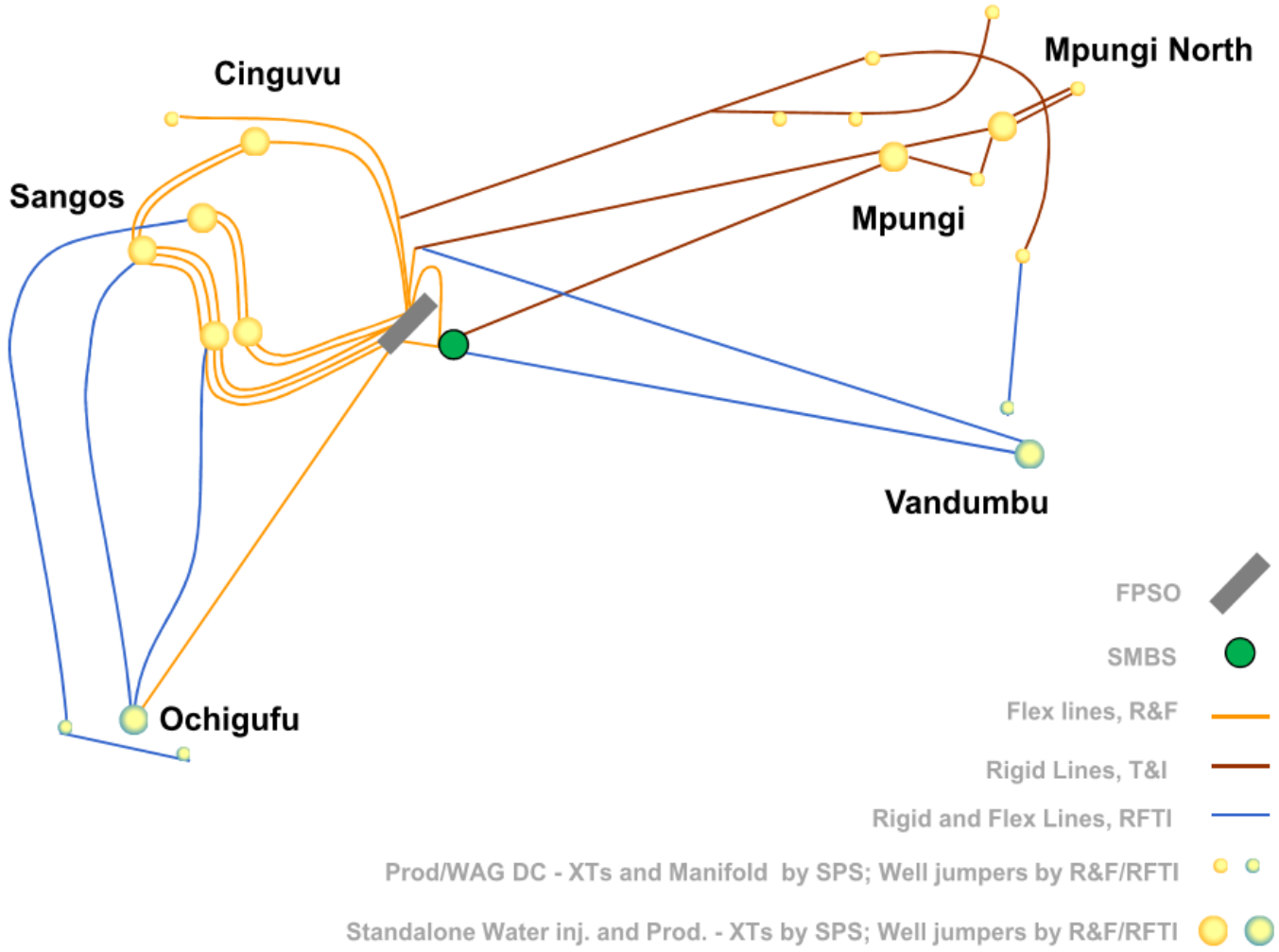
THE CONVERSION OF UNUSED ASSETS

As happened with a platform from the Gulf of Mexico relocated to the Marine XII field in Congo, the FPSOs of the three West Hub, East Hub and OCTP projects were built on the base of **fully converted oil tankers**, with **considerable savings in cost** and time compared with the construction of a new FPSO.

Conventional Subsea Architecture (oil case)

- *Angola West Hub Block 15/06 type*

- *Main features:*
  - *2 Headers manifolds*
  - *Service lines*
  - *Pigging loop*
  - *Short tie back distances*
  - *Massive chemical Injection*
  - *Standard Copper Comms/Power*



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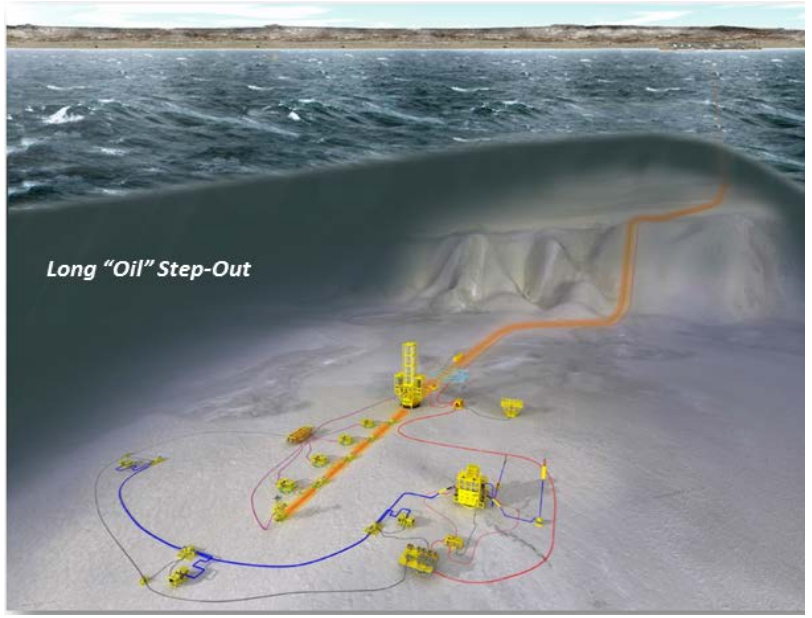
Long Step-Out Technology Challenges

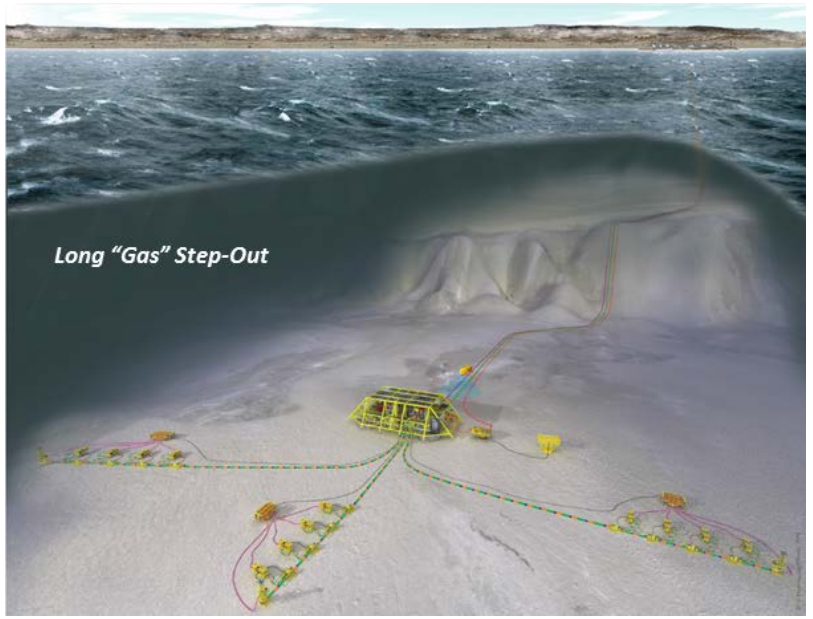
FLOWASSURANCE:

- *Low reservoir pressure and temperature*
- *High viscosity fluid*
- *Wax and Hydrate management*
- *Corrosion & Erosion*
- *Slugging*

ARCHITECTURE

- *Water transportation / Re-injection*
- *Long communication and power step-out*
- *Control Umbilical losses*
- *Cost and weight of umbilical*
- *Infield system preservation*





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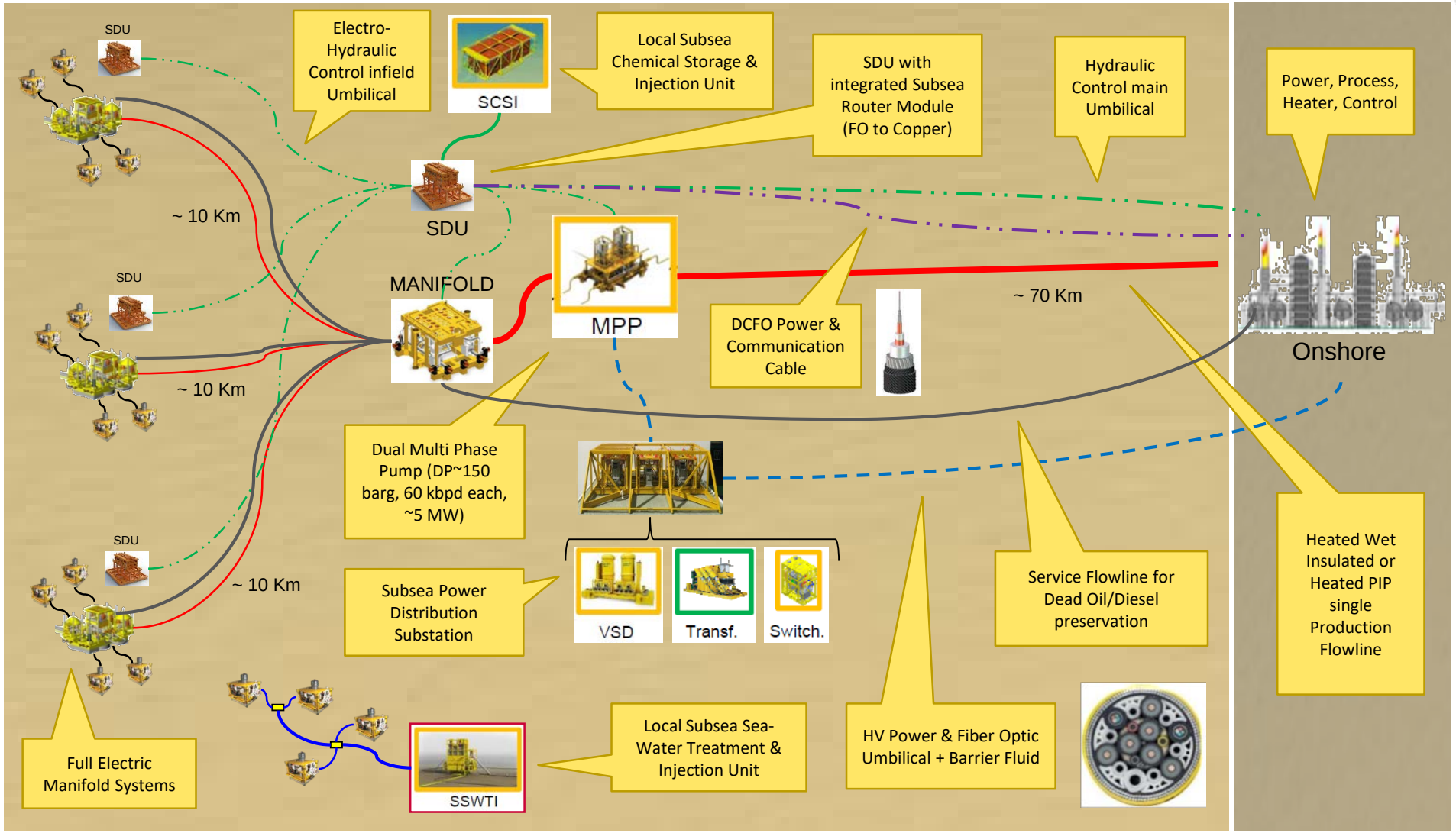
Long Step-Out Technology Enablers

Identification of technological needs/gaps and R&D initiatives to be promoted for the development of assets with very long offshore distances.

Future Steps:

- All electric XTs
- Subsea Power Gen
- Subsea Injection System
- Autonomous SCM
- Subsea Raw Water Injection



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Master Frame Agreement

Costs reduction *(range of 10÷20%)*

- *Alignment with international standards supplier's specifications*
- *Standardization of Company's requirements*
- *Cost saving due to Construction & Delivery optimization*

Time to market minimization:

- *ITT documents preparation*
- *Tender period*
- *Technical and commercial evaluation*
- *Construction & delivery ex-works*

Characteristics

- No "minimum commitment guaranteed"
- Area of Application: Worldwide
- Duration: 4 years + 2 optional
- Agreed T&C, Functional Specs, Unpriced Schedule of Price

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SPS

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AkerSolutions
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OneSubsea A Cameron & Schlumberger Company

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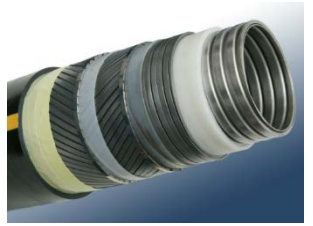

TechnipFMC
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BAKER HUGHES a GE company

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Standard eHXT

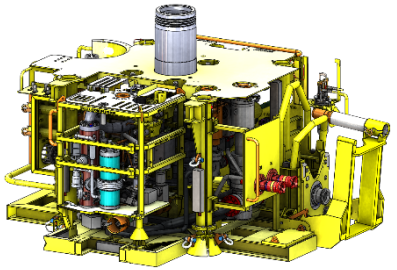
AkerSolutions TechnipFMC OneSubsea A Cameron & Schlumberger Company BAKER HUGHES a GE company

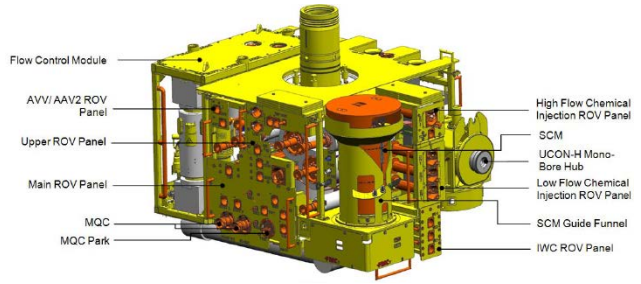
Goals:

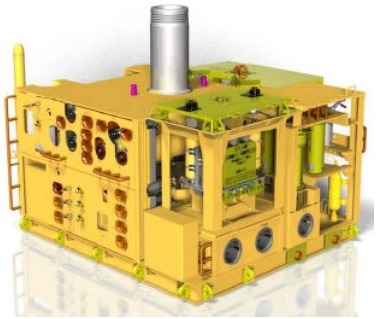
- *To define a design of a Xmas Tree that can be used for the future subsea fields development with minor / no modifications.*
- *To achieve future early production opportunities, having a standard XT System and related equipment ready to be quickly put into production and installed.*
- *Based on the existing MFWA specifications and agreements, using Contractor's standard and qualified components, quality and work process (i.e. ITPs, MRBs, ….).*

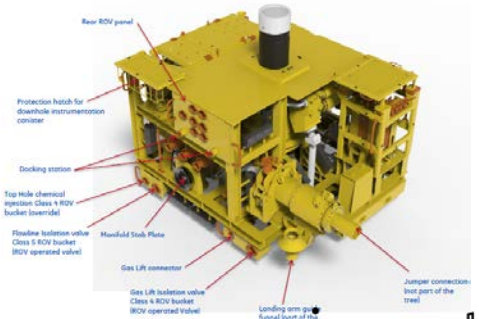
Expected Future Benefits:

- *Reduced Tender & Engineering Phases*
- *Reduced XT Delivery Time (12-14 months)*
- *Reduced XT Cost after few applications (-20%)*
- *Use of unused spare XMT(s) across other fields*









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