



**SWS**

上海外高桥造船有限公司  
SHANGHAI WAIGAOQIAO SHIPBUILDING CO.,LTD.

# Standardization of FPSO Design



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**SWS**

# Agenda



1 Introduction of SWS and SWS FPSO Experience

2 FPSO Market Outlook

3 Challenge of New Building FPSO

4 Way Forward - Standardization

# 1. Introduction of SWS and SWS FPSO Experience



**China State Shipbuilding Corporation (CSSC Group)**



**CSSC holding Ltd. 600150 listed in Shanghai Stock Exchange**



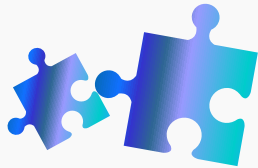
**Shanghai Waigaoqiao Shipbuilding Co., Ltd. (SWS)**



**SWS Shipyard**



**SWS Offshore**



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# 1. Introduction of SWS and SWS FPSO Experience



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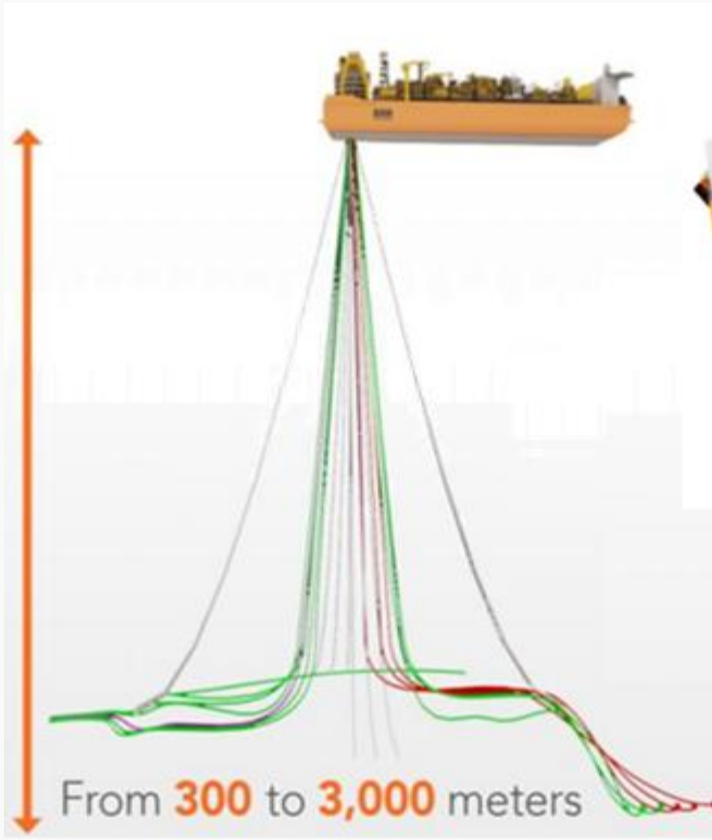


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# 1. Introduction of SWS and SWS FPSO Experience



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**4**  
**FAST WARD™**  
NEXT GENERATION FPSO



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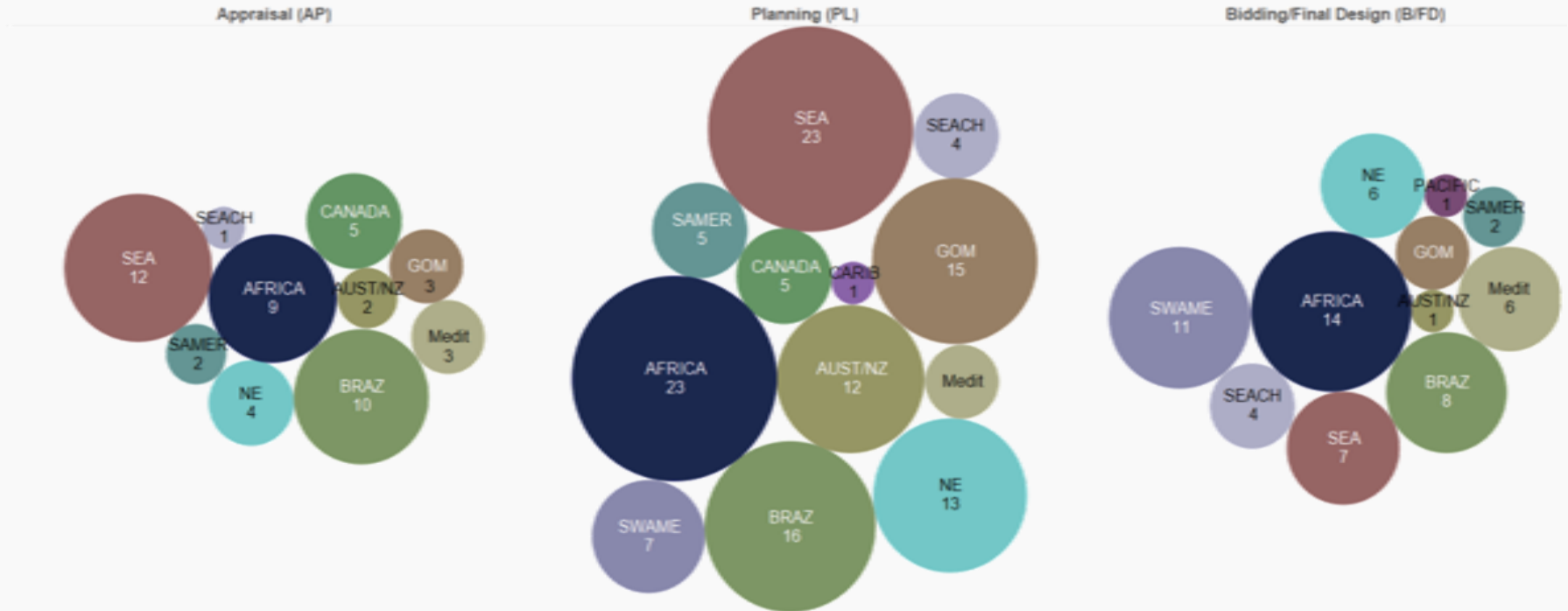
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## 2. FPSO Market Outlook



### Projects in Planning Process by Region

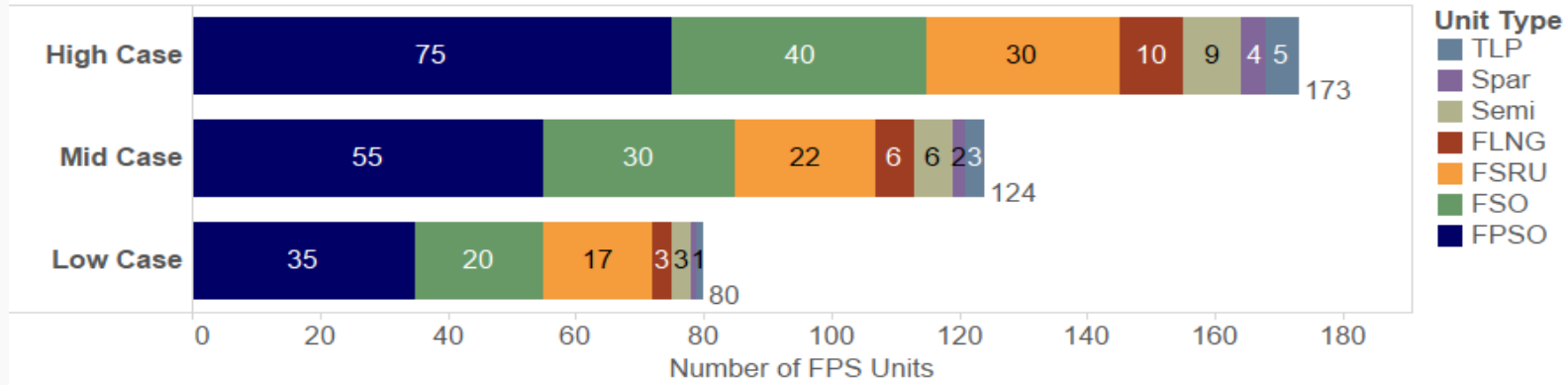


## 2. FPSO Market Outlook



### 2018-22 Forecast – 80–173 Orders over next 5 years

Forecast Order for All FPS Types 2018-2022  
(High, Middle, Low Case)



- Increased number of FPSOs (+5 units in mid and high cases)
- Increased redeployments
- FPSOs remain the largest segment

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### 3. Challenge of New Building FPSO

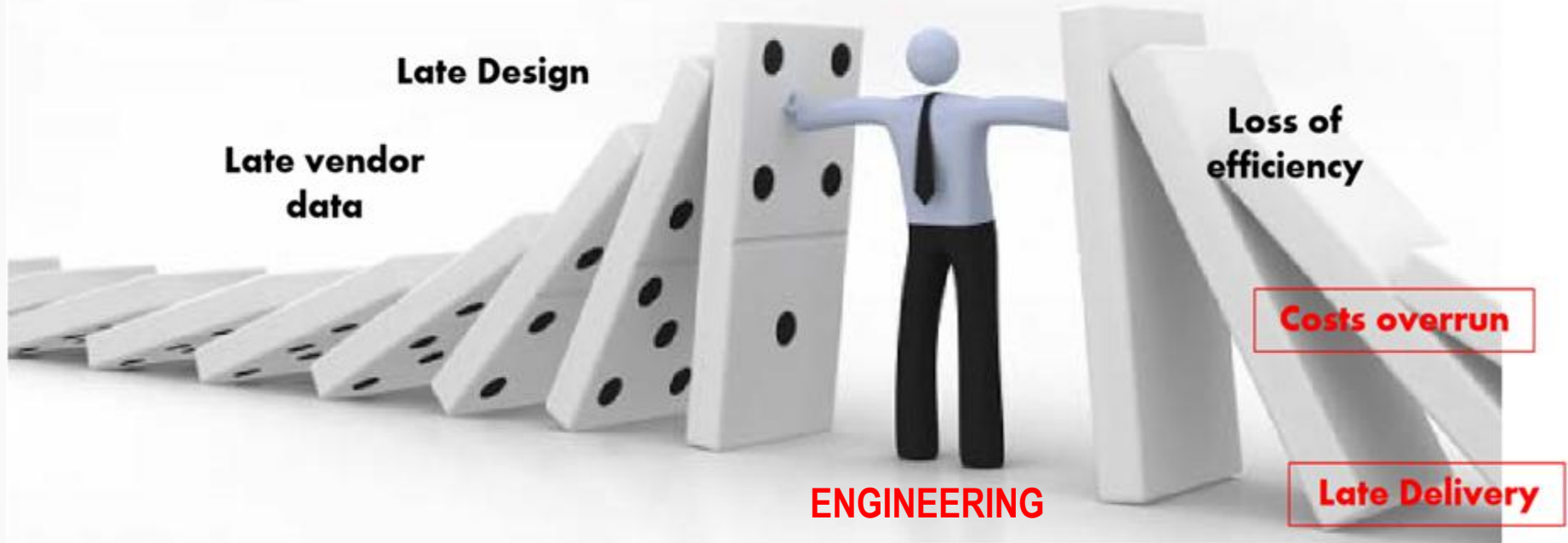


### 3. Challenge of New Building FPSO



- Pre-outfitting target missed
- Re-work

- Carry over work after launching
- Rework





Time and Cost always  
an issue for new  
building FPSO

### 3. Challenge of New Building FPSO



With the current market, demand of fast delivery and low construction cost became more and more important.

Conversion FPSOs are advantaged at the fast delivery and low construction cost.

But the conversion FPSOs have disadvantages in terms of maintenance after delivery and limitations on the topside load.

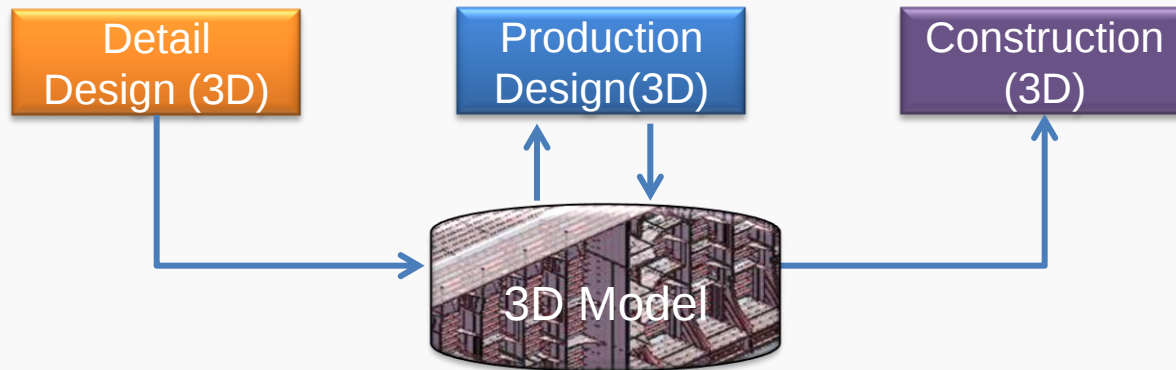
In order to meet the market requirements, standard FPSO have to be an solution for future.

### 3. Challenge of New Building FPSO



Designers and shipyards are trying to start the design in early phase in order to save time of the whole project. And by applying the STANDARD FPSO concept, the design can be wildly re-used for the future FPSOs.

Also the design method are improving rapidly to support the future standard FPSO concept.



### 3. Challenge of New Building FPSO



**IS STANDARD FPSO MUST BE MORE EXPENSIVE?**

The answer is **MAY NOT NECESSARY !**



**WHICH IS MORE EXPENSIVE?**

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## 4. Way Forward – Standardization



FPSO is on the critical path to first oil.

Reduced complexity and shorter schedules are key in reaching better safety, economics and lower risk for floating production solutions.

Although a fully standardized FPSO is not practical, there are **MANY OPPORTUNITIES TO STANDARDIZE** and accommodate the features.

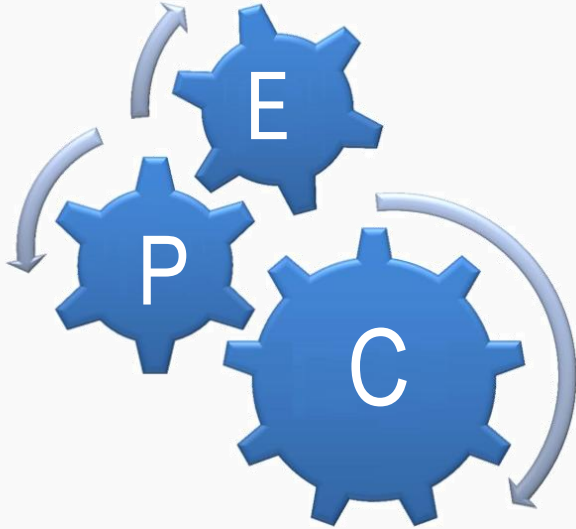
The key to an optimal layout is **MODULARIZATION**.

Standardization can **ACCELERATE** not only the **DESIGN PROCESS**, but also the **SUPPLY CHAIN** and **CONSTRUCTION** phase.

## 4. Way Forward – Standardization



Engineers shall think the design differently compare to the customized design. The design shall consider all the possible selected vendors/equipments.



The procurement of the equipment shall consider the delivery time of the equipments and exchange the delivery information even before the contract.

The construction method shall allow shipyard to fabricate the project with a very high peak load. This makes the selection the right shipyard became ultra important.

## 4. Way Forward – Standardization



Engineering Before S/C 14 m

Basic Design 4m

Detail Design 8 m

Construction Design 12 m

Construction-Hull 20 m

Topside Integration till 1<sup>st</sup> Oil 12 m

46 m



## 4. Way Forward – Standardization



Engineering Before S/C

Basic Design

Detail Design

Construction Design

Construction-Hull

Topside Integration till 1<sup>st</sup> Oil

4 m  
With Standard Hull  
Design



20 m

12 m

36 m

## 4. Way Forward – Standardization



Engineering Before S/C

Basic Design

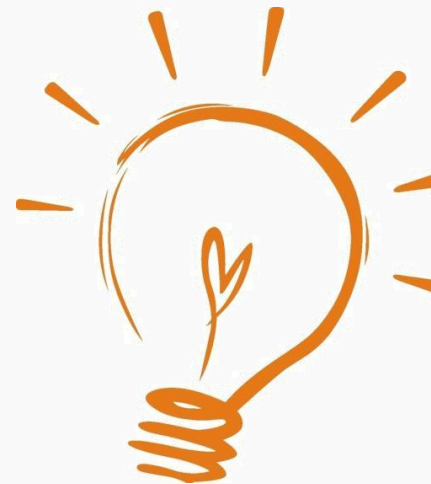
Detail Design

Construction Design

Construction-Hull

Topside Integration till 1<sup>st</sup> Oil

4 m  
with standard hull  
design



20 m

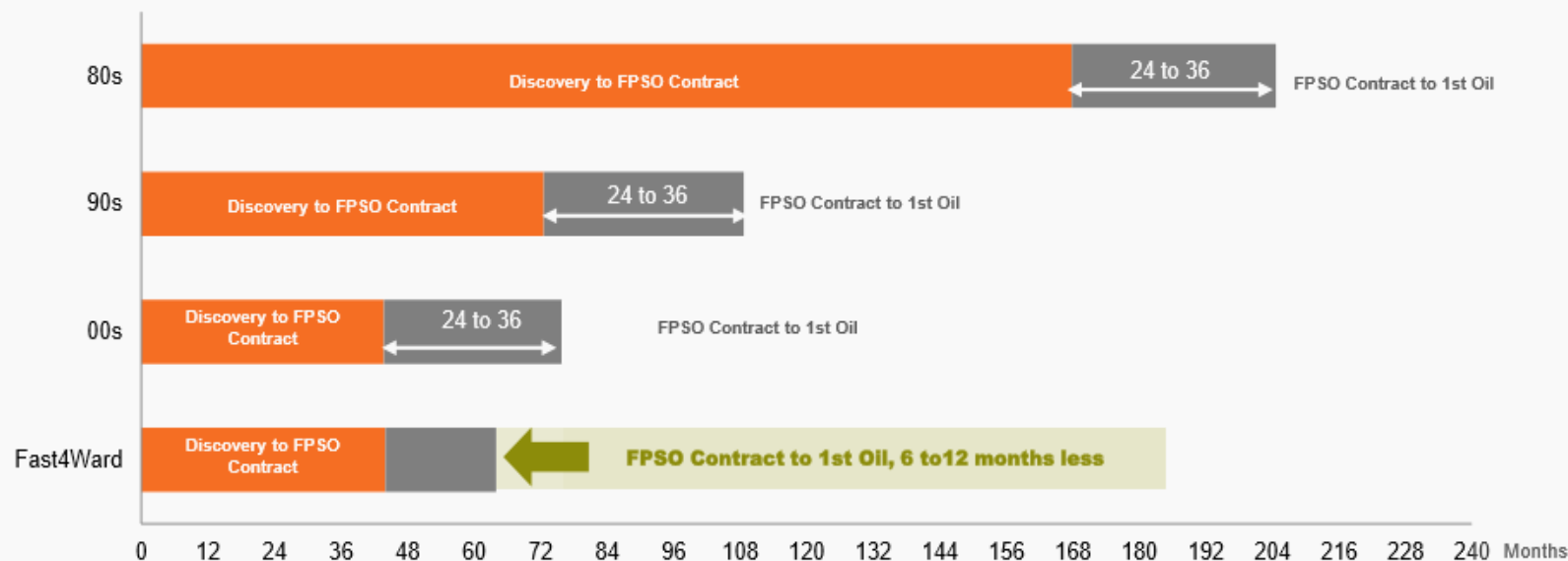
12 m

31 m

## 4. Way Forward – Standardization



FPSO PROJECTS BY DECADE OF DISCOVERY



Where the Fast4Ward model is applicable, this can result in **6 to 12 months gain** on a typical FPSO schedule

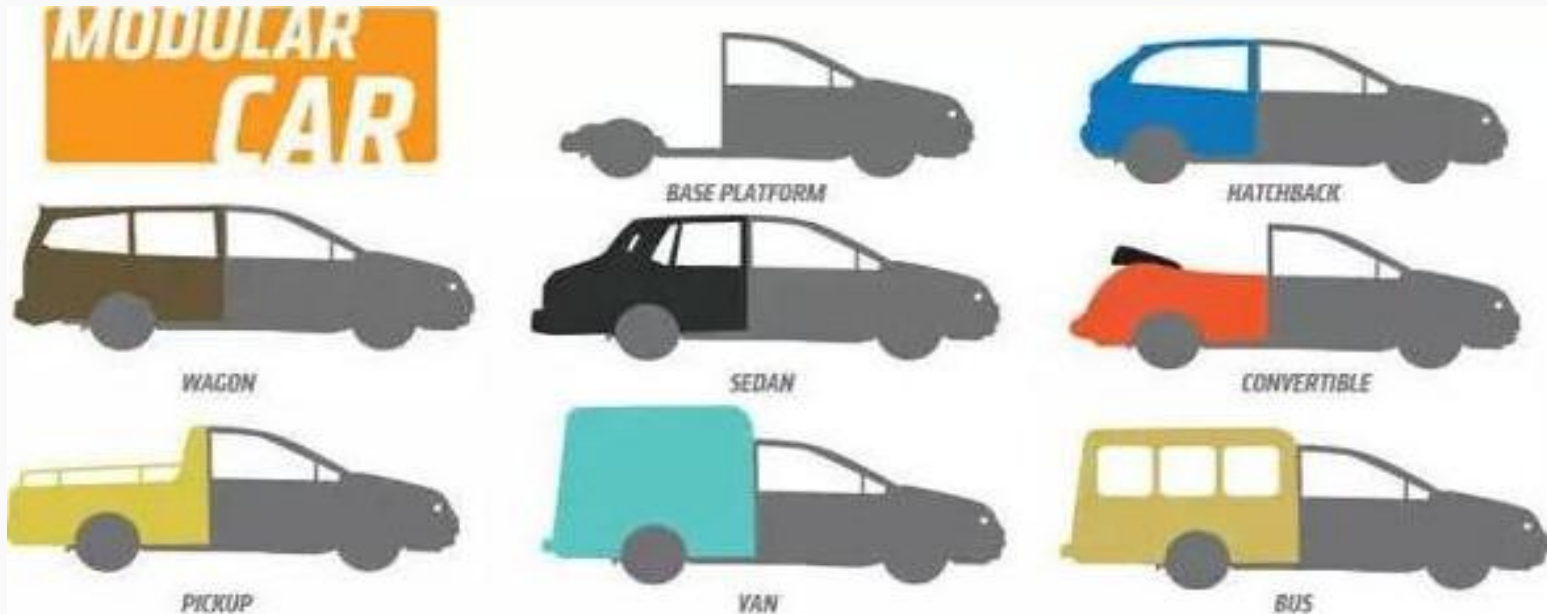


## 4. Way Forward – Standardization

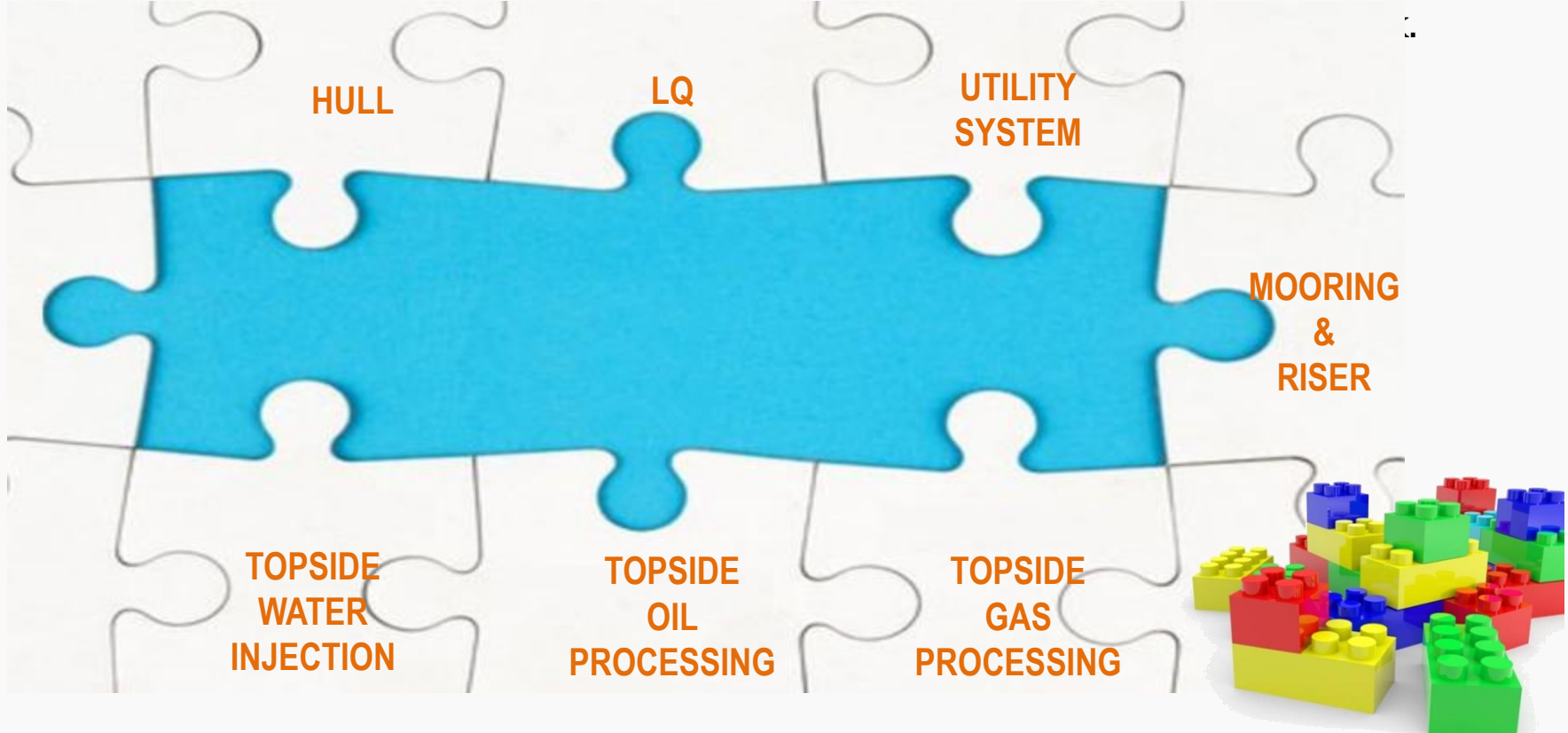


Modularization is the key approach to design/build the FPSO with fast track.

Modularization provide a possibility for the design flexibility with standardization concept.



## 4. Way Forward – Standardization



## 4. Way Forward – Standardization



Over design is normally selected during the standard FPSO design, but it create additional cost for the project.

With modularization concept, it will support shipyard to develop the design commercially competitive.

The whole project is divided into several area modules and are able to be integrated together.

Regional sensitivity analysis will also carry out in order to have a better principle of area modularization.

| Forward Part    | Middle Ship |            |              |        | Aft Part | LQ |
|-----------------|-------------|------------|--------------|--------|----------|----|
|                 | Main Deck   | Side Shell | Inner Strut. | Bottom |          |    |
| Spread Mooring  |             |            |              |        |          |    |
| Internal Turret |             |            |              |        |          |    |
| External Turret |             |            |              |        |          |    |

## 4. Way Forward – Standardization



In order to save construction time, the different area is better to be parallel build in different shipyard.

The forward and after area normally not heavily rely on automatic welding machines like middle ship. It is better to be build in a separate yard.

The living quarter is built with thin steel plate and need different building method is better to be built with special skills. As LQ is the key path of the project, it is better to build the LQ with single lift of integration onto the deck.

## 4. Way Forward – Standardization



Sequential Construction

Forward Area



Middle Ship



After Area



Living Quarter



Integration



## 4. Way Forward – Standardization



Parallel Construction

Forward Area



Middle Ship



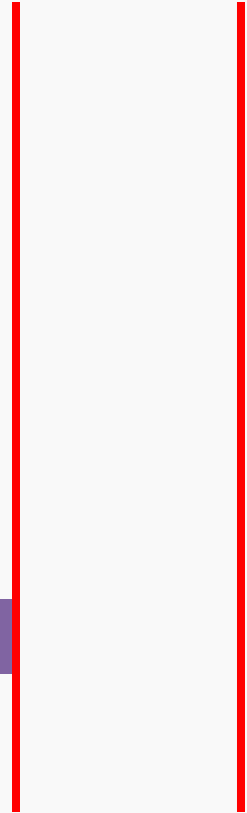
After Area



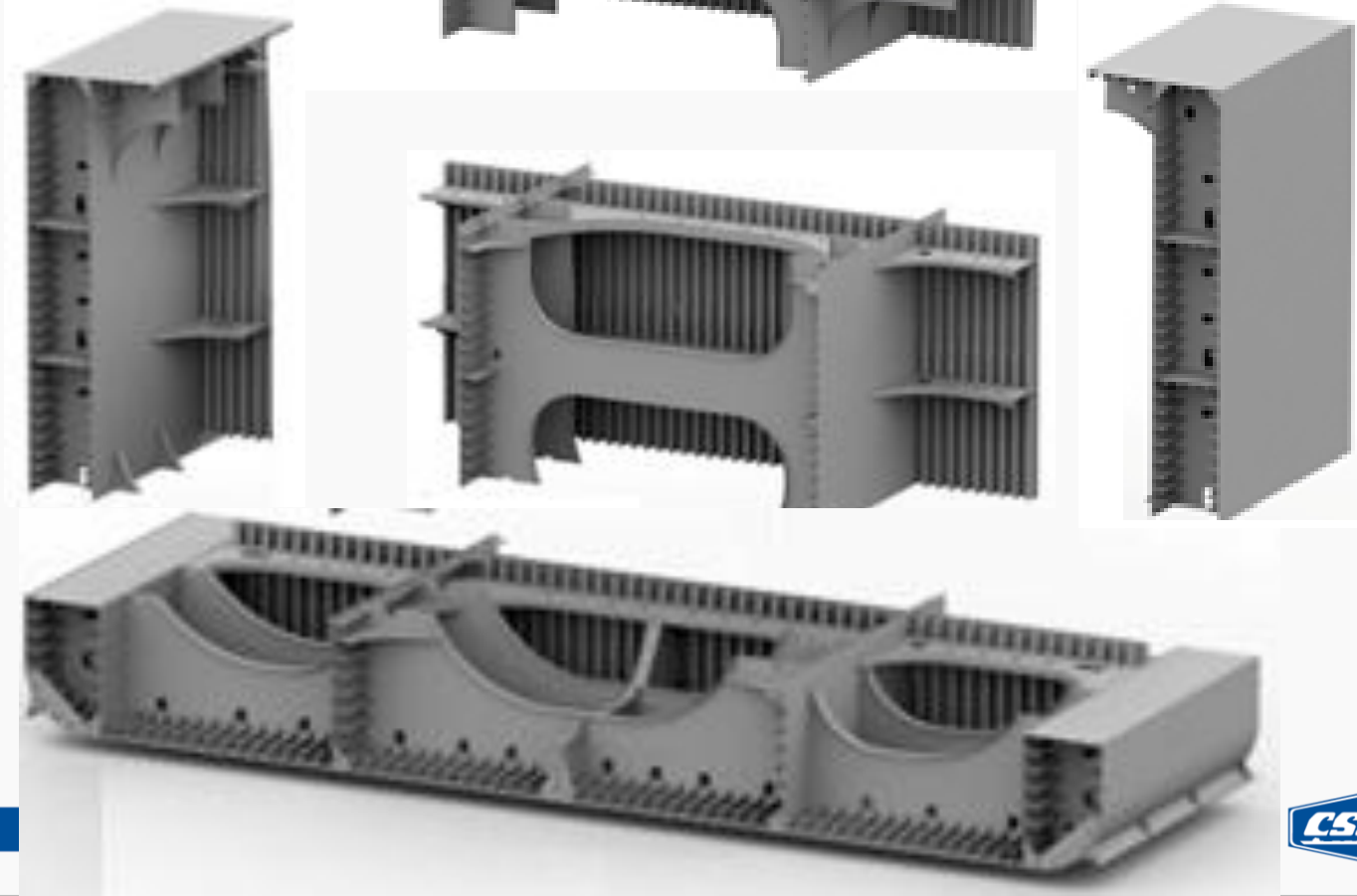
Living Quarter



Integration



## 4. Way Forward



## 4. Way Forward – Standardization





# THANK YOU

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