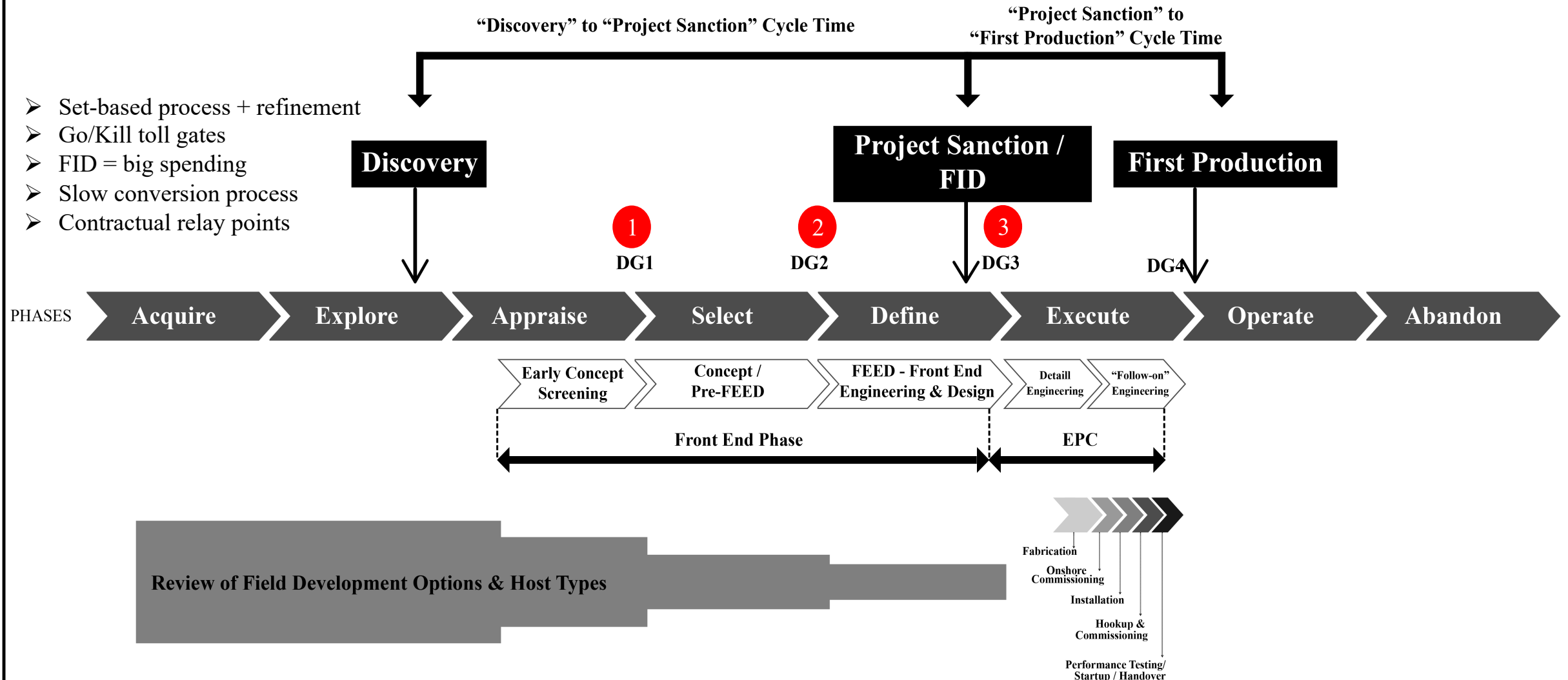


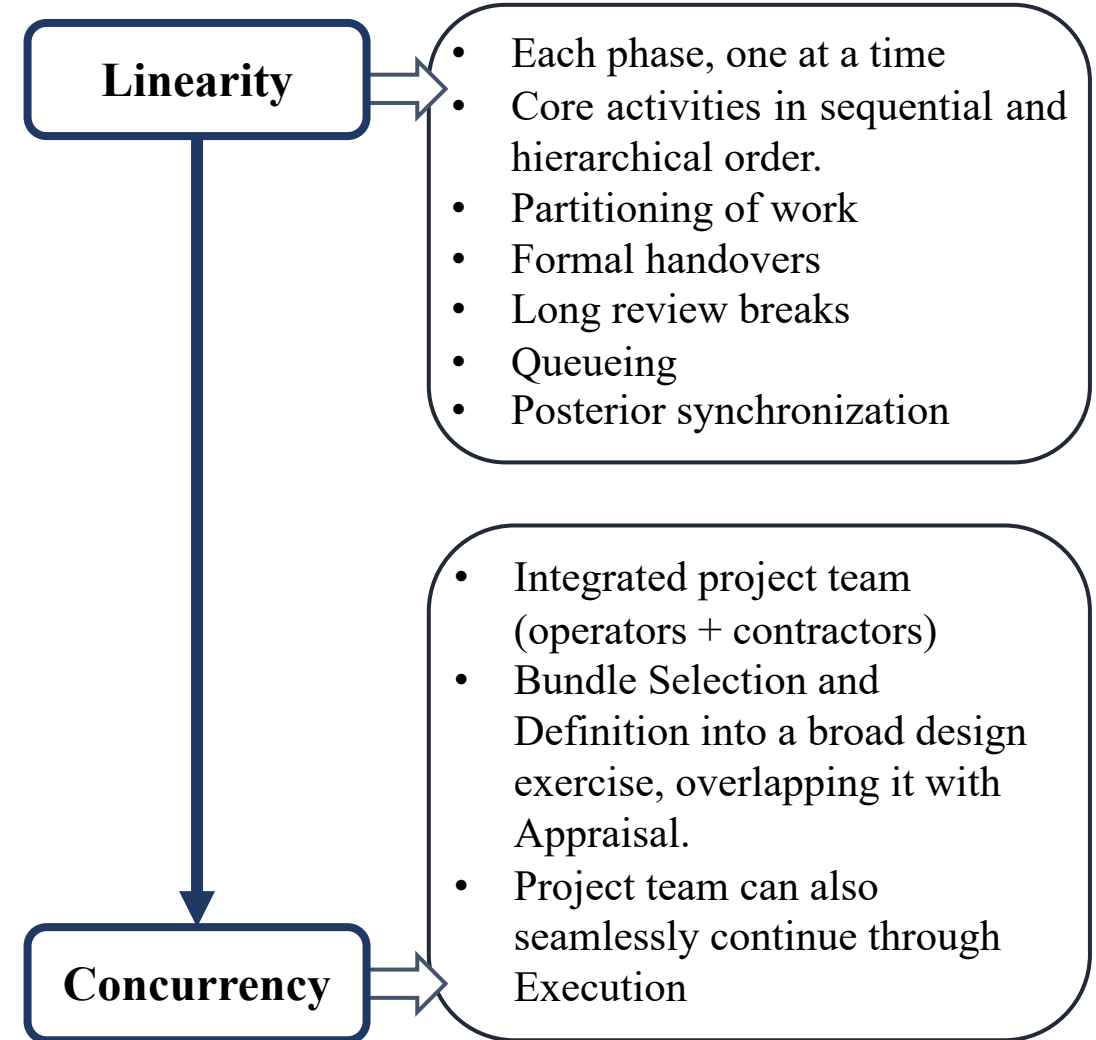
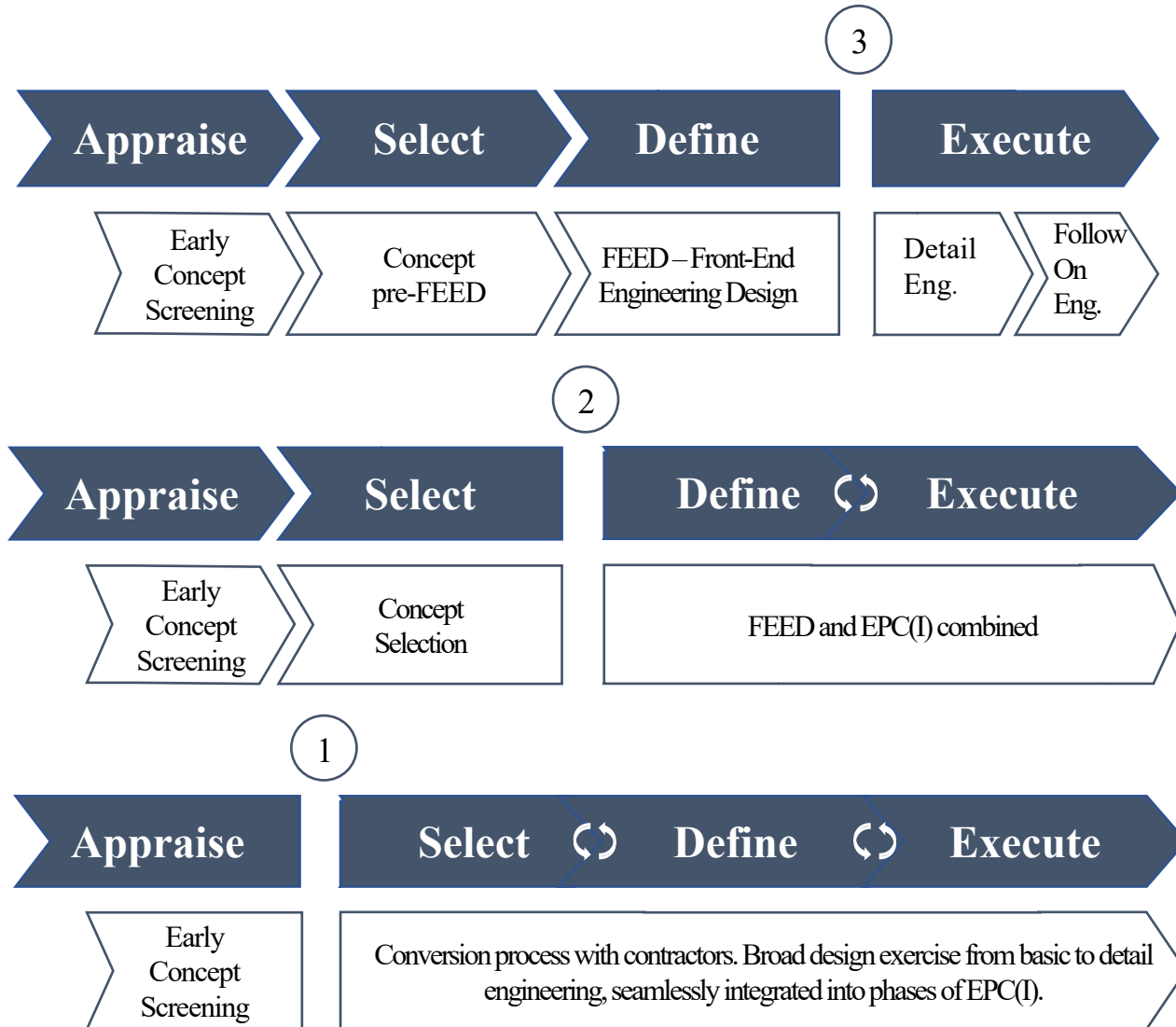
Inter-firm collaboration at the Front-End phase

Typical Deepwater Oil & Gas Field Life-Cycle Phases

Pinho Filho & Ryggvik, forthcoming



When to integrate EPC contractors



Concurrency

- Project Management buzzword of the 90s
 - Execute design tasks simultaneously
 - Overlapping phases of development
 - Integrating team members with different functional backgrounds, so they could exchange information back-and-forth, without handoffs or relay points.
- Specialists from different areas were expected to bring forward strategic issues that would otherwise be addressed only at ensuing stages of product development. In return, alternatives generated elsewhere would force another round of adaptation, modifying and adding solutions mid-course. Design would progress through many iterations.
- Oil&Gas = Alliances and Partnerships approach
- FPS development (newbuilds and conversion)
- Less duplication, less contractual interfaces

Different economics / favors different business models

To increase net present value with interfirm collaboration at the front-end

X

To secure the best commercial rates, while extracting only the core specialization of contractors

- + predictability in the execution
- better understanding of schedule and cost drivers, materials, technology application
- Procuring long lead items
- Save time that is usually lost in producing the documentation with requirements, doing the tender and then going over a process of technical clarification that costs many engineering hours.

Hardly the cheapest contractors in the market, but they have decades of experience in developing technologies and delivering projects for the industry, which enables them to enhance its economics in different ways.

Can integrate project management services with fabrication, late phase engineering and operational support.

Combination of yards + technology centers + marine equipment, and consulting roles + field development studies + early concept selection.

- Ambiguous/generalized design that do not favor any specific solution that could lock them out of a broader competition for the construction work.
- More attractive when operators have a big organization to oversee all interfaces and streamline the process.

Engineering houses to provide technical assistance, benchmark concept solutions and technologies, and have vast experience in framing the project within the requirements of operators.

Contractors that are not specialized in conceptual and design work but have an aggressive pricing approach to execution. That way they managed to dominate the floater fabrication and conversion market in the last decades, building topsides and hull.

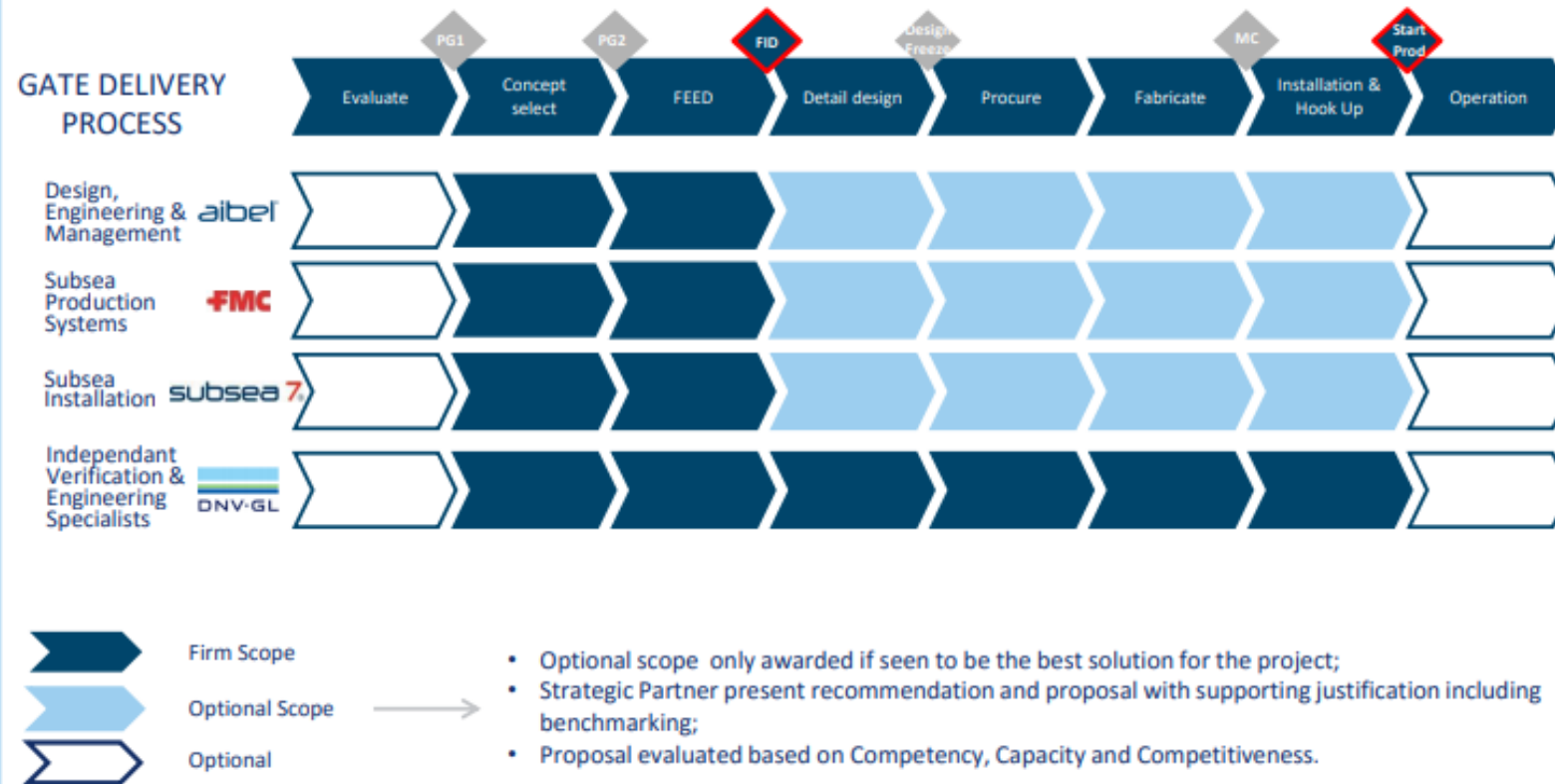
Lessons from Norway / Context

- Similarities in Projects Sanctioned worldwide:
- Big Fields:
 - Trimming costs with re-engineering
 - Phased Developments
 - Standardization
 - Design One, Build Two
- Smaller Fields:
 - Subsea tiebacks
 - Wellhead platforms

Collaboration as key

- Johan Castberg and Johan Sverdrup heralded as a product of close collaboration with local supply chain
- Modest and less experienced organizations entering the market to develop smaller fields, relying almost entirely on supplier-led solutions (Fenja, Oda, Nova)

Strategic Partnerships – Scopes of Work



Norwegian contractors

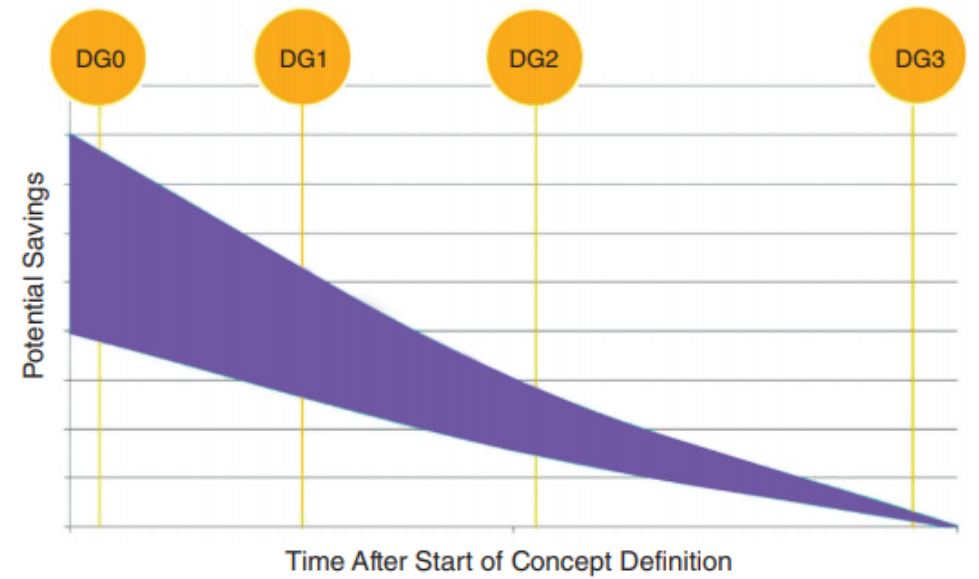
- Decades-long experience in delivering full projects.
- Broad portfolio of technologies, human capital and services, and from a project management perspective, they can integrate work that goes from design to fabrication, to operational support.
- Competitive edge does not come from prices, their main interest is to avoid lower-cost bidding and promote their business model, more focused on creating value through collaboration, fit-for-purpose technologies and asset integration.
- The values of integration are promoted by them as essential to make projects be economical and profitable against other energy projects, and to compete with low-cost fabricators and contractors with same competencies.
- Some of them are capitalizing on their expertise as manufacturers to develop more configurable equipment, so they can get in early, customize and start procuring and fabricating before all design decisions are made.
- If they have vessels for installation, then they claim to offer better forecast for schedule drivers.
- The ones that have proprietary technology use it in conceptual studies to assess their performance.
- And all of them advertise their front-end capabilities to help operators reach their cost targets and save time that is spend on moving the work from group to group.

TRADITIONAL EPC CONTRACT STRATEGIES (36 months from start FEED to 1st Oil)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44
FEED								Tender				EPC Contract Execution																				Offshore				1st Oil							
Performed by FEED contractor								Tender FEED verification Negotiations EPC contract				Detail Design (E) Procurement (P) Construction (C) Scope of work: Platform mechanical complete (MC) and ready for sail																				T&I HUC & Comissioning Tie-In											

ALLIANCE EXECUTION SCHEDULE (29 months from start FEED to 1st Oil)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44
FEED (7)							MLC Onshore Execution Phase (18)																		Offshore (4)				1st Oil														
Performed by the Alliance MLC agreement in parallel Detail Design for LLI Detail Design for early MTOs							Earlier design freeze due to design work performed in FEED phase Earlier fabrication start Earlier start onshore comissioning – reduced work offshore Less time consuming routines for comments, approvals, correspondence, etc.																		T&I HUC & Comm Tie-In				NPV value creation														



Source: Forsys Subsea (an FMC Technologies)

DG—decision gate

