Shell Petroleum Development Company of Nigeria

Classification Status: Restricted

September 2021 SCiN-2021-08-00000038

SCiN Reshape Initiative

80-20 HCM Framework for Drill to Fill (D2F) Program Guidance Note: HCM Process Scaling

Revision History

Revision No.	Date of Issue	Reason for Change
R01	15 July 2021	Issued for Review
R02	26 July 2021	Revised abridged version for review
R03	02 Sep 2021	Issued for Use

Revision Philosophy

All revisions for review will be issued at R01, with subsequent R02, R03, etc. as required.

All revisions approved for issue or design will be issued at A01, with subsequent A02, A03, etc. as required.

Documents approved for Construction will be issued at C01, C02, and C03 respectively.

All Detailed Design documents for review shall be issued at D01, with subsequent D02, D03, etc. as required

Revisions approved for Tender will be issued as T01, with subsequent come as T02, T03 etc.

All revisions approved for Purchase will be issued as P01, with subsequent P02, P03, etc.

All Cancelled documents will be issued at X01, X02, and X03 respectively.

Documents or drawings revised as "As built" will be issued as Z01, Z02 Z03 etc.

Narrative sections revised from previous approved issues are to be noted in the table below and/or highlighted in the RH margin (using the appropriate revision status) thus: | A02

Previous revision details to be removed from the cover page at subsequent issues

Drawings/diagrams revised from previous approved issues are highlighted by 'clouding' the affected areas and by the use of a triangle containing the revision status.

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1 Introduction

This guidance note describes the *"competitively scaled"* ORS process and Hydrocarbon maturation (HCM) framework for "Drill to Fill" (D2F) program (>60% of SCiN Portfolio in OP20) which is aimed at supporting SCiN to meet the challenge of getting to Beyond Point C.

The aspiration is to become more efficient in maturing projects leading to a reduction in **DG1 to OSD cycle time to less than 4 years by 2025**, as well as **DG3 to Spud cycle time within 18 months** without impacting the quality of opportunity maturation and project delivery nor loading more maturation work to the pre-DG1 stage. However, the timeline for individual project shall still be determined based on the complexity and risk profile of each project.

This process is the **default starting point** and approved for all projects under the D2F program. Project teams **do not need individually approved deviations** for any of the ones that are approved as per this note. There may be cases where further scaling or adding controls/assurances/process steps is value adding, which remains the accountability of BOM/DE, when required with advice from DRB member and Technical Authorities.

Subsequent revisions of this document may be issued to include compliance updates to the ORS, PMF, GWDP, etc. and/or recommend further HCM process improvements, but it is expected that the overall framework will not change. Project teams are encouraged to feedback suggestions to the process owner.

The PMF, ORP, GWDP and DCAF processes together form the ***"80 – 20 HCM Framework"*** for D2F program". These processes encourage risk-based scaling and emphasize that the activities performed by the project team should be risk-based and outcome-focused. With that aim, this scaled framework and process steps described in this note are based on the principles of competitive scoping, i.e. to start with a minimum level of controls & assurance and then to justify controls and/or assurances based on value or risk mitigation.

The recommended scaled HCM framework for D2F is summarized in Figures 1 and 2 below which can be used by FEDM (Project Lead)/BOM/DE to further discuss the options and agree the Decision Based Roadmap, including controls and assurance, at DG1. The FEDM (Project Lead)/BOM/DRB/DE are still expected to own the scaled process and all the requirements, controls and assurances that are agreed for the project and to ensure that the scaled process is justified for their project.

Functional Requirement		Functional Options Table				Recommended Option
		MTS	Other Options			
ORS	Stage gated decision process	DG4 Only	DG1 – DG4	**DG1 – DG3 – DG4**	DG1-DG2-DG3-DG4	One Assess-Select HCM Framework enables maximizing the use of standardization and improving maturation efficiency in a proven basin
	Risk Management	Portfolio Level Risk Register Only	**Portfolio Level Risk Register + Project specific add-ons**	Project Level Risk Register		Active risk management across all ORS phases
	Stakeholder Management	Portfolio Level Stakeholder Management Only	**Portfolio Level Stakeholder Management + Project specific add-ons**	Project Level Stakeholder Management Plan		Active stakeholder management across all ORS phases
	Project Controls and Assurance Plan	None	**Standard PCAP across all ORS phases**	PCAP creation per ORS phase		Standardised PCAP template for project under D2F program is available with rationalized RTA assignment, eliminating the need for multiple PCAP creations for projects. A project specific PCAP with FEDM/BOM ownership is still required & to be revisited from the standard template at the start of each phase.
	Opportunity Framing	None	Pre-DG1	**Pre-DG1 + Re-framing if changes to mandate**	Re-framing at start of each phase	Use opportunity framing post DG1 to align stakeholders on opportunity mandate, value drivers, risks and a quality decision-based roadmap
INTEGRATED ASSURANCE EVENTS (OAP)	Opportunity Assurance	Only before DG4	Assurance reviews at end of each phase	**At end of Asses-Select & Define phase**		Self-Assurance Reviews (SAR) shall be undertaken in combination with Integrated Technical Reviews (ITR)
	Business Assurance	PER Only	CEF + PER	**CR + CEF + PER**	CC + CR + CEF + PER	Competitiveness Review (CR) at end of Assess – Select Phase; Competitive Execution Framework (CEF) at the end of Define Phase; Project Execution Review (PER) prior to field mobilization for major construction
	Integrated Technical Review	None	Combined ITR and WRB in Assess-Select Dedicated WRB in Define Only	Combined ITR and WRBs in all phases	**Separate ITR**	Internal functional reviews of key deliverables should be completed preceding the ITR. All Stakeholders alignment workshops such as Concept Select, CP Strategy, Deep Dives etc. should be completed before Internal Functional Reviews leading to ITR.
	Well Technical Reviews				**Separate Well Technical Reviews**	Wells Concept Design Endorsement in Assess-Select Phase, Well Proposal in Define Phase, Well Program in Execute Phase
	Integrated Well Trajectory Session (IWTS)	None	**Yes**			Maintain IWTS; Separate Well Concept Design Endorsement session to be held with TAs post IWTS and associated action close out
	Integrated Reservoir Modeling (IRM) & Technical Peer Assists (TPA)	None	**Yes**			Single phase IRM process in One Assess-Select Phase. Combine TPA1 & TPA2 as part of Static Peer Assist whilst separate TPA3 for Dynamic Peer Assist
PMF	Expected practices & controls	None	**Fully risk based – meeting intent of controls at Portfolio level and treating at project level**	All controls met at either portfolio level or at project level	All controls met at individual project level	The recommended scope is a combination of deviations (where risks do not apply for Drill to Fill portfolio of projects), meeting the intent at portfolio level (where risks and treatment are common across the portfolio) and treating at project for project specific level controls (for project specific risks)

Legend: Old Ways of Working New Ways of Working – Post Aug 1'21

Figure 1: Competitive scaling of ORS, OAP, PMF and DCAF components

2 80-20 HCM Framework

The Scaled HCM Framework shown in Figure 2, highlights key activities/decision, PCAP Master Controls and assurance events from DG1 to OSD.

Important to note is that one of the critical success factors for projects to achieve an optimized schedule is to have ways of working such that a Natural Team (co-located or virtual) working on the project from end to end, eliminating the need for handovers in the process. Projects generally enter the drilling sequence as part of the annual Business Planning cycle. The DE is accountable to ensure that the project is robust enough prior to entering the firm sequence.

The projects to be included in the plan as **"in-plan"** are assessed considering the following screening criteria:

- **IRR > 18% (including projects that have a credible pathway towards an IRR of 18% or better)**
- **BEP < $40/bbl**
- **Payback by 2035 for oil and 2040 for gas**
- **VIR > 0.5**

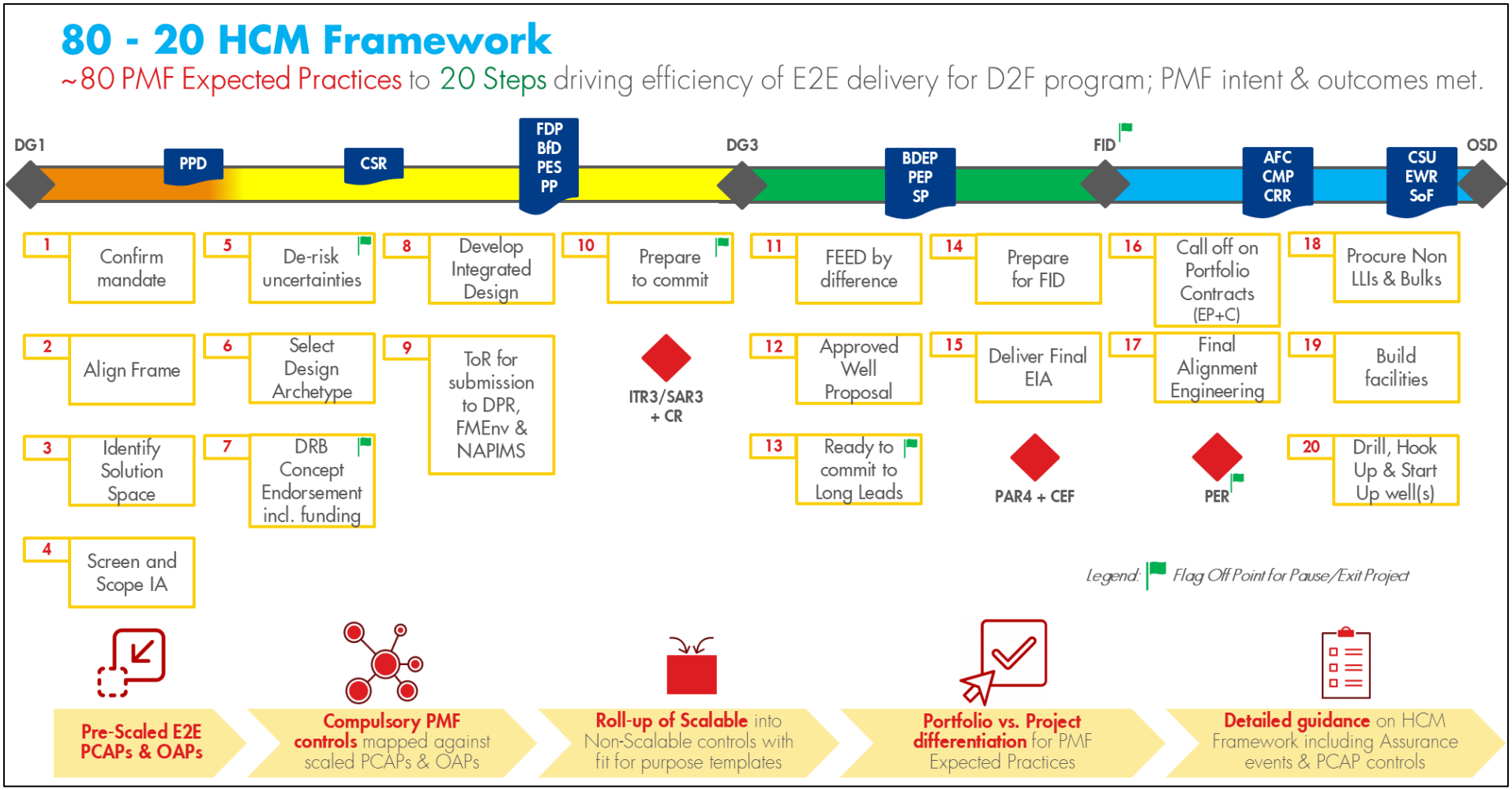

Figure 2: 80 – 20 HCM Framework for D2F Program

In assessing the project attractiveness and resilience, Carbon emission levels should also be considered. Not all projects might meet all these criteria and therefore, at EVP SAU discretion, additional projects such as integrated value projects, license or partner commitments, and/or phased projects can be included. Projects which do not meet the screening criteria, and are not approved by EVP SAU, are submitted as "out-of-plan option".

Further detailed guidance on the PMF Controls for each ORS phase can be found in Appendix 1.

3 Opportunity Assurance Plan (OAP)

Projects in D2F program will adhere to the portfolio OAP and update project specific details in the standard OAP following the initial opportunity framing for BOM/DE sign off and acceptance. The projects are all "self-assured" and key assurance events are pre-identified. Additional and specific integrated assurance events can be added at the discretion of the BOM/DE based on the risk and complexity of the project.

The Project team and FEDM ATA2 will be accountable to use these integrated assurance review, including CSR, PP-FG to have an effective conversation with the discipline TAs and to collect risk ratings and recommendations on the applicable Master Control Points. This eliminates the time required for the ATA to gather RTA risk ratings and recommendations and facilitates a more effective communication among TAs and the project team and therefore a higher quality integrated assurance.

It is accepted that a scaled Integrated Technical Review is applied to D2F program, where the ATA and RTAs will participate in a desktop review of the integrated project scope and does not require to be externally led.

Relevant Master Controls and IRM TPAs shall therefore be available prior to integrated assurance review, and RTAs should have been involved in the project work leading up to this review. Functional assurance for subsurface, wells and surface **shall** always be completed prior to integrated assurance reviews.

The FEDM ATA2 for a project shall be selected either from the DAM list by project FEDM (Project Lead)/BOM or delegated by FEDM TA1.

Selection of Assurance Reviews

Capital Project - Upstream

M andatory - in case of deviation relevant approval required
R ecommended - at the discretion of the opportunity

Assurance Review name	Acronym & Link	Assess		Select		Define		Execute		
Opportunity Value Assurance										*If not selected record reasoning for justification*
Value Assurance Review	VAR									
Concept Select Value Assurance Review	CS VAR									
Project Execution Review	PER							R	✓	
Integrated Functional Assurance review										
Invitation to Tender Review	ITTR									
Economics Assurance Review	EAR			M	✓	M	✓			
General Commercial Peer Review	GCPR			R	✗					Only to be done if there is commercial impact on the opportunity
Agreements Review Assurance	ARA					R	✗			Only to be done if there is new agreements to be put in place to mature the opportunity
Integrated Technical Review	ITR	R	✗	R	✓	R	✗			ITR3 will supercede ITR2 - One Assess-Select Phase for Drill to Fill program; SAR4 will supercede ITR4
Pre Startup Audit	PSUA									
Self Assurance / selected optional Assurance reviews										
Self Assurance Review	SAR	M	✗	M	✓	M	✓			SAR3 will supercede SAR2 - One Assess-Select Phase for Drill to Fill program
Pre Startup Review	PSUR							M	✓	
Competitiveness Review	CR				✓					
Competitive Execution Framework	CEF						✓			
Cost and Schedule Risk Assurance	CSRA				✓		✓			

Figure 3: Assurance Events for D2F program

4 Standardized Project Controls & Assurance Plan (PCAP) for D2F Program

The standardized PCAP Master Controls for D2F program projects is shown in the table below. The non-scalable Master Control Points from DCAF and PMF

	IDENTIFY	ASSESS-SELECT	DEFINE	EXECUTE
ORS Requirements		• Estimate & Schedule Fact Sheet (ESFS) • Subsurface Fact Sheet (SSFS) • Proposal to Commit Project (PCP) *if applicable*	• Estimate & Schedule Fact Sheet (ESFS) • Production Promise Fact Sheet (PPFS) • Subsurface Fact Sheet (SSFS) • Group Investment Proposal (GIP)	
PMF Master Controls	• Project Premise Document (PPD)[1]	• Project Premise Document (PPD) *Update only* • Concept Select Report (CSR)[3] • Basis for Design (BfD) • Project Execution Strategy (PES) • Field Development Plan (FDP)	• Basic Design Engineering Package (BDEP) • Project Execution Plan (PEP) • Production Promise (PP)	• Approved for Construction (AFC) Report • Construction Readiness Report (CRR) • Commissioning and Start Up Plan (CSU) • Statement of Fitness (SoF)
PCAP Non-Scalable Controls *(outside PMF Master Controls)*		• Well Functional Specification (WFS)	• Well Detailed Design • HC Production Forecast and Resource Volume Estimation	• Well Programme • End of Well Report (EWR) • Well Unloading Plan • Technical Integrity Verification Report • Well Handover Plan
SPDC specific Controls Points		• Assured Subsurface - Concept Engineering Design Parameters Sheet • Pore Pressure Prediction and Fracture Gradient (PP-FG)		
Deviations	• Resource Change Control Note (RCCN)[2] • Well Initiation Note	• Resource Change Control Note (RCCN)[2] • Feasibility Report[4] • Production Promise[5]	• Resource Change Control Note (RCCN)[2] • Early Works Readiness Report (ERR) • Well test proposal • Sourcing Packages	• Resource Change Control Note (RCCN)[2] • HC Production Forecast and Resource Volume Estimation • Contract Management Plan (CMP)

Footnotes:

1. DG1 slide pack serves the purpose of PPD
2. RCCN accountability rests with Asset Development Team however changes from projects should be captured as part of annual RCCN updates & ARPR process
3. The Concept Select Workshop slide pack along with the MOM serves the purpose of CSR
4. The intent of feasibility report will be captured in the CSR
5. The assured economics and incremental forecast capture the intent of Production Promise

Figure 4: D2F Program PCAP Control Points

are generally applicable, with a few exceptions. Additional Master Control points have been added to address the specific risks associated with D2F program.

5 DCAF deviations and risk management

Deviation	Approver	Risk	Mitigation
No Feasibility Report in One Assess-Select Phase	Front End Development TA1	Potential lack of looking far and wide on feasible options	Feasibility assessment & options shall be included in the Concept Select Report
No Production Promise in SELECT	Production Operations TA1	Unrealistic production promise	Hydrocarbon Production Forecast that is functionally assured in Pre-DG3 and included in the ITR3 captures incremental production promise in enough detail. This assured forecast is incorporated in business planning cycle.
No Resource Change Control Note (RCCN) in IDENTIFY, ASSESS, SELECT and DEFINE	Reservoir Engineering TA1	Wrong estimation or classification of hydrocarbon resources	Individual D2F program projects are rolled up into field-level RCCNs and assured for ARPR reporting

Figure 5: DCAF deviations

The use of DG1 & Concept Select workshop slide packs as DG1 PPD and CSR respectively is not a deviation. There is a minor risk of lower effectiveness and potential loss of audit trail compared to full reports. Gold standard templates are therefore being made available to ensure quality and complete content, and the slide packs will be formally published with SPDC report references.

6 Governance

The GM SPDC shall be the default portfolio DE for projects in the D2F Program. However, this can vary according to project headline size and complexity. Refer to DRB handbook (Ref 2 slide 8) for DE and DRB composition.

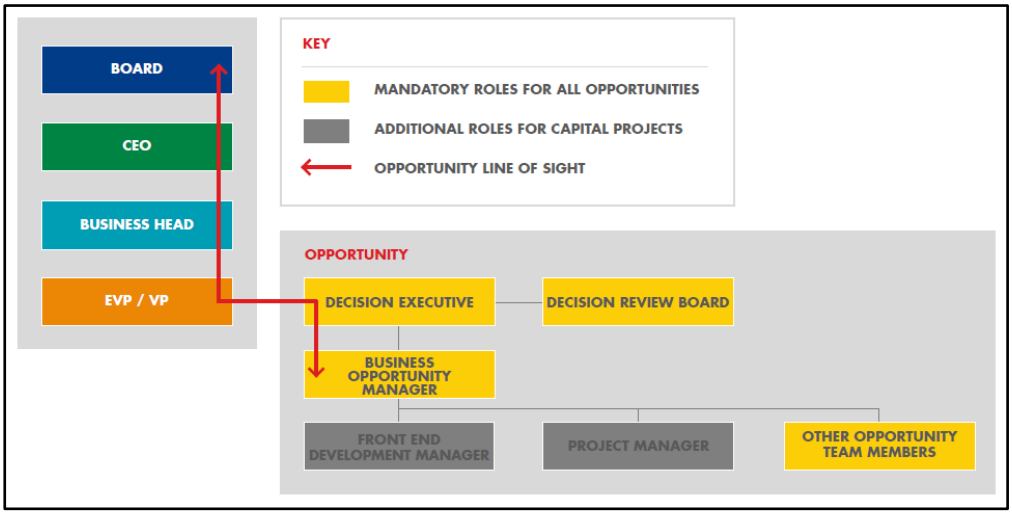

Figure 6: Line of Sight Diagram for Opportunities

7 Decision Mandates, including BOM Mandate, and Risk Management

BOMs and FEDM (Project Leads)/PMs are mandated to make quality decisions to allow an efficient maturation of the opportunity. DE/DRB should be kept informed of decisions made and changes through DRB sessions. A standard mandate for opportunities is provided in the table below

Mandate	Decision Hierarchy (top level decisions listed below – others as per agreed decision hierarchy)	Funding requests	Cost, Recovery or Value changes in between Decision Gates	Schedule changes
DE	• Decision to progress beyond a Decision Gate • Deviations from standard PCAP / OAP • Selected concept for integrated project (DG3)	• Approval to raise IRE for pre-FID Long Leads and/or post-FID project funding	• NPV or EUR changes by more than 30% • VIR reduction to below investment criteria • >1 kboe/d Impact to new O & G target for next 2 years	• Any change in ETSD with an impact on the approved Drilling Sequence
BOM	• Integrated Competitive Concept Selection	• Approval to raise IRE for pre-FID design (Feasex)	• Scope/Cost changes > 10% from previous DG • NPV or EUR decrease > 10% from previous DG • >0.5 kboe/d Impact to new O & G target for next 2 years	• Changes in ETSD of > 3 months without impact on the Drilling Sequence • Changes in timeline to next DG > 2 months
FEDM (Project Lead)/PM	As per the agreed decision hierarchy		• Scope/Cost changes < 10% from previous DG • NPV or EUR decrease < 10% from previous DG • >0.2 kboe/d Impact to new O & G target for next 2 years	• Changes in ETSD of < 3 months without impact on the Drilling Sequence • Changes in timeline to next DG < 2 months

Figure 7: Decision Mandate

Project risks should be managed through regular risk reviews between BOM and the integrated project team, where mitigation actions and close-out of critical risks are endorsed by the BOM (with possible escalation to the DE).

Appendix 1: Detailed Guidance on 80-20 HCM Framework

A. One Assess-Select Phase for D2F Program

For D2F program, the analysis of feasible concepts shall be done by project teams as part of the competitive solution space and then converge to select from the standard design archetypes as part of the concept selection work. The preferred concept shall be based on replication of previous projects or SPDC-wide archetypes. However, a formal Decision Gate DRB session shall still be required to endorse accelerated project timeline, with assumptions, risks and tradeoffs clearly shown at end of Identify Phase.

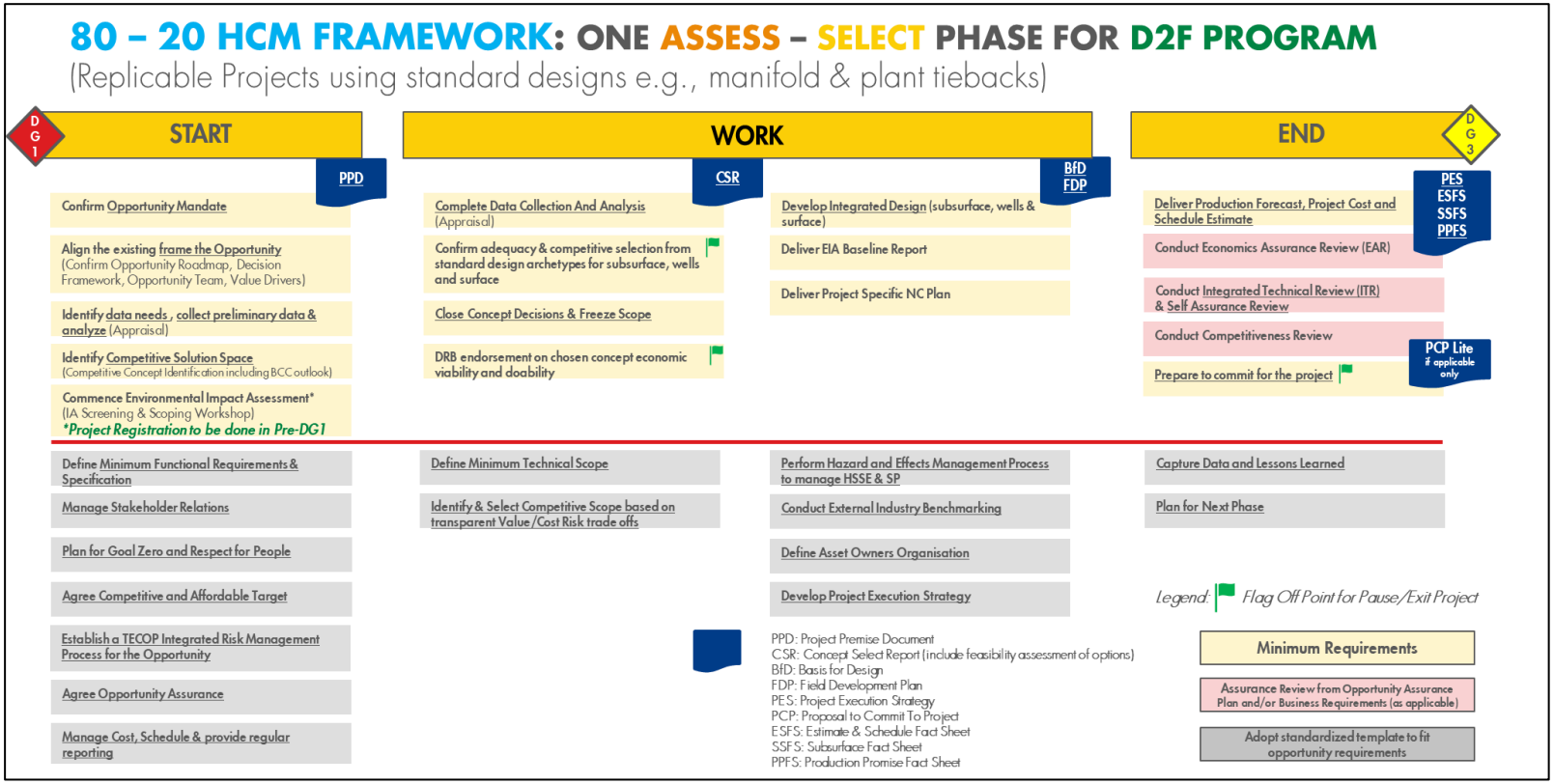

Figure 8: 80-20 HCM Framework for ONE ASSESS-SELECT Phase

B. Define Phase for D2F Program

For the D2F program although the project organisation is pre-established, an alignment with the project premise, competitive target and project metrics is critical for its success. The continuation of stakeholder relations and risk management are essential throughout this phase. Management of Change (MoC) is used in Define to control change to HSSE & SP risks, cost, schedule and decisions made in previous phases.

For the D2F program, the standardized design archetypes enable the FEED team to do FEED by Difference only i.e. customize the standard templates to suit the project needs. Any step out from the standard design will require approval from the relevant TA and Project Manager using a MoC process.

For the D2F program, the project teams will leverage on the portfolio level CP Strategy & Tactics and Call-off contracts that are put in place under the *"Clustering Campaign for contracts"* initiative and no separate project specific tendering cycle shall be accounted for unless required.

At the end of the Define phase, the team shall demonstrate that the project is economically viable, that risks across the Technical, Economic, Commercial, Organisational and Political (TECOP) dimensions are mitigated and the Project Execution Plan (PEP) is well defined. Demonstration that the project has been done right, supported by applicable assurance, prepares for the final investment decision at Decision Gate 4 (DG4).

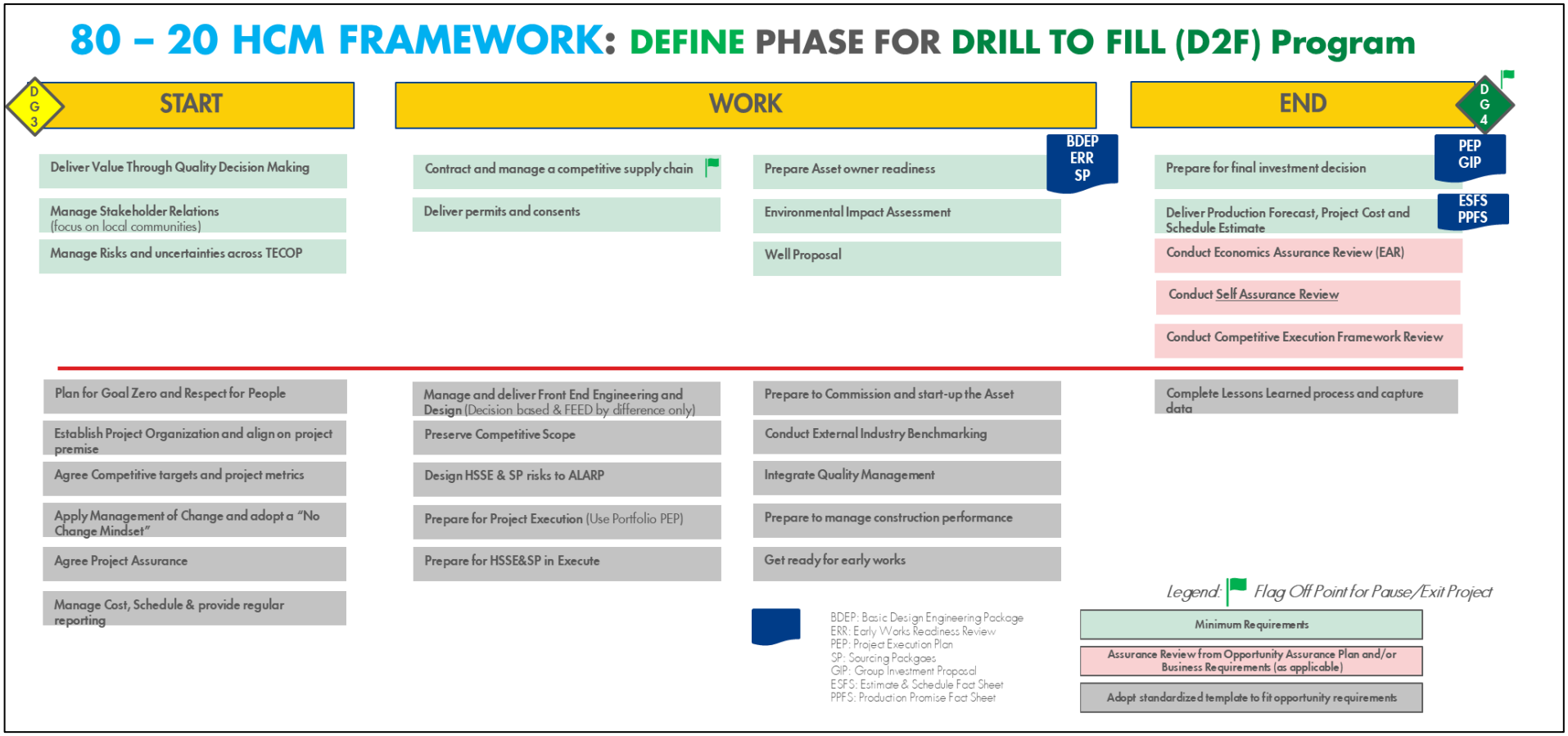

Figure 9: 80-20 HCM Framework for DEFINE Phase

C. Execute Phase for D2F Program

The objective of the Execute phase is to ensure the project is delivered against the promise, the asset organisation is ready to operate and the forward plan maximizes value delivery.

The execution of the project commences once the final investment decision has been taken. Execute contracts are awarded and the teams are aligned. The final alignment engineering and well program delivery can then start. Prior to field mobilization, a Project Execution Review (PER) shall be undertaken to ensure full readiness for construction start. Construction starts following a construction readiness review, when some of the detailed design has been done. Meanwhile, various supporting and controlling processes, such as cost and schedule control, contract management, stakeholder management, HSSE & SP management, change management, and the procurements of goods and services, take place.

Towards the end of construction, preparations for commissioning and start-up are finalized. Pre-commissioning is done by the project and the commissioning with hydrocarbons by operations. The Pre-Start-up Audit (PSUA) proves to the asset owner that the project has been implemented as designed.

The owner can then take the decision that the asset is Ready for Start-up (RFSU). After commissioning and start-up, the project has to carry out some close-out activities before the formal transfer of ownership takes place.

Six to twelve months after start-up, a project close-out is done to capture data in the corporate memory (and benchmarking) and to review whether the project is meeting its promise.

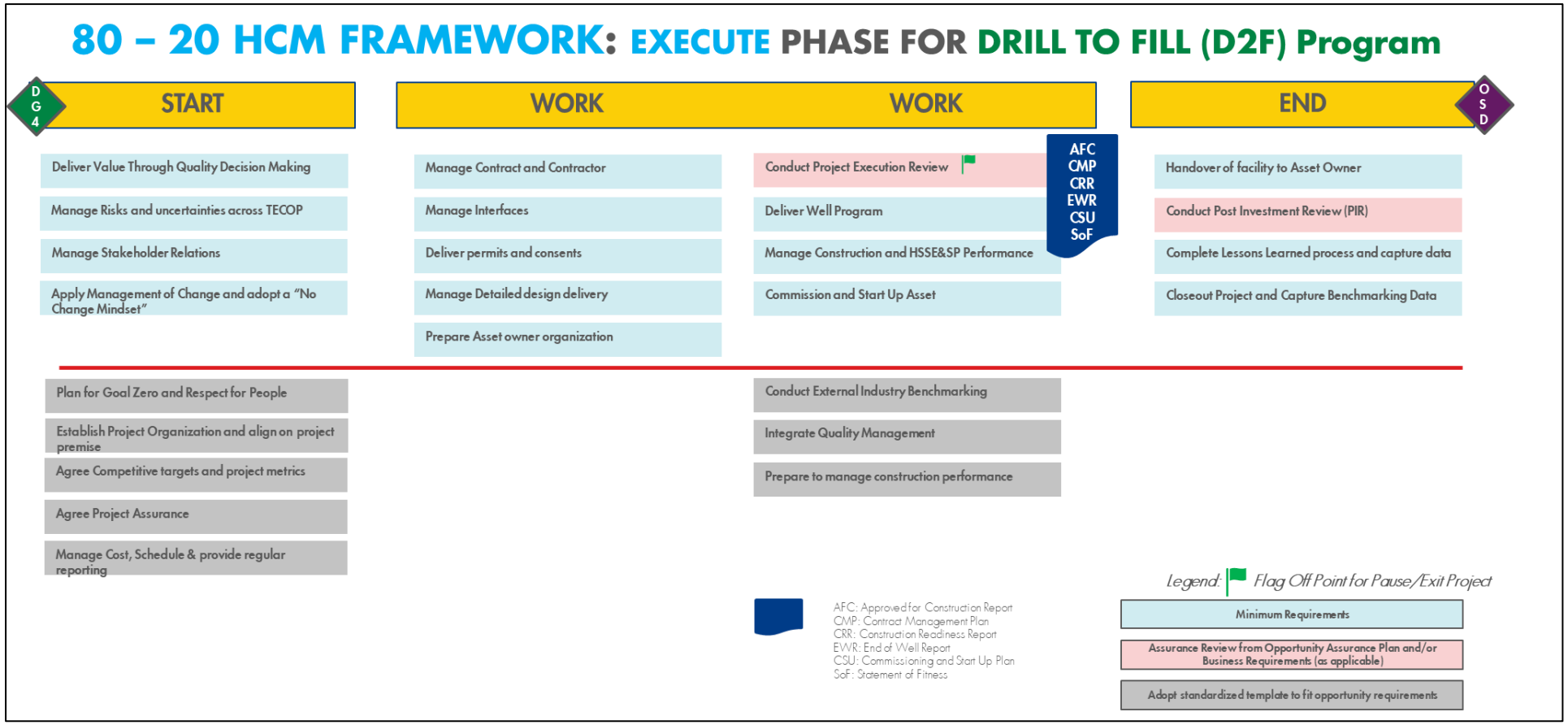

Figure 10: 80-20 HCM Framework for EXECUTE Phase

D. Integrated Assurance Embedded in ITR/SAR

The Project team and FEDM ATA2 will be accountable to use these integrated assurance review, including CSR, IWTS and PPP to have an effective conversation with the discipline TAs and to collect risk ratings and recommendations on the applicable Master Control Points. This eliminates the time required for the ATA to gather RTA risk ratings and recommendations and facilitates a more effective communication among TAs and the project team and therefore a higher quality integrated assurance.

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The FEDM ATA2 for a project shall be selected either from the BSP DAM list by project FEDM/BOM or delegated by FEDM TA1.

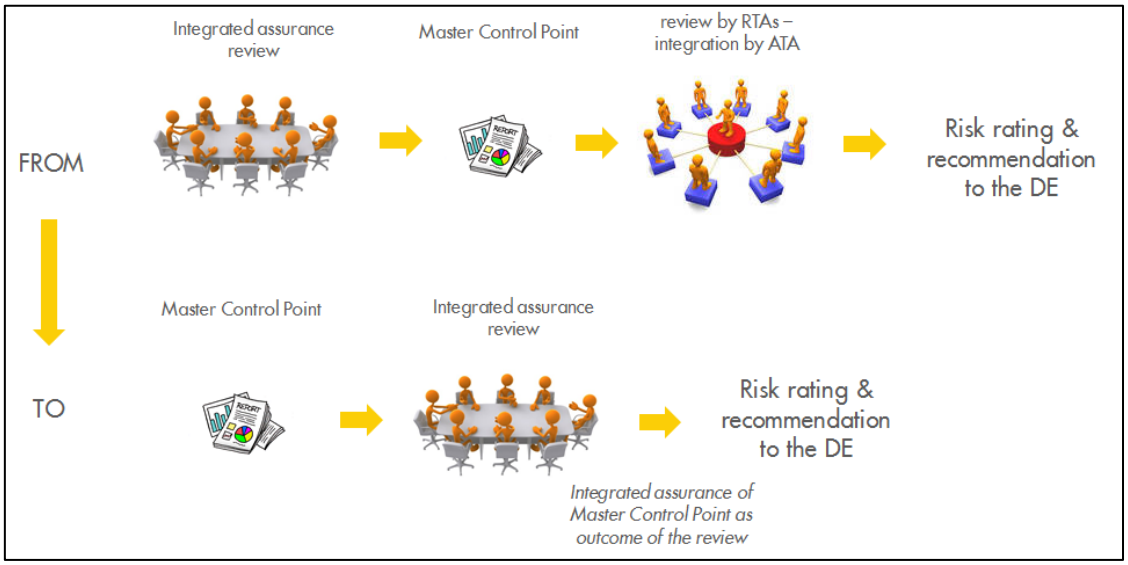

Figure 11: Moving to integrated assurance of master control points as outcome of the integrated review

A standard PCAP is available for projects with a rationalized set of RTAs applicable to projects in D2F Program. This is to be updated at each stage of the ORP phase for individual opportunity.

References

1. Opportunity Realisation Standards
2. Opportunity Assurance Plan (OAP)
3. Discipline Controls and Assurance Framework (DCAF)
4. DRB Effectiveness Guide
5. IPMS – Integrated Project Management System
6. Subsurface-Concept Engineering Design Parameters Sheet
7. Pause/Exit Criteria - One Pager Success Stories Template
8. SOP: Standardization & Replication in Subsurface

LIST OF ABBREVIATIONS

ARPR	Annual Reservoir Performance Review
ATA	Accountable Technical Authority
BFD	Basis for Design
BOM	Business Opportunity Manager
CDE	Concept Design Endorsement
CITHP	Closed-in Tubing Head Pressure
CSR	Concept Select Report
DAM	Discipline Authority Manual
DCAF	Discipline Control Assurance Framework
DDE	Detailed Design Endorsement
DE	Decision Executive
DG	Decision Gate
DRB	Decision Review Board
EUR	Estimated Ultimate Recovery
FDP	Field Development Plan
FEDM	Front End Development Manager
FID	Final Investment Decision
FR	Feasibility Review
GOR	Gas Oil Ratio
GWDP	Global Well Delivery Process
HC	Hydrocarbon
HCM	Hydrocarbon Maturation
IPA	Independent Project Analysis
IRM	Integrated Reservoir Modelling
ITR	Integrated Technical Review
IWTS	Integrated Well Trajectory session
MFS	Minimum Functional Specification
MOC	Management of Change
MTS	Minimum Technical Specification
NFE	Near Field Exploration
NPV	Net Present Value
OAP	Opportunity Assurance Plan
ORP	Opportunity Realisation Process
ORS	Opportunity Realisation Standards
PCAP	Project Control and Assurance Plan
PE	Project Engineer

PEP	Project Execution Plan
PES	Project Execution Strategy
PM	Project Manager
PMF	Project Management Framework
PPD	Project Premises Document
PPP	Pore Pressure Prediction
RCCN	Resource Change Control Note
RTA	Responsible Technical Authority
SAR	Self-Assurance Review
SSDS	Subsurface Data Sheet
TPA	Technical Peer Assist
UDC	Unit Development Cost
VIR	Value Investment Ratio
WAFS	Well Abandonment Function Specification
WFS	Well Functional Specification
WTS	Well Technical Specification

LIST OF FIGURES