

SKG 16 – BASE Technology Competency Matrix

Discipline – 16.2 Production Planning

Sub-Discipline – Upstream

Effective Date – 01/08/2016



TECHNOLOGY INVENTORY	COMPETENCY LEVELS				
	Awareness	Knowledge	Skill	Advanced	Expert
	List, identify, recognize	(can do with help) Describe, anticipate, contribute	(can do without help) Apply, plan, analyse	(can do and help) Manage, troubleshoot, motivate, assessor trainer	(mastery) originate, champion, develop, regulate

B1	<p>Regulatory Health, Safety and Environmental (HSE)</p> <p>To apply HSE reference framework and guidelines in production operations activities by using PETRONAS Carigali and country standards, identification and control risks associated to design, construction, operation and maintenance to protect personnel, environment, equipment and improve company image and reputation</p>	<ul style="list-style-type: none"> ▪ Recognizes regulatory agencies and PETRONAS policies and restrictions with respect to Health, Safety and Environmental (HSE) related issues. ▪ Aware of hazardous materials/chemicals and their respective MSDS/CSDS. ▪ Aware of unsafe act unsafe conditions (UAUC). ▪ Aware of Crisis Management Team (CMT) [Emergency Response Team (ERT) / Damage Control Team (DCT)] ▪ Aware of Business Continuity Plan (BCP) ▪ Aware of hazards associated with offshore facilities, operations and activities ▪ Aware of personnel safety requirement e.g. personnel protective equipment ▪ Aware of basic safe system of work related to ZeTo Rules which are typically put in place in an operating environment. 	<ul style="list-style-type: none"> ▪ Know and apply HSE policies for controlling work execution and reporting HSE requirement. ▪ Understand personal duties and responsibilities on safety as prescribed in local law/regulations (e.g. OSHA in Malaysia) or other regulations as may be applicable ▪ Ensure compliance to the applicable legislation and allowable emissions (in terms of concentrations of constituents and flow rates), and the working principles of the safety and shutdown systems. ▪ Anticipate impacts of hazardous material /chemicals based on CSDS/MSDS. ▪ Understand and able to participate in CMT/ERT/ DCT and/or BCP, HSE Audit ▪ Able to identify hazards related to the work area, function or activities using simple techniques such as JHA, PTW and UAUC e.g. wireline, production testing, pipeline construction and other specific operational activities applicable to own work area/functions ▪ Able to give examples of ZeTo Rules requirements and application for specific upstream operational activities 	<ul style="list-style-type: none"> ▪ Apply HSE programs in view of implementing country regulations and PETRONAS policies. ▪ Apply appropriate methods in conducting risk assessment (i.e. JHA, PTW, HAZOPS, etc.). ▪ Analyse the risk levels and respective restriction to workplace and the surrounding area. ▪ Quantify and analyse the emission and effluent rates and assess their impacts in qualitative terms, and identifies short and long term remedial actions/plan. ▪ Participate in CMT/ERT/ DCT and/or BCP (including drill, TIER 1, 2 or 3 exercise) ▪ Able to contribute to the implementation and auditing of safe system at work such as HSE Audits, safety and UAUC assessment ▪ Member of a HSE audit/ review /committee team. ▪ Understand HEMP concept for identification and/or review of safety critical element (SCE) e.g. BOP, SSSV, firewater pump etc. to prevent or mitigate major incidents; and the maintenance program to ensure their integrity. 	<ul style="list-style-type: none"> ▪ Develop programs and incentives to improve HSE compliance. ▪ Transfer HSE knowledge to PETRONAS staff and contractors through mentoring and on the job-training. ▪ Define procedures to apply HSE reference framework and guidelines upstream activities. ▪ Predict HSE implications of alternative process design options and advises on the most suitable design, taking into account economics and environmental requirements ▪ Contribute in developing procedures to enforce HSE reference.
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<p>B2 Reservoir / Wells Surveillance and Enhancement</p> <p>Identify, rectify and resolve well/reservoir problems through well surveillance operations.</p> <p>Maximise well technical potential by conducting well services using proper tools /equipment and methods and performing production enhancement.</p> <p>Analyse well flow parameters and well test data; conduct and evaluate sensitivity test; optimize well production; ensure RMP implementation and compliance</p>	<ul style="list-style-type: none"> Aware of well / reservoir surveillance programs. Aware of well accessories and its functions. Able to draw well diagram. Aware of well intervention and production enhancement activities such as behind casing opportunity, gaslift optimisation, etc. List down required equipment applicable for well intervention. Recognise various types of workover units and major components of rigs and their functions. Recognise general application and limitations of the rig types. Identify well conditions and surface facilities to flow wells. Aware of RMP. Understand on basic reservoir properties and reservoir drive mechanisms. Understand HC recovery concept. Understand the importance of well parameters. 	<ul style="list-style-type: none"> Participate in analysing well and reservoir surveillance data. Describe well surveillance objectives and operations. Anticipate key considerations in planning for production enhancement Describe equipment applicable for well intervention. Describe major elements of the well completion. Describe RMP and its implementation. Describe basic reservoir properties and reservoir drive mechanisms. Describe HC recovery phases. Participate in well data acquisition. Describe common well problems associated with reservoir and crude properties 	<ul style="list-style-type: none"> Evaluate well surveillance operations effectiveness. Apply well/reservoir surveillance data/results to rectify/resolve any well problems. Able to prioritize production enhancement / well intervention sequence based on production forecasts and economic considerations. Understand on basic reservoir, crude properties, HC recovery processes, artificial lift methods and nodal analysis; Analyse problems associated with reservoir and crude properties; estimates inflow performance. Analyse well and surface production facility data. Conduct and evaluate sensitivity test results i.e. MRT Plan and analyse PPGUA implementation and compliance. Analyse common well problems associated with reservoir and crude properties. Propose/review artificial lift application. Construct IPR of vertical wells. 	<ul style="list-style-type: none"> Review well operations procedures for improvements. Propose new technology to improve production. Performs technology benchmarking for long term strategic planning. Play key role in assessment and selection of suppliers and contractors (especially for QHSE). Train staff on subsurface production optimizations, artificial lifts and well intervention. 	

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B3	Multidisciplinary Engineering* Understand the fundamental, the key requirements and the execution challenges of operation activities at 6 (six) lenses (reservoir, well, process, pipeline, terminal and customer). Activities include, but not limited to the following: 1. Basic G&G and reservoir. 2. Well surveillance and intervention (Pressure surveys, well parameters, , well integrity, etc) 3. Drilling interfacing and simultaneous operations 4. Production operation, maintenance & reliability (including plant turnaround) 5. Construction works, facilities tie-in and simultaneous operations 6. HC transport (pipelines) 7. HC storage / inventory and export 8. Logistic operation 9. Facilities abandonment (including wells)	<ul style="list-style-type: none"> ▪ Aware of different roles & responsibilities of the various functions in the integrated operations in supply chain. ▪ Aware of the necessity to plan and prioritise the various multi-disciplinary activities for optimum field operation. ▪ Aware the importance of integrated plans for various disciplines' activities in order to achieve optimum operations plan e.g. turnaround (TA) coordination, modification works integration, Field Improvement Proposal (FIP), decommissioning etc. ▪ Aware the importance of preparing 30 days, 90 days, 1 year and other plans to ensure effective coordination of planned activities by various department. ▪ Aware of importance and requirement of field performance reporting. 	<ul style="list-style-type: none"> ▪ Able to contribute in preparing and finalising the integrated activity planning (IAP) through the understanding of various multi-disciplinary works/task and the inter-relations. ▪ Understand and able to contribute in developing and finalising the short, medium and long term plan with appropriate sequencing & scheduling of well intervention and key production & maintenance activities e.g. monthly target letter (MTL), WPB, etc. ▪ Able to plan for non-routine operations and maintenance activities towards minimal operations interruptions through understanding of coordination requirements, work processes and activities prioritisation with consideration of facilities' and other resources constraints and limitations. ▪ Able to coordinate/ prepare field performance reporting with sufficient understanding of various disciplines KPIs, activities/ issues and able to explain the performance gaps with the required intervention plan. 	<ul style="list-style-type: none"> ▪ Coordinate the development and finalisation of various multi-disciplinary works / task's schedule and priorities during the integrated activity planning (IAP) with various discipline engineers and the offshore team towards optimum field operation. ▪ Implement and apply the approved work program and budget (e.g. CPB / WPB / KPBI etc.), covering various disciplines and departments' plan and activities, and translate that into an optimum monthly plan / schedule e.g. monthly target letter (MTL), etc. ▪ Lead multidisciplinary review or discussion or situational assessment. ▪ Prioritise and highlight opportunity, threats and mitigation plan involving cross-functional requirements (for performance review). 	<ul style="list-style-type: none"> ▪ Anticipate potential issues on the proposed prioritisation activities based on the advanced understanding of multidisciplinary activities and their inter-dependency. ▪ Optimise the approved work program and budget (e.g. CPB, WPB, KPBI, etc.) during the finalisation of short, medium and long term plan (e.g. monthly target letter, etc.) ▪ Advise, challenge and recommend way forward for any cross-functional works/ issues' improvement initiatives. ▪ Advise and guide the management on re-prioritisation or change of key strategies based on the on-going operation inter-discipline issues and action items. ▪ Trains staff on cross-functional coordination. ▪ Proposes improvement and prevention that require cross-functional contributions to support operations. 	
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	Understand how the above activities are planned and executed in an integrated manner. Requires understanding on the cross-functional relations and constraints between various activities					
B4	<p>Surface Production / Flow Assurance & System Optimization</p> <p>Process Flows:</p> <ol style="list-style-type: none"> Utilize Process Flow Diagrams (PFD), Piping and Instrumentation Diagrams (P&ID) and Equipment Design Data to perform material balance, analysis of equipment performance for process enhancement, debottlenecking and minimize HC losses Understand requirements of each unit operations and its interconnection between each other and impact on changes within each process unit 	<ul style="list-style-type: none"> Recognize Process Flow Diagram (PFD), Piping and Instrumentation Diagram (P&ID) and familiar with the process components and parameters of each unit operation. Aware of process simulation tools and its inputs/outputs. Aware of normal, optimum and design operational parameters. Aware different properties and specification of produced fluid. Aware of types of chemicals and utilities used in surface facility. Aware of function of each unit operation in surface facility. 	<ul style="list-style-type: none"> Understand the overall material balance. Understand the different modes and design basis to cater for produced fluid properties and specification. Understand the connectivity between the unit operations (e.g. impact of failure of one unit to another). Understand function of each chemicals (at least 5 chemicals) and utilities used in surface facility. Participate in the analysis of normal and design process parameter settings to come out with optimum process parameters. 	<ul style="list-style-type: none"> Describes in detail the different types of process units used within the HC industry. Able to perform material balance on each process unit to identify HC yield and losses. Perform analysis on unit operations performance (e.g. efficiency analysis) and participate in process equipment enhancement or trouble shooting. 	<ul style="list-style-type: none"> Understands in detail the different types of process units used within the industry, their benefits and limitations. Propose mitigation to optimize production and minimize hydrocarbon losses (e.g. flaring). Develops best practices on how to work around constraints and limitations. 	

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<p>Process Operations:</p> <p>1. Understand different operating modes of operations, maintenance and development activities and their impact on process and plant performance.</p>	<ul style="list-style-type: none"> Recognize routine tasks to operate production facilities. Recognize non-routine tasks related to operations, maintenance and development (e.g. SISO, start up, shut-down, PASR). Aware of plant data extraction method. 	<ul style="list-style-type: none"> Describe different operating modes of operations, maintenance and development activities and their impact on process and plant performance. Participate in reviewing operation procedures. 	<ul style="list-style-type: none"> Able to analyse the operations, maintenance or development activities and propose optimization (e.g. change in operating procedure, different technique) to safeguard plant performance 	<ul style="list-style-type: none"> Participate / contribute in developing best practises on operation activities (e.g. start-up, shutdown, normal operations, troubleshooting guidelines, maintenance activities). Conduct training on surface facility. 	
<p>Process Optimization:</p> <p>1. Analyse operational parameters / variables & equipment sizing in order to assure optimized production delivery in volume, time and quality as established and required by PTS requirements.</p> <p>2. Provide technical supports with regards to operational trouble shootings, de-bottlenecking, process optimization, energy conservation, chemical treatment and optimisation, modification as required.</p>	<ul style="list-style-type: none"> Aware of operating envelope of production process system (oil gathering, separation, oil treatment, gas conditioning, processing and compression, crude and condensate stabilization, storage, transport, and waste treatment and disposal systems). Aware of the physical properties of the production fluids to be used in the simulation and main variables or parameters for surface production process operation and design. Aware of the simulation techniques and commercial software packages (example: HYSYS, PIPESIM etc.). Recognizes the standards used to design process equipment. 	<ul style="list-style-type: none"> Provide data for modelling of any given production process in the preparation of flow diagram. Compare operational parameters against optimum values or operating envelope and participate in providing optimization proposals. Participate in providing operational parameters set up and surface facilities configuration based on the production forecast, fluids handling and customer specifications. 	<ul style="list-style-type: none"> Is able to justify process operation variables and service specifications (separators, pumps, heat exchanger, treatment, etc.) for process optimization. Recommends optimum process operational conditions considering uncertainties in fluids compositions, future operating modes and required/ desired flexibility in operating conditions. Recommend options for capacity tests of surface facility processes and reviews of existing operations. Demonstrates the use of the knowledge to identify critical facilities limitations and recommends technical solution to existing problems on equipment. 	<ul style="list-style-type: none"> Has conducted surface facility operation analysis and determines production process requirements and equipment sizing by analysing actual and future capacity, process conditions, and simulations. Mentors PETRONAS's personnel on surface production process and facilities optimization. Develop surface production optimization studies by integrating disciplines to reduce cost and increase productivity according to ARP. Predicts impact of use of new surface facility technologies on operation and production optimization. Able to link observed performance, simulation results 	



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			<ul style="list-style-type: none"> Optimizes surface facilities aligned with other relevant processes (6 lenses). 	<p>shortcomings in design and operational practices.</p> <ul style="list-style-type: none"> Is fully conversant with the concept of operating envelopes and is able to identify the scope for facility/process upgrading and debottlenecking, with consideration of remaining field life, economics and long term operating conditions. Selects and ranks the best integral technical-economic optimizations options based on interrelation of production process, asset operational development and technology plan. 		
B5	<p>Hydrocarbon Measurement, Testing, Allocation and Balancing*</p> <p>Analyse & validate production measurement data to manage accurate production database for conducting production allocation, production optimization & inventory management.</p> <p>Apply measurement best practices and ensure the operations of metering &</p>	<ul style="list-style-type: none"> Recognize the elements of the production, and measurement systems that will affect production measurement/well testing/allocation/balancing. Recognize the metering devices for liquid, gas, and multiphase flow measurement for operational control and fiscal purposes. Recognize the importance of having accurate oil and gas volumetric balance for estimating hydrocarbon losses, and back allocation. Identify the various options of production allocation and its 	<ul style="list-style-type: none"> Describe various factors and issues affecting accuracy of production measurement and production allocation/balancing. Describe the metering devices for liquid, gas, and multiphase flow measurement for operational and fiscal purposes. Anticipate the importance of having accurate oil and gas volumetric balances for estimating hydrocarbon losses and back allocation. Describes operational guidelines & procedures related to production allocation and HC inventory. 	<ul style="list-style-type: none"> Analyse and validate factors and issues relating to production measurement, (metering & sampling) and production allocation/balancing. Implement operational guidelines and procedures related to production allocation and HC inventory. Applying HC accounting and allocation best practices, within the accuracy limitations of the metering and sampling facilities and/or techniques. Able to plan/analyse, and quantify the hydrocarbon inventory (hold-up volumes) 	<ul style="list-style-type: none"> Train staff on the application, validation and analysis of well/ conduit/ related process data/ metering/ sampling data/ hold-up volumes/ spillage. Train staff on the application of the guidelines and procedures related to production allocation and HC inventory. Troubleshoot and train staff on the detection and calculation of metering, and/or sampling irregularities. Evaluate best options for the metering/sampling system, and manage the PSC partners with 	<ul style="list-style-type: none"> Participate in industry committees that establish and review specifications and standard, and recommend best practices related to MTAB. Resolve dispute and abnormalities related to metering, sampling and system. Champion new metering and/or



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<p>sampling facilities within the accuracy limit.</p> <p>Implement operational guidelines & procedures related to production allocation and HC inventory.</p> <p>Evaluate measurement, testing, allocation and balancing options for accurate, and cost effective application covering the whole life-cycle of the PSC involved.</p>	<p>advantages and disadvantages.</p> <ul style="list-style-type: none"> Recognise operational guidelines and procedures related to production allocation and HC inventory. 	<ul style="list-style-type: none"> Understand the allocation system and database to allow correct hydrocarbon analysis/ allocation/ inventory for existing and future tie in. Aware of what is involved in metering/sampling validation and the system operations itself. 	<p>during start of facilities and/or at abandonment of facilities, and spillage, etc.</p> <ul style="list-style-type: none"> Analyse the allocation and balancing options for accurate results; able to analyse metering and sampling system/ equipment irregularities. Initiate adjustment/ correction proposal of any irregularities of metering/ sampling /process data. Involved and able to review metering/sampling validation report. Able to develop measurement, testing, allocation and balancing (MTAB) procedures/system (including PSC closing entitlement). Able to troubleshoot discrepancies between unreconciled and reconciled figures, with the limitations of the metering, and sampling facilities and/or techniques in view. Participate in evaluating best options for the metering/sampling system, and manage the PSC partners with the company's and countries' interest in view. 	<p>the company's and countries' interest in view.</p>	<p>sampling systems / technology (involving the business economics taking into consideration the whole life cycle).</p> <ul style="list-style-type: none"> Present in international congress technical papers related to own experiences and innovations.
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<p>B6</p> <p>Integrated Hydrocarbon Supply Chain , Inventory and Export Management</p> <p>To align, schedule and optimise the field hydrocarbon production availability and evacuation programs, adhering to related procedures and agreements i.e. GSA, NLA, Supply Allocation / Priority of Supply / gas nomination procedure (GNP), Terminal Regulations & Procedure.</p>	<ul style="list-style-type: none"> Aware of the importance to comply with contractual terms & conditions that regulate oil and gas evacuation process. Able to identify key factors to be taken into consideration during planning & preparation of hydrocarbon evacuation programs. Aware of tank top / tank bottom conditions Recognizes economic impact of penalties for non-compliance of contractual terms & conditions and shipping delays. Aware of the regulatory requirements related to hydrocarbon evacuation. Is aware of the relevant Customs documentations or approval to be obtained before and after loading. Is aware with local legislations / ordinance related to hydrocarbon evacuation. 	<ul style="list-style-type: none"> Able to describe the common contractual conditions related to hydrocarbon evacuation such as crude quality standard (ASTM/IP Methods & Standard (Crude/ Condensate, Natural Gas, Petroleum Products & Water) and basic penalty regulation. Participate in a multidisciplinary team consisting of PETCO, MPM, PSC partners, and regulatory bodies in preparing the hydrocarbon delivery programs in accordance with production and sales plans to assure volume availability. Able to calculate & quantify the potential demurrage/dead freight charges, penalty quantity (PQ) To understand the basic procedures or Royal Malaysian Customs' export requirements. 	<ul style="list-style-type: none"> Able to propose solutions in resolving misalignment between plan and actual of hydrocarbon availability Able to propose solutions in resolving gas supply & demand issue. Able to propose solutions in resolving hydrocarbon off specs and composition requirements. Able to propose solution to mitigate & manage tank top & tank bottom issues in sustaining continuous hydrocarbon production, as well as resolving issues regarding penalty and claims (e.g. demurrage, dead freight). To understand the regulatory requirements before commencement of 1st export from Onshore Crude Oil/ Condensate Terminal or FPSO. To understand the activities involved in the lifting operations. Analyse & evaluate optimum asset storage capacity in consideration of production capacity & associated risk impact. 	<ul style="list-style-type: none"> Incorporates statistic and probabilistic analysis for inventory control, to prevent dispatch problems and to avoid operation delays, foreseeing causes and remedial actions. Defines and develop procedures (e.g. OCM, NFF, Standing Instructions, etc.) for optimizing oil and gas transfers, blending and conditioning, by applying root-cause analysis and process simulation to reduce ship delays and hydrocarbon volume delivered out of contractual conditions. Monitors and controls inventory and dispatch process through execution of multiple and simultaneous hydrocarbon balances supported by real time visualization systems (i.e. TGCC, SOCC & PBOCC). Prepares mentoring and on the job training programs for professionals with less skills and experience about hydrocarbon inventory control and delivery. Able to anticipate the world market demand and capitalise on high crude price. 	<ul style="list-style-type: none"> Participates in industry committees that establish and review specifications and standards, and recommend best practices for hydrocarbon inventory issues. Anticipates strategically the requirement and leads the acquisition of new technology to be applied in the company/asset, related to hydrocarbon inventory management and delivery. Innovates in new control systems and procedures as well as software applications, oriented to improve hydrocarbon inventory management Publishes and presents technical
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						<p>papers in known periodicals and international congresses in topic related to own experiences and innovations of hydrocarbon inventory and delivery</p> <ul style="list-style-type: none"> ▪ Is consulted by all levels of corporation regarding aspects on hydrocarbon inventory management. ▪ To champion technology, such as real-time data to manage hydrocarbon blend with the best financial yield, able to maximise usage of storage capacity, etc.
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B7 Production Planning, Forecasting & Performance Management* Generate short, medium and long term production plans, considering existing, enhancement and new hydrocarbons taking into account the reservoir production decline, integration of activities and optimise production deferment in order to support production delivery program. Management of performance deviations through periodic production and data analysis.	<ul style="list-style-type: none"> ▪ Able to recognise key planning process elements. ▪ Able to list well test requirement and its use for determining well Technical Potential (TP). ▪ Able to identify TP generation process. ▪ Able to list down well and facilities constraint affecting TP and availability. ▪ Able to identify Integrated Activities Planning (IAP) process. ▪ List different unpredictable events that can affect production and their implications ▪ Understand the type of planning tools required and how the system interlink each other ▪ Aware of Production Planning, Forecasting & Performance procedures ▪ Able to identify hydrocarbon nomination process with respect to timeline ▪ Aware of customers/ suppliers operation & requirement. ▪ Able to recognise preventive and remedial/ optimization / enhancement for production opportunities. 	<ul style="list-style-type: none"> ▪ Contribute in developing relevant periodic production plan following the process and procedures. ▪ Able to verify well test and understand generating well TP and describe sensitivity test, well data and its use to optimize well production. ▪ Able to generate TP and availability taking into account all constraints and activities. Calculates production capacity with consideration of planned & unplanned deferment/slow-down, decline rate and production optimization/ enhancement. ▪ Apply various planning tools to produce production plan in the most economical and cost effective way. ▪ Apply best strategy to maximize value creation (technical potential, capacity constraint, downtime, nomination, supply chain & commercial). ▪ Able to develop preventive and remedial/ optimization/ enhancement for production plan to reduce impact from disruption to mitigate the gap. ▪ Conduct performance benchmarking for improvement by consolidating & validating gap analysis to improve production planning. 	<ul style="list-style-type: none"> ▪ Develop, review and optimize the overall periodic production plan. ▪ Analyse and identify abnormalities of well test data and implications to TP generation. ▪ Generate realistic short, medium and long term production plans, incorporating planned & unplanned deferment / slowdown and production optimization / enhancement. ▪ Aligns customers/suppliers operation & requirement in nomination planning process. ▪ Execute optimization strategy to maximize value creation (technical potential, capacity constraint, downtime, nomination, supply chain & commercial) ▪ Analyses production performance periodically and recommend preventive & remedial / optimization / enhancement for production plan to reduce impact from disruption to mitigate the gap. ▪ Lead performance benchmarking for improvement by consolidating & validating gap analysis to improve production planning. 	<ul style="list-style-type: none"> ▪ Manages integrated plan and information to support regional, corporate and national target by considering key elements such as annual volumetric goals, constraints and new asset incorporation, to generate regional Production Plans. ▪ Proposes planned deferment optimization and incorporates all factors from upstream, downstream and external parties to maximize field availability. ▪ Proposes production optimization / enhancement incorporating internal and external elements such as regional supply and demand, hydrocarbon prices and seasonality to adjust production plans. ▪ Liaises with relevant parties to introduce improvements in work processes and practices to achieve planning effectiveness. ▪ Transfers knowledge on production forecasting, planning, and programming to professionals with less skills and experience through mentoring and training programs. 	<ul style="list-style-type: none"> ▪ Consulted by all levels of corporation. ▪ Advises top management on production planning, asset growth and development strategy to maximize production plans value & asset growth considering internal constraints and execution capacity as well as external elements such as supply / demand and geopolitics / country risk. ▪ Champions for new technology acquisition and implementation applicable for production planning. ▪ Establishes community of practice, produces / presents technical papers in international forum.
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	<ul style="list-style-type: none"> Able to recognise differences between plan and actual production. 	<ul style="list-style-type: none"> Prepares production deferment for facility efficiency analysis. Develop contingency plan in anticipation of various activities to maximize product availability. Anticipate customers/ suppliers operation & requirement in nomination planning process. 	<ul style="list-style-type: none"> Participate in gap mitigation efforts to reduce impact from disruption. Able to detect abnormalities in various planning tools. 		<ul style="list-style-type: none"> Participates in industry committees that establish and review specifications and standards, and recommend best practices for issues related to Production Planning and hydrocarbon inventory and evacuation coordination.
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	List, identify, recognize	(can do with help) Describe, anticipate, contribute	(can do without help) Apply, plan, analyse	(can do and help) Manage, troubleshoot, motivate, assessor trainer	(mastery) originate, champion, develop, regulate
<p>K1 Planning Tools Management*</p> <p>Identify database, system, application, data link, data architecture and integration, using web based and other technologies.</p> <p>To update and control operational and financial data quality, data transmission and storage, data filtering and transfer to planning tools to ensure availability of asset history, operational and financial information, able to help to control operational and subsurface behaviour and supervise asset performance.</p> <p>RESNET – Oil FORGAS – Gas PX tools – Production Excellence eIAP HyPAS – RF1 PGPS – RF2 ODMS PROCEeDS / eWPB MS Project</p>	<ul style="list-style-type: none"> Aware of oil and gas field data acquisition, reporting/data flow, information generation process and data storage. Aware of PETRONAS data base system (operations, unit cost, maintenance, production, well history data, etc.) applied in planning management Recognize the importance and use of database in relevant decision making. Aware of backup methodology and automatic storage management (if any). 	<ul style="list-style-type: none"> Understand and able to explain the communication system and data transfer through the system (at least 2 systems). Detect database malfunctions; monitor data base behaviour and generate reports/notes of anomalies. Propose improvements in data storage. Able to provide inputs for system upgrade requirements and participate in database system modification/upgrade. 	<ul style="list-style-type: none"> Use database application and documentation system. Diagnose and alert on database malfunction (using 'real time' visualization tools, data analysis report, data reconciliation system, IT & data base connectivity). Able to lead database management and upgrading requirement referring to the best practices. Apply and utilise linked applications to integrate data and information from different sources and best practices. Able to conduct technical and economic analysis to select the best database from different options and connectivity architectures. 	<ul style="list-style-type: none"> Lead and supervise projects from development until implementation stage, working with internal and external clients, vendors, consultants, and computer specialists. Improve subsurface-surface data storage and monitoring using data base and IT architecture to guarantee the asset history. Predict undesired events during the field data storage, transfer and deployment using SCADA system, IT technologies and specialized tools. Lead multidisciplinary teams to design and control field data architecture and storage to get a best control of the oilfield data and information. Lead field data/model review with functional and technical teams. Lead multidisciplinary advanced projects (virtual reality, artificial intelligent, extending human-computer interaction and oilfield operational supervision applications). Mentor staff of lower level on database management and application 	<ul style="list-style-type: none"> Well recognized nationally and internationally as an authority in database management and applications. Present and publish technical papers in recognized domestic and international congress related to topics of database management and applications. Incorporate strategically latest technologies and determine how database could help production field asset optimization. Advise on joint ventures, alliances or contracting opportunities using benchmarking, considering field technological plan associated with the reservoir life cycle. Coordinate and evaluates the performance of the field data management.

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<p>K2</p>	<p>Field Life Cycle Analysis (Asset Reference Plan)*</p> <p>To define and apply a systematic process for asset life cycle analysis through development of reserve, optimising project portfolio and identification of cost and timing for all life cycle stages from conceptualization to abandonment, considering execution capacities, CAPEX, OPEX, production deferred, production quality in order to maximize asset profitability along its life cycle.</p>	<ul style="list-style-type: none"> ▪ Identify the key contributions required of design and maintenance in optimising life cycle costs. ▪ Monitor and report on the value of key performance indicator on the Asset Reference Plan (ARP). ▪ Recognise when critical parts of assets should be debottleneck, overhauled / maintained, rejuvenation or replaced. ▪ Aware of basic concepts related to project economic analysis such as CAPEX, OPEX, NPV, and IRR. ▪ Recognise major activities and cost elements for each stage in the life of an oil/gas reservoir. ▪ Recognise concepts of risk and uncertainty as key elements to determine projects viability. ▪ Aware of the asset utilisation targets and Operational targets. ▪ Familiar with project management tools for scheduling activities, identify critical paths and quantify resources in asset development planning. 	<ul style="list-style-type: none"> ▪ Collate and prepare existing asset data for components of ARP development (operation, forecasting, maintenance, cost, etc.) ▪ Participate in the selection and identification of critical parts of asset for debottleneck, overhaul / maintenance, rejuvenation or replacement incorporates in the short and long term activity schedule. ▪ Understand cost associated in life cycle stages from exploration to abandonment considering execution capacities, CAPEX, OPEX, production deferred, production quality. ▪ Able to establish key cost data and information through understanding of the asset cost structure. ▪ Able to identify risks involved in projects execution. ▪ Has performed the short term and long term planning of asset maintenance and asset operating modes, production volumes, capacities and utilisation plans, downtime, uptime, etc. 	<ul style="list-style-type: none"> ▪ Provide data for ARP Models. Identifies new opportunities and select options ▪ Contribute to the determination of asset life cycle cost from exploration to abandonment. ▪ Participate in commercial and technical evaluation of field opportunities and scenarios. ▪ Perform works in certain phases of the ARP (Review of budget, review performance requirements, identify constrains, identify resources and services, integrate activities programs, iterate occurrences, etc.) ▪ Contribute and provide data for asset development and utilisation concepts; validate asset capital and operating cost, economic analysis based on life cycle cost. ▪ Contribute and provide data for asset development concepts; sets asset utilisation and operational targets ▪ Integrates data, knowledge, applications and processes from the early stage of planning to support generation of the optimised ARP. 	<ul style="list-style-type: none"> ▪ Create/update asset reference plan in order to reduce uncertainties and/or risks (key for appropriate activities in execution processes). ▪ Establish asset development options. ▪ Integrate maintenance plan with asset operating modes, production volumes, capacities and utilization plans. ▪ Connect reliability and availability indicators with the asset life stage and the total cost, providing advice to operators and designers to minimize/optimize asset total lifecycle cost. ▪ Improve or develops methods and/or tools for asset life cycle analysis by connecting key performance indicators at different levels and generate cost optimization opportunities in real time. ▪ Train staff on life cycle cost through mentoring and on the job training project. ▪ Anticipate variables that affect the asset life cycle profit (operation cost, product, obsolescence, equipment performance, equipment availability / reliability, procurement & abandonment). 	<ul style="list-style-type: none"> ▪ Participate in industry committees that review or establish specifications, standards or recommended practices for issues related to or involving asset lifecycle analysis. ▪ Anticipate strategically the requirement and acquisition of new technology to be applied in the company / asset. ▪ Recognized as an authority in any topic related to Petroleum Asset Management providing advice and solutions to complex problems. ▪ Innovate new process in asset life cycle analysis to company by incorporating process or techniques developed in or out oil industry.
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<p>K3</p> <p>Petroleum Arrangement Contract (PAC) Management and Procedures</p> <p>Define, review and apply the technical, financial and legal terms and conditions that influence the PETRONAS Carigali shared assets and business</p> <p>Able to manage relationship with partners, prepare budget, measure and control asset performance, calculate partners' participation in disbursements and earnings.</p> <p>Able to monitor asset performance and future plans in accordance to the contracts in maximizing asset value.</p> <p>Understand and use relevant procedures and guidelines relevant to Petroleum Arrangement such as:</p> <ul style="list-style-type: none"> • JOA, • PPGUA • Specific Country Procedure 	<ul style="list-style-type: none"> ▪ Aware of the various petroleum arrangement contracts in upstream oil and gas, including the relevant procedures and guidelines. ▪ Aware the definition of Petroleum Arrangement key terms, terminologies and its impact to operations. ▪ Able to list down the documents, procedures and guidelines used in the organisation. 	<ul style="list-style-type: none"> ▪ Describe procedures for preparing Work Program & Budgets, and controlling business performance in assets under exploitation by Petroleum Arrangement and joint ventures. ▪ Understand shared CAPEX, OPEX and cost allocation between JV partners, based on their business' participation. ▪ Understand petroleum economic indicators and various sensitivities analysis for different scenarios / options. ▪ Understand the definition of Petroleum Arrangement key terms, terminologies and its impact to operations. ▪ Understand and interpret the application of procedures and guidelines in operations. 	<ul style="list-style-type: none"> ▪ Improve budgeting and control process by incorporating Activity Based Costing and Activity Based Management in shared assets. ▪ Collect and evaluate technical, legal and financial information to support Petroleum Arrangement team in managing application of contractual terms and conditions. ▪ Active participation in contract negotiation with joint venture partners, service providers, O&M companies, establishing clear rules, defining key performance indicators and using new tools as Balanced Scorecard to measure and control shared asset performance. ▪ Manage daily operations using specific guidelines. 	<ul style="list-style-type: none"> ▪ Review and advice contract terms and strategies related to asset exploitation, verifying equal treatment for partners, project feasibility and profitability. ▪ To develop and introduce improvements to audit work processes and practices and to evaluate contract conditions' applicability. ▪ Train staff on Petroleum Arrangement management through mentoring and training. ▪ Able to enhance or improve procedures, guidelines or agreement as and when required. ▪ Share experiences in technical forum / workshop about shared asset negotiation, operation, coordination and control. ▪ Able to advise top management about negotiation of terms and conditions related to assets. 	
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K4 Value Chain Management To describe the movement of molecule from reservoir to sales point along the 6 dimensions/ lenses To evaluate and improve the value of each element in the lenses. To design and define value chain strategies with organisation and business requirement.	<ul style="list-style-type: none"> Aware of the value chain of hydrocarbon production system and its primary and support activities. Recognizes the importance about the linkages between all activities in the value chain and its meaning. Identifies inventory management in planning resources. Recognizes how technology impacts the value chain. 	<ul style="list-style-type: none"> Describe the value chain of hydrocarbon production system and its primary and support activities. Able to identify the main elements and policies that allows a better service to the customer and higher productivity of the resources. Understands the principles and practices of production planning that allows an effective integration of the production efforts. Understands how the information technology supports the value chain processes that allows to guide and sustain daily operative decision. 	<ul style="list-style-type: none"> Involved in communication and integration between supplier and customer. Assess and mitigate constraints along the value chain in integrated manner through different methods and techniques. Applies basic management operations techniques to maximize the use of the resources with a smaller operations costs. 	<ul style="list-style-type: none"> Lead and develop chain value analysis including benchmarking studies to identify opportunities for improvement in value chain. Transfers value chain analysis knowledge to personnel of asset/company through mentoring and on the job-training. Detects the common production process pitfall and apply the mechanisms to prevent them. Presents different distribution network configuration strategies that allows to increase the level of service, cost reductions, inventories and market time response. Able to use information technology to support the value chain processes that allows to guide and sustain daily operative decision. 	
K5 Real Time Data Acquisition Identify and apply suitable real time data acquisition technologies for wells, process parameters and relevant production system.	<ul style="list-style-type: none"> Aware of real time data acquisition applied in upstream business. Recognize that there is a real time data acquisition application in a field, process plant, terminal, etc. 	<ul style="list-style-type: none"> Describe the real time data acquisition concept in upstream business. Describe the importance of data mining, data flow and artificial intelligence concepts. 	<ul style="list-style-type: none"> Apply / use the real time data acquisition system. Analyse data quality and evaluate subsurface/ surface production system parameter deviations through real time data acquisition system. 	<ul style="list-style-type: none"> Able to justify the requirement of real data acquisition system based on technological and profitability analysis. Assess potential problems that could affect the reliability of real data acquisition system and 	

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	<p>Ensure of applying high speed digital telemetry microprocessors and imaging tools for visualization, data and information integration, and process remote controls.</p> <p>Apply the supporting artificial intelligence technologies for optimization automation and decision making. Apply the technology to maximize asset value.</p>	<ul style="list-style-type: none"> Recognize the importance of data mining, data flow and artificial intelligence concepts. Identify the benefit of applying the real data acquisition technology. 	<ul style="list-style-type: none"> Describe the benefit of applying the real data acquisition technology. Describe subsurface and surface production sensors and instruments for real time data acquisition. Explain example of real time data acquisition application in a field, process plant, terminal, etc. (what parameters, where monitored and how to optimize the process). Participate in applying/ using the real time data acquisition system. 	<ul style="list-style-type: none"> Able to participate in designing real time data acquisition system e.g. defining data architecture to feed field optimization model. Able to generate proposal for real time data acquisition considering field experiences, benchmarking and value creations. 	<p>propose solution based on findings.</p> <ul style="list-style-type: none"> Advise in strategic alliances and agreements to assure reliability of supervision and control of equipment operations Validate novel concepts on architecture / data integration, applications & systems, technological intelligence, data bases and simulation / modelling tools. Recommend the deployment of real time data acquisition solutions and best practices. 	
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<p>P1</p> <p>Deep Water Operations Planning</p> <p>To design the Asset Reference Plan (ARP) for fields under 500 meters subsea, supported by 3D seismic and reservoir modeling, selecting the adequate well architecture, generating drilling programs to be executed from semi-submersible-or platforms; designing fluid production, gathering and transport system by using subsea operation facilities, and introducing state of the art technology in robotics and remote operations, with real time control to assure economical asset exploitation.</p>	<ul style="list-style-type: none"> Recognizes some elements that intervene in deep water development planning as semi-submersible platforms and subsea production equipment. Is aware of some operation approaches (fixed platforms, FPSO's, seabed equipment) commonly used in oil and gas deep water operations. Identifies elementary differences between operations in platforms with equipment and facilities over sea level and in seabed equipment, remote operated and controlled. 	<ul style="list-style-type: none"> Describes sequence of activities to execute mobilization and positioning of platforms and seabed equipment for deep water development operations. Utilizes reservoir properties and fluid flow rates to design production system architecture for deep water hydrocarbon assets. Identifies adequate systems for remote monitoring and control of deepwater operations, related to subsea well-equipment connection, valve opening and closing and equipment repairs. Supports drilling and production planning teams in collecting and evaluating data to load planning software and develop strategies for deep water field development. 	<ul style="list-style-type: none"> Generates reservoir delineation plans, supported by information from 3D static models, extended multi rate well tests and build ups to select well trajectories, total deep and completions. Prepares well drilling and seabed equipment positioning and connecting programs in order to minimize downtiming, supported by software for programming and scheduling. Recommends routine test for deep water well – reservoir data acquisition as LWD/FEWD, well stem test, fluid sampling and analysis for asset development decision taking. Design logistic and supply programs referred to personnel, materials and services to ensure continuity in deep water development operations. 	<ul style="list-style-type: none"> Recommends new non-conventional materials and remote controlled procedures for deep water equipment operations to generate robust strategies that deliver high NPV at an acceptable risk level. Introduces in deep water development scheduling and planning the changes in productivity and downtime as a result of the influence of extreme weather by using operation modeling and process simulation. Applies probabilistic analysis to investigate the sensitivity of asset performance to uncertainties, in order to frame the limits. Transfers knowledge to asset/company personnel on deep water development planning through workshops, seminars and field practices. 	<ul style="list-style-type: none"> Participates in industry committees that establish and review specifications and standards, and recommend best practices for issues related to Deepwater Development and Operation Planning. Anticipates strategically the requirements and lead the acquisition of new technology to be applied in the company/asset, related to deep water equipment and process' design. Has a great corporate impact by advising top management about strategies of having in-field intervention resources, such as drilling units or workover vessels vs. chartering them on demand. Produces and presents in international congress technical papers related to own experiences and innovations about subsea separation systems, artificial lift, etc.
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P2 Enhanced Oil Recovery (EOR) To define, execute, evaluate, monitor and control EOR projects by selecting technology according to reservoir characteristics, determining reservoir production mechanism and fluid phase behavior, analyzing fluid miscibility characteristics and properties, integrating production, injection and reservoir data, interpreting analytical models and numerical simulators outputs, monitoring and controlling continuously reservoir behavior to maximize oil recovery factor.	<ul style="list-style-type: none"> Recognizes the basis of the various types of miscible processes and basic displacing properties and the importance of a proper process design, its influence on the recovery factor and its fundamental limitations. Identifies the different miscible flooding mechanisms and efficiencies. Understands the importance of proper selection of miscible gas injection process to improve recovery efficiency. 	<ul style="list-style-type: none"> Evaluates with help miscible flooding processes. Able to do with help miscible flooding project design and laboratory techniques. Designs with help control and monitoring techniques for miscible flooding processes. Participates with reservoir engineering team in the design of miscible flooding projects. 	<ul style="list-style-type: none"> Has experience in evaluating miscible flooding processes. Has experience in miscible flooding processes design and laboratory techniques. Designs, controls and monitors techniques for miscible flooding processes. Works with reservoir engineering team to design miscible flooding or enhanced oil recovery projects. Applies reservoir screening criteria for miscible flooding processes (Rock and fluid characteristics, phase behavior and fluids miscibility). 	<ul style="list-style-type: none"> Leads multidisciplinary teams to define, execute, evaluate, monitor and control EOR projects. Makes interpretations of simulation results to adjust developing plan accordingly (wells to be drilled, spacing, well flow rates, injection pattern, workovers, etc.); providing advanced warning of impending production difficulties to enable preventive and remedial actions. Plans and interprets miscible displacing lab and field pilot tests to analyze rock- injected fluids compatibility, injected fluid miscibility and ensure injecting fluids quality control to avoid formation damage. Controls and monitors production and injection behaviour and integrates production, injection, reservoir pressures, fluid samples, flow meter tests, WOR and GOR maps to follow up on reservoir performance. Perform Mentoring activities: teach other members of the team (learning by doing) Present and publish technical papers. Recognized at company level. 	<ul style="list-style-type: none"> Has developed and implemented miscible flooding and enhanced oil recovery processes to get maximum reservoir recovery. Participates in oil industry review committees to standardize best practices and learned lessons in EOR projects, and ensure transference between organizations. Performs worldwide benchmarking to strategically anticipate the requirement and lead the implementation of new EOR processes to be applied in the asset. Coordinates the activities of the EOR Network (Knowledge Community). Produces and presents in international congresses technical papers related to own experiences and innovations about EOR processes. Is recognized at international level.

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P3 Smart Well/Downhole Operations To identify and operate technologies for smart well/downhole operation under premises of self-regulation and optimization by using downhole sensors, automated valves and special tools, in order to reduce cycle time and uncertainties for decision making and anticipate well intervention.	<ul style="list-style-type: none"> Recognizes the smart well/downhole operations under premises of self-regulations, optimization and the equipments associated. Identify some technologies used in smart wells as: information technology, fiber optics, sensors, automated valves and downhole water/gas separators. 	<ul style="list-style-type: none"> Collects and validates the data needed to operate an smart well/downhole operation Differentiates the function of each component (fiber optics, sensors, automated valves, etc) of the subsea completion system and recognizes the main criteria for selecting the final operate configuration. Participates in the process of real time downhole data acquisition and processing and its use for decision making. Contributes to incorporate surface-subsurface data into intelligent well operate and implementation. 	<ul style="list-style-type: none"> Has been involved in designing intelligent well completions. Demonstrate experience in recommending elements of an intelligent well design (fiber optics, sensors, automated valves, etc) for self-regulation and optimization. Has been involved in the supervision of installing intelligent completion equipment and validating such installations Works with other disciplines (e.g. SCADA, Automation, etc.) to develop policies and procedures for the use and application of remote data collection and information management tools for its use Anticipates smart well / downhole operations problems by analyzing on line reservoir and downhole / operational information and recommends actions to avoid downtime problems/failures 	<ul style="list-style-type: none"> Leads and mentors teams in designing intelligent completion systems for new and mature fields. Proposes new schemes of intelligent well completions increasing well life and maximizing productivity, with minimum environmental impact and maximum safety enhancement. Teach others on designing intelligent well completions. Provide guidance in developing assessment criteria for selection of technology provider. 	<ul style="list-style-type: none"> Able to network externally and internally to capture and make enhancement on intelligent well completion design Publish and present paper internally and externally on case study Able to organize and establish the future need and develop plan for improvement accordingly Perform technology benchmarking to assist long term strategic planning Able to advise on new technology materials, equipment and tools for improving efficiency of intelligent well completions.

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<p>E1 Subsea Productions System operations</p> <p>To understand, operate and maintain the subsea component. To evaluate alternative for subsea manifold configuration and provides conceptual or definition engineering for the development of subsea field taking into consideration the operation and maintenance condition and procedures. To develop operational specifications for subsea production facilities and completion systems.</p>	<ul style="list-style-type: none"> Is able to identify the components of offshore production system. Understands various types of equipment and assets in subsea facilities. Recognizes how subsea and well flows is related to required pipeline capacity. Recognizes different types of subsea manifold (horizontal, vertical and choke bridge connection), cluster manifold, among others. Is able to identify the Subsea Production System Architectures, Main Components including Piggings, Testing, Hydrate, Wax Management & Flow Assurance issues, Control Systems, Re-Injection, Intervention, etc. Current Codes & Standards, Company Codes & Standards Recognizes the configuration of a subsea manifold containing termination facilities, production and injection line, subsea control and flow meter 	<ul style="list-style-type: none"> Is able to explain the function of the main component of a subsea manifold (base frame, manifold frame, controls distribution units, accumulator banks, control modules, hydraulic trunking, pipeline connections, pigging loops and protective roof) Operates with mentoring subsea manifold system Is able to understand suitable components of the subsea manifolds Is able to understand the key aspects of subsea facility inspection and maintenance. Is able to understand the most recent deepwater manifold systems (retrievable manifolds with remote diverless connections of intra-field flowlines, umbilicals and pipelines) Is able to understand the connection of the subsea system manifolds, umbilical, multiphase pump, separators, etc . Is able to understand the automation and maintenance for subsea system. 	<ul style="list-style-type: none"> Analyzes the production fluids and system during the life cycle of the field and identifies the main components that subsea manifolds should have Provides technical support for developing alternate subsea production manifold concepts Has work experience in the operation of the subsea manifold system as well as the inspection and maintenance that should be done Demonstrates experiences in developing an integrated subsea - surface facility operations and maintenance plan together with all other relevant disciplines. Evaluates alternative subsea manifold configuration and design 	<ul style="list-style-type: none"> Provides definition engineering of subsea Manifolds and defines subsea manifold components arrangement. Interacts with subsea manifold technology supplier to select the best option for PETRONAS' field. Mentor PETRONAS' staff on the design, operation and maintenance of the subsea system Teaches courses on subsea production operations 	<ul style="list-style-type: none"> Appraisal of novel technologies (including subsea boosting, electric flowline heating) and determining the benefits, risks and estimated cost of adopting such innovations. Participates in industry committees that review or establish specifications, standards or recommended practices for issues related to or involving Subsea production operations Anticipates strategically the requirement and acquisition of new technology in subsea Is recognized national and internationally as an authority in any topic related to subsea production system and advises on solutions to complex subsea production problems. Innovates new subsea process by incorporating process or techniques developed in or out oil industry

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E2	<p>Unconventional Resources</p> <p>To understand and operate the unconventional resources production.</p> <p>To provide conceptual and/or engineering definition for unconventional resources development and production operations.</p> <p>To develop operational specifications for unconventional resources production facilities.</p>	<ul style="list-style-type: none"> ▪ Understand various types of unconventional resources. ▪ Recognize how we define unconventional resources. ▪ Recognize how different unconventional resources compared to conventional resources in term of production/evacuation methodology. ▪ Able to identify production system for each type of unconventional resources. 	<ul style="list-style-type: none"> ▪ Able to explain the suitable technology to boost the production for each type of unconventional resources to reach economic scale. ▪ Participate in applying such technology in unconventional resources or similar operations. ▪ Understand the key aspects of subsurface matters applied in production operations of unconventional resources ▪ Understand the key aspects of facility operations in production operations of unconventional resources. 	<ul style="list-style-type: none"> ▪ Provide technical support for developing production/evacuation operation concepts for unconventional resources. ▪ Participate in designing production system for unconventional resources. ▪ Experience in operating production/ evacuation of unconventional resources ▪ Able to propose suitable technology relevant to unconventional production/ evacuation with consideration of field experiences, benchmarking and value creations. 	
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