Integration with customer teams

For execution of field development planning, Petrofac consultants and engineers are accustomed to interfacing with client sub-surface personnel to jointly develop the optimum sub-surface/surface solution for the asset.

Hence, particularly within our consultancy group, there is an understanding and appreciation of the potential issues associated with aspects such as flowing wellhead pressure on productivity, gathering network pressure drop, artificial lift methods, water injection for reservoir pressure maintenance, gas injection for reservoir pressure maintenance and plateau production periods.

Our workflow methods for feasibility and concept studies typically include means of handling data uncertainty by developing and costing options for variation in wellhead/arrival pressures, artificial lift and injection/disposal of gas and water and fluid composition.

Our expertise built on experience

From our experience of working with our clients during the very early phases of the project we recognise that that close cooperation is required to agree, amongst other items, on

- **Well locations**: these need to be optimised to ensure that the selected locations take into account the gathering system and plant inlet conditions. Similarly early discussions between facilities and sub-surface is required to ensure that wellhead flowing conditions are meaningful. It has been found on previous projects that nominal wellhead conditions have been specified resulting in unnecessarily large and operationally unstable gathering facilities. Petrofac works with Gap and Prosper models to give the reservoir engineers a more accurate picture of the interaction between the surface facilities and the well performance.

- **Artificial lift**: the artificial lift strategy is defined by the production engineers. However this needs to be developed with the surface team as the overall costs of various strategies need to be offset against the recovery achieved. Again the use of Gap and Prosper modelling can help the design team reach an optimal solution, particularly where gas lift is being used.

- **Production profile**: it is important that the sub-surface team understands where breakpoints are for the surface facilities. For example where a small decrease in throughput will generate significant Capex savings by allowing a single train or smaller frame size compressor to be installed. The impact of breaking bottlenecks can then be assessed to identify where the NPV can be maximised.

- **Composition/contaminants**: it is important that contaminants that may affect the surface facilities, such as mercury, are identified during well testing. In addition the potential for sand production needs to be considered and adequately quantified.

- **Pressure maintenance**: the means of pressure maintenance and the surface treatment and facilities required must be fully understood. A common example would be the maximum allowable particle size for water injection where, sometimes, the size specified by the sub-surface team is smaller than required and proves very expensive and difficult to achieve.
Our capability and delivery
We are able to execute development planning for onshore, offshore and assets requiring a combination of onshore and offshore facilities and pipelines. The work typically includes, but is not limited to, the development of:

- production system pipeline gathering architecture optimisation
- flow assurance studies, using PIPESIM or OLGA for subsea and onshore pipelines
- process plant facilities definition, including technology selection and HYSYS or PROMAX simulations
- offshore development options including fixed platforms, floating installations, mobile production units and subsea installations
- plant layout studies
- structural analysis
- metallurgy analysis and materials selection
- screening level definition blocks and cost estimating
- driver selection and power generation selection and optimisation studies
- dynamic simulation
- HAZID and ENVID workshops
- risk assessments
- safety studies
- reliability, availability and maintenance studies
- preparation of surface facilities field development planning document

Our consultancy group is supported by comprehensive in-house multi-discipline engineering resources.

Group synergies
In addition to the experience and capability within the consultancy group we can call upon a range of Petrofac Group companies in order to deliver an optimised development service. These include:

- Plant Asset Management (PAM)
  - maintenance and structural integrity
  - operational and project management consultancy
- well construction and operations (SPD)
  - well construction, well engineering and drilling consultancy
- petroleum technology (Eclipse)
  - field development optimisation
  - production modelling
  - well life cycle risk management
  - production optimisation software – PetroAtlas

Global support
The Engineering Services consultancy is a company centre of excellence for conceptual development studies. Its experienced personnel provide consultancy and support from feasibility through all phases of project to all aspects of operation, maintenance and inspection to its customers around the world as well as to other Petrofac group companies in Sharjah, London and elsewhere.