

# Integrated Operations – Generation 2 and Beyond (IO@anywhere)

Point of View by Sesha Konda and Ole Evensen



# Introduction

Integrated Operations (IO) in the Exploration and Production (E&P) Industry, a novel topic some 4 to 5 years ago has emerged to become one of the areas of high business interest and benefited from increased investment monies. Following the adoption of IO by the industry most major Oil and Service companies have established specific programmes to drive the uptake of Integrated Operations. These programmes with differing names from iFields, eFields, Field of the Future, Smart Fields and Integrated Operations all have similar goals and objectives. Capgemini has found over the past few years that there is a varied range of uptake and success of Integrated Operations in various Oil Companies and regions.

However, in our opinion, the Norwegian Continental Shelf (NCS) has been one of the regions with a greater uptake and success of Integrated Operations than anywhere else in the world. This has further been confirmed by the OLF (Norwegian Oil Industry Association) study, in April 2006, on "Potential Value of Integrated Operations on the Norwegian Continental Shelf" concluded Integrated Operations represented a potential of NOK 250 billion (NPV).

Capgemini have, in 2007, conducted a follow-up study that updated the initial 2005 Petoro survey this gauged the progress of the further evolution of Integrated Operations on the NCS. This latest survey has found that Integrated Operations is no longer the future way of working, but increasingly the current way of conducting business in the NCS.

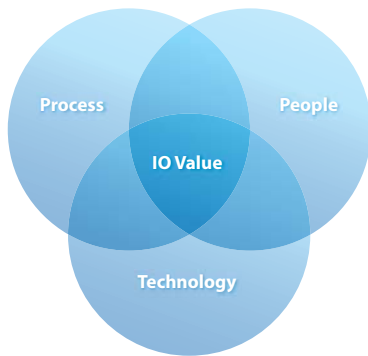
We have made the following observation;

- primary drivers of IO are increase production, extend reserves and reduce costs
- improved offshore / field & onshore / base offices collaboration
- improved multi-disciplinary collaboration
- appropriate location of decision making, either offshore or onshore
- integration of real time data
- technology improvements
- redesigned work processes to make full use of all other benefits.

Capgemini have therefore coined the term '**IO@anywhere**' to represent the transition of Integrated Operations from the initial 'point solution's and more into the mainstream upstream operational business – and recognition of the holistic nature of Integrated Operations.

In addition, we have also recognised that value is being realised through the building of an organisational capability that manages the work processes, human factors and technology changes within the context of the asset and organisational constraints. We recognise that value does not come from one solution set alone, but rather from a number of solutions working together in collaboration – in this sense, the term solution does not necessarily refer to a technological one, but encompasses both people and process.

# Process, People and Technology



## Process

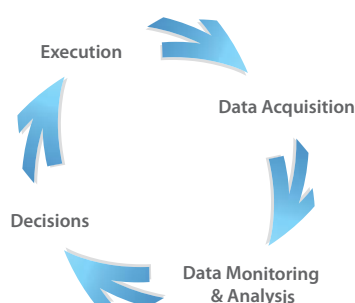
Fundamental changes are being driven by IO in the E&P business processes in at least three major areas of the upstream value chain, i.e. drilling, sub surface and facilities. In addition the business processes in other parts of the value chain, for example; logistics, are also being continuously evaluated and re-designed to align with the Integrated Operations business environment. We have observed that companies are moving away from their traditional functional processes in order to realise the full potential of Integrated Operations.

For example, Drilling and Operation Centres are now well recognised as one of the key visible elements of Integrated Operations. These centres are equipped with tools and techniques, for example; real time data visualisation to enable the collaborative multi-disciplinary teams to monitor and analyse the relevant data and take timely decisions that will further optimise operations.

## People

Integrated Operations is causing a fundamental shift in the way, and where, people work. The recent Petro study highlights cost reduction as one of the driving factors for Integrated Operations. In offshore operations this may be illustrated by moving non-critical positions onshore. While this is an area of real opportunities, it requires thorough and holistic consideration of all the affected disciplines.

It is a well established fact that a large part of the workforce in the oil industry will be retiring in the next few years. This necessity of change will result in the requirements of new employees to be trained more rapidly, for example; faster training cycles may be achieved by enabling professionals to work by pairing a novice with an experienced person, where some of the training will be conducted in the Collaborative Work Environment. Integrated Operations are enabling companies to gear up for new operational paradigms through creating modified business processes and staffing the Operation Centres with multidisciplinary teams, cross-trained to work efficiently. Individual Performance Management needs to also be addressed as these new business processes require a different approach to Performance Management and Key Performance Indicators (KPI).



## Technology

One of the key enablers of Integrated Operations is advances in technology, for example; fibre optics, wired pipes, the increase in computer processing power (Moore's Law), satellite data transmission and computing. However, underpinning Integrated Operations is the availability of real time or near real time data. There has been enormous increase in bandwidth enabling transfer of increasing volumes of data from remote locations to the user community – be they either onshore or offshore.

Capgemini have observed that improved data management systems are required to manage these increased volumes of data and to distinguish between critical and non critical data. Leading companies are experimenting with advanced technologies like neural networks and artificial intelligence to utilise the data efficiently. Increased collaboration requires increased and seamless data flow and exchange across processes, applications and enterprises. This, service oriented business approach, requires a shift from traditional IT architecture to service oriented architecture. This is addressed in a separate Capgemini Point of View, "Service Oriented Architecture for Smart Oil & Gas Operations" There is also increased focus on standardisation of data flow and exchange like WITSML, OPC, PRODML etc.

# Asset and Organisational Constraints

Companies have to consider the options for Integrated Operations based on their asset capacity, organisational characteristics and organisational capability.

## Asset Capacity

Consideration of the asset potential from a development and operational perspective establishes the overall value potential and largely determines the types and feasibility of particular solutions. The main variables include:

- significant remaining recoverable reserves
- high operational costs
- high labour costs
- active or planned development drilling programme
- access to key ICT components such as data transmission (high bandwidth fibre) network.

## Organisational Characteristics

The primary determinants as to whether the full value potential is realised are contingent on organisation-specific factors, including:

- the degree of executive sponsorship, support and accountability
- the development of an articulated vision and strategy
- integrated multi-disciplinary asset teams being a normative organisational model
- a collaborative work environment particularly between onshore / offshore personnel and across assets (versus organisational silos)
- a focused and “purpose built” redesign of work processes
- a pragmatic approach to value measurement
- an ability to manage significant organisational change

## Organisational Capability

The primary determinants as to whether the full value potential of this next generation of Integrated Operations is realised includes:

- clearly defined sponsorship and stewardship with central coordination and line accountability
- definition of roadmap for Integrated Operations programme management, corporate and asset level
- a balanced focus on people, process and technology
- performance measurement to track improvements and embed a continuous improvement mindset
- prescribed Process Management
- prescribed Change Management
- IT architecture, adopting and promoting common standards and integrated solutions
- an ability to work within a truly collaborative environment
- an ability to attract the right partners (suppliers) - and establish an understanding of win/win opportunities and culture
- a legal framework that takes into consideration the Intellectual Property rights of joint innovation and development
- a process to maintain functional excellence in a multi-disciplinary environment
- prescribed training programme
- an investment in collaborative tools & infrastructure to provide the capability to readily shift to the next generation of Integrated Operations capability.

# Integrated Operations

## Integrated Operations Maturity

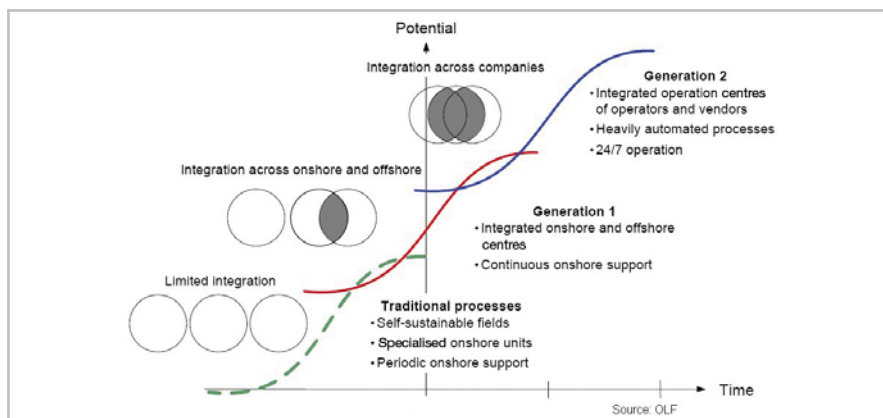
Compared to the traditional approach of limited collaboration between offshore & onshore and between disciplines, industry has seen a marked movement towards better collaboration within each operator's organisation, defined as Generation 1 (G1) by OLF, and illustrated in the figure.

We have observed that while there has been progress on collaboration between operators and service companies, defined as Generation 2 (G2) e.g. an operator in Norway has its Operation Centres linked with the Engineering Contractor's Centre for virtual collaboration on engineering modification work.

However, what Capgemini now recognises is the emergence of truly networked organisations that allow seamless collaboration, virtually anywhere by anyone, *IO@anywhere*, classified as Generation 3 (G3) for this Point of View.

Generation 3, "IO@anywhere", is characterised by high degree of collaboration and innovative use of technology to CREATE VALUE as well as VALUE REALISATION.

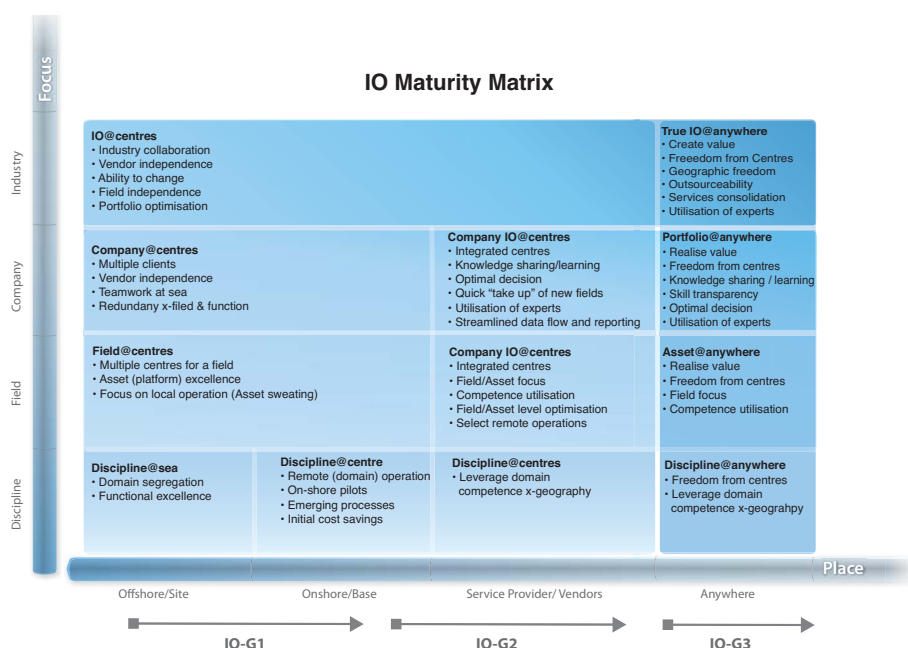
Traditionally Generations 1 and 2 will always realise value from assets, Generation 3 is focusing on creating value. The "IO Maturity Matrix" illustrates positions or stages in Integrated Operations adoption, along the axes of focus (domain/discipline, field/asset, companywide or industry) and location of operation (offshore, onshore/centre, service provider centres or "anywhere"). A company's position may represent a challenge, a strategy – or a pathway to a strategic intent.



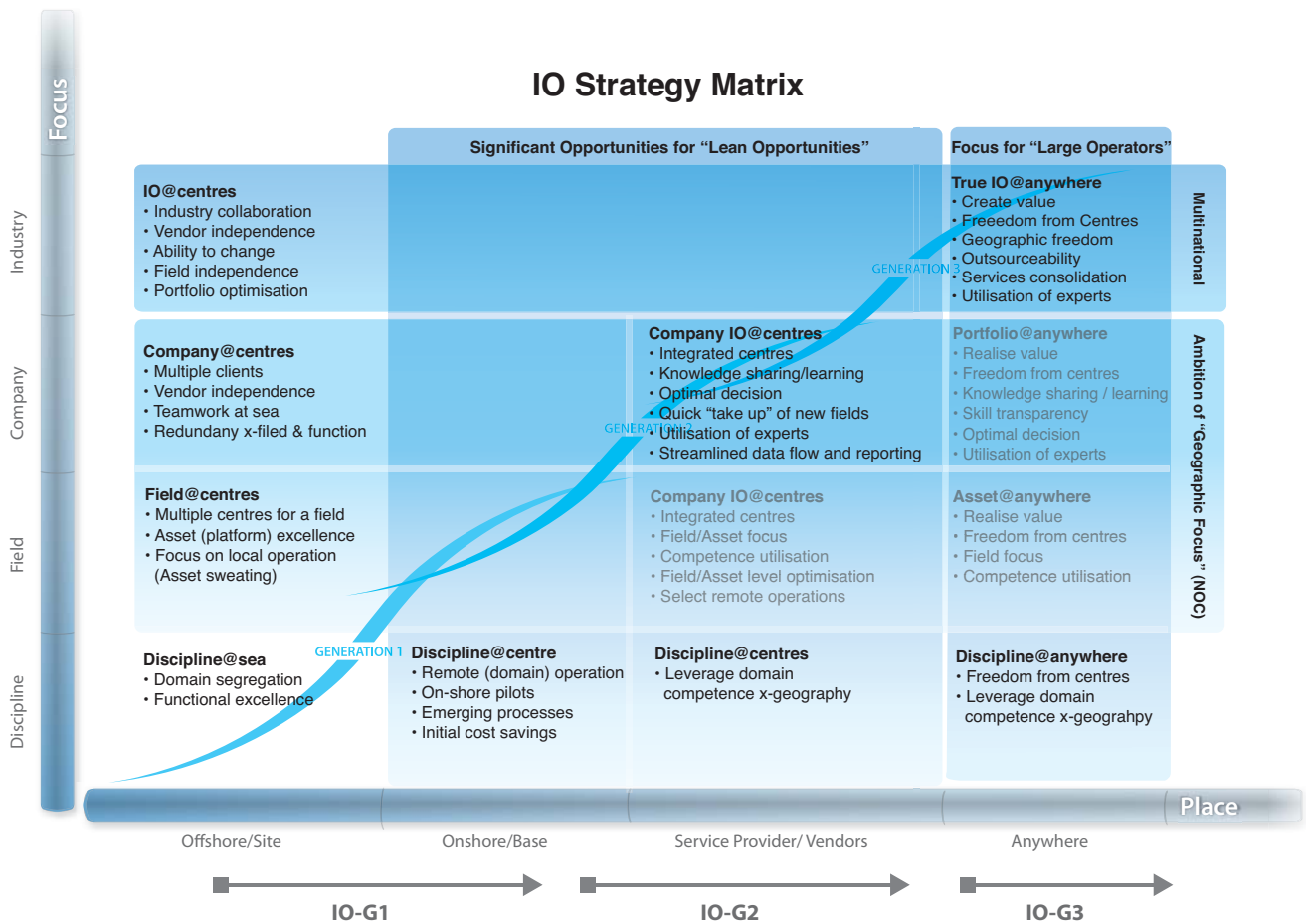
The lower left corner represents the traditional approach, with domain segregation, functional excellence and possibly silo decision making. The diametric opposite (top right corner) represents "IO@anywhere" with high level of collaboration, multidisciplinary teams to improve the quality of, and time to make decisions. A prerequisite to such freedom of "place of operation" would be excellence in information management and technical integration. Challenges to conquer will range from available, reliable and governed interoperable

services to domain ontology, collaborative technology and work processes that allow for geographically distributed teams.

One of the visible elements in Integrated Operations, for improving and facilitating collaboration, are the Centres (Drilling, Operations and Remote Monitoring Centres). Operators view the Centres, within the Asset and Organisational constraints, as facilitating improved decision making through real time data monitoring and interpretation resulting in increased collaboration.







Operators are establishing centres assigned to specific disciplines, fields and / or regions. Leading operators are also working to interlink centres to provide 24/7 support. Service Providers and Vendors collaborate with Operators either through "in-centre staff" or by connecting their own Vendor Centres to Operator Centres.

The primary underlying drivers, as mentioned earlier, are increase production, extend reserves and reduce costs. It has been realised and proven that this is possible through multi-disciplinary skills and collaboration and use of new and innovative technology. The Centres provide the environment for this collaboration. Improved technology and process innovation will fuel companies' IO ambitions, but the most important driver of change may derive from the industry emerging deficit of professionals in several disciplines. Finding new ways to provide the right (available) people

with the right data at the right time, irrespective of their locations, may be a critical success factor to extend companies' areas of operations and improvement. The challenges and the emergence of technology will give way to both needs and visions of IO@anywhere. A practical example of improved utilisation of human resource is offshore personnel with mobile computers, equipped with appropriate audio visual equipment, supporting onshore experts to "see and interact" with offshore equipment.

So Generation 3 (IO@anywhere) may be characterised by:

- focus on creating value
- ambitions of geographic / location freedom
- freedom from physical centres
- high level of competence utilisation
- outsource ability – interoperable systems.

### Integrated Operations Strategy

Companies will have to consider their options with regard to Integrated Operations in light of their asset capacity, asset portfolio, organisational characteristics and organisational capability. Large Operators can benefit from Generation 3 Integrated Operations leading to creating value, high level of collaboration, competence utilisation. The illustrated "IO Strategy Matrix" extends the concepts of the "IO Maturity Matrix". The purpose is to illustrate various strategic options different Operators, Large & Lean Operators and Multinationals & National Oil Companies may consider, based on their corporate strategic intent as operator.

# Conclusion

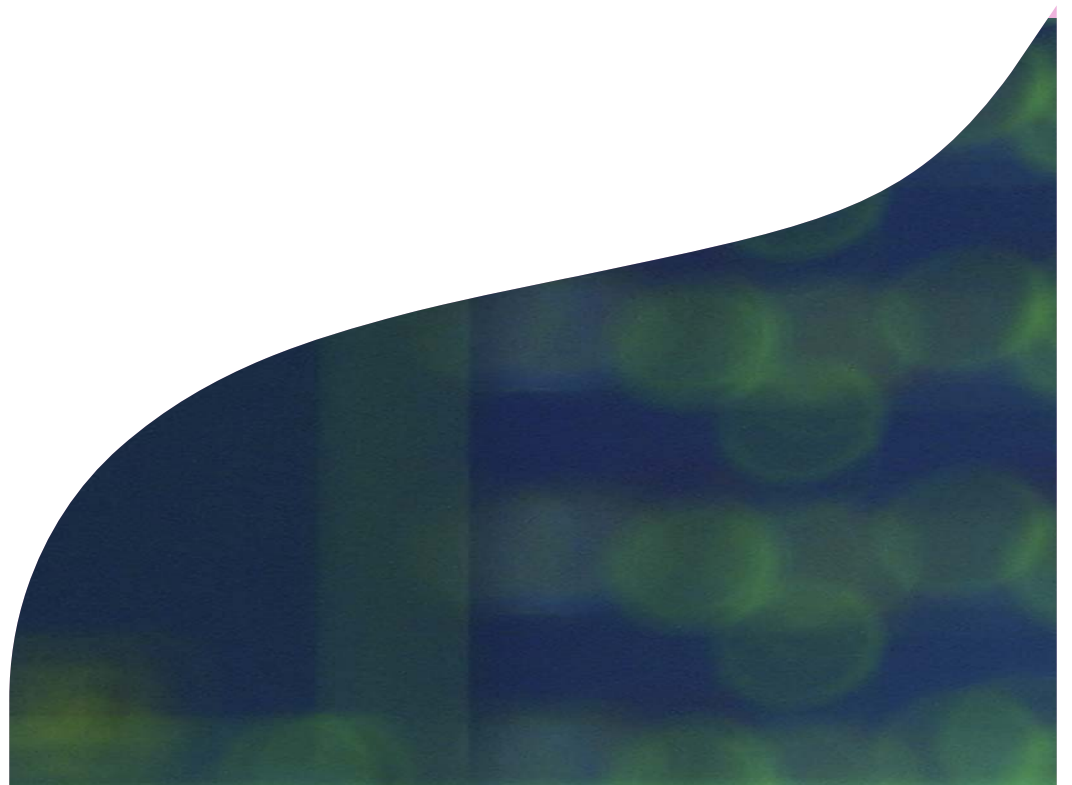
Capgemini now no longer see Integrated Operations as a new topic in the oil and gas industry. The concepts of Integrated Operations have clearly demonstrated the value potential of management and innovation of work processes, human factors and technology. It is recognised that the maturity of Integrated Operations varies significantly between companies, even within the various geographic regions.

In terms of a global perspective the Norwegian Continental Shelf is, in Capgemini's opinion, by far the most advanced in innovation and the uptake of Integrated Operations. However, operators in other oil provinces are not standing still and as both their global and local programmes reach maturity we believe that **IO@anywhere** will be the *modus operandi* for the oil and gas business in the future.

Some key points for consideration:

- Business processes are being modified for the provision of right information to the right people at the right time, at the ideal location, in order to optimise operations and increase HSE.
  - Multi-disciplinary teams with cross training are being formed to work efficiently.
  - The value chain perspective is being extended, to include suppliers in a company's technology, process and change initiatives.
  - The new service oriented business approach, requires a shift from traditional IT architecture to service oriented architecture.
  - Companies have to consider the options for Integrated Operations based on their asset capacity, organisational characteristics and organisational capability.
- True interoperability will require standardisation of data, transport and integration. This will require industry collaboration to develop and join forces to adopt and enforce.
  - Whereas technology and standards may enable data transparency, there is a need to ensure data governance to ensure security, digital rights and to balance the oil industry's need for a competitive supplier industry with the attraction of simplicity.

Beyond Generations 1 and 2 of Integrated Operations, a new generation, Generation 3 "IO@anywhere", is developing which would enable the companies to become lean and efficient and create value through a high degree of flexible collaboration.





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