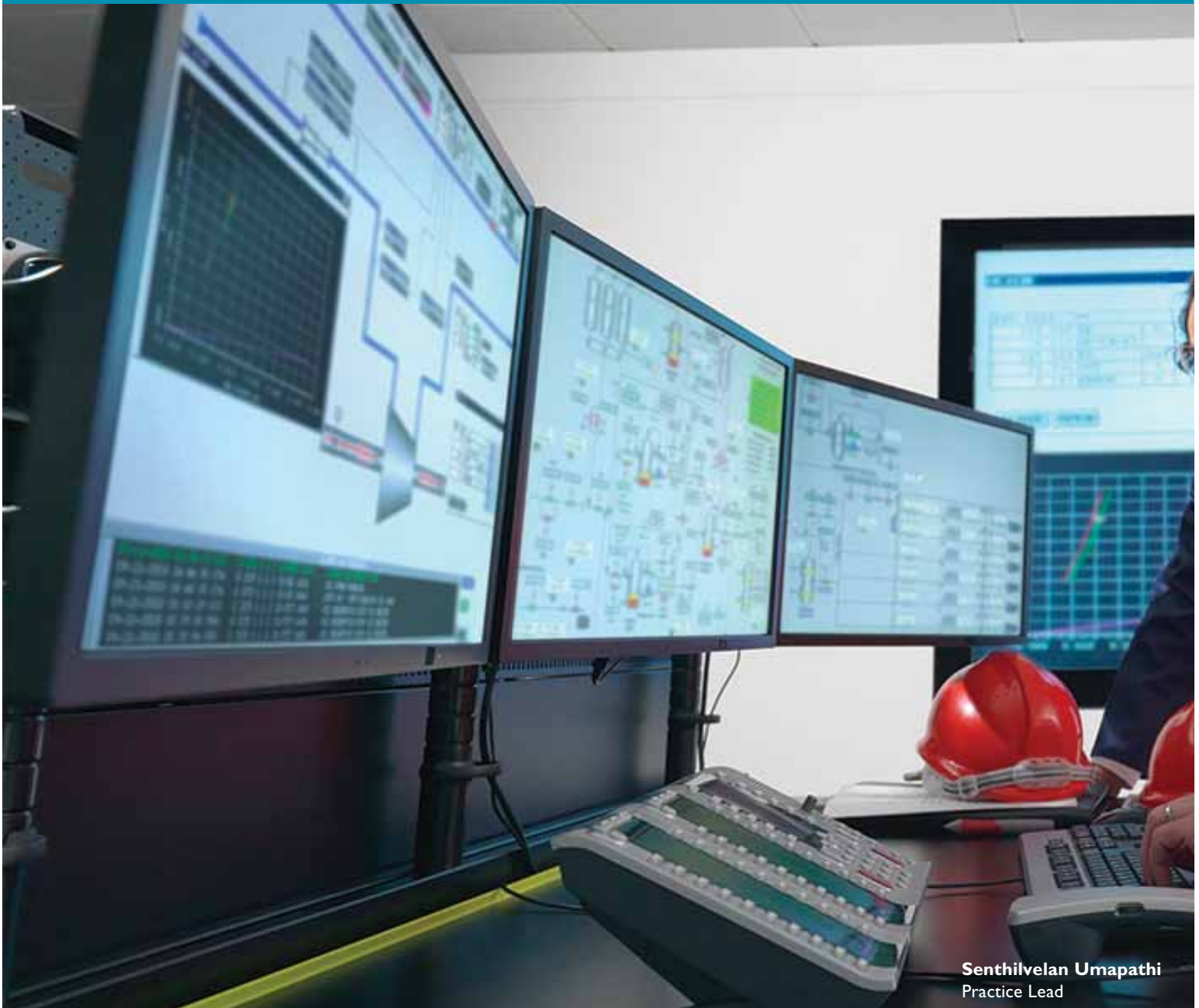


# CENTRALIZED CONTROL CENTERS FOR THE OIL & GAS INDUSTRY

A detailed analysis on Business challenges and Technical adoption.



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## Executive Summary

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Global energy requirements continue to rise. The industry focus is shifting to an integrated approach on the exploration, development and production of new oil and gas resources and refining and distribution facilities. Industry leaders are building various centralized control and monitoring centers in the name of iField-Digital Oil Field, Smart Manufacturing, CWE – Collaborative Work Environment, IRIS – Integrated Refinery Information Systems, etc.

There are other key challenges that the industry faces in terms of forecasting and budgeting and they are exceedingly difficult in the face of the ongoing pricing volatility and many other uncertainties of a dynamic environment on and off the field, not to mention geo-political pressure, the country's economy dependence, sustaining oil fields over the period of time, and finding and keeping experienced personnel to manage the production control centers.

This paper mainly discusses the current business challenges faced by the industry and how an organization adapts to growing technological solutions to overcome the challenges using Centralization of control centers.

# Business Challenges

Industry leaders are turning to a variety of innovative technologies like unmanned control systems, mobile asset management, wireless sensors, robot based monitoring etc. But a few questions need to be answered before taking any investment decisions on these technologies

1. Are these technologies enough to meet the demands of today's environment and are they scalable and expandable for future needs?
2. How do we integrate and synergize the volume of data and details that these systems generate?
3. What are the value additions to the organization in bringing business functions together to improve productivity, cost efficiencies and reduce HSE incidents, etc?

Some of the specific challenges of the Oil & Gas industry are as follows:

1. Number of applications deployed across the enterprise at both the business and production levels to manage and record operations performance. Each application instance has its own unique reference and data model which makes dependencies with multiple vendors for integration.
2. Process tag information and its context to equipment are not conveyed in real-time system integration, thus a heavy reliance on engineering interpretation.
3. Process events and alerts cannot be easily defined, distributed, and subscribed to, across the enterprise to initiate business processes or personnel collaboration, or prompt attention.

4. Production analysis calculations are done off-line, requiring data replication and are not accessible for reuse and access by dashboards, portals and KPIs.
5. Critical Events are captured in 'Silo's and decision are taken in fire fighting mode at local levels.
6. Real time process views are restricted to plant level / production center level.
7. To a great extent, knowledge sharing and cross learning are not happening between the field and corporate centers.

## Organizational approach to new-age solutions

The approach to new age oil and gas systems implementation should consist of a clear road map based on maturity vs. value that it brings to the organization.

1. The availability of advanced technology could greatly shorten time-to-value and increase investment returns.
2. There is an impending need for progressing from field instruments data to integration to intelligence.
3. Collectively, they reflect a holistic view of the field, instead of a fragmented mix of siloed technologies – as sophisticated as each may be on its own.
4. Collaborating the business function and their IT applications including rationalization of in-house applications
5. Enabling predictive and informed operations of plants/assets/clusters

As part of an effective business and IT integration strategy, the solution needs to focus on the Visibility, Governance, and Automation needed to answer the challenges of providing superior operations as follows:



Fig1: Organization Strategy

Any solution to overcome business challenges mainly runs through investment cycle and development cycle and focuses on areas like,

1. Business process streamlining / improvement in workflow
2. Technical area of systems implemented in Corporate and field level
3. Infrastructure for physical and communication
4. Change management including training, up skilling, restructuring etc.

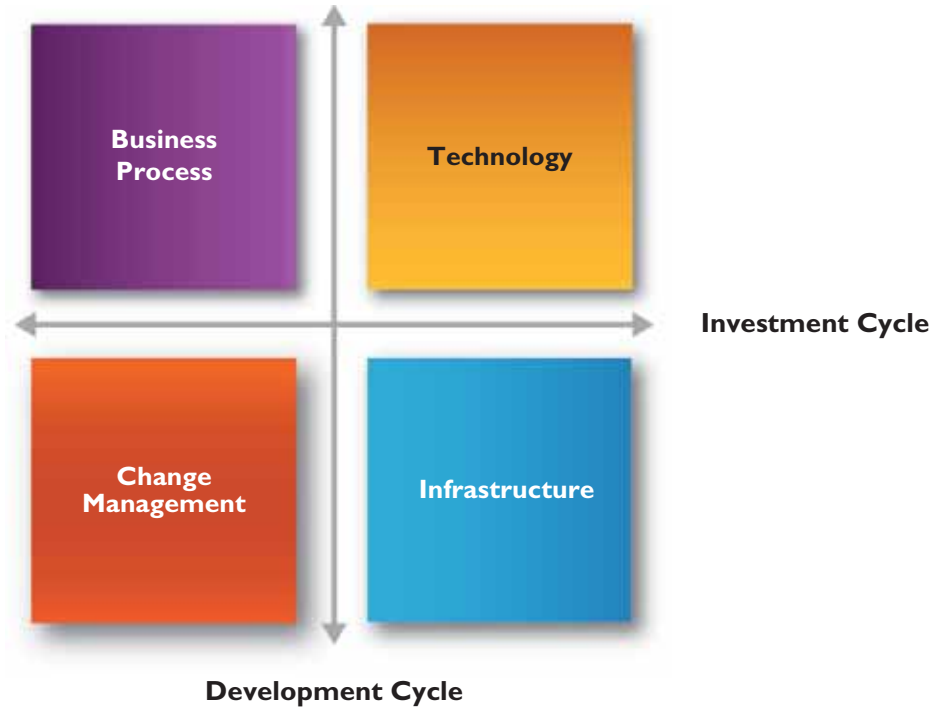


Fig 2: Organization Focus area through cyclic approach

Typically in the upstream industry, many organizations have strategized and implemented major business transformation initiatives to bring the single version of truth across the organization. They keep technological advancements to bring interconnected smart systems by focusing on the following areas:

- Integration of surface and sub-surface data to take advantage of optimization
- Implementing international standards for data transfer using concepts of SOA
- Building necessary workflow for validation and authorization
- Creating centralized repository of data and enterprise level portals

## Current trends and Value Realization

Companies across the globe evaluate various platforms/solutions but their adoption is mainly structured with respect to maturity level and its business value. The level of solution adoption starting from capturing Real-time Data to Asset Optimization to the highest order.

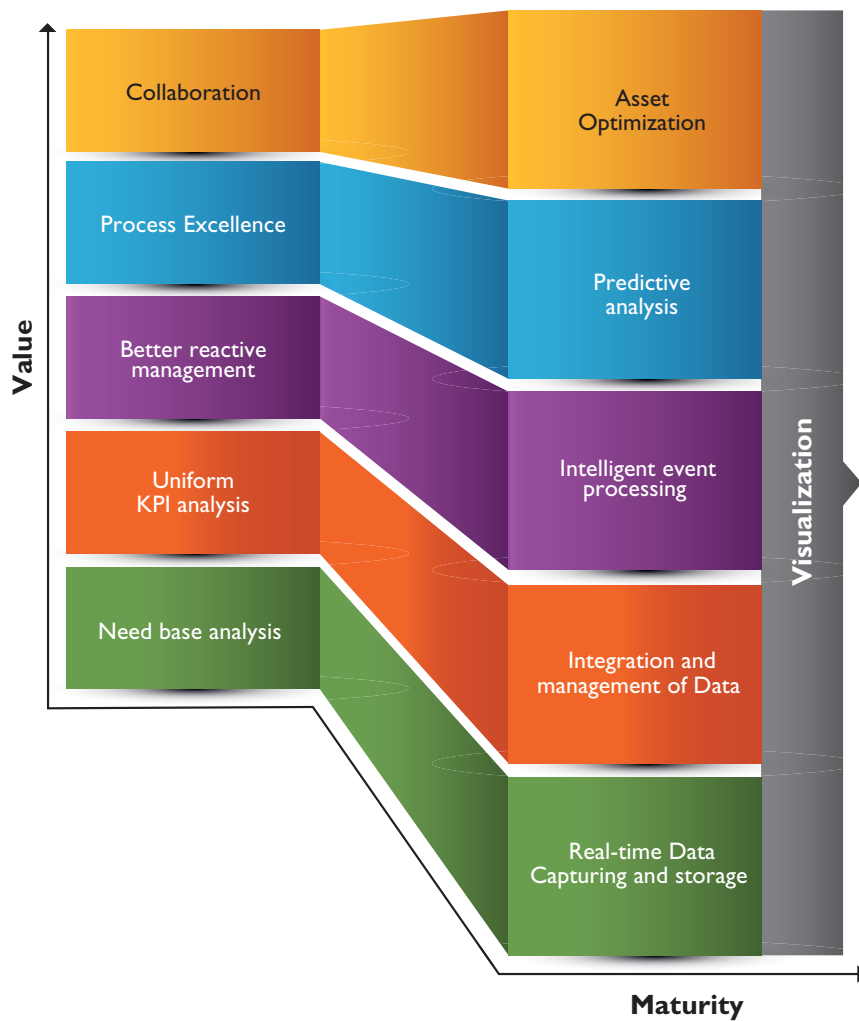
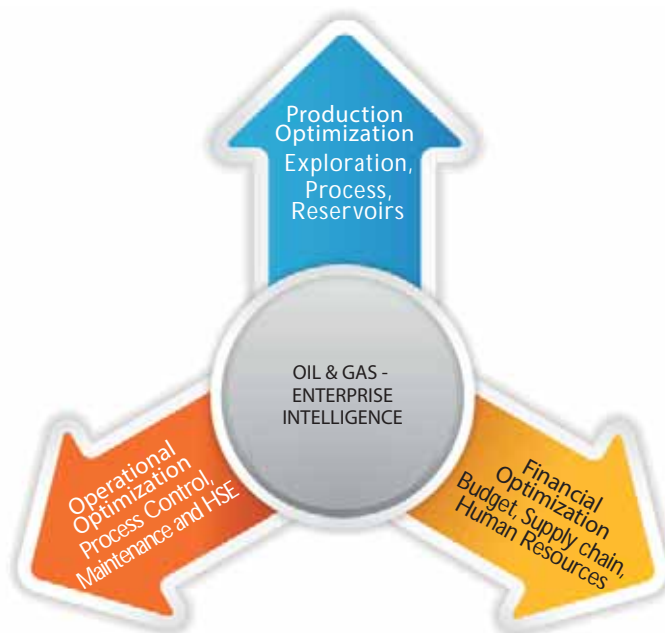


Fig 3: Value Realization

Cross functional synergy is the key for enterprise intelligence and optimization, and is achieved across key functions like Production, Finance and Operations by adopting various technical and process improvements in the field.



Technology adoption has brought the oil majors various benefits at different levels.

Oil Major	Concept	Solution	Business Benefits
US Oil Major	iFields	Monitoring and optimization tools	Anticipating and planning real-time adjustment of operating conditions helps reduce deferrals and improve productivity
Europe Oil Major	Unmanned Platforms	Fully remote, integrated control centre	Minimizes the production operation cost and increases safety for personnel
Middle East oil major <sup>3</sup>	Operations Coordination Center "Big Wall"	Full monitoring from Well to Customer. Functional collaboration of various teams in one place with Real-time data.	Operations: Efficiency in action from 2 seconds to 11 years plan Integration: Best resources at one place with seamless communication
Middle East oil major <sup>2</sup>	Integrated Digital Fields	Collaboration centre for well monitoring and control	Automated work flow enables functional collaboration, make informed decision, better utilization of assets, ease of operations and reduction in time of troubleshooting

The list is not complete as many industry leaders strive to solve business challenges with enablement from technology and products.

Accessing real-time operational and field data through a secured system is currently achievable in many ways. The ability to use real-time data interface with the help of international standards and transforming it into useful information is key. The solution needs to be built by accessing the current level of technical maturity, landscape, people's awareness and process integration in any organization.

Industry leaders are constantly striving to bring new technology to improve 'Top line' and sustain 'Bottom line'. The top management's focus drives companies to develop process re-engineering methodologies and adopt tools to meet their business and technology needs.

# Technology readiness

The technology readiness of Industry is grouped under Business level centralization and Field level centralization. Business level centralization is being achieved through various technology partners in the market who are following SOA and ESB based solutions. In summary,

Microsoft <sup>1</sup>	IBM <sup>4</sup>	SAP <sup>5</sup>
<ul style="list-style-type: none"> <li>Provides architecture framework with performance-oriented infrastructure that includes cloud services, mobility, social computing and platforms</li> <li>Integration and visualization services in the framework are designed so that they can be deployed on-premise or in the cloud</li> <li>The various users/roles in the organization have access to platforms and services wherever they are located through various secured connections</li> </ul>	<ul style="list-style-type: none"> <li>Manufacturing Service Bus is a subset of ESB layer, and it is IT framework for Centralization</li> <li>It has 3 major components, viz Integration layer, Business Process Templates and Service Enablement</li> <li>It supports various industry standards of integration like ISA-95, MEMOSA and OAGIS</li> </ul>	<ul style="list-style-type: none"> <li>Semantics web based architecture helps logically collaborate human and machine interfaces</li> <li>With semantics, we can structure information as flexible as the permanent change of our business required it</li> <li>SAP's solution that supports business research activities, such as market or product research. From a single interface, you can search for information, organize your findings, and collaborate with others</li> </ul>

For the centralization of Field Systems, the integration of Control systems are mainly driven through latest technology called 'Distributed Server Architecture' (DSA). Honeywell specific DSA has an unique capability of allowing seamless "integration" of Distributed Control Systems (DCS) from various locations into a single common unified visualization and control system. This concept of DSA allows multiple DCS systems to share

Point data, Alarms, Messages and History in real-time without mandating duplicate configuration on any server. It requires very little engineering effort to establish DSA.

The centralization of Field System integration for real-time information and the Business system integration using SOA helps industry to build seamless Centralized Control Centers.

## Conclusion

Integration and centralization of field level systems is the nucleus of Centralized Control Centers. The optimization, planning & scheduling, performance monitoring are the functions at corporate level are to be built around it. The data requirement for all such requirements starts from near real-time data to historical data up to few years.

The level integration and centralization is decided based on the values that organizations intend to realize, also, the technical maturity that an organization posses and technology availability in the marketplace. Effective blend of value realization through technology readiness brings successful Centralized Control Center.



## Appendix I: References

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1. Microsoft – Mura : <http://www.microsoft.com/MURA>
2. International Digital Oil Field Conference – Oman edition
3. Saudi Aramco - Operations Coordination Center
4. IBM – SOA architecture framework for Manufacturing
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## About the Author

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Senthilvelan is an experienced professional with a strong background in the oil and gas industry. He holds a graduation degree in Instrumentation Engineering and a Masters degree in Information Technology. He has 13+ years of working experience in Oil & Gas, ERP, Integration and Terminal, and Retail Automation with oil majors such as Shell, BP, Chevron, Indian Oil Corporation, ONGC and PDO.

## About Wipro's Energy, Natural Resources, Utilities and Engineering & Construction (ENU) Strategic Business Unit

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Businesses across the globe, over the last decade, have established us as a trusted partner to address their business challenges using our deep industry domain competency and technology expertise. We have over 6600 dedicated consultants serving businesses in the oil & gas, mining, water, natural gas, electricity, engineering and construction industries. Having a strong relationship with over 40 large customers spread across Americas, Europe, India, Middle East, Southeast Asia, Australia and New Zealand, the ENU SBU has been continuously investing in building competencies to help our customers do business better. In 2011, Wipro acquired SAIC's Global Oil and Gas business unit, reinforcing its focus on this industry. We understand your business, to help you do business better.

## About Wipro Ltd.

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