

# Emergence of the Main Information Contractor (MIC) in the Era of Large-Scale Capital Projects

*Information management is serious business for large-scale capital projects.  
Is it time for a Main Information Contractor to do the job?*



Capital projects for oil and gas companies have grown to enormous scale over recent years. The “mega” project is now being shadowed by projects of even greater scale: new construction with price tags of tens of billions of dollars. With great scale comes greater risk and complexity, and many of the functions previously thought of as basic or foundational are becoming mission critical disciplines in themselves.

With the revival of the oil, gas and downstream process industries, many new projects are being planned around the world; including new liquefied natural gas projects, ethylene plants, polymer plants, and many other gas, petroleum, and chemicals products. These new plants provide an opportunity to utilize new information more effectively without requiring the complexities and investments needed to retrofit existing plants. New technologies and capabilities promise seamless integration, enhanced visibility into performance, control and optimization, real-time reaction to and mitigation of events, enhanced root causes analysis, and even improved prediction of events before they occur. These capabilities in turn can support new levels of performance in production reliability, safety, yields, and overall gross margins.

Therefore, effective **information management (IM)** throughout the asset lifecycle has become more critical than ever before. Many projects now involve multiple EPC (Engineering, Procurement, and Construction) contractors or are utilizing many complex configurations of joint venture teams or organizations, all who must interact and collaborate with common information sets across a variety of functions. The various phases of activity, be it in preliminary planning, FEED (Front End Engineering Design), detailed design, construction, start-up, handover and ongoing operations and improvement all have complex and different information

requirements. At the same time, the integration of information between the phases of FEED-build-handover-operate is also increasingly critical. How engineering information is designed and used profoundly affects how operational information will be used.

Good **information management** can now even more directly influence the success or failure of the overall project while also creating significant financial impact.

With so much risk and opportunity at stake, the traditional approach to IM should be re-examined. Today, it is often an afterthought once the primary EPC has been contracted and the engineers have moved into planning. The IM strategy might be delegated to the EPC during the design phase and not be tightly coordinated with the operational IM strategy and architecture. It may be directed by an organization whose primary competency rightly lies elsewhere, such as in engineering or managing production operations. The tools, approaches, methodologies, access to technology, knowledge of the state-of-the-art in information management and other technological aspects may be secondary to the organization’s primary competency.

Too often, it seems, IM strategy and programs are a *reaction* to the engineering or operational strategy, not a purposeful, driving and aligned force within them.

The right information standards, strategies, architectures, applications and governance can drive the efficiency of IT, the ability to collaborate, the ability to launch a successful operation, and the ultimate ability to realize the true value of the asset.

Given the volume of capital that is at stake within large-scale capital projects, owner/operators are beginning to evaluate new models of designing and deploying their IM strategies. The most promising may be the establishment of a **Main Information Contractor (MIC)**, a third-party organization that specializes in leading information practices. The MIC concept is analogous to that of the Main Automation Contractor (MAC), which has evolved over the last decade or so into a separate function designed to coordinate the integration of plant automation. The MIC concept relies on close alignment with the various stakeholders to obtain design standards and information from EPCs, capture the accountability requirements from owner/operators, and integrate a comprehensive information management environment that drives new success into collaboration and project outcomes, and streamlines handover processes, all while saving big money in day-to-day operating costs.

The MIC helps all participants involved in the creation, launch and use of the new asset:

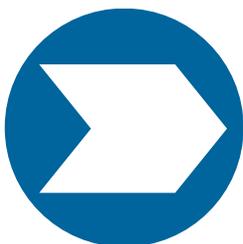
- **EPCs** are able to focus on what they do best while benefiting from a superior integrated engineering information environment
- **Project teams** are able to better collaborate and access more consistent and higher quality information

- **Corporate IT** can benefit from physical infrastructure innovations, enhanced data security, and better support interoperability with back-office systems such as ERP, finance, HR, and supply chain
- **Engineering** can better manage, coordinate and use engineering documents and data through more efficient transmittal processes
- **Operations** can realize an expedited and higher quality handover and capitalize on better access to information required for operations and maintenance

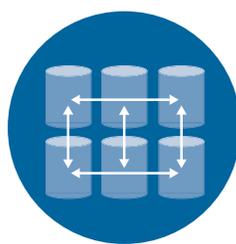
The opportunity for improved IM is powerful and multi-fold. The owner/operator pioneers that pursue it will improve their control and access to capital project originated information.

### New Views of an Optimal, Modern Main Information Contractor

Upon understanding why an MIC may be needed, the next step is to define what they should do, understand and be competent at. To do this, we can examine the various ‘views’ an MIC would have responsibility for designing and managing. The value in understanding these views is two-fold: it demonstrates the relative complexity of the IM challenges at hand and also creates a basis for determining how the challenges should be addressed in specific ways. Three important views include:



1. Planning for the **Asset lifecycle**



2. Enabling **Interoperability**

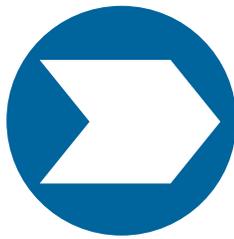


3. Excelling at **Information management**

Figure 1: There are three important views for which an MIC is responsible.

Taken together, these begin to frame the case and scope of a good MIC.

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### 1. Planning for the **Asset lifecycle**

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Capital projects are often represented by the sequence of events in their design, deployment and management. IM becomes increasingly important starting in pre-FEED in preparation for and to expedite operational readiness. During the project, EPCs, suppliers, owners and other contributors access design and engineering data in order to collaborate and fulfil planning and design activities. During this time, the information processes and architecture necessary to support the *operational state* of the asset are planned. The transmittal and handover of engineering deliverables, consisting of drawings, specifications, standards, and other information and data provides accelerated visibility and access to information necessary to support operational readiness.

Throughout the asset development cycle, high quality information management practices and architectures raise both the quality of the outcome (e.g. the quality of engineering and operational readiness) as well as the efficiency of the activity itself (e.g. the cost of managing data, the speed of fixes, the fixing of data errors, etc.).

Most owner/operators recognize the value but face challenges when trying to combine these different phases of the asset lifecycle from an information point of view. Poorly designed information processes in the design phase may hamper engineering outcomes and ultimately delay operational readiness. Because of this, special care and approaches are needed to assure that each phase of the process has high-performing IM practices and that the IM strategy coordinates and aligns across the entire lifecycle.

Using this end-to-end approach, the MIC begins detailed IM planning during the pre-FEED and FEED stages. Throughout engineering and construction, the MIC will ensure that engineering platforms are both optimized for collaboration and facilitating design and construction work as well as being aligned to support future operational requirements and systems.

The MIC should help manage and support IM operations after deployment. IM systems deployment and integration should be closely aligned with the project schedule, commissioning, and start-up. Resolution of issues may be more efficiently resolved and cost less at project planning and design stages than during construction and start-up.

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### Can an MIC shorten time to first production?

A powerful case can be made that improved IM planning and processes can speed the time to first production and revenue generation. Through advanced coordination, the reduction of errors and rework, the mitigation of unexpected obstacles and other factors, an MIC could reduce the time needed for handover and start-up, thereby creating material benefits. These benefits can be represented by a reduction in capital project costs and accelerated revenue generation and can easily make the economic case for use of the MIC concept.

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**Pre-process IM planning**

IM and architecture planning before contractors are engaged

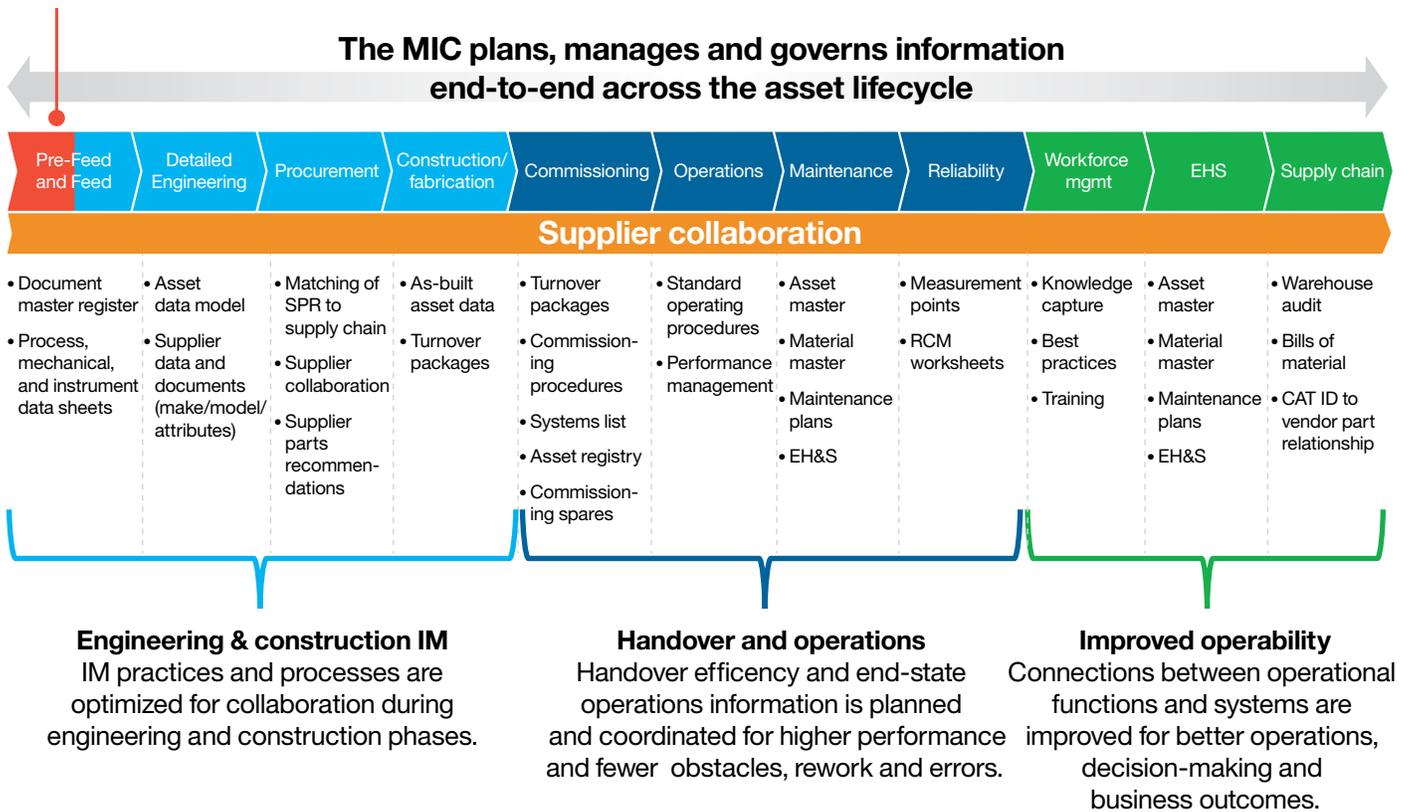
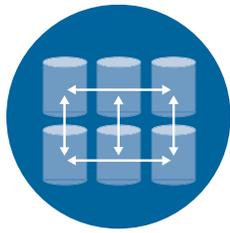


Figure 2: The MIC plans, manages and governs information end-to-end across the asset lifecycle.



## 2. Enabling Interoperability

An MIC can also help improve *interoperability* between systems throughout the development and operation of an asset. An owner/operator enterprise is not just an outcome of the production asset. Information that originates from a production asset, such as raw material consumption, production volumes, maintenance costs, resource or capacity shortages and other operational factors, also affects how other departments like finance or HR make their decisions. Conversely, outcomes of sales, customer service, inventory supplies, market trends and other external data may affect decisions made on the production level of the asset. An MIC can support selecting, architecting, implementing and integrating core IT systems to improve system and function collaboration and interoperability. Some are beginning to think of IM planning, deployment and management in terms of ‘dimensions’ that extend beyond the first task of engineering in capital projects.

In this view, IM planning may start with one area (say, engineering) and then grow to include others so that they inform and interact optimally, sharing common data and configuration, ensuring high-quality data, a single version of the truth, and automating or improving key functional tasks such as real-time inventory management or improved financial projections.

### Dimensions may include:

- **3D – Design and coordination** that can include engineering design activities (e.g., 3D modeling, discipline tools).
- **4D – Scheduling and sequencing** such as scheduling and progress planning and monitoring, and performance management.
- **5D – Finance and cost** activities such as estimating, cost management (budgeting, commitments, actuals, forecasts, trends), accounts payable/receivable, and financial reporting impact.
- **6D – Procurement** activities such as bid cycle management (e.g., quantities/volume), supplier/partner management, and materials management.
- **7D – Operations and maintenance** functions such as work management, condition monitoring, plant historian and predictive maintenance.
- **XD – Or other** functions such as environmental, health, and safety considerations, regulatory compliance, commodity trading or other key activities.

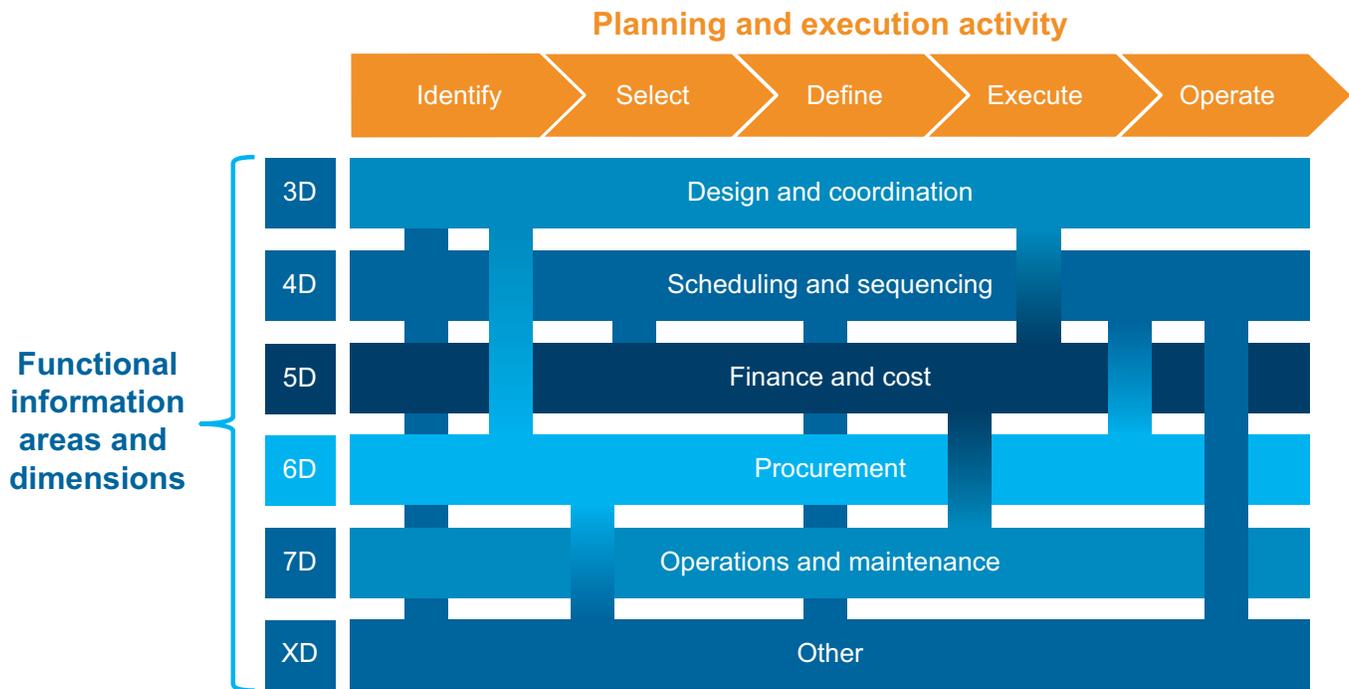


Figure 3: Planning and execution activity

While certain skills, such as those possessed by EPCs or operations, may be required during certain project phases, the optimal MIC must have comprehensive skills in critical areas such as data architecture, systems integration, emerging information technology, and a holistic view of the business considerations of an asset. It is unlikely that the EPC, whose core competence is in engineering and construction, can alone

provide the skills necessary to excel in this increasingly complex environment. Further, there is a general misalignment between an EPC's commercial and incentive structure and the requirements of the owner/operator's production data link to finance systems or how well materials and human resource data is linked to work management, planning and scheduling systems, for example.



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### 3. Excelling at Information management

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A third view into how an MIC can excel at IM for large-scale capital projects is to consider how well they understand *information management* and *information technology* as primary disciplines themselves, above and beyond the specifics of information for engineering or operations. Today's technology evolves very quickly. Consider the emergence of cloud as an infrastructure strategy, the adoption of tablets and mobile devices among field operators, new approaches to system integration, to new development methodologies such as Agile. Being immersed in technology is a key competency in IM, and only those who bask in these areas can keep up with new changes, adapt IT approaches quickly and truly drive new innovation in the space.

A technology-focused MIC will have the capabilities to design and build technology solutions throughout the asset development lifecycle (e.g., identify business needs, select and vet applications, define requirements and portfolio decisions, implement technology, operate and maintain technology solutions). They will be able to do this across IT focus areas/competencies such as developing IM strategy, creating data standards and processes, configuring applications, and designing the right information architecture.

This factor may be one of the most compelling reasons to engage a third-party MIC to manage IM operations across the engineering/operation lifecycle and to ensure enterprise technology interoperability. A firm specializing in enterprise technology will most likely have the best access to and knowledge of new technology, the most exposure to the greatest number of tools, a deep base of skilled technology professionals, dedicated R&D capabilities in technology, access to infrastructure, and an arsenal of proven methodologies and intellectual assets that will improve technology performance and speed outcomes.

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#### The MIC enables an intelligent asset

IBM has a vision for an asset that is Instrumented; Interconnected; and Intelligent. It has capabilities to visualize performance, predict events before they occur, effectively mitigate events, and identify optimum operations under different conditions.

Designing new assets provides an opportunity to utilize new information technologies more effectively without requiring the complexities and investments required to retrofit. These technologies can support seamless integration, enhanced visibility into performance, real-time reaction to and mitigation of events, root causes analysis, event prediction before it occurs, and integration and utilization of back office and front office ERP systems.

During the capital project design phases, an MIC can help properly design and implement these emerging technologies and incorporate leading practices to build towards the vision of an intelligent asset. The historical and current paradigm used to build most process plants in operation today typically relies on the EPC to design and manage the implementation of the business and manufacturing information systems, using subcontractors as required. The emerging new paradigm recognizes the importance of information technology expertise for both business and manufacturing and utilizes a Contractor with core competence in these areas. In simple terms, it allows the EPC to focus on engineering, procurement and construction while the MIC focuses on the IT applications and systems.

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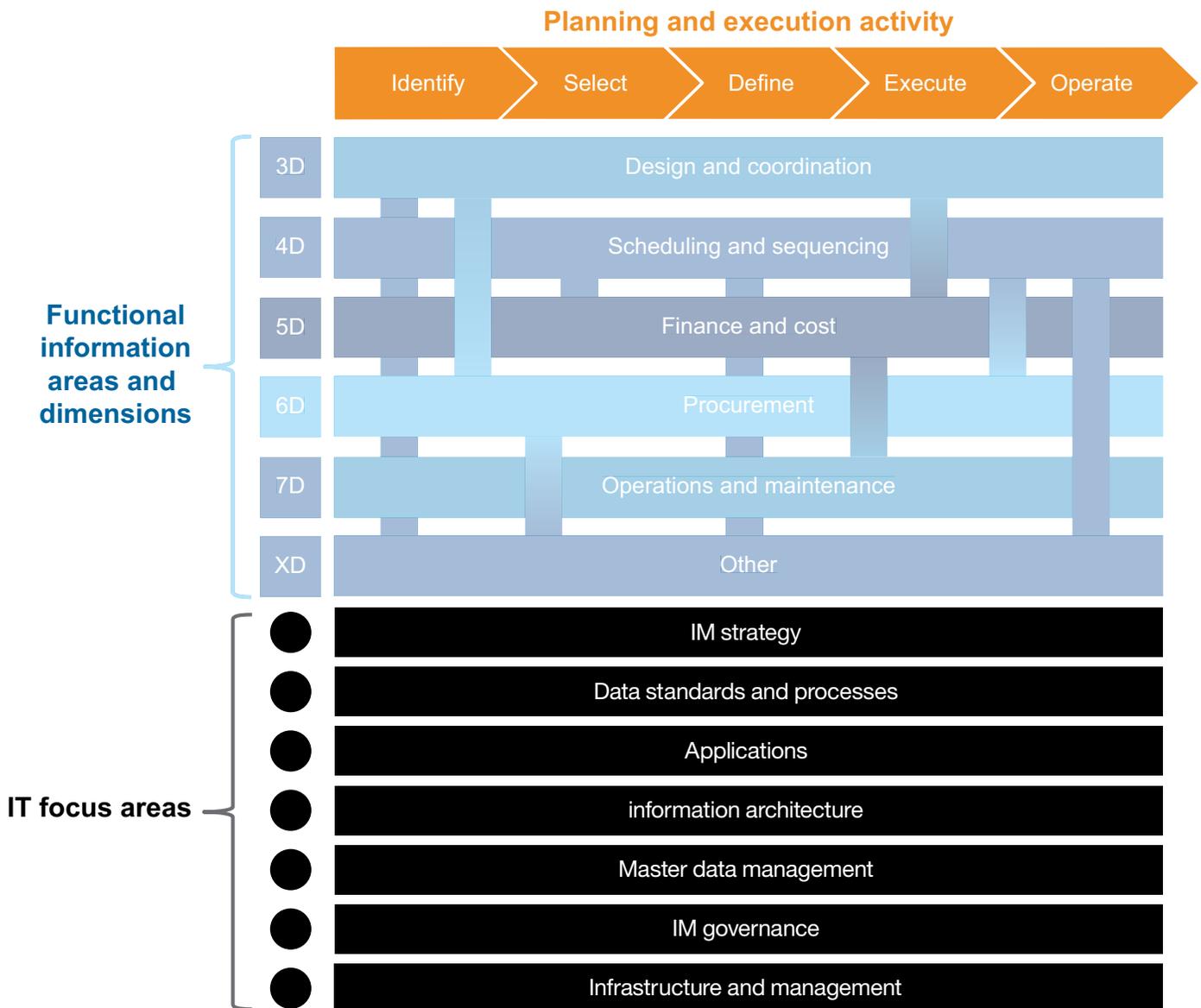


Figure 4: IT focus areas

## Who should serve as a Main Information Contractor? Does a Dedicated MIC Make Sense?

The case for taking the IM function in major capital projects as a serious, purposeful, organizational and strategic endeavour is compelling, especially when the implications of doing it right can help a lot more than just getting the asset up and running. In particular, it is the transition during handover, into day-to-day operations and ultimately its interoperability with the enterprise technology portfolio that is making it such a sprawling, complex and critical function.

When evaluating how to approach the IM function, owner/operators should first consider some key attributes of the project, such as:

- Business case and market conditions
- Project size and complexity
- Greenfield vs. Brownfield
- Development and sourcing strategy

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### MIVs and MACs: are MICs the next step?

Some automation vendors have been offering “Main Instrument Vendor” (MIV) services to EPCs since the mid 1990s, and many have seen this evolve to the concept of a Main Automation Contractor (MAC) to EPC and ultimately to owner/operators in the early 2000s.

The MIC is likely the next evolution in this progression, with the key benefits of the MIC being:

- A larger focus on the entire lifecycle of the asset, not just design or construction
  - More focus on interoperability with back-office systems
  - Deeper competencies in IT and IM
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Next, the owner/operator should determine who should develop the strategy, plan, and execute the IM program. Having the EPC manage the function is the traditional approach. How does an MIC stand up to comparison? Table 1 shows a quick comparison when considering who should own the IM function.

Traditionally, the primary EPC has been a capable provider, and their raw industry knowledge about engineering data and practices is difficult to match. But when scrutinized for how well they can facilitate complex technology, handle operational IM and be strategic within interoperability concerns, they may be better suited as expert advisors and contributors to the IM organization, but not in charge themselves.

Owner/operators have the greatest at stake when it comes to successful IM. They require success across the entire capital project’s lifecycle and align business objectives to the asset producing, not just being built. They also have the most intimacy and knowledge of the operations and interoperability aspects. This said, the same case for a strategic technology partner in capital projects is the same for having one for enterprise technology: an external partner can provide extra-organizational competencies and capabilities often unavailable internally, often at a superior cost structure and all while enabling the owner/operators to focus on what they do best—manage their core business of producing oil and gas.

It’s possible that hybrid, consortium or other alternative approaches could work. Centralizing accountability that encompasses the entire asset lifecycle will likely be key. Once the IM conversation starts, other options can be explored.

Then there is the MIC. As discussed earlier, the MIC is independent and likely reports directly to the owner/operator. They are able to bring deep technology skills and practices, advocate for complete views across the entire end-to-end capital asset development lifecycle, and delve into interoperability within the enterprise portfolio. In the end, they may be able to do this all at the same relative cost of IT as traditional approaches or even cost less in the medium- to long-term.

<b>Owner ► Consideration:</b>	<b>EPC managed</b>	<b>Owner/ Operator managed</b>	<b>Main information contractor</b>
<b>Strengths</b>	<ul style="list-style-type: none"> <li>• Excellent industry and engineering knowledge</li> <li>• Highly dependent on getting engineering data/platform right</li> <li>• Traditional player with track record</li> </ul>	<ul style="list-style-type: none"> <li>• Fully aligned and vested in outcomes across the entire lifecycle</li> <li>• Most knowledge of existing production processes and data</li> <li>• Maintains ownership and accountability centrally</li> </ul>	<ul style="list-style-type: none"> <li>• Able to centrally manage IM strategies across the entire asset lifecycle</li> <li>• Able to support interoperability across the enterprise technology portfolio</li> <li>• Deepest technology and IM capabilities and skillset</li> <li>• May provide additional scalability/agility not otherwise available</li> </ul>
<b>Weaknesses</b>	<ul style="list-style-type: none"> <li>• IM practices and technology are not a primary core strength</li> <li>• May default to their own preferred IM strategy vs. meeting Owner IM objectives</li> <li>• May lack interest/skills in operational IM and interoperability</li> <li>• Potential commercial conflicts between project outcome and asset value</li> </ul>	<ul style="list-style-type: none"> <li>• IM and IT may not be core strengths</li> <li>• Engineering data knowledge may be less than external players</li> <li>• Internal resources may be too constrained or limited, or may be better suited for other tasks</li> <li>• May be cost prohibitive</li> </ul>	<ul style="list-style-type: none"> <li>• Engineering data knowledge may need to be augmented through EPC participation</li> <li>• Adds an additional party/stakeholder to overall environment</li> <li>• May create organizational redundancies if not properly managed</li> </ul>
<b>Cost/benefit considerations</b>	<ul style="list-style-type: none"> <li>• Neutral costs per traditional standards</li> <li>• Potential negative cost benefit due to need for systems rework in the operational phase</li> </ul>	<ul style="list-style-type: none"> <li>• May incur additional costs</li> <li>• May lack deep IT expertise impacting costs</li> </ul>	<ul style="list-style-type: none"> <li>• Possible neutral or preferred cost advantage</li> <li>• Potential medium term cost benefits through improved project phase execution</li> <li>• Long-term cost benefits through improved information access and reduction in systems rework during the operational phase</li> </ul>

Table 1

**EPCs should embrace the MIC concept**

EPC firms will likely find themselves as critical advisors if not key decision makers in determining the approach to Information Management during early planning phases. EPCs stand to benefit greatly from partnering with an MIC and should advocate for a partner they believe will deliver extraordinary outcomes. By doing so, they will enrich the overall project both during and after their own participation. They will ensure that post-launch operations and interoperability are high performing. They will also benefit from higher information and system performance during their own critical activities, creating a more productive and efficient engineering process. Lastly, by engaging an MIC the EPC will be able to focus their energies on what they do best: engineering, procurement and construction.

**MIC: the right choice**

We believe that there is a strong case for owner/operators to pursue the MIC option, especially as projects continue to grow larger and more complex. As owner/operators begin their initial conversations and their deeper analysis, they should look for certain characteristics in their MIC partners that would indicate a good match. These may include:

- **Independent and objective** toward EPCs, technology, staffing approaches and operating models
- Having **information management and information technology as their primary competency**
- **Scalable and flexible** in their delivery models, able to work globally or in multiple locations with flexible capacity
- **Technology and technology-trend savvy**, with a keen knowledge of new approaches, emerging technologies and industry trends
- **Equipped** with proven, demonstrable methodologies, intellectual assets, tools and accelerators
- Deep oil and gas industry knowledge, including **deep expertise** throughout development, engineering, construction, and operations
- Large populations of **deeply skilled information management resources**
- An **ability to innovate**, including R&D investments in engineering and oil and gas solutions

**Conclusion**

When capital projects are enormous, nearly every feature and factor is magnified in its importance. Everything is big money and worthy of doing right. But that's just the beginning of why IM must be elevated in strategic importance. Information is the new blood of the smarter asset, where intelligence, accuracy, quickness, agility and smart decision-making all rise in importance. Nominal savings or tweaks to IT costs are not the point; the point is to take the critical information assets and make them work sooner and at superior levels for the benefit of the engineering project, the handover, the operation and its operability within the enterprise technology environment. Good IM can't be a reaction to the engineering process; it must be substantiated at its inception and live throughout in perpetuity. This is partly why an MIC—an information-savvy organization with the ability to enable and enhance the use of information throughout the life of an asset—is critical, and why those looking to capitalize on it are putting the idea at the forefront of their strategic capital project conversations.

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