



## **Achieving Integrated Operations and Unit Efficiency with the IBM Chemical and Petroleum Integrated Information Framework**



**Achieve integrated operations and unit efficiency through the IBM Chemical and Petroleum Integrated Information Framework (C&P IIF).**

Companies can achieve improved and quicker decision-making across chemical and petroleum business operations through a new real-time integration approach by IBM. Called the C&P IIF, this unique and powerful framework enables solutions providing sophisticated analysis through new business insight, collaboration, and connectivity leveraging the large and complex array of existing disparate assets that chemical and petroleum operations utilize.

*Highlights:*

- *Improve productivity from real-time visibility of measurements in the context of equipment*
- *Reduce costs leveraging federated information providing performance comparison across multiple assets across the enterprise*
- *Reduce planned and unplanned shutdowns, increase production and decrease maintenance costs based on enterprise wide event based information*
- *Speed decision making with enterprise wide access to real-time process performance relative to KPIs*
- *Create agility to incrementally expand across additional assets and processes*

A new vision across intelligent oil fields, pipelines, refineries and chemical plants enables operational leadership to visualize and act upon critical operational data and process in new ways to make better business decisions, boost production, decrease operational cost and increase overall efficiency. This vision for better integrated operations and production is enabled by the IBM Chemical and Petroleum Integrated Information Framework (C&P IIF), a new approach for accessing disperse control system, historian and asset data and delivering it to key users and systems in a context ideal for taking smarter action and improving business process execution. The C&P IIF delivers new business benefits by utilizing distinctive new technology approaches, including the Reference Semantic Model based on industry standards, web browser visualization software, and enablement in an open Service Oriented Architecture (SOA). IBM delivers this new framework, composite business services and approach to leading chemical and petroleum companies ready to take a next step toward enterprise web services enablement. We bring the tools, experience, approach, software, and the people to make the C&P IIF a reality at your company through a low cost, incremental and proven solution approach.



## The critical objective for information and integration in the oil, gas and chemical industries

The ability to make timely, smart business decisions about oil field operations and production performance directly drives the overall effectiveness, efficiency, and production of the range of tasks in upstream or downstream oil fields plus the key assets working it. Unfortunately, at most chemical and oil production operations, the information needed to make these vital business decisions is often “too little too late” to be truly effective.

The challenges are many. Operational managers such as production supervisors do not have timely and contextual visibility of their field assets. Data standards may be tied to each different equipment type, and critical business information is delivered via crude alarms or belated reports, and often not in a context that promotes better understanding or action.

From the technologists' view, the system environment is too diverse and chaotic. Hundreds or thousands of data instances are kept and managed differently; data is tracked in different conventions and systems; and few common definitions or standards exist. The concept of integrating all of this information seems impossibly expansive or expensive. In many operations, both business and IT leadership must abandon their vision for actionable, integrated, contextual production data. It's just too hard to achieve.

## IBM has an answer: The Chemical & Petroleum Integrated Information Framework (C&P IIF)

With a unique combination of business-focused capabilities and an inventive, leading-edge technology solution, IBM can help chemical and petroleum production operations achieve their vision for integrated operations or smart manufacturing supporting increased profitability and safety. This new approach is called the Chemical & Petroleum Integrated Information Framework (C&P IIF).

The image below shows how different users and systems access new business value in the C&P IIF landscape. This is supported by key C&P IIF technology components that bring together information from a diverse and complex system environment.



## Value of C&P IIF to the Chemical and Petroleum Enterprise

The C&P IIF transforms how business users view and interact with their oil field assets and teams. The C&P IIF provides production decision-makers with new or improved capabilities:

- **Visualization of contextual oil field information:** *View the entire oil field in a fast and intuitive graphical interface, running on a very thin client, where data from every sensor and machine is presentable in clickable, hierarchical levels of detail, ready for analysis and decision making.*
- **Better decisions utilizing sophisticated measurement and predictive analysis:** *Perform deeper and more sophisticated analysis of oil field production, viewing all KPIs and measurements in the right business context, for both real-time decision-making and operational planning.*
- **Intelligent alerts and event management:** *Work with intelligent, predictive, sophisticated alerts that drive information and action to both human and system participants.*
- **Optimized automation and integration:** *Provide an open enterprise data and process integration framework for existing and new manufacturing applications*
- **Expert collaboration:** *Enable or extend the ability to collaborate with experts on challenges and solutions instantly via collaboration technologies, shared information, all available from an exciting new vision of the business control room.*
- **Enterprise connectivity with ERP and other systems:** *Share critical operational information with other enterprise applications, such as procurement and ERP, enabling extended business users to better plan, forecast, and respond to business imperatives.*



### The C&P IIF Technical Solution

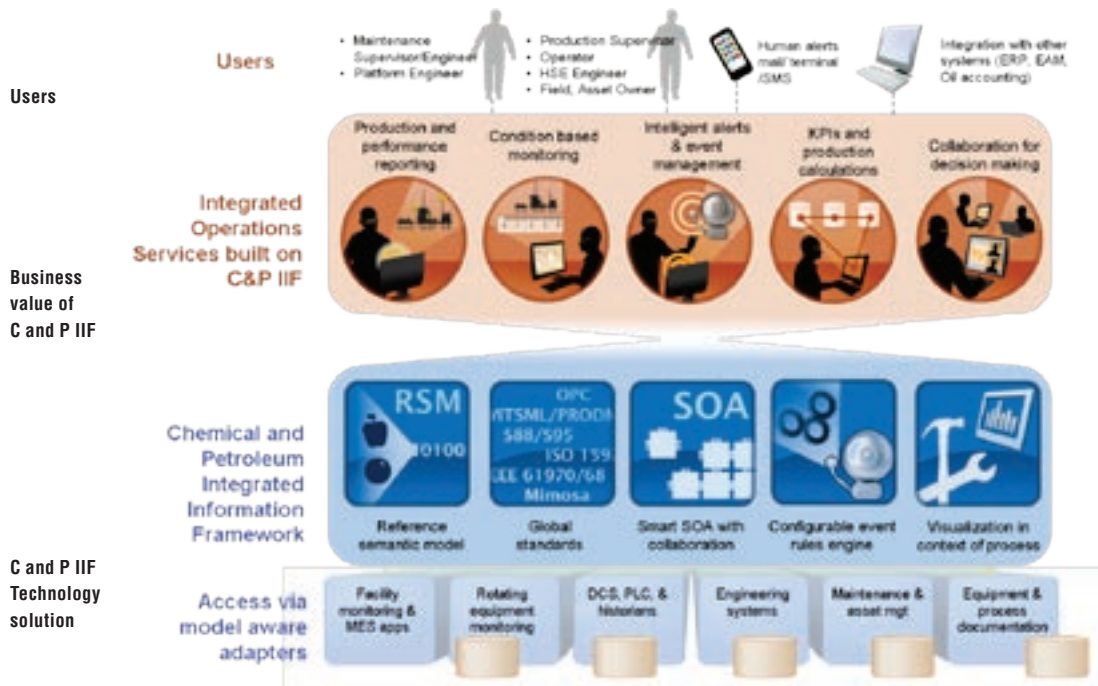
The C&P IIF is enabled by distinctive, leading edge technology practices that make realizing these capabilities viable, affordable, and flexible in even the most complicated system environments. Most importantly, using SOA and other techniques, the approach does not require a replacement or transformation of the existing IT environment, but instead embraces the past IT investments as a foundation for the future, building new and flexible data integration capabilities only previously imagined.

Based on experiences from our global Petroleum & Chemical projects, IBM has built a Unified Markup Language (UML) model that links to the key industry standards and techniques for representing process equipment and related measurement data, documents, reports and specifications. C&P IIF enables the management of a previously overwhelming array of disorganized process tag information and creates the ability to

“name” and locate that information for an entire enterprise. The C&P IIF uses this model to manage large volumes of process tags and document information without having to know the specific name of a process tag.

### The C&P IIF technical solution has five distinguishing characteristics: *Reference Semantic Model (RSM)*

The RSM repository maintains meta data defining the relationships of the enterprise components as described by industry standard ISA SP95, with a consistent data and object naming service. It is technology neutral lingua franca to reference the framework plant model based on recognized global chemical and petroleum industry standards. The RSM provides multiple enterprise hierarchies that models relationship between process equipment, measurements, and document connectivity. This supports visual perspectives on the model (i.e. process view, unit view) and provides role-based information that traverses different capabilities.



### Sources

Figure 1. The Framework Landscape

The RSM ontology is a federated access to data, not a “replication”, meaning that data remains in emitting systems avoiding expensive replication in data warehouses. The RSM facilitates the exchange of information and does not constrain the way applications implement the information contained within the model. This enables a dual success: we get the benefits of an integrated data set while the source data remains untouched. As a result, the RSM is not just a data model but also contains the processes deemed important by the customer.

### *Global industry standards*

Central to the RSM’s ability to translate data is the use of global industry and technology standards. Using global standards, as opposed to using a proprietary set, speeds the creation and upkeep of the RSM across the hundreds of diverse data sources. The mix of standards may be applied to best represent the varied aspects of oil operations. For example, a high quality solution may use OPC & WITSML/PRODML for information mapped to the RSM ontology, Measurement Values functions, and classes; ANSI/ISA-88/ANSI/ISA-95, ISO 15926, IEEE 61970/68 for asset and physical hierarchy representation; and Mimosa for asset life cycle management.

### *Smart SOA Approach*

A Smart SOA™ approach is an architectural strategy that enables new functionality to be rapidly deployed without a “rip n’ replace” approach to old systems. It creates a win-win for technology and business stakeholders alike: new systems and capabilities can be enabled while technology investments from the past are leveraged forward.



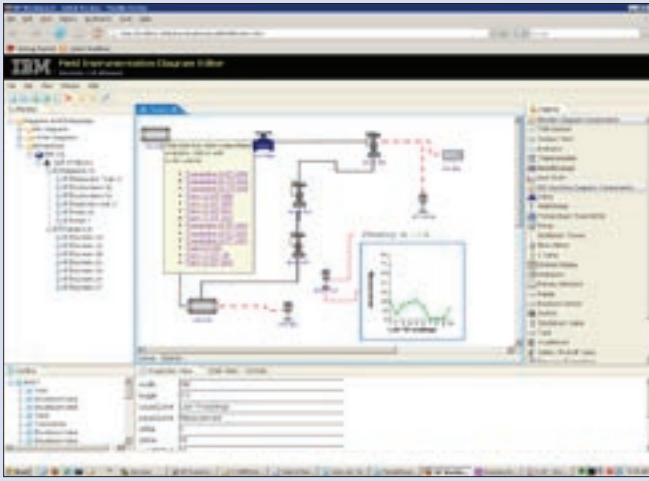
Services are pieces of application functionality that represent a repeatable, categorically containable business task. In the oil field, an example may be “check valve pressure” or “calculate KPIs for Barrels Per Calendar Day (BPCD)”. Services are only built once and maintained in one place with interaction via an Enterprise Service Bus (ESB).

Services can be combined to form applications, and services may be made available for use in other systems. This extensibility is what can help effectively integrate the operational data into the core applications, as well as putting into the hands of other business users, such as those using ERP, financial, and transactional systems. The customer determines what components in their environment use these services.

The C&P IIF approach extends and improves on a traditional SOA in many ways. C&P IIF is built for the chemical and petroleum industry, taking into account the specific participating legacy applications. The C&P IIF has its own three-mode validation process. It also enables complex alarm and event definition and management that can trigger critical business and technical processes to start or invoke legacy applications or calculations.

### *Configurable Event Rules Engine*

The configurable event rules engine enables complex business processes and web services initiation acting as a non-human, intelligent agent. The rules engine monitors data and KPIs based on particular thresholds as well as on sophisticated historical models. The engine has pre-defined actions it takes when particular criteria is met, such as launching an alert, notifying different users, provisioning information, or launching other system activities. It is completely customizable from the business user, meaning that events and criteria can be defined without IT intervention. This approach takes advantage of the individual’s business expertise plus best practice techniques gathered from multiple sources.



### Benefits summary of C&P IIF

- Real-time, sophisticated business intelligence, collaboration and connectivity where it matters most: at the point of oilfield production decision-making
- Optimal technology approach that readily and affordably achieves transformative results while thriving in complex legacy system environments.

### User visualization, collaboration, and analytical toolset

The visualization, collaboration, and analytical toolset is the user's portal and metaphor for the field operations, with visual, clickable representations of the field's assets. The user can view the entirety of his oil field metrics by looking at animated summary icons, each with the ability to drive down into further level of detail. The interface also provides customization tools so that the user can "build their own" oil field, adding new assets, establishing new KPIs, creating business rules, making comments, and logging information into knowledge bases and historians. Top-level functions include:

- *Visualization / Manufacturing Intelligence features such as: process and instrumentation views; complex event definition and subscription; KPI definition and tracking; operations performance views; conditioned based monitoring of process equipment, and reporting, dashboard, and analysis tools*
- *Collaboration tools including knowledge sharing, messaging, video conferencing, screen sharing, etc.*
- *Integration and inclusion of extra enterprise businesses & market-facing-units*

The interface itself is flexible and extensible. It supports Web 2.0 Visualization. The very thin client interface itself is unobtrusive from a system resource stand-point, and can work in nearly environment, including through SAP and SharePoint portals. Due to C&P IIF's use of industry standards, IIF uses the customer's visualization tools, not just IBM's.

### Getting it done: How IBM makes C&P IIF a reality for your operation

The Integrated Information Framework itself is not merely a bundle of software or hardware components, but involves a strategic vision for improved work activities; the coordination of process, people, and technology; and a journey that the enterprise must undertake to realize the vision and benefits. Bringing all of these elements together, from advocacy of senior leadership to the tactical deployment of systems, requires a focused effort on driving real change. IBM understands this, and brings the people, tools, approaches, services, and assets to make the change real for our enterprise clients. These services and solutions include:

- *Composite business services that provide specific solution on top of C&P IIF. For example condition monitoring acquires real time and historical data via integration to DCS and historian systems for comparison against engineer-set KPIs and historical performance. Engineers set triggers and monitoring regimes to deliver out of tolerance alerts and predictive maintenance information. These services can be reused across assets, speeding the standardization of best practice processes for integrated operations.*
- *Business analysis, strategy, and planning of the C&P IIF, including understanding the challenges of your unique operation, aligning business strategy with implementation priorities, developing a comprehensive blueprint and roadmap, building stakeholder consensus, and defining a compelling, benefit-driven business case.*

- *Customization and application of the C&P IIF to bring our proven, pre-built standard models, reference architectures, change plans, and other valuable assets that make up the C&P IIF into your specific business and technology environment to achieve your operational goals.*
- *Design, build, deployment and support of the C&P IIF solution, inclusive of technology build-out, technology deployment, design, build and support of new systems and infrastructure.*
- *Change management, including managing new behavior and competencies within the field personnel, maintaining enthusiasm and advocacy for the change within the leadership team and the company culture, and instilling a formal program of persistent, effective communications.*
- *Hardware and software solutions from IBM to enable the technology aspects of the C&P IIF*

### **IBM Advantage**

As one of the world's largest and most successful consulting and technology solutions companies, we certainly have the credentials and capabilities to deliver C&P IIF to your operations. Perhaps what really differentiates IBM is our deep understanding, investment, and experience in delivering the C&P IIF with solution to enterprise-class chemical and petroleum companies around the world. The C&P IIF is not an academic construct, but a proven, implemented framework that is already in the field at top companies delivering real results.



Some key advantages that make IBM an ideal provider of C&P IIF include:

*A proven, deployed solution:* We've done the detailed design and construction of C&P IIF for the real world, and can bring this model and toolset to our clients, eschewing a "blank page" or theoretical approach.

*Experience:* We've successfully deployed, tested and measured real results with C&P IIF at leading companies, and the IIF itself was based on learning from hundreds of chemical and petroleum engagements with leading companies around the globe.

*C&P Practice depth and breadth:* Our team is uniquely positioned to deliver innovative industry solutions across the C&P value chain based on our deep R&D capabilities, comprehensive hardware, software and services portfolio, extensive industry experience and unmatched global presence.

*A focus on results, partnership and innovation:* IBM prides itself on creating a genuine partnership with our clients focused on business results. We invest heavily in innovation in the Chemical and Petroleum industry, and bring this benefit to our client-partners.

### **Let us continue the conversation**

Are you ready to get started? Let us invite you to hear our story and learn about yours. We want to dive deep into your specific challenges, and explain to you in detail about our C&P IIF solution and our vision for integrated operations and unit efficiency. Let us begin the conversation.

**For more information, visit [ibm.com/chemicalspetroleum](http://ibm.com/chemicalspetroleum)**



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Route 100  
Somers, NY 10589  
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