

# AN INTELLIGENT 'PLATFORM' TO MANAGE OFFSHORE ASSETS

*A set of information technology (IT) capabilities has emerged that is contributing to improved productivity in upstream oil and gas. Applied to offshore production and to condition monitoring of equipment assets, this set of capabilities might be called the "I-Platform" or "Intelligent Platform."*

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**O**n offshore platforms, asset management involves the care and maintenance of equipment and is a major determinant of productivity. A primary goal of what could be called the "I-Platform" is to reduce equipment downtime and increase reliability. It does so by helping to 1) define operating envelopes that optimize equipment use, 2) allow early identification of pending equipment outage, and 3) enable root-cause failure analysis.

The resulting productivity gain is expressed as facility cost reductions, enhanced system availability, reduced manpower requirements, and improved safety for platform operations.

Offshore oil and gas, as a globally dispersed environment, presents special challenges to the implementation of IT solu-

tions. But advances in network, computing, and software technologies have made the I-Platform a reality.

The efficacy of the I-Platform rests on its ability to aggregate and correlate data from a range of diverse sources. What we're talking about here, though, is a global level of aggregation and analysis beyond that typically derived from supervisory control systems. Information is brought from the well to onshore engineering workstations; it's combined with data derived from equipment models, engineering analyses, and business systems; and advanced tools such as neural networks and advanced analytics may be involved.

One way of achieving the I-Platform is through a combination of hardware and software technologies from Hewlett-Packard and Schlumberger. It is an integrated solution that connects equipment sensors onto a common infrastructure to aggregate and analyze data as it is received.

## Network capabilities

With its focus on topside equipment monitoring, the I-Platform supports work ongoing in the petroleum industry to optimize well production through better information management.

As has been pointed out in a paper prepared for presentation at the Society of Petroleum Engineers (SPE) Asia-Pacific Conference on Integrated Modeling for Asset Management, and available on the Schlumberger Web site, titled "From Real-Time Data to Production Optimization," heretofore the bottleneck for data flow has been the transfer of real-time data to the engineers' desktop in a clean, timely, and useful fashion. Engineers typically have seen only a subset of data: daily production volumes and rates along with a few gauge pressure and temperature settings.

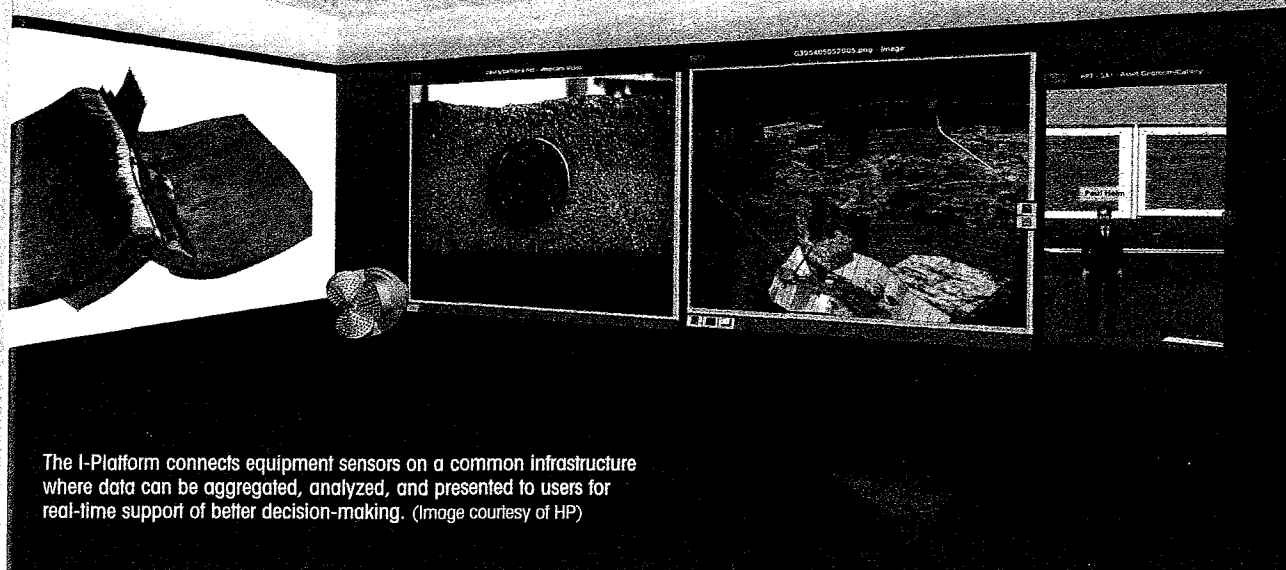
What's needed, states the paper, "is an alarm system to inform engineers of under-performing or critical conditions of a well or reservoir."

I-Platform delivers the connectivity needed. By means of a global network, local, remote, and external participants – i.e., a "pool of global machinery expertise" – collaborate to optimize facility efficiency and energy consumption based on

## MEANS TO AN END

I-Platform is an end-to-end offshore-to-onshore solution that brings together a unique set of mission-critical characteristics to ease operational, development, and deployment uncertainty and serve as a foundation for long-term project success. I-Platform supports requirements as follows:

- Downtime reduction/reliability improvement;
- Maintenance and reliability KPI development based on defined operating envelopes;
- Facility efficiency and energy-consumption optimization;
- Root-cause-failure analysis;
- Early identification of pending equipment wear-out or failure;
- Justification for extended overhaul periods;
- Fixed equipment fouling identification;
- Machinery fleet management; and
- Capacity performance reviews and enhancement.



The I-Platform connects equipment sensors on a common infrastructure where data can be aggregated, analyzed, and presented to users for real-time support of better decision-making. (Image courtesy of HP)

common views of equipment performance data streams, alarms, and notifications.

Challenges include the following:

- Production monitoring requires collecting data from equipment not necessarily running on a common “bus”;
- Accurate fault detection and root-cause analysis requires the data from the platform to be correlated;
- Fault detection requires pattern recognition and automated data analysis; and
- Data analysis often calls for skills that are globally dispersed.

The many diverse data sources are brought onto a single bus by means of a multi-level, secure local-area network (LAN). Read-only access is achieved across the company business LAN. But these advanced network implementations also can be configured for read-and-write access to data and packaged monitoring systems, including for advanced engineering functions accessed via desktop interfaces from onshore locations.

### Using the data

Until recently, access to production and asset-management data flows was site-restricted. Moreover, given its dynamic nature, it’s difficult to describe well behavior by means of a single, all encompassing model.

Once a resource is equipped with an infrastructure network proven for high data volumes and mission-critical applications, the requisite equipment performance streams, alarms, and notifications can be delivered to the pool of global machinery expertise. This includes a common interface to onboard packages and equipment, real-time data processing, alarm management, and historians.

Notifications and alarms can be based on simple rules or models. In operations, then, such a system would allow the following:

- A global view of operations, and the ability to identify and locate events;

- Determination of the event’s nature: is it a condition or a failure?
- An understanding of the cause of the failure; and
- A deep-dive analysis of the problem that leads to its resolution.

Business-intelligence capabilities and a data-analysis engine such as Babelfish from Schlumberger provide additional powerful capabilities. By combining multiple data streams and applying business rules specific to the industry, field, and well, it’s possible to generate custom notifications when a pre-determined combination of data stream conditions occurs. Alarms or notifications are sent via an operator dashboard to select personnel based on roles and key performance indicators (KPI).

An operator dashboard is important for its roles-based view of client-specific maintenance and reliability KPIs, based on domain expertise collected during the concept of operations/site assessment. By tapping into the expertise of the aforementioned pool of global machinery expertise, KPIs are made to reference facility efficiency and energy consumption metrics or display equipment maintenance parameters within defined operating envelopes.

Moreover, data analysis capabilities and expert systems support root-cause-failure inquiries to identify impending equipment wear-out or failure. Historical data analysis can be brought to bear in decision-making to justify period extensions between overhauls or the rapid identification of fixed equipment fouling from remote locations.

### Final words

I-Platform, fully implemented, supports downtime reduction and reliability improvement by monitoring and analyzing performance data before failures occur and the dispatch of the right personnel to take proactive steps to avoid downtime. The platform can be used to manage performance of the machinery fleet and support capacity performance review and enhancement. ▀