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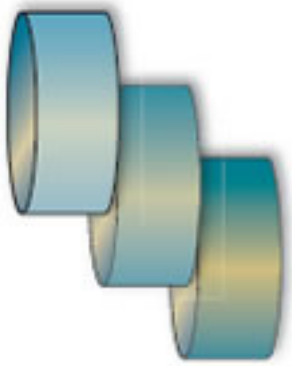

Open, seamless collaboration among all parties in a project is already a reality in many organizations-and it's providing real value.

Design, Operate, Maintain (DOM), the term coined by industry analysts ARC Advisory Group, gives us a vocabulary to talk about some of the key concepts in asset management and in industrial maintenance, repair and operation.

Indeed, industrial facility designers and those who operate and maintain those facilities need to work together closely if plant efficiency and profitability are to improve over time. Communication between these various entities, however, has been lacking. Modern enterprise resource planning tools (ERP), computerized maintenance management systems (CMMS) and CAD design packages are moving towards a point of integration that could facilitate greater communication between these disciplines.

Interestingly, many industries were in a better position to implement DOM concepts years ago than they are today.As early as the 1980s, growth in the number of process control and systems engineering firms indicated that more and more industries were outsourcing their plant engineering.While in-house plant engineering departments gave an organization greater control over design and information standards, corporate "right-sizing" and a growing movement toward open standards and interoperable components made it possible to involve numerous outside vendors, ranging from industrial engineering firms to manufacturer representatives and system integrators, in plant design. The in-house data created by a captive engineering department may not have been leveraged fully, but lack of communication between designers and the industries they serve seems only to have grown as outsourcing became the trend. The independent control systems integration market had grown, according to the Control System Integrators Association, to $12 billion by the turn of the millennium, from a fraction of that 20 years before.Now,more and more technical data, drawings and specifications that traditionally had been developed and maintained in-house

are coming from outside of an industrial organization.

Pre-existing gaps in communication between design engineers and operation/maintenance also have widened as consulting engineers have become free to simply design to meet a particular capacity increase outcome. Design data is developed separately, often on different platforms from those used by manufacturing operations and maintenance personnel who will live with the industrial design into the future. Currently, an ISO data standard for this information is being developed, and that standardization should (at least) allow in-house staff and outside design consultants to more seamlessly communicate and share data that leads to greater industrial efficiency.Yet, before this ISO 15926 standard is finalized, there is plenty that maintenance and plant operations professionals can do to make DOM a reality today.

Maintenance - Historical Work Orders

Work Orders - Cause: Design Error

WO No	Directive	Object ID	Completion Date
202297	Cleaning of Flow Transmitter	PM-312-FT-001	5/14/06
202292	Vibration Measurement - Malfunction	PM-311-PA-003	5/7/06
202291	Circuit Breaker Release	PM-312-PA-003	5/5/06
202288	Pump Motor Overheating	PM-312-PA-001	4/3/06
202296	Cleaning of Flow Transmitter	PM-312-FT-001	3/23/06
202295	Level Transmitter - Incorrect Reading	PM-311-VZ-001	1/2/06
202294	Level Transmitter - Incorrect Reading	PM-311-VZ-001	12/5/05
202293	Level Transmitter - Incorrect Reading	PM-311-VZ-001	2/28/05
202290	Pump Motor Overheating	PM-312-PA-001	12/6/04
202289	Circuit Breaker Release	PM-312-PA-003	12/6/04

The challenge

The switch has just been thrown on a renovated production line at your process manufacturing facility.As pressures and temperatures start to come up to spec and product begins flowing, a head pressure problem develops in a critical compressor unit. Maintenance is dispatched to the site, but quickly finds that they lack the information to diagnose the problem.

The necessary data, it turns out, is buried in a stack of CDs and binders left by the consulting design engineers. This lack of communication leads to unplanned downtime as the necessary information is located and the problem is diagnosed.

Or, what about the maintenance engineer who finds that a new production line suffers from unplanned stoppages caused by the same design features as the line it replaced? While data contained in years of maintenance records could reveal the design changes that are necessary, the system engineers don't have the ability to milk that data for meaningful information.

Not every problem, though, is the fault of the industrial engineer. Imagine logging hundreds of hours on a design for a new mix and fill line, only to find out later that maintenance engineers had upsized several pumps on the line you are replacing-a change not included in the as-built information on the preexisting line. Although you have spent tens of thousands of dollars to engineer a suboptimal system, you are now faced with the prospect of asking your client to split the cost over-run caused by this miscommunication.

Technology can only offer a partial solution to the problems caused by inadequate communication between design engineers, plant operators and maintenance managers. Integrated Asset Lifecycle Management (ALM) tools that encompass all three disciplines will only do so much good if there is inadequate communication with an outside engineer who does not use the ALM tool. Even in-house departments can fail to work together effectively and mesh completely to optimize the DOM process. Thus, regardless of what technology is available to members of the team, a proactive approach is probably the most important factor in implementing DOM processes in your organization. Technology can only facilitate and standardize your proactive, cooperative approach, and in some cases can automate parts of the DOM process. Here are three steps that can help you realize the benefits of DOM today:

#1 Maintain a flexible, open IT system. . .

Whether they are used by you or your consulting engineering firm, proprietary data standards are barriers to communication.

If you keep your operation and maintenance information in an open, easily-accessed format,

you can import and export information in a controlled way and use public application program interfaces (APIs) to handle that export and import.

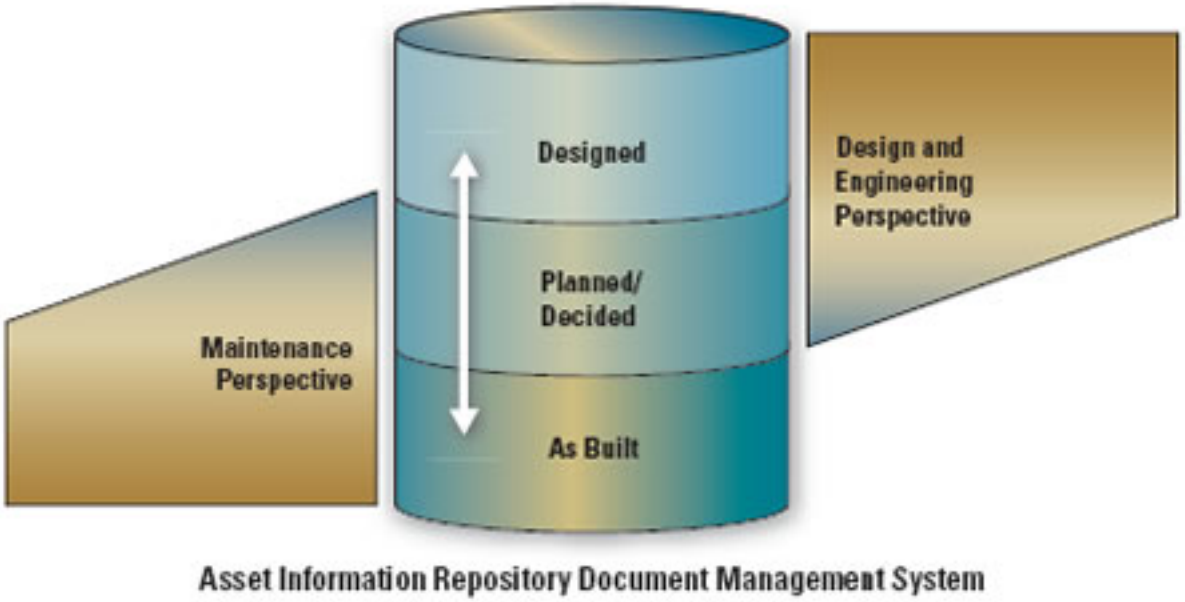

Fig. 2 With a layered architecture of your asset managementsystem, you are in control of what and when information is available to design/engineering and maintenance/operations. Both document management and asset management solutions can be configured to comply with your company standards. This puts you in control of the technical attributes and requirements regarding different pieces of equipment, and allows you to adapt the data to your system. The system provides dynamic links between information on assets, equipment and facilities..

If the asset information management solution you are using supports flexible and configurable import and export from standardized file formats such as Excel, XML, etc., you are in an even better position.

In order to operate in a DOM modality, it also will be important to have an asset management system with a layered architecture. This will let you view information on projects as they are in the design phase and track them through construction and design. At each step of the process, different departments can view layers of a project that are relevant to them and provide feedback. This will give you the ability to start collecting information during a project and make sure you are getting the design that meets your needs. Early access to information also will let you work ahead in planning a preventive maintenance program and otherwise give you a head-start for the day when the new production facility goes into operation.

#2 Take control of your information. . .

Information about your plants and assets is worth a great deal. You need that cumulative operation and maintenance history data to optimize your processes on an ongoing basis. If you are undertaking projects to improve your production capacity, you need to be able to share such information with the design engineers. To do this, you must agree on a format that you and your designer can both use-and that you are capable of exporting from your own systems.

Conversely, before work starts, agree with your design engineer on data formats and frequency of communication on the new design. Generate a list of features, components and/or pieces of equipment you will need to manage on an ongoing basis. Determine what information you need about each item on the list, at what points in the project you need it and how data must be structured to tie into your existing asset management system.Whether it is a series of Excel spreadsheets, an Access database or XML-documents, you will want this data structured in a way that allows it to be tied to information about your current operations and maintenance activities.

Agreeing in advance on how and when information will be exchanged can be a workaround to the fact that you and your designer are likely on different information platforms. The spreadsheet contents and/or tables your engineer provides will have to be mapped to fields in your existing system, but at least information will be flowing from design into your asset management systems.

#3 Establish ongoing dialog

Just as information needs to flow from design into your asset management systems, data needs to flow from your maintenance and operational history into the design process. Actively solicit suggestions from your designers on exactly what data-and which data format-will provide them with the necessary insight to optimize project results.

In time, format will not matter as much, since the ISO standard will allow ALM and engineering platforms to standardize on a data structure that can cross platforms transparently. But, even when that technological barrier no longer exists, work habits will have to reflect DOM thinking.

The ideal DOM work flow involves a collaborative process where maintenance and operational histories are freely available to design, and plans and specifications are freely

available to operators and maintenance personnel- even as a project is being planned. Imagine that a portion of your plant is being rebuilt and that the plans are integrated into your asset management system. If you see that new pumps and compressors are being planned to replace existing mechanicals, it may make sense to forego rebuilds or other maintenance on the equipment that is about to be decommissioned. Moreover, because you know the new specifications, you can begin ordering spare parts and other supplies for the equipment being installed-before it is even in place. In turn, the day your new or rebuilt production facility goes live, you can have an excellent understanding of its inner workings.

Based on experience with some major infrastructure projects, this writer has seen how a project owner can establish a Web portal open to the design and contracting teams, with that portal becoming the medium through which a collaborative process takes place. Just imagine the benefits that can provide.

Whether your collaboration takes place internally with in-house departments or with outside designers, whether through an integrated ALM tool or through a patchwork of applications mapped together with lots of human intervention, a real-time collaborative environment is where DOM will ultimately take those who employ these concepts. **MT**

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