



Enabling Global
Competitiveness

Automation India

Issue 1 – June, 2004

A newsletter of the Automation Industry Association



The formation of AIA brings together for the first time, all the leading automation technology players in the country for a common and customer focused cause. AIA's primary aim will be to increase knowledge and awareness levels when it comes to cutting edge automation technologies and help Indian industry leverage these for greater productivity, efficiency, quality and consistency – the key to global competitiveness. As India integrates itself with the world economy and Indian industry looks beyond national borders, the need for such an initiative has never been greater. State-of-the-art automation technologies have a vital role to play in facilitating this effort. AIA will serve as a key facilitator in the information sharing, deployment and development of automation technologies and showcasing the latest trends and global best practices across the process, manufacturing and consumer industry spectrum. The association will provide a common platform when interfacing with government and other institutions, thereby playing an important role in shaping related policies and standards. Amongst its objectives, AIA also intends to foster awareness and technology knowledge amongst a wider audience through academia interface. The association will also promote best practices within the automation industry and encourage innovation to promote the cause of Indian industry.

Ravi Uppal
President, AIA

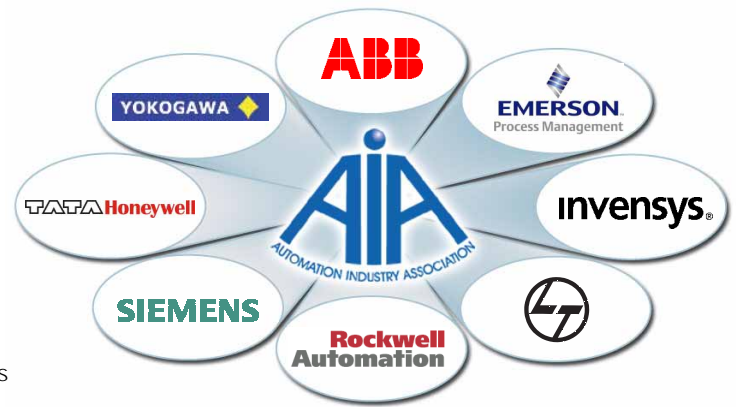


Key Aims & Objectives

- To create awareness about the role of automation & its value proposition
- To enable productivity and efficiency improvements
- To enable increased global competitiveness of the Indian industry by leveraging the latest international technologies on offer
- To promote the development of automation technologies and foster innovation
- To provide a platform for technology and information exchange, and dissemination for automation users, vendors, academicians and others
- To conduct seminars, symposia and events for the propagation of automation technology and to understand industry needs
- To present and address industry issues on a common platform
- To represent the automation technology industry at interactions with Government institutions, Standards and Technical Authorities as well as other relevant institutions at national and international levels
- To promote best practices within the industry
- To facilitate human resource development in terms of knowledge, talent and technical competence



Members of the association



ABB

ABB is a global leader in power and automation technologies that enable utility and industry customers to improve performance while lowering environmental impact. The ABB Group of companies operates in around 100 countries.

ABB offers products, systems and services ranging from complete process automation and optimisation solutions to products like electrical machines, drives and power electronics, low-voltage products, instrumentation, controls and robotics. The company serves the entire spectrum of process, manufacturing and consumer industries and is a market leader with unparalleled domain expertise and global experience.

Emerson

Emerson services a diverse world – from solutions for alternative power generation to products for army helicopters! The company's solutions and services are as varied as the industries it serves. Emerson's world-class technology and commitment to quality enables its customers to increase productivity, giving them a competitive edge in their businesses.

Invensys

Invensys is a 3 BUSD, UK based global automation, controls and process solutions group comprising Invensys Process System (IPS), Wonderware, IMserv, Production Compliance, Walsh V&R, APV, Eurotherm, Rail Systems, Appliance Controls and Climate Controls. Invensys meets the needs of the process and batch industries – from oil & gas, power and utilities, chemicals and rail systems to food & beverage, healthcare and data communications – as well as discrete and hybrid manufacturing sectors, and provides components, systems and services to the heating management, commercial refrigeration, residential safety and automotive industries, electronic and electro-mechanical systems and components to appliance and related industries. The Foxboro division of Invensys is a global leader in Process Control Instrumentation and Automation with over 100 years of experience across the industry. Invensys India Pvt. Ltd. (IIPL) is a fully owned subsidiary of Invensys Plc.

Larsen & Toubro Limited

Larsen & Toubro Limited is India's largest multi-disciplinary conglomerate with leading positions in its major businesses i.e. Engineering & Construction, Electrical & Electronics and Information Technology. L&T's technology base and experienced resource pool enables it to offer integrated services for domestic and global markets. L&T's Electrical & Electronic business enjoys leading positions in LV Switchgear products & systems, Metering & Protection and Petrol Dispensing systems. Its Control & Automation SBU is one of India's largest system integration and automation solution providers offering end-to-end solutions in process and electrical automation based on a unique business model that brings some of the world's finest automation technologies to the Indian market through strategic alliances in areas like Variable Speed Drives, Process Automation, turnkey Instrumentation, MES and Electrical Control Systems serving a wide industry spectrum.

Rockwell Automation

Rockwell Automation is one of the world's leading industrial automation companies and a focused provider of power, control and information solutions. Rockwell Automation offers the broadest range of products for the plant-floor automation in the Industry

including services and solutions that provide end-users, system integrators and OEMs a way to increase their competitive advantage. Helping customers meet their business objectives has made Rockwell a preferred industrial automation provider for many prominent companies in India and around the world. Through its products, services and employees, Rockwell Automation helps manufacturers around the world improve their results by reducing costs, streamlining productivity and speeding time to market. Based in Milwaukee, the company is home to more than 22,000 employees and has an annual sales of over \$ 4.1 billion. The company has a breadth of technologies and competencies for products, systems and solutions serving the automation needs across industry segments. Rockwell brings together leading brands in industrial automation, including Dodge® mechanical power transmission products, Reliance Electric motors and drives, Allen-Bradley® controls and engineered services and Rockwell Software® factory management software. Global technical and customer service is an integral part of the company with nearly 5,600 distributors, system integrators and agents serving customers in 80 countries.

Siemens

Siemens is among the world's largest supplier of products, systems, solutions and services for industrial and building automation. The company is setting new standards with innovative products, systems and complete solutions plus service and support for manufacturing automation, process automation and building systems. Integrated automation solutions from Siemens provide a unique and complete range of integrated products across sectors of industry, boosting productivity while securing their investment.

TATA Honeywell

TATA Honeywell, a joint venture between the TATA Group and Honeywell Inc., is a leader in providing integrated automation and software solutions. The company provides cutting-edge services and solutions to "core" business sectors like petrochemicals, refining, oil & gas, minerals, mining & metals, pulp & paper, food, pharmaceuticals and power.

Yokogawa India Limited

From primarily being a provider of process automation systems and products, Yokogawa India Limited (YIL) is today positioned as a comprehensive solutions provider of enterprise technology solutions.

YIL has a state-of-the-art Global Engineering Center and manufacturing centers apart from a strong marketing and service network across India. The company has a breadth of competencies to meet the technological requirement of products, systems and solutions for automation in industry segments of oil & gas, refining, power, chemicals, fertilizers and metals.

AIA will be an affiliated member of Confederation of Indian Industries, India's premier business association.



AIA has the support of ARC Advisory Group, a strategic consulting and research company and an independent industry body, considered as thought leaders for manufacturing.



Automation protocols

The history of Fieldbus

In the 1940s, process instrumentation relied upon pressure signals of 3-15 psi for the monitoring of control devices. In the 1960s, the 4-20 mA analogue signal standard was introduced for instrumentation. Despite this standard, various signal levels were used to suit many instruments which were not designed to the standards specification. The development of digital processors in the 1970s sparked the use of computers to monitor and control a system of instruments from a central point. The specific nature of the tasks to be controlled called for instruments and control methods to be custom designed. In the 1980s smart sensors began to be developed and implemented in a digital control, microprocessor environment. This prompted the need to integrate the various types of digital instrumentation into field networks to optimise system performance. While the "if it works then use it" mentality progressed, it became obvious that a fieldbus standard was required to formalise the control of smart instruments.

Present Situation

There have emerged literally hundreds of fieldbuses developed by different companies and organisations all over the world. The term fieldbus covers many different industrial network protocols. Most fieldbus protocols have been developed and supported by specific PLC manufacturers. The accompanying description summarises some of the main ones.

HART (Highway Addressable Remote Transducer) is a digital communication protocol which operates on top of a conventional 4-to-20mA current loop signal from a measurement device - a transmitter - or to a valve positioner. HART uses a low-level frequency-shift-keyed sine-wave signal to convey the digital communication. This has an average value of zero, so does not affect the analogue signal. Because the

analogue current loop is typically unbalanced (grounded on one side), and not impedance-matched, cable capacitance attenuates high-frequency signals. HART therefore uses relatively low frequencies (1200 and 2200 Hz) and this, in turn, restricts it to 1200 baud (equivalent to 1200 bits per second, with simple "1-bit-per-symbol" coding techniques). Similar modulation methods used to carry digital signals over telephone lines have somewhat more capacity, because they do not have to contend with the possible levels of cross-talk which can occur in the multi-pair cables commonly used in industrial process field wiring.

PROFIBUS Network Solutions according to IEC 61158/EN 50170

PROFIBUS is a fieldbus network designed for deterministic communication between automation devices such as PLCs, DCS, PCs, HMI devices, field devices, using a uniform bus according to standard IEC 61158/EN 50170. It is extensively adopted across Europe, the Americas, Asia and parts of Africa.

A wide range of PROFIBUS products can be used together in one network. PROFIBUS can handle large amount of data at high speed and serve large installations. Based on a real-time capable asynchronous token bus principle, it defines multi-master and master slave communication relations with cyclic or acyclic access, with baud rates up to 12 Mbps. The Protocol uses physical layer (2 wire RS 485 physical connection), data link layer 2 and application layer.

To suit varying applications there is PROFIBUS DP - for fast, cyclic data exchange with field devices and PROFIBUS PA - for process automation applications in intrinsically safe areas.

Fail-safe systems control processes whose direct switching off does not endanger people or the environment, making it possible to replace conventional safety design by



PROFIBUS DP components. This applies, inter alia, to the replacement of switchgear for emergency stop, safety door monitoring systems and two-hand operation. PROFIBUS DP has also been expanded for intrinsically safe areas. The acrylic communication services of PROFIBUS DP (V1) / PA, permit online access to device parameters giving process control systems direct access to current field device data, status and diagnostic messages.

Production lines with variable speeds or online plant control facilities can be implemented using PROFIBUS DP. For fault-free production, it is essential to be able to flexibly modify variables. At the same time, plant availability and downtime minimisation are becoming increasingly important. Using powerful communication components makes it possible to quickly locate and signal faults.

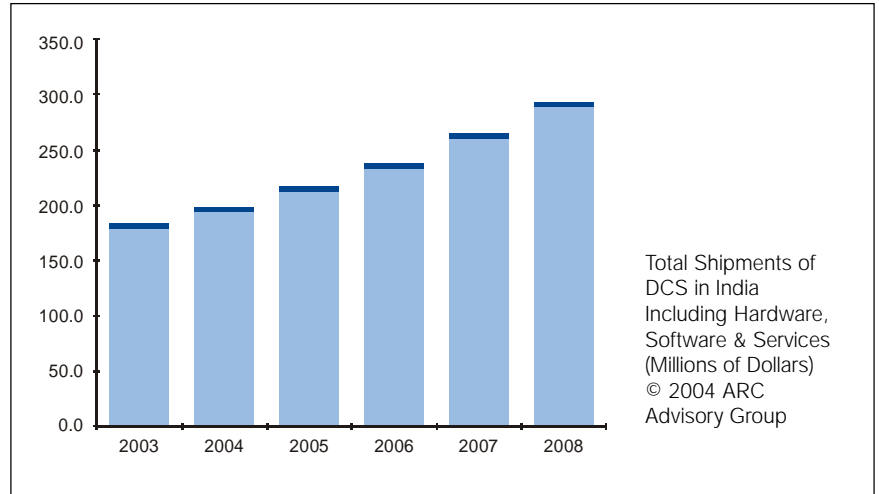
Process automation places high demands on plant performance and reliability. PROFIBUS PA uses the fail-safe transmission technology defined in IEC 61158-2 enabling incorporation of field devices in hazardous areas.

Emerging Protocols

The dream of a unified fieldbus, coupled with the lack of standards providing openness and interoperability between products from different vendors, and the absence of an industry standard, have prompted manufacturers to increasingly forge strategic alliances to share expertise, increase the level of integration and develop compatible products. Presently, the different concepts can be subdivided into 'encapsulation technologies' (Ethernet/IP, Foundation Fieldbus HSE and Modbus-TCP/IP), and 'Gateway and Proxy Concepts' (ProfiNet and Interbus).

Flourishing Indian Economy provides excellent opportunities for DCS

The Distributed Control Systems (DCS) market in India is expected to grow at an average annual rate of 9.9 percent through 2008, according to ARC Advisory Group's new study DCS Outlook for India - Market Analysis and Forecast Through 2008. The manufacturing industry in India, with its economy emerging as one of the fastest growing, is humming with activity. The rising consumer demand, which is well supported by large investments in infrastructure projects such as construction, transportation, and manufacturing, is naturally spurring the demand for control systems. "In 2003, the Indian economy started emerging out of the correction phase. Companies have begun to invest in creating additional capacity. India's emergence as a growth market



for DCS systems stems from significant investments taking place in process industries. The expanding demand for a wide range of goods is resulting in investments in greenfield projects, production facility expansions, revamps, and project upgrades across a broad spectrum of manufacturing verticals,"

according to ARC Research Director Larry O'Brien.

Power industry is the Indian market's largest user

All major process industries will contribute to DCS market growth, but the power industry is, and will continue to be, the biggest user of DCSs as the country expands its generating capacity to meet the increasing needs of manufacturing and residential power. More investments in the power sector essentially means that the Indian manufacturing industry can look forward to the removal of one of the major hurdles to its growth and that of the Indian economy. State owned enterprises will continue to make the bulk of new power project investments. According to industry sources, at least \$20 billion will be invested in the next 5 years to generate an additional 20,000 MW of power. This is in addition to the investments contemplated in the renovation of existing power plants.





China vs. India: Foreign investment grows

China and India adopted different strategies to set in motion the cycle of disposable incomes, demand fulfillment, capital formation, and growth. China successfully created its initial affluence through the traditional route of development through manufacturing. India succeeded in generating wealth through new economy industries and services, a development path that has not been traversed before.

Foreign investment, which spurred further capital formation in the manufacturing industry in China, is also beginning to happen in India. In 2003, India attracted around \$4.5 billion in foreign direct investments. It is a modest beginning, but the trend

bodes well for the Indian economy and its manufacturing activity. DCS suppliers can look forward to the growth of the Indian market on a sustainable long-term basis.

Offer solutions that help manufacturers achieve operational excellence

The decision to create production facilities in India is an integral part of global manufacturers' strategic considerations to disperse their production centers driven by logistics and other considerations. They are a link in the chain of production centers set up to improve corporate performance. ARC's business performance improvement concept is Operational Excellence (OpX). The OpX concept is valuable for conveying a clear and intuitive

understanding of the business improvement processes.

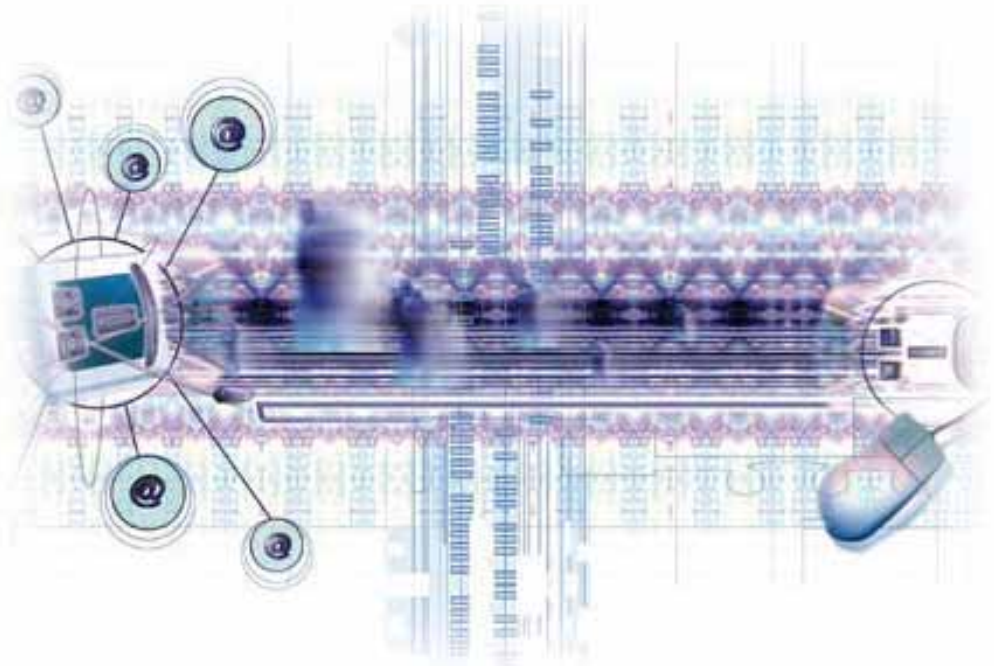
Operational Excellence in a process plant environment translates to Production Management and Process Control. OpX embraces two fundamental processes: Improvement and Control. Improvement is an off-line process that utilizes tools such as Six Sigma to identify weaknesses compromising performance. The second process, Control, essentially is the control strategy and execution for the plant and is the heart of OpX. Control also has two levels, a supervisory level and an execution level. These levels, in terms of their automation counterparts, are production management and process control respectively.

Open O&M – A CALM Enabler

Managing the Operate & Maintain (O&M) asset life-cycle phase remains a major challenge for manufacturers and other asset intensive organisations. Assets are expected to generate their returns and justify the investment decision during this phase. Disruptions to effective asset use limit returns, extend payback periods and, in many cases, impact corporate bottom lines and customer/supplier relations. Despite the importance of high asset performance, maintenance budgets are frequent targets of cost-cutting initiatives. Balancing performance requirements against budget constraints is a daily challenge for asset managers that demands close coordination between operating and maintenance organisations.

High asset performance demands close collaboration between all groups within an asset-intensive organisation. Open O&M is an emerging information integration standard focused on the collaboration needs of operations and maintenance.

Asset management strategies like Preventive Maintenance (PM), Reliability-Centered Maintenance (RCM) and Total Productive Maintenance (TPM) have contributed significantly to higher asset availability in recent years. Predictive Maintenance (PdM) or Condition-based Maintenance (CBM), using on-line condition monitoring and other asset health



sensors, is the next step in improving overall asset performance. Recognising problems before they become functional failures allows organisations to use scheduled downtime for the most important repairs, reduces parts inventories, and optimise use of limited labour. But the inability to share information between multi-vendor products and between operating and maintenance departments continues to hamper implementation of these newer strategies.

MIMOSA, the OPC Foundation and ISA-SP95 recently formed a joint working group to address this very challenging issue. They are collaborating on a new standard, Open O&M, for integrating diagnostic, prognostic control and maintenance applications within an enterprise. ARC applauds this effort and sees this as a key step towards enabling the many

benefits we have discussed in our Collaborative Asset Life-cycle Management (CALM) and Multisite CALM strategies.

Analysis

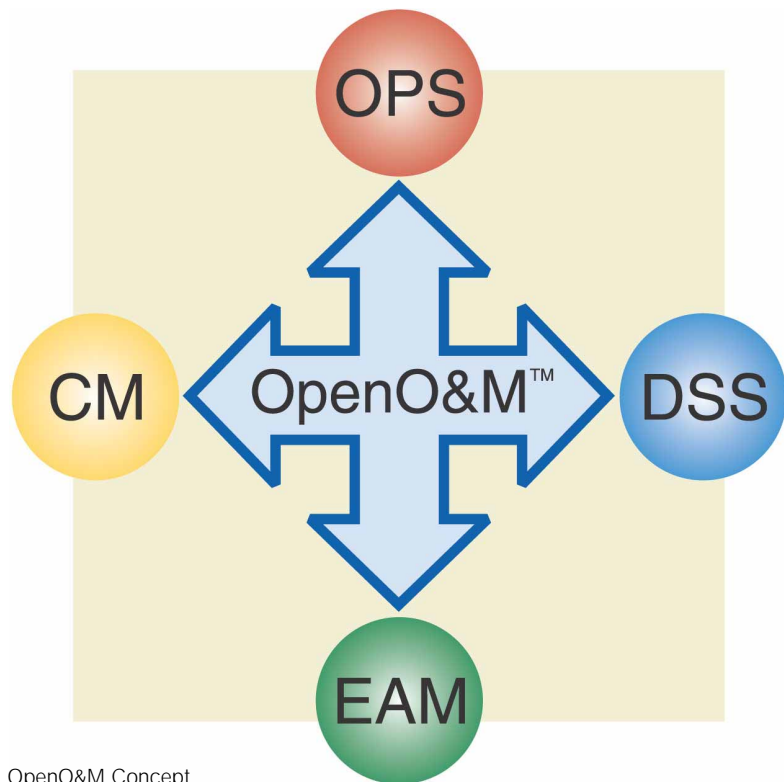
A variety of control systems, maintenance management, condition monitoring and enterprise applications are involved in the management of complex, asset-intensive

Mimosa's OSA-EAI, OPC and ISA-95 have all made significant progress as standards in their own right. OpenO&M recognises that a combination of these standards is necessary to address the full breadth of collaboration challenges in asset management.

operations. Standards for information exchange have evolved independently for each of these areas. OPC has gained considerable acceptance as a

standard for sharing information between control systems and associated manufacturing applications. MIMOSA's OSA-EAI standard for sharing condition monitoring and asset health information with maintenance, operations, and enterprise systems is likewise being widely supported. The Instrumentation, Systems & Automation Society ISA-95 standard for integration between enterprise and production management systems in continuous, batch and discrete industries is also already being adopted by a broad range of suppliers and users in those industries. Each of these efforts addresses an important issue and has clearly made significant progress in its own right. Open O&M recognises that the combination of these standards provides an excellent basis for addressing many of the challenges in asset management.

Open O&M is being developed through a joint working group of professionals with support from MIMOSA, OPC and ISA-95 standards. The goal of Open O&M is to enable optimal asset performance through collaborative decision-making across operating and maintenance organisations. While the standards being used for Open O&M have their origin in process manufacturing, the joint working group is also charged with addressing the needs of the broader asset management community, including facilities and



The OpenO&M Concept

fleets in both the public and private sectors. The importance of these other areas is reflected in the involvement of several elements of the U.S. military services and the National Institute of Building Sciences Facility Maintenance and Operation Committee (NIBS FMOC).

Open O&M Integration Model

Open O&M is focused on information integration between four disparate technology arenas. Advancements in asset status assessment, through condition monitoring, specialised sensors and analysis tools, have been significant over the last decade. We are clearly at the point where Condition-based Maintenance (CBM) and Condition-based Operations (CBO) are becoming realisable strategies. But in many organisations this information is still

only being used by local technicians who maintain the equipment. Integration of asset Condition Monitoring (CM) information with control systems and operations (OPS), enterprise asset management (EAM) and other decision support systems (DSS) has now become imperative.

Open O&M exploits the benefits of MIMOSA's common Asset Registry model to eliminate asset identification issues across multi-vendor systems and across different enterprise organisation solutions. Integrating this with the standard object models of OPC provides a recognised interface with automation systems and all supporting solutions, including in many cases, EAM. Working within the context defined by ISA-95 further ensures that this same information can be used by higher level enterprise applications.

The emerging standard is specifically focused on providing value to end-users by creating plug and play capabilities for faster implementation and by allowing them to pick and choose the best solutions from suppliers that comply. An extensible, open architecture based on XML and service oriented interfaces that leverage best of breed technology and support practical interoperability and compliance is implicit in Open O&M.

Collaborative Asset Life-cycle Management

Open O&M is consistent with the requirements identified in ARC's CALM and Multisite CALM strategies. CALM focuses on optimisation of all classes of assets across all life-cycle stages, from sourcing and installation, to operations, maintenance and retirement. CALM recognises the needs of multiple stakeholders in the asset management process and the value of cross-functional, collaborative decision-making. Cross-functional collaboration enables disparate departments such as operations, maintenance and procurement to work together in achieving better return on

assets, reduced parts' inventories and more optimal asset deployment.

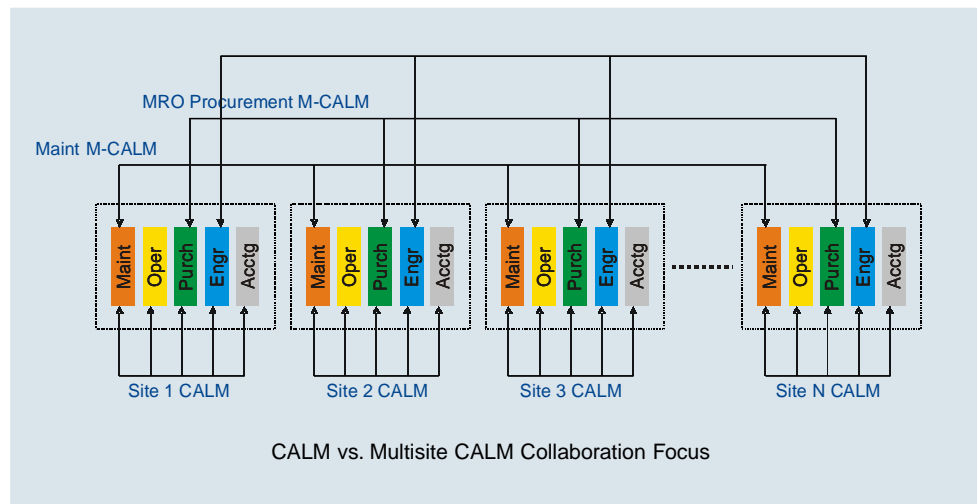
Multisite CALM (M-CALM) addresses the additional opportunities of cross-facility collaboration for organisations with geographically distributed assets. In this case information is shared across the same groups located at different sites in order to collaborate on best practices, maintenance knowledge, performance standards, resource sharing and asset performance measurement and improvement.

Open O&M has the potential to support both forms of collaborative asset management. Open O&M within a single site enables different functional groups to share information and work together. Organisations that implement Open O&M at all sites will also have a

platform for standardisation which is mandatory for sharing information across sites and with external service providers.

Recommendations

- Implementing new standards requires a concerted, cooperative effort from suppliers, end-users, and service providers. Everyone must first agree on the Open O&M standard. Suppliers must then develop products based on the new standard, end-users must deploy the new products and service providers must support and recommend them.
- ARC believes that Open O&M has the potential for addressing a vital issue in asset management. All end-users and suppliers should investigate this initiative by contacting MIMOSA, OPC Foundation or ISA-SP95.



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