ARC STRATEGIES

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MARCH 2004

Multisite CALM: A New Frontier for Asset Management

ARC Advisory Group

THOUGHT LEADERS FOR MANUFACTURING & SUPPLY CHAIN

Has increased significantly in importance

Has become a key management focus

Was always a key concern and has remained about the same

Was never a key concern and has remained about the same

Don't know

Has decreased in importance

0%   20%   40%   60%
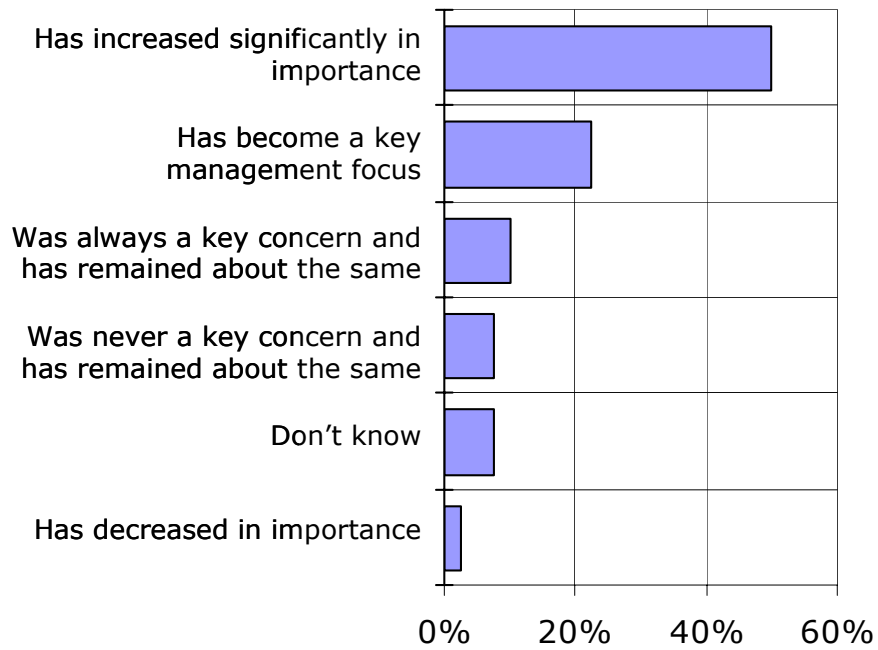
Industry View of Multisite CALM Has Changed over the Past Two Years

Increase

Significant increase

Same

Don't know

No budget or spending

0%   20%   40%   60%
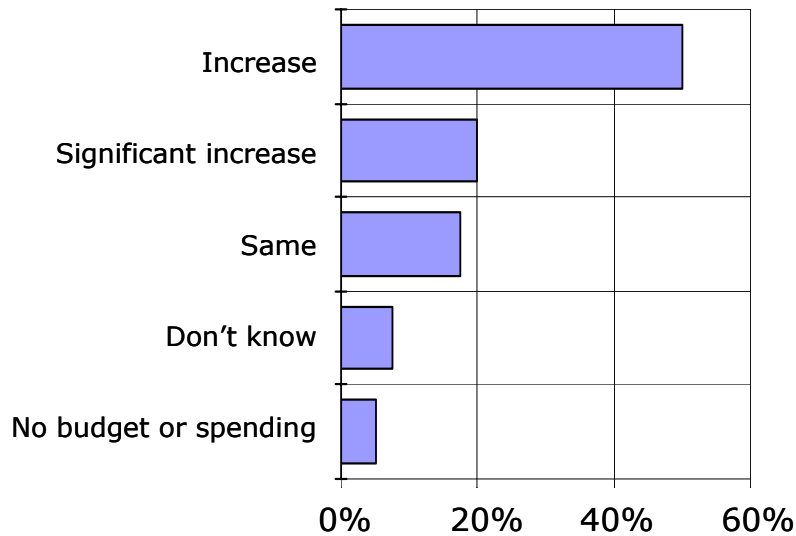
Planned Budget and Spending on Multisite CALM for the Next Year

Executive Overview

Multisite CALM is an emerging asset management strategy that can extend the benefits of Collaborative Asset Lifecycle Management (CALM) for organizations faced with the challenges of managing similar asset bases across multiple, possibly geographically separated sites.

CALM, or Collaborative Asset Lifecycle Management, has been described in previous ARC reports as a cradle-to-grave strategy for effectively managing capital assets. CALM considers all classes of assets, all stages in an asset's lifecycle, and all stakeholders involved in the asset management process. CALM benefits are well recognized and reflect the significant process improvements that can be achieved when appropriate information technology is applied to individual asset management activities.

Multisite CALM addresses a somewhat different aspect of asset management. It uses collaboration across sites, or "multisite collaboration" to exploit the knowledge and practices developed at individual sites for the betterment of the entire organization. Benefits of Multisite CALM are different and add to those already being derived from individual CALM programs.
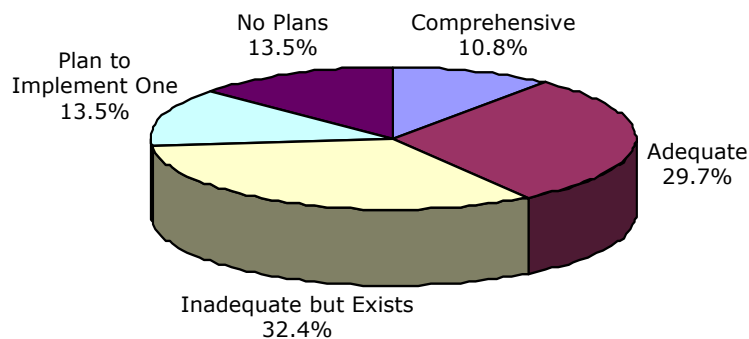
Current Status of Multisite CALM Strategies

Based upon ARC's recent survey on this subject, Multisite CALM is already gaining popularity in many organizations. Over 80% of the respondents indicated that their organizations recognize the significant benefits of Multisite CALM and over 40% already have such programs underway. The growing interest in Multisite CALM is also reflected in the fact that almost 60% of surveyed organizations plan to increase spending in this area over the coming year.

Multisite CALM technology selection and project management present new challenges for asset management professionals. Solutions must be evaluated by how well they enable best practices across the entire organization, not how they improve a specific plant or functional activity. Organization-wide analysis and planning becomes essential for reconciling shared needs

with individual plant constraints and team dynamics play a central role in project success.

This strategy report presents a model for Multisite CALM and recommendations as to how an organization can implement this strategy. In the process we identify the key issues that must be addressed by Multisite CALM solutions, describe how some organizations are already addressing these issues and discuss the benefits they have received. We also provide benchmarking information regarding the current state of organizations with respect to Multisite CALM so that the reader can assess their own organization's position.

The Multisite CALM Value Proposition

The significant role of information technology in improving asset management is already well recognized in most organizations. Traditional CMMS solutions have been used for many years to help maintenance departments manage work orders and improve the planning and scheduling of preventive and emergency service activities. The result has been more efficient use of maintenance resources and longer asset lifecycles. The evolution of CMMS to more comprehensive EAM solutions extended these benefits to other asset classes and more asset lifecycle stages. CALM, which is the most recent extension of EAM, recognized the need to integrate activities across functional boundaries such as maintenance, operations, purchasing, engineering and accounting. Cross-functional collaboration enables higher asset availability, reductions in parts inventories and better decisions regarding asset improvement, replacement, and redeployment.
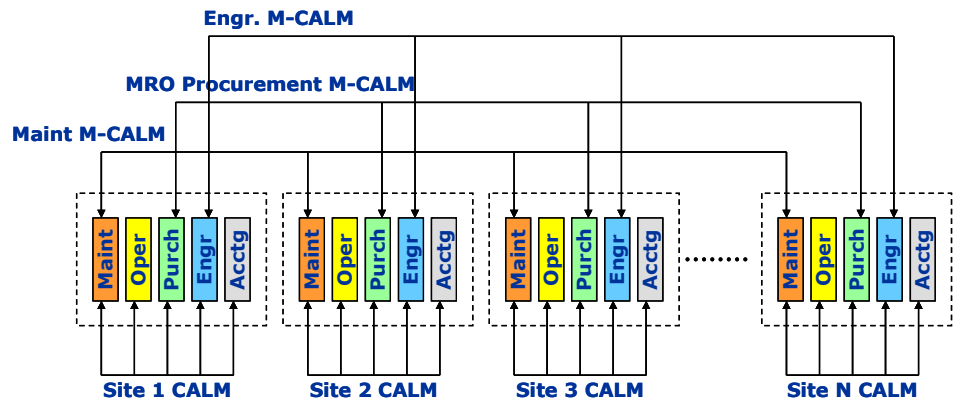
CALM vs. Multisite CALM Collaboration Focus

Multisite CALM has a similar approach to value capture as CALM, but a distinctly different focus. Multisite CALM addresses the benefits that can be achieved in large, multi-site organizations when collaboration occurs between similar asset management functions at different sites. Cross-site, or Multisite, collaboration helps companies by sharing information and practices learned in one place with the rest of the organization and by enabling joint, coordinated execution of certain asset management tasks.

Multisite CALM applies to many different functional areas, such as maintenance, procurement and engineering. Information and best practice sharing among these groups can help to establish common performance standards for specific assets, adopt validated best practices, and proactively alert others of reliability issues with common assets, manufacturers and service providers. Joint, coordinated action enables organizations to implement corporate standards for solution and equipment procurement, leverage combined purchasing power and actively share critical resources like people, parts and tools.

1. Identify and share best practices

2. Share important knowledge and asset information

3. Compare benchmarks and performance

4. Better utilize available and limited resources

5. Collaborate on planning and installation

6. Negotiate better service agreements

7. Consolidate and optimize MRO materials inventory

8. Redeploy critical assets

9. Reduce MRO materials pricing

ARC Survey Rankings of Multisite CALM Benefits

The importance of a given benefit will naturally vary according to the specific situation an organization faces. Participants in ARC's survey were asked to rank the importance of each benefit to their organization. The attached table shows the results in rank order. It is interesting to note that information sharing benefits dominate the list and highlight the existence of a critical information gap. Benefits from joint, coordinated action are certainly no less important but they may already be in place as part of corporate management policies or through use of shared corporate services like centralized purchasing. Such practices may also be less dependent upon the kinds of information sharing commonly enabled by Multisite CALM practices.

Significant Benefits Are Already Being Achieved

ARC believes that the arguments for implementing a Multisite CALM program are quite compelling. But the real "proof is in the pudding" and questions were included in the ARC survey regarding measurable benefits that have actually been achieved through Multisite CALM practices. Users reported savings in most of the expected areas and highlighted some additional benefits such as better management of regulatory issues. Many also noted that the creation of a multisite database with common codes for resources, assets, and other information has enabled broader programs such as operational excellence and continuous improvement.

ARC also conducted individual interviews with several organizations that have implemented new asset management programs that explicitly included multisite collaboration. These organizations were recommended by some of ARC's supplier clients who provided associated EAM solutions. Following are some highlights from those interviews.

Company	Application and Benefit
APM Terminals	IFS Application Suite helps optimize loading and unloading operations at 9 cargo ship terminals in North America and Europe. Sharing asset information helps avoid equipment failures and eliminated up to 20% of equipment at some terminals.
Bowater	Implementing Indus EMPAC in 11 paper mills using RCM, KPI and TPM best practices. Upfront planning on coding standards, sharing clean data, collaborative benchmarking and annual scorecard audits will help provide ROI payback in 2 to 3 years from MRO purchasing, inventory and overtime savings.
TransCanada Pipelines Ltd.	Avantis EAM enabled reduced maintenance costs and achieved improved asset performance through a "Balanced Scorecard" approach to multisite asset management. This approach improved communications, recognition of best practices and asset performance measurements.
Major Food Producer	Has deployed Datastream 7i at five North American plants using combined TPM, OEE and quality management best practices. Expects ROI payback within two years.

Examples of Multisite CALM Implementations and Benefits

Bowater implemented Indus EMPAC across eleven paper mills in North America. A key focus of this program was to achieve operational excellence using collaboratively developed benchmarks and best practices to improve performance, reliability and quality. Good upfront planning, coding standards and data cleansing prior to the rollout and use of annual scorecard audits helped generate strong ROI payback from MRO purchasing, inventory and overtime savings.

TransCanada Pipeline's implementation of Avantis EAM from Invensys focused on improving company communications, measurements and accountability. Using "regional ranking" of field operations for preventive maintenance and a "balanced scorecard" including shareholders, customers, employees, society and internal processes, TransCanada decreased maintenance costs and improved operational performance across 38,000 kilometers of natural gas pipeline.

Using the IFS Application Suite has helped APM Terminals optimize loading and unloading assets at nine ship cargo terminals in North America and Europe. Improvements in KPIs such as mean time between repairs (MTBR) eliminated the need for up to 20% of the fleet equipment at some terminals. Proactive sharing of critical asset information between terminals also helped to avoid failures, potentially saving over $10,000 per hour in costly dock time delays. Good upfront strategic planning and terminal operations modeling enabled more effective change management and accelerated user acceptance.

Current Multisite Collaboration Practices

Considering that organizations already recognize the value of information technology for asset management, it is instructive to see how organizations are currently using such technology to support current multisite collaboration activities. Multisite collaboration is often not considered when one develops an asset management program. Funding for cross-site activities, like multisite collaboration, are always challenging when there is no single point of responsibility. Therefore, technology investments in this area may not be in line with other aspects of asset management.

> Many organizations already share important information but do so infrequently.
>
> Infrequent exchange may be adequate for some industries but is certainly not a proactive approach for driving operational excellence and enabling continuous improvement.

ARC explored this issue in our recent survey by asking each participant to indicate how frequently they shared different kinds of asset information with other sites and what solutions they used to help them manage certain multisite collaboration processes.

According to the survey, many organizations share important information but do so infrequently. Some share asset status, work order status and re-

pair history in real-time while others review them annually or not at all. Most organizations also exchange procedures, benchmarks, performance measures, equipment specifications and MRO catalogs annually or less often. Infrequent exchange may be adequate for some industries but is certainly not a proactive approach for driving operational excellence and enabling continuous improvement. Many more companies were proactive in sharing daily work schedules and weekly inventory reports, maintenance logs and status of resources and work orders. An operations summary was also often reviewed monthly along with safety sheets.

Multisite Asset Management Information	Hourly or more often	By Shifts	Daily	Weekly	Monthly	Quarterly	Annually or less often	Never
Asset status	XXX	X	X	X	XX	X	XXX	XXX
Resource status	X	X	X	XXX	X	XX	XX	XX
Work order status	XX	X	XX	XXX	X		XXX	XX
Work Schedules	X	X	XXX	XX	XX		XXX	XX
Failure and repair history	XX		X	XX	XX	XX	XXX	XX
Procedures	X		XX	XX	X	XXX	XXXXX	X
Benchmarks	X	X	X	X	X	XX	XXXXX	X
Performance measures	X		X	XX	XX	XXX	XXXX	X
Equipment specifications	X		XX	XX	X	X	XXXXX	X
Safety sheets	X	X	X	XX	XXX	X	XXX	XX
Compliance reports	X	X	X	XX	XX	XX	XXX	XX
MRO catalogs	X		X	XX	X	XX	XXXX	XX
Bill of materials	X	X	X	XXX	XX	X	XXX	XX
Inventory reports	X	X	X	XXX	XX	X	XXX	XX
Operations summary	X	X	XX	XXXX	XXX	XX	XX	X
Maintenance logs	X	X	X	XXXX	X	X	XXX	XXX

Current Practices for Multisite Information Collaboration
(X – few, XXX – some, XXXXX – many)

Many organizations also have multisite collaboration processes in place, but in an unstructured way with limited information technology support. Meetings, email, phone and FAX are still the mainstays for collaboration. Even important programs like reducing MRO materials costs are still mainly done on an ad hoc basis.

Collaborative Multisite Process	Dedicated Software Application	Automated Procedures and Workflows	Website or Portal	Email	Phone or FAX	Scheduled Meetings	Ad hoc
Share important knowledge and asset information	XXX	X	XX	XXX	XX	XX	X
Establish common procedures and workflows	X	XX	X	XXX	XX	XXX	X
Better utilize available resources	X	X	X	XXX	XX	XXX	X
Collaborate on planning procurement and installation	XX	X	X	XXX	XXX	XXX	X
Negotiate better contract agreements	X	X	X	XX	X	X	X
Consolidate and optimize MRO materials inventory	XX	X	X	XX	XX	XX	X
Redeploy critical assets	X	X	X	XX	X	XX	XX
Reduce MRO materials costs	XX	X	X	X	X	XX	XX

Current Approaches Used for Multisite Collaboration
**(X – few, XXX – some, XXXXX – many)**

While structured sharing of information in real time is not a prerequisite for adoption of a Multisite CALM philosophy, ARC believes that the value of multisite collaboration is greatly amplified when organizations take advantage of the full power of today's information technologies. Collaboration supported by dedicated software applications, automated procedures and website portals help to establish a structured approach to information exchange enabling predictable access to the right information by the right person at the right time. Other methods, although convenient and simple, frequently create unacceptable delays in the timely sharing of critical information and can be too unreliable for making fast and accurate decisions. Electronic collaboration performed across the internet also facilitates use of

better analysis tools and implementation of best practices for critical deci-sionmaking.

The conclusion from this information is clear — there is considerable op-portunity for improvement of existing multisite collaborative processes. The issue is not whether to apply better tools but what tools should be used.

An OMP Model for Multisite CALM

ARC has developed a model for Multisite CALM. This model is illustrated below and is an application of the ARC Operations Management Platform (OMP) in the context of asset management. OMP is described in detail in another ARC report (see ARC Strategy Report, February 2004 – "Operations Management Platforms Drive Manufacturing Performance") and is focused on the use of integration and collaboration to improve performance of any operation.
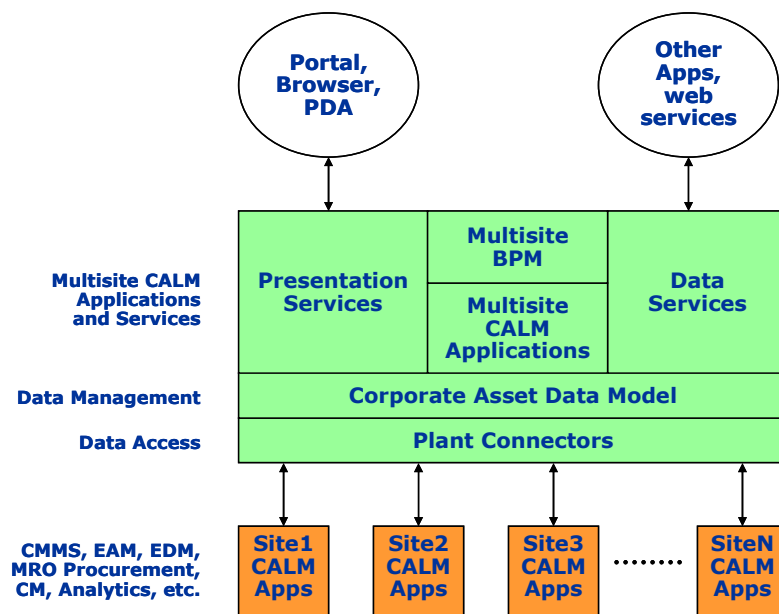
ARC Operations Management Platform (OMP) for Multisite CALM

Key elements of this model are:

- **Plant Connectors** that enable access to any kind of plant level CALM solution set. Connectors would ideally exploit technologies like XML

and web services to allow interconnection of globally separated sites having different CALM solutions and facilitate rapid integration of new facilities into existing corporate Multisite CALM strategies when acquisitions are made. With a connector philosophy, organizations that already have good CALM practices are free to continue to use their solutions, not forced into replacement just to be compatible with other corporate solutions. At the same time connectors must support integration for a broad mix of CALM applications including CMMS, EAM, Electronic Document Management (EDM), MRO Procurement, Condition Monitoring (CM), Analytics, etc.

- **Corporate Asset Data Model** that provides an overall structure for all corporate assets. This data model may include an actual data base of values or just be the means to access information from plant level systems. Regardless of the specific implementation approach, the Corporate Asset Data Model supports all of the information needs of Multisite CALM applications such as analysis tools, best practice management, etc.

- **Presentation Services** enable access to Multisite CALM information from a variety of interfaces including Portals, Browsers, and wireless devices like PDAs and cellphones. Use of asset information can be pervasive in an organization and access should not be limited to specific screens, etc.

- **Data Services** enable access to Multisite CALM information by other corporate activities like financials, HR, Purchasing, etc. Ideally these interfaces would support web services to enable full access across the internet, considering the fact that an underlying need for Multisite CALM is the fact that sites are geographically dispersed.

- **Multisite CALM applications** include any applications that focus on analysis and comparison of common measures across sites. Examples would include searches for where a given part is located in MRO inventories, comparison of service contracts with common service providers, management of best practice libraries, comparison of performance metrics for similar equipment across different sites, etc.

- **Multisite BPM** is the ability to develop organization-wide business processes that interact with multiple asset sites. Examples would in-

clude management of shared resources like people, parts, and tools, change management for best practices and safety procedures, etc.

Hosted EAM Solutions Are Not Necessarily the Answer

Hosted EAM solutions are becoming increasingly popular with asset management professionals. These solutions are fully web-enabled implementations of broad EAM functionality, can be hosted internally or externally, and allow organizations to extend the benefits of EAM across multiple sites with minimal investment and minimal support. While ARC fully endorses use of such solutions for reasons of cost effectiveness and standardization, they do not necessarily address all of the issues of Multisite CALM.

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A given EAM solution may not support cross-site analysis which is basic to the Multisite CALM philosophy. Even when they do support this kind of analysis, they do not generally support connection with other EAM solutions, requiring instead that users convert asset management activities at all sites to the common framework. Where no EAM solution exists, a hosted EAM solution should certainly be preferred since common applications simplify Multisite CALM integration. But care must be taken to recognize that this is a multi-plant implementation of EAM, not a Multisite CALM solution.

Another issue to address is that Multisite CALM is connecting a variety of organizational activities and their associated applications across different sites. While EAM is a key element of a CALM strategy and may satisfy the needs of the maintenance organization, it will likely not meet all of the requirements of other stakeholders like engineering, procurement and operations. One must evaluate all of the user needs against the capabilities of a given EAM solution before deciding that it can be the basis for a robust Multisite CALM program.

Are You Prepared for Multisite CALM?

Enabling sites to share information and collaborate on joint problems can generate benefits regardless of the organizational setting. But benefits are

greatly enhanced when the organization has already adopted standard as-
set management practices across all sites and when all sites are equally
equipped to participate in collaborative processes. Different practices cre-
ate different measures that make comparison of information difficult.
Likewise, sites that cannot produce information that others need cannot be
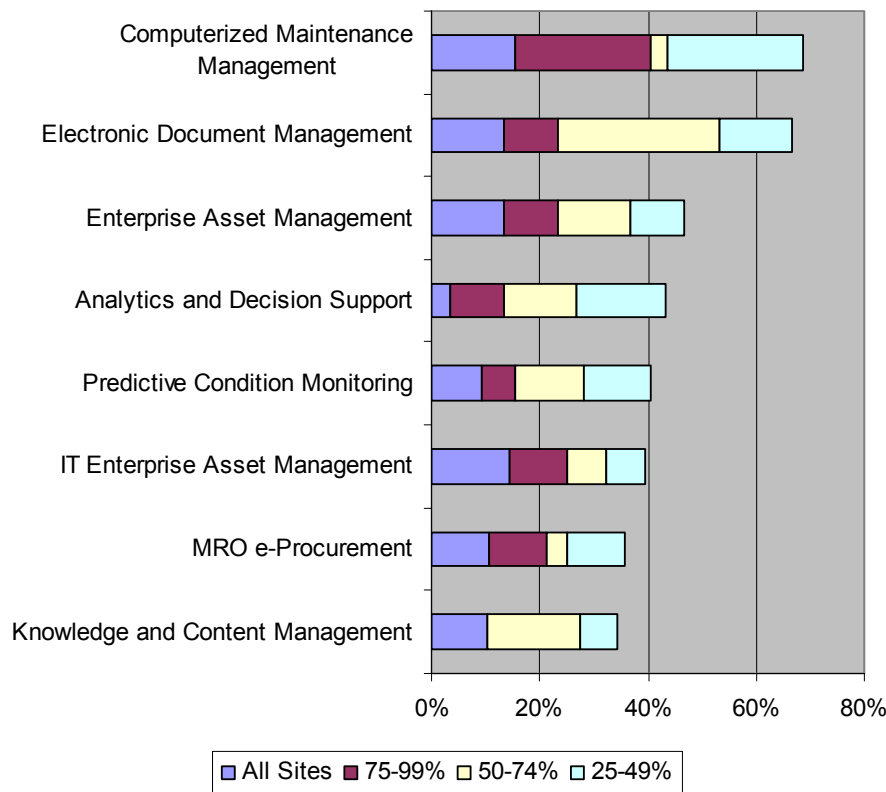strong collaborators.

A common corporate data model, as described in ARC's OMP model, can
help to reconcile data differences but it cannot create information that is
simply unavailable. Likewise collaborative processes cannot be imple-
mented at the corporate level if supporting processes are non-existent at
certain sites. A Multisite CALM program should therefore include an
analysis of the organization's current state with regard to common practices
and site information technology levels. Preparing the organization for Mul-
tisite CALM is one of the best ways to ensure that maximum benefits are
achieved.
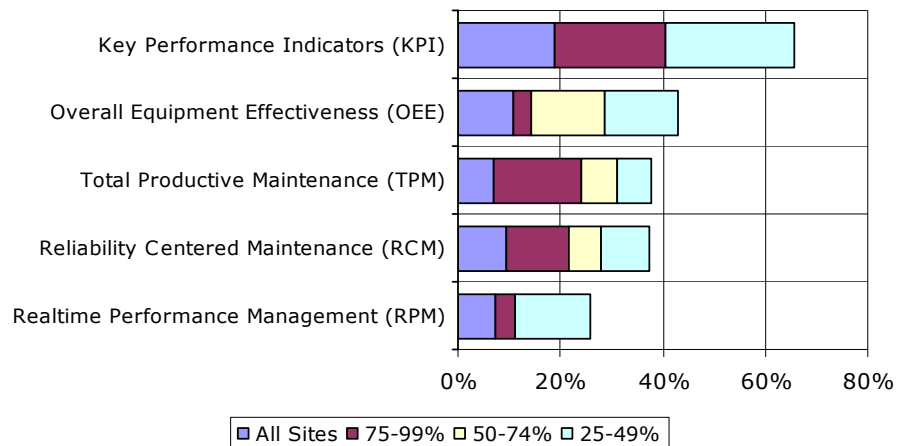
Current Use of Asset Management Best Practices

While each organization will have to do their own assessment, it is also in-
teresting to evaluate the overall readiness of organizations to implement
Multisite CALM. These results can help users benchmark their own or-
ganizations as well as provide guidance for solution provider development
programs.

The survey investigated the use of several very popular asset management
best practices. Key Performance Indicators (KPI) seems to be the most
widely deployed strategy from a corporate perspective, followed by a spe-
cific instance of KPIs, Overall Equipment Effectiveness (OEE). This result
likely reflects the current popularity of performance measurements in gen-

eral and the increasing use of competition between sites to drive organizational performance.

Total Productive Maintenance (TPM) and Reliability Centered Maintenance (RCM) are asset management strategies that can have a large impact on comparability of information and development of collaborative processes. While the low use of these practices is not unexpected, this situation will likely impede capture of many Multisite CALM benefits in the short term and is an area that should be on the radar of solution providers.

Extent of CALM Solution Deployment

Legend: ■ All Sites ■ 75-99% □ 50-74% □ 25-49%

It should be noted that these best practices are not mutually exclusive. Each addresses a specific set of asset management challenges and they can be combined to reap maximum benefits. Multisite CALM benefits will be limited by the extent that the associated practice is being used and by the pervasiveness of that use across the organization.

We assessed information technology readiness of organizations by how broadly they have deployed the various CALM applications. The most broadly deployed solution is the Computerized Maintenance Management System (CMMS) followed closely by Electronic Document Management (EDM). These results are somewhat expected since EDM is typically a company wide decision and CMMS is a mature strategy used by most maintenance departments.

Enterprise Asset Management (EAM), IT EAM, and MRO e-Procurement are the next most deployed applications and in many cases have the same level of "All Sites" penetration as CMMS. Predictive Condition Monitoring

Multisite CALM Application	All Sites Use Corporate Standard Solution	Same Solution Used by Multiple Sites	Sites Choose Own Solution	Solution Is ASP Hosted	Not Used at Any Site
Enterprise Asset Management	XX	XX	XX	X	XX
Computerized Maintenance Management	XXX	XXX	XX	X	X
Predictive Condition Monitoring	X	XX	XXX	X	XX
MRO e-Procurement	XX	XX	XX	X	XX
IT Enterprise Asset Management	XX	X	XX	X	XX
Electronic Document Management	XXX	XX	XXX	X	X
Knowledge and Content Management	XX	XX	XX	X	XX
Analytics and Decision Support	XX	X	XXX	X	XX

CALM Solution Deployment Strategies
(X – few, XXX – some, XXXXX – many)

is less extensively deployed, reflecting the nascent state of some of these technologies. Analytics is the least deployed which is surprising given the popularity of KPIs. This likely reflects the nascent nature of KPI monitoring and highlights how technology readiness may not be meeting the requirements of corporate level initiatives.

We also assessed the strategies being used for selecting and deploying CALM applications. Industry is currently experiencing a changewave from sites choosing their own asset and information management solutions to multiple sites using a web based corporate standard. CMMS and EDM solutions are most likely to be corporate standards followed closely by EAM and MRO e-Procurement. Other CALM applications requiring specialized training such as Predictive Condition Monitoring are more likely to be site specific and slower to be adopted as a corporate standard or used at multiple sites. Deployments of web hosted CALM applications are expected to grow over 25% annually for the next several years as web based architecture replaces older solution designs.

Implementation Challenges

While Multisite CALM is a new concept, some companies have already been experimenting in this arena. Accordingly, we included the issue of implementation challenges within our survey.

Several organizations indicate that it is a good idea to develop a rollout plan defining when solutions will be installed and activated in different sites. Connecting one or two pilot sites helps to develop a consistent implementation methodology and winning strategy for rapid and successful deployment in the remaining plant sites. It also permits the phased implementation of corporate level standards for naming conventions, performance measurements, and other collaborative requirements. Developing best practices for this activity can be just as important as what is done, since early success at some sites will encourage better cooperation from other sites.

1. Changing business rules and workflows

2. Executive management support

3. User acceptance and participation

4. Multisite solution integration

5. Choosing and configuring CALM solutions

6. Multisite sharing and cooperation

7. Establishing corporate coding standards

8. Deploying proper technology

9. Implementing security

Current Ranking of Multisite CALM Challenges

The most difficult challenges involve managing change, promoting participation and gaining user acceptance. For example, changing business rules and workflows was considered the most difficult challenge by many survey participants, followed closely by obtaining management support, user acceptance and overall participation. Change that is legislated at a corporate level is always more difficult to accomplish since most plants want to remain autonomous and control their own destiny. This makes both corporate executive and plant level management support of a team environment critical for success. Once the implementation exhibits signs of being successful, participation will increase and user acceptance will follow.

The most difficult technical challenges seen by users involved application integration, solution configuration and finding skilled people for deployment of proper standards and technology. Integrating applications within the same plant is difficult but integration across multiple plants often with applications from different solution providers can be a monumental task requiring a strong commitment to adoption of corporate standards.

Even with corporate standards and properly skilled people, sharing knowledge and cooperation between plants was more challenging than anticipated. This was often due to traditional competition between regionalized facilities that has evolved over time and is not easily discarded overnight. Creating functional versus regional teams using best practices and new performance metrics can help to break down old organizational barriers.

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Determining objectives, best practices, useful standards and proper changes to business rules and processes is best accomplished using a collaborative team from corporate and all affected sites. This approach will also help to obtain needed management support from individual sites, achieve faster user acceptance and provide a successful rollout strategy.

Projects and payback periods for Multisite CALM tend to be longer and larger than for individual plant programs and this should be factored into project justification and project schedules. Collaboration has pervasive impact that is often hard to specify precisely and requires experience and creativity to recognize all of the benefits.

Recommendations

This report reviews the benefits and challenges of applying Multisite CALM, a collaborative strategy for asset management, across multiple organizational sites. ARC's research clearly shows that the value proposition for Multisite CALM is compelling and that the current situation presents significant opportunities for both end users and suppliers of information technology solutions.

> Large multi-site organizations that have not yet implemented Multisite CALM should consider the potential benefits of this strategy.
>
> Those that already have active multisite collaboration programs should consider how new information technologies can enhance the performance of those programs.

Large multi-site organizations that have not yet implemented Multisite CALM should consider the potential benefits of implementing collaborative best practices, knowledge sharing, common coding standards, a unified database, corporate benchmarks and standardized per-

formance measurements across all of their sites. Those that already have active multisite collaboration programs should consider how new information technologies can enhance the performance of those programs. ARC's OMP Model for Asset Management provides a good basis for development of an appropriate platform.

> Suppliers of CALM solutions need to recognize the broad requirements inherent in Multisite CALM and develop software and methodologies that can support such corporate-wide programs.

Suppliers of CALM solutions need to recognize the broad requirements inherent in Multisite CALM and develop software and methodologies that can support such corporate-wide programs. Web-enabled and hosted solutions support Multisite CALM and are extremely valuable, but they are not a complete solution. Where necessary, suppliers should consider strategic partnerships with other technology companies to address any solution gaps. Integration is clearly the major technical challenge for Multisite CALM and customers will prefer single sources for the complete solution.

Regardless of the approach taken, all parties involved in Multisite CALM must recognize the implementation challenges in these programs when developing project justifications and schedules. A successful rollout should include a comprehensive upfront analysis and a program to prepare the entire organization to ensure that maximum benefits are achieved.

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Distribution: All EAS and CEC Clients

Acronym Reference: For a complete list of industry acronyms, refer to our web page at www.arcweb.com/Community/terms/terms.htm

ALM	Asset Lifecycle Management	**ISP**	Internet Service Provider
ASP	Application Service Provider	**IT**	Information Technology
BOM	Bill of Materials	**KCM**	Knowledge and Content Management
BPM	Business Process Management		
CALM	Collaborative Asset Lifecycle Management	**KPI**	Key Performance Indicator
		MRO	Maintenance, Repair, Operations
CBM	Condition-Based Maintenance	**OEE**	Overall Equipment Effectiveness
CM	Condition Monitoring	**OMP**	Operations Management Platform
CMM	Collaborative Manufacturing Management	**OpX**	Operational Excellence
		PAM	Plant Asset Management
CMMS	Computerized Maintenance Management System	**PCM**	Predictive Condition Monitoring
		PLM	Product Lifecycle Management
CPI	Continuous Process Improvement	**RCM**	Reliability Centered Maintenance
EAI	Enterprise Application Integration	**ROI**	Return on Investment
EAM	Enterprise Asset Management	**RPM**	Real-time Performance Management
EDM	Electronic Document Management		
		SCM	Supply Chain Management
ERP	Enterprise Resource Planning	**TPM**	Total Productive Maintenance