Master Data Management:
Creating an Enabling Platform for Business Integration

Master Data Management is a relatively new name for an issue that has plagued life sciences, pharmaceutical, and biotechnology companies for years: delivering consistent data throughout the enterprise, and beyond. The more functions and divisions a company has, the less likely it is to be able to establish a standardized, common understanding of its widely used reference data. Although it is not a new problem, MDM is fast becoming a strategic focus for organizations all over the world, as evidenced by an ever-growing number of industry publications, standards organizations, specific products and analyst coverage. When data standardization is achieved—when an entire enterprise recognizes the same information to mean the same thing—organizations are able to realize significant benefits to the business, in both cost savings and revenue-generating areas. This is not because MDM creates business improvements by itself. Instead, it is a critical enabler; it allows companies to achieve business improvements. MDM provides corporations with better access to, and consistency of key information, delivering a foundational element for better decision making and process execution. Efficiency and profitability are the ultimate goals of MDM, not data standardization.

In today’s marketplace, where all possible advantages over competitors must be pressed aggressively, it is no surprise that more and more companies pursue MDM as a way to improve data quality and consistency, develop more effective applications, and eliminate the mistakes and inefficiency borne of poorly managed data.

In this white paper, author John Williams, the vice president of services at Collaborative Consulting and the leader of the organization’s Industry and Services Practice, spells out approaches companies can employ to define and recognize master data, a sometimes difficult but critical step in its optimization. He also details the broad-ranging business value an MDM initiative can provide for an organization. Additionally, he cautions against the “irrational exuberance” that can accompany trends such as MDM. In truth, while the results of a well-planned and well-executed MDM initiative can be exceptional, they often require considerable groundwork, oversight and diligence. For example, a sober, dispassionate assessment may show that a new MDM tool may not perform any better than the software an organization already has, especially if the in-house application can be extended.

The paper also outlines other challenges organizations must overcome to implement a successful MDM program, such as technology barriers, organizational and process issues, lasting governance, and funding. Moreover, it explains how organizations can overcome political issues that often arise as MDM programs get under way, and continue down their directed path.
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MDM is an enterprise approach companies can implement via a collection of tactical initiatives that feature a common view toward a broader strategy.

I. Defining Master Data Management

Master Data Management is common definition and management of specific business information. It is an enterprise approach companies can implement via a collection of tactical initiatives that feature a common view toward a broader strategy. It deals with what is often referred to as reference data, rather than transactional data. MDM has several key objectives, which are listed here.

1. Simplify complex MDM functions.
   - Often, business growth, either through expansion or acquisition, creates multiple management and entry points for the same or similar data. This makes keeping a “single version of the truth” difficult or impossible. One key MDM goal should be to simplify complex and non-integrated data management processes.

2. Consolidate critical information across the enterprise, while reducing redundancy.
   - Organizations frequently create data and application silos through various initiatives. These silos generally grow, unchecked, until the corresponding data inconsistency becomes a business issue. Bringing this data back together, either logically or physically, is also a key goal of MDM.

3. Assess and prioritize different data subject areas.
   - The adage that it is impossible to “boil the ocean” certainly applies to MDM. Considering which data subsets will yield the greatest benefit is key to effective MDM.

4. Improve data integrity and ensure accuracy, validity and completeness.
   - Through data standardization, organizations can realize the benefits of accurate and valid data.

5. Make more effective business decisions.
   - As data quality improves, so will decisions based on data.

6. Measure performance throughout the company.
   - Corporate performance can only be legitimately measured through use of well-defined master data. It is imperative to have a common understanding of key information across the organization to create an enterprise set of measurements.

7. Provide a clearer understanding of the information a company collects.
   - Different departments, groups and divisions collect data. In many instances, it has broader applicability that its initial purpose. Making the availability of data known throughout the entire organization can yield significant unexpected value elsewhere in the enterprise.

According to AMR Research, MDM is "a system of business processes and technology components that ensures information about business objects, such as materials, products, employees, customers, suppliers, and assets, and is consistent and accurate whether used inside or exchanged outside the enterprise." It also includes the appropriate organizational components to sponsor, manage and govern these business process and systems.
II. The Value Proposition

As discussed in the AMR Research Report “Combining IT Cost Containment and Business Change Could Save Global Businesses $1 Trillion,” (September 2003), major opportunities for system benefits hinge on a company’s ability to generate and leverage a global view of its customers, suppliers and materials. Clearly, there is a strong business case for a comprehensive and complete understanding of the key elements of information that are integral to the achievement of these savings.

The following list offers several examples of business problems many companies endure, which are alleviated by well-planned and executed MDM programs:

- ERP “go-live” activities are delayed, and production hindered, because the new system requires more complete and consistent master data.
- Management spends more time reconciling data in support of key business decisions than analyzing it.
- Companies cannot obtain the expected value of a global supplier management initiative because they do not have clean, consistent internal data.
- Companies are limited in their ability to leverage industry collaboration capabilities, such as GS1, because they lack consistent definitions of critical business entities such as supplier, customer and product.
- Organizations cannot globally manage procurement of common materials.
- No one is quite sure whose spreadsheet is the correct one, and therefore, which numbers represent the actual business situation.
- A fragmented view across channels and geographies results in poor customer problem recognition and support.
- Organizations have a fragmented view of business partners, and cannot determine how much they buy from and/or sell to particular companies. As such, they cannot optimize their buying agreements.
- Companies miss opportunities for synergy and synchronization after acquisitions, therefore they fail to maximize the value of the merged entity.

Most of these issues are a result of evolution of systems and information repositories that support the business. They have evolved in silos, focused on solving specific, single business problems, rather than the overall goals of the business. By implementing an MDM program, companies make their business groups and applications less “selfish.” They enable them to concentrate on more than simply their own function and its unique requirements and information needs. As these programs are infused with a more holistic, company-wide perspective, they enable each department to act as an important element of an overall enterprise, rather than as an independent, single segment.

Global Operations Require Data Harmonization

Increasingly, MDM is becoming a global issue. Companies are trying to define themselves to the marketplace by their global value propositions, rather than just local or regional ones. Oftentimes, attempts by global corporations to gain advantage from economies of scale boil down to their ability to leverage commonalities across their operations, customers and suppliers.
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The practitioners of these functions became much more proficient than their colleagues in individual offices.

For example, in the 1980s, General Electric realized it could save considerable money by consolidating several back-office functions under a single roof—that of the organization’s Shared Services Center. Instead of having numerous GE entities all over the world performing functions such as accounts payable or payroll as they saw fit, these tasks were brought into a single center (or one of just a few regional centers). Within these organizations, common processes could be enforced more easily.

Not only did GE benefit from performing the tasks in a standardized way, thus eliminating multiple errors, at the same time, it received better performance. The practitioners of these functions became much more proficient than their colleagues in individual offices.

Although the concept of optimizing a global organization by consolidating business functions is not new, it is more and more prevalent, and an integral element of many companies’ value proposition. This issue resonates from grocery conglomerates, to international retailers, to global product suppliers. By implementing MDM, a company can more easily achieve the standard business definitions it needs to operate in more streamlined ways, enabling the entire enterprise to function as a cohesive unit. Other business reasons to pursue an MDM strategy include:

- Improved customer relationships
- Better contract and revenue management
- Better inventory visibility and management
- A consolidated view of enterprise performance
- Coordinated purchasing from global suppliers
- Reuse of product designs and components
- Reduced regulatory costs.

As stated in the definition, MDM focuses on development of a central repository of core reference data (e.g., Product, Location, Vendor, Customer), and a corresponding delivery method for that data, to keep the entire organization synchronized. This harmonization can extend beyond the four walls of the organization to create a Global Data Synchronization capability that enables integration with external entities.

III. Setting Expectations

As we have demonstrated, MDM provides organizations with considerable business benefits. However, as with most “Next Big Things,” MDM will have a difficult time living up to the considerable hype already generated. In truth, most companies will not experience the exceptional gains discussed in industry publications and/or promised by experts. Without doubt, MDM benefits can be real and substantial. However, there are pitfalls that can hinder an MDM initiative.

Too often, an organization’s technical environment, its relationship with its partners, suppliers and customers, and other marketplace realities undermine the potential effectiveness of an MDM initiative. Non-integrated applications, fragmented identifiers, varying content and content formats, multi-platform technical
environments, etc., create significant hurdles. As a result, data professionals should approach MDM with a guarded optimism. Specifically, they should carefully determine how much value such a program can deliver, and figure out how painful it will be to achieve real business advantage.

A cautious, realistic approach to an MDM initiative will help an organization ascertain whether such a pursuit is worthwhile. Practicality must play a significant role in measuring the potential for success. A clear risk/cost vs. benefits analysis must be performed early on to determine viability. The companies that have the most successful MDM programs tend to be those that plan well and set realistic expectations—i.e., they are honest with themselves, and employ a tactical approach. They also maintain a holistic, open-minded perspective.

Participation is another area where expectations must be established. All involved must understand that MDM is both a business and IT initiative. If these expectations are not properly set, the appropriate people will not be involved at the right levels. For example, it is inevitable that a new set of processes for the management of reference data will need to be established, as well as, quite possibly, a new technical platform to support this management. It will also be critical to create a common set of definitions, define an ownership/stewardship strategy, and create ongoing governance and funding models. All of these activities require significant business and IT participation—continuous, dedicated, active involvement. While the scale of an organization and the subject matter under discussion require consideration, business professionals should plan to allocate at least 25 percent as many resources to the effort as IT.

MDM: Streamlining the Enterprise

Master Data Management initiatives unite companies’ disparate systems and information, and ensure that the entire organization treats master data uniformly. The intended result of such an initiative should be the following:

- An infrastructure that provides for the collection and dissemination of key reference data throughout the organization
- A set of common processes for management of master data
- A governance structure that ensures that data consistency is maintained in the long term
- An organization, either centralized or federated, that manages MDM on an ongoing basis
- A common language for reference data (e.g., Item, Location, Vendor, Customer)
- A standard set of values for that context to improve communication and understanding
- An enabling platform for initiatives such as global data synchronization.
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Most companies realize they have a problem with master data where their various transaction systems are concerned, but few have an overall plan to deal with it. Additionally, while the initial MDM strategy effort is most often driven by IT, business professionals must be responsible for the process component, while IT must own the technical component. Governance and future organization structure lie somewhere in the middle; they are shared duties. This is how effort and responsibility will most likely break down in the future, too. Business will be responsible for the operational aspects of managing master data, while IT will own the infrastructure that supports the effort.

IV. Challenges and Approaches to MDM

Master data problems are not new. What is new is the fact that users are beginning to realize they need a systematic approach to data management, much the way the Sarbanes-Oxley Act highlighted the need for a sustained (rather than “one-off”) approach to compliance.

Most companies realize they have a problem with master data where their various transaction systems are concerned, but few have an overall plan to deal with it. Cost and scope make a top-down solution impractical, especially for manufacturing and retail companies that rely on packaged software. A best practice approach includes making MDM improvement projects part of each significant business initiative, with each featuring an explicit plan or roadmap designed to piece together a complete solution over several years.

MDM is not a panacea, especially for companies that lack exceptional data environments. In fact, companies that try to implement such programs face numerous challenges. One such challenge is defining which data elements within the enterprise should actually be considered as master data. As yet, there are no specific sets of rules for all organizations, no universal standards. Instead, individual organizations must develop their own regulations to define what makes a data element part of the company’s master data.

Having determined a set of parameters by which to define master data, the next challenge is prioritizing the enterprise’s subject areas (e.g., Item, Customer, Vendor, etc.). Each company must go through this prioritization exercise to determine the subject area(s) MDM should address, and in what order. When participating in prioritization, it is imperative that the organization’s planned initiatives are considered.

Next, the company must develop the plan and design of the tactical solution that will address the MDM initiative (or the MDM portion of a corresponding initiative). Assessing and identifying the need for an MDM program are strategic endeavors. However, they do not necessarily call for the tactical details needed to design the actual solution. In fact, the actual solution requires an in-depth understanding of the data, as well as the techniques and processes involved in deploying an MDM initiative.
V. Defining and Deploying an Appropriate Solution

Data professionals and other executives should think strategically, but act tactically to achieve their MDM objectives. They need to employ an approach that looks at the whole problem—holistically—and then solves it in business-focused, identifiable segments, each of which adds value.

With this structured approach, the team benefits from early and frequent successes. Consequently, the project gains momentum and high morale is sustained. And, with each completed phase, the company receives value. As such, if business priorities change along the way, the entire project is not scrapped, as it would be in a “Big Bang” approach. Some tactical steps companies should pursue in an MDM program follow.

One: Understand the current environmental complexities. Successful MDM initiatives require the organization to understand the current state of its application environment dispassionately and pragmatically. An objective perspective enables the company to focus on the material it needs to know to complete the program effectively, while ignoring extraneous information.

One of the initial steps in the process is development of a conceptual model for each subject area to be addressed. Concept can be defined as an abstract or general idea inferred or derived from specific instances. A conceptual model is an abstract or general model based on specific instances of a business. An enterprise conceptual model (ECM) is produced by identifying and defining major business concepts within the subject areas of a business.

The conceptual model is concerned with the kinds of information an organization needs to run and manage its business affairs. It is vital to the understanding and management of what information is available to the organization.

The conceptual model provides the MDM project team a single source of knowledge and understanding about the business concepts that comprise the project’s in-scope subject areas, and it expresses them clearly and unambiguously. The conceptual model also will help the team develop more detailed data models in later project phases. Those models use definitions of business concepts in the conceptual model as anchor points to ensure alignment with the current thinking of the business, and “build in” the semantic integrity of the data specified by the model.

Additional steps toward Understanding the current environmental complexities include a system and process inventory.
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System/Application Inventory

Many large companies have literally hundreds of systems that are candidates for MDM analysis. By assessing their capabilities, use and performance, companies can determine those that qualify and those that do not. Unfortunately, doing so is labor intensive and slow. By stratifying applications into tiers—i.e., sorting them by the degree to which they use and/or manipulate master data—a company can avoid a great deal of unnecessary work. For instance, by assigning each application to one of three tiers (Tier One, Two or Three) for each subject area, an organization can rule out a great deal of applications very quickly, saving considerable time and effort. It is an optimal approach to analysis. For instance, a system that features Item and Customer Data can be assigned to a tier indicating its duality and value. The tiers are described here:

- **Tier One** systems are directly involved in the maintenance of reference data. These applications change master data in some way; they insert, update or delete information. An Order Management System, which calls for the entry of customer data, falls in this category.

- **Tier Two** systems are the recipients of reference data. Tier Two applications do not alter master data, but use it heavily for processing. A pricing application, for example, requires Vendor data, Location data and Item data. However, it does not create any of that information. It only creates a pricing model.

- **Tier Three**, or out-of-scope systems, are those that do not leverage reference data.

Finally, companies must understand how to plan and execute an MDM deployment. An MDM initiative in a typical large company will impact hundreds of systems; they are enterprise scale issues.

Process Inventory

Identifying and understanding a company’s business processes is also problematic. When business processes are not well documented (and usually, they are not), that task must be performed from scratch. Approaching business process identification similarly to application identification is helpful. Each business process, like each application, can be assigned to a tier.

In fact, managing master data requires several business processes itself, such as adding a new product, hiring a new employee or removing a redundant supplier. Within a large grocery organization, for example, one division might add an item, such as a kind of produce. Another group might add an item like soap. In addition, the grocer may have a direct vendor feed. In short, complexity can mount quickly. As such, business processes such as these, which affect process flows (i.e., when an activity is changed, deleted or added), can be identified as Tier One.
Tier Two business processes concern users of data, such as consumers, and are less likely to have a dramatic impact. Still, integrating the business processes involved in an MDM initiative can be just as complex as integrating the systems, and just as worthy of assigning specific processes to tiers.

Two: **Build approach and prioritize systems.** A good first step in building an approach for an MDM initiative is to create a "straw man" logical data model for the subject area(s) involved. Before executing detailed interviews, the straw model can provide context for detailed discussions. As each system is reviewed, the logical model is updated with additional attributes and entities discovered, and the system is mapped to the logical model at an "attribute group" level. Be sure to leverage any existing data models while developing the logical data model.

In addition to building the straw model, one of the most important elements of a successful MDM initiative is determining what master data is, and just as critically, what it is not. When an organization has a uniform description, it can begin to create a solution.

Three: **Determine what qualifies as master data.** While AMR does an excellent job classifying what Master Data Management is, the definition does not say what master data is. Determining what qualifies as master data can be problematic for many organizations. However, doing so is a fundamental step toward MDM success. Only when it is identified can it be used properly.

There are ways around the barriers that make identifying master data troublesome. For example, if a certain data attribute is used in eight of a company's 10 systems, chances are, it is master data. If it is used in just two of the systems, it is probably not. However, in many cases, companies might consider a piece of information to be master data in one scenario, but not in another.

Unfortunately, as stated earlier, as yet there are no defined standards or established rules of thumb to determine the specific criteria that constitute master data. However, several widely agreed upon parameters exist, and are helpful.

- **Reference transaction data as master data.** Some systems reference transaction data from another system to support internal business processes. They use it in a manner similar to master or reference data.

- **Understand master data associations created by transaction data.** Some of the most common outputs of business transactions are assignment of ownership, responsibilities or commitments that link two master data entities. When this occurs, the results are usually disparate, manually maintained copies of the same information.

- **Leverage status information.** Status information usually tracks a master data entity's progress or performance within the context of a given business process (planning or transactional). It may or may not be classified as master data, depending on its functional dependence on transactional data entities.

Without a clear definition of master data, companies expose themselves to a host of problems when gray areas arise, as they invariably do (usually very quickly). As a result, attempting to implement a data foundation before defining master data is asking for trouble.

Understanding the Opportunity

When working on an MDM program, it is critical to keep its business purpose foremost in mind at all times. Companies can spend substantial amounts of time and money consolidating data, but if they fail
When working on an MDM program, it is critical to keep its business purpose foremost in mind at all times. To relate their work directly to the business problem, they are wasting their energy. For instance, if the organization aims to optimize its logistics, the way it moves products into and out of its warehouses and stores, it should focus on consolidating time and location data. In the same vein, a multi-chain conglomerate looking to optimize supplier purchasing should focus on vendor and item data. By doing so, it can recognize instances when it can use a common supplier to acquire material, leveraging economies of scale and eliminating risk.

Moreover, a company will be able to optimize its pricing strategy if it is able to determine what customers are buying, and buying in sets, throughout all of its entities. In all cases, by clearly understanding the problem the MDM initiative is being asked to solve, and maintaining a focus on that problem, the organization stands a far better chance of success.

Additionally, when considering the opportunities an MDM initiative provides, the company must be sure to look closely at internal prospects. Often, the establishment of a global standard data pool can help a large organization use master data to significant advantage.

Vendor Advice

And, just as MDM programs as a whole are hard-pressed to live up to the hype that precedes them, software products usually are not the cure-all a vendor may promise. For instance, when reviewing a software product, the organization must also consider data and application integration, i.e., it must create an integration architecture and tie it to all systems that need it. In fact, most vendors do not include application integration features. To achieve integration, the company must also purchase entire sets of a product’s architecture components. That too, is fraught with complexity, given the large number of vendors in the market, and the broad array of products they offer. There are guidelines for navigating the morass of vendors, however. Companies that already use enterprise resource planning software should give a long look to those vendors’ MDM products, especially if, as often happens, as much as 80 percent of their data will reside in the ERP system. These vendors may already feature a great deal of the necessary “piping,” which could make integration much easier.

Furthermore, when a company settles on a deployment model, it must consider how it will test it. Like other large and complicated projects, a pilot implementation can serve as an excellent benchmark. It helps the organization understand the complexity of the project and the challenges involved in the migration. Once these are realized, the organization can measure the results, and continue to plan the effort.

VI. Conclusion

The ability to implement an effective MDM initiative is becoming a critical capability for many large organizations. The pressure to grow quickly and seamlessly is a very real element of every business, and MDM enables integrated, strategic expansion without unnecessary rework. As a result,
organizations become more competitive and profitable.

Of course, like most important projects, an MDM effort requires commitment from the entire organization. Additionally, that commitment must be lasting. While MDM will provide numerous quick-hit benefits, those derived over the long term are most substantial. If dedication wanes and attention to detail becomes lax after a little while, or if resources are pulled away when other issues arise, the effectiveness of the MDM initiative will be curtailed, if not eliminated. Such a gradual decline can be avoided with exceptional governance. By clearly indicating who is responsible, and by empowering those people to do their jobs, the likelihood of success increases dramatically.

A successful MDM effort also needs integration between business and technology professionals. While this requirement is hardly a revolutionary idea, cooperation between these entities remains elusive for many organizations. Frequently, office politics stand in the way of widespread acceptance. For instance, MDM projects often blur the boundaries of organizational “turf.” They change the terms of data ownership and access, and worse, they can expose a history of often negligent and embarrassing data management within IT. Moreover, these projects can affect the work practices of highly autonomous and powerful user groups within the enterprise—people not accustomed to being ordered around. Additionally, various functions may feel that they “own” the data in their systems, and be reluctant to allow another system to access—much less alter—what is considered critical information.

However, an MDM initiative cannot survive amidst disjointed communication among functions. Simply defining master data in a uniform way requires considerable collaboration, and a true team effort. In a global organization, an MDM initiative will have a significant impact on the IT department, the systems architecture and business processes. Those responsible for the MDM effort must ensure that all stakeholders understand its benefits, and convince them to make sacrifices when necessary.

If particular groups refuse or are disinclined to participate, they must be convinced of the need to use the solution—but this cannot be done simply by fiat. Executive sponsorship, internal marketing, education and training help people recognize the greater good of an MDM program, and embrace change more readily. Knowing how these groups will be impacted, before the new “rules” are laid out, is also a good early step.

Unfortunately, politics are part and parcel of an MDM initiative. As such, political skills are important, and, as much as most professionals would like to, they cannot be ignored. They are as important to MDM as the data itself.

Eleven Master Data Management Truths

1. Data governance is a prerequisite for successful Master Data Management. The first step in an MDM project is to establish a governance process to define who will be accountable for master data and its quality. Moreover, the emphasis of governance must be data stewardship, not ownership. Groups and/or individuals do not own the data, they are its stewards, and they serve the entire organization. Additionally, groups that benefit from MDM should fund the programs.

2. Organizations must address short-term tactical needs with a view toward a broader MDM strategy. Treat tactical initiatives such as Customer Data Integration (CDI) and Product Information Management (PIM) as strategic opportunities. Think strategically, but deploy tactically. Tactical initiatives are the cost of doing business; broader MDM is the cost of doing business more profitably and competitively.

3. Companies must identify and coordinate various tactical master data activities and understand the flow and life cycle of the master data they produce and use.

4. Build a technology foundation geared for long-term goals.

5. Be aware that a single master data repository may not be a possibility and if it is, it may be years away.

6. MDM is essentially a data quality and standardization exercise. To perform the data quality assessment required to standardize and remediate master data, organizations must develop an objective method of using tools and techniques to assess enterprise systems holistically. Then, they must aggregate the results into a meaningful summary.

7. MDM is a foundational activity. By “foundational,” we mean it is mandated and enterprise-wide, ensures business alignment, and is focused on management and infrastructure.

8. Standards are critical for integration. Without standards, integrating data and applications built on proprietary technologies and data schemas is difficult and expensive.

9. Technical assumptions and system limitations will not define what is considered master data. Rather, business information processing needs and inherent characteristics of the data itself will be the primary factors in determining whether it should be maintained within the data foundation.

10. MDM is not a silver bullet. People across various functions and departments still must come to a consensus on what comprises master data, what defines it, and what its sources are.

11. MDM is not so much a technical implementation as a business process exercise.
About Collaborative

Collaborative Consulting is committed to building long-term relationships and strives to be a trusted partner with every client. Founded in 1999, the organization serves clients from offices across the United States.

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John leads Collaborative’s Industry and Services Practice. He maintains a special focus on information management, an area in which he has over two decades of relevant experience. John has spent a large portion of his career helping high-profile companies rein in information and use it to create immediate, long-term business advantage. John has extensive systems development and integration experience, and is an expert in data management, data warehousing, database design and architecture. He has developed solutions for companies in many different industries including Financial Services, Life Sciences, Retail, Consumer Goods, High Tech, Utilities, and State Government. Prior to joining Collaborative, John was Director of Technology at NerveWire, and before that, a Partner with CSC Consulting, where he directed the development of the National Data Warehousing Practice. He is an engaging and highly sought-after speaker, and frequently publishes thought leadership materials, such as white papers and trade magazine articles. Email him at jwilliams@collaborative.com.