



Putting Collaboration to Work: Enhancing Existing Business Practices Using Citadon's Enterprise Solutions

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Introduction: The Promise of Collaboration and the Collaboration Gap

The promise of collaboration – both with internal employees as well as external partners and customers – has enticed enterprise software users since the dawn of the modern ERP era in the early 1990s. The theoretical ability of multiple stakeholders to share documents and data across common business processes has been touted as a major breakthrough towards gaining new efficiencies and enabling new opportunities in a wide variety of industries.

Despite the promise, and considerable marketing dollars and developmental efforts, existing enterprise software is often unable to support a level of collaboration that truly matches customer needs. This is primarily due to process and functional gaps, within established products and between different products that force users to use non-automated, non-integrated processes. This problem, which Enterprise Applications Consulting terms the “collaboration gap,” is one that exists in virtually every industry, and in every company. The lack of automation and process efficiency means that the promise of collaboration – in terms of effectiveness, efficiency, quality, and excellence – is either unachievable or is prohibitively expensive. For many companies, the collaborative processes that do exist are enabled not by efficient software, but by inefficient, ad hoc means that fail to deliver on the promise of collaboration.

One of the key areas in which collaboration often fails to meet its promise is in industries that require a fluid flow of complex documentation and data, regardless of format, between a wide variety of stakeholders. This requirement exists in the collaborative design requirements for capital intensive projects such as oil pipelines and building construction projects as well as in complex, intellectual property-rich areas such as pharmaceutical research and development. Documents and data have to cross firewalls, span borders and time zones, and coexist in different digital formats in an organized manner in order to support the complex, collaborative processes that underscore these endeavors. Their use and alteration must be carefully documented as well, both for audit purposes as well as to meet regulatory requirements.

The complexity of many of these projects and their document and data requirements are only one barrier to true collaboration. The other is timeliness: in many industries, the cost of delay and inaccuracy can be measured in losses of hundreds of thousands or even millions of dollars, as

well as in regulatory sanction and lost opportunity. For projects and processes that span multiple partners and stakeholders working in different locations, meeting the timeliness requirements of collaboration has been difficult and expensive, if not ultimately impossible.

Citadon Inc., an enterprise software vendor based in San Francisco, has been successful in breaking down these collaboration barriers by delivering a document and data management solution that enables collaboration between multiple stakeholders, despite differences in software, format, and business process requirements. This ability to build collaborative processes on top of disconnected systems has enabled Citadon to enhance the value of both the enterprise software environments of its customers as well as the value of the relationships between business partners and customers on which these newly collaborative processes are based.

Citadon has asked Enterprise Applications Consulting (EAC) to look at how Citadon's products can improve the collaboration of existing enterprise software environments through an analysis of the company's products and its customer successes. EAC's review shows that Citadon can significantly enhance the collaborative environment for customers in a wide variety of industries by filling in the collaboration gaps in individual company processes. While Citadon's customers have a range of existing enterprise software solutions, EAC's analysis shows that given the functional gaps in these solutions – particularly with respect to meeting the requirements of customers' specific business processes – Citadon can be the more cost-effective and readily implemented solution, particularly in heterogeneous environments.

This white paper describes the parameters of the collaboration gap in enterprise software and its cost in terms of lost productivity and opportunity. Examples of how Citadon can help companies span collaboration gaps will be shown by examining how Citadon can enhance the value of an existing ERP implementation in three key verticals: retail chain construction, health sciences, and the oil and gas industry. This paper concludes with EAC's recommendations for enhancing collaboration in existing enterprise software environments using the Citadon product suite.

Defining the Collaboration Gap and the Role of ERP Software

The uptake of enterprise software in the last 15 years has been defined by the requirement for efficiency and competitive advantage, and to a large extent the ERP suites that emerged in the early 1990's went a long way towards achieving these goals. Companies like SAP and Oracle, as well as the now-defunct PeopleSoft, J.D. Edwards, Baan, and other competitors, were all able to deliver a significant amount of technology that allowed companies to innovate by automating their business processes, achieving new levels of efficiency, and genuinely improving their competitive profiles.

This need for innovation has only grown in recent years. The continually dynamic nature of business in the 21st century driven by rapid time to market, global competition, and new paradigms for collaboration in product development, service delivery, and sales, has made it clear that enterprise software must be even more effective in order to continue to deliver on the promise of ERP in the 20th century.

Ironically, while ERP vendors continue to innovate at a rapid rate, their very success has often made it hard for them to innovate at a rate equal to the needs of many of their customers. This innovation dilemma is occurring for three important reasons. The first is that the scope of the use – or potential use – of enterprise software has grown beyond the original functionality of the software. ERP's origins in finance and the manufacturing bill of materials has expanded to include customer relationship, human resources, the supply chain, and a host of other domains that has almost infinitely expanded the scope of enterprise software-driven innovation. Indeed, much of the innovative value of enterprise software today takes place *outside* the enterprise, in the form of processes like e-commerce and supply chain management, that directly involve partners, customers and other key external stakeholders.

The second reason that customer-specific innovation is hard for large ERP vendors derives from the first. As the potential for innovation increases, the ability for a single ERP suite to provide the next level of innovation becomes compromised. While ERP vendors have been very good at automating key processes in the enterprise – order to cash being a classic example – the finer points of how a large process like order to cash is realized in specific industries, or by innovative companies in those specific industries, are harder and harder to “bake into” a large enterprise

software suite. Innovating at the leading edge of an industry or company takes a lot more specialized expertise and domain knowledge than many ERP companies are able to acquire and deploy.

The third reason that large ERP vendors are handicapped in the innovation race has to do with the collaborative nature of the next level of innovation. New innovations beyond the capabilities of any individual ERP suite must also be able to leverage the processes – and users – from software products or suites. This need to innovate and collaborate in what is a highly heterogeneous software world further limits the ability of a single suite vendor to span the innovation gaps in both its own software and that of its competitors. The demands of innovation and collaboration in the face of extreme heterogeneity have limited how quickly and thoroughly the ERP vendors can respond to the specific needs of customers across a wide range of industries.

THE COLLABORATION AND INNOVATION BARRIER IN ERP SOFTWARE

Growing Scope of Usage and User Base

Increasing Industry and Customer-Specific Requirements

Complexity of Collaboration in Heterogeneous Environments

The result is a gap in the innovative nature of ERP software, and, by definition, a collaboration gap that follows from these limits. ERP vendors continue to excel at innovation, but it is more within the confines of their applications, and the specific user communities and business processes they have traditionally serviced, rather than in the ability to provide customer-specific innovation and collaboration in highly heterogeneous environments.

Enabling High-Value Collaboration: The Process Problem

Enterprise Application Consulting's (EAC) research has shown that this collaboration gap is most extreme in areas where innovative companies are pursuing the automation of value-added processes that are unique to their industries and business models. These value-added collaborative processes are often company or industry-specific, and are therefore rarely covered by the more

general-purpose processes that make up the majority of enterprise software suite functionality today.

EAC defines these value-added collaborative processes by the following five criteria:

- **Able to span and support processes, data, and information from heterogeneous systems.** High-value collaborative processes start with the ability to take data, information and processes in existing enterprise systems and use them as the building blocks for new or enhanced business processes.
- **Based on “extreme” vertical expertise.** Collaborative processes have the highest customer value when they are based on vertical industry-specific processes and user knowledge.
- **Involve multiple internal as well as external stakeholders.** The next level of value comes from enabling a rich and varied set of stakeholders to work together in ways that either improve on existing automated processes or automate processes that were previously un-automated.
- **Workflow-driven.** Collaborative processes must be enhanced by the availability of a workflow or process-flow environment that allows user-specific and/or industry-specific requirements to be expressed in the collaborative process flow.
- **Provide significant business and opportunity value.** While it should go without saying, it is important to emphasize that the business case for building and/or buying highly collaborative applications must be in the forefront of the justification process.

While most ERP vendors can deploy the tools and consultants needed to build customized or highly modified applications to meet the above criteria, in most cases the solutions lack the cost-effectiveness, ease of deployment, and ease of modification that a packaged solution could provide. As we shall see in the case of data and document management in large-scale projects, Citadon’s packaged solution provides support for high-value collaboration that is either unavailable from existing software suites or available at a cost that is significantly higher than what Citadon is offering.

Closing the Gap:

Document and Data Collaboration Using Citadon CW

While the domains of project, document, and data management are well-covered by enterprise software vendors, the ability of these products, particularly the large ERP suites, to enable high-value collaboration across these domains is limited. The limits span four areas:

The first is in data and document management as a function of process flow in a given project. Being able to maintain, update, and distribute key data and documents according to the needs of a specific point in the flow of a large project or projects is not a standard best practice for most of the solutions on the market today.

The second domain encompasses the collaborative use of data and documents by the different stakeholders in the enterprise. Matching the changing data and documentation needs of a changing group of stakeholders throughout the lifecycle of a project is also not a common capability of most ERP solutions.

The third limit is in the integration of the disparate, heterogeneous systems that “own” the data and documents with the project and its processes. This means that in addition to data and document management systems, financial, compliance and other enterprise systems that are dependent on inputs, corrections, and updates from the project processes themselves must also be integrated.

The fourth limit comes from the lack of “extreme” vertical expertise noted above, particularly as applied to the specific use of document and data collaboration.

THE GAP: ERP SOFTWARE IN DOCUMENT AND DATA COLLABORATION

Data and Document Management Limited

Collaborative Use Restricted

Heterogeneity Hard to Support

Extreme Vertical Expertise Lacking

When looking at the collaboration gap that Citadon spans from a software level, there are three classes of enterprise software that can be enhanced by the collaborative functionality of Citadon:

- **Project management software.** These products are quite good at project management, but lack the ability to manage data and documents as part of the process workflow.
- **Data and document management software.** These products have no real sense project and process management requirements, and lack broad-based collaborative functions.
- **ERP suites.** Most ERP suites have problems linking project-related data and documents to specific process workflow requirements. They are also less able to manage highly heterogeneous environment requirements, and support a highly collaborative environment.

Citadon's CW product is able to span the collaboration gap by providing a collaborative environment for sharing data and documents among a wide range of internal and external stakeholders according to the specific workflow needs of a company. This process-driven use of data and documentation is delivered in an on demand model, allowing instantaneous, on-line access by multiple stakeholders. Citadon also provides a document viewing and reviewing environment that does not require the user to have access to the applications used to create the documents, and CW provides full check-in and check-out control and traceability for regulatory and other compliance requirements. The Citadon solution also provides full integration to three key classes of enterprise software: project management, document management, and ERP suites. (See sidebar.)

This broad range of functionality allows Citadon's customers to bridge many of the collaboration gaps that exist in their existing enterprise software environments while enhancing the value and use of those products. The importance of this latter point cannot be overemphasized. The use of Citadon ensures that the key data and documents

on which ERP processes depend are accurate and accessible in a very timely manner. This means that processes under direct control by ERP software – financial management, procurement, logistics, and compliance, among others – can proceed based on the most accurate and up to date information and documentation generated by a large-scale project. The increased accuracy and viability of the data and documentation used in a project and managed by Citadon has a direct, and often enormous, value to the rest of the enterprise software environment and to the bottom line of the business as well.

Collaboration at Work: Citadon Customer Examples

In order to further define the collaboration opportunity presented by Citadon, EAC interviewed Citadon customers in three highly disparate vertical industries – retail sales construction, health sciences, and oil and gas development. In each case, Citadon was able to fill in the collaboration gap, provide a significant return on investment, and add value to the existing enterprise software base without disrupting IT or business functionality.

These interviews have been consolidated into the three use cases below. The ground rules for the interviews prohibit mentioning the companies by name in this report, but their examples and experiences speak for themselves. In each case, innovative requirements for document and data management in a workflow-driven environment necessitated the use of Citadon CW as an important adjunct to the functionality in existing enterprise software.

Managing Chain Store Construction in the Consumer Retail Market

Large chain retailers have a special set of problems relating to the management of their construction requirements that go outside the scope of much of what ERP vendors consider as the engineering and construction process. While many ERP vendors can provide functionality that covers the standard practices of large construction projects (see table below), the needs of major retail chains, particularly those that are in dynamic, high-growth markets, greatly exceed what most ERP packages can deliver.

STANDARD ERP CONSTRUCTION PROCESSES

Project Management

Design and Engineering

Procurement

General Contracting/Building Construction

Facilities Management and Maintenance

The problem is not so much with the ERP packages but with the specific requirements of large retail chains. Ironically, these companies' requirements are much more similar to the requirements of electronics or other discrete manufacturers than those of most large engineering construction firms.

The difference lies in the requirement to build and manage branded retail properties that are based on a single design or set of designs, and follow a highly proscribed building process that can involve literally hundreds of similar construction projects nationwide per year. This forces large retail chains, and the companies that manage the design and construction of their retail stores, to think in terms of repeatability, design management, collaboration, and real estate and asset management in very different ways than an engineering and construction firm – or typical ERP vendor – would view the management of a single, one-off project such as an office building or bridge.

Thus, in the retail chain market, the need to maintain a constant brand experience in each store requires a level of collaboration and coordination that cannot be managed with standard ERP functionality. While the management tasks are relatively similar, and the coordination between tasks such as design, asset, and real estate management, as well as financial and legal issues, are also similar, the necessity to coordinate literally hundreds of construction projects simultaneously, and then provide the means to manage these assets once construction is finished, is simply not within the scope of what ERP systems are designed to provide.

CITADON-SUPPORTED POST-ERP PROCESSES

Large-scale, Multi-project Coordination

Collaborative Document Management

Phase or Process-Based Progress and Versioning

Integration with Project, Asset, Lease, Finance & Construction Management Systems

Audit Trail for Document Usage

Citadon's ability to provide a comprehensive document and data management environment that can be tied to a workflow driven project management function fills an important gap in ERP software and provides Citadon's partners with a measurable functional advantage in their work. Citadon can help construction, engineering, and design firms work with large retail chains by providing the following capabilities:

- Manage all documents – including their versioning, status, and access – from a central repository.
- Provide managed, auditable access to project documents based on user profiles.
- Design and manage the processes and key deliverables associated with the different phases of design, construction, and maintenance.
- Track progress and provide reports and alerts on milestones and special conditions.
- Provide bi-directional data access to other software systems, including project management, asset management, lease administration, finance, and construction management, among others.

Importantly, Citadon can manage these requirements despite the fact that virtually every document type needs to be created and stored by contractors, subcontractors, and outside consultants in its own format using the particular software product that created it.

Citadon allows contractors and construction management firms to track and manage a wide variety of tasks based on the documentation and data requirements that are performed by an equally wide variety of internal and external users. The Citadon solution can manage the asbestos survey data from an outside environmental consultant, keep track of the architectural survey reports, help maintain information on layouts, signage, permissions and variances, building permits, construction plans, lease terms and conditions, and maintenance schedules, among others. Retailers that use financial data to drive construction and location decisions can use the Citadon system to import and manage those data and reports. And as the finished store comes under maintenance, the same document repository and process flow can be used to facilitate remodels, expansions, closings or relocation as needed.

R&D Project Management and Intellectual Property Assessment in Health Sciences

The nature of research and development in the health sciences has evolved significantly in recent years. Gone are the days when only the largest companies could afford to be innovators. Indeed, while manufacturing, marketing, sales, and distribution in the health sciences continue to consolidate under a few global companies, innovative research and development is often the purview of small, highly specialized companies that can provide, under license or similar contract, technology, products, and expertise that the larger health science companies can no longer develop in-house. This collaborative environment often means that the smaller entity must have a “virtual presence” inside the larger entity in order for the collaboration to meet its goals. This virtual presence must be based on a trustworthy exchange of intellectual property between the two partners. Anything short of full trust will yield unacceptable results.

This sets up a disconnect between what many ERP vendors are able to provide in terms of health science processes and the requirements of smaller innovative companies and their larger partners. This partnership model requires not only significant support for collaboration across the firewall, but, more importantly, a strong security and intellectual property protection model that is not part of the standard ERP health science process package (see table below.)

STANDARD ERP HEALTH SCIENCES PROCESSES

R&D Administration

Drug Development

Clinical Trial Management

Regulatory Management

Quality and Safety Management

Again, this omission on the part of the ERP vendors comes not through negligence but through an historical focus on the needs of an older model of project and intellectual property management that doesn't coincide with the way innovation comes to market in the health sciences industry today.

The collaborative processes that Citadon is able to support are much more in line with how this new model of collaborative productization works. One of the key requirements in health science innovation is the ability of the small, innovative companies to share key documents and data with their larger development partners. Product designs, new techniques and processes, clinical trial data, manufacturing specifications and other intellectual property must flow unimpeded – but in a highly controlled manner – between the partners in order for the collaboration to be successful. These documents and data have three key characteristics that add to the difficulty of supporting this new model of collaboration:

- **Confidentiality and Security.** The legal, regulatory, and competitive sensitivity of the data to be exchanged cannot be overemphasized. Health care regulations and the competitiveness of the health sciences industry make security – and therefore auditability – a key factor.
- **Timeliness.** New product development is an enormously expensive undertaking, and all partners are under pressure to move through the development process to product delivery as fast as possible. This makes collaboration based on the latest and most accurate information absolutely essential.
- **Complexity.** Collaboration in the health sciences includes everything from Word documents and Excel spreadsheets to CAD drawings, engineering markups, and material safety data sheets.

Citadon's ability to support these three requirements allows its health sciences customers to participate in a process flow that differs significantly from the traditional health science processes that are covered by standard ERP packages. Thus, a process of collaboration that starts with a simple, highly secure data exchange – for feasibility testing – can then proceed to a full-blown research and development effort based on a customized process flow supported by Citadon. The centralized data and document repository model supported by Citadon allows both partners to work in a real-time, collaborative environment with the full assurance that their intellectual property is protected and its use fully tracked by the Citadon system. The ability to limit or control access based on user profiles is particularly important in limiting the illicit spread of intellectual property and preventing breaches of confidentiality.

CITADON-SUPPORTED POST-ERP PROCESSES

Data Exchange with Full Audit Controls

Customized Process Flow for Partnership Collaboration

User-defined Data and Document Access

Technical Support for Test, Measurement, and Manufacturing Equipment

Joint Regulatory Approval Submissions

The impact of Citadon CW can also be felt after product development, when aftermarket service and support requires that sensitive test or usage data be shared in order for the partners to fully understand the nature of a product problem and its resolution.

The ability of Citadon to meet the needs of the new model of product development in health sciences effectively enhances and extends the support that already exists from ERP systems and adds the specialized data, document, and process management requirements that the new collaborative environment in health sciences requires.

Complex, Capital-intensive Construction in the Oil and Gas Market

The challenge of complex oil and gas pipeline development mirrors that of many capital-intensive projects when it comes to data and documentation: most ERP systems are unable to link documents and data to the workflow of a project while providing “universal,” secure access to a wide variety of internal and external stakeholders.

STANDARD ERP UPSTREAM OIL AND GAS PROCESSES

Exploration and Appraisal

Field Development

Field Production

Service and Repair

Contract Management

As with the other two case studies in this report, pipeline construction has a number of special requirements that are not generally met by the standard processes enabled in ERP systems. Again, many of these ERP systems have an extremely rich set of functionality targeted at the oil and gas industry. The nature of the pipeline construction process and its data and documentation requirements, however, mean that most ERP packages fall short in providing the specific functionality pipeline companies need.

The main issue has to do with maintaining, tracking, and updating the vast quantity of information, data sheets, safety and regulatory filings, designs, engineering assessments, and other key data points and documents that go into a highly collaborative multi-million dollar construction effort. Pipelines are typically built in remote sites, have complex construction and engineering requirements, and demand a tremendous amount of collaboration between builders, engineers, contractors, operators, and regulators. This cooperation in many ways centers around how and when data and documents are used, whom they are used by, and how they are modified to fit different requirements by different users.

Thus, the pipeline construction business has similar requirements to the health sciences and retail environments discussed above:

- Large data and document volumes that must be shared by multiple stakeholders.
- Extreme time sensitivity with respect to project milestones. The high cost and high stakes at play in pipeline construction make instantaneous access not just a luxury but a requirement.
- Access to multiple document and data formats from applications that aren't necessarily available to every user at every point of use, especially those that are working remotely or on-site.
- Confidentiality, security, auditability.

Citadon is able meet these requirements in the oil and gas industry in a way that is hard for standard ERP packages to fulfill without significant cost to the customer. Citadon's ability to build a workflow and process-driven data and document management environment that allows multiple stakeholders to access any document or data type regardless of its originating software program has proven invaluable to customers that need to not only find more efficiencies in a costly construction process but also need to reinforce the collaborative relationships around which these costly pipelines are constructed.

Citadon-Supported post-ERP Processes

Large-scale Project Coordination

Collaborative Document Management

Phase or Process-Based Progress and Versioning

Integration with Project, Finance, Engineering and other Systems

Security and Audit Trail for Document Usage

As in the other vertical industries discussed in the report, it is important to note that Citadon functions very much as an adjunct to existing enterprise software functionality, and can be used to enhance the value of the enterprise software stack. This is particularly important in terms of managing the materials and construction costs of a pipeline project – usually the purview of the financials module of an ERP package – in terms of the process flow managed by Citadon.

Conclusion: Best Practices for Crossing the Collaboration Gap

Existing enterprise software solutions cover a lot of ground when it comes to key processes in a broad range of industries, but they often fail to deliver on the functionality needed by highly dynamic companies that require new and different ways to innovate and collaborate. For these companies, the unifying themes of data and document management, secure access by multiple disparate stakeholders, support for heterogeneity, and extreme vertical functionality fit well into the functionality that Citadon CW can provide while enhancing the capabilities and value of an existing enterprise software stack.

Those companies that are interested in the Citadon approach should measure their potential success against the following criteria:

- Faster and more thorough project management
- Improved collaboration for all project participants
- Better audit and regulatory compliance
- Improved document and data security
- Faster and more effective document use and modification
- Improved ROI for existing enterprise applications

While not every company will have measurable improvements in each area, a Citadon solution should be able to have an impact on each of these areas. How much Citadon can improve an individual company's success will depend in large part on how poorly the company's achievement was in each of these areas prior to a Citadon implementation or pilot. EAC believes that a significant number of companies facing the kinds of collaboration gaps discussed in this report will find that Citadon is able to provide a measurable ROI across many if not most of these

areas. For companies with the class of problems outlined in this report, the option of digging deeper into the existing enterprise software for a solution is still a possibility. Based on EAC's research, however, most ERP, document management, and project management cannot bridge the collaboration gap in as cost-effective and time-effective manner as Citadon CW. Citadon has gone a long way towards bringing the theoretical potential of collaboration forward in the market. Companies looking to shrink the collaboration gap in their innovative processes should actively explore what Citadon has to offer.