KEL224

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Ariba Implementation at MED-X:
Managing Earned Value

Chris, what do you mean, we can't deploy the system on time? It's a month before the end of the project and now you're telling me that we may not deploy on time! Do you know what this means? Don't you understand what the implications are? I don't understand what went wrong. This entire time I have been reviewing the budget variance and combined earned value reports and everything appeared to be fine. How am I going to explain this to the steering committee? I want to know what went wrong with the project and how you are going to fix it!

Terry Baker, CIO of MED-X Inc., a Fortune 500 pharmaceutical company, was furious. The e-procurement implementation she had been sponsoring was not going according to plan and the project manager had very few answers for her.

Christopher Martin, a consultant from Implementation Technologies, was the project manager for the $2 million Ariba e-procurement implementation at MED-X Inc. This was Martin's first time managing a full-life-cycle e-procurement implementation and he was having problems figuring out what was delaying the project. He had been aware of some potentially troublesome events early in the project, but had not been comfortable reporting them to his client.

Martin was very bright, had a great deal of technical development experience, and knew Ariba functionality well. He was just completing his MBA in the manager's program at the Kellogg School of Management, and was looking forward to a big raise when this project was over. However, Martin knew very little about earned value and had never seen it used in project analysis before. His client Terry Baker was demanding answers and Martin had to figure out what was going wrong.

The Ariba implementation was broken up into several phases. However, the critical path went through two major components of the project: technical infrastructure setup and software customization. Looking at the project plan alone, Martin could not figure out which component was causing the delay.

MED-X Inc.

MED-X Inc. was a global pharmaceutical company headquartered in Houston, Texas, with fifty-four plants and more than 40,000 employees worldwide. Founded by a genetic engineering

scientist in 1972, MED-X had been growing rapidly ever since. In 1985 MED-X's research and development team developed a blockbuster drug to treat skin cancer. In addition to drug development, MED-X established alliances with other pharmaceutical companies whose drugs it licensed and sold through retailers of over-the-counter medication.

One of MED-X's key strategic objectives was to transform its procurement organization into a decentralized purchasing model with a self-service philosophy. MED-X was spending $3 billion annually on indirect goods and services. Of this amount, $2 billion was sourceable and $1 billion was spent on technology. MED-X estimated that a decentralized procurement model would help it save $200 million annually. By moving all its preferred suppliers onto the Ariba e-procurement platform, MED-X would reduce maverick spending, streamline the procurement process, and expedite user adoption.

In addition, MED-X would realize many other benefits from implementing the Ariba Buyer solution. The solution would encourage nationwide compliance with negotiated agreements, maximize the purchasing power of the organization, and reduce processing costs and cycle times. In addition, it would track purchasing behavior and retrieve historical information, allowing nonpurchasing employees to focus on mission-related responsibilities. As a result of the implementation, MED-X would realize a significant return on investment.

Implementation Technologies

Headquartered in Chicago with branch offices in New York, Dallas, Miami, and Seattle, Implementation Technologies had more than five hundred employees. Founded in 1995 by three ex-"Big Five" partners, the organization had hired only the best and brightest. The average consultant had at least five years of experience in information technology consulting, business analysis, and project management.

Implementation Technologies's mission was to be the premier provider of global business-to-business (B2B) e-commerce consulting services. It offered a full range of consulting services, including Ariba B2B commerce platform implementation, supplier integration, and Ariba training and support. Revenues for 2001 were expected to reach $80 million.

Implementation Technologies was the fastest-growing organization in the dynamic technology services sector and successfully competed with the likes of Accenture and PWC. In fact, MED-X had chosen Implementation Technologies over Accenture because it had successfully implemented Ariba for more than thirty clients, five of which were other pharmaceutical companies.

Implementation Technologies currently had other initiatives underway and wanted to partner with other enterprise resource planning (ERP) companies, such as PeopleSoft and SAP, to provide the best implementations for its worldwide organization.

Ariba Inc.

Ariba (*www.ariba.com*) offered a powerful suite of e-procurement solutions to help companies manage spending so that expenses fell faster than revenues in down times and grew

more slowly than revenues in up times. The Ariba spend management solution was designed to significantly improve bottom-line results.

Since its founding in 1996, Ariba had remained at the forefront of the Internet revolution, providing easy-to-implement, robust online commerce solutions for proven cost savings and returns on investment. In 2002 Ariba led the enterprise spend management (ESM) market. ESM was a new class of solutions that focused on delivering a closed loop of control and leverage over a company's spending. This included assessing spending activities, conducting effective sourcing, and capturing and reconciling spending enterprise-wide. The Ariba spend management solution delivered results quickly while providing a sustainable spend management capability.

In 2001 a seasoned management team directed Ariba's fast-paced growth. Together, the team had significant management experience in high-growth organizations and the combined experience of seven successful startups. The team members had held senior management positions at Digital Equipment Corporation, General Motors, IBM, Lotus Corporation, NeXT Computers, Parametric Technology Corporation, Rasna Corporation, and SAP.

As the leading provider of spend management solutions and services to leading companies around the world—including forty of the Fortune 100—Ariba brought companies together in entirely new ways through powerful, easy-to-use Web technologies that transparently overcame differences in applications and business processes.

In 2002 Ariba products and solutions were enabling global industry leaders, including Cisco Systems, Chevron, Hewlett-Packard, Canadian Imperial Bank of Commerce, and Phillips NV, to save money, discover new revenue streams, and increase their competitive advantage.

Business Case and Technology

E-procurement means obtaining or purchasing commodities and services via the Internet. It involves the use of an electronic catalog of items, automated requisitioning, and an automated approval process.

The Ariba network-centric approach to e-procurement and value chain management linked customers, suppliers, partners, and distribution channels on a common platform for fast return on investment and rapid cost savings. Value chain management (VCM) enabled companies to connect seamlessly to trading partners for all their inter-enterprise commerce processes—from analysis and planning to fulfillment and payment. Ariba provided its customers with powerful VCM solutions: Web-based applications that ran on a shared technology platform, facilitating inter-enterprise transactions over the Ariba Commerce Services Network (Ariba CSN, Ariba's scalable B2B network).

The Ariba CSN provided a shared flexible infrastructure that connected multiple enterprises in an interactive community. Companies could use third-party services to transact in real time with buyers, partners, distribution channels, and more than 20,000 suppliers worldwide through a single connection. Network-enabling the value chain allowed companies to drive cost savings through lower negotiated prices, employee and contract compliance, reduced inventories, and greater process efficiency.

The Ariba CSN provided a secure infrastructure of connectivity, transaction management, supplier enablement, and commerce services, and the Ariba platform facilitated integration with back-end systems. The platform and network worked together with Ariba's VCM applications for core B2B commerce processes, from sourcing to payment.

See **Exhibit 1** and **Exhibit 2** for an overview of the Ariba Buyer platform configuration and the Ariba development environment, respectively.

Proposed Approach and Plan

The partnership between MED-X and Implementation Technologies was designed to leverage industry, business process, IT, and experience implementing the Ariba Buyer solution. The implementation methodology was modeled in accordance with the AribaLive Methodology to formulate a "best-of-breed" approach tailored to meet MED-X's project requirements.

A phased approach was taken to ensure project delivery by October 1, 2001. This approach would drive efficient, effective use of resources, promote reuse of solutions across divisions, and enable transfer of knowledge to MED-X in order to complete the full deployment and supplier enablement.

The original project timeline was as follows:

Approximate project start date:	May 1, 2001
Conference room pilot (CRP):	June 25, 2001
Live date:	October 1, 2001
User groups:	Home office (about 250 users)
Possible Suppliers:	Boise Cascade, Corporate Express, Grainger, Fisher Scientific
Technical integration:	ERP system—JDE

The original project timeline is shown schematically in **Exhibit 3**. The CRP had gone as planned, but by September 1 it was clear the system was not going to go live on October 1.

Project Management

Successful projects require a set of project management processes in conjunction with project development activities. These processes and activities should be organized to provide a complete set of tasks for starting the project, employing an iterative set of tasks for managing the ongoing work effort, and closing the project. The activities and associated tasks within the management processes are both linear and iterative in nature. They can be performed on an as-needed basis (daily, weekly, monthly), or they can be triggered by events and run continually for a specific period of time.

An ideal project management approach for an Ariba implementation promoted tight integration of the business transformation and organizational change. In addition, the organizational issues had to be coordinated with the Ariba configuration and IT infrastructure aspects of the project and the associated parties conducting these activities.

For a successful project, the project management team had to foster effective communication among project team members and between project teams, and manage and track multiple projects from an executive perspective. The team also had to manage "scope creep" to meet stated project goals and objectives and provide for faster and more effective project decisions.

The project management team also needed to provide enhanced focus on project issues/risks and recommended actions, establish documentation standards regarding quality and consistency, manage workflow regarding review and approval of project deliverables and work products, and provide for better utilization of scarce project resources. Finally, it had to provide for effective knowledge transfer between consulting and client project teams, provide a basis for an end-user help desk, and ensure that the client was completely satisfied.

Project Plan

Implementation Technologies designed the plan, outlined below, to roll out Ariba Buyer 7.0 to 250 users in MED-X's home office. A thorough gap analysis was conducted prior to the start of the project that compared delivered Ariba functionality with the "to be" process and identified the differences for review. This analysis enabled Implementation Technologies to understand the gaps between MED-X's current procurement system and an ideal e-procurement solution.

The gap analysis team uncovered and documented the detailed steps necessary to implement the appropriate change management initiatives and effectively roll out Ariba Buyer. The first project phase culminated in a CRP in which MED-X was able to see and test Ariba functionality for the first time. Baker and other MED-X senior managers were enthusiastic about the successful pilot test.

Project Objectives

One of the early objectives was to design and configure the initial Ariba solution that would serve as both a "proof of concept" and learning tool to aid in the establishment of an enterprise-wide e-procurement solution and support structure. The CRP was an integral component of the production project as a first test of the solution.

Another objective was to provide MED-X with a low-risk and controlled entrée into leveraging Ariba e-procurement technology and evolving best practices and to allow personnel to start developing functional and technical expertise in the Ariba Buyer application set.

In addition, Information Technologies aimed to further define the requirements for elements of scope not met by Ariba "out-of-the-box" functionality and develop a strategy for developing the associated solution. This required defining a holistic and long-term integration strategy for Ariba and MED-X's enterprise systems. The ultimate goal targeted for after October 1 was to roll out the common baseline solution across the home office for approximately 250 people.

Project Organization

Exhibit 4 details the resources and roles required from MED-X and Implementation Technologies to successfully staff the project. Implementation Technologies estimated a six-month timeline to successfully deliver the customized MED-X Ariba system.

MED-X provided eight individuals to staff the project. Some of them assisted on an as-needed basis. A MED-X project manager worked with Christopher Martin to help manage issues for the MED-X team. Most of the individuals provided by MED-X were procurement specialists who were responsible for working with the Implementation Technologies team to ensure Ariba worked as intended and to deploy the system to other business users.

Implementation Technologies provided seven individuals to staff the project. A project quality advisor was staffed part-time to provide quality management guidance throughout the project. Martin was responsible for overall project management and leadership. He was supported by the technical, functional, and supplier leads.

The functional lead was primarily responsible for gathering business requirements. The technical lead was responsible for transforming MED-X business requirements into Ariba Buyer customizations. The supplier integration expert was responsible for working with the Ariba Buyer team and the suppliers that MED-X enabled. Finally, additional technical staff were to assist with specific customizations, such as writing business rules and interface modifications.

Project Scope

From the following high-level scope activities, project tasks were developed to support the delivery and execution of the final Ariba e-procurement system for MED-X.

Ariba Buyer 7.0 Configuration/Installation. Install and configure server hardware, install third-party software (e.g., Web server), and install four initial instances of Ariba 7.0 (demo, test, CRP, and development).

Business Process Design/Redesign. Validate "as is" and develop "to be" requisition-to-check and sourcing processes. Develop gap analysis to flag functional requirements not addressed by Ariba. Document end-to-end receiving requirements and commodity code strategy and mapping.

Integration of Ariba Buyer 7.0 via TIBCO to MQ Series. Implement needed push-and-pull adapters.

Catalog Content On-Boarding. Implement four supplier catalogs, configure catalog hierarchy to support catalogs implemented, and adapt UN/Standard Products and Services Code (UNSPSC).

Supplier Enablement. Work with Ariba-enabled and non-Ariba-enabled suppliers. Plan and coordinate the supplier summit.

Business Rules. Implement Ariba approval rules as stated in the request for proposal and analyze business rule requirements for the project.

Object Model and User Interface Modifications. Limit user interface (UI) modifications for the project to those essential for capturing additional data elements not part of the standard Ariba

object model and presenting a standard format on the HTML-based requisition screens, printouts, and vendor direct orders.

Source Data and Adapters. Manually load control data (e.g., unit of measure (UOM), currency, user hierarchy, vendor information, purchase transactions) and assist in the designing, building, and testing of custom interfaces to the MQ Series.

Change Management. Includes end-user communication planning, development and execution of custom training curriculum for pilot end-user roll-out, assistance with developing training materials based upon knowledge repository, and a change management toolkit for Ariba Buyer.

Reports. Use standard reporting functionality and begin capturing requirements for custom reports.

Custom Functionality. Capture custom requirements in a functional gap analysis and research offline with Ariba to identify potential solution approaches (e.g., workarounds, customizations, or inclusion in upcoming versions of Ariba software) for future implementation.

PCards, Invoices, Matching, Receiving, Payments, and Accounting. Implement Ariba Buyer with PCard functionality and ensure that all interfaces and process design enable efficient requisition to payment processing.

System Testing

System testing plans were developed to validate that the system architecture and software associated with Ariba Buyer met MED-X's requirements. The system had to meet or exceed the performance, reliability, maintainability, and availability expectations of MED-X. The specific scope of system testing was as follows:

- Database server processes
- Web server processes
- Server connection processes
- Client connection processes
- Middleware client module
- Middleware server module
- Workstation processes
- Client data entry modules
- Client printing services
- Interface processes
- Accounting data load
- Human resources data load
- General ledger (GL) data load

Technical Infrastructure

A schematic of the development environment for the Ariba solution is shown in Exhibit 2. To facilitate rapid development, no other production applications could be running or were intended to run on the Ariba servers.

Frequent Ariba server reboots were required during installation, so no other access to these servers could be active during the installation process. Consultants needed full access (console/physical) to the Ariba servers during installation. Full administrative rights were given to the consultants during the installation process and were ongoing for development and test environments (but not production).

System administrators were available for on-call support during the installation of all instances. Prerequisite database software, personal computer hardware and software, server hardware and software, and intranet proxy and e-mail infrastructure had been installed, configured, and tested prior to installation of all Ariba modules. All necessary hardware and software for the Ariba Buyer e-procurement solution were installed prior to the project kickoff, and the workspace was prepared and designated for the team.

Data Cleansing

For the completed project, Information Technologies required MED-X to cleanse all source data required to support the Ariba system. In addition, the generation of all associated data conversion files had to be completed by MED-X.

The original contract specifically stated:

> *Managing and performing all data extracts required from host systems and the modifications to host systems required to accept data from Ariba will be completed by MED-X. It is MED-X's responsibility to work with Ariba for any and all issues, should they arise, relating to the integrity of Ariba software and patches. MED-X will provide project personnel with knowledge of company labs' environment to fulfill the functional roles and responsibilities. MED-X will provide the project team with all documentation relating to any process reengineering and strategic sourcing initiatives.*

So far in the project, MED-X had lived up to the contract and had delivered on schedule.

Critical Success Factors

Critical success factors for this project included a plan for organizational change effectiveness, quick resolution for business decisions affecting policy, and establishment of clearly defined project objectives, since exact definitions of project scope were key to keeping the project on time and within budget. It was also important to establish concise measures of success and support with strong executive sponsorship so that interdepartmental issues were addressed in an efficient manner.

Other critical success factors included understanding MED-X's B2B strategy, understanding current B2B projects underway, and determining methods of leveraging the results (collaborate rather than duplicate). Another important issue was to identify and assign key individuals to assist

in understanding current legacy systems and review and challenge complex business processes to reduce development and maintenance efforts. In addition, it was important to identify and allocate key resources that kept the project on schedule, since key personnel losses could significantly affect the delivery schedule.

It was also important to identify current ERP system and process weaknesses, since staged multiple development environments were crucial to support the ability to implement changes without disrupting other aspects of the project. For project success, it was critical to use software version control; this is essential in a distributed development environment. Finally, the management team had to build early consensus across the user base and establish points of escalation or parameters to keep the team on track and working together.

Project Status to Date

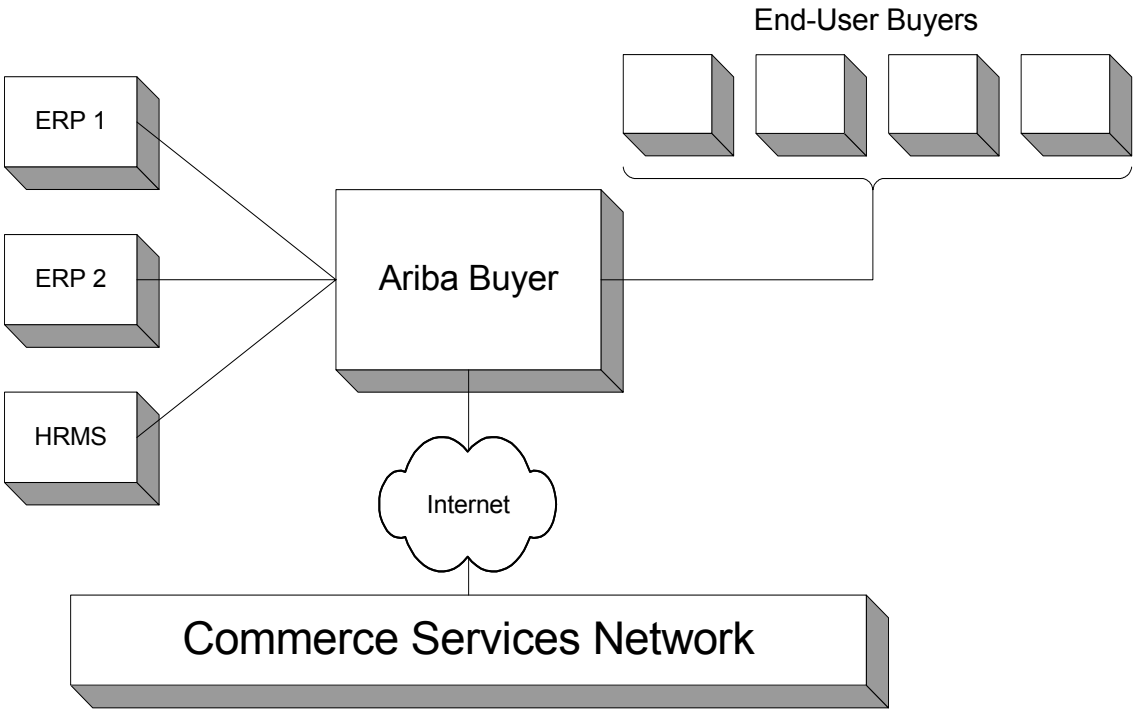
After the meeting with Baker, Martin returned to his office. "Wow, Terry was really upset," he thought. He knew he was on shaky ground, although his gut told him the project was not totally out of control.

The MED-X implementation had been running rather smoothly to date, but some events had impacted it. For instance, very early in the project, a part-time MED-X staffer had been repeatedly pulled off the project for other duties. At the end of June, immediately after the successful CRP, there was a slight delay as the Sun server equipment showed up late. In July, system testing of the development of legacy data interfaces was scheduled late. In the testing, Martin's team uncovered several things that were not working as designed. These events all contributed to delaying unit testing and holding up the Ariba integration with the PeopleSoft purchasing module.

Martin studied the Microsoft Project Gantt chart on his computer screen, but could not tell exactly which component of the project was responsible for the delay. Maybe Baker had a good idea: check the earned value. Martin sent an e-mail to the project staff to obtain the necessary information.

The data Martin's staff provided is given in **Exhibit 5–Exhibit 7**, and **Exhibit 8** is the standard Implementation Technologies earned value analysis template. Martin was not exactly sure what to do with the data now that he had it, but he figured this was a good start.

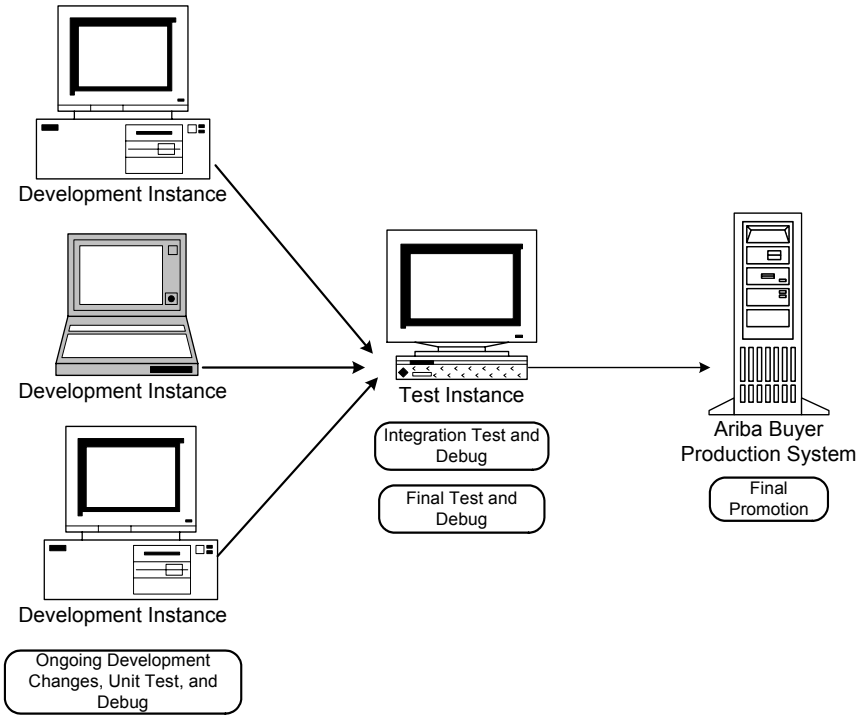
Exhibit 1: Ariba Buyer Configuration



The diagram above illustrates the Ariba Buyer configuration. The Ariba B2B platform did the following:

- Provided an infrastructure for e-commerce
- Provided an open, standards-based Internet service that allowed Ariba Buyer to connect buyers and sellers worldwide
- Simplified and streamlined order routing and catalog management
- Promoted rapid supplier integration
- Enabled e-commerce technology such as Punchout and cXML

Exhibit 2: Ariba Buyer Development Environment



This diagram illustrates a high-level approach to development. Ariba recommended creating three types of instances: *development, test,* and *production* (the production instance was the Ariba Buyer production system). Changes could be made first in development instances and then merged into a test instance, and finally moved into the Ariba Buyer production system, although these activities often took place concurrently.

Exhibit 3: Project Timeline

This chart outlines the project timeline for MED-X's Ariba implementation. The project began in May and the go-live date was October 1, 2001. The CRP was scheduled for June 25. This was the first time that the Ariba e-procurement system, customized for MED-X, was functionally demonstrated.

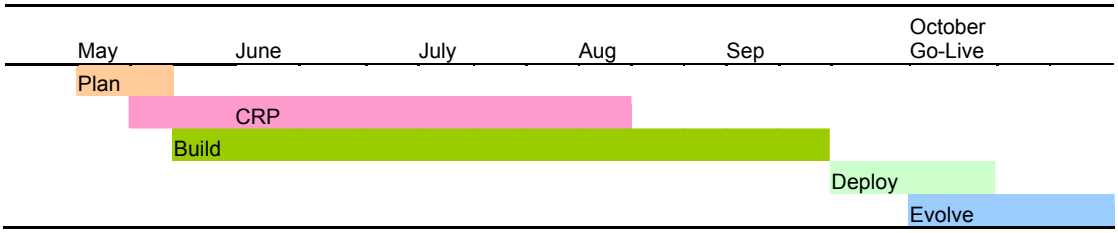


Exhibit 4: Project Organization

(A) MED-X RESOURCE REQUIREMENTS

MED-X would provide the appropriate resources with the requisite level of commitment. The table below specifies the types and level of resources needed from MED-X.

Functional Area	Role	Responsibilities	Full-Time Equivalents
Procurement	Procurement professional	Provide input to project team concerning procurement processes and procedures	1.0
Procurement	Catalog manager/ supplier manager	Manage supplier processes	0.5
Procurement	Training	End-user training	0.5
Procurement/IT	Ariba configuration/ development	Through knowledge transfer, learn the Ariba solution set and configuration process and assume deliverable responsibilities in subsequent phases	0.5
IT	Network/system administration	Administer Ariba servers	As needed
IT	Database administration	Administer database server	As needed
IT	Integration expert	Provide input to project team concerning integration	1.0
Project	Project manager	Provide project management	1.0

(B) CONSULTING FIRM RESOURCES FOR IMPLEMENTATION PROJECT

The consulting firm would need to bring the following resources to MED-X for this implementation.

Consulting Partner Resources	Responsibilities
Project advisor	Available throughout project duration to facilitate resolution of strategic issues and to ensure that project is delivered on time and on budget. Responsibilities include monitoring workplan progress and quality assurance, aiding in resolution of difficult business issues and customer satisfaction, and maintenance of client relationship.
Project manager	Available throughout project duration to manage implementation team and complete project on time and on budget. Critical responsibilities include managing customer relationships, architecting project plan, identifying resource requirements, developing project infrastructure and management tools, and providing primary communication channel for all customer issues and feedback to Ariba.
Functional lead	Available during analysis, implementation, and deployment phases for defining business process requirements, business rules, and data integration requirements.
Supplier integration expert	Responsible for supplier integration/enablement, catalog and commodity management, and knowledge transfer to client supplier integration analyst.
Technical lead	Responsible for management of all development and integration activities. Will also have assigned development deliverables.
Rules/UI specialist	Responsible for writing of business/approval rules, UI/object model customizations, Java code, and all supporting documentation.
Integration expert	Responsible for configuration of delivered integration events and development of any custom interfaces to back-end systems.

(C) ARIBA RESOURCES FOR IMPLEMENTATION PROJECT

Ariba Resource	Responsibilities
Ariba GSD consultant	Assist with implementation as product expert. Also help facilitate communication between implementation team and Ariba to resolve issues.

Exhibit 5: Infrastructure and Software Customization Budgeted Cost of Work Scheduled

TECHNICAL INFRASTRUCTURE PLAN

(a) The dollar amounts below represent the budgeted cost of work scheduled (BCWS) to be done for the given time period for the technical infrastructure component of the project plan.

Month	Dollar Amount
May	$ 120,000
June	$ 192,000
July	$ 192,000
August	$ 192,000
September	$ 192,000
October	$ 60,000

SOFTWARE CUSTOMIZATION PLAN

(b) The dollar amounts below represent the budgeted cost of work scheduled (BCWS) to be done for the given time period for the software customization component of the project plan.

Month	Dollar Amount
May	$ 120,000
June	$ 192,000
July	$ 192,000
August	$ 192,000
September	$ 192,000
October	$ 60,000

Exhibit 6: Infrastructure and Software Customization Actual Cash Burn

TECHNICAL INFRASTRUCTURE ACTUAL CASH BURN

(a) The dollar amounts below represent the actual cost of work performed (ACWP) for the given time period for the technical infrastructure component of the project plan.

Month	Dollar Amount
May	$ 120,000
June	$ 215,000
July	$ 192,000
August	$ 216,500
September	$ 170,000

SOFTWARE CUSTOMIZATION ACTUAL CASH BURN

(b) The dollar amounts below represent the actual cost of work performed (ACWP) for the given time period for the software customization component of the project plan.

Month	Dollar Amount
May	$ 119,000
June	$ 187,000
July	$ 165,000
August	$ 189,000
September	$ 186,000

Exhibit 7: Infrastructure and Software Customization Actual Performance

TECHNICAL INFRASTRUCTURE ACTUAL PERFORMANCE

(a) The dollar amounts below represent the budgeted cost of work performed (BCWP) in the given time period for the technical infrastructure component of the project plan.

Month	Dollar Amount
May	$ 120,000
June	$ 170,000
July	$ 173,000
August	$ 190,000
September	$ 185,000

SOFTWARE CUSTOMIZATION ACTUAL PERFORMANCE

(b) The dollar amounts below represent the budgeted cost of work performed (BCWP) in the given time period for the software customization component of the project plan.

Month	Dollar Amount
May	$ 133,250
June	$ 197,000
July	$ 220,000
August	$ 215,000
September	$ 240,000

Exhibit 8: Earned Value Analysis Template

The template below can be used to analyze earned value for the MED-X Ariba implementation. The accompanying electronic file has built-in Excel formulas to help derive the earned value ratios.

Software Customization	Monthly Plan		May	Jun	Jul	Aug	Sep	Oct
Monthly status	Plan	BCWS						
	Actual burn	ACWP						
	Actual perform	BCWP						
Rolling status	Plan	BCWS						
	Actual burn	ACWP						
	Actual perform	BCWP						
Rolling ratios	Schedule impact	SV = BCWP – BCWS						
		SPI = BCWP / BCWS						
	Cost impact	CV = BCWP – ACWP						
		CPI = BCWP / ACWP						
	Control ratio	CR = SPI × CPI						

Technical Infrastructure			May	Jun	Jul	Aug	Sep	Oct
Monthly status	Plan	BCWS						
	Actual burn	ACWP						
	Actual perform	BCWP						
Rolling status	Plan	BCWS						
	Actual burn	ACWP						
	Actual perform	BCWP						
Rolling ratios	Schedule impact	SV = BCWP – BCWS						
		SPI = BCWP / BCWS						
	Cost impact	CV = BCWP – ACWP						
		CPI = BCWP / ACWP						
	Control ratio	CR = SPI × CPI						

Combined Projects			May	Jun	Jul	Aug	Sep	Oct
Monthly status	Plan	BCWS						
	Actual burn	ACWP						
	Actual perform	BCWP						
Rolling status	Plan	BCWS						
	Actual burn	ACWP						
	Actual perform	BCWP						
Rolling ratios	Schedule impact	SV = BCWP – BCWS						
		SPI = BCWP / BCWS						
	Cost impact	CV = BCWP – ACWP						
		CPI = BCWP / ACWP						
	Control ratio	CR = SPI × CPI						