



ioXpress Product Brief

An iOiQ Whitepaper

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II. Why ioXpress?

ioXpress is a proven enterprise wide knowledge management and workflow system. ioXpress is currently used by industry associations, and several major chemical and oil and gas companies to comply with Process Safety Management (PSM) regulatory requirements.

ioXpress is designed to help companies improve the efficiency and effectiveness of critical business and compliance processes including:

- Enhanced change management, process operations, and loss avoidance
- Information Life Cycle Management
- Cost efficient reviews and audits
- Compliance Assurance and Standardization

ioXpress offers significant advantages to companies trying to address PSM requirements by enabling them to combine "structured" and "unstructured" data.

It is estimated that in a typical company, 80% of corporate information is "unstructured" while only 20% of the data may be "structured". Structured data is data that already exists in a database environment while unstructured data might reside in e-mails, spreadsheets, presentations, and other types of documents or drawings.

ioXpress glues structured and unstructured data and offers:

- Single point access to different data formats
- Integration of legacy/existing documentation and supporting engineering calculations regardless of what calculation method, format, or tool is or was used
- Easy, quick, and secure web based access (internet or intranet) to the right information when needed

ioXpress installation is so simple, you can be up and running the same day!

III. ioXpress Features

There are two versions of ioXpress: (a) Basic and (b) Workflow. The Basic version of ioXpress provides several easily configurable and auditable modules for the following PSM elements:

- Process Safety Information (PSI) management
- Process Hazard Analysis (PHA) recording and management¹
- Relief Systems design and design basis lifecycle information management
- Action Tracking

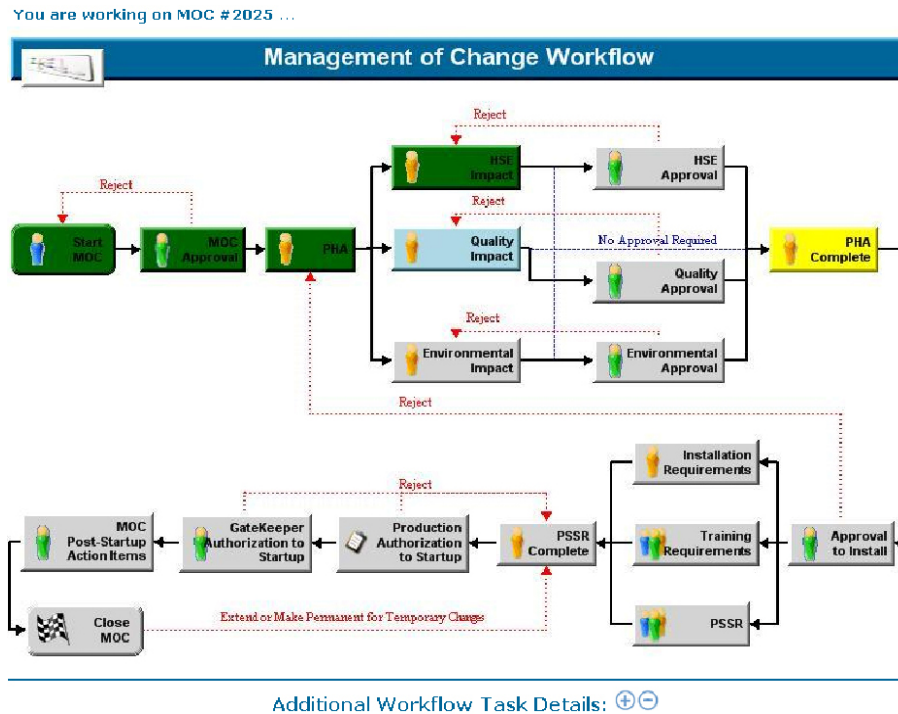
The ioXpress Workflow version is the Basic version that incorporates workflow and business rules engines that enable management of critical PSM and business processes such as:

- Management of Change (MOC),
- Incident Investigation (II), and
- Auditing
- User Defined Workflow (add your own!)

ioXpress Workflow has a visual workflow that guides the user through each task in a business process. The ioXpress Workflow engine is based upon prevalent industry norms and best practices. This workflow engine can easily and cost-effectively be configured to conform to any company's or individual site's specific procedures, thereby significantly reducing training time for users.

¹ Using HAZOPTimizer.

Figure 1: Default ioXpress MOC Workflow



ioXpress can help you manage your PSM compliance requirements by organizing information to be readily auditable and by standardizing the format of data to ensure consistency and by specifying required data to ensure completeness of information. This can be of great benefit, especially during audits or inspections by regulators. For example, OSHA's recent National Emphasis Program (NEP) will focus on refineries and is expected cover chemical plants as well.

Process safety information can easily be organized and made readily accessible for use in PHAs and other PSM activities. PHAs can be recorded using the HAZOPTimizer software (open source and free) and the action items can be imported directly to ioXpress for action tracking and management.

Relief systems design and design basis lifecycle information can be maintained through the use of ioXpress dynamic forms. Relief devices can be linked to the protected equipment design information and vice versa.

Any PSM or other activities that generate action items can be imported into ioXpress and tracked to completion. There is no limit to the number of modules that can be created by the user to manage other aspects of PSM or other business activities.

Glue and Manage Structured & Unstructured Data

The Basic version is a web-based system that manages mixtures of structured and unstructured data including engineering data, engineering drawings, electronic documents, dynamic forms, and activities/tasks. Examples of data that can be managed and indexed by ioXpress include:

- Engineering Documents and Drawings (including AutoCAD and Visio)
- Databases
- Email
- HTML
- ASCII text
- Portable Document Format (PDF)
- All Microsoft Office documents

Documents can be added directly into ioXpress or can be sent via email and stored in libraries for easy access.

ioXpress' powerful search capability with full text indexing of all documents allows for quick retrieval of any document making it an excellent tool for management of all plant information such as engineering data, process safety information (PSI), procedures, action items, records, and reports. The major features of ioXpress Basic are summarized in Table 1.

Table 1: Major Features of ioXpress Basic

<i>FEATURE</i>	<i>DESCRIPTION</i>
<i>Audit Log, Traceability, and Version Control</i>	All ioXpress objects, workflow tasks, and user actions have a history tab where all changes are recorded and can be traced. ioXpress also offer complete version control of documents, forms, and objects.
<i>Reporting Service</i>	ioXpress reporting can be configured interactively to generate a wide range of technical and management reports in a variety of formats: <ul style="list-style-type: none">▪ Powerful reporting engine supported by the Microsoft SQL Reporting Services▪ User friendly reports▪ An unlimited number of user-defined custom reports with custom report fields▪ Export any structured data from ioXpress into Excel Spreadsheets, XML, HTML, PDF, etc.
<i>Search and Advanced Search</i>	All information added and/or updated in ioXpress is automatically indexed and immediately searchable using simple and complex search queries in a similar fashion to Google: <ul style="list-style-type: none">▪ Search all data objects (documents, forms, forums, URLs, etc.)

<i>FEATURE</i>	<i>DESCRIPTION</i>
	<ul style="list-style-type: none"> ▪ Numerous options for making your searches more precise and relevant ▪ Search keywords in titles, metadata, and the actual content of all indexed documents including all Microsoft Office documents, PDF files, and AutoCAD drawings ▪ External files (network documents) are also searchable when linked to ioXpress
<i>Security</i>	<p>ioXpress uses multiple levels of security and encryption as used by major financial institutions and corporations:</p> <ul style="list-style-type: none"> ▪ Secure login ▪ Encryption prevents automated registration attempts ▪ Spam filter control ▪ Objects permission control ▪ Group level permissions can be added and updated ▪ Organization permission control ▪ Permissions can be configured
<i>Dynamic Forms</i>	<p>ioXpress dynamic forms are easy to create and update at any time:</p> <ul style="list-style-type: none"> ▪ Create dynamic forms on the fly using the web interface ▪ Facilitate data input and links to documents ▪ A practical and efficient infrastructure to capture and manage business information ▪ Manage engineering data such as relief and vent sizing data including basic process data, sizing calculations, and final device specifications ▪ Add field validation to forms ▪ Easy to search, print, copy, email, and export to Excel, XML, HTML, etc. ▪ Convert complex data to user friendly forms and displays ▪ Access all connected/inter-related data and information from one form ▪ Share data forms with ioXpress users or others in a secure way
<i>Communication and e-mail Integration</i>	<p>E-mail or copy ioXpress like you would email a colleague and let its communication and integrated e-mail engine categorize, associate, index, and link all information:</p> <ul style="list-style-type: none"> ▪ Emails can be sent to individuals, groups, or all active users ▪ Emails with attached documents can be added to ioXpress and the attached documents will remain linked ▪ Multiple forums allow you to have a different discussion assigned to each forum for knowledge management ▪ Private and common Urls can be created to provide users with information links ▪ News and broadcast
<i>Alerting Services</i>	<p>Subscribe to ioXpress alerting services to stay up to date, watch, and/or obtain important information when it becomes available or is updated:</p> <ul style="list-style-type: none"> ▪ Be notified when a data object/document is changed ▪ Be notified when a data object/document is added or deleted ▪ Use simple and/or complex search criteria to personalize your alerting service ▪ Maintain and manage multiple alert criteria

FEATURE	DESCRIPTION
Engineering Documents Management with Version Control	<p>Leverage your entire knowledge base for business advantage:</p> <ul style="list-style-type: none"> ▪ Store all types of data in libraries and create multiple categories within each library to keep data organized ▪ Link documents to each other and a multitude of forms and other data objects ▪ Each document can be up to 2GB in size ▪ Add single or multiple documents at a time ▪ Get multiple documents or even entire libraries at a time ▪ Check in/ Check out documents ▪ Version control ▪ Share and email documents and data objects ▪ Maintain document access and change history ▪ Document security (object permission and organization chart permission) ▪ Documents are automatically indexed for search. Examples of data that can be managed and indexed by ioXpress include: Engineering Drawings(AutoCAD and Visio), Databases, Email, HTML/XML, ASCII text, Portable Document Format(PDF), and All Microsoft Office documents ▪ Group documents and apply changes and/or operate on multiple documents ▪ User external network folders and files ▪ Manage streaming video and digital picture with Meta tags, a feature that is very useful for operator training
Action Tracking and Task Management	<p>A task management utility that allows action items to be entered directly, imported, or automatically generated, based on pre-defined business rules.</p> <ul style="list-style-type: none"> ▪ Action items are tracked to completion through email reminders and built-in workflow process business rules ▪ Action items can be assigned or reassigned by the authorized users ▪ Single or multiple documents can be attached to the action item to provide details of the required action or to verify completion of the action item ▪ All action items are searchable via simple search or advanced search
Global Change	ioXpress has a cart feature which allows global changes on groups of documents.
Multiple Site Configuration	ioXpress can be easily configured for multiple facility locations with different organization structures. This configuration flexibility enables companies to implement common workflow processes that meet site specific needs.

ioXpress Workflow

The ioXpress Workflow version has all of the features of the Basic version with the addition of workflow and business rules that allow for management of critical business and/or compliance processes such as:

- Management of Change (MOC),
- Incident Investigation (II), and
- Auditing
- User Defined Workflow (Add your own!)

ioXpress is not limited to PSM related workflow. ioXpress includes optional business modules such as:

- Time card management
- Project management
- Contact management
- Purchasing management
- Expense management

Some of the salient features of ioXpress Workflow are summarized in Table 2.

Table 2: Generic Features of ioXpress Workflow

<i>FEATURE</i>	<i>DESCRIPTION</i>
<i>Workflow Management</i>	<p>A comprehensive visual workflow that guides the user through a step-by-step process. The ioXpress workflow engine is based upon prevalent industry norms and best practices. This workflow engine can easily and cost-effectively be configured to conform to any site's specific procedures.</p> <p>Business rules allow the workflow to be dynamic by changing data and task requirements based on data entry. This allows workflow to be simplified or expanded based on the specifics of the task.</p>
<i>Dynamic Forms</i>	<p>Dynamic Forms become more powerful with the ioXpress Workflow and business rules engine. The ioXpress Workflow management of change (MOC) module is an excellent example of using Dynamic Forms with workflow. The ioXpress Workflow MOC module guides the user through a visual step-by-step process for standard MOC functions. Specific features can be configured for virtually any client-specific specifications.</p>
<i>Email Notification</i>	<ul style="list-style-type: none"> ▪ ioXpress provides email notification when an action item is assigned, updated, deleted and reassigned ▪ Users can email documents and attachments directly to ioXpress ▪ Email notification can also be sent to selected groups or individuals as well as the assignee and assignor ▪ Reports can be sent through email manually or automatically based on business rules

<i>FEATURE</i>	<i>DESCRIPTION</i>
<i>Action Tracking</i>	Action tracking is fully integrated with any workflow and document/knowledge management. Other modules / workflows can be easily configured

MOC Workflow

The framework for the default visual ioXpress MOC module (see) constitutes a comprehensive workflow that guides the user through a step-by-step process for standard MOC functions such as MOC initiation, approval, Process Hazard Analysis (PHA) revalidation, Pre-Startup Safety Review (PSSR), start-up authorization, etc. The workflow incorporated in ioXpress is based upon prevalent industry norms and best practices.

This module can easily be configured to your existing organizational structure or the entire workflow can be configured to match your existing workflow process. Some of the built-in features of the workflow module include:

- Individuals responsible for approvals are assigned automatically based on the specified plant area and unit
- Certain tasks, data or approvals may be required or omitted based on information specified in previous tasks
- Action items are generated automatically based on responses to questions on forms
- Tasks may not be completed until all required action items have been addressed
- Forms can be linked to the version of a document at the time the task is completed
- Once a task is completed, the information on the dynamic forms cannot be changed
- Provisions are included for handling temporary and emergency changes
- Action items generated by activities outside of the workflow (i.e., PHA and PSSR) can be imported and tracked within the workflow
- PHAs can be revalidated for each change (continuous PHA revalidation)
- Each new MOC is assigned a unique reference number automatically
- E-mail notification is provided to all individuals who are responsible for advancing the workflow or completing assigned action items, with a link to the workflow

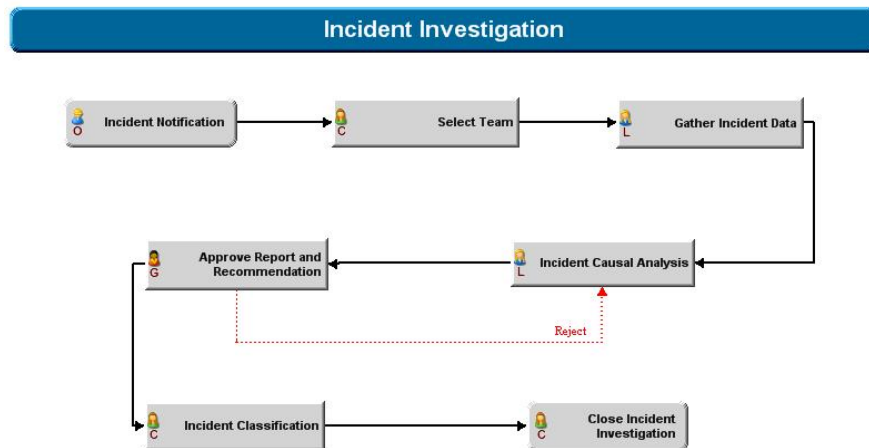
When viewing the workflow graphic display completed tasks are shown in **dark green**, tasks that are ready to be completed are shown in **light blue**, tasks with some prerequisites completed but which are not ready, to be completed are shown in yellow, tasks not completed and not yet ready to be completed are shown in **grey**.

Incident Investigation Workflow

The ioXpress Incident Investigation module (see Figure 2) will manage your entire incident reporting and investigation process. The module contains the following workflow tasks:

- Incident Notification – this task ensures that regulatory and company notifications have been conducted following an incident
- Select Team – this task allows the incident team to be selected based on the type of incident
- Gather Incident Data – this task creates a library within ioXpress to store incident data in the following categories: people, physical, electronic, position, and paper
- Incident Causal Analysis – this task allows the root cause analysis to be conducted and documented using the Comprehensive List of Causes technique
- Approve Report and Recommendations – this task allows the incident report to be reviewed and approved online
- Incident Classification – this task allows the incident to be classified to allow for incident trend analysis as well as sorting for use in process hazard analyses
- Close Incident Investigation – this task verifies that all recommendations and action have been completed before the investigation can be closed.

Figure 2: Sample Incident Investigation ioXpress Workflow



ioXpress allows the incident investigation process to be managed online from the initial reporting of the incident to closure. Relevant data is stored in a unique library created for each incident. Recommendations can be entered and tracked within ioXpress. As each task is completed the appropriate individuals are notified by email to ensure that the workflow proceeds in a timely manner. The workflow can be implemented at multiple locations simultaneously using the organization chart for each facility. At the corporate level, incidents companywide can be managed and analyzed for all locations worldwide.

IV. Get Your PSM Activities and Reporting Under Control with ioXpress

ioXpress is uniquely positioned to offer operating companies the most comprehensive, practical, and technically superior enterprise wide system for expediting PSM workflows and PSI management:

- Glue and access information in the simplest manner from one place.
- Incorporate EH&S best practices and methodologies.
- Leverage knowledge management throughout the enterprise for business advantage.
- Leverage existing and/or legacy document and information management systems.
- Easily configure ioXpress workflow to conform to your own work processes.
- The ioXpress platform is designed to be scalable to accommodate future needs.

Information Accessibility

As a web-based client/server application, ioXpress enables your employees to easily access, utilize, distribute, and manage plant information from any web-enabled computer. This feature of the application delivers quantifiable cost-savings and productivity benefits.

In addition, ioXpress offers a robust content management infrastructure that will empower you to organize, archive, and manage information in different formats. To ensure data integrity, ioXpress provides “Check-in”, “Check-out”, and “Versioning” functionality.

Best of all, you can access all the data from one place and glue together both structured and unstructured data.

Incorporation of Best Practices and Methodologies

ioXpress’ work processes are based upon the industry’s prevalent best practices and methodologies. These methodologies were defined based upon our extensive experience with major operating companies across various engineering and EH&S functions. As an example, our *Incident Investigation* module is based upon the Center for Chemical Process Safety (CCPS) *Guidelines for Investigating Chemical Process Incidents*.

Leverage Existing/Legacy Document and Information Management Systems

Over the past decade, companies have invested tremendous resources in an effort to streamline plant wide information. From localized systems within departments (such as maintenance planning) to plant-wide enterprise resource planning (ERP) systems, there has been a concerted effort to implement solutions to facilitate routine tasks and manage information.

ioXpress is designed to interface with existing ERP, EDMS, and KMS systems. The state-of-art architecture provides the ability to link data to other data and documents in different formats to execute the required tasks. As an example, the MOC module links actions items generated during a process hazard analysis (PHA) to the relevant piping and instrumentation diagrams (P&IDs) and operating procedures resident in other EDMS systems.

This aspect of ioXpress ensures that investments made in prior information management initiatives are leveraged to the maximum. Further, it allows seamless flow of plant information within different departments and business units to automate work processes to the maximum degree.

Facilitate and Leverage Knowledge Management for Business Advantage

A key objective of ioXpress is to allow an operating company the ability to leverage past EH&S and engineering information for improvements in safety and reliability. ioXpress can be configured to allow external access to its API (Application Programming Interface) by data mining software, statistical software, and in-house user programs to identify data trends and gain business and operating intelligence. Such tools can be used to identify simple and complex trends. An example of a simple trend that can be identified is a PHA team member missing his target completion date for follow on action items more than three times in one month. An example of a complex trend that can be identified is the dependence of a near miss on the set point of a control system changed by an operator or operating practices contained in e-mails stored in ioXpress that can lead to a potential hazard.

Ease of Configuration

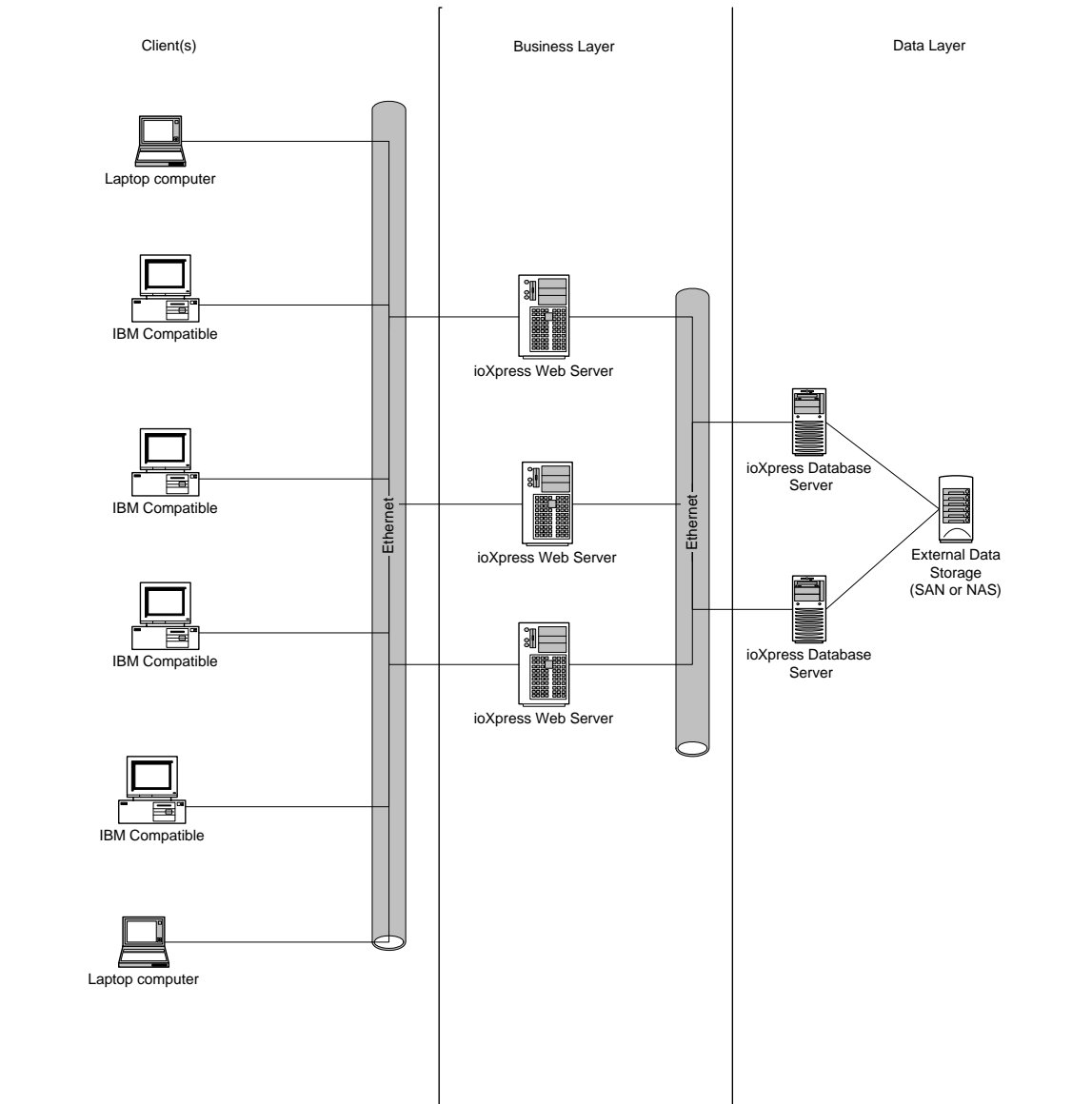
ioXpress' solution architecture is structured to allow easy and rapid application configuration to conform to your company's specific work processes.

Solution Scalability

ioXpress is based on N-Tier computing as shown in Figure 3. This architecture enables ioXpress to scale from one user to several thousand users by simply adding more servers to either the business logic layer (web server) and / or the data layer (SQL servers). All communication from clients to server is HTTP based, leading to a lighter load on your network and the ability to use 3rd party load balancing and fault tolerance tools like

Cisco Local Director. ioXpress supports both scaling up (using more high powered servers) and scaling out (adding more servers).

Figure 3: N-Tier ioXpress Architecture



V.ioXpress Hardware and Software Requirements

Server Hardware Requirements

- Intel or AMD Based Server, preferably with two dual core CPUs or two Quad core CPUs, 4 GB of RAM, redundant power supply, redundant 1 Gb/s network connections,
- 1 GB free disk space for the software on system drive
- 300GB (RAID or mirrored, SAS, 10,000 or 15000 RPM Drives) free disk space

Database and Web services (running on same server)

- Windows 2003 Server (R2) on web server
- Indexing Service
- Microsoft SQL Server 2000 (Standard or Enterprise Edition) with SP3 or later
- Microsoft SQL Server 2000 Reporting Services (Enterprise Edition)
- Microsoft .Net Framework 1.1
- Internet Information Services along with ASPnet client component

About iOiQ, LLC.

iOiQ, LLC. is a leading software development company. iOiQ, LLC. focuses on providing safety, risk analysis, and knowledge management software for business advantage. For more information about iOiQ software offerings, please visit www.ioiq.com

About ioMosaic Corporation

ioMosaic Corporation owns the exclusive marketing and distribution rights to all iOiQ software products. Founded by former Arthur D. Little Inc., executives and senior staff, ioMosaic Corporation is a leading provider of safety and risk management consulting services.

Since the early 1970's, ioMosaic's senior staff and consultants have conducted many landmark studies including investigation of the Bhopal disaster, an audit of the Trans-Alaska pipeline brought about by congressional whistle blowers, and the safety of CNG powered vehicles in tunnels. Our senior staff and consultants have authored more than ten industry guidelines and effective practices for managing process safety and chemical reactivity and are recognized industry experts in LNG and pipeline safety.

ioMosaic Corporation is also the leading provider of pressure relief systems design services and solutions. Its pressure relief system applications are used by over 250 users at the world's largest operating companies. It holds key leadership positions in the process industries' most influential and active pressure relief system design, and chemical reactivity forums, and plays a pivotal role in defining relief system design, selection, and management best practices.

For more information about ioMosaic and its services, please visit www.iomosaic.com

