



Laboratory Information Management Systems (LIMS) have become important tools for moving information gathering, decision making, calculation, review and release processes away from the office and into the workplace. Four of the industry's leading companies offer up their executives for an in-depth panel discussion on how a successful LIMS implementation can help keep your company competitive.



**Anthony Uzzo**, is President and co-founder of Core Informatics. Anthony started Core Informatics along with co-founder James Gregory in January 2006 to address the lack of a customizable yet affordable LIMS within the marketplace. Members of the company average over ten years of industry experience and have worked on numerous successful custom LIMS implementations. In just one year Core Informatics has already completed several successful LIMS implementations and has developed a solid reputation within the industry.



**Dave Champagne** was named vice president and general manager of Thermo Fisher Scientific's Informatics business in April 2005. He joined Thermo Fisher in April 2003 as director of global services for Informatics, and was later promoted to commercial director for the company's Informatics and Services division. Dave's career includes 13 years at Lotus Development Corporation and two roles as chief executive officer for early-stage software companies.



**Kim Shah** has more than 20 years experience in high tech marketing and management. Prior to joining Thermo Fisher Scientific in November 2006, he served as vice president of marketing and channel development at Convoq, Shah has held leadership roles at Inso Corporation, Lotus Development and Micrografx. He also co-founded e-tractions, Inc., a provider of strategy and implementations of online marketing campaigns.



**John Bainbridge** is the General Manager for the LIMS business at Applied Biosystems. As a former customer of SQL\*LIMS, like most of the Applied Biosystems staff, he understands the challenges facing LIMS customers throughout the selection, implementation, and support stages of LIMS. John joined Applied Biosystems in 1996 as part of AB's Professional Services team where he managed many implementations including several in the Pharmaceutical industry.



**Michael Ball** joined GenoLogics as CEO in 2004 and was instrumental in securing both the first and second round of venture capital financing in 2005 and 2006 and he has added a number of key members to the Board of Directors. He has 20 years experience in international sales, marketing and business development with high growth technology companies. Previously, Michael held executive positions at various technology companies.

**How does your company handle the customization process of each LIMS project? How do these customizations impact the delivery date and price of your systems?**

**AU:** Core Informatics' staff has spent their entire careers providing custom software to the biotech and pharmaceutical industries. We started in the laboratory before we became informatics professionals and as a result we have a very strong appreciation for the unique needs of the laboratory scientist. This experience within the industry has taught us that every company's approach to research is different.

Our Core LIMS product was designed with customization in mind from the onset. As a result we handle the customization process differently from most LIMS vendors. Prior to delivering a price quotation we interview the key players in the lab, management and IT to identify the needs of each group. As part of these interviews we document every lab's workflows and determine if and where customizations to our core system are required to meet the individual needs of the scientists. We also identify where data flows into and out of each workflow and strive to capture as much information as possible about each lab's processes.

Our customization process leads to a detailed proposal and accurate price quotation. In general, most client customizations account for an increase of 2 to 6 weeks for delivery and between

5 and 15 percent in the price. In our experience, this relatively small increase in time and cost makes all the difference to our clients. What we ultimately deliver is their custom LIMS system and not our product.

**DC:** As a provider of purpose-built solutions, Thermo Fisher Scientific builds as much functionality as possible into our core products to reduce risk and total cost of ownership. This is because customizing software increases the cost, duration and risk of implementation, validation and ongoing maintenance. To reduce customization, our purpose-built pharmaceutical solutions, like Watson and Darwin LIMS, include out-of-the-box functionality to address standard pharmaceutical practices like environmental monitoring, stability, product and formulation management and dissolution and bioanalysis. This significantly reduces the amount of custom code, and subsequently, the amount of code requiring validation. By future-proofing our software and building products that grow with our customers, organizations can quickly take advantage of new functionality as upgrades to the products are made. Our Watson LIMS is the leading choice for bioanalysis and is implemented with virtually no customization.

**KS:** It is important to recognize that software — even purpose-built — cannot meet 100 percent of a customer's requirements. Therefore, Thermo Fischer has on staff experienced business analysts with extensive industry and application expertise who



work with our customers to conduct cost/benefit analyses of any potential customization. This includes an evaluation of cost, available resources and the frequency of use for the desired customization. We always examine alternative courses of action, such as how standard functionality might be applied differently to achieve the desired result, or what work processes or methodologies might be changed to reduce or lessen customization.

**JB:** Generally speaking, we try to steer customers away from customizations. The challenges associated with customizations from a validation and long-term support view are well known. As a pharmaceutical LIMS, most customer requirements can be found in our out-of-the-box solution since it was designed against industry best practices. If a customer does identify a key feature that would ordinarily require customization, AB first checks to see if a similar enhancement is within its product roadmap. If not, through a customer advisory board, we will evaluate if this request can be added to our standard system.

Applied Biosystems boasts the strongest Professional Services organization specifically designed to support the LIMS industry. Our project managers are certified as Project Management Professionals (PMP) by the Project Management Institute (PMI). We have implemented processes that ensure all customizations delivered by our professional services team follow the same rigorous process that we follow in core software development. This accomplishes two purposes: 1) it eases the pain of validation for the customer and, 2) it allows for easier insertion into the core product if generally applicable to the larger customer base.

**MB:** One of the key issues with LIMS solutions in the past was the inability to easily accommodate change or technology shifts after implementation. When GenoLogics approached this market we chose to build a platform that facilitates change easily at the user level rather than the programmer level. This approach benefits both GenoLogics and the user because we are able to implement a solution faster with less expense to the customer.

Many customizations can be accomplished through our configurable user interface (UI) (without any additional professional services costs) at implementation, or in the future when inevitable technological, methods or process changes occur. We've also built a library of common instrumentation, robotics and bioinformatics tools for the life sciences which we can leverage for new customers to enable rapid implementations.

Another key challenge for customers when GenoLogics approached this market was the lack of purposed applications available within an enterprise-level solution. Historically, most enterprise software solutions were generic systems that required months of customization to purpose the solution for specific sciences. GenoLogics has built purposed applications for life sciences research fields such as proteomics, genomics, metabolomics and other -omics areas, which all have special needs that generic systems cannot easily address. The result is when GenoLogics works with a lab to configure a solution, we already have the majority of typical customizations done for their specific science domain.

In short, we have built a product and platform that is designed from the ground up to offer immediate value with a reduced need for customization at installation or during the life of the product.

### What are the most critical elements to a successful LIMS installation?

**DC:** Without question, selecting a vendor who understands your business and then working with that vendor to define expectations and requirements are of utmost importance.

With 19 of the top 20 pharmaceutical companies using Thermo Scientific LIMS, we have a strong track record of guiding our customers to a successful deployment. We work closely with our customers from day one to agree on expectations, define user requirements within the scope of those expectations and establish, manage and monitor an implementation process or methodology that ensures success.

**KS:** Defining the customer's expectations, and gaining management buy-in, is critical — our customers need to understand the project scope and what resources they must commit to successfully implement the LIMS. This includes a frank discussion on what business processes or lab protocols they might be willing to change in order to more fully utilize purpose-built functionality. In this regard, we provide our expertise from 20 years of working with all manner of pharmaceutical, biotech and contract research organizations so that our customer is successful, without having to reinvent the wheel. We use a workshop series to guide customers through their requirements gathering and setting, and use a well-defined implementation methodology that takes the project team from inception to "go live." The entire process is championed by experienced service consultants and business analysts, who keep the project on track and within scope.

**JB:** First is a strong, technologically advanced product platform. After years of continuous development, SQL\*LIMS offers a set of deep, rich product functionality out of the box.

Beyond technology, the most critical element to a successful LIMS implementation is a strong partnership between the customer and the LIMS vendor. The customer brings the knowledge of their organization and practices while the vendor brings experience at implementations as well as product knowledge. Blending the respective strengths of both parties allows for a successful project to be planned, executed and successfully concluded.

The vendor should offer a standard and documented project management methodology. The customer should not need to pay the vendor to reinvent the wheel when it comes to successful practices. Applied Biosystems has made a large investment in our Project Management Office (PMO). Using our proven methodology, the PMO can assist with building the initial project plan as well as tracking time and costs during project execution — all at no cost to the customer. This is just one of many examples of commitment that Applied Biosystems offers for the success of our customers' objectives. We do not pass ownership or risk along to a third party, but remain accountable to our customers throughout the process.

Additionally, successful LIMS implementations don't end with a successful go-live. For us, success only comes when the customer is pleased year after year. We look at the relationship between AB and the customer as a long-term partnership. For that reason, AB invests heavily in customer support mechanisms such as a dedicated technical support staff and frequent customer communications such as online user forums.

**MB:** A few key elements that take place at different stages of the relationship contribute to the overall success of a LIMS installation.

The most important element in a successful LIMS implementation is having a company strategy or vision which is aligned with the customer's vision of the future. Our vision for our product line is to provide a flexible, open platform for all discovery research labs, with purposed modules for specific -omics sciences. We stay on top of new technologies, software and instruments so we can provide maximum value to life sciences researchers within their specific lab environment. This strategy ensures our customers

are more likely to be successful, since our development goals are already aligned with their science disciplines. Our entire business is focused on building world-class LIMS for the life sciences industry.

Another element in a successful LIMS implementation comes from working with all the diverse users to understand their goals and making sure they are well trained and understand how they can derive value from the LIMS. The company and the customer must both be committed to ensuring a successful implementation.

Understanding the needs of the customer is another key factor. This is a critical step as it sets the tone for the relationship with the customer and can impact how much value they derive from the solution. LIMS can be large living systems which must accommodate evolution and change. The vendor needs to provide a system which will be successful in an environment in which the science, instruments, techniques and people change at a fairly high rate.

By understanding what people want to accomplish and then showing them EXACTLY how you are going to help them do it, you lower the barrier to adoption and drive toward a successful solution.

The final key element is ongoing open communication with the customer post-installation. Often, we find that system requirements which are initially suitable on paper and at the time of installation evolve over time as the customer adoption rate climbs. Continuing open dialogue with the customer ensures

we have a solid understanding of their needs and allows both parties to evolve the relationship over time.

**AU:** In our experience, the most critical elements to successfully deploying a LIMS are communication and flexibility. As you move through the entire lifecycle of a LIMS project from requirements gathering to customization, installation and configuration to deployment of the "most critical" element changes.

When the project first begins and you are gathering functional requirements, effective communication with the client is absolutely critical. One of Core Informatics' great strengths is that each member of our project teams averages over ten years of experience in the industry and we speak the language of our clients. This enables us to deliver a very thorough functional specification document that speaks to the needs of the client in their own terms. This process solidifies exactly what the client is going to get when the system goes live, and there are no surprises.

As we enter the customization, installation and configuration phase of a LIMS deployment, flexibility of the underlying system becomes the most critical element. Core Informatics' ability to move quickly from a functional specification document to a customized enterprise LIMS in about two months can only be accomplished because of the architecture of our underlying platform – our Core LIMS product.

Once the LIMS is deployed and the project moves into a support and maintenance mode, communication and flexibility are equally essential. Anyone who has worked in this industry knows



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At Core Informatics we understand that your approach to research is different from your competition. Our company was formed to address the lack of a customizable yet affordable LIMS in the marketplace. Discover the difference that a customized approach can bring. Contact us today to begin discussions on the future of data management within your organization.

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that the environment is always changing: new technologies and new assays being brought online, etc. Once again this is where we believe Core Informatics has a significant advantage. Because of the underlying flexibility of the system we can easily plug new functionality into the system as our client's needs change over time.

During the specification and deployment and training phases of the project we develop relationships with the scientific directors and end-users of the system. Because we have developed these relationships, we are much more approachable. This is where we like to say that Core Informatics is not just a vendor — we are your partner.

**What are the most common new features requested by your clients? How does your company address them?**

**JB:** We continually hear from our current and prospective customers that they would like LIMS to expand beyond traditional feature sets. Applied Biosystems is responding through a combination of internal development and third-party collaborations. A new capability like a Quality Event Management System that manages quality deviations and investigations is an example of new functionality that addresses a currently unaddressed need within LIMS. We are also expanding our reach into Environmental Monitoring by providing a true paperless collection, management and reporting of environmental monitoring information. Likewise we are working with a respected vendor in the Electronic Laboratory Notebook space to remove manual steps in the running of test assays.

Applied Biosystems maintains a close relationship with its customer base and we utilize this community to learn and react to evolving trends. Our Customer Advisory Board takes an active role in setting and validating our product evolution.

To react quickly to pressing customer needs, we have established an R&D team whose sole purpose is to address reported defects and enhancement requests coming from our customers through our technical support organization. It is through this mechanism that we help ensure that all customers are able to participate in driving product enhancements.

**MB:** Typically, integrations to third-party products are the most common requests we receive.

Our platform architecture allows us to rapidly use the existing framework to add new integrations in the context of the purposed product. For instance, assume a new mass spectrometer is being released with a new format. Since we already have a platform that is made to integrate to various mass specs, it will take us far less time to complete an integration than if we started from scratch. We already have mass spec driver files, so we simply create a new file to load into the new mass spec. We already do MzData/MzXML conversions for other mass specs, so adding a new conversion call is straightforward.

In addition to new and evolving instrumentation integration requirements, many of our customers also require their LIMS to be deeply science purposed to address the needs of their science disciplines. We have built science purposed applications onto our LIMS platform that really differentiate our solutions from more generic systems, and help us provide strong value to customers beyond lab management and sample tracking.

Our solutions contextually integrate scientific data, providing data querying, reporting, cross-comparison views and export mechanisms to statistical analysis and data warehouses for data mining. For this reason, we are becoming the LIMS of choice for pharmaceutical organizations and large research institutes with translational medicine and systems biology initiatives.

**AU:** At a high level most feature requests involve either getting new data into the LIMS or providing a different mechanism of getting it out. One of the strengths of our product is in how we handle automated data capture and reduction. The Core LIMS has a framework that allows scientists to easily import any raw data file from any data-generating instrument. As part of the specification and rollout of any new system for our clients we help determine which assays and instruments should be integrated directly. We build custom file parsers for each of their instruments and custom data reduction algorithms that reflect how they would like their data analyzed and reported. The challenge for all LIMS vendors, though, is to provide a system that can easily evolve over time to support the new assay technologies within the lab. Incorporating support within the LIMS for a new assay or instrument is one of the most common feature requests that we receive from our clients and because of the frameworks that we have built into our system we can usually accomplish these tasks in a matter of days. This level of customization and quick turnaround time is what provides significant benefit to our clients.

Several of our partners require tools that allow them to easily import and export data from the LIMS to exchange with a partner. Since there is little standardization in the industry with regard to data exchange, this is often no simple task. This is an area where we can build relatively simple customizations to their systems to make this otherwise complex process fairly simple.

**DC:** We're finding that customers are looking for solutions that have more robust functionality built into the core product that meets their needs and minimizes customization. Thermo Scientific LIMS for the pharmaceutical industry include functionality specific for bioanalysis, in vitro ADME experiments, discovery R&D as well as manufacturing R&D and QA/QC. By providing our customers with four distinct LIMS solutions, we speed the deployment and lower the total cost of ownership.

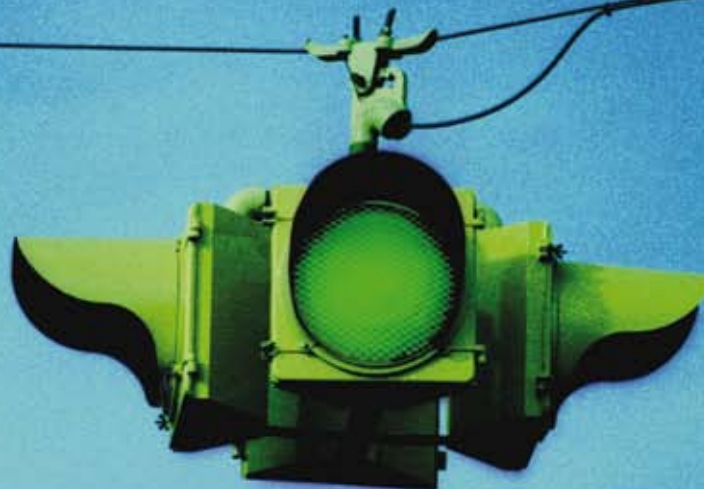
**KS:** We're also finding that customers want increased instrument integration and automation. Manual transcription of data increases compliance risk and is an inefficient use of the lab's time. Thermo Fisher addresses this issue with the use of its Integration Manager technology. This single application has the capability of interfacing not only to scientific equipment but also to complex ERP systems such as SAP. This powerful tool enables our customer to configure a single interface between their scientific equipment and our LIMS, thus saving them time and effort.

Improving or easing validation is always important, and Thermo Fisher responds with a dedicated staff of validation professionals and validation tools available for all our major products. Our experts are involved early in the project to ensure a successful roll-out and faster return on investment. By designing purpose-built solutions, customers will find that the amount of custom code that needs to be validated is significantly minimized.

**DC:** One other area is Cross-WAN deployment to reduce IT costs. Our customers tell us, "We are not an IT company or an informatics company." As their partner, our informatics products and services are designed with centralized enterprise deployments in mind, and they are supported and tested on Citrix.

**What efforts are underway to maximize a pharmaceutical company's ability to harmonize processes globally? How are LIMS vendors breaking down data silos?**

**AU:** As most of our clients are small- to medium-sized biotech and pharmaceutical companies with limited staff and tight budgets, they aren't talking about global process harmonization.



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Our clients have taken on the unenviable task of identifying novel drug candidates within a compressed timeframe with less staff, money and technology than their large pharmaceutical counterparts. Most of these companies are financed by private equity investments and are expected to provide a return on investment within 3 to 5 years. As a result, these companies need to develop some sort of competitive advantage that will allow them to work faster and better than their competition. For our clients, the Core LIMS is a critical element in improving research efficiency.

As we look at the competitive landscape of the LIMS market, it is apparent that in an effort to “break down data silos,” many LIMS vendors are buying or creating multiple-point solutions and then bundling these individual products as “a suite of tools” where information and data can be shared or passed from point solution to point solution.

We took a more holistic approach to the underlying data structure of our Core LIMS product where we can track virtually any kind of data or information about any object in the system right out of the box. We also provide incredibly simple access to all of that information. Because of this, end-users of the Core LIMS can very quickly identify pockets of missing information. Once these silos have been identified, we work with the scientists to develop strategies to extract the relevant information from these silos and place that information in the LIMS where the entire organization can benefit.

The simple fact is that data silos are created by people and can only be broken down by people. We do not believe that the challenge for us is to break down these data silos but to clearly and easily identify all that exists within an organization.

**MB:** Within the life sciences, research groups need a single system to track their discovery research, provide traceability and run their labs. This is a key initiative within many pharmaceutical companies; however, this must be balanced with providing a great deal of flexibility for specific labs and individual researchers.

Pharmaceutical companies continue to focus on data integration, leveraging controlled vocabularies, data standards and technology and vendor consolidation. We are well-positioned to enable this by providing a science-purposed LIMS platform for multi-lab, enterprise-wide research efforts. Our flexible, open OMIX platform enables multi-lab rollouts across multiple science disciplines, based on a common software platform and user interface.

LIMS vendors need to approach breaking down data silos from the perspective of providing an open flexible platform that can accommodate many different processes, in many different ways. One of reasons these types of systems end up being shelved is lack of use; we try to minimize this by allowing people many options when it comes to using the system. Ultimately, a LIMS needs to track what people do and how it's done — it must make their life easier.

**DC:** From our perspective, standardization and interoperability are two keys to process harmonization and enterprise-wide knowledge sharing. With pharmaceutical companies operating in multiple locations around the globe, they need systems and solutions that enable access to the knowledge being created throughout their enterprise. LIMS capture and maintain much of that knowledge, and independent research has concluded that organizations can save as much as 40% of their total cost of ownership by standardizing on one LIMS solution instead of supporting multiple systems. So we strongly advocate that customers standardize for their own benefit.

Thermo Fisher intends to more fully integrate its portfolio of informatics solutions with platform development. Taking advantage of the Web and Service-Oriented Architecture enables the shift from dedicated point systems to an integrated suite of Thermo Scientific solutions. In addition to enhanced productivity, the platform delivers: ease of integration and upgrades/future proofing; interoperability, with connectivity to enterprise systems, instruments, equipment, storage and automation; end-to-end workflows; common interface and open standards; and Web-based browsing and reporting.

**JB:** There are two primary ways that we are working to assist our pharmaceutical customers in achieving true harmonization globally.

The first way is a technology solution. SQL\*LIMS is a web-based application that allows for centralization of the data center along with no local PC workstation maintenance. So long as the end-user PC is able to run a browser, the SQL\*LIMS client is available to them. This offers the obvious advantages of reducing IT overhead and eliminating the burden of PC workstation validation associated with a LIMS implementation. This also reduces support staff and allows them to be centrally located supporting a wider geographic area.

The second solution is a business solution. Given that SQL\*LIMS has been used extensively in the pharmaceutical industry for many years; our product and team have developed great pharmaceutical specific expertise. This includes not just product features such as lot control and stability, but also some of the service side aspects of a LIMS implementation such as validation requirements.

We've recently taken that expertise and developed a pre-configured, pre-validated version of SQL\*LIMS that we refer to as the Plug & Play Pharma Pack (P4). SQL\*LIMS P4 is a purpose-built pharmaceutical LIMS that comes bundled with already executed validation scripts, an analytical statistical package, Pharma specific reports, common USP and ICH methods, user training and optional server hardware.

**“Configuration” seems to have replaced “customization” in software marketing claims, but what is the difference, and how does that affect customers?”**

**MB:** GenoLogics led the market in this area more than three years ago, when we decided to build a “configurable” software platform. We wanted to differentiate our company within the relatively crowded LIMS marketplace. We kept hearing two things from all the researchers and lab managers we talked to: a LIMS must be flexible and it must be purposed. We needed to build something for specific disciplines that researchers could configure themselves without support.

We often hear customers saying “SHOW ME, show me what your system does for me today, not what you can build for me over the next 12 months.” We can provide customers with a configurable system today, which is not generally offered by LIMS vendors.

GenoLogics offers a product that is useable out of the box and configurable for specific processes within hours rather than months. In contrast, toolkits are customizable, not configurable. I believe we have the most configurable, off-the-shelf product in the LIMS marketplace today.

**DC:** At Thermo Fisher, we define customization as ANY manually written code that modifies the system behavior. Whether the LIMS embeds a scripting language or requires custom functionality to be written in an external tool or environment, any written instructions to create functionality represents customization

— at an additional investment of time, money and resources for the customer. This would include manually creating XML or HTML for web-based user interfaces, or stored procedures to automate workflow processes.

Configuration, on the other hand, offers control over the software without requiring any additional code. Take the example of automatically printing sample labels at the time of registration. In a configurable scenario, a purpose-built or off-the-shelf LIMS may include a checkbox in the setup options that activates label printing at the time of sample registration. In the customization scenario, systems that do not offer such an option would require the system administrator to write code that triggers sample label printing at registration time. In the first scenario, the customer relies on vendor testing as evidence that the label printing capabilities are functioning as designed; in the second, there is no such vendor testing. The functionality has been implemented at the customer site in a specific instance and requires complete lifecycle management and validation at additional expense to the customer.

**JB:** The meaning of the word “configuration” has been so misused in the LIMS industry that clients are no longer able to differentiate it with “customization.” The word customization has taken on a negative connotation for obvious cost and long-term support reasons. Unfortunately, many vendors have simply substituted the word “configuration,” giving the impression that these issues have gone away when in reality, the exact same issues exist. The word “configuration” seems to imply that any customer workflow that can be imagined can be represented in the product. The reality may be far different.

For me, here’s the litmus test: Did the customer or the vendor not have to write code or use an internal scripting tool to create some form of user functionality in the LIMS? When experiencing a problem, can a customer call tech support and direct that tech support engineer to a part of the application that can be replicated in that engineer’s environment? During a demo, can the vendor point to a page in a user manual that describes the exact same screen they are seeing in the demo with the exact same functionality? If not, then the “configuration” is really a “customization.”

Obviously, if this litmus test fails, the cost and validation burden realized was probably far greater than originally planned. The customer may have ended up with a solution — whether labeled “configuration” or “customization” — that the vendor cannot support as a standard product when problems or questions do occur. Additionally, later on when it’s time to migrate to a new version of the product, it’s unlikely that the functionality will persist leaving the customer with a costly consulting engagement.

**AU:** This certainly does seem to be the case and it is likely a function of the fact that most LIMS vendors simply cannot provide “customization” so they are attempting to change the dialogue to focus on “configuration” instead. All good data management systems need to be configurable by the end-user. The difference between configuration and customization is that customization involves changes to the business rules of a given process that are unique to that individual client. These tasks require low-level understanding of the system architecture and are simply not possible for the end-user of the system.

The net effect on customers is that they have to change their laboratory workflows to reflect their data management system. This is the opposite of the effect originally intended for these systems. One of the primary goals for any LIMS is to

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improve the operational efficiency of a laboratory. At the point when scientists need to change their behavior for the LIMS, this goal is no longer achievable.

Every one of our client installations is unique. They each reflect the distinct requirements that are necessary to improve the overall efficiency of that organization. We are very proud of this fact and believe that this is our key advantage over the competition.

**Explain how you have utilized newer technologies in an effort to provide customers with a more flexible approach to their changing needs.**

**AU:** Core Informatics employs many newer technologies to improve our customers' experience. The primary example is that our system is entirely web based. This presents a huge advantage to our customers as they can access the application from as many locations as desired without imposing any hardware requirements or client software installations. When we issue updates and feature enhancements, we do so entirely on the server side. This completely isolates the end-user from the headache of ensuring that they are always running the latest version of our product.

Our Core LIMS system is written entirely in Java, and we take full advantage of the features inherent in object-oriented programming: inheritance, polymorphism, abstraction, etc. This is how we are able to develop and deploy customized data reduction routines and business rules classes quickly.

Our software architecture also takes advantage of the portability of the Java language. The "write-once, run-anywhere" mantra of Java gives our customers the freedom to choose the operating platform they want to run our application on. We have customers running on Windows, Linux, Unix and combinations of those platforms. We also write all of our software such that we remain database agnostic. The entire database layer of our application is written in ANSI-SQL. This provides our customers with the freedom to deploy our application on Oracle, MySQL, DB2, SQL Server, etc.

We also make full use of other web technologies that allow us to provide exceptional levels of customer support and maintenance. These technologies include VPN and SSH for remotely accessing and updating client installations. We also use services like WebEx to provide training services over the web for our clients. These are the kinds of technologies that make our approach to LIMS possible. In the end, the clients are the key and we must endeavor to make them happy or they will go elsewhere. We have found success in simply giving them what they want.

**DC:** We're leading the industry in the effort to create open standards. As a certified Microsoft partner, we're moving our solutions to the Microsoft® .NET platform, using service oriented architecture (SOA) and shifting away from proprietary programming languages in an effort to increase interoperability. Our open, unified architecture share an XML-based middleware layer that will be performance-tuned to communicate and work seamlessly with all major instruments and automation available in the marketplace, whether they are Thermo Scientific solutions or another vendor's.

**MB:** GenoLogics entered the LIMS market only five years ago, so we have the advantage of utilizing the latest software technologies. In addition, we don't have legacy systems to support so we were able to start with a fresh perspective on how to build the best LIMS, a key reason we have been able to build such an open and configurable platform. We started by focusing on proteomics because the workflows were complex and the

science and techniques were changing rapidly. We felt that if we could build a flexible software platform for this challenging market, it could be easily extended to other discovery labs.

Over the past five years, we have developed core technologies that enable flexibility and easy adaptation to meet the diverse and changing needs of proteomics and genomics lab environments and discovery research.

These core technologies include our Automated Informatics™ Framework, which is an automation framework for easy integration to instrumentation, robotics and bioinformatics software tools and algorithms utilized in a life sciences laboratory.

We have also built an Adaptive UI and Configuration System. GenoLogics leverages a rich graphical user interface (GUI) which utilizes an intuitive wizard-driven interface. From user-definable options through our administrator configuration system, customers can easily adapt and re-adapt their LIMS solutions to their evolving lab environment and technology platforms without writing code or utilizing our professional services team.

We also leveraged J2EE Java Enterprise Technologies when we built our LIMS and Data Management solutions. Java provides the cross-platform technology infrastructure to support diverse IT infrastructures, networks, data archiving/SAN, operating systems and databases. Java also provides strong native support for internet technologies, application programming interfaces (APIs) and connectivity with other systems and data sources within large enterprises.

Finally, we have built our software with open systems in mind, and, as a result, we can deploy our solution in virtually any IT environment. In addition, we built APIs early on to allow us to easily integrate third-party software and instruments. All of these elements add up to a LIMS solution that is truly state of the art.

**KS:** Customers operate in a heterogeneous technology environment and their success, as well as ours, is dependent on ensuring that all these technologies can work together as seamlessly as possible. Proprietary languages make interoperability difficult — and quite frankly, are difficult to support over time. The trend is to open up to cooperation with other vendors who provide other key software and hardware essential to the user's business. That's one of the reasons Thermo Fisher Scientific has joined the Microsoft BioIT Alliance. We'll be at the forefront of developing industry-wide conventions for sharing data. The Alliance brings together science and technology leaders to consider innovative ways to address challenges of integration, collaboration and knowledge management.

**JB:** One example of technology use is, of course, the web-based nature of SQL\*LIMS. This enables multi-site organizations to consolidate their data centers and reduce local administration costs, translating into real production dollars that can be saved.

In the area of support, Applied Biosystems is launching a remote administration capability. This goes well beyond someone logging into your system remotely to resolve issues. Utilizing now available technology, it becomes a predictive tool. It allows Applied Biosystems to monitor your system identifying and correcting potential problems before they result in costly down-time. This is a great value for any laboratory, but especially useful for smaller organizations that don't have the benefit of IT staff the way our major pharmaceutical customers have. This service allows the customer to reduce the expense of costly administrators. For 24-7 operations, this service helps to minimize downtime resulting in obvious production cost savings.