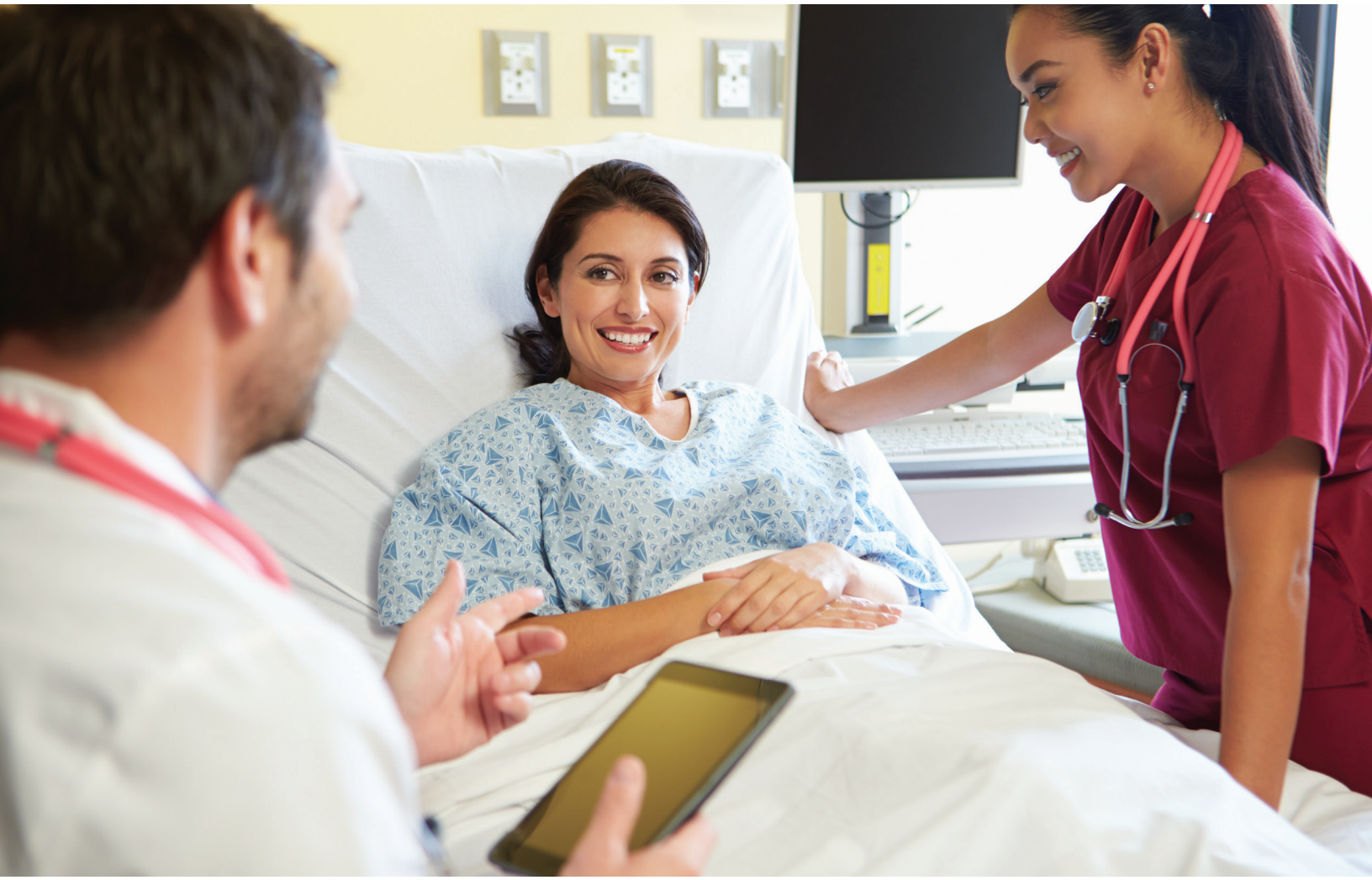
Instrument of Change: Creating the Next Generation of Laboratory Middleware



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Health | Business | Government

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Executive Summary:

An Inflection Point for Developers of Laboratory Middleware

There has never been a greater need or opportunity for advanced medical laboratory middleware. The diagnostic laboratory industry is, like most areas of healthcare, in the midst of profound change. Middleware vendors need to position themselves to help labs not only survive, but also thrive in this new environment.

Aging Populations

Worldwide, populations are living longer, often with multiple chronic conditions, thus increasing the complexity of care. Clinicians' ability to see lab results in the context of a complete medical record is crucial to making the right care decisions.

Genomics and Personalized Medicine

Genomic sequencing and personalized medicine are poised to reshape clinical diagnsotics. A single human genome with 1 billion reads can create up to 100 gigabytes of data, and even the processed genomic variant files are nearly a gigabyte in size. As genomic assays and personalized medicine generate massive amounts of data, labs need new ways to manage and analyze it, and to deliver results.

Lab Consolidation

As labs consolidate, become more automated, and run higher volumes of samples and tests, scalability and high availability become critical aspects of the middleware solution.

Sustainability

In public and private healthcare systems worldwide, administrators are attempting to increase efficiency and contain costs without compromising quality. Clinicians are struggling to make informed decisions in this changing landscape. And patients are asking for greater access to their providers and health information, but they want it to be as easy as using an app on their mobile phones. Meanwhile, the cost of care continues to rise faster than the ability of healthcare systems to pay for it.

It's an unsustainable trajectory.

Shift Your Thinking

These healthcare challenges create opportunities for the next generation of middleware to provide even more value to labs and the clinicians who depend on them. It requires a shift in thinking about the place and role of lab middleware, as it evolves from an operational tool to a platform that serves all of the business needs associated with running a laboratory.

Middleware has already evolved from a simple enabler of data communication between analyzers and laboratory information systems to a provider of simple business intelligence capabilities that generate metrics and key performance indicators for managing the business.

Shift Gears

Key to the next shift in middleware solutions is the ability to pull together test requests, results, and complete patient information on demand, and then analyze and act on all of the data in near real time. For example, with access to complete patient information, lab applications can flag requests for duplicate or expensive tests for review, to ensure that the tests are necessary and that time and money aren't wasted.

ANALYZE DATA AND ASSIST DECISION-MAKING BASED ON A COMPLETE PATIENT HEALTH RECORD.

A Platform Approach to Middleware From InterSystems

To support the needs of tomorrow's laboratory, middleware vendors don't have to create all of the necessary infrastructure from scratch. Instead, you can develop middleware solutions on the InterSystems platform. InterSystems provides the flexibility and infrastructure necessary for next-generation laboratory products. Starting from this foundation, innovation can be maximized so your product's unique business value becomes the focal point of the software development process.

Flexibility

Flexibility will be the hallmark of next-generation middleware. Cost pressures are forcing many labs to evaluate their LIS infrastructure. Middleware that enables flexibility through a service-oriented architecture provides a viable migration path for functionality to move off of an aging LIS in an organized fashion that minimizes operational disruption. Greater modularity and flexibility will allow next-generation middleware to command greater mindshare within the lab.

USE THE SAME DATA TECHNOLOGY THAT POWERS OVER 60% OF U.S. MEDICAL RECORDS.

Beyond Data Management

Healthcare data comes in many forms — records, images, events, and documents, in structured and unstructured formats. The ability to analyze and act on all of this data will be at the heart of future middleware solutions.

As the number of data systems in use in labs increases, middleware will be challenged to collect data across all those systems and deliver useful information in real time. Aggregating, cleansing, and managing data that scales across the laboratory's systems requires a range of technologies found within our platform, from streamlined interoperability to data aggregation and analytics.

Developers no longer have to choose between a traditional relational database management system and newer NoSQL options. The InterSystems platform includes a powerful, multi-model (relational, object, key-value, document) database platform. It enables applications to efficiently store and retrieve all types of healthcare data within a common and consistent environment. This is the same data technology that powers over 60% of the medical records within the United States and supports over 500 million patient records worldwide.

Scalability, Availability, and High Performance

As labs consolidate and become more automated, scalability and high availability become critical aspects of the middleware platform. The InterSystems platform economically provides both. Applications based on it don't require large investments in hardware, support, operating system licenses or storage to support high-availability and scalability options. Compared with relational applications of similar size, InterSystems-based applications require significantly less hardware and minimal administration.

Patient Data Aggregation for Multi-lab Data Management

Future middleware will be expected to play a role in multi-lab operations, not only managing workflow and throughput across the lab network, but also managing results information and providing data consistency and normalization of inter-lab variations. InterSystems provides a comprehensive data model for aggregating operational, patient, clinical, image, and financial data, and even genomic test results. With this ability to aggregate and harmonize diverse data from multiple sources, you can create a truly holistic virtual patient record on demand. This provides a path for your middleware solution to evolve from an operational tool to a platform that can serve business needs across the spectrum of lab analytics — from real-time operational metrics to regulatory, clinical, and quality reporting.

Next-generation middleware characteristics

- Aggregates complete patient information
- Leverages real-time analytics
- Adapts to customer workflow and business processes
- Interoperable
- Mobile and responsive
- Health service bus architecture
- Standards based

Business Process and Workflow Management

The InterSystems platform includes powerful built-in support for long-running, guaranteed business processes as well as coordinated human workflow. Easy-to-use graphical tools for rules and business process management quickly automate business processes and information flow. The business process management tools support workflows of any complexity, from sophisticated auto-validation capabilities to alerts and notifications.

Interoperable by Design

Interoperability is required for middleware to be effective. The laboratory industry is moving away from its traditional reliance on proprietary driver connectivity toward standards-based interoperability. For solution providers that choose to leverage our platform as part of their middleware environments, it offers advanced interoperability capabilities, including an industry-leading health service bus (HSB).

The HSB supports IHE profiles from LAW to XD-Lab and everything in between with equal ease. It is fluent in all healthcare standards necessary for laboratory operations and can manage billing output (X12) and FHIR as easily as ASTM or HL7, so your solution becomes instantly connectable to other systems. The InterSystems platform also positions middleware for an API-driven future with powerful JSON and REST capabilities.

Mobile-Ready Development

The modern laboratory is a changing environment. Clinical lab spaces are no longer designed for manual bench testing with technicians working in walled-off environments. Newer open-plan labs designed around automation are creating a need for greater mobility and improved user experiences through lab middleware. Lab users demand fast and easy access to the information and services they need in the form they want. Our platform includes the front-end frameworks and back-end services developers need to easily create modern, mobile and responsive web-based middleware applications.

InterSystems brings together the data, analytics, and business services needed to power mobile solutions. It publishes these services using efficient and secure REST and web services protocols. And it delivers a sleek and personalized user experience via mobile and responsive HTML5 frameworks.

Real-time Healthcare Analytics

The laboratory middleware layer is an information-rich environment. All the connectivity and transactional data flowing through middleware represent a tremendous, untapped opportunity for analysis. Traditionally, analytics are used with structured data — the "slicing and dicing" of numbers. The traditional approach involves creating and maintaining a data warehouse, which can only provide a historical view of data.

The InterSystems platform includes software that makes it easy to enhance transactional applications to provide real-time analytics, and to deliver insights to users exactly when and where they need them. No data warehouse is required. Application developers can rapidly build interactive dashboards that are graphical displays of key performance indicators. Since these dashboards are embedded within transactional applications, our platform makes it easy for users to access vital information at the point of need.

Middleware data such as turnaround times, auto-verification of results, and quality and volume metrics can be easily presented in real time. This instant access to timely, actionable metrics ensures that lab operations are continuously monitored for performance.

For laboratories to thrive under population management and value-based payments, middleware must provide increasingly sophisticated analytics capabilities. Value-based clinical and quality data will require new and expanded types of analytics that have previously been outside of the domain of traditional middleware. For example, the InterSystems platform offers technology for analyzing unstructured data. Although most instrument output is highly structured, emerging middleware must be increasingly capable of providing context to data — often derived from unstructured physician notes and patient history — to improve diagnostic capabilities.

Analytics Technology

The InterSystems platform offers an optional analytics environment that contains a complete analytics data model, infrastructure, and starter sets for meaningful health analytics. This allows you to add robust analytics to any enterprise solution or extend existing analytics solutions by delivering current, credible data for processing.

The analytics environment is tailored to the demands of multi-laboratory analysis of large-scale data and results across multiple entities. Typical LIS or middleware data is highly transactional in nature. As laboratories look to expand their understanding of data across patients and clinical environments and over time, new analytical capabilities are needed.

InterSystems analytics technology can form the basis of a multi-client or multi-facility analytical strategy. As laboratories continue to consolidate, forward-thinking middleware vendors will look to deliver analytics capabilities that extend beyond traditional single-site transactional performance metrics.

Cloud, On-Premises or Hybrid

Middleware technology needs to provide multiple deployment options to deliver rapid value to clients. Vendors may need to deploy middleware on site for major academic medical institutions while offering cloud deployment options for smaller labs or laboratory environments.

InterSystems offers multiple deployment options, supporting cloud, on-premises, and hybrid models. InterSystems believes that technology deployment should be a business decision, not a technical one. We offer templates and features that make it easy to deploy, provision, monitor, and manage applications built on our technology in any environment.

More Intelligent Middleware, Less Challenging to Create

The InterSystems platform takes the challenge out of creating connected, information-rich, nonstop middleware solutions. It removes the complexity from data management, mobile and web access, interoperability and integration, healthcare analytics, and other common tasks so developers can focus on the unique value and content of the next-generation laboratory middleware solution. It is a comprehensive, modular health informatics platform, so you can license just the modules you need now, knowing that as your requirements evolve, the InterSystems technology will keep pace.

Partner with InterSystems

Over 80% of InterSystems business is with long-term partners. Companies like LifeLabs, Pathology Associates Medical Laboratories, ACL Laboratories, BioReference Laboratories, Quest Diagnostics, LabCorp, Bio-Rad, Data Innovations, Sunquest, and Roche Diagnostics have made a strategic commitment to InterSystems. Our record for success and customer service is second to none in the healthcare software industry.

Times of transition are also times of opportunity. In the medical laboratory market, that time is now — where the right technology and the right application can make a huge difference in business operations and patient health. Middleware built on the foundation of the InterSystems platform ensures that it will have the high performance, reliability, scalability, interoperability, and intelligence to deliver the right information to the right person, in the right way, at the right time — every time.

Learn More

Contact us now to take advantage of our superior healthcare technology and dedication to customer success.

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Visit InterSystems.com/contact for a link to the number of your local office.

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