Middleware mantra for today's economy: flexibility, speed, ROI

Anne Ford

As if following the lead of lawmakers working to strengthen the economy, middleware systems companies are emphasizing their products' ability to boost—and speed—laboratories' return on investment and thereby strengthen both parties' bottom line.

Indeed, Data Innovations president Gregory R. Vail cites "customers' demand for quicker and quicker return on investment" as a driving force behind IMSolutions, a middleware product for hematology and chemistry the company was preparing to introduce at CAP TODAY press time. Vail calls the product "an industry-first, all-inclusive middleware offering" that includes Data Innovations' Instrument Manager software as well as hardware, installation, training, support, and "a revolutionary rules package for the laboratory discipline for which it is installed." That rules package, he says, includes rules and test data suites pre-populated in the system, forms to collect parameters, algorithm documentation, and validation templates. "This offering drastically reduces the time it takes to go from manual validation to a live autoverification system to as little as one week," he adds.

At the same time, Fletcher-Flora Health Care Systems' vice president of sales and marketing, Terry Watson, foresees that "the trend will be for health care facilities to use middleware products as a way to maximize their overall IT investment"—products such as the company's FFlex eLink solution. Introduced last year, FFlex eLink connects clinical instruments and an electronic medical record, electronic health record, or practice management system. The product's streamlined installation process, says Watson, helps laboratories achieve a faster return on investment: "It can be up and running within a day or two in most cases, depending on the number of instruments and number of individuals to be trained. This helps customers realize the cost savings immediately, eliminating manual entry and improving efficiencies and patient care."

It's not only Data Innovations and Fletcher-Flora, but also the 11 other companies in this month's middleware product guide that are striving to maximize laboratories' return on investment by offering systems that add intelligence and functionality to the connection between laboratory instruments or automation systems and laboratory information systems.

In January, Sysmex America introduced an online learning module for its Sysmex WAM software that allows users to access a virtual learning laboratory on demand. This summer the company "will extend its middleware beyond hematology to support its urinalysis and coagulation products by offering multidisciplinary modules," says senior product manager Anne Tate. Sysmex will also enhance its hematology functionality by adding a specimen-tracking module for real-time tracking on Sysmex HST hematology automation systems with predictive destinations and sort locations; an alert module that provides on-screen alerts to any system, interface, or quality con-

Middleware systems, pages 15–25

Product Guide

Dawning Middleware

The Dawning DataMiner™ Database Query Engine
A unique data mining and rules development tool
US Patent Pending

The DataMiner connects to a desired database and automatically senses the structure and contents of the database **without SQL programming.** The user can select any of the available database columns to use, and can define a list of aliases for them to make the development of subsequent queries easier. After defining the list of database elements to work with, queries can be developed to sift the database for selected information.

The Dawning DataMiner can be used for applications such as:

- **Validation of critical ranges** by researching the actual LIS database
- Researching **test utilization** procedures and controls
- Offline middleware **rules development**, testing and validation
- Exploration of **non-lab databases** for any desired comparison and filtering

The DataMiner GUI allows **several types of queries** to be constructed:

Single queries, List queries, Ranged queries, Date queries, Delta check queries, Repeated test queries, etc.

When development of a query is complete, several actions are available:

- A **report** summarizing the query and results can be produced

- A query can be **saved**, either as an individual query or as a template for use in future development

- The query can be **exported** from the DataMiner and imported as a set of rules in Dawning's JResultNet Middleware, for use in realtime lab data processing

Sample List — Sample Review

	Name	Value	Units	Flag	Result Type	Comments	Database
	BUN	1.025	seconds		I	Test ran slow	Pending
*	CO2	3214.0	%	Normal	F	Abnormal	Pending
✓ *	COL	100.98	seconds	Abnormal	F		Pending
✓ *	COL	32.97	%	Above high n...	F	Better	Pending
✓ *	K	32.09	%		I	Oops!	Pending
	K	1.025	mL	Abnormal	F	Oops!	Pending
*	K	1.003	%	Below panic ...	X	Needs to be ...	Pending
*	RBC	20.99	pounds	Above panic ...	X		Pending

Patient Information — Prime ID 2, Patient ID 382718, SSN 867-5309, Birthdate 19790321, Name Murtha,Becky, Sex F, Doctor Spock, Location XRay Station 1. Patient Comment: No known diseases.

Sample Information — Specimen ID 2456, Action Code Append, Sample Type Blood, Sample Source Wrist, Priority Control. Sample Comment: Not correct.

Signature LabTech1

© Copyright 2007 Dawning Technologies, Inc.

www.dawning.com
sales@dawning.com
800.332.0499 or +1. 239.931.6004
Circle No. 30 on reader service card

dawning ®
Smart Connections

Volunteer pathologists needed in Ghana

Pathologists Overseas, a nonprofit organization dedicated to introducing or improving pathology and lab services in developing countries, has begun a project at the Komfo Anokye Teaching Hospital in Kumasi, Ghana. Volunteer pathologists are needed to staff the histopathology laboratory and to train two local physicians as surgical pathologists. Assignments are for one-month periods throughout the year. Local housing is provided; volunteers are responsible for air travel and local living expenses. Contact Thomas Coppin, MD, for more information: coppin_thomas@hotmail.com.

Middleware

trol event; and a management report module with six standard reports for ongoing monitoring of test data, automation turnaround time, and rule tracking and efficacy. At the same time, Sysmex will introduce a quality control-patient link for autovalidation that allows users to manage out-of-range QC results by automatically suspending patient autovalidation via the alert module until the QC event is resolved.

Roche Diagnostics is planning to launch the new version of its Roche Middleware Solution next month. This new version, says IT solutions marketing manager Aime Chidester, will include an archiving feature that can automatically copy data into an archive database. "While the archived data will be read-only, it can also be saved to a file for use," she notes. The new version will also provide enhanced rules processing, intended to make it easier for users to add new rules and edit existing ones as well as to create lists of values that can be substituted into a rule to avoid creating multiple rules. An advanced rules testing feature will "empower the user to build and test rules in a new test environment," Chidester says. "This change provides a way for customers to save test scenarios and use them for later applications, thus reducing the need to re-create a test scenario."

Roche too is developing a moving patient averages feature for the product so users can track an assay's statistical volatility. "The solution will be based on input from our customers who do clinical chemistry and immunoassay testing and will be incorporated into the Roche middleware application in partnership with Data Innovations," Chidester says.

A new offering from Pathagility is Agility Engine. Introduced last summer, it "provides a single-source solution for integration between multiple trading partners," company representative Kyle Harrell explains. He describes it as "an interoperable technology framework that functions as a central, scalable hub for all of your integration needs" and that supports industry protocols such as HL7 and ELINCs (EHR-Lab Interoperability and Connectivity Specifications). Pathagility is working on two enhancements to Agility Engine, an electronic ordering function and a device/instrument interoperability feature, which it plans to release in the third quarter. The latter feature will allow users to receive results from devices used to perform testing or other work. "Our solution is optimized for flexibility," Harrell says, "allowing Pathagility to offer options rather than excuses."

As a side note, Pathagility CIO Mike Heckman says the company is poised to respond to the health care information technology strategy outlined in President Obama's stimulus plan. "We believe the federal government will produce a national electronic medical records repository [that] physicians and practices will push [data] to and pull data from for their patients," he says. "In lieu of practices or physicians developing point-to-point interoperability, connectivity to this national repository will be the most effective way of transporting data. Pathagility would like to be in a position to offer connectivity to this national repository."

In the last few months Technidata America Medical Software has focused on strengthening the functionality of its middleware, primarily its rules logic, reporting, alerts, and epidemiology features. "This includes the addition of data elements in the rules-based system and the addition of actions which may be triggered when a rule is executed," explains Jacques Baudin, executive vice president and general manager. In addition, the company has upgraded its online help feature and added a log manager function to record service events and preventive maintenance. And in the future? "We are working on a number of development projects related to quality control and management reports," says Baudin. "Some of these features will be released by summer, the others by the end of the year." Like other middleware marketers, he expects that demand for such systems will only increase as budgets continue to shrink.

In addition to IMSolutions, Data Innovations has introduced the IMLink real-time monitoring feature for middleware. Launched last July, IMLink automatically transmits information to host servers. "Certain events or alarms automatically generate incidents in our customer relationship management system," Vail explains. Under development: IMSolutions rule packages for additional laboratory disciplines, which are expected to be released throughout

the year, and Instrument Manager v8.10, scheduled for release in October. The latter will include a redesigned security package "featuring OS/LDAP [Lightweight Directory Access Protocol] authentication, single sign-on, and the ability to create groups that will allow the administrator to easily maintain security profiles," Vail says.

Also scheduled for release in the third quarter is a new version of P.G.P./Data Innovations Europe's Laboratory Production Manager, or LPM. "LPM version 5.5.4 will print labels based on analyzer, request and test, sample type, patient information, priority, and even technical specifics based on the tests requested," says marketing representative Renato C. Protti. "This feature reduces the chance for mislabeling by streamlining the workflow."

Protti points out that middleware products have gotten a boost in Europe because "we are seeing national health legislations being modified to encourage laboratories—often with different LISs—to work together to run the majority of their tests on a centralized pool of analyzers. LPM's features allow this grouping to be realized without changing any of the LISs." That is, "LPM can receive requests from any number of disparate LISs, load-balance the tests over the centralized pool of instruments, and send back results to the requesting LIS."

Forthcoming from Fletcher-Flora in late spring: a version of the company's FFlex eLink product designed for multi-facility operations. "This new version will be configured to use a cascading arrangement to streamline organization so that only a single interface to the EMR is necessary to support multiple sites," Watson explains. "Orders will cascade down to organize work at the proper facility and results will flow back up to the EMR."

Finally, Beckman Coulter's IT offerings continue to include Extended Quality Control software, which lets clinical labs use normal patient test results as an additional system stability monitor between quality control runs. The software achieves this by using two statistical methods—the moving average of normal results and the exponentially weighted moving average. And PVT LabSystems continues to offer its Silver Server middleware, which features an online concentrator for pre- and post-analytics and can be used as a back-up solution.

CAP TODAY's middleware product guide includes offerings from the aforementioned companies as well as from Abbott Diagnostics, Dawning Technologies, Healthvision, Ortho Clinical Diagnostics, and Siemens Healthcare Diagnostics. Vendors supplied the information listed. Readers interested in a particular middleware system should confirm that it has the stated features and capabilities. ☐

Anne Ford is a writer in Chicago.

Middleware systems

Part 1 of 9	Abbott Diagnostics Scott Goss scott.goss@abbott.com 100 Abbott Park Road Abbott Park, IL 60064
See accompanying article on page 12	800-323-9100 www.abbottdiagnostics.com
Name of middleware system	Instrument Manager (supplied by Data Innovations)
First ever middleware installation/Most recent installation (based on January 2009 survey deadline) Last update of middleware system	2007/2009 2009
No. of contracts for sites operating middleware • U.S. contracts/Foreign contracts (In what countries?)	36 16/20 (Curacao, Singapore, Lithuania, Hong Kong, Argentina, Saudi Arabia, Canada, New Zealand, Thailand, Puerto Rico)
No. of sites operating middleware Percentage of business that is middleware	36 —
Staff to develop/install and support/other* in entire company Staff to develop/install and support/other* in middleware division	— —
Hardware platforms • Proprietary hardware required? Smallest hardware platform system can run on Largest hardware platform in use Software platforms Fault-tolerant solutions/Hardware must be purchased from company? Databases used Storage capacity of standard configuration of hardware • No. of results/orders that can be stored	Windows PC, server no Core 2 Duo PC with 2.0 GHz, 512 MB RAM, 80 GB hard disk Core 2 Duo Windows PC/server with 3.4 GHz, 2 GB RAM, 320 GB hard disk Windows 2000 Professional, XP, Windows 2000 server, Windows 2003 server, VMware — InterSystems Caché Core 2 Duo Windows PC/server with 2.0 GHz, 1 GB RAM, 200 GB hard disk unlimited/unlimited
System can interface with instruments from any manufacturer? Data supported from microbiology instruments Data supported from molecular instruments Data supported from genomics instruments No. of instruments one middleware device can support Configuration of middleware device Protocols middleware supports to interface to instruments Low-level transport middleware supports to interface to instruments	yes — — — unlimited PC with standard interfaces HL7, ASTM, XML, proprietary, ODBC serial, TCP/IP, ODBC, FTP, LAT
LIS/HIS/EMR interfaces for receiving orders LIS/HIS/EMR interfaces for sending results No. of diff. host system connections operational at once on one middleware unit Protocols system supports to interface to other systems	Sunquest, Oasis, Meditech, Healthvision, Cerner, Misys, GE Healthcare, others Sunquest, Oasis, Meditech, Healthvision, Cerner, Misys, GE Healthcare, others unlimited HL7, ASTM, XML, proprietary, ODBC
Human languages middleware supports (other than English) • Multiple languages can be used at same time on one system? System supports local date and time formats? No. of users that can access system at once No. of user security levels system supports	all known languages yes yes unlimited unlimited (user defined)
Users can write all rules for system? • System supports simple rules?/System supports compound rules? • Programming or script language required to write rules? Full and persistent audit trail of rules?/System supports rules testing? QC data used as part of auto-verification or rules process? Results that are entered manually processed by rules?	yes yes/yes no yes/yes yes yes
System supports event notification? System user notified of rules-based events?/Notification methods supported	yes yes/pop-up windows, e-mail, pager, audio/visual device
Automation routes determined by user-defined rules? System supports test-based load balancing across instruments? Events that lead to automation routes being dynamically updated Audit trail of the route a sample has taken? Laboratory automation system interfaces System interfaces with noninstrument automation devices?	yes yes new test requests, reflex test requests, instrument down yes Abbott yes (pre-analytic automation, tube sorter, decapper, specimen storage and retrieval module, centrifuge, resealer)
Back-end specimen storage and retrieval tracking? System supports management of inst. & automation device maintenance records? • System provides alerts when an instrument needs maintenance?	yes yes yes
System provides LIS downtime functions?/System allows for manual order entry? System generates downtime specimen ID?/Algorithm user definable? Orders entered in middleware manually are sent back to LIS automatically? System supports data collection or data mining?	yes/yes yes/yes yes yes
Quality control module? System interfaces to third-party QC packages? System supports multi-rules?	yes yes (Bio-Rad Unity) yes
Users can customize screens? • Users define custom fields?/Users populate custom fields via user-defined rules? • Screen has image support for any type of image? Users design own reports?/Report-generation software used • Reports include any data elements in database?	yes yes/yes yes yes/ODBC-compliant applications yes
Around-the-clock customer service in U.S.? System training available/On-site consulting?	yes classroom, on site/yes
Smallest cost for hardware/software/monthly maintenance Largest cost for hardware/software/monthly maintenance Fee for additional users	— — —
Distinguishing features of middleware (supplied by vendor)	• integration of quality control results and instrument events within the processing of results • open middleware solution can connect to any vendor's instrumentation and to multiple disciplines inside the laboratory, including immunoassay, clinical chemistry, hematology, etc. • connectivity for use in multi-site, multi-LIS, and multi-workstation environments

*other = sales, marketing, administration, and other company functions
Note: a dash in lieu of an answer means company did not answer question or
question is not applicable

Tabulation does not represent an endorsement by the College of American Pathologists.   Survey editors: Raymond D. Aller, MD, and Hal Weiner

Middleware systems

Part 2 of 9 *See accompanying article on page 12*	Beckman Coulter Ellen Storms estorms@beckman.com 200 S. Kraemer Blvd. Brea, CA 82822 714-961-4810 www.beckman.com	Data Innovations sales@datainnovations.com 120 Kimball Ave., Suite 100 South Burlington, VT 05403 802-264-3470 www.datainnovations.com
Name of middleware system	Remisol Advance (supplied by Normand Infomatique)	Instrument Manager (IM)
First ever middleware installation/Most recent installation (based on January 2009 survey deadline) Last update of middleware system	1996/January 2009 March 2008	1993/2009 October 2008
No. of contracts for sites operating middleware • U.S. contracts/Foreign contracts (In what countries?) No. of sites operating middleware Percentage of business that is middleware	~1,600 ~800/~800 (Europe, Canada, Australia, New Zealand, Israel, India, Hong Kong) ~1,600 —	5,000+ 4,500+/500+ (57 countries) 5,000+ 100%
Staff to develop/install and support/other* in entire company Staff to develop/install and support/other* in middleware division	— —	17/33/35 17/33/35
Hardware platforms • Proprietary hardware required? Smallest hardware platform system can run on Largest hardware platform in use Software platforms Fault-tolerant solutions/Hardware must be purchased from company? Databases used Storage capacity of standard configuration of hardware • No. of results/orders that can be stored	dual-core server yes PC dual-core server PC yes/yes Microsoft SQL 6 GB 4,000,000 chemistry and immunoassay results/160,000 samples without graphics and 80,000 samples with graphics	Windows PC, server no Core 2 Duo PC with 2.0 GHz, 512 MB RAM, 80 GB hard disk IBM server cluster connecting multiple laboratories across the world Windows 2000 Pro, XP, Windows 2003 server, 2008 server, Vista yes/no InterSystems Caché 80 GB standard, any disk storage size supported limited only by storage size/limited only by storage size
System can interface with instruments from any manufacturer? Data supported from microbiology instruments Data supported from molecular instruments Data supported from genomics instruments No. of instruments one middleware device can support Configuration of middleware device Protocols middleware supports to interface to instruments Low-level transport middleware supports to interface to instruments	no (with Beckman Coulter, Instrumentation Laboratory ACL Top) — — — 4 PC with standard interfaces ASTM, proprietary serial, TCP/IP	yes numeric, alpha, multi-level, images numeric, alpha, multi-level, images numeric, alpha, multi-level, images unlimited PC with standard interfaces HL7 (2.2, 2.3, 2.4, 2.5, 3.0), ASTM (1238, 1394), XML, proprietary, ODBC/SQL serial, TCP/IP, ODBC, FTP, LAT, files, Web services, http
LIS/HIS/EMR interfaces for receiving orders LIS/HIS/EMR interfaces for sending results No. of diff. host system connections operational at once on one middleware unit Protocols system supports to interface to other systems	Cerner, GE, McKesson, Meditech, Siemens, SCC Soft Computer Cerner, GE, McKesson, Meditech, Siemens, SCC Soft Computer 1 ASTM, proprietary	McKesson, Siemens, CliniSys, Healthland, Wyndgate, Eclipsys, GE Healthcare, others McKesson, Siemens, CliniSys, Healthland, Wyndgate, Eclipsys, GE Healthcare, others unlimited HL7 (2.2, 2.3, 2.4, 2.5, 3.0), ASTM (1238, 1394), XML, proprietary, ODBC/SQL, files, Web services, http
Human languages middleware supports (other than English) • Multiple languages can be used at same time on one system? System supports local date and time formats? No. of users that can access system at once No. of user security levels system supports	French, German no yes 5 unlimited	all known languages (product is user translatable via use of tables)[†] yes yes unlimited unlimited (user defined)
Users can write all rules for system? • System supports simple rules?/System supports compound rules? • Programming or script language required to write rules? Full and persistent audit trail of rules?/System supports rules testing? QC data used as part of auto-verification or rules process? Results that are entered manually processed by rules?	yes yes/yes no no/yes yes yes	yes yes/yes no yes/yes yes yes
System supports event notification? System user notified of rules-based events?/Notification methods supported	yes yes/pop-up window, dedicated event window, color-coded icons	yes yes/pop-up windows, e-mail, pager, audio/visual device, data color coding
Automation routes determined by user-defined rules? System supports test-based load balancing across instruments? Events that lead to automation routes being dynamically updated Audit trail of the route a sample has taken? Laboratory automation system interfaces System interfaces with noninstrument automation devices?	yes yes new test requests, reflex test requests, instrument down yes Beckman Coulter yes (sorting, centrifuge, decapping, aliquotter, stockyard)	yes yes new test requests, reflex test requests, instrument down yes Beckman Coulter, Ortho, Abbott, Roche, Olympus America, Siemens, Thermo Scientific, Sysmex, A.I. Scientific, PVT, Tecan, others yes (sorters, decappers, aliquotters, slide maker/stainers, pipetting, extraction/purification, storage units, track controllers)
Back-end specimen storage and retrieval tracking? System supports management of inst. & automation device maintenance records? • System provides alerts when an instrument needs maintenance?	yes no no	yes yes yes
System provides LIS downtime functions?/System allows for manual order entry? System generates downtime specimen ID?/Algorithm user definable? Orders entered in middleware manually are sent back to LIS automatically? System supports data collection or data mining?	yes/yes yes/yes — yes	yes/yes yes/yes yes yes
Quality control module? System interfaces to third-party QC packages? System supports multi-rules?	yes no yes	yes yes (Bio-Rad, Thermo, Instrumentation Laboratory, Codasy, Netika) yes
Users can customize screens? • Users define custom fields?/Users populate custom fields via user-defined rules? • Screen has image support for any type of image? Users design own reports?/Report-generation software used • Reports include any data elements in database?	yes yes/no no yes/SQL compatible yes	yes yes/yes yes yes/proprietary, any ODBC-compliant application yes
Around-the-clock customer service in U.S.? System training available/On-site consulting?	yes classroom, on site, e-learning/yes	yes classroom, on site, e-learning, Web based/yes
Smallest cost for hardware/software/monthly maintenance Largest cost for hardware/software/monthly maintenance Fee for additional users	— — defined by lab's key operator	0/$3.075k/1.5% —/$350k/1.5% $1.65k for each concurrent access
Distinguishing features of middleware (supplied by vendor)	• extended quality control (EQC) module monitors the quality of diagnostic system operation using patient moving data; detects drifts in diagnostic system between commercial QC runs; provides autoverification procedures to address inspection requirements • proactively alerts operator of critical test results • complex rules can be developed and maintained by the lab's key operator	• FDA 510(k) cleared; earned ISO 13485 certification and device licensure for Canada • $21 million in worldwide sales; six wholly owned offices; worldwide 24/7/365 support; 40+ partnerships • full suite of services, including remote IM monitoring, disaster recovery, and rules-sharing Web site

*other = sales, marketing, administration, and other company functions
Note: a dash in lieu of an answer means company did not answer question or question is not applicable

[†]*French, German, Spanish, Portuguese, Chinese, Italian can be downloaded from company Web site*

Tabulation does not represent an endorsement by the College of American Pathologists.

Middleware systems

Part 3 of 9	Dawning Technologies Jay Sax sales@dawning.com 8140 College Parkway, Suite 202 Fort Myers, FL 33919 800-322-0499 www.dawning.com	Dawning Technologies Jay Sax sales@dawning.com 8140 College Parkway, Suite 202 Fort Myers, FL 33919 800-322-0499 www.dawning.com
See accompanying article on page 12		
Name of middleware system	JavaLin interfaces	JResultNet Interface Engine Software
First ever middleware installation/Most recent installation (based on January 2009 survey deadline) Last update of middleware system	1984/2009 2009	1984/2009 2008
No. of contracts for sites operating middleware • U.S. contracts/Foreign contracts (In what countries?) No. of sites operating middleware Percentage of business that is middleware	2,400 2,175/225 (45+ countries) 2,450 100%	1,350 1,200/150 (45+ countries) 1,400 100%
Staff to develop/install and support/other* in entire company Staff to develop/install and support/other* in middleware division	8/7.5/7 8/7.5/7	8/7.5/7 8/7.5/7
Hardware platforms • Proprietary hardware required? Smallest hardware platform system can run on Largest hardware platform in use Software platforms Fault-tolerant solutions/Hardware must be purchased from company? Databases used Storage capacity of standard configuration of hardware • No. of results/orders that can be stored	Dawning JavaLin/PDI yes JavaLin/PDI JavaLin/300 Linux OS, Java-based embedded JResultNet software yes/yes HSQL, Codebase 1 GB 1,000+ internal and unlimited external/1,000+ internal and unlimited external	platform portable Java-based application, JavaLin interfaces, PCs, Macintoshes, servers no JavaLin/PDI rack servers Windows Vista, 2000, XP Pro or 2003 server, Linux, OS X yes/no HSQL, Codebase, several external databases, including PostgreSQL, Oracle, 10ex, other SQL compliant unlimited unlimited/unlimited
System can interface with instruments from any manufacturer? Data supported from microbiology instruments Data supported from molecular instruments Data supported from genomics instruments No. of instruments one middleware device can support Configuration of middleware device Protocols middleware supports to interface to instruments Low-level transport middleware supports to interface to instruments	yes numeric, alpha, multi-level numeric, alpha, multi-level numeric, alpha, multi-level 2 special-purpose device (no PC involved) HL7, ASTM, XML, proprietary, CSV, flat file, direct database, HPRIM, Web-based services, POCT-1A serial, TCP/IP, ODBC, FTP, LAT	yes numeric, alpha, multi-level numeric, alpha, multi-level numeric, alpha, multi-level unlimited PC with standard interfaces HL7, ASTM, XML, proprietary, CSV, flat file, direct database, HPRIM, Web services, POCT-1A serial, TCP/IP, ODBC, FTP, LAT, flat file
LIS/HIS/EMR interfaces for receiving orders LIS/HIS/EMR interfaces for sending results No. of diff. host system connections operational at once on one middleware unit Protocols system supports to interface to other systems	— — 2 HL7, ASTM, XML, proprietary, CSV, flat file, direct database, HPRIM, Web-based services, POCT-1A	Cerner, CPSI, Custom Software Solutions, GE Healthcare, Healthcare Management Systems, Impac, McKesson, Siemens, Sunquest, others Cerner, CPSI, Custom Software Solutions, GE Healthcare, Healthcare Management Systems, Impac, McKesson, Siemens, Sunquest, others unlimited HL7, ASTM, XML, proprietary, CSV, flat file, direct database, HPRIM, Web-based services, POCT-1A
Human languages middleware supports (other than English) • Multiple languages can be used at same time on one system? System supports local date and time formats? No. of users that can access system at once No. of user security levels system supports	— no yes unlimited 3	version 3.2 (2009): German, French, Spanish, Portuguese, others no yes unlimited 3
Users can write all rules for system? • System supports simple rules?/System supports compound rules? • Programming or script language required to write rules? Full and persistent audit trail of rules?/System supports rules testing? QC data used as part of auto-verification or rules process? Results that are entered manually processed by rules?	yes yes/yes no yes/yes yes yes	yes yes/yes no yes/yes yes yes
System supports event notification? System user notified of rules-based events?/Notification methods supported	yes yes/e-mail, message flags, save to file, print	yes yes/e-mail, message flags, save to file, print
Automation routes determined by user-defined rules? System supports test-based load balancing across instruments? Events that lead to automation routes being dynamically updated Audit trail of the route a sample has taken? Laboratory automation system interfaces System interfaces with noninstrument automation devices?	yes no new test requests, reflex test requests, instrument down yes Beckman Coulter, Ortho, Abbott, Roche, Olympus America, Siemens, Sysmex yes (slide makers)	yes no new test requests, reflex test requests, instrument down yes Beckman Coulter, Ortho, Abbott, Roche, Olympus America, Siemens, Sysmex yes (slide makers)
Back-end specimen storage and retrieval tracking? System supports management of inst. & automation device maintenance records? • System provides alerts when an instrument needs maintenance?	no no no	no no no
System provides LIS downtime functions?/System allows for manual order entry? System generates downtime specimen ID?/Algorithm user definable? Orders entered in middleware manually are sent back to LIS automatically? System supports data collection or data mining?	yes/yes yes/yes yes yes	yes/yes yes/yes yes yes
Quality control module? System interfaces to third-party QC packages? System supports multi-rules?	no yes (Bio-Rad) yes	no yes (Bio-Rad) yes
Users can customize screens? • Users define custom fields?/Users populate custom fields via user-defined rules? • Screen has image support for any type of image? Users design own reports?/Report-generation software used • Reports include any data elements in database?	no yes/yes no yes/Crystal Reports yes	no yes/yes no yes/Crystal Reports yes
Around-the-clock customer service in U.S.? System training available/On-site consulting?	yes classroom, on site, Web based/yes	yes classroom, on site, Web based/yes
Smallest cost for hardware/software/monthly maintenance Largest cost for hardware/software/monthly maintenance Fee for additional users	$2.2k/included/$0.018k $2.2k/$1.5k/$0.032k none	—/$4k/$0.036k —/$4k+/$0.056k $0.6k
Distinguishing features of middleware (supplied by vendor)	• ideal for connecting remote serial instruments to an LIS or other network without terminal servers; acts as a Linux-based gateway device to secure sensitive instruments on a large network • flexible protocols, large library of applications—supports HL7, ASTM, HPRIM, XML, CSV, CDF, Web services and others without a PC manager required; Dawning's Java instrument driver module library contains 500+ instrument applications • supports rules-based processing	• off-line, Excel-based, rules-entry tool for the most common rules allows fast and easy rules development, validation signature, and automatic entry into the middleware • Dawning DataMiner, a U.S. patent-pending data-mining application that is part of the JResultNet rules development kit, allows connection to an external database, automatic sensing of the database structure, and the ability to develop rules to test the database for specific contents • highly scalable, user configurable—can serve single-instrument or enterprise-wide application environments

*other = sales, marketing, administration, and other company functions
Note: a dash in lieu of an answer means company did not answer question or question is not applicable

Middleware systems

Part 4 of 9 *See accompanying article on page 12*	Fletcher-Flora Health Care Systems **Terry Watson** fflexelinksales@fletcher-flora.com 1580 Orangethorpe Way Anaheim, CA 92801 800-777-1471 www.fletcher-flora.com	Fletcher-Flora Health Care Systems **Terry Watson** terryw@fletcher-flora.com 1580 Orangethorpe Way Anaheim, CA 92801 800-777-1471 www.fletcher-flora.com
Name of middleware system	**FFlex eLink**	**FFlexConnect**
First ever middleware installation/Most recent installation (based on January 2009 survey deadline) Last update of middleware system	**2006/January 2009** **December 2008**	**2006/January 2009** **January 2009**
No. of contracts for sites operating middleware • U.S. contracts/Foreign contracts (In what countries?) No. of sites operating middleware Percentage of business that is middleware	9 9/0 11 5%	83 83/0 162+ 65%
Staff to develop/install and support/other* in entire company Staff to develop/install and support/other* in middleware division	11/17/17 —	11/17/17 —
Hardware platforms • Proprietary hardware required? Smallest hardware platform system can run on Largest hardware platform in use Software platforms Fault-tolerant solutions/Hardware must be purchased from company? Databases used Storage capacity of standard configuration of hardware • No. of results/orders that can be stored	PC running Windows XP Professional, Vista no 1 GB RAM, 80 GB hard disk 1 GB RAM, 80 GB hard disk Windows XP, Vista, 2000, 2003 no/no Microsoft Express, Microsoft SQL 2000, Microsoft 2003, MySQL limited only by disk space: 80 GB limited only by disk space/limited only by disk space	PC running Windows XP Professional, Vista no 1 GB RAM, 80 GB hard disk — Linux, Windows XP, Vista, 2000, 2003 no/no Microsoft SQL server, Microsoft SQL Express, MySQL, Unify, Oracle limited only by disk space limited only by disk space/limited only by disk space
System can interface with instruments from any manufacturer? Data supported from microbiology instruments Data supported from molecular instruments Data supported from genomics instruments No. of instruments one middleware device can support Configuration of middleware device Protocols middleware supports to interface to instruments Low-level transport middleware supports to interface to instruments	yes — numeric, alpha numeric, alpha 6 per license PC with standard interfaces HL7, ASTM, proprietary serial, TCP/IP	yes numeric, alpha, multi-level numeric, multi-level numeric, alpha, multi-level 6 per license PC with standard interfaces HL7, ASTM, XML, proprietary serial, TCP/IP, ODBC
LIS/HIS/EMR interfaces for receiving orders LIS/HIS/EMR interfaces for sending results No. of diff. host system connections operational at once on one middleware unit Protocols system supports to interface to other systems	OncoEMR, eClinicalWorks, others Noteworthy, OncoEMR, eClinicalWorks, Misys, others 1 HL7, ASTM, proprietary	McKesson, Cerner, Misys, GE Healthcare, Logician, Epic, iMedica, LabCorp, Noteworthy, TechTime, OncoEMR, eClinicalWorks, Medical Manager, NextGen, others McKesson, Cerner, Misys, GE Healthcare, Logician, Epic, iMedica, LabCorp, Noteworthy, TechTime, OncoEMR, eClinicalWorks, Medical Manager, NextGen, others multiple HL7, ASTM, XML, proprietary
Human languages middleware supports (other than English) • Multiple languages can be used at same time on one system? System supports local date and time formats? No. of users that can access system at once No. of user security levels system supports	none no no 1 3	none no no multiple 3
Users can write all rules for system? • System supports simple rules?/System supports compound rules? • Programming or script language required to write rules? Full and persistent audit trail of rules?/System supports rules testing? QC data used as part of auto-verification or rules process? Results that are entered manually processed by rules?	yes yes/no no no/no no yes	no yes/yes no no/yes no yes
System supports event notification? System user notified of rules-based events?/Notification methods supported	no no/on-screen flags	yes yes/on-screen flags
Automation routes determined by user-defined rules? System supports test-based load balancing across instruments? Events that lead to automation routes being dynamically updated Audit trail of the route a sample has taken? Laboratory automation system interfaces System interfaces with noninstrument automation devices?	no no — no — no	— yes new test requests, reflex test requests yes — no
Back-end specimen storage and retrieval tracking? System supports management of inst. & automation device maintenance records? • System provides alerts when an instrument needs maintenance?	no no no	no no no
System provides LIS downtime functions?/System allows for manual order entry? System generates downtime specimen ID?/Algorithm user definable? Orders entered in middleware manually are sent back to LIS automatically? System supports data collection or data mining?	no/yes no/no yes no	no/yes no/no yes no
Quality control module? System interfaces to third-party QC packages? System supports multi-rules?	no no —	— QC via the LIS no
Users can customize screens? • Users define custom fields?/Users populate custom fields via user-defined rules? • Screen has image support for any type of image? Users design own reports?/Report-generation software used • Reports include any data elements in database?	no no/no no no/results sent to EMR, EHR, practice management system for reporting no	no no/no no no/reports generated via host system no
Around-the-clock customer service in U.S.? System training available/On-site consulting?	yes online, on site available/yes	yes online, on site available/yes
Smallest cost for hardware/software/monthly maintenance Largest cost for hardware/software/monthly maintenance Fee for additional users	—/—/$0.599k —/—/$0.719k none	— — none
Distinguishing features of middleware (supplied by vendor)	• cost-effective solution that connects laboratory instruments directly to a host system • simply manages orders and results to and from an EMR, practice management system, or other host system to analyzers • easy to use for small labs that want to minimize manual transcription of results into their host system	• versatile and powerful connectivity solution for interfacing instruments, printing devices, and host systems with the LIS • multiple applications can run concurrently on a single FFlexConnect server, improving the cost-effectiveness of deployment • deliver new instrument interfaces quickly and inexpensively and solve challenging connectivity issues

*other = sales, marketing, administration, and other company functions
Note: a dash in lieu of an answer means company did not answer question or question is not applicable

Tabulation does not represent an endorsement by the College of American Pathologists.

Middleware systems

Part 5 of 9

See accompanying article on page 12

Ortho Clinical Diagnostics
Beth A. Slavic   bslavic@its.jnj.com
1001 U.S. Highway 202
Raritan, NJ 08869
800-828-6316   www.orthoclinical.com

Pathagility
Mark McCuin   mark@pathagility.com
1125 Oak Street, Suite 303
Conway, AR 72032
501-327-7700   www.pathagility.com

	Ortho Clinical Diagnostics	Pathagility
Name of middleware system	Instrument Manager (supplied by Data Innovations)	Agility Engine
First ever middleware installation/Most recent installation (based on January 2009 survey deadline)	2005/November 2008	2008/June 2008
Last update of middleware system	June 2008	January 2009
No. of contracts for sites operating middleware	80	2
• U.S. contracts/Foreign contracts (In what countries?)	41/39 (France, United Kingdom, Germany, Spain, Australia, Hong Kong, Thailand, Brazil, Canada, Iceland, Chile, Finland, Italy, Denmark, Sweden)	2/0
No. of sites operating middleware	70+	2
Percentage of business that is middleware	less than 1%	90%
Staff to develop/install and support/other* in entire company	—	1/2/2
Staff to develop/install and support/other* in middleware division	—	1/2/2
Hardware platforms	Dell OptiPlex	virtualized Intel servers
• Proprietary hardware required?	yes	no
Smallest hardware platform system can run on	Pentium class, 2 GB RAM, 40 GB hard drive	Windows 2003 configuration
Largest hardware platform in use	—	4 GB RAM, 2 CPUs, 20 GB HD
Software platforms	Windows XP	Windows 2003 server
Fault-tolerant solutions/Hardware must be purchased from company?	yes/yes	yes/no
Databases used	InterSystems Caché	Microsoft SQL server 2005
Storage capacity of standard configuration of hardware	40,000 MB	10 GB
• No. of results/orders that can be stored	—	unlimited/unlimited
System can interface with instruments from any manufacturer?	no (with enGen automation)	no (future development of interfaces)
Data supported from microbiology instruments	—	—
Data supported from molecular instruments	—	—
Data supported from genomics instruments	—	—
No. of instruments one middleware device can support	128	—
Configuration of middleware device	PC with standard interfaces	—
Protocols middleware supports to interface to instruments	HL7, ASTM	HL7
Low-level transport middleware supports to interface to instruments	serial, TCP/IP	serial, TCP/IP, ODBC, FTP
LIS/HIS/EMR interfaces for receiving orders	Cerner, Misys, Meditech, Cortex, others	e-MDs, Impac PowerPath
LIS/HIS/EMR interfaces for sending results	Cerner, Misys, Meditech, Cortex, others	e-MDs, Impac PowerPath
No. of diff. host system connections operational at once on one middleware unit	4	—
Protocols system supports to interface to other systems	HL7, ASTM	ASTM, XML, custom
Human languages middleware supports (other than English)	French, Spanish, German, Portuguese, Thai, Chinese	future development
• Multiple languages can be used at same time on one system?	yes	no
System supports local date and time formats?	yes	no
No. of users that can access system at once	10–128 (operating system dependent)	unlimited
No. of user security levels system supports	multiple (function/connection driven)	2
Users can write all rules for system?	yes	no
• System supports simple rules?/System supports compound rules?	yes/yes	yes/yes
• Programming or script language required to write rules?	no	no
Full and persistent audit trail of rules?/System supports rules testing?	yes/yes	yes/no
QC data used as part of auto-verification or rules process?	yes	no
Results that are entered manually processed by rules?	yes	yes
System supports event notification?	yes	yes
System user notified of rules-based events?/Notification methods supported	yes/pop-up windows, e-mail, pager, light pole	yes/e-mail
Automation routes determined by user-defined rules?	yes	yes
System supports test-based load balancing across instruments?	yes	yes
Events that lead to automation routes being dynamically updated	new test requests, reflex test requests, instrument down	new test requests, reflex test requests, instrument down
Audit trail of the route a sample has taken?	yes	yes
Laboratory automation system interfaces	Ortho, Thermo Scientific	—
System interfaces with noninstrument automation devices?	yes (sorter, centrifuge, decapper, recapper, aliquotter)	—
Back-end specimen storage and retrieval tracking?	yes	no
System supports management of inst. & automation device maintenance records?	yes	no
• System provides alerts when an instrument needs maintenance?	yes	yes
System provides LIS downtime functions?/System allows for manual order entry?	yes/yes	yes/yes
System generates downtime specimen ID?/Algorithm user definable?	yes/yes	no/no
Orders entered in middleware manually are sent back to LIS automatically?	yes	yes
System supports data collection or data mining?	yes	yes
Quality control module?	yes	yes
System interfaces to third-party QC packages?	yes (Bio-Rad Unity Real Time)	no
System supports multi-rules?	yes	yes
Users can customize screens?	yes	no
• Users define custom fields?/Users populate custom fields via user-defined rules?	yes/yes	no/yes
• Screen has image support for any type of image?	yes	no
Users design own reports?/Report-generation software used	yes/built-in report designer, optional Crystal Reports	no/—
• Reports include any data elements in database?	yes	yes
Around-the-clock customer service in U.S.?	yes	yes
System training available/On-site consulting?	on site, classroom/yes	classroom, on site, online/yes
Smallest cost for hardware/software/monthly maintenance	—	0/$15k/transaction based
Largest cost for hardware/software/monthly maintenance	—	0/$65k/transaction based
Fee for additional users	—	transaction based
Distinguishing features of middleware (supplied by vendor)	• Vitros Navigator—prebuilt configuration file designed to allow connection of multiple Vitros systems to the LIS, including prewritten rules that provide some autoverification rules for Vitros systems • traceability and integration of autoverification with Vitros systems' unique technologies—for example, sample integrity • configuration control and flexible request- and result-based routing for automation	• provides a blend of interoperability and customized workflow solution potential; company involved in the short- and long-term business strategies of clients • Web-based collaboration portal and customized report distribution management tool can replace or enhance the capabilities and extend the lifespan of technology investments and anatomic pathology lab systems • software-as-a-service platform that provides infrastructure savings to clients

*other = sales, marketing, administration, and other company functions
Note: a dash in lieu of an answer means company did not answer question or question is not applicable

Tabulation does not represent an endorsement by the College of American Pathologists.

Middleware systems

Part 6 of 9	P.G.P./Data Innovations europe-sales@datainnovations.com 34 Avenue Jacques Brel Brussels, Belgium 1200 +3227706222 www.datainnovations.com	PVT LabSystems Miriam Hoelzel info@pvtlabsystems.com 300 Townpark Drive, Suite 190 Kennesaw, GA 30144 877-788-5227 www.pvtlabsystems.com
See accompanying article on page 12		
Name of middleware system	Laboratory Production Manager (LPM)	Silver Server
First ever middleware installation/Most recent installation (based on January 2009 survey deadline) Last update of middleware system	1982/January 2009 December 2008	1997/2008 —
No. of contracts for sites operating middleware • U.S. contracts/Foreign contracts (In what countries?) No. of sites operating middleware Percentage of business that is middleware	356 3/353 (Belgium, France, U.K., Netherlands, Luxembourg, Sweden, Norway, Finland, Austria, Germany, Switzerland, Italy, Singapore, Israel, others) 654 100%	33 3/30 (Germany, Netherlands, Belgium) 33 —
Staff to develop/install and support/other* in entire company Staff to develop/install and support/other* in middleware division	17/33/35 17/33/35	0/7/7 —
Hardware platforms • Proprietary hardware required? Smallest hardware platform system can run on Largest hardware platform in use Software platforms Fault-tolerant solutions/Hardware must be purchased from company? Databases used Storage capacity of standard configuration of hardware • No. of results/orders that can be stored	PC no P4, 2 GB RAM, 30 GB HD 2 redundant systems with 4 dual-core CPUs, shared disk cluster cabinet Windows 2000, 2003, XP yes/no Oracle 70 GB limited only by storage size/limited only by storage size	IBM PC-compatible x86 computer no x86 Intel Pentium 4 network of 7 to 8 standard computers QNX yes/yes SAM database 20 GB 1,000,000+/1,000,000+
System can interface with instruments from any manufacturer? Data supported from microbiology instruments Data supported from molecular instruments Data supported from genomics instruments No. of instruments one middleware device can support Configuration of middleware device Protocols middleware supports to interface to instruments Low-level transport middleware supports to interface to instruments	yes numeric, alpha, multi-level, images numeric, alpha, multi-level, images numeric, alpha, multi-level, images 250 PC with standard interfaces HL7, ASTM (1238, 1394), XML, proprietary serial, TCP/IP, ODBC, FTP, files, .dll	yes numeric, alpha numeric, alpha numeric, alpha 16 PC with standard interfaces ASTM, proprietary serial, TCP/IP
LIS/HIS/EMR interfaces for receiving orders LIS/HIS/EMR interfaces for sending results No. of diff. host system connections operational at once on one middleware unit Protocols system supports to interface to other systems	MIPS, Cortex, Technidata, Molis, Agfa, Medasys, MBC, Seralis, Helios, Hexaflux, Sbim, others MIPS, Cortex, Technidata, Molis, Agfa, Medasys, MBC, Seralis, Helios, Hexaflux, Sbim, others 64 HL7, ASTM (1238, 1394), XML, proprietary	— — 2 ASTM, proprietary
Human languages middleware supports (other than English) • Multiple languages can be used at same time on one system? System supports local date and time formats? No. of users that can access system at once No. of user security levels system supports	French, German, Dutch, Hebrew, others on request yes yes 256 user definable	German no yes 20+ —
Users can write all rules for system? • System supports simple rules?/System supports compound rules? • Programming or script language required to write rules? Full and persistent audit trail of rules?/System supports rules testing? QC data used as part of auto-verification or rules process? Results that are entered manually processed by rules?	yes yes/yes yes yes/yes yes yes	yes yes/yes no yes/yes no yes
System supports event notification? System user notified of rules-based events?/Notification methods supported	yes yes/pop-up, pager, e-mail, phone calls, fax, audio/light alarm	— —
Automation routes determined by user-defined rules? System supports test-based load balancing across instruments? Events that lead to automation routes being dynamically updated Audit trail of the route a sample has taken? Laboratory automation system interfaces System interfaces with noninstrument automation devices?	yes yes new test requests, reflex test requests, instrument down no Beckman Coulter, Ortho, Abbott, Roche, Siemens, Thermo Scientific, Sysmex yes (sorters, centrifuges, decappers, aliquotters, slide maker, stainer)	yes no new test requests yes PVT Probenverteiltechnik GmbH, Sarstedt yes (sorters, decappers, recappers, aliquotters)
Back-end specimen storage and retrieval tracking? System supports management of inst. & automation device maintenance records? • System provides alerts when an instrument needs maintenance?	no no no	yes — —
System provides LIS downtime functions?/System allows for manual order entry? System generates downtime specimen ID?/Algorithm user definable? Orders entered in middleware manually are sent back to LIS automatically? System supports data collection or data mining?	yes/yes yes/yes yes yes	yes/yes — no —
Quality control module? System interfaces to third-party QC packages? System supports multi-rules?	yes yes (NVKC, Bio-Rad, Instrumentation Laboratory, others) yes	no no —
Users can customize screens? • Users define custom fields?/Users populate custom fields via user-defined rules? • Screen has image support for any type of image? Users design own reports?/Report-generation software used • Reports include any data elements in database?	yes/yes yes/yes yes yes/ReportBuilder no	no/no — no — —
Around-the-clock customer service in U.S.? System training available/On-site consulting?	no classroom, on site/yes	yes on site/yes
Smallest cost for hardware/software/monthly maintenance Largest cost for hardware/software/monthly maintenance Fee for additional users	$2k/$4.5k/$0.068k $200k/$300k/$4.5k $2.3k	—/$25k/$1k —/$50k/$1k —

Distinguishing features of middleware (supplied by vendor)	• high level of workflow customization meeting customer-specific
	  requirements via a powerful parameterization tool
	• rules across multiple disparate specimens belonging to the same order
	• robust multi-site, multi-lab, and multi-LIS implementation support with
	  full LIS downtime management
		• flexible—can be adapted to customer needs
		• efficient and effective; improves and expedites workflow
		• simplifies handling and coordination of various tests for samples

*other = sales, marketing, administration, and other company functions
*Note: a dash in lieu of an answer means company did not answer question or
question is not applicable*

Tabulation does not represent an endorsement by the College of American Pathologists.

Middleware systems

Part 7 of 9	Roche Diagnostics Aime Chidester aime.chidester@roche.com 9115 Hague Rd. Indianapolis, IN 46256 317-521-2000 www.roche-diagnostics.us	Siemens Healthcare Diagnostics Sepehr Seyedzadeh sepehr.seyedzadeh@siemens.com 511 Benedict Ave. Tarrytown, NY 10591 914-524-3827 www.siemens.com/diagnostics
See accompanying article on page 12		
Name of middleware system	Roche Middleware Solution (supplied by Data Innovations)	Advia CentraLink (supplied by MIPS)
First ever middleware installation/Most recent installation (based on January 2009 survey deadline) Last update of middleware system	1998/2009 November 2008	2001/January 2009 September 2008
No. of contracts for sites operating middleware • U.S. contracts/Foreign contracts (In what countries?) No. of sites operating middleware Percentage of business that is middleware	630 630/0 630 —	— — — —
Staff to develop/install and support/other* in entire company Staff to develop/install and support/other* in middleware division	— 0/35/9	— —

Hardware platforms
  • Proprietary hardware required?
Smallest hardware platform system can run on
Largest hardware platform in use
 	
Software platforms
Fault-tolerant solutions/Hardware must be purchased from company?
Databases used
Storage capacity of standard configuration of hardware
  • No. of results/orders that can be stored
	Dell OptiPlex 755, Dell PowerEdge 2900
	yes
	Dell OptiPlex 755, 80 GB hard drive, Core 2 Duo E4600/2.4 GHz processor
	multiple middleware servers connecting 20 geographically dispersed,
	networked customer locations
	Windows XP, Windows 2003 server
	yes/yes
	InterSystems Caché
	80 GB–Dell OptiPlex; three 146 GB HDs–Dell PowerEdge 2900 (RAID 5)
	limited only by storage size/limited only by storage size
		Dell server systems (PowerEdge 2900 III, PowerEdge 1800)
		yes
		Dell PowerEdge 1800
		Dell PowerEdge 2900 III
		
		Windows-based operating system (Windows server 2003, XP)
		no/yes
		OpenEdge
		180 GB
		40,000,000/960,000

System can interface with instruments from any manufacturer? Data supported from microbiology instruments Data supported from molecular instruments Data supported from genomics instruments No. of instruments one middleware device can support Configuration of middleware device Protocols middleware supports to interface to instruments Low-level transport middleware supports to interface to instruments	no (with all Roche centralized diagnostic equipment, Siemens Centaur, specified Stago and Sysmex instruments) numeric, alpha, multi-level, images — — unlimited PC with standard interfaces HL7, ASTM, XML, proprietary, ODBC/SQL serial, TCP/IP	yes (third-party manufacturer instrument can be interfaced upon Siemens' approval) — numeric — 32 PC with standard interfaces HL7 (2.5), ASTM (1394), proprietary serial, TCP/IP, FTP
LIS/HIS/EMR interfaces for receiving orders LIS/HIS/EMR interfaces for sending results No. of diff. host system connections operational at once on one middleware unit Protocols system supports to interface to other systems	McKesson, SCC Soft Computer, Cerner, Meditech, Sunquest, homegrown LISs, others McKesson, SCC Soft Computer, Cerner, Meditech, Sunquest, homegrown LISs, others unlimited HL7, ASTM	Siemens, Aspyra, Sunquest, Cerner, CIS, Meditech, McKesson, Multidata, Orchard, GE Healthcare, SCC Soft Computer, Schuyler House, others Siemens, Aspyra, Sunquest, Cerner, CIS, Meditech, McKesson, Multidata, Orchard, GE Healthcare, SCC Soft Computer, Schuyler House, others 1 HL7 (2.5), ASTM (1394), Technidata LMX 6.0
Human languages middleware supports (other than English) • Multiple languages can be used at same time on one system? System supports local date and time formats? No. of users that can access system at once No. of user security levels system supports	— no no operating system dependent unlimited	Spanish, French, Italian, German, Dutch yes yes 15 4

Users can write all rules for system?
  • System supports simple rules?/System supports compound rules?
  • Programming or script language required to write rules?
Full and persistent audit trail of rules?/System supports rules testing?
QC data used as part of auto-verification or rules process?
Results that are entered manually processed by rules?
	yes
	yes/yes
	no
	yes/yes
	yes
	yes
		yes
		yes/yes
		no
		no/yes
		yes
		yes

System supports event notification? System user notified of rules-based events?/Notification methods supported	yes yes/pop-up windows, e-mail, audio/visual devices	yes yes/visual, trace logs
Automation routes determined by user-defined rules? System supports test-based load balancing across instruments? Events that lead to automation routes being dynamically updated Audit trail of the route a sample has taken? Laboratory automation system interfaces System interfaces with noninstrument automation devices?	yes yes new test requests, reflex test requests, instrument down yes Roche, PVT LabSystems, TTA (Task Target Automation) yes (PVT RSD and RSA products for sample sorting and aliquotting)	yes yes new test requests, reflex test requests, instrument down yes Siemens yes (Siemens' Advia LabCell, WorkCell)
Back-end specimen storage and retrieval tracking? System supports management of inst. & automation device maintenance records? • System provides alerts when an instrument needs maintenance?	yes yes yes	yes no no
System provides LIS downtime functions?/System allows for manual order entry? System generates downtime specimen ID?/Algorithm user definable? Orders entered in middleware manually are sent back to LIS automatically? System supports data collection or data mining?	yes/yes yes/yes yes yes	yes/yes no/no yes yes
Quality control module? System interfaces to third-party QC packages? System supports multi-rules?	no yes (Bio-Rad Unity series or QC OnCall—bi-directional) yes	yes yes (export-only feature into Bio-Rad) yes

Users can customize screens?
  • Users define custom fields?/Users populate custom fields via user-defined rules?
  • Screen has image support for any type of image?
Users design own reports?/Report-generation software used
 	
  • Reports include any data elements in database?
	yes
	yes/yes
	no
	yes/any ODBC-compliant reporting application (Crystal Reports, MySQL,
	Excel, others)
	yes
		yes
		yes/yes
		yes
		yes/Advia CentraLink internal software
		
		no

Around-the-clock customer service in U.S.? System training available/On-site consulting?	yes classroom, on site, WebX/yes	yes e-learning, on site/yes
Smallest cost for hardware/software/monthly maintenance Largest cost for hardware/software/monthly maintenance Fee for additional users	— — —	— — —

Distinguishing features of middleware (supplied by vendor)	• supports third-party connectivity to specified high-volume instruments,
	  hematology and coagulation analyzers
	• over a decade-long supplier partnership with Data Innovations
	• maintains a resource pool of project management
	  professional-certified project managers to help with the pre-planning
	  and installation of Roche Middleware Solution
		• true multi-discipline data-management and networking solution with
		  proven record
		• comprehensive and integrated quality control package—patient moving
		  averages used in quality control and autoverification
		• market-leading automation system controller

*other = sales, marketing, administration, and other company functions
*Note: a dash in lieu of an answer means company did not answer question or
question is not applicable*

Tabulation does not represent an endorsement by the College of American Pathologists.

Middleware systems

Part 8 of 9 *See accompanying article on page 12*	Siemens Healthcare Diagnostics **Sepehr Seyedzadeh** sepehr.seyedzadeh@siemens.com 511 Benedict Ave. Tarrytown, NY 10591 914-524-3827 www.siemens.com/diagnostics	Sysmex America **Tammy Kutz** communications@sysmex.com 1 Nelson C. White Parkway Mundelein, IL 60060 847-996-4500 www.sysmex.com
Name of middleware system	**EasyLink Informatics System**	**Sysmex WAM**
First ever middleware installation/Most recent installation (based on January 2009 survey deadline) Last update of middleware system	**2001/January 2009** **December 2008**	**2003/December 2008** **October 2006**
No. of contracts for sites operating middleware • U.S. contracts/Foreign contracts (In what countries?) No. of sites operating middleware Percentage of business that is middleware	**—** **—** **—** **—**	**116** **112/4 (Canada)** **272** **5%**
Staff to develop/install and support/other* in entire company Staff to develop/install and support/other* in middleware division	**—** **—**	**53/176/202** **12/18/46**
Hardware platforms • Proprietary hardware required? Smallest hardware platform system can run on Largest hardware platform in use Software platforms Fault-tolerant solutions/Hardware must be purchased from company? Databases used Storage capacity of standard configuration of hardware • No. of results/orders that can be stored	**Windows-based PC** **yes** **Windows-based PC** **Windows-based PC** **Windows XP** **no/yes** **Firebird** **120 GB** **34,000,000/7,000,000**	**Red Hat Linux** **no** **Linux** **Unix** **Compuware Uniface** **yes/no** **Oracle** **sized for 2 years of data storage** **2 years worth/2 years worth**
System can interface with instruments from any manufacturer? Data supported from microbiology instruments Data supported from molecular instruments Data supported from genomics instruments No. of instruments one middleware device can support Configuration of middleware device Protocols middleware supports to interface to instruments Low-level transport middleware supports to interface to instruments	**yes (third-party manufacturer instrument can be interfaced upon Siemens' approval)** **—** **—** **—** **8** **PC with standard interfaces** **ASTM (E1394-97), proprietary** **serial, TCP/IP**	**no (with Sysmex hematology analyzers and automation, including SP1000i slide maker/stainer and TS-500 tube sorter; Bio-Rad Variant II Turbo [HbA1c]; CellaVision [digital cell morphology])** **—** **—** **—** **unlimited across multiple sites** **—** **HL7 (2.3), ASTM (E1394), proprietary** **serial, TCP/IP**
LIS/HIS/EMR interfaces for receiving orders LIS/HIS/EMR interfaces for sending results No. of diff. host system connections operational at once on one middleware unit Protocols system supports to interface to other systems	**Siemens, Cerner, Meditech, Sunquest, SCC Soft Computer, others** **Siemens, Cerner, Meditech, Sunquest, SCC Soft Computer, others** **2** **ASTM (E1394-97), proprietary**	**Cerner, Sunquest, Meditech, SCC Soft Computer, McKesson, GE Healthcare, others** **Cerner, Sunquest, Meditech, SCC Soft Computer, McKesson, GE Healthcare, others** **unlimited** **HL7 (2.3), ASTM (E1394), proprietary**
Human languages middleware supports (other than English) • Multiple languages can be used at same time on one system? System supports local date and time formats? No. of users that can access system at once No. of user security levels system supports	**Spanish, French, Italian, German, Portuguese, Japanese, Greek** **yes** **yes** **25** **3**	**none** **no** **yes** **unlimited** **unlimited**
Users can write all rules for system? • System supports simple rules?/System supports compound rules? • Programming or script language required to write rules? Full and persistent audit trail of rules?/System supports rules testing? QC data used as part of auto-verification or rules process? Results that are entered manually processed by rules?	**yes** **yes/yes** **no** **yes/yes** **yes** **yes**	**yes** **yes/yes** **no** **yes/yes** **no** **yes**
System supports event notification? System user notified of rules-based events?/Notification methods supported	**yes** **yes/visual notifications**	**yes** **yes/pop-up, audio/visual**
Automation routes determined by user-defined rules? System supports test-based load balancing across instruments? Events that lead to automation routes being dynamically updated Audit trail of the route a sample has taken? Laboratory automation system interfaces System interfaces with noninstrument automation devices?	**yes** **yes** **new test requests, reflex test requests, instrument down** **yes** **Siemens** **no**	**yes** **yes** **new test requests, reflex test requests, instrument down** **yes** **Sysmex** **yes (Sysmex SP1000i slide maker/stainer and TS-500 tube sorter, CellaVision digital cell morphology)**
Back-end specimen storage and retrieval tracking? System supports management of inst. & automation device maintenance records? • System provides alerts when an instrument needs maintenance?	**yes** **yes** **yes**	**yes** **no** **no**
System provides LIS downtime functions?/System allows for manual order entry? System generates downtime specimen ID?/Algorithm user definable? Orders entered in middleware manually are sent back to LIS automatically? System supports data collection or data mining?	**yes/yes** **no/no** **yes** **yes**	**yes/yes** **no/yes** **yes** **no**
Quality control module? System interfaces to third-party QC packages? System supports multi-rules?	**yes** **yes (export-only feature into third party, such as Bio-Rad)** **yes**	**yes** **no** **yes**
Users can customize screens? • Users define custom fields?/Users populate custom fields via user-defined rules? • Screen has image support for any type of image? Users design own reports?/Report-generation software used • Reports include any data elements in database?	**yes** **no/yes** **yes** **yes/Jasper Reports** **yes**	**no** **yes/yes** **yes** **no/—** **no**
Around-the-clock customer service in U.S.? System training available/On-site consulting?	**yes** **e-learning, on site, classroom/yes**	**yes** **classroom, on site, e-learning/yes**
Smallest cost for hardware/software/monthly maintenance Largest cost for hardware/software/monthly maintenance Fee for additional users	**—** **—** **—**	**—** **—** **—**
Distinguishing features of middleware (supplied by vendor)	**• browser-based system utilizing standard Internet browser for access to patient results, QC data, and specimen information across multiple network locations** **• comprehensive and integrated QC package: patient median calculation, customizable rules, audit trail and reporting** **• supports preventative maintenance and remote diagnosis/access of connected instruments**	**• flexible rule engine with extensive rule-variable combinations for building rules for autovalidation, reflexing, add-on testing, generation of manual differential smears, and sample routing** **• ability to support orders and results from multiple LISs and multiple sites for managing patient and QC results** **• QC module has advanced graphing capability for review of up to six instruments' data by test or control material superimposed on one graph**

*other = sales, marketing, administration, and other company functions
Note: a dash in lieu of an answer means company did not answer question or question is not applicable

Tabulation does not represent an endorsement by the College of American Pathologists.

Middleware systems

Part 9 of 9 *See accompanying article on page 12*	Technidata America Medical Software **Ricardo Nunez** ricardo.nunez@technidata-web.com 1760 E. River Rd., Suite 302 Tucson, AZ 85718 520-577-2872 www.technidata-web.com	Technidata America Medical Software **Ricardo Nunez** ricardo.nunez@technidata-web.com 1760 E. River Rd., Suite 302 Tucson, AZ 85718 520-577-2872 www.technidata-web.com
Name of middleware system	TD-Middleware suite: TD-IDM/TD-WAM (Instrument Data Manager and Work Area Manager, alias TDC/TDW)	TD-Middleware suite: TD-LPM
First ever middleware installation/Most recent installation (based on January 2009 survey deadline) Last update of middleware system	1991/November 2008 December 2008	1991/2008 January 2009
No. of contracts for sites operating middleware • U.S. contracts/Foreign contracts (In what countries?) No. of sites operating middleware Percentage of business that is middleware	440+ 160+/280+ (Europe, Middle East, Asia-Pacific, Latin America, South Africa, Canada) 440+ (primarily via OEM and distributors) 25%	20+ 2/20+ (Canada, France, Italy, United Kingdom) 20+ (primarily via OEM and distributors) 25% for corporate office; 80% for U.S. subsidiary
Staff to develop/install and support/other* in entire company Staff to develop/install and support/other* in middleware division	47/42/41 12/13/10	47/42/41 12/13/10
Hardware platforms • Proprietary hardware required? Smallest hardware platform system can run on Largest hardware platform in use Software platforms Fault-tolerant solutions/Hardware must be purchased from company? Databases used Storage capacity of standard configuration of hardware • No. of results/orders that can be stored	hardware independent no 1 Windows-based PC 5 PCs Windows 2003, XP, Vista (older versions of Windows with older versions of TD-IDM/TD-WAM) no/no Microsoft Access, proprietary hardware and site dependent; 40 GB 500,000/500,000	hardware independent no 2 Windows-based PCs fault-tolerant system supporting 25 concurrent users Linux, Windows 2003 server, VMware ESX yes/no Oracle, SQL server hardware and site dependent; MB: unlimited unlimited/unlimited
System can interface with instruments from any manufacturer? Data supported from microbiology instruments Data supported from molecular instruments Data supported from genomics instruments No. of instruments one middleware device can support Configuration of middleware device Protocols middleware supports to interface to instruments Low-level transport middleware supports to interface to instruments	yes numeric, alpha numeric, alpha — 6 per PC PC with standard interfaces HL7 (v. 2.3), ASTM (1394), XML, proprietary, POCT-1A serial, TCP/IP, FTP	yes numeric, alpha, multi-level numeric, alpha, multi-level numeric 200 PC with standard interfaces HL7 (v. 2.3), ASTM (1394), XML, proprietary, POCT-1A serial, TCP/IP, FTP, LAT
LIS/HIS/EMR interfaces for receiving orders LIS/HIS/EMR interfaces for sending results No. of diff. host system connections operational at once on one middleware unit Protocols system supports to interface to other systems	Cerner, McKesson, Sunquest, Meditech, Siemens, SCC Soft Computer, homegrown, proprietary, others Cerner, McKesson, Sunquest, Meditech, Siemens, SCC Soft Computer, homegrown, proprietary, others 1 HL7 (v. 2.3), ASTM (1238), proprietary	homegrown, Meditech, Molis, MIPS, Misys, Telepath, Antrim, others homegrown, Meditech, Molis, MIPS, Misys, Telepath, Antrim, others 8 HL7 (v. 2.3), ASTM (1238), proprietary
Human languages middleware supports (other than English) • Multiple languages can be used at same time on one system? System supports local date and time formats? No. of users that can access system at once No. of user security levels system supports	21 languages, including Spanish, French, German, Korean, Greek, Japanese no yes 5 (requires Windows 2003 server) 5	21 languages, including Spanish, French, German, Korean, Greek, Japanese yes yes hardware/licenses dependent 8
Users can write all rules for system? • System supports simple rules?/System supports compound rules? • Programming or script language required to write rules? Full and persistent audit trail of rules?/System supports rules testing? QC data used as part of auto-verification or rules process? Results that are entered manually processed by rules?	yes yes/yes no no/yes yes yes	yes yes/yes no yes/yes yes yes
System supports event notification? System user notified of rules-based events?/Notification methods supported	yes yes/background color, review status	yes yes/e-mail, ISMS (pager), POP/VP, visual (background color)
Automation routes determined by user-defined rules? System supports test-based load balancing across instruments? Events that lead to automation routes being dynamically updated Audit trail of the route a sample has taken? Laboratory automation system interfaces System interfaces with noninstrument automation devices?	no no — no Roche, Siemens, Sysmex, A&T Corp. no	yes no new test requests, reflex test requests, instrument down no Beckman Coulter, Roche, Siemens, Thermo Scientific, Sysmex, A&T, Tecan yes
Back-end specimen storage and retrieval tracking? System supports management of inst. & automation device maintenance records? • System provides alerts when an instrument needs maintenance?	no yes no	yes yes no
System provides LIS downtime functions?/System allows for manual order entry? System generates downtime specimen ID?/Algorithm user definable? Orders entered in middleware manually are sent back to LIS automatically? System supports data collection or data mining?	yes/yes yes/yes yes yes	yes/yes yes/yes yes yes
Quality control module? System interfaces to third-party QC packages? System supports multi-rules?	yes yes (export to Microsoft Excel) yes	yes yes (Bio-Rad Unity QC, export to Microsoft Excel) yes
Users can customize screens? • Users define custom fields?/Users populate custom fields via user-defined rules? • Screen has image support for any type of image? Users design own reports?/Report-generation software used • Reports include any data elements in database?	yes no/no yes yes/proprietary, export to Microsoft Excel no	yes no/no yes yes/proprietary, Crystal Reports (other tools can be used) yes
Around-the-clock customer service in U.S.? System training available/On-site consulting?	yes classroom, on site, e-learning/yes	yes classroom, on site, e-learning/yes
Smallest cost for hardware/software/monthly maintenance Largest cost for hardware/software/monthly maintenance Fee for additional users	—/—/1.5% —/—/1.5% Windows terminal server license	—/—/1.5% —/—/1.5% —
Distinguishing features of middleware (supplied by vendor)	• ease of use, fast access; can switch functions without losing context • checks reproducibility of results with unknown results materials to minimize quality control costs • automatic real-time processes and alerts; powerful rules-based editor; online maintenance, service, and reagent logging	• ergonomic, user-friendly, rule-based system with powerful and friendly rules editor • patient and production audit trail; automatic real-time processes • open system; scalability; specialized microbiology module

*other = sales, marketing, administration, and other company functions
Note: a dash in lieu of an answer means company did not answer question or question is not applicable