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

Middleware systems, pages 15–25

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 TO-DAY 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, sup-

port, 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

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.



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



Smart Connections

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-

continued on page 14

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

continued from page 12

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 solu-



Every number is a life.™

Demonopointor Sharpen Your Diagnostic Skills

The College of American Pathologists (CAP) online digital slide program in dermatopathology (DPATH) offers valuable benefits to assess and improve your diagnostic abilities:

- Two releases, each with five diagnostic challenges—earn five CME credits per year.
- Whole slide imaging (WSI) technology—it simulates the use of a microscope, allowing
 you to scan throughout the field and change magnification.
- Online convenience—complete the challenges on your terms, when and where you want.
- Instant feedback—you'll know immediately whether or not your diagnosis is correct.



Join us in advancing excellence. www.cap.org

tion 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-topoint 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

	yeteine
Part 1 of 9	Abbott Diagnostics Scott Goss scott.goss@abbott.com 100 Abbott Park Road
See accompanying article on page 12	Abbott Park, IL 60064 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,
No. of sites operating middleware Percentage of business that is middleware	Ganada, New Zealand, Manand, Puerto Rico) 36 —
Staff to develop/install and support/other* in entire company Staff to develop/install and support/other* in middleware division	_
Hardware platforms	Windows PC, server
Proprietary hardware required? Smallest hardware platform system can run on Largest hardware platform in use Software platforms Foult televant colutions/Wardware must be purphased from company?	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
 Path-toterant solutions/hardware must be purchased from company? Databases used Storage capacity of standard configuration of hardware No. of results/orders that can be stored 	— 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 and middlewage device can support	yes — — —
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	unimited 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?	yes
System user notified of rules-based events?/Notification methods supported	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?	yes yes (Bio-Rad Unity)
System supports multi-rules?	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

	Declamon Ocultor	Data Inneustions
Fall 2 UI 9	Ellen Storms estorms@beckman.com	sales@datainnovations.com
	200 S. Kraemer Blvd.	120 Kimball Ave., Suite 100 South Burlington VT 05402
See accompanying article on page 12	714-961-4810 www.beckman.com	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	1996/January 2009	1993/2009
(based on January 2009 survey deadline)	March 2008	October 2008
No. of contracts for sites operating middleware	~1 600	5 000+
• U.S. contracts/Foreign contracts (In what countries?)	~800/~800 (Europe, Canada, Australia, New Zealand, Israel, India, Hong Kong)	4,500+/500+ (57 countries)
No. of sites operating middleware Percentage of business that is middleware	~1,600	5,000+ 100%
Staff to develop/install and support/other* in entire company	_	17/33/35
Staff to develop/install and support/other* in middleware division	_	17/33/35
Hardware platforms	dual-core server	Windows PC, server
Smallest hardware platform system can run on	yes PC	no Core 2 Duo PC with 2.0 GHz, 512 MB RAM, 80 GB hard disk
Largest hardware platform in use	dual-core server	IBM server cluster connecting multiple laboratories across the world
Fault-tolerant solutions/Hardware must be purchased from company?	yes/yes	yes/no
Databases used	Microsoft SQL	InterSystems Caché
No. of results/orders that can be stored	4,000,000 chemistry and immunoassay results/160,000 samples without	limited only by storage size/limited only by storage size
	graphics and 80,000 samples with graphics	
System can interface with instruments from any manufacturer? Data supported from microbiology instruments	no (with Beckman Coulter, Instrumentation Laboratory ACL Top)	yes numeric, alpha, multi-level, images
Data supported from molecular instruments	_	numeric, alpha, multi-level, images
Data supported from genomics instruments No. of instruments one middleware device can support	4	numeric, alpha, multi-level, images unlimited
Configuration of middleware device	PC with standard interfaces	PC with standard interfaces
Protocols middleware supports to interface to instruments Low-level transport middleware supports to interface to instruments	ASTM, proprietary serial. TCP/IP	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	Cerner, GE, McKesson, Meditech, Siemens, SCC Soft Computer	McKesson. Siemens. CliniSvs. Healthland. Wyndgate. Eclipsys.
g	······, ······	GE Healthcare, others McKesson Siemens CliniSvs Healthland Wundrate Erlinsvs
LIS/HIS/EMR interfaces for sending results	Cerner, GE, McKesson, Meditech, Siemens, SCC Soft Computer	GE Healthcare, others
No. of diff. host system connections operational at once on one middleware unit Protocols system supports to interface to other systems	1 ASTM, proprietary	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)	French, German	all known languages (product is user translatable via use of tables) [†]
System supports local date and time formats?	yes	yes
No. of users that can access system at once	5 unlimited	unlimited unlimited (user defined)
licers can write all rules for system?	VPC	
System supports simple rules?/System supports compound rules?	yes/yes	yes/yes
 Programming or script language required to write rules? Full and persistent audit trail of rules?/System supports rules testino? 	no no/ves	no ves/ves
QC data used as part of auto-verification or rules process?	yes	yes
Results that are entered manually processed by rules?	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
Automotion routes determined by user defined vulas?	100	coding
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 wall of the route a sample has taken?	yes Beckman Coulter	Beckman Coulter, Ortho, Abbott, Roche, Olympus America, Siemens,
System interfaces with noninstrument automation devices?	ves (sorting, centrifuge, decapping, aliquotter, stockvard)	Thermo Scientific, Sysmex, A.I. Scientific, PVT, Tecan, others ves (sorters, decappers, aliguotters, slide maker/stainers, pipetting,
	• • • • • • • • • • • • • • • • • • •	extraction/purification, storage units, track controllers)
Back-end specimen storage and retrieval tracking?	yes	yes
System provides alerts when an instrument needs maintenance?	no	yes
System provides LIS downtime functions?/System allows for manual order entry?	yes/yes	yes/yes
System generates downtime specimen ID?/Algorithm user definable? Orders entered in middleware manually are sent back to LIS automatically?	yes/yes	yes/yes ves
System supports data collection or data mining?	yes	yes
Quality control module?	yes	yes
system interfaces to third-party QC packages? System supports multi-rules?	yes	yes (DIO-NAU, I NETTIO, INSTRUMENTATION LADORATORY, GODASY, NETIKA) Yes
Users can customize screens?	yes	yes
Users define custom fields?/Users populate custom fields via user-defined rules? Sereen here image support for any type of image?	yes/no	yes/yes
Users design own reports?/Report-generation software used	yes/SQL compatible	yes yes/proprietary, any ODBC-compliant application
Reports include any data elements in database?	yes	yes
Around-the-clock customer service in U.S.? System training available/On-site consulting?	yes classroom, on site, e-learning/ves	yes classroom, on site, e-learning. Web based/ves
Smallest cost for hardware/software/monthly maintenance		0/\$3.075k/1.5%
Largest cost for hardware/software/monthly maintenance	-	—/\$350k/1.5%
Fee for additional users	defined by lab's key operator	\$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 	 FDA 510(k) cleared; earned ISO 13485 certification and device licensure for Canada
	system between commercial QC runs; provides autoverification procedures	S21 million in worldwide sales; six wholly owned offices; worldwide
	proactively alerts operator of critical test results	full suite of services, including remote IM monitoring, disaster recovery,
	complex rules can be developed and maintained by the lab's key operator	and rules-sharing Web site
corner = sales, marketing, administration, and other company functions		to set a

Part 3 of 9	Dawning Technologies	Dawning Technologies
	Jay Sax sales@dawning.com	Jay Sax sales@dawning.com
	Fort Myers, FL 33919	Fort Myers, FL 33919
See accompanying article on page 12	800-322-0499 www.dawning.com	800-322-0499 www.dawning.com
Name of middleware system	JavaLin interfaces	JResultNet Interface Engine Software
First ever middleware installation/Most recent installation (based on January 2009 survey deadline)	1984/2009	1984/2009
Last update of middleware system	2009	2008
No. of contracts for sites operating middleware • U.S. contracts/Foreign contracts (In what countries?)	2,400 2,175/225 (45+ countries)	1,350 1,200/150 (45+ countries)
No. of sites operating middleware	2,450	1,400
Staff to develop/install and support/other* in entire company	8/7.5/7	8/7.5/7
Staff to develop/install and support/other* in middleware division	8/7.5/7	8/7.5/7
Hardware platforms	Dawning JavaLin/PDI	platform portable Java-based application, JavaLin interfaces, PCs, Macintoshes. servers
Proprietary hardware required?	yes	no
Smallest hardware platform system can run on Largest hardware platform in use	JavaLin/PDI JavaLin/300	JavaLin/PDI rack servers
Software platforms Fault-tolerant solutions/Hardware must be nurchased from company?	Linux OS, Java-based embedded JResultNet software	Windows Vista, 2000, XP Pro or 2003 server, Linux, OS X
Databases used	HSQL, Codebase	HSQL, Codebase, several external databases, including PostgreSQL,
Storage capacity of standard configuration of hardware	1 GB	unlimited
• No. of results/orders that can be stored	1,000+ internal and unlimited external/1,000+ internal and unlimited external	unlimited/unlimited
System can interface with instruments from any manufacturer? Data supported from microbiology instruments	yes numeric, alpha, multi-level	yes numeric, alpha, multi-level
Data supported from molecular instruments	numeric, alpha, multi-level	numeric, alpha, multi-level
No. of instruments one middleware device can support	annen, apria, muiu-levei 2	uniene, aipna, muu-ievei unlimited
Configuration of middleware device	special-purpose device (no PC involved) HL7, ASTM, XML, proprietary, CSV, flat file, direct database, HPRIM,	PC with standard interfaces HL7, ASTM, XML, proprietary, CSV, flat file, direct database, HPRIM,
Protocols middleware supports to interface to instruments	Web-based services, POCT-1A serial TCP/IP ODBC, FTP LAT	Web services, POCT-1A serial TCP/IP ODBC FTP LAT flat file
LIS/HIS/EMR interfaces for receiving orders		Cerner, CPSI, Custom Software Solutions, GE Healthcare, Healthcare
	_	Management Systems, Impac, McKesson, Siemens, Sunquest, others Cerner, CPSI, Custom Software Solutions, GE Healthcare, Healthcare
LIS/HIS/EMR interfaces for sending results	2	Management Systems, Impac, McKesson, Siemens, Sunquest, others
Protocols system supports to interface to other systems	HL7, ASTM, XML, proprietary, CSV, flat file, direct database, HPRIM, Webbased services, POCT-1A	HL7, ASTM, XML, proprietary, CSV, flat file, direct database, HPRIM, Web-based services, POCT-1A
Human languages middleware supports (other than English)	_	version 3.2 (2009): German, French, Spanish, Portuguese, others
• Multiple languages can be used at same time on one system? System supports local date and time formats?	yes	no yes
No. of users that can access system at once No. of user security levels system supports	unlimited 3	unlimited 3
Users can write all rules for system?	yes	yes
 System supports simple rules?/System supports compound rules? Programming or script language required to write rules? 	yes/yes no	yes/yes no
Full and persistent audit trail of rules?/System supports rules testing?	yes/yes	yes/yes
Results that are entered manually processed by rules?	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?	yes	yes
Events that lead to automation routes being dynamically updated	no new test requests, reflex test requests, instrument down	no new test requests, reflex test requests, instrument down
Audit trail of the route a sample has taken? Laboratory automation system interfaces	yes Beckman Coulter, Ortho, Abbott, Roche, Olympus America, Siemens, Sysmex	yes Beckman Coulter. Ortho. Abbott. Roche. Olympus America. Siemens. Sysmex
System interfaces with noninstrument automation devices?	yes (slide makers)	yes (slide makers)
Back-end specimen storage and retrieval tracking? System supports management of inst. & automation device maintenance records?	no no	no no
System provides alerts when an instrument needs maintenance?	no	no
System provides LIS downtime functions?/System allows for manual order entry? System generates downtime specimen ID?/Algorithm user definable?	yes/yes yes/yes	yes/yes yes/yes
Orders entered in middleware manually are sent back to LIS automatically?	yes	yes
Quality control module?	no	no
System interfaces to third-party QC packages?	yes (Bio-Rad)	yes (Bio-Rad)
oystein supports mutu-fules?	yes no	yes no
Users define custom fields?/Users populate custom fields via user-defined rules?	yes/yes	yes/yes
 screen has image support for any type of image? Users design own reports?/Report-generation software used 	no yes/Crystal Reports	no yes/Crystal Reports
Reports include any data elements in database?	yes	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	\$2.2k/included/\$0.018k	—/\$4k/\$0.036k
Largest cost for hardware/software/monthly maintenance Fee for additional users	\$2.2K/\$1.5K/\$0.032k none	—/\$4k+/\$0.056k \$0.6k
Distinguishing features of middleware (supplied by vendor)	ideal for connecting remote serial instruments to an LIS or other network	off-line, Excel-based, rules-entry tool for the most common rules allows fast
	without terminal servers; acts as a Linux-based gateway device to secure sensitive instruments on a large network	and easy rules development, validation signature, and automatic entry into the middleware
	flexible protocols, large library of applications—supports HL7, ASTM, HPRIM_XML_CSV_CDE Web services and others without a PC manager	Dawning DataMiner, a U.S. patent-pending data-mining application that is nart of the IResultNet rules development kit allows connection
	required; Dawning's Java instrument driver module library contains 500+	to an external database, automatic sensing of the database structure,
*other = sales, marketing, administration, and other company functions	Instrument applications supports rules-based processing 	and the ability to develop rules to test the database for specific contents highly scalable, user configurable—can serve single-instrument or
note, a uash in neu of an answer means company did not answer question or question is not applicable	-	enterprise-wide application environments

March 2009

Middleware systems

Part 4 of 9	Fletcher-Flora Health Care Systems	Fletcher-Flora Health Care Systems
	Terry Watson filexelinksales@fletcher-flora.com	Terry Watson terryw@tletcher-flora.com
	Anaheim, CA 92801	Anaheim, CA 92801
See accompanying article on page 12	800-777-1471 www.fletcher-flora.com	800-777-1471 www.fletcher-flora.com
Name of middleware system	FElev el ink	FlexConnect
First aver middleware system	0000 / January 0000	
(based on January 2009 survey deadline)	2006/January 2009	2006/January 2009
Last update of middleware system	December 2008	January 2009
No. of contracts for sites operating middleware	9	83
• U.S. contracts/Foreign contracts (In what countries?)	9/0	83/0
No. of sites operating middleware Percentage of husiness that is middleware	11 5%	162+ 65%
Cheff to develop (install and support/atheut in antire compony)	44 (47)(47	11/17/17
Staff to develop/install and support/other* in middleware division		
Hardware nlatforms	PC running Windows XP Professional Vieta	PC running Windows XP Professional Vista
Proprietary hardware required?	no	no
Smallest hardware platform system can run on	1 GB RAM, 80 GB hard disk	1 GB RAM, 80 GB hard disk
Largest hardware platform in use	1 GB RAM, 80 GB hard disk	
Somware plamorms Fault-tolerant solutions/Hardware must be nurchased from company?	windows XP, vista, 2000, 2003 no/no	LINUX, WINDOWS XP, VISTA, 2000, 2003 no/no
Databases used	Microsoft Express, Microsoft SQL 2000, Microsoft 2003, MySQL	Microsoft SQL server, Microsoft SQL Express, MySQL, Unify, Oracle
Storage capacity of standard configuration of hardware	limited only by disk space: 80 GB	limited only by disk space
No. of results/orders that can be stored	limited only by disk space/limited only by disk space	limited only by disk space/limited only by disk space
System can interface with instruments from any manufacturer?	yes	yes
vata supported from microbiology instruments Data supported from molecular instruments		numeric, aipna, mutu-level numeric. multi-level
Data supported from genomics instruments	numeric, alpha	numeric, alpha, multi-level
No. of instruments one middleware device can support	6 per license	6 per license
Configuration of middleware device Protocols middleware supports to interface to instruments	PC with standard interfaces HI 7 ASTM proprietary	PC with standard interfaces HI 7 ASTM XMI proprietary
Low-level transport middleware supports to interface to instruments	serial, TCP/IP	serial, TCP/IP, ODBC
LIS/HIS/FMR interfaces for receiving orders	OncoEMB eClinicalWorks others	McKesson Cerner Misus GE Healthcare Logician Enic iMedica LabCorn
		Noteworthy, TechTime, OncoEMR, eClinicalWorks, Medical Manager,
LIS/HIS/EMR interfaces for sending results	Noteworthy OncoEMB aClinicalWorks Misus others	NextGen, others McKesson Corner Misus GE Healthcare Logician Enic iMedica LabCorn
	Noteworkny, Oncoemin, Connication 8, Misys, Outers	Noteworthy, TechTime, OncoEMR, eClinicalWorks, Medical Manager,
		NextGen, others
No. of diff. nost system connections operational at once on one middleware unit Protocols system supports to interface to other systems	1 HI 7. ASTM, proprietary	multiple HI 7. ASTM. XML, proprietary
Multiple languages can be used at same time on one system?	none	no
System supports local date and time formats?	no	no
No. of users that can access system at once	1	multiple
No. of user security levels system supports	3	5
Users can write all rules for system? • System supports simple rules?/System supports compound rules?	yes ves/no	no ves/ves
 Programming or script language required to write rules? 	NO 10	yes/yes no
Full and persistent audit trail of rules?/System supports rules testing?	no/no	no/yes
QC data used as part of auto-verification or rules process?	no	no
Results that are entered manually processed by fulles?	yes	yes
System supports event nouncation? System user notified of rules-based events?/Notification methods supported	no no/on-screen flaas	yes ves/on-screen flaas
Automation routes determined by user-defined rules?	no.	
System supports test-based load balancing across instruments?	no	yes
Events that lead to automation routes being dynamically updated	-	new test requests, reflex test requests
Audit trail of the route a sample has taken?	no	yes
System interfaces with noninstrument automation devices?	n	no
Pack-and chaniman storage and retrieval tracking?	70	10
System supports management of inst. & automation device maintenance records?	no	no
System provides alerts when an instrument needs maintenance?	no	no
System provides LIS downtime functions?/System allows for manual order entry?	no/yes	no/yes
System generates downtime specimen ID?/Algorithm user definable?	no/no	no/no
System supports data collection or data mining?	yes 10	yes N0
	no.	
System interfaces to third-party QC packages?	no	QC via the LIS
System supports multi-rules?	_	no
Users can customize screens?	no	no
 users define custom fields?/Users populate custom fields via user-defined rules? Screen has image support for any type of image? 	no/no no	no/no no
Users design own reports?/Report-generation software used	no/results sent to EMR, EHR, practice management system for reporting	no/reports generated via host system
Reports include any data elements in database?	no	no
Around-the-clock customer service in U.S.?	yes	yes
System training available/On-site consulting?	online, on site available/yes	online, on site available/yes
Smallest cost for hardware/software/monthly maintenance	—/—/\$0.599k	-
Largest cost for hardware/software/monthly maintenance Fee for additional users	—/—/\$U.719k none	
Distinguishing teatures of middleware (supplied by vendor)	 cost-effective solution that connects laboratory instruments directly to a host system 	 versatule and powerful connectivity solution for interfacing instruments, printing devices, and host systems with the LIS
	 simply manages orders and results to and from an EMR, practice 	multiple applications can run concurrently on a single FFlexConnect
	management system, or other host system to analyzers • easy to use for small labs that want to minimize manual transportation of	server, improving the cost-effectiveness of deployment • deliver new instrument interfaces quickly and inevnensively and colve
	results into their host system	challenging connectivity issues

Part 5 of 9	Ortho Clinical Diagnostics	Pathagility
	Beth A. Slavic bslavic@its.jnj.com 1001 U.S. Highway 202	Mark McCuin mark@pathagility.com 1125 Oak Street, Suite 303
See accompanying article on page 12	Raritan, NJ 08869 800-828-6316 www.orthoclinical.com	Conway, AR 72032 501-327-7700 www.pathagility.com
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 • U.S. contracts/Foreign contracts (In what countries?)	80 41/39 (France, United Kingdom, Germany, Spain, Australia, Hong Kong, Thailand, Brazil, Canada, Iceland, Chile, Finland, Italy, Denmark, Sweden)	2 2/0
No. of sites operating middleware Percentage of business that is middleware	70+ less than 1%	2 90%
Staff to develop/install and support/other* in entire company Staff to develop/install and support/other* in middleware division	Ξ	1/2/2 1/2/2
Hardware platforms	Dell OptiPlex	virtualized Intel servers
Smallest hardware platform system can run on	yes Pentium class, 2 GB RAM, 40 GB hard drive	no Windows 2003 configuration
Largest hardware platform in use Software platforms	 Windows XP	4 GB RAM, 2 CPUs, 20 GB HD Windows 2003 server
Fault-tolerant solutions/Hardware must be purchased from company? Databases used	yes/yes InterSystems Caché	yes/no Microsoft SQL server 2005
Storage capacity of standard configuration of hardware No. of results/orders that can be stored 	40,000 MB	10 GB unlimited/unlimited
System can interface with instruments from any manufacturer?	no (with enGen automation)	no (future development of interfaces)
Data supported from molecular instruments	-	
No. of instruments one middleware device can support	 128	_ _
Configuration of middleware device Protocols middleware supports to interface to instruments	PC with standard interfaces 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		e-mus, impac roweiraui
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 yes	future development no
System supports local date and time formats? No. of users that can access system at once	yes 10–128 (operating system dependent)	no unlimited
No. of user security levels system supports	multiple (function/connection driven)	2
Users can write all rules for system? • System supports simple rules?/System supports compound rules?	yes yes/yes	no yes/yes
 Programming or script language required to write rules? Full and persistent audit trail of rules?/System supports rules testing? 	no ves/ves	no ves/no
QC data used as part of auto-verification or rules process? Results that are entered manually processed by rules?	yes	no ves
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
System supports test-based load balancing across instruments?	yes	yes yes
Events that lead to automation routes being dynamically updated Audit trail of the route a sample has taken?	new test requests, reflex test requests, instrument down yes	new test requests, reflex test requests, instrument down yes
Laboratory automation system interfaces System interfaces with noninstrument automation devices?	Ortho, Thermo Scientific yes (sorter, centrifuge, decapper, recapper, aliquotter)	_
Back-end specimen storage and retrieval tracking? System supports management of inst & automation device maintenance records?	yes	no no
System provides alerts when an instrument needs maintenance?	yes	yes
System provides LIS downtime functions?/System allows for manual order entry? System generates downtime specimen ID?/Algorithm user definable?	yes/yes yes/yes	yes/yes no/no
Orders entered in middleware manually are sent back to LIS automatically? System supports data collection or data mining?	yes yes	yes yes
Quality control module?	yes	yes
System interfaces to third-party QC packages? System supports multi-rules?	yes (Bio-Rad Unity Real Time) yes	no yes
lleare can ouetamize corecene?	100	
Users define custom fields?/Users populate custom fields via user-defined rules? Overse besize a custom fields?	yes yes/yes	no/yes
 screen nas image support for any type of image? Users design own reports?/Report-generation software used 	yes yes/built-in report designer, optional Crystal Reports	no/
Keports include any data elements in database? Around-the-clock customer service in U.S.?	yes ves	yes ves
System training available/On-site consulting?	on site, classroom/yes	classroom, on site, online/yes
Smallest cost for hardware/software/monthly maintenance Largest cost for hardware/software/monthly maintenance Fee for additional users	_ _ _	0/\$15k/transaction based 0/\$65k/transaction based transaction based
Distinguishing features of middleware (supplied by vendor)	Vitros Navigator—prebuilt configuration file designed to allow connection of multiple Vitros custome to the LIS including propulition rules that preside	provides a blend of interoperability and customized workflow solution notential: company involved in the short, and long term husinese
	or manupre viruos systemis to tree Lis, including prewritten rules that provide some autoverification rules for Vitros systems • traceshilty and integration of autovarification with Vitros systems?	potential, company involved in the Short- and long-term business strategies of clients • Web-based collaboration portal and austamized conset distribution
	 configuration control and flexible request- and result-based routing for automation 	 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

Ariel of Subscription Subscription Subscription Subscription In caracterization Caracterization Caracterization Caracterization Subscription Caracterization Caracterization Caracterization <th></th> <th></th> <th></th>			
Special space of the spectra s	Part 6 of 9	P.G.P./Data Innovations	PVT LabSystems
Alexa a space of a set of a second set se		europe-sales@datainnovations.com	Miriam Hoelzel info@pvtlabsystems.com
Landamping with any part of the section of the sec		34 Avenue Jacques Brel	300 Townpark Drive, Suite 190
Add and addiam upper 70042070000740071000074007100007Near addiam upper factor statistics42000000000000000000000000000000000000		Brussels, Belgium 1200	Kennesaw, GA 30144
Inter denotes againJearany 2009 areaJearany 2009 area <th< td=""><td>See accompanying article on page 12</td><td>+3227706222 www.datainnovations.com</td><td>877-788-5227 www.pvtlabsystems.com</td></th<>	See accompanying article on page 12	+3227706222 www.datainnovations.com	877-788-5227 www.pvtlabsystems.com
And the second of the second base of the second o	Name of middleware system	Laboratory Production Manager (LPM)	Silver Server
Ray body with the second with the constructionBBD with the second wi			
LandbardPersonalPerson	First ever middleware installation/Most recent installation	1982/January 2009	1997/2008
and according in later controls in the second sec	Last undate of middleware system	December 2008	_
An A series of the probability o			
Note of the sports of the state of the st	No. of contracts for sites operating middleware	350 2/252 (Palaium France II K. Natharlanda Luvambaura Swadan Nanyay	33 2/20 (Cormony Notherlando Polsium)
Not observing instructionSectorImage: SectorSectorRecise prime instruction1200ConstructionConstructionRecise primeNot observationSectorSectorRecise primeNot observationSectorSector <td>• 0.5. contracts/roleign contracts (in what countries?)</td> <td>Finland, Austria, Germany, Switzerland, Italy, Singapore, Israel, others)</td> <td>5/50 (definiting, welliefiallus, belgiuni)</td>	• 0.5. contracts/roleign contracts (in what countries?)	Finland, Austria, Germany, Switzerland, Italy, Singapore, Israel, others)	5/50 (definiting, welliefiallus, belgiuni)
Recent private starting industry in private starting in the start private start start private start in the start private start private start in the start private start private start private start private start in the start private start in the start private start in the start private star	No. of sites operating middleware	654	33
Introductional supproduction all	Percentage of business that is middleware	100%	-
Bit Discongrinul17305	Staff to develop/install and support/other* in entire company	17/33/35	0/7/7
Instrume Projecting Justices Projecting Justices MULTP Control Instrume MULTP Contro Instrume MULP	Staff to develop/install and support/other* in middleware division	17/33/35	_
Note of the section of the s		P0	IDM D0. commetible v0C commuter
Answer starting registering reg	naruware plationiis		
Importance performs area:And and any strange and Normal Advances (Park, backer disk disks conserved)And any strange and Normal Advances (Park, backer disk disks conserved)And any strange and Normal Advances (Park, backer disk disks conserved)And any strange and Normal Advances (Park, backer disk disks conserved)And any strange and Normal Advances (Park, backer disk disks conserved)And any strange and Normal Advances (Park, backer disk disks conserved)And any strange and 	Smallest berdware platform avetem can run an		110 x96 Intel Dentium 4
DefectionControl (Control (Contr	l arnest hardware platform in use	2 redundant systems with A dual-core CPUs, shared disk cluster cabinet	network of 7 to 8 standard computers
Back before bit bit bit bit bit bit bit bit bit bit	Software platforms	Windows 2000, 2003, XP	ONX
Babbase Barbase and order of the form of the set o	Fault-tolerant solutions/Hardware must be purchased from company?	ves/no	ves/ves
Biose guidy standard and puttering71 Gil mode90 dimRef. articulation tails standard and puttering standard and putter puttering standard and puttering sta	Databases used	Oracle	SAM database
• h. derive drie durie dur	Storage capacity of standard configuration of hardware	70 GB	20 GB
Sphere can infrare with instruments from any samufacture? ys	 No. of results/orders that can be stored 	limited only by storage size/limited only by storage size	1,000,000+/1,000,000+
In the support from microbiolog instrumentmicrot, spha matire, spha mat	System can interface with instruments from any manufacturer?	Ves	ves
Del supporte fun motocular futurante Da supporte fut	Data supported from microbiology instruments	- numeric, alpha, multi-level, images	- numeric, alpha
Back graduation storiesmarice, signa, marice, signa, mar	Data supported from molecular instruments	numeric, alpha, multi-level, images	numeric, alpha
Box2001010Conjugated on dividence doctor analysisPA with standard interfaces and to PA with standard interfaces 	Data supported from genomics instruments	numeric, alpha, multi-level, images	numeric, alpha
Dering and windlows doi:0Pollis tandad infortes: NUK 2008, F71 flas, all and LDVP DOB, F71 flas, all branch, Sin, dbr. comparison of the section of the s	No. of instruments one middleware device can support	250	16
ProbabilityIVT, ASTM (1281, 1994), MML, proprietary unitable methods are support to interfaces to instrumentsIVT, ASTM (1281, 1994), MML, proprietary unitable methods are support to interfaces to instrumentsASTM (1281, 1994), MML, proprietary unitable methods are support to interfaces to instrumentsASTM (1281, 1994), MML, proprietary methods, MML, Scient, Moleculary, MMC, Scalis, Molecu, MMC, Scalis, MMC, Scalis, Molecu, MMC, Molecu, MMC	Configuration of middleware device	PC with standard interfaces	PC with standard interfaces
Lock-own functionartial, TDPP (0000, PH, 1001, ApJ, Modary, MC, Sarali, Halow, Hesthar, Sbin, Abdary, MC, Sarali, Malay, Hesthar, Sbin, Malay, MC, Sarali, ML, Malay, Hesthar, Sbin, MC, MC, Malay, MC, Sarali, ML, Malay, Hesthar, Sbin, MC, MC, MC, MC, MC, MC, MC, MC, MC, MC	Protocols middleware supports to interface to instruments	HL7, ASTM (1238, 1394), XML, proprietary	ASTM, proprietary
LBARBER Instructions for aroaning randsMBS, Scatta, Technika, Maida,	Low-level transport middleware supports to interface to instruments	serial, TCP/IP, ODBC, FTP, files, .dll	serial, TCP/IP
Haraba, Shan, Metra Marka,	LIS/HIS/EMR interfaces for receiving orders	MIPS, Cortex, Technidata, Molis, Agfa, Medasys, MBC, Seralis, Helios,	-
LBAMBE DIRA Interfaces to sending resultsMPBS, Cares, Fieldingts, Molis, Agh, Moles, Syn, Miss, Agh, Moles, Syn, Miss, Agh, Moles, Syn, Miss, Agh, Moles, Syn, Miss, Syn, Mis		Hexaflux, Sbim, others	
in. of data system connections operational at outs on an indication of the system in the system is indication in the sy	LIS/HIS/EMR interfaces for sending results	MIPS, Cortex, Technidata, Molis, Agfa, Medasys, MBC, Seralis, Helios,	-
NoticeACMA STM (1238, 1360, XML, propriataryACMA strain (1238, 1360, XML, propriataryACMA strain (1238, 1360, XML, propriatary)Hums, Ingrages middows appets (bmt han Eglab)Front, Gurma, Duch, Marvo, Oths on requestGarmaHums, Ingrages middows appets (bmt han Eglab)Front, Gurma, Duch, Marvo, Oths on requestGarmaNo diagla particulation on appets (bmt on an eglam)Sa GarmaBarcoNo di cuer scrait/ fuelo strain support fuelo strain support strain	No. of diff. host system connections operational at once on one middleware unit	Hexaflux, Sbim, others	2
In control of the second secon	Protocols system supports to interface to other systems	04 HL7 ASTM (1238 1394) XML proprietary	Z ASTM proprietary
Hama inguages middlows supports (other has register) of the rank register) of the register of			Aorini, proprietary
* Montpole shape and provide shape and provide and shape and provide shape and provi	Human languages middleware supports (other than English)	French, German, Dutch, Hebrew, others on request	German
System supports doci data and mine winning? Not of uses that makes anowly lowed system supports of the stem of the sector of th	Multiple languages can be used at same time on one system?	yes	no
International and access of the system supportCost of definible	System supports local date and time formats?	yes 256	yes 20 J
Inclusion Construction Section Users can write all rules for system? yes yes • System supports can be starting or rules? yes/yes yes/yes • Operation of or rules process? yes yes > System supports can be starting or rules? yes performant > System supports can be starting or rules? yes performant > System supports can rules rules? yes performant > System supports rules	No. of users cuarted levels system supports	user definable	20 +
Users can whe all rules for systems upports compound rules?yesyes> System supports can provide rules that had rules?yes/yesyes/yes> Programming or script imaging required in write nules?yes/yesyes/yes00 data used as part of auto-infication or rules provide?yes/yesyes20 data used as part of auto-infication or rules provide?yesyesSystem supports event infification?yes-System supports event infification?yes-System supports event infification?yesyesSystem supports event infification?yesnoSystem supports event infification?yesyesSystem supports event infification?yesnoSystem supports event infification?yesno			
* Jyler happer 18 miger inter 2ystem supports inter 2ystem support inter 2ystem support inter 2ystem support inter 2ystem	Users can write all rules for system?	yes	yes
Programming in statut and relation or rule process?pss/pspss/ps(b) dial dipersistent and that if and (ers) system supports rules testing?yss/pspss(b) dial dipersistent and that if and (ers) system supports rules testing?ysspss(b) dial dipersistent and testing?ysspss-(b) dial dipersistent and testing?psspss-(b) dial dipersistent and testing?pss(b) di	System supports simple rules?/System supports compound rules? Brogramming or corint longuage required to write rules?	yes/yes	yes/yes
In transmission transmission yes perspective perspective Results that are entreed manually processed by user? yes yes	 Programming or script language required to write rules? Full and nereistant audit trail of rules?/System supports rules testing? 	yes ves/ves	
Bissuits that are entred manually processed by rules? yes	OC data used as nart of auto-verification or rules process?	ves	yes/yes no
System supports event notification? yes - System supports event notification? yes - System supports first-based events?/Motification methods supported yes/poi-up, pager, e-mail, phone calls, fax, aud/o/light alarm - System supports first-based load balancing access instruments? yes now yes System supports first-based load balancing access instruments? yes now yes System supports first-based load balancing access instruments? yes now now yes System supports instructed to note access instruments? yes now now yes System supports and tool on on oncess Beckman Coulter, Ortho, Abbott, Roche, Stemens, Thermo Scientific, System yes (orthers, decapters, aliquotters) System provides alers when an instrument needs maintenance? no - - System provides alers when an instrument needs maintenance? no - - System supports data collection of data inning? yes'yes - - System supports data collection of data inning? yes/yes - - System supports data collection of data inning? yes/yes - </td <td>Results that are entered manually processed by rules?</td> <td>ves</td> <td>ves</td>	Results that are entered manually processed by rules?	ves	ves
System Pressure <	Sustam supports supert notification?		
Operation work induced of inder also be trained. perspective program perspespective program perspective program	System user notified of rules_based events?/Notification methods supported	yes ves/non-un nager e-mail nhone calle fax audio/light alarm	_
Automation routes determined by user-defined rules?yesyesSystem supports test-based (ad balancing across instruments?new test requests, instrument downnew test requestsEvents that lead to automation routes being dynamically updatednew test requests, instrument downyesLaboratory automation system interfacesBeckman Coulter, Ortho, Abbott, Roche, Siemens, Thermo Scientific, SymmeYP Probeneverlaitenank (moth, Sarstedt)System interfaces with nonistrument automation devices?yes (orters, centrifuges, decappers, aliquotters, side maker, stainor)yesSystem interfaces usin nonistrument automation devices maintenance?no	System user nouned of rules-based events://wouncation methods supported	ישטאר אין	
System supports text-based load balancing across instruments? yes no Events that lead to automation routes being dynamically updated new text requests, netflex test requestes respecify test requestes netflex tes	Automation routes determined by user-defined rules?	yes	yes
treems into use use automation routes being optimically updatednew test requests, instrument downneW test requestsLaboratory automation system interfacesBeckman Coulter, Ortho, Abbott, Roche, Siemens, Thermo Scientific, SysmeVPT Probemetrelitechnik CmMH, SarstedtLaboratory automation system interfacesBeckman Coulter, Ortho, Abbott, Roche, Siemens, Thermo Scientific, SysmeVPT Probemetrelitechnik CmMH, SarstedtSystem interfaces with noninstrument automation device maintenance?noyesSystem provides LIS downtime functions?/System allows for manual order entry?yes/yes-System provides LIS downtime functions?/System allows for manual order entry?yes/yes-System provides LIS downtime functions?/System allows for manual order entry?yes/yes-System provides LIS downtime specimen ID?/Algorithm user definable?yes/yes-YesyesSystem supports data collection or data mining?yesyesyesyesQuality control module?yes/yes-System supports multi-rules?yes/yes-yes for servers?yes/yes-yes/yesUsers define custom fields?/Users populate custom fields via user-defined rules?yes/yesyes/yesUsers define custom fields?/Users populate custom fields via user-defined rules?yes/yesyes/yesViest's induce and all alloments in database?nooutser define custom fields?/Users populate custom fields via user-defined rules?yes/yes	System supports test-based load balancing across instruments?	yes	no
Adduit and to the food as sample risks data if '' no yes System interfaces with noninstrument automation devices? Peckman Coulter, Ortho, Abbott, Roche, Siemens, Thermo Scientific, System PVT Probenverteiltechnik GmbH, Sarstedt System supports management of inst. & automation devices? no - System supports management of inst. & automation devices maintenance? no - System provides alers when an instrument needs maintenance? yes/yes - System provides alers when an instrument needs maintenance? yes/yes - System provides alers when an instrument needs maintenance? yes/yes - System provides alers when an instrument needs maintenance? yes/yes - System provides alers when an instrument needs maintenance? yes/yes - System supports data collection or data mining? yes/yes - System supports data collection or data mining? yes/yes - System supports multi-rules? yes/wes - System supports multi-rules? yes/wes - Viers define custom fields?/losers populate custom fields via user-defined rules discino mort reports?/Reports/learch and tababase? no Viers define cu	Events that lead to automation routes being dynamically updated	new test requests, reflex test requests, instrument down	new test requests
Calculation of youth models of states with nonistrument automation devices? Description for the state with nonistrument automation devices? Provide states with nonistrument automation devices? Back-end specimen storage and retrieval tracking? no - - System michaes with nonistrument automation devices? no - - System provides alters when an instrument automation devices maintenance record? no - - System provides LLS downtime functions?/System allows for manual order entry? yes/yes - - System provides LLS downtime specimen ID?/Algorithm user definable? yes/yes - - System supports data collection or data mining? yes/yes - - System provides LLS downtime functions?/System allows for manual order entry? yes/yes - - System provides LLS downtime specimen ID?/Algorithm user definable? yes/yes - - - System provides LLS downtime specimen US yes/less - - - - System provide sto third-party CD packages? yes (WKC, Blo-Rad, Instrumentation Laboratory, others) no - - - Users define cursom fields?/User	Auur u all OF UP FOULE à Sample Nas Taken?	IIU Reckman Coulter Ortho Abbott Rocho Sigmone Thorma Scientific Sugman	ycs PVT Prohenverteiltechnik GmhH. Sarstadt
Back-end specimen storage and retrieval tracking? 0 System supports management of inst. & automation device maintenance records? no System provides affets when an instrument needs maintenance? no System provides affets when an instrument needs maintenance? no System provides affets when an instrument needs maintenance? yes/yes System specimen ID?/Algorithm user definable? yes/yes System supports data collection or data mining? yes no Quality control module? yes no System supports multi-rules? yes/yes Users can customize screens? yes/yes Ves define custom fields?/Users populate custom fields via user-defined rules? yes/yes Users can customize screens? yes/yes Ves define custom fields?/Users populate custom fields via user-defined rules? yes/yes Ves define custom fields?/Users populate custom fields via user-defined rules? yes/yes	System interfaces with noninstrument automation devices?	ves (sorters, centrifuges, decappers, aliquotters, slide maker, stainer)	ves (sorters, decappers, recappers, aliquotters)
back-ena specimen storage and retrieval tracking? no no model of site A automation device maintenance records? no no model of site A automation device maintenance? no no model of site A automation device maintenance? no no model of site A automation device maintenance? very service service in middleware manual or der entry? yes/yes very services and service manual or der entry? yes/yes very services and service manual or attracking? yes is service and services were derived to model? Yes is services and services were derived to model? Yes is services were derived to the services were derived to th	Park and an always also at the transfer	······································	
Cystem provides alerts when an instrument needs maintenance records no	Back-end specimen storage and retrieval tracking?	no no	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 Orders entered in middleware manually are sent back to LIS automatically? yes no System supports data collection or data mining? yes Duality control module? yes no System supports data collection or data mining? yes no System supports data collection or data mining? yes no System supports data collection or data mining? yes no System supports multi-rules? yes (NVKC, Bio-Rad, Instrumentation Laboratory, others) no System supports multi-rules? yes/yes Users define custom fields?/Users populate custom fields via user-defined rules? yes/yes • Users define custom fields?/Users populate custom fields via user-defined rules? yes/peortBuilder • Screen has image support for any type of image? yes/ReportBuilder • Soreen has indatabase? no yes/ReportBuilder • Reports include any data elements in database? no yes/ses • Around-the-clock customer service in U.S.? no yes/ses System training available/fon-site consulting? <td< td=""><td>System provides alerts when an instrument needs maintenance?</td><td>no no</td><td>_</td></td<>	System provides alerts when an instrument needs maintenance?	no no	_
System provides LB downtime functions?/System allows for manual order entry?yes/yesyes/yesSystem generates downtime specimen ID?/Algorithm user definable?yes/yesOrders entered in middleware manually are sent back to LIS automatically?yesSystem supports data collection or data mining?yesQuality control module?yesnoSystem interfaces to third-party QC packages?yes (NVKC, Bio-Rad, Instrumentation Laboratory, others)noSystem interfaces to third-party QC packages?yes (NVKC, Bio-Rad, Instrumentation Laboratory, others)noSystem supports multi-rules?yes/yesUsers can customize screens?yes/yesVesr define custom fields?/Users populate custom fields via user-defined rules?yes/yesYes/resnoUsers define custom fields?/Users populate custom fields via user-defined rules?yes/resYes/resnoSystem training available/On-site consulting?yes/keportBuilderAround-the-clock customer service in US.?noyes/keportBuilderSystem training available/On-site consulting?classroom, on site/yeson site/yesSmallest cost for hardware/software/monthy maintenance\$2k/\$4.5k/\$0.068k-/\$25k/\$1 kLargest cost for hardware/software/monthy maintenance\$2.3kbitinguishing features of middleware (supplied by vendor)• high level of workflow customization meeting customer-specific requirements via a powerflup arametrization tool• efficient and effective; improves and expedites wo			
System generates countrime spectment to // Augorithm user deminator yes/yes	System provides LIS downtime functions?/System allows for manual order entry?	yes/yes	yes/yes
Orders enterbed in inductivate inatuativity of sent data to Lis automaticity? yes	System generates downtime specimen ID?/Algorithm user definable?	yes/yes	-
Cycle Post Post Quality control module? yes no System interfaces to third-party QC packages? yes (NVKC, Bio-Rad, Instrumentation Laboratory, others) no System supports multi-rules? yes/yes no/no Users can customize screens? yes/yes no/no • Users define custom fields?/Users populate custom fields via user-defined rules? yes/yes • Screen has image support for any type of image? yes no ves/s design own reports?/Report-generation software used yes/ReportBuilder • Reports include any data elements in database? no Around-the-clock customer service in U.S.? no yes/ses on site/yes Smallest cost for hardware/software/monthly maintenance \$2k/x4.5k/x0.068k /\$25k/\$1k -/\$25k/\$1k Largest cost for hardware/software/monthly maintenance \$2.03k * * Distinguishing features of middleware (supplied by vendor) • high level of workflow customization meeting customer-specific requirements via a powerful parameterization tool * • flexiblecan be adapted to customer needs * erificient and effective; improves and expeditise workflow * • ules across multiple disparate specinens belonging to the same orde	System supports data collection or data mining?	yes Ves	
Quality control module?yesnoSystem interfaces to third-party QC packages?yes (NVKC, Bio-Rad, Instrumentation Laboratory, others)noSystem supports multi-rules?yes (NVKC, Bio-Rad, Instrumentation Laboratory, others)noUsers can customize screens?yes/yesno/no• Users define custom fields?/Users populate custom fields via user-defined rules?yes/yes• Screen has image support for any type of image?yes/ReportBuilder• Screen has image support for any type of image?yes/ReportBuilder• Reports include any data elements in database?no• Reports include any data elements in database?noAround-the-clock customer service in U.S.?noyes/ReportBuildersystem training available/On-site consulting?classroom, on site/yeson site/yeson site/yesSmallest cost for hardware/software/monthly maintenance\$2k/\$4.5k/\$0.068k/\$25k/\$1kLargest cost for hardware/software/monthly maintenance\$2x/\$4.5k/\$0.068k/\$25k/\$1k§2.3kDistinguishing features of middleware (supplied by vendor)* kjelleel of workflow customization meeting customer-specific requirements via a powerful parameterization tool• requirements via a powerful parameterization tool• efficient and effective; improves and expedities workflow• uies across multiple disparate specimens belonging to the same order• efficient and effective; improves and expedities workflow• uies across multiple disparate specimens belonging to the same order• eff		y	
System interfaces to third-party UC packages? yes (wtxc, bio-kad, instrumentation Laboratory, others) no System supports multi-rules? yes (wtxc, bio-kad, instrumentation Laboratory, others) no Users can customize screens? yes/yes no/no • Users define custom fields?/Users populate custom fields via user-defined rules? yes/yes • Screen has image support for any type of image? yes (web, yes no • Screen has image support for any type of image? yes (web, yes no • Screen has image support for any type of image? yes (web, yes no • Screen has image support for any type of image? yes (web, reportBuilder • Reports include any data elements in database? no Around-the-clock customer service in U.S.? no yes System training available/On-site consulting? classroom, on site/yes on site/yes Smallest cost for hardware/software/monthly maintenance \$2k/\$4.5k/\$0.068k /\$25k/\$1k Largest cost for hardware/software/monthly maintenance \$2.0k/\$300k/\$4.5k -/\$50k/\$1k Fee for additional users \$2.3k - - Distinguishing features of middleware (supplied by vendor) •/lieb arcross multiple dispara	Quality control module?	yes	no
System supports multi-rules? yes — Users can customize screens? yes/yes no/no • Users define custom fields?/Users populate custom fields via user-defined rules? yes/yes — • Screen has image support for any type of image? yes no Users define custom fields?/Users populate custom fields via user-defined rules? yes/yes — • Screen has image support for any type of image? yes no Users design own reports?/Report-generation software used yes/ReportBuilder — • Reports include any data elements in database? no — no	System interfaces to third-party UC packages?	yes (NVKC, Bio-Rad, instrumentation Laboratory, others)	no
Userves/vesno/no• Users define custom fields?/Users populate custom fields via user-defined rules?yes/yes-• Screen has image support for any type of image?yes/yesno• Screen has image support for any type of image?yes/ReportBuilder-• Reports include any data elements in database?no-• Round-the-clock customer service in U.S.?no-System training available/On-site consulting?classroom, on site/yeson site/yesSmallest cost for hardware/software/monthly maintenance\$2k/\$4.5k/\$0.068k-/\$25k/\$1kLargest cost for hardware/software/monthly maintenance\$2k/\$4.5k/\$0.068k-/\$25k/\$1kEve for additional users\$2.3k-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• flexiblecan be adapted to customer needs • efficient and effective; improves and expedites workflow	System supports multi-rules?	yes	-
Users can customize screens?yes/yesno/no• Users define custom fields?/Users populate custom fields via user-defined rules?yes/yes• Screen has image support for any type of image?yesno• Screen has image support for any type of image?yes/ReportBuilderUsers design own reports?/Report-generation software usedyes/ReportBuilder• Reports include any data elements in database?noAround-the-clock customer service in U.S.?noyesSystem training available/On-site consulting?classroom, on site/yeson site/yesSmallest cost for hardware/software/monthly maintenance\$2k/\$4.5k/\$0.068k/\$25k/\$1kLargest cost for hardware/software/monthly maintenance\$200k/\$300k/\$4.5k/\$25k/\$1kFee for additional users\$2.3k-Distinguishing features of middleware (supplied by vendor)• high level of workflow customization meeting customer-specific requirements via a powerful parameterization tool• flexiblecan be adapted to customer needs• rules across multiple disparate specimens belonging to the same order• flexible-can be adapted to customer needs			
• Users define custom fields?/Users populate custom fields via user-defined rules?yes/yes	Users can customize screens?	yes/yes	no/no
• Screen nas image support for any type of image?yesnoUsers design own reports?/Report-generation software usedyes/ReportBuilder• Reports include any data elements in database?noAround-the-clock customer service in U.S.?noyesSystem training available/On-site consulting?classroom, on site/yeson site/yesSmallest cost for hardware/software/monthly maintenance\$2k/\$4.5k/\$0.068k/\$25k/\$1kLargest cost for hardware/software/monthly maintenance\$20k/\$300k/\$4.5k-/\$50k/\$1kFee for additional users\$2.3kDistinguishing 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• flexible—can be adapted to customer needs • efficient and effective; improves and expedites workflow • simplifies handling and coordination of various tests for samples	Users define custom fields?/Users populate custom fields via user-defined rules?	yes/yes	-
Users uesign own reports // Report generation software used yes/Report Builder	Screen has image support for any type of image?	yes wee/DemostBuilder	no
Around-the-clock customer service in U.S.?no classroom, on site/yesyes on site/yesSystem training available/On-site consulting?classroom, on site/yeson site/yesSmallest cost for hardware/software/monthly maintenance Largest cost for hardware/software/monthly maintenance \$200k/\$300k/\$4.5k \$2.3k/\$25k/\$1k /\$50k/\$1k -/\$50k/\$1kDistinguishing 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• flexible—can be adapted to customer needs • efficient and effective; improves and expedites workflow • simplifies handling and coordination of various tests for samples	users design own reports?/Keport-generation software used	yes/neportbuilder	
Around-the-clock customer service in U.S.?noyesSystem training available/On-site consulting?classroom, on site/yeson site/yesSmallest cost for hardware/software/monthly maintenance\$2k/\$4.5k/\$0.068k/\$25k/\$1kLargest cost for hardware/software/monthly maintenance\$200k/\$300k/\$4.5k/\$25k/\$1kEve for additional users\$2.3k/\$50k/\$1kDistinguishing 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• flexible—can be adapted to customer needs • efficient and effective; improves and expedites workflow • simplifies handling and coordination of various tests for samples	- neports include any data elements in database?	10	
System training available/On-site consulting?classroom, on site/yeson site/yesSmallest cost for hardware/software/monthly maintenance Largest cost for hardware/software/monthly maintenance *200k/\$300k/\$4.5k *2.3k\$2k/\$4.5k/\$0.068k *200k/\$1k -/\$25k/\$1k -/\$50k/\$1k 	Around-the-clock customer service in U.S.?	no	yes
Smallest cost for hardware/software/monthly maintenance \$2k/\$4.5k/\$0.068k /\$25k/\$1k Largest cost for hardware/software/monthly maintenance \$200k/\$300k/\$4.5k /\$50k/\$1k Fee for additional users \$2.3k Distinguishing features of middleware (supplied by vendor) • high level of workflow customization meeting customer-specific requirements via a powerful parameterization tool • flexible—can be adapted to customer needs • efficient and effective; improves and expedites workflow • rules across multiple disparate specimens belonging to the same order • simplifies handling and coordination of various tests for samples	System training available/On-site consulting?	classroom, on site/yes	on site/yes
Largest cost for hardware/software/monthly maintenance \$200k/\$300k/\$4.5k /\$50k/\$1k Fee for additional users \$2.3k /\$50k/\$1k Distinguishing features of middleware (supplied by vendor) • high level of workflow customization meeting customer-specific requirements via a powerful parameterization tool • flexiblecan be adapted to customer needs • rules across multiple disparate specimens belonging to the same order • flexible- can be adapted to customer needs	Smallest cost for hardware/software/monthly maintenance	\$2k/\$4.5k/\$0.068k	—/\$25k/\$1k
Fee for additional users \$2.3k — Distinguishing features of middleware (supplied by vendor) • high level of workflow customization meeting customer-specific requirements via a powerful parameterization tool • flexible—can be adapted to customer needs • requirements via a powerful parameterization tool • flexible—can be adapted to customer needs • efficient and effective; improves and expedites workflow • implifies handling and coordination of various tests for samples	Largest cost for hardware/software/monthly maintenance	\$200k/\$300k/\$4.5k	—/\$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 • rules across multiple disparate specimens belonging to the same order	Fee for additional users	\$2.3k	-
requirements via a powerful parameterization tool • rules across multiple disparate specimens belonging to the same order • simplifies handling and coordination of various tests for samples	Distinguishing features of middleware (supplied by yondor)	high level of workflow customization meeting customer-specific	flexible—can be adapted to customer needs
• rules across multiple disparate specimens belonging to the same order • simplifies handling and coordination of various tests for samples	שייים ארוויטיוויש וכענערט טי ווועעופאמר (סעאווכע איז אפוועטו)	requirements via a powerful parameterization tool	efficient and effective; improves and expedites workflow
		• rules across multiple disparate specimens belonging to the same order	• simplifies handling and coordination of various tests for samples

robust multi-site, multi-lab, and multi-LIS implementation support with full LIS downtime management

March 2009

Middleware systems

Part 7 of 9	Roche Diagnostics Aime Chidester aime.chidester@roche.com 9115 Haque Rd	Siemens Healthcare Diagnostics Sepehr Seyedzadeh sepehr.seyedzadeh@siemens.com 511 Repedict Ave
See accompanying article on page 12	Indianapolis, IN 46256 317-521-2000 www.roche-diagnostics.us	Tarrytown, NY 10591 914-524-3827 www.siemens.com/diagnostics
Name of middleware system	Roche Middleware Solution (supplied by Data Innovations)	Advia CentraLink (supplied by MIPS)
First ever middleware installation/Most recent installation	1998/2009	2001/January 2009
(based on January 2009 survey deadline) Last update of middleware system	November 2008	September 2008
No. of contracts for sites operating middleware • ILS, contracts/Foreign contracts (In what countries?)	630 630/0	_
No. of sites operating middleware Percentage of business that is middleware	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	Dell OptiPlex 755, Dell PowerEdge 2900	Dell server systems (PowerEdge 2900 III, PowerEdge 1800)
 Proprietary hardware required? Smallest hardware platform system can run on 	yes Dell AntiPlex 755, 80 GB hard drive, Core 2 Duo F4600/2 4 GHz processor	yes Dell PowerEdge 1800
Largest hardware platform in use	multiple middleware servers connecting 20 geographically dispersed, networked customer locations	Dell PowerEdge 2900 III
Software platforms Fault-tolerant solutions/Hardware must be purchased from company?	Windows XP, Windows 2003 server ves/ves	Windows-based operating system (Windows server 2003, XP) no/ves
Databases used	InterSystems Caché	OpenEdge
Storage capacity of standard configuration of hardware • No. of results/orders that can be stored	80 GB-Dell OptiPlex; three 146 GB HDs-Dell PowerEdge 2900 (RAID 5) limited only by storage size/limited only by storage size	180 GB 40 000 000/960 000
System can interface with instruments from any manufacturer?	no (with all Roche centralized diagnostic equipment, Siemens Centaur, specified Stago and Sysmex instruments)	yes (third-party manufacturer instrument can be interfaced upon Siemens' approval)
Data supported from microbiology instruments	numeric, alpha, multi-level, images	
Data supported from genomics instruments	_	
No. of instruments one middleware device can support	unlimited	32 DC with standard interference
Protocols middleware supports to interface to instruments	FG with standard interfaces HL7, ASTM, XML, proprietary, ODBC/SQL	FC with standard interfaces HL7 (2.5), ASTM (1394), proprietary
Low-level transport middleware supports to interface to instruments	serial, TCP/IP	serial, TCP/IP, FTP
LIS/HIS/EMR interfaces for receiving orders	McKesson, SCC Soft Computer, Cerner, Meditech, Sunquest, homegrown	Siemens, Aspyra, Sunquest, Cerner, CIS, Meditech, McKesson, Multidata, Orchard, GE Healthcare, SCC Soft Computer, Schuvler House, others
LIS/HIS/EMR interfaces for sending results	McKesson, SCC Soft Computer, Cerner, Meditech, Sunquest, homegrown LISs, others	Siemens, Aspyra, Sunquest, Cerner, CIS, Meditech, McKesson, Multidata, Orchard, GE Healthcare, SCC Soft Computer, Schuyler House, others
No. of diff. host system connections operational at once on one middleware unit Protocols system supports to interface to other systems	unlimited HL7, ASTM	1 HL7 (2.5), ASTM (1394), Technidata LMX 6.0
Human languages middleware supports (other than English)		Spanish, French, Italian, German, Dutch
Multiple languages can be used at same time on one system? Sustam supports local data and time formate?	no	yes
No. of users that can access system at once	operating system dependent	15
No. of user security levels system supports	unlimited	4
Users can write all rules for system? • System supports simple rules?/System supports compound rules?	yes ves/ves	yes ves/ves
 Programming or script language required to write rules? 	no	no
Full and persistent audit trail of rules?/System supports rules testing? OC data used as part of auto-verification or rules process?	yes/yes	no/yes ves
Results that are entered manually processed by rules?	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?	yes	yes
System supports test-based load balancing across instruments? Events that lead to automation routes being dynamically undated	yes new test requests reflex test requests instrument down	yes new test requests reflex test requests instrument down
Audit trail of the route a sample has taken?	yes	yes
Laboratory automation system interfaces System interfaces with poninstrument automation devices?	Roche, PVT LabSystems, TTA (Task Target Automation) yes (PVT RSD and RSA products for sample sorting and aliquetting)	Siemens ves (Siemens' Advia LabCell, WorkCell)
Back-end specimen storage and retrieval tracking?	yes	yes
System supports management of inst. & automation device maintenance records? • System provides alerts when an instrument needs maintenance?	yes	no
System provides LIS downtime functions?/System allows for manual order entry?	yes/yes	yes/yes
System generates downtime specimen ID?/Algorithm user definable? Orders entered in middleware manually are sent back to LIS automatically?	yes/yes yes	yes
System supports data collection or data mining?	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 (export-only feature into Bio-Rad)
Users can customize screens?	100 100	yes
Users define custom fields?/Users populate custom fields via user-defined rules?	yes/yes	yes/yes
Screen has image support for any type of image? Users design own reports?/Penert_constantion activers used	no yes/any ODBC-compliant reporting application (Crystal Reports, MySQL,	yes vac/Advia Contral ink internal coffware
Reports include any data elements in database?	Excel, others) yes	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	_	_
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

Part 8 of 9	Siemens Healthcare Diagnostics	Sysmex America
	Sepehr Seyedzadeh sepehr.seyedzadeh@siemens.com	Tammy Kutz communications@sysmex.com
	Tarrytown, NY 10591	Mundelein, IL 60060
See accompanying article on page 12	914-524-3827 www.siemens.com/diagnostics	847-996-4500 www.sysmex.com
Name of middleware system	EasyLink Informatics System	Sysmex WAM
First ever middleware installation/Most recent installation	2001/January 2009	2003/December 2008
(based on January 2009 survey deadline)	December 0000	
Last update of middleware system	December 2008	October 2006
 No. of contracts for sites operating middleware II.S. contracts/Foreign contracts (In what countries?) 	_	116 112/4 (Canada)
No. of sites operating middleware	_	272
Percentage of business that is middleware	-	5%
Staff to develop/install and support/other* in entire company	-	53/176/202
Staff to develop/install and support/other* in middleware division	-	12/18/46
Hardware platforms Proprietory bardware required?	Windows-based PC	Red Hat Linux
Smallest hardware platform system can run on	yes Windows-based PC	Linux
Largest hardware platform in use	Windows-based PC	Unix
Software platforms Fault-tolerant solutions/Hardware must be nurchased from company?	Windows XP no/ves	Compuware Uniface
Databases used	Firebird	Oracle
Storage capacity of standard configuration of hardware	120 GB	sized for 2 years of data storage
No. of results/orders that can be stored	34,000,000/7,000,000	2 years worth/2 years worth
System can interface with instruments from any manufacturer?	yes (third-party manufacturer instrument can be interfaced upon Siemens' approval)	no (with Sysmex hematology analyzers and automation, including SP1000i slide maker/stainer and TS-500 tube sorter: Bio-Bad Variant II
.		Turbo [HbA1c]; CellaVision [digital cell morphology])
Data supported from microbiology instruments	_	_
Data supported from genomics instruments	_	_
No. of instruments one middleware device can support	8	unlimited across multiple sites
Configuration of middleware device Protocols middleware supports to interface to instruments	PC with standard interfaces ASTM (E1394-97) proprietary	— HI 7 (2 3) ASTM (E1304) proprietary
Low-level transport middleware supports to interface to instruments	serial, TCP/IP	serial, TCP/IP
LIS/HIS/EMR interfaces for receiving orders	Siemens, Cerner, Meditech, Sunquest, SCC Soft Computer, others	Cerner, Sunguest, Meditech, SCC Soft Computer, McKesson, GE Healthcare.
g		others
LIS/HIS/EMR interfaces for sending results	Siemens, Cerner, Meditech, Sunquest, SCC Soft Computer, others	cerner, Sunquest, Meditech, SCC Soft Computer, McKesson, GE Healthcare, others
No. of diff. host system connections operational at once on one middleware unit	2	unlimited
Protocols system supports to interface to other systems	ASTM (E1394-97), proprietary	HL7 (2.3), ASTM (E1394), proprietary
Human languages middleware supports (other than English)	Spanish, French, Italian, German, Portuguese, Japanese, Greek	none
 Multiple languages can be used at same time on one system? System supports local date and time formats? 	yes ves	no ves
No. of users that can access system at once	25	unlimited
No. of user security levels system supports	3	unlimited
Users can write all rules for system?	yes _	yes _
 System supports simple rules?/System supports compound rules? Programming or script language required to write rules? 	yes/yes no	yes/yes no
Full and persistent audit trail of rules?/System supports rules testing?	yes/yes	yes/yes
QC data used as part of auto-verification or rules process?	yes	no
	yes	yes
System supports event notification? System user notified of rules-based events?/Notification methods supported	yes ves/visual notifications	yes ves/pop-up, audio/visual
Automation routes determined by user-defined rules?	ves	ves
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? I aboratory automation system interfaces	yes Siemens	yes Svsmex
System interfaces with noninstrument automation devices?	no	yes (Sysmex SP1000i slide maker/stainer and TS-500 tube sorter,
		CellaVision digital cell morphology)
Back-end specimen storage and retrieval tracking?	yes	yes
System supports management of inst. & automation device maintenance records? System provides alerts when an instrument needs maintenance?	yes ves	no
System provides LIS downtime functions?/System allows for manual order entry?	ves/ves	ves/ves
System generates downtime specimen ID?/Algorithm user definable?	no/no	no/yes
Orders entered in middleware manually are sent back to LIS automatically?	yes	yes
	yes	10
Quality control module? System interfaces to third-party OC packages?	yes ves (export-only feature into third party such as Rio-Rad)	yes no
System supports multi-rules?	yes	yes
Users can customize screens?	Ves	no
• Users define custom fields?/Users populate custom fields via user-defined rules?	no/yes	yes/yes
Screen has image support for any type of image?	yes	yes
Users design own reports?/Report-generation software used	yes/Jasper Reports	no/—
Keports include any data elements in database?	yes	no
Around-the-clock customer service in U.S.? System training available/On-site consulting?	yes e-learning on site classroom/ves	yes classroom on site e-learning/ves
cystom u anning avanabit/UII-Site UUISUIUIIY?	o เงนากแห้ง กา อแร่, กาสออากกาท / 200	010301 UUIII, UII 3116, 5-1601 IIIIIY Y53
Smanest 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	flexible rule engine with extensive rule-variable combinations for
0	to patient results, QC data, and specimen information across multiple	building rules for autovalidation, reflexing, add-on testing, generation
	network locations • comprehensive and integrated OC packages patient median colouistica	 manual unterential smears, and sample routing ability to support orders and results from multiple LISs and multiple
	customizable rules, audit trail and reporting	sites for managing patient and QC results
	• supports preventative maintenance and remote diagnosis/access of	 Go module has advanced graphing capability for review of up to six instruments' data by test or control material superimposed on one graph
	connected instruments	

March 2009

Middleware systems

Dant 0 of 0	Technidete America Madical Cothucara	Tashuidata America Madical Coffman
	Ricardo Nunez ricardo.nunez@technidata-web.com	Ricardo Nunez ricardo.nunez@technidata-web.com
	1760 E. River Rd., Suite 302 Tucson, AZ 85718	1760 E. River Rd., Suite 302 Tucson, AZ 85718
See accompanying article on page 12	520-577-2872 www.technidata-web.com	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	1991/November 2008	1991/2008
(based on January 2009 survey deadline) Last update of middleware system	December 2008	January 2009
No. of contracts for sites operating middleware • U.S. contracts/Foreign contracts (In what countries?)	440+ 160+/280+ (Europe, Middle East, Asia-Pacific, Latin America, South Africa, Canada)	20+ 2/20+ (Canada, France, Italy, United Kingdom)
No. of sites operating middleware Percentage of business that is middleware	440+ (primarily via OEM and distributors) 25%	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	47/42/41	47/42/41
Start to develop/instant and support/other* in induleware division	12/13/10	12/13/10 hardware independent
Proprietary hardware required?	no	no
Smallest hardware platform system can run on Largest hardware platform in use	1 Windows-based PC 5 PCs	2 Windows-based PCs fault-tolerant system supporting 25 concurrent users
Software platforms	Windows 2003, XP, Vista (older versions of Windows with older versions of	Linux, Windows 2003 server, VMware ESX
Fault-tolerant solutions/Hardware must be purchased from company?	no/no	yes/no
Databases used Storage capacity of standard configuration of bardware	Microsoft Access, proprietary	Oracle, SQL server
No. of results/orders that can be stored	500,000/500,000	unlimited/unlimited
System can interface with instruments from any manufacturer?	yes	yes
Data supported from microbiology instruments Data supported from molecular instruments	numeric, aipna numeric, alpha	numeric, aipna, muiti-level numeric, alpha, multi-level
Data supported from genomics instruments		numeric
Configuration of middleware device	o per PC PC with standard interfaces	200 PC with standard interfaces
Protocols middleware supports to interface to instruments	HL7 (v. 2.3), ASTM (1394), XML, proprietary, POCT-1A	HL7 (v. 2.3), ASTM (1394), XML, proprietary, POCT-1A
LIS/HIS/FMR interfaces for receiving orders	Serial, Tor/IF, FTF	serial, TGF/IF, FTF, LAT
	homegrown, proprietary, others	
LIS/HIS/EMR interfaces for sending results	cerner, McKesson, Sunquest, Meditech, Siemens, SCC Soft Computer, homegrown, proprietary, others	nomegrown, meditech, molis, mirs, misys, leiepath, Antrim, others
No. of diff. host system connections operational at once on one middleware unit	1 HL7 (v. 2.3). ASTM (1238). proprietary	8 HI 7 (v 2 3) ASTM (1238) proprietary
Human languages middleware supports (other than English)	21 Janguages including Spanish French German Korean Greek Jananese	21 Janguages including Spanish French German Korean Greek Jananese
• Multiple languages can be used at same time on one system? System supports local date and time formats?	no yes	yes
No. of users that can access system at once	5 (requires Windows 2003 server)	hardware/licenses dependent
lisers can write all rules for system?	ves	o Ves
System supports simple rules?/System supports compound rules?	yes/yes	yes/yes
 Programming or script language required to write rules? Full and persistent audit trail of rules?/System supports rules testing? 	no no/ves	no ves/ves
QC data used as part of auto-verification or rules process?	yes	yes
Results that are entered manually processed by rules?	yes	yes
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?	no no	yes no
Events that lead to automation routes being dynamically updated Audit trail of the route a sample bas taken?	n	new test requests, reflex test requests, instrument down
Laboratory automation system interfaces	Roche, Siemens, Sysmex, A&T Corp.	Beckman Coulter, Roche, Siemens, Thermo Scientific, Sysmex, A&T, Tecan
System interfaces with noninstrument automation devices?	no	yes
Back-end specimen storage and retrieval tracking? System supports management of inst. & automation device maintenance records?	no yes	yes yes
System provides alerts when an instrument needs maintenance?	no	no
System provides LIS downtime functions?/System allows for manual order entry?	yes/yes ves/ves	yes/yes
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? System interfaces to third-party OC packages?	yes ves (export to Microsoft Excel)	yes ves (Bio-Rad Unity QC. export to Microsoft Excel)
System supports multi-rules?	yes	yes
Users can customize screens? • Users define custom fields?/Users populate custom fields via user-defined rules?	yes no/no	yes no/no
Screen has image support for any type of image?		yes
users design own reports?/Keport-generation software used	yes/proprietary, export to Microsoft Excel	yes/proprietary, Grystal Reports (other tools can be used)
Around-the-clock customer service in U.S.?	yes	yes
system training available/Un-site consulting?	ciassroom, on site, e-learning/yes	ciassroom, on site, e-learning/yes
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	ergonomic, user-friendly, rule-based system with powerful and friendly
	 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 	rules editor • patient and production audit trail; automatic real-time processes • open system; scalability; specialized microbiology module