We Connect the Systems that Power Education®

Understanding SIF—the Open Choice for Integrating Educational IT

The Schools Interoperability Framework® provides true data interoperability and integration—from the smallest school district to the largest state education agency.

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EDUSTRUCTURES

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The Goal: Interoperability and Integration

Education is all about integration—helping students gain knowledge and skills across disciplinary boundaries so they can grow to become well-rounded and productive adults. The successful graduate is much greater than the sum of his or her individual areas of knowledge.

It's the same way with educational IT. Many school districts and state education departments are now looking to remake their IT environments to enable more unified identification, instruction, tracking, and reporting across the educational system. At the same time, they're looking for secure, high-performing systems that evolve and adapt. And they're looking for an affordable integration strategy that returns much greater value than the cost of its individual components.

Achieving these goals requires a fundamentally new approach to IT. Yesterday's siloed systems extract huge costs in terms of redundant data entry, data inconsistency and inaccuracy, manual collation of data for combined reports, and other time-consuming and risk-prone processes. Today's and tomorrow's schools will require an effective integration platform that allows systems to freely share standardized data provided by authoritative sources, enabling continuous growth and improvement in IT capabilities without the labor and expense of reinventing system interfaces with each change.

Through effective integration and standardization, a single student enrollment process can automatically:

- Provide student information to Active Directory
- Create email and Web access account
- Populate the student record
- Generate a bar-coded ID card
- Grant secure access to the library and cafeteria
- Begin tracking the student's individual progress
- Include the student in NCLB reporting
- Create a new alumni record upon graduation

More than 90 percent of the data-entry and management effort can be eliminated, while minimizing the risk of errors and inconsistencies between systems. And with thousands of students moving through the system each year, the reduced labor and risk add up to enormous potential returns.

Choosing the Right Integration Approach

Given these benefits, the question isn't whether to integrate, but how. Like any other type of enterprise, school districts and states must choose whether to build or buy, whether to go with a general-purpose or an industry-specific solution, and whether to base the solution on open standards or proprietary protocols.

Learning from Other Industries

Over the past several years, industries of all types have increasingly moved away from point-to-point connectivity, instead building multi-tier architectures that decouple applications from one another and provide a shared layer for data modeling and message handling. This approach obviates the need to map data formats between each individual application. Instead, applications require a one-time mapping to the shared data model—making it much easier to add or remove applications in a modular fashion and to designate specific applications as authoritative data sources.

When evaluating solutions that achieve integration through this tiered approach, educational IT departments rightly look to technologies that have been so successful in other industries. These include Web Services in a Service-Oriented Architecture (SOA), with standard protocols such as HTTP and SOAP handling data transactions between loosely coupled applications in a modular environment. Commercial products—such as the Enterprise Service Bus (ESB) implementations available from Microsoft, Oracle, IBM and other vendors—are often chosen to provide the middleware abstraction layer between the underlying enterprise messaging system and the SOA itself.

As a general-purpose architecture, the SOA approach with ESB middleware works well, and has made large-scale integration of disparate applications more practical and beneficial than the point-to-point integration techniques, which characterized previous integration approaches. In fact, this general architecture is often the default recommendation for enterprises that have unique needs along with the technical resources, IT budgets and development time required to customize their application integration.

The Limitations of SOA

But for enterprises that can't devote full-time specialists to customizing and managing the solution, this approach can be fraught with risk. There's nothing simple or standardized in the SOA concept, and no fully developed SOA solutions you can simply buy to meet your specifications.

Without industry-specific data and messaging models already in place, you have to build these models yourself—a process that could literally take years depending on the complexity of the environment. No general-purpose ESB can provide the required messaging capabilities or SOA services off the shelf. Furthermore, you have to manage messaging versions on an ongoing basis, and

any new application or update threatens to "break" the system if it introduces a new data format that you haven't previously incorporated in your design.

The Importance of Industry Standards

No one wants to reinvent the wheel, although general-purpose ESB vendors may try to convince you that's a good idea. For truly unique enterprises, building from the ground up may be the only option. However, many industries have well-defined requirements, and have developed industry-specific standards and protocols to make things much easier. HL7 standards for healthcare, PCI for the payment card industry, and MMS for manufacturing are just a few examples of industry-specific standards that make it far easier to implement solutions that interoperate across the enterprise. And without such standards, it would be difficult or impossible to interoperate with other enterprises across the industry.

When you choose a general-purpose ESB product, you're committing to building and maintaining your own proprietary solution—one that will never natively integrate with new applications or the solutions used by other schools and districts.

Two questions may arise. First, doesn't an industry-specific standard defeat the purpose of an open SOA? The answer is a resounding *no.* The architecture itself has no content or purpose until there's a specific data model and messaging model to handle the communication requirements of the applications supported by the architecture. If you don't have an existing standard tailored to your industry, you have to build one yourself. Having an industry-specific standard makes it far simpler to build your own interoperability platform. For that matter, having a standard makes it possible for application vendors to build to that standard, making your integration job even easier.

The follow-up question is, does such a standard exist for the education market? And here, the answer is a resounding *yes.* The Schools Interoperability Framework (SIF) is the acknowledged standard for application and data integration in educational settings. At Edustructures, we believe SIF provides the best foundation for integrating IT in educational environments, and that's why we develop SIF-based solutions.

Understanding SIF

As we've worked with educators and IT directors to raise awareness of SIF and propose integration solutions, we've often encountered confusion about SIF and how it relates to the more familiar concepts of SOA, ESB, SOAP and Web Services. Compounding this confusion is the often-heard advice that SOA and ESB are the only way to go when building an integration solution.

This advice often comes from ESB vendors as well as IT professionals who have come to education from another industry where they worked with an SOA built

upon an ESB. And when repeated as conventional wisdom, this advice only increases the confusion by painting SIF and SOA/ESB as competing choices. But this confusion is largely the result of a historical accident.

The History of SIF

The Schools Interoperability Framework Association (SIFA) was originally founded in 1997 as a working group of the Software and Information Industry Association (SIIA). SIFA became independent of SIIA in 2003, incorporating as a not-for-profit membership organization. Today, SIFA comprises more than 1,700 software vendors, school districts, state departments of education, and other organizations—all collaborating on open, platform-independent, vendor-neutral standards designed to integrate school IT systems end-to-end and provide educators with the most current and accurate data available.

Since its 2003 incorporation, SIFA has steadily gained a higher profile, and SIF-based integration solutions are now achieving significant penetration in education markets. And SIF will continue to gain prominence as more educational organizations see the necessity for integrated data and applications to improve accountability and compliance, eliminate duplications and errors, reduce budgetary pressures, and provide a comprehensive learning experience.

Despite today's growing awareness, it's important to remember that the basic terminology behind SIF was formed beginning in 1997. For the sake of comparison, the W3C was founded in 1994; the concept of an SOA was first described by Gartner in 1996; SOAP and XML both came into being in 1998; HTTP/1.1 was released in 1999; and the Web Services Activity of W3C was launched in 2002.

In other words, the terms and technologies many people associate with SOA were still in flux while SIF standards were already well underway. And the parallel development of separate terminologies for SIF and generic SOA has obscured the fundamental ways in which these two concepts overlap, drawing upon the same basic architectural concepts.

SIF is an SOA

Despite the differences in terminology, the truth is that *SIF is an SOA.* Or, to put it more precisely, SIF is an enabling standard for an education-specific SOA that uses a specialized ESB architecture.

General-purpose ESB vendors often don't understand SIF or incorrectly dismiss SIF as "proprietary," so our claim that SIF enables an education-specific SOA using a specialized ESB architecture may seem counterintuitive. Let's unpack this claim to see why it's true.

Developed and maintained by SIFA, SIF defines a canonical data model that enables all participating applications to exchange data by means of application agents that communicate with a central Zone Integration Server (ZIS). Communications between agents and the ZIS use a unified messaging model that's independent of the underlying protocol. Most implementations use HTTPS over IP because it's the most widely used standard for secure communications, but other protocols can be used as well.

The ZIS controls which applications have authority for which data items and handles the routing of data between all applications. In effect, *the ZIS is an ESB*—but it's a specialized ESB designed to handle data and messaging optimized specifically for education, rather than a general-purpose ESB that requires you to create the messaging model from scratch.

By decoupling applications from the communications layer, this architecture allows you to:

- Plug in, modify, or remove applications without affecting other applications
- Ensure authoritative data sources
- Eliminate duplication of effort
- Automatically provision directories
- Consolidate reporting

Most important, the architecture helps streamline processes and model their real-world interactions—from student enrollment, to meal plans, to grading, to graduation, to electronic transcript exchange. Instead of separate islands of information, all your systems interact in a holistic way. If you think that sounds like a good metaphor for the ideal educational environment and the well-rounded student, you're right. If it also sounds—literally—like the definition of an SOA, you're right about that as well.

Why SIF is Better for Education than a General-purpose ESB

If SIF-based solutions use essentially the same architecture and support the same communication protocols as ESB products, why should you choose SIF for your educational IT integration project?

With SIF, you're choosing an open standard specifically optimized for education.

If you've been told that ESB is open while SIF is proprietary, the answer to that question may seem surprising. Using a general-purpose ESB forces you to develop your own data and messaging models. It requires you to develop a way to map each application to the overall solution—even though you have no way to know how the applications work "under the hood" since you have no access to the source code or technical documentation.

Furthermore, each new application you add to the environment will require new development efforts, and you might not be able to integrate some applications at all—leaving you with the labor and risk of performing some processes manually. When there's a change in one application—for example, a new Student ID format—the change could have unpredictable ripple effects throughout the system. And if you ever exchange data with another school system, you'll be dealing with a completely foreign data model.

In other words, a solution based on a general-purpose ESB product is actually a one-off solution that *you have to build and implement yourself*, which could literally take years. And you have sole responsibility for maintaining, repairing and upgrading the solution, even when the future brings new and upgraded applications that require you to significantly revise your data model. When you sign up for such a project, you're becoming your own developer and help desk for *your own proprietary solution*.

SIF is the Open Choice

SIF, by contrast, is the truly open choice. It's the acknowledged and widely used standard for IT integration within education, providing a common specification that any solution vendor or IT professional can freely access and use. At the same time, SIF is the easy choice, supporting an entire ecosystem of applications that are essentially "plug-and-play," so you can be up and running in days instead of years.

With SIF, the data and messaging models have already been designed and optimized specifically for education. For example, you don't have to determine how student names and IDs will be formatted and communicated between applications, because all data handling is formalized in the SIF specification. There are currently more than 8,000 data elements in the specification covering all aspects of education, and this number continues to grow under the direction of SIFA as new data requirements are identified.

Moreover, SIF-compliant vendors understand both their own applications and the needs of the education marketplace. They create SIF application agents with a thorough understanding of both their own products and the requirements of a SIF architecture, and application updates include any necessary updates to the SIF agent out of the box. So instead of figuring out how to integrate each application on your own, you can confidently add and upgrade SIF-compliant applications knowing that they will "just work" with the rest of your IT environment. SIFA certifies SIF agents and ZIS products to ensure they work according to spec and allow seamless interoperation of applications.

If you choose to build a one-off system using a general-purpose ESB, there are no education-specific data models, agent developers or product certifications to help you do it right. Instead, it's up to you to design a system that works and then constantly fight to keep it working—from initial implementation through the product lifecycles of every application in the solution.

SIF is the Scalable Choice

SIF standardization also makes it easy to scale the solution to accommodate a growing population or to bring additional schools onboard. SIF is built for scalability through the concept of stateless transactions and zones. Each zone is a building block that represents all the data and applications for an organizational unit in your school system—whether it's an individual school, a district, a city, or even an entire state. Even a single zone, using a single ZIS on a single server, can provide all the scalability many organizations require; in fact, there are entire state school systems currently running on a single ZIS.

Scaling up and out is a simple matter of adding new zones. New zones can be added to an existing ZIS server, or you can add new servers depending on performance requirements. The stateless messaging protocol allows you to easily add more nodes to provide more processing power—without the need for multiple nodes to share states.

Web Services, SOA, and ESB are high-level concepts with no inherent standardization and no equivalent to SIF zones. If you build your own solution, on the other hand, you also have to create your own method for scaling it and then live with the consequences of your prior choice if your scalability needs change.

SIF: Built for Education

As we've seen, there's a commonly held fallacy that a generic ESB product provides openness, while SIF-based products lock you into a proprietary model. In fact, the very opposite is true. When you choose a general-purpose ESB product, you're committing to building and maintaining your own proprietary solution—one that will never natively integrate with new applications or the solutions used by other schools and districts.

With SIF, you're choosing an open standard specifically optimized for education, with an entire ecosystem of vendors who provide applications that work out of the box—and will continue to work for decades to come.

About Edustructures

Edustructures is the recognized leader in SIF integration solutions for education, making it possible for market-leading solutions to reliably and securely share data in real time. Edustructures delivers:

- Premier SIF technology—the SIFWorks® integration platform is the foundation of more SIF implementations, in the U.S. and internationally, than any other SIF solutions provider
- Comprehensive Professional Services—best practice-based implementations and ongoing customer support assure SIF success
- Strategic industry relationships—ensuring that *we connect the systems that power education*™

For more information about Edustructures, please visit www.edustructures.com, or call toll-free at 877.790.1261