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Interoperability In School Information Systems

I. Overview

With regard to computer technology, the term “interoperability” is broadly applied. It can mean allowing Mac clients to connect to a Windows server, or it can mean publishing a Word processing document in a Web-compatible format. For the purpose of this introduction, the term interoperability will be used to describe the use of technology, professional standards, and procedures with the purpose of ensuring that the content (or data) created in a particular software package can be viewed and revised in another computer program, regardless of the manufacturer or operating system.

This document discuss the problems of that interoperability attempts to solve as well as introduce the concept of interoperability frameworks. The Schools Interoperability Framework, (SIF) is described in detail, to provide a practical example of an interoperability solution. A review of key concepts and principles of XML is included for convenience.

II The Nature of Interoperability

Imagine you are a business owner in the mid 1800's. It's the midst of the Industrial Revolution. New inventions are popping up every day. There are brand-new machines and improvements on others. Your sales have been rising and the economy is on the upswing. One of the developments, the railroad, has helped immensely in this success. The railroad system, though, presents numerous new challenges. In the first place, time is not standardized. Trying to plan for future shipments is a nightmare. Getting your product where you want it to go, when you want it to get there isn't always feasible. Getting from point "A" to point "B" is not a problem. The tracks are well made and that company's train is usually on time. The problem is getting goods from point "A" to point "C" while having to pass through point "B." Why? It's because the track from B to C is not the same width (between the rails, or gauge) as the track from A to B. You have to make arrangements to unload the first train at B and then load up a second train to take your shipment to C. This process costs time and money. Products are lost due to physical damage and inventory errors.

The situation we have in the information age is not far off from that endured by an entrepreneur in the 1850's. Because of incompatibility among information systems, and software applications our product (information) often gets damaged or lost if it has to be repeatedly entered into multiple locations. Software companies develop proprietary source code. The code is created without regard to how it may or may not interact with other applications. The code will usually be compatible with other products from the same company, but will probably need some sort of transfer method in order to be usable with software from other companies.

How does this situation affect the educational process? School districts are constantly under pressure to implement the latest technologies in the classroom, the administration office, the library, the cafeteria, and the transportation office. Each of these areas keeps student records. In many cases, there is separate software for each reporting group. The challenge of interoperability is making these systems work together, such that the disparate systems are made aware of each other, regardless of the users' products or operating systems.

To properly set expectations, it should be noted that while the promise of interoperability is large, it should never be expected to become universal. For example, it's unlikely that data generated by a gene-sequencing program would be imported into a desktop calendaring program. While it's theoretically possible, there would be little value to adding billions of lines of data into your weekly to-do list.

However, it is a very likely scenario that a school district may want to share data about trends in truancy and grade averages with state or federal agencies. And It's a common occurrence that an instructor or learner may not have the required software to view learning content obtained from the web or other source. Below are descriptions of three common interoperability problems: redundant data entry, content sharing among desktop applications, and publishing of educational material across multiple formats.

1. **Redundant Data Entry and Data Tombs–** If two or more databases containing similar records are maintained separately, then there is potential for high levels of inconsistency among the databases. An example might be a database of students' grades maintained by individual schools, and another might be a database of subsidized lunches that is maintained by the school district. There is going to be information common among these databases, however, because these are maintained separately there is bound to be variances in the students' records. For instance, one database might have a student's name as 'Bill' and his address as 'Woodward.' The other might have a record of the same student as 'Billy" and his address 'Woodwind.'

   Suppose that the state has requested a district to compile a report that presents the grades of all students in the subsidized lunch program. Because of the discrepancies, the generation of an accurate report could not be done without an arduous process of proofreading and editing (are Bill and Billy the same person? Who would know that? We'd have to verify with that person, then change the record on the report; then we should also change it on the in the grades database, and then in the subsidized lunch database). The data are not easily shared between these source and, in a sense, are isolated in data "tombs"[1] making reports of this nature difficult to generate.

2. **Content Sharing Among Desktop Applications—**Sharing of electronic documents is a common practice. However, you may need to create a file in a program for a recipient who does not have that program. In the case of a word-processing document, you have the choice of saving it into one of several neutral formats (such as text), but all formatting is lost. The recipient would have to import the text file into his or her own program then re-apply the formats. The document could be saved as a PDF, though that will impede a user's ability to edit the content. The challenge is to allow the user to create content in one application while allowing another user to view and customize the content in a different application.

[1] www.imsproject.org/otf/IMS_SIF_2002.pdf

3. **Publishing Educational Material Across Multiple Media —** Since computers made their way into the educational setting, they have been used to create content that has been distributed in a wide array of electronic formats, including word processing, PDF, and most recently HTML. However, with traditional workflows, the end user has only one choice of a content format.

   For example, a history lesson might be built with a page layout program to ensure a high-aesthetic quality. The interoperability challenge is that while the document can be converted to electronic formats (HTML, PDF, etc.) for distribution, each limits the ease with which the content can be customized for other educational context. Furthermore, an electronic page layout is of no value to students who are visually impaired.

   The promise of *cross-media publishing* is that content can be created once and can be automatically converted ('repurposed' is the buzzword) for a variety of media, based on the end users' preferences; this could essentially be any electronic, print, or even spoken format.

Approaches To Interoperability

One interoperability option, and the least practical, is to manually convert data. If an organization is trying to combine the records of two or more dissimilar databases, it is possible to do so manually. Database records can be printed, quality checked and revised. If there are discrepancies between these databases, there must be resolution by a qualified knowledge source. A similar manual approach might be employed in the scenario where learning content is created in software vendor's proprietary format and needs to be transformed into a competing format. These methods of sharing data are extremely time consuming and highly inaccurate.

A second way that interoperability can be addressed is with collaborative efforts between software manufacturers. This currently happens at varying levels, but full compliance can only be realized if software developers from competing companies were to share each other's source code, an event that rarely happens. Furthermore, even if there was full cooperation between two software developers, interoperability would be still be limited to products from these companies alone.

A third way that interoperability can be realized is for an industry or professional organization to draft standards—a ***framework***—to which members, as well as their clients and vendors, strive to adhere. This is, by far, the most viable. With respect to computer technology, a framework provides the structure for development of commercially released products, and also prescribes a

standard of how information will be delivered among members, their clients and suppliers, and other key stakeholders.

There are many organizations that have developed frameworks for educational topics such as accessibility, assessment and educational content.[2] These frameworks, though targeting different objectives, employ a similar approach. Each has addressed problems specific to its focus, and each includes means of exchanging data among its members and other stakeholders. A forthcoming section will further discuss the **Schools Interoperability Framework (SIF)**, to provide an example of an application of a professional framework. The section that immediately follows provides a review of XML, even you are comfortable in your understanding of XML, you may want to make a few moments to review this section before moving onto the SIF section

Review of XML

As we learned in a previous unit, XM like HTML, is a standard that was created, approved, and continues to be modified by the Worldwide Web Consortium (W3C). However, while HTML essentially tells a Web browser what text should look like, and where graphics should be placed, XML provides a means of describing data in such a way that they can be understood by a vast number of applications. Remember, "extensible" means that any organization or person can develop a personalized (extended) language for the description of data. Thus, an accountant may develop data descriptor fields such as 'depreciation' and 'debit' while a zoologist might use descriptor fields like 'genus' and 'species.'

XML is used in a plethora of ways. XML provides a means to exchange data/content between disparate applications. Because of the language's flexibility, many software makers have adopted XML compatibility. Many major software titles already support XML, or will do so in forthcoming version releases.

Another use of XML is for "cross-media publishing." XML content can be easily converted ('repurposed') so that it can be viewed in a browser or a variety of other presentation formats, including print. XML content can also be repurposed into Braille, or voice communication, so XML's value is growing dramatically in the area of accessible content.

In the area of software configuration, an XML file can usually stand alone; however, in the area of interoperability, including cross-media publishing, there are usually three layers to an XML-based workflow: the data requirements, the data or content itself, and the presentation of the data.

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[2] http://www.xml.org/xml/registry_searchresults.jsp?industry=22&keyword=&update_date=7200&schema_type=0

Data Requirements–XML data rules are usually described with a 'Document Type Definition' or *DTD*. The DTD is a description of rules for an XML document. The DTD lists all elements that will be in an XML file as well as if they are required or optional. Since the XML standard was approved in 1998, thousands of industry-standard DTD's have evolved. There are DTD's[3] specific to genetics, advertising, aviation, human resources, etc. One of the foundations of SIF is a DTD that is specific to the K-12 context.

The XML Content–This is the actual XML code. An XML file can be created in a text editor, or it can be generated by any application that is XML compliant (the list continues to grow). An XML file can be created independently of a DTD, but in order to fulfill the promise of interoperability, an XML file will be "validated" against a DTD.

Presentation–An XML file is just a bunch of code with angle brackets (<> </>); it's nothing glamorous. A *style sheet* gives an XML file a certain look by describing publishing rules. A style sheet can turn the XML code into HTML, or a number of other presentation formats.

So what does XML mean for our interoperability challenges described earlier?

• **Redundant Data Entry and Data Tombs -** Our first problem with the disparate databases might be solved by exporting data as an XML file in compliance with a DTD, so that data can be read by the second database that also references the DTD. In a refinement of our example, a record could be changed in the subsidized lunch database, and that information could be reflected automatically in the grades database. With disparate databases in synch, generation of reports can be done in few minutes, rather than several hours or days.

• **Content Sharing Among Desktop Applications -** It is already possible to exchange data among some programs with XML. Almost every major software title has XML compliance, or will have compliance in its next version release. Notably, the next version of Office will have full XML import/export capabilities. So it will soon be possible to export content from a PowerPoint document as an XML file, and be able to import into a word processing program a Web design program such as Dreamweaver, or any other XML-compliant software.

• **Publishing Material Across Multiple Media -** XML-based solutions that support cross-media publishing have become reasonably well established. There are several desktop- and server-based products that allow the content creator to update records in a single instance, and the end user can access the content in a number of formats, such as PDF and HTML. In the accessibility context, the content could be converted to an audio format (thereby "speaking" the content),

[3] http://www.xml.org/xml/registry.jsp

or even to Braille.

The Schools Interoperability Framework, once ubiquity is established, will go a long way to solving issues #1 and #2. A more detailed description of SIF follows in the next section of this paper. SIF does not currently address “cross-media” publishing or accessibility, but the same principles of data rules and presentation layers apply. There are several commercially available products, though at this writing, no organization has drafted a framework for single-source publishing in K-12 education. We will further discuss the concept of cross-media publishing in the “Content Management” unit later in the semester

III. Interoperability in K-12 Schools

Interoperability presents a challenge to any person or organization that is trying to share information. In 1997, a group comprised of software vendors, technology coordinators, and school administrators began discussing methods that would allow school districts to meet this challenge[4]. They recognized that education suffered from problems that were similar to those suffered by business, government and other entities:

- ❷Applications and their data are isolated from one another
- ❷Redundant data entry is common
- ❷Disconnected applications increase support costs
- ❷Data reporting is costly and inefficient[5]

"To help overcome the technical hurdles of data sharing, and to help schools streamline administrative reporting, and improve school management, a group of software companies and school systems joined together in 1999 to create the Schools Interoperability Framework (SIF)."[6] The key to success was not going to be making every application compliant with every other application, but to develop a framework to which software developers can adhere.

SIF is not a product. SIF is an effort by many vendors to coordinate their different software applications. As mentioned earlier, a key component of SIF is its Document Type Definition (DTD). The SIF DTD is essentially a set of education-specific rules that provide software developers and system administrators a standard to which they must comply.

The SIF DTD[7] is over 30 pages long and defines components or "objects" that help to describe data pertaining to educational operations. The DTD accounts for information such as student addresses, bus routes, student room numbers, and grade level.

Making SIF Work

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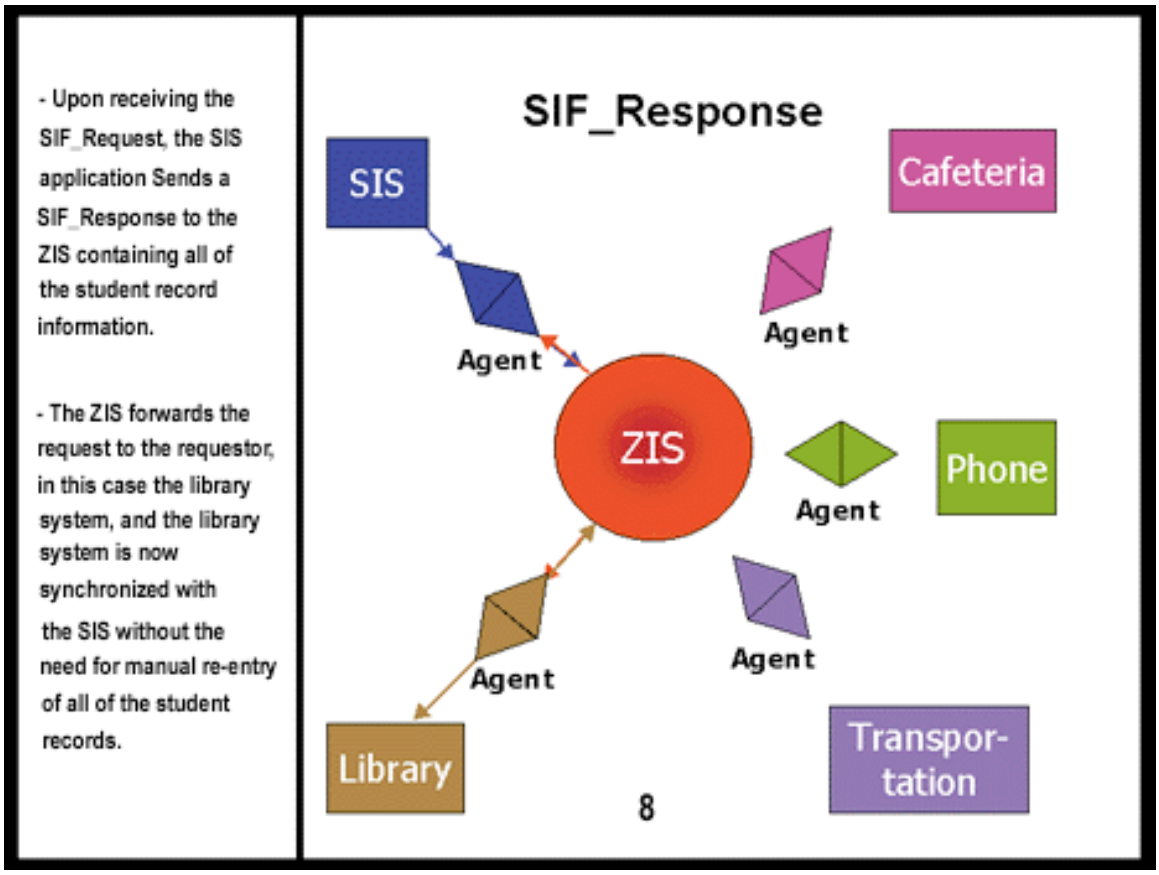
[4] http://www.sifinfo.org/overview.html
[5] http://www.sifinfo.org/overview.html
[6] March 2002, "The Work Behind SIF's Framework," T.H.E. Journal, http://www.thejournal.com/magazine/vault/A3948.cfm, June 4, 2003.
[7] http://www.sifinfo.org/spec.html

SIF, like any framework, is reliant on providers of technology. In the SIF architecture, software must not only be supportive of XML, but it must also have the intelligence to validate the XML against the SIF DTD. Furthermore, the software must be able to import and export the SIF-compliant XML files. This requires the development of a *SIF Agent*. An agent is an extension of a computer program that performs the function of validating against the SIF DTD, and importing and exporting XML data. Fortunately, the list of software companies that have pledged support to SIF is substantial. It should be a short time before a critical mass of familiar titles will be bundled with an SIF agent.

In a scenario where multiple computer programs are to be set up in the SIF framework, management by a centralized server is required. The SIF working group developed the concept of the Zone Integration Server (ZIS) to solve this problem. Essentially, the ZIS manages the information that is generated by the agents. When a ZIS is set up, each agent registers with the ZIS. The multitude of applications does not have to be aware of each other. Instead, requests are made to the ZIS and are routed accordingly. Thus, when information is updated on one database, the agent notifies the ZIS, which then propagates the information in all affected records. An added feature of the ZIS is that it helps to ensure security of all information so that information remains private as well as accurate. An illustration of a sample ZIS architecture is below:



Taken from: http://www.thejournal.com/magazine/vault/A3949A.cfm
Published by: T.H.E. Journal L.L.C., copyright 2003, accessed June 11, 2003

On the surface, an SIF information system appears rather simple, requiring only software with SIF agents and a Zone Integration Server. However, even given the trend of SIF-compliant software, it will likely be some time before many school districts can justify the software upgrades. Additionally, implementation of a SIF information system is not likely to be a core competency of a district's technology staff; thus, outside consultants may be necessary. Like every major innovation, there is the issue of change management, which means getting users to learn and adopt a new way of doing things. Still, the benefits of implementing a SIF system—removing redundancies, providing accurate, accessible data—will make the conversion worth the time and expense of doing so.

Because SIF is in its infancy, not many schools even know about it. However, some schools have engaged in pilot programs. One school is Ramsey Elementary in Minnesota. "At Ramsey, the goal was to integrate a student information system (SASIxp) with a cafeteria management system (WinSnap)

and a library automation system (Follett 4.0)."[8] Ramsey wanted to reduce the amount of time and effort used to enter data into the three different systems. SIF allows them to do that. In response to an inquiry (by the authors) about the school's assessment of the SIF pilot, Patrick Plant the district's Directory of Technoloy said that the implementation was "was ongoing and a success."

Another school district, using SIF, is "Peoria Unified School District's Copperwood Elementary. With SIF, they were able to integrate their student information, automate library check out, and automate dialing for student's absence reporting."[9]

There seems to be little downside to Interoperability. Who wouldn't want to become more efficient with less cost? What SIF does do is to require "school districts to undertake a system-wide analysis of what data is currently collected and some decisions about how this data is to shown."[10]

There are other interoperability plans in the works, but they are more tailored toward business or higher education functions. One of the earliest attempts to make interoperable software was in 1989. "Representatives from federal and state government agencies, elementary/secondary, and post secondary institutions have been meeting since 1989 to develop standard record formats based on guidelines set forth by the American National Standards Institution (ANSI) Accredited Standards Committee (ASC)X12."[11]

A system used in higher education is called SPEEDE/ExPRESS.

> "SPEEDE/ExPRESS is an electronic transcript exchange system developed by AACRAO - the American Association of Collegiate Registrars and Admissions Officers. SPEEDE refers to the collegiate system and ExPRESS to the high school sector. "It is a partner system. If you want to send transcripts electronically, there needs to be someone who is willing to receive the data. At present, there are no schools in Michigan that have an operational capability to send or to receive. Delta College and Michigan-AA both brought the system up some years ago but do

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[8] Schools Interoperability Framework, 2002, "About SIF," Software and Information Industry Association, http://www.sifinfo.org/about.html, June 4, 2003.

[9] Schools Interoperability Framework, 2002, "SIF in the Real World," Software and Information Industry Association, http://www.sifinfo.org/vendor.html, June 4, 2003.

[10] T.H.E. Journal, 2003, "How SIF Works," T.H.E. Journal L.L.C., http://www.thejournal.com/magazine/vault/A3949A.cfm, June 3, 2003.

[11] National Center for Educational Statistics, 2003, "Electronic Exchange of Data," U.S. Department of Education, http://nces.ed.gov/edi/speedeExp.asp, June 3, 2003.

not use it now. However, SPEEDE/ExPRESS is currently used extensively in Texas, Florida, and Arizona.[12]

The purpose of the SPEEDE/ExPRESS system is to create a way that high schools and high school students can interact with universities with regard to entrance applications, loan applications, and transcript submissions. As more and more states find the need for this type of program, they will turn to SPEEDE/ExPRESS, or a system just like it.

A well-constructed interoperability architecture, based on industry-standards, will provide tremendous benefits to the K-12 community. When SIF matures and is widely adopted, it will have a dramatic impact on education because it will enable teachers to spend more time teaching and less time doing data entry and maintenance. Frameworks such as SPEEDE/Express have the potential to increase efficient communication among higher education institutions and K-12 schools, thereby enhancing the learning opportunities for all learning levels. Also, by increasing data fidelity and data accessibility, interoperability, specifically the adoption of XML-based data exchange, will allow schools to realize unprecedented cost savings.

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[12] From an email from Dugald McMillan, Associate Registrar, Michigan State University 187 Administration, East Lansing, MI 48824-0210, 517-353-4490, fax 517-432-3347 dugaldmc@msu.edu

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T.H.E. Journal, 2003, "How SIF Works," T.H.E. Journal L.L.C., http://www.thejournal.com/magazine/vault/A3949A.cfm, June 3, 2003.

V. VENDORS

ACE Software LLC www.adm2000.com : Student financial software: Product name; "ADM 2000," attendance, grades, scheduling, demographics
Achieve Inc. www.achieve.org: Customizing curriculum for states.
Administrative Assistants Ltd. www.admassist.com: Student records: Product name; "eSIS™"
Alphanumeric www.alphanumeric.com : Student information. Product name: "eDirectory"
American Association of School Administrators www.aasa.org: strictly an advisory organization
Anoka-Hennepin School District www.anoka.k12.mn.us/Ahnet: School district participating in SIF pilot
Apex Learning www.apexlearning.com: online instruction: Product name; "classtools."
Apple Computer Inc. www.apple.com: hardware and educational software; products include: "iMac," " iBook," " Airport," " itools" (Mac.com, KidSafe, iDisk, Homepage)
Blackboard Inc. www.blackboard.com: Online educational tool designed to "transform the Internet into a powerful environment for the educational experience."
Brainium Technologies www.brainium.com: Hardware: Product: "The Brainium Dream Max" (wireless computer), "Dreamwriter 450" (word processor)
Bromcom Computers Plc. www.bromcom.com: Attendance and Registration Program: Product names: "e-school ^{4G}," " e-school^{asp}," " e-college."
CELT
Corp. www.celtcorp.com: no access when attempted
Central Minnesota Research & Development Council (cmERDC)
www.erdc.k12.mn.us: Digital Imaging, special education management: Product names: "cmERDC" (Elementary Electronic Progress Report System (EEPR)), "Due Process Reporting System,"" Jcafe"
Central Susquehanna Intermediate Unit http://tech.csiu-pa.org:
Centrinity Inc. www.centrinity.com: Classroom information, school news, professional development: Product name: "FirstClass 7.1"
Century Consultants www.centuryltd.com: Attendance and instruction software: Product names: "StarBase™," " Star_Mobile," " Star_Learning," "Star_Portal," " Star_Insight"
Chancery Software Ltd. www.chancery.com: Student information management: Product: "Chancery SMS 3.5"
Classroom Connect Inc. www.classroom.com: instruction cooperative
Classwell Learning Group www.classwell.com: Standards based advisors
COMPanion Corp. www.goalexandria.com: Educational Technology advisors
Vendors (pg 2)

Compass Learning Corp. www.compasslearning.com: Educational Management, Assessment tools, all standard's based: Product name: "CompassLearning Odyssey"
Computer Power Solutions of Illinois www.vcasel.com: Student communication tools and material. Product name: "VisualCASEL"
Curriculum Associates Inc. www.curriculumassociates.com: K-8 standards based lesson plans.
Datacard Group www.datacard.com: Card systems. Product name: "Datacard Affina Software"
Douglas County School District www.dcsd.k12.co.us: School district already using SIF interoperability
eChalk www.echalk.com: Communications solutions. Product name: "eChalk version 3.1"
Education Logistics Inc. www.edulog.com: Transportation software.
Education Solutions Development LLC (ESD) www.esd-sys.com: Student and District administrative solutions
Edustructures www.edustructures.com: Actual SIF platform sales. Product names: "SIFWorks™ Enterprise ZIS," "SIFWorks™Agent Developer Kit (ADK)"
Enterprises Computing Services Inc. www.ecs-eduk12.com
Epixtech Inc. www.epixtech.com: Library software. Product name: "HorizonInfo Management System"
Epylon Corp. www.epylon.com : Procurement software. Product name: "eProcurement"
Erie 1 BOCES www.erie1boces.org : Special Education management. Specializes in Buffalo NY school districts
eScholar LLC www.escholar.com: Data warehousing, gathering and interpreting data. Product name: "eScholar version 4.0"
eschoolmall.com www.eschoolmall.com: Procurement software. Product name: "EasyBid 4.0"
Excelsior Software Inc. www.gradebook.com: Assessment management solutions. Product name: "Gradebook^2," "Pinnacle System"
Follett Software Co. www.fsc.follett.com: Library management. Product name: "Follett 5.1"
Gateway to Educational Materials www.geminfo.org: Lesson plans. Free from the Department of Education
High Touch Inc. www.hightouchinc.com: Student information management. Product name: "Pro/Star™
Horizon Software International Inc. www.horizon-boss.com: Cafeteria management. Product name: "FastLane"
Horizon Software Systems Inc. www.excent.com: Special Education Management. Product name: "Exent™"

Vendors (pg 3)

IBM Corp. www.ibm.com: Professional Development and Training. Integrating technology into the curriculum.

Ignite! Inc. www.ignitelearning.com: Standards based curriculum. Product name: "Ignite!"
Infineer Ltd. www.infineer.com: No access at this time
InfoHandler.com www.infohandler.com: Benchmark standards software for at risk students. Product name: "SpecEd™"
Jackson Software Inc. www.jacksoncorp.com: Student information, gradebook, on-line access for parents. Product names: "GradeQuick," "SchoolCom," "Edline"
JDL Technologies Inc. www.jdltech.com: Technology Procurement Solutions. Product names: "Information Delivery Assurance™(IDA)," "IT Ingrastructure Library," "IDL8™"
JES & Co. www.jesandco.org: Developing communication skills. Product names: "Encompass Academy," "Dell Academy"
Knowledge Adventure Inc. www.knowledgeadventure.com: VU games, educational games. Product names: "JumpStart Study Helpers™ Spelling Bee," "JumpStart Study Helpers™ Math Booster." Also Fisher Price, Barbie, and Jurrasic Park toys.
Kyrus www.kyrus.com: Cafeteria management. Product name: "Lunchbox™"
Laidlaw Education Services www.laidlaw.com: Transportation software. Also sells busses.
LearnCity www.learncity.com: Standards based Curriculum and assessments
Learning Company, School Division www.learningcompanyschool.com: Lesson plans software. Provides catalog for Educational Software
Learning Tools International www.ltools.com: Spe cial Education Management. Product name: "Goalview"
Lightspan Inc. www.lightspan.com: Professional development, Standards based curriculum. Product name: "AchieveNow"
MajicSoft Corp. www.majicsoft.net: Tamper proof desktop network management. Product name: "Schoolmajic"
McGraw-Hill Learning Network www.mhln.com: Interactive textbooks, through Glencoe
MediaSeek Technologies www.mediaseek.com: Teacher resources, Library resources. Product name: "bigchalk integrated classroom," "ProQuest Professional Education"
Media-X Systems Inc. www.media-x.com: Photos on handheld devices. Product name: "ePrincipal MxWeb," "MPics," "Photos 2 Go"
Microsoft Corp. www.microsoft.com/education: Educational Software. Curriculum resources. Professional Development. Lesson Plans
MindSurf Networks www.mindsurf.net: no access at this time

Vendors (pg 4)

National Center for Education Statistics (NCES) www.nces.ed.gov: Collects and Analyzes data. Government Bureaucracy, Department of Education
NCS Learn (formerly Computer Curriculum Corp.) www.ncslearn.com: Part of Pearson Inc.
NCS Pearson www.ncspearson.com/k12: See Pearson
NetSchools Corp. www.netschools.net: no access at this time
Novell Inc. www.novell.com: Synchronizes information. Product name: "DirXML"
Olympia Computing/Schoolmaster www.schoolmaster.com: Grading and scheduling software.
Opengroup www.opengrahics.org : Dedicated to open source. Product name: "Unix 03" Also, developed and managed SIF 3rd party compliance regulations
Oracle Corp./Oracle Service Industries www.oracle.com: Data warehousing and integratin. Product names: "Oracle 9: database," "Oracle E-Business Suite"
Orbit Software Inc.
Parlant Technology Inc. www.parlant.com: Online data management. Product name: "ParentLink XP 6.5"
Pearson Educational Technologies www.pearsonedtech.com **:** Education software; Product names: "SuccessMaker®," "NovaNET®," "SASIxp™," "ParentCONNECT®" "InteGrade®Pro"
PhoneMaster/US NETCOM Corp. www.usnetcomcorp.com: Phone messaging service, absentee notification. Product name: "PhoneMaster"
Plano Independent School District www.pisd.edu: School district already participating in SIF
PowerSchool (a division of Apple) www.powerschool.com: Apple affiliate, provides online student information. Product name: "Powerschool"
Prologic Technology Systems Inc. www.prologic-tech.com: Student information management. Product names: "ProAudit," "ProWeb," "ProNet,"
QYX Learning Inc. www.qyx.com: Electronic Notebooks. Product name: "QYXie"
Renaissance Learning Inc. www.renlearn.com: Professional Development and Assessment software. Books available
Riverdeep Interactive Learning www.riverdeep.net: Online learning, professional development. Product name: "logal," "EDVantage," "Edmark," "Smartstuff," "Galaxy Classroom™"
Sagebrush Corp. www.sagebrushcorp.com: Library automation system. Product names: "Accent," "Athena," "Spectrum Suite," "Pinpoint," "Serials Manager," "Ucheck," WebMarc"
SAP Public Services www.sap.com: IT education
Scantron Corp. www.scantron.com: Data collection, assessment systems. Product names: "Performance Series," "Curriculum Designer," "Skills Connection," "ParSystem," "Classroom Wizard"

Vendors (pg 5)

Scholastic.com www.scholastic.com: Teacher resources, lesson plans, activities
Schoolhouse Software www.schoolhousesoftware.com: Food service solutions. Product name: "CafTRAC™"
School-Link Technologies www.myschool-link.com: Cafeteria fund tracking
SchoolMessenger www.schoolmessenger.com: Communications solutions, attendance reporting, parent notification.
SchoolNet www.schoolnet.com: Data warehousing, curriculum alignment, assessments
SchoolPalm.com www.schoolpalm.com: No access at this time
Scientific Learning Corp. www.scilearn.com: Curriculum, lesson plans, software. Product names: "Fast ForWard® Language," "Fast ForWard® Middle and High School," "Fast ForWard® Language to Reading," "Reading Edge™"
Simplexis.com www.simplexis.com: Procurement software. Product name: "Public Buy Link," "Schoolhouse Link"
SIRS Mandarin Inc. www.sirs.com: Library Management. Product name: "SIRS Research®"
Skyward Inc. www.skyward.com: Student information management, cafeteria payment management, special education student management. Product name: "PaCStudent"
Softlink America Inc. www.softlinkamerica.com: Library management software. Product name: "Liberty™ 3"
Software & Information Industry Association (SIIA) www.siia.net: Sets standards for technology dissemination.
Software Technology Inc. www.sti-k12.com: Student records. Product names: "STI Office," "STI Bookkeeper," "STI Classroom," "STI Sets/STI Health"
Specialized Data Systems Inc. www.schooloffice.com: Student and financial records. Product name: "School Office v.8"
Stardata Technologies Inc. www.stardatatech.com: Student information. Product name: "SchoolServer"
Sun Microsystems Inc. www.sun.com: Data storage. Hardware and software
SunGard Pentamation www.pentamation.com: Student information, human resource, financial solutions. Product name: "Parent Access," "Parent Notifier," "Student Portfolio"
TechERA www.techera.com: Technical incorporation
Test University Inc. www.testu.com/info/default.asp: Interactive education software, test preparation. Product name: "Ideal Learning Environment™"
TetraData Corp. www.ease-e.com: Student information, curriculum development. Product name: "Ease-e™"
Texas Instruments http://education.ti.com: Handheld software applications, not just math anymore. Product names: "TimeSpan™" "NoteFolio™," "CellSheet™"

Vendors (pg 6)

The CLM Group Inc.
TIES www.ties.k12.mn.us: Technology trainers. Product names: "School TIES," "Web TIES"
Tom Snyder Productions www.tomsnyder.com: Educational software. Product names: "Graph Club 2.0," "Neighborhood Map Machine 2.0"
VersaTrans Solutions Inc. www.versatrans.com: Transportation solutions. Product names: "Fleetvision," "Trip Tracker," "Routing and Planning"
VIP Tone www.viptone.com: Attendance, Student information, assessments. Product name: "SUX SS," "KidMap," "Profiler," "Quiz Studio"
Visual Software Inc. www.routepointe.com: Transportation manager. Product names: "Route Pointe/server," "Route Pointe/Planner," "Route Pointe/ S (schools)," "Route Pointe/ D (districts)"
Vivid Education Corp. www.vivED.com: Technical consulting
Vobix Corporation www.vobix.com: No access at this time
Washington School Information Processing Cooperative www.wsipc.org: School Management
Weidenhammer www.hammer.net/home.asp: software and hardware

VI. WEB LINKS

http://www.sifinfo.org/about.html. This is the basic information with regards to the formation of the Schools Interoperability Framework. It gives information on how to make your software compliant with SIF. It lists the members already on board (see above). There are also case studies of pilot programs that have already instituted SIF.

http://www.thejournal.com/ This site has articles on many aspects of technology. A search through the "Article Archives" is where I found the information regarding SIF (from March 2002).

http://nces.ed.gov/edi/ This site is the National Center for Educational Studies. The U.S. Department of Education maintains this site.

www.edustructures.com: Edustructures. Actual SIF platform sales. Product names: "SIFWorks™ Enterprise ZIS," "SIFWorks™Agent Developer Kit (ADK)"

www.opengrahics.org : Opengroup**.** Dedicated to open source. Product name: "Unix 03" Also, developed and managed SIF 3rd party compliance regulations