CASE STUDY

OKLAHOMA'S INTEROPERABILITY STORY

ARIANA BAUER
CPSI, Ltd.
OKLAHOMA STATE DEPARTMENT OF EDUCATION

The Oklahoma State Department of Education is dedicated to improving student success through service to schools, parents and students; leadership for education reform; and regulation/deregulation of state and federal laws to provide accountability while removing any barriers to student success. The OK SDE serves 512 traditional school districts, 28 charter school districts, 58 charter school sites, and over 1,795 schools. With over 693,700 students in the state, the OK SDE works hard to meet the challenging needs of students with educational technology.

HOW OKLAHOMA SDE STARTED

In 2004, the Oklahoma state passed into law a requirement that by the 2005-2006 school year any Student Information System (SIS) or Instructional Management System used by school districts within the state were required to send data to the state via version 1.5 of the Schools Interoperability Framework (SIF) protocol. This meant that all Student Information System vendors would be required to have a functional SIF Agent that would send the data to the SDE utilizing XML (Extensible Markup Language). To do this, the SDE needed to have the necessary components at the state to receive the data coming from the districts. The SDE also needed a way to automatically generate and send the state level student unique identifier, known as a Student Testing Number (STN), back to SIS systems over the SIF protocol. The goal of the state was to create a comprehensive state student information system. The multi-year project would collect the necessary data from schools to perform the required functions and duties of the state.

The Wave would enable SDE staff to manage data for decision-making and statistical reporting at the state level, routinely provide pertinent information to the school districts, and satisfy mandated state and federal reporting requirements. The Wave would give the SDE the ability to enhance how it addressed accountability issues, student mobility, longitudinal studies, emerging policy matters, federal reporting mandates, and more. Utilizing the SIF framework would also enable real-time data collection that would significantly decrease the amount of time spent on collections for reporting.

To do this, the SDE needed to hire a vendor that was capable of performing the needed requirements for over 500,000 students and 540 plus districts within the state of Oklahoma. Performance, reliability, and accuracy were crucial to the success of the project. In 2005 the SDE hired CPSI to implement the SIF data collection and STN automation project. This project became known as The Wave. The Wave would be a multi-year and multi-phase project to develop solutions for multiple issues at the SDE, including developing business rules for reporting to state and local agencies. The process would also help the districts by providing the better business practices for school districts.
THE PROBLEM:

In 2004, the Oklahoma state legislature passed into law a requirement that by the 2005-2006 school year any Student Information System (SIS) or Instructional Management System used by school districts within the state were required to send data to the state via version 1.5 of the Schools Interoperability Framework (SIF) protocol.

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With over half a million students and more than 540 school districts, the SDE knew that whatever solution they chose it would need to meet the heavy performance requirements of the state. It was of vital importance that data coming into the state as well as the STN assignment was fast and reliable. The system needed to have fail-safes that would allow for issues with connectivity that were common to rural districts as well as the capacity to handle the large amounts of data coming in from the largest districts in the state. It also needed to function with all SIF Agent created by vendors of student information systems using SIF to send and receive data. To this, the SDE needed a certified and high performing Zone Integration Server (ZIS) as per the SIF requirements. It was also required that the districts did not incur any additional costs for the SIF Agent from their SIS vendors.

STN assignment also had issues. The SDE was already dealing with an excessive amount students with multiple STNs due to the old processes. The new system needed to be able to handle the many different cases for STN assignment without creating new STNs unless it was truly a new student. The state also wanted a way for school districts to manage their own cases for possible duplicates so that the state was not burdened with STN assignment issues for possible duplicates.

State reporting times were also a problem. The SDE needed a way to gather the data quickly and ensure that the right data was being sent by all of the districts. With multiple reporting periods and so many districts of varying size and technical expertise, state reporting was difficult to complete in a timely manner for the SDE and for school districts. Data would now be flowing directly from the Student Information System and this caused a new problem. The data within the SIS had to be accurate as the districts no longer could just export a file to a spreadsheet and modify the spreadsheet data before sending to the state for reporting.
The districts would need to learn better data management skills in order to achieve this. The state also needed to implement a way to validate the incoming data to know if the data matched the state business rules. Districts would need to view the results of the data validation to correct the data within their SIS.

With over 540 school districts of varying levels of expertise combined with a short time frame to implement, the SDE needed a way to onboard the districts quickly. To do this, the SDE would need some level of district buy in to get cooperation with the districts. Many districts were unsure of how safe the new system would be or even how the new system would work. This could easily have become one of the largest hurdles for the SDE as the onboarding needed to be done in such a short period of time.

THE SOLUTION:

In 2004, the SDE and the SIF organization started working to produce a new version of the SIF 15r1 specifications that became known as the Oklahoma SIF Specifications. This version of the SIF specification was customized to the needs of the SDE with additional extended objects that were necessary for data collection. Eventually every SIS vendor in the state would need to certify that they met the Oklahoma SIF Specifications in order to sell in the state.

CPSI was selected to implement the Wave system in 2005. Over the course of the initial meetings, a hardware structure and basic plan of action was put into place to implement the STN automation and initial Wave Reporting structures. CPSI also helped to further refine the Oklahoma SIF Specification and a new version was released in 2006 that would be final for the 2005-2006 school year and encompass the initial collection and STN process.

The Oklahoma SIF Specification also defined the requirements for handling the STN. To do this, CPSI implemented several of their products, including xDZIS as the Zone Integration Server, xDStore as the Operational Data Store, xDUID for assigning STNs, and xDValidator for business rules validation. The system was designed where data flowed from the district’s SIF Agent through the xDZIS and then into the xDStore. The xDValidator and the xDUID read the data in the xDStore. xDUID managed the assignment of the STNs and gave users the ability to login to a web interface to resolve ambiguous issues with students.

xDValidator read the database and verified the data against the implemented business rules. xDValidator also had a web user interface for users to view their errors. Districts were expected to fix any data errors in their SIS system. This would trigger the data to be sent via the SIS SIF Agent to the state and start the process from the beginning for records with errors.
Users needed a way to view data securely while still giving the state the flexibility to add to the system as the years went on. CPSI designed a web based user interface that the state now upkeeps to deliver reports to their users about validation errors. This UI also gave users the ability to manage their data certification and STN assignment issues.

All components of the system needed to be housed on site within a secure network. All apps were installed on the servers hosted and maintained at the SDE by SDE staff. This created a secure environment for all student data while maintaining the SDE’s ability to ensure that all data privacy laws are upheld within their system. No data is sent to any server that is outside of the control of the SDE at any time.

**THE IMPORTANCE OF AUTOMATION AND REAL TIME DATA:**

Data automation and the ability to collect data in real time was critical to the success of the project. Traditional methods, such as file uploads over SFTP, have too many areas for critical failure in the delivery of the data. Collecting the data automatically and direct from the source in real time enabled the SDE to have a constant flow of data for STN assignment and data collection. This meant that the SDE could deliver the STN numbers back into the Student Information Systems at the speed of reality.

**THE SIF IMPLEMENTATION AND OBJECTS**

The Wave system was initially rolled out using the SIF 1.5r1 framework in 2006. The vendors were required to support the reporting of data via a SIF Agent. The SDE developed their own version of the SIF specification that was given to vendors that detailed the support requirements.

Initially, eight objects were collected from districts via SIF Agents. In 2007, the SDE moved to the SIF 2.0r1 framework and expanded the requirements for support from vendors. The requirements for SIF support has continued to expand over the years and still continues to grow. The current data collection from districts in the state of Oklahoma includes the objects listed below.

The detailed SIF specification for the state is published annually of their website and contains information on the requirements for each of the elements within these objects as well as any extended elements that are required.
THE RESULTS

The Oklahoma State Department of Education has automatically assigned STNs and collected data for reporting for over 12 years. This is one of the longest running state level data collections systems in any state in the United States, and one of the only ones that does this full data collection automatically. One of the biggest factors in the long running success of this project has been the use of the real event-driven data framework that is behind the SIF specification. The SIF specification also provided a way for vendors to share and consume data over the common “language” of SIF.

CPSI has been implementing and creating tools to make SIF work for education since the beginning of SIF. CPSI leverages SIF in all of its tools, allowing the tools to work in nearly any educational technology environment. This gave the Oklahoma SDE the ability to use the CPSI toolset to enable them to collect data from over 540 school districts in record time.

The SDE is currently collecting and validating data for over 540 school districts seamlessly via automation. The SDE is also assigning STNs for over 693,700 students, 41,775 teachers, and thousands of staff members. The Wave system receives and average of 8,810 requests per week over 5 servers hosted at the SDE. Over 430 different validations occur against the 20 different objects collected on a daily basis, creating millions of data validations occurring on daily. Plus, the average time for validation and STN assignment is under 9 seconds.

DATA VALIDATION STATISTICS

Validations on student personal records daily: 36,980,372
Validations on student school enrollment records daily: 65,558,380
Wave DB Size for 2017 to 2018: 990 GB
Number of Records Updated and Entered on a Weekly Basis: 46,000,000+
Number of Student Personal Records: 971,492
Number of Student School Enrollment Records: 1,558,145
Number of Student Section Mark Records: 1,488,723

HIGHLIGHTS AND FEATURES

- Utilizes the CPSI toolset: xDStore, xDUID, xDValidator, xDZIS, xDComposer, and more
- Data is collected from over 540 school districts in real time over the SIF 2.0r1 specification
- All SIS vendors in the state are required by law to connect to the SDE via SIF Agents
- STNs are assigned automatically using the xDUID toolset from CPSI
- Districts have the ability to manage their own data securely over the web for data certification, reporting, and STN management
- Fully automated system that does not rely on human intervention
- SDE has access to current real-time data all year - not just at reporting periods
- Increased efficiency in state reporting since districts do not have to "remember to report"
- xDStore gives the SDE the ability to easily expand data collection without the need for custom programming
- The Oklahoma State Department of Education has saved both money and time, allowing the SDE to do more with less resources
WHAT'S NEXT?

In the upcoming year, the SDE is expanding their system to add a CEDS-base LDS (longitudinal data store). In order to do this, the SDE is planning to use CPSI’s xDStore for CEDS/Generate transactional data store and data layer. Additionally, the SDE and CPSI are creating a data dictionary of the data used in the applications at the state level used in collections. This dictionary will be used to create the mappings to CEDS using xDStore for CEDS/Generate in order to automate the movement of data into the data silos that will be used for data reporting.

The SDE also plans to retire non-necessary legacy applications in order to reduce the maintenance burden on IT and data staff. This work is currently in progress, with an estimated completion date of July 2020.

Project Unicorn is an effort to improve data interoperability within K-12 education. We aim to create a community of innovators who make the broader case for secure interoperability by determining shared priorities, working in partnership with school systems and EdTech vendors to understand its importance and benefits, creating a demand side push for interoperability through partnerships, and educating buyers to consider the total cost of ownership through informed comparison of vendors.

Project Unicorn does not endorse a specific product or data standard but instead is an educational initiative dedicated to the secure, controlled interchange of data.