SIF Systems Interoperability Framework Association AU

REAL TIME STUDENT DATA EXCHANGE

→ WESTERN AUSTRALIA

SOLVING REAL WORLD PROBLEMS THROUGH INTEROPERABILITY, THIS CASE STUDY 2 OF 7 IN THE SIF AU PILOT PROGRAM, FUNDED BY THE FEDERAL GOVENMENT AND SUPPORTED BY THE GOVERNMENT OF WESTERN AUSTRALIA DEPARTMENT OF EDUCATION AND TRAINING .

→ INTRODUCTION AND BACKGROUND

The Digital Education Revolution envisages "technology enriched learning environments" for all young Australians. Key to its success is the capacity to put the right information at the right time into the hands of learners, teachers, parents and policy makers.

Since 2007 Chief Information Officers from Australia's state and territory education systems, together with colleagues from the Catholic and Independent school sectors and with support from the Commonwealth Department of Education, Employment and Workplace Relations, have been working towards the establishment of an open standard for systems interoperability for Australian schools to enable information to be used when and where it is needed.

This joint initiative, known as "Towards SIF AU", has enabled the development of a draft SIF Implementation Specification for schools in Australia (further referred to as the SIF AU Spec.) and a business case identifying the costs and benefits of adopting SIF across the Australian Schools Sector. The business case assessed evidence gathered from interviews and surveys with key stakeholders, and through a program of pilot projects aimed at solving practical interoperability challenges making use of SIF. The pilot program was conducted in such a way as maximise the sharing of knowledge and solutions across projects and produce a knowledge base of enduring value to the schools sector.

This is a summary case study of one of these pilots.

→ OVERVIEW: EXCHANGING STUDENT DATA IN WESTERN AUSTRALIA

The challenge for the WA pilot project was to transfer student, teacher, course and enrollment information from a central student database into an online teaching and learning system in near 'real time'. The WA Department of Education and Training (DET) already has infrastructure to perform this task, involving a custom interface between the two key systems. With the expanding use and complexity of its digital learning systems, however, DET is seeking a standards-based solution, such as SIF, to provide a more flexible and cost effective solution into the future.

A number of other Australian jurisdictions have similar challenges.

The WA pilot confirmed that the initial SIF AU specification was appropriate to use to exchange student, course and enrollment data between two major systems. It also showed that the SIF architecture could deal comfortably with the high transaction load this test required.

The WA project team developed two software "agents" with capability to publish and subscribe to connected information systems. (Agents are software applications that transfer information from computer systems to and from SIF). The agents were built to run on existing WA systems, but the WA developer went further and created an open source 'agent development framework'. This framework not only accelerated development work on the WA project but was also reused by other jurisdictions. The documentation and software developed by this experienced team served as a benchmark and resource for other pilots. The WA team also gave extensive support, tutoring and assistance to other jurisdictions in the pilot program.

THE ADVANTAGE OF USING SIF, IS THAT A STANDARD MESSAGING SYSTEM IS USED... IT WILL STREAMLINE FUTURE DEVELOPMENT SINCE SIF IS A STANDARD

→ PARTICIPANTS

The project was sponsored by Bevan Doyle, CIO of the WA Department of Education and Training (DET), managed by Justin Magraith from DET, with development undertaken by Joerg Huber, with project support provided by the SIF AU team.

Infrastructure provided by the National Systems Interoperability Service (NSIS), was used to deliver this project. This included use of a Zone Integration Server (ZIS) and agent software development kits (ASDKs).

→ PARTICIPANT EXPERIENCE OF THE PILOT

The developer primarily concerned with creating the agents for the WA pilot had previously gained experience with SIF during his involvement in an earlier 'proof of concept' projects. This was valuable both to this pilot and to all other Phase One pilots. For example, he created a time-saving code framework which was valuable both as a code structure and also as a model for another pilot framework later written in .NET.

Some custom objects (data structures not included in the SIF Implementation Specification) had to be written for this pilot. The developer had to learn how to transmit custom objects and how to handle versions of ASDKs and ZIS servers. This required the direct assistance of SIF vendors. Some vendors responded more quickly than others to requests for assistance:

Ultimately the custom objects were integrated by vendors. The developer subsequently submitted the custom objects to the SIF AU Data Standard Working Group. These custom objects have now been successfully integrated into the SIF AU specification. This has demonstrated the success of the feedback processes used in developing the SIF AU Spec, demonstrating both the viability of the Australian SIF Specification and the flexibility of SIF generally.

Issues with versioning were quickly dealt with by collaboration:

"Issue logged by [TAS pilot developer] about SIF Versioning. Having the NSIS [the discussion forum] and Confluence [the groupsite] helped me to quickly find a solution." [JH 5/7/09]

The developer mentioned on several occasions throughout the project how useful it was to have a data expert available on the SIF AU team:

"[the SIF AU team data standards expert] has been very helpful in explaining/suggesting appropriate SIF Objects for [the WA pilot]" [JH 24/5/09]

→ SOLUTION

Two agents were required for this project: a publishing agent and a subscribing agent. The ZIS used was provided by the National Systems Interoperability Service. The pilot, operated in parallel with a custom solution currently in production, could be directly compared with that solution as an alternative approach to central system integration.

"The advantage of using a SIF environment rather than the current system (DIM), is that a standard messaging system is used rather than a in-house message system. It will also streamline the future development since SIF is a standard where as the current system (DIM) is not. Appropriate monitoring tools and queuing mechanisms are part of SIF (ZIS) and do not need to be developed and maintained by DET WA as they do now with DIM." [Test Result Report: WA].

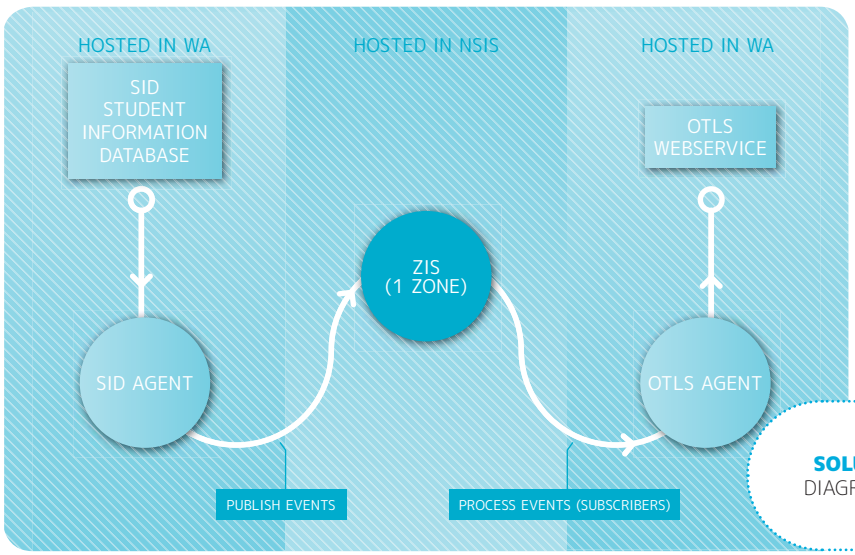
PUBLISHING AGENT

The publishing SID Agent is attached to the Student Information Database (SID) application. This application triggers a transfer of all changes to the subscribing OTLS Agent once a day, which in turn transfers changes to the Oracle Online Teaching and Learning System (OTLS).

The publishing agent interprets certain specified changes to the SID database as events. On receiving one of these events, the agent generates a SIF Message (using the SIF Object appropriate to the event) and then forwards this to the ZIS. The ZIS used for the pilot was one of the three ZIS servers maintained by the NSIS pilot, each of which ran software provided by a different SIF vendor: Visual Software, RM Asia Pacific and Edustructures. As a part of pilot testing, these requests were successfully repeated on another of the ZIS servers, proving that the SIF Specification is not dependent on any one SIF vendor.

SUBSCRIBING AGENT

The subscribing OTLS Agent receives a SIF Message from the ZIS as soon as it becomes available. If this agent should be unavailable when its subscribed SIF Objects are published, the ZIS queues the messages



SOLUTION
DIAGRAM 1.1

until the agent is available, thus providing asynchronous guaranteed delivery.

Using the single zone required for this project, the ZIS forwards the information to the subscribing OTLS Agent. This agent unpacks the data, and then updates the OTLS system with the data it requires.

The OTLS Oracle Interface adds some complexity to this process by demanding that ALL updates for a particular student are presented to OTLS together via a web service. This required a change to the delivered SIF data objects, and ultimately led to the creation of custom objects. The process of integrating these objects into SIF provided a useful test case for the SIF AU specification. This experience showed that SIF provides an open standard, yet is flexible enough to allow quite major exceptions for the servicing of legacy systems.

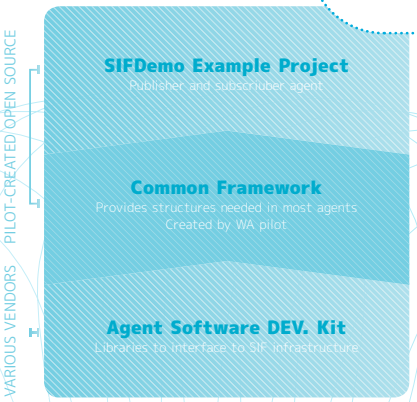
→ KEY FINDINGS

As the WA pilot project progressed a number of key findings emerged:

- **Development time and cost was reduced** due to co-learning, collaboration and working to a common data specification. Using the groupsite as a medium, people worked together with increasing enthusiasm and confidence, updating each others documents, helping each other across jurisdictions, and sharing access to experts.
- **The SIF AU spec supported the interoperability needs of the Phase One pilot program.** However, to continue to serve the needs of the Australian education sector, the SIF AU spec will require ongoing development. This will include continual engagement with local industry and SIF vendors.
- **Previous experience greatly speeds SIF development.** Due to this jurisdiction's staff involvement with the previous Proof of Concept SIF projects (POC 1 and 2) development was greatly speeded. This benefit went beyond the jurisdiction, as their most experienced developer was able to provide help and overcome roadblocks for other pilots.
- **Reuse saves development time.** A reusable agent framework created by this jurisdiction saved time both within the jurisdiction (28% of development time) and in other pilots which were able to use the framework directly or as a model.
- **SIF operates in near real time, and scales to the capacity required.** The test project ran for one week in parallel with production systems, and produced response times easily within required limits. That week of traffic was then compressed and successfully pushed through in a single day, using only the shared NSIS ZIS located on a virtual server in Victoria. A dedicated server in WA could handle much higher loads.

SIGNIFICANTLY, THE WA PILOT CREATED AN AGENT FRAMEWORK WHICH WAS USED IN OTHER PILOT PROJECTS.

AGENT CONSTRUCTION
DIAGRAM 1.1



→ BENEFITS

JURISDICTION BENEFITS

It has proved useful to have a SIF solution tested in the context of jurisdictional infrastructure. Staff capability in interoperability has been developed. Methods, examples and an emerging culture of sharing of information about interoperability with other jurisdictions has been established. Additionally, the pilot project provided a model for replacing existing bespoke interoperability mechanisms with a method based on open standards, and explored some of the real-world issues associated with that process.

This jurisdiction has gained considerable benefit from helping create a piece of national infrastructure. The open-source agents and frameworks created can be reused collaboratively, with the complementary advantages that maintenance is shared (reducing costs), expertise is preserved and a larger pool of users is available to share problem solving. This is a starting point for a knowledge- and code-base that can be reused across Australia, distributing capability that can ultimately enable jurisdictions to solve the increasing complex problems that the Digital Education Revolution will present.

WIDER BENEFITS

This pilot has assisted in the testing and implementation of the newly-developed Australian SIF standard. In addition, the SIF skills developed in staff are highly transferable to other jurisdictions or vendors working with SIF.

BUSINESS BENEFITS FROM THIS PILOT

As well as the benefits gained by simply fulfilling its charter, this pilot has generated some specific artifacts for reuse (frameworks and example project) which have greatly speeded Phase One pilot development, and will continue to have a far-reaching impact on forthcoming Phase Two pilots and SIF production system development. The artifacts build on vendor-supplied ASDKs to make development in the Australian environment both easier to understand and faster to implement.

MONITORING TOOLS AND QUEUING MECHANISMS ARE PART OF THE ZIS

→ NEXT STEPS

On the successful conclusion of the pilot program the following steps were suggested:

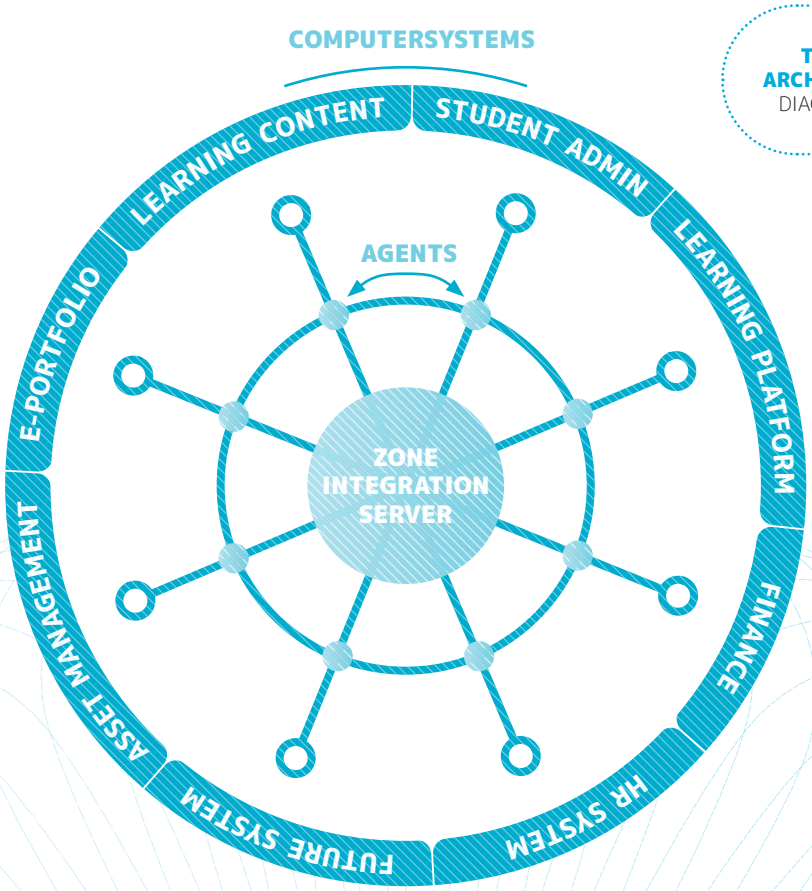
- Learnings from this pilot should be communicated throughout the jurisdiction.
- Data mappings which required extension of existing SIF Objects, or the creation of new ones, should be communicated back to the SIF AU Data Standards Working Group (DSWG) to improve the evolving SIF AU spec.
- Framework code should be contributed for reuse in several Phase Two pilots.
- Agents could be reused in the upcoming Phase Two Tri-Borders pilot (involving the jurisdictions of WA, SA and NT).
- The requirements for the deployment of a Zone Integration Server in WA should be evaluated.

→ ABOUT THE SYSTEMS INTEROPERABILITY FRAMEWORK

The Systems Interoperability Framework (SIF) is a simple but powerful tool for effectively integrating information from diverse computer systems. SIF manages both the "what" and the "how" of information sharing. Its core components are: a specification of what is to be transferred (the SIF Implementation Specification Australia); a software agent that maps the information in a computer system to that Specification; and a traffic cop directing the flow of information between systems called the Zone Intergration Server (ZIS).

The SIF Implementation Specification (Australia) is administered in Australian jurisdictions by the interim SIF AU Board, and internationally certified by the SIF Association.

THE SIF ARCHITECTURE
DIAGRAM 1.1



→ MORE INFORMATION

For more detailed information, see the SIF AU Phase One Pilot Program Report. This study also forms one of seven summary case studies on pilots from Tasmania, Western Australia, South Australia, Catholic Education Office Melbourne, Enterprise Scale SIF, National Systems Interoperability Service and the SIF AU Specification.

You can find case studies and other useful information on the SIF AU website: **http://au.sifassociation.org/**

You can contact SIF AU by email: **info-au@sifassociation.org**

→ ACKNOWLEDGEMENTS

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