



One Washington
Integration Strategy 2.0

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1.0 Overview

One Washington's integration strategy will leverage an open-architecture approach to facilitate data exchange and application interoperability between multiple legacy and external applications to support implementation of an enterprise resource planning solution. Current state applications are not well integrated with one another, rely on aging technologies and require extensive effort by staff to maintain and function. These applications create a complex ecosystem that is sensitive to changes, cumbersome and proliferates stale data.

The integration strategy will ensure data quality and consistency between the ERP software solution and agency line-of-business applications, thereby providing interoperability. Consolidation and standardization of interfaces also provides the following benefits to the state:

- reduced overall integration complexity
- improved transactional visibility with the system of record
- central control of interface management with the system of record
- improved security of data transmissions

2.0 Executive Summary

Replacing the state's aging financial applications, Agency Financial Reporting System, is critically important as AFRS long ago exceeded its useful life. Doing nothing is no longer an option.

OneWa is a business transformation program sponsored by the Office of Financial Management to modernize the systems that support the state of Washington's enterprise administrative operations. OFM unveiled the OneWa vision in 2013 to catalyze the transformation of legacy business processes and to modernize the state's five core business processes – finance, procurement, budget, human resources and payroll. The modernization vision will be underpinned by implementation of a cloud-based software as a service ERP solution for the state. The plan for OneWa reflects a thoughtful, well-researched approach to modernize and integrate statewide financial and business operations.

This version of the integration strategy is created in response to a reduction in funding for the 2019-21 biennium. This reduction triggered a revision of the program strategy and a reconsideration of scope and timeline. The result is a 2019 recommendation for a phased implementation approach, beginning with the replacement of AFRS. This reimagined project approach includes the activities necessary to achieve the project objectives. The first phase is the implementation of the core financial and purchase-to-pay components by July 1, 2022. The full functions of financial and procurement operations (i.e. bidding, solicitations, and e-procurement) will be implemented by July 1, 2023. This will include expanded functionality not currently available to the state. The remaining administrative functions of budget, HR and payroll will be implemented during calendar year 2025.

3.0 Introduction and Background

This section outlines the high-level integration strategy and guiding principles for interfaces between the OneWa ERP solution and agency line-of-business applications that will connect to the integration layer (and interface with the ERP). The following topics facilitate the development of the integration strategy:

- high-level approach and guiding principles
- integration methodologies
- data conversion approach

The integration strategy development is based on a review of existing documentation ([appendix A](#)), discussions with technical groups and agency staff, and OneWa program industry expertise and input including:

- applicable state and federal security and compliance requirements
- current tool capabilities – such as Informatica and business objects
- current state of infrastructure
- systems data collection
- interfaces data collection
- data elements collection
- reporting requirements collection

The main objective of the integration strategy is to provide a unified system of record for finance, procurement, budget, and HR/payroll. A unified system of record is an information system that is the authoritative data source for a given set of data. The new ERP software solution will be the unified system of record per [Executive Order 19-04](#). The new ERP software solution will provide the following benefits:

- accurate and up to date data for decision makers
- transparency
- cross-functional unification for end-to-end business processes
- automation of calculations
- unique identity/employee/customer data elements for business process roles and responsibilities and security management
- process efficiencies from automated routine tasks

4.0 Methodology

The integration strategy is based on the methodology of leveraging service-oriented architecture to provide automated real-time interfaces. SOA would allow agencies to send and receive data in a variety of formats and methods that support standard specifications. The standard specifications for integrations with the ERP software solution will be further defined during the implementation design phase of the OneWa program.

5.0 Guiding Principles

Guiding principles that relate to the integration plan include:

1. Facilitate and support a unified system of record for finance, procurement, budget, HR and payroll.
2. Adhere to data and information security, accessibility and privacy standards consistent with industry standards, federal and state law, and OCIO policy(s).
3. Leverage common practices across agencies and limit variation to the extent possible and to continuously align business processes. Configuration will remain standard within and across all business functions.
4. Recognize data as an asset.
5. Ensure business continuity to reduce risk to business operations.
6. Use of service orientation to fulfill stakeholders' needs.
7. Leverage security protocols and data handling through the integration layer.
8. Ensure accessibility compliance with functionality available for all end users.

9. Portability capabilities are available from one system to another.
10. Core functionality in the ERP software solution will be maintained and standardized.

The foundational guiding principle is to provide a unified system of record for finance, procurement, budget, and HR/payroll. To support this guiding principle, OneWa will incorporate leading industry standards to consolidate and standardize interfaces to and from the ERP software solution.

6.0 Approach

For OneWa to successfully execute and implement this integration approach, it is necessary to understand the scope of interfaces and conversion. The approach will include the following:

- An integration layer, middleware, will be implemented to maximize flexibility.
- All legacy applications currently interfacing with AFRS have been identified and a determination made to retire, replace or integrate with the ERP software solution.
- Determine necessary interfaces and data conversions.
- Determine roles and responsibilities of agencies during implementation.

An integration platform that resides outside of the ERP software solution itself affords a level of control and flexibility that can facilitate standard mechanisms of interaction between legacy application interfaces and a new ERP environment. This layer enables the emulation of legacy conduits for applications that will remain on premises at various agencies and facilitates a transition path to a future state where the system of record can be interfaced more directly by users for like functionality and through application programming interfaces.

Targeted functions in the ERP environment will effectively transition from legacy applications that currently provide the system of record for those functions to the new ERP software solution. The system of record transition of key functions will enable the decommissioning of legacy applications but will also require a mechanism of providing a transition for agency applications that cannot readily be replaced by ERP functionality. Initially, an integration platform would be capable of providing this transition through the emulation of the legacy integration. Strategically, the desire is for these interim conduits to be replaced either by leveraging a matured functionality in the ERP environment directly, or to utilize an API to the system of record rather than a legacy integration.

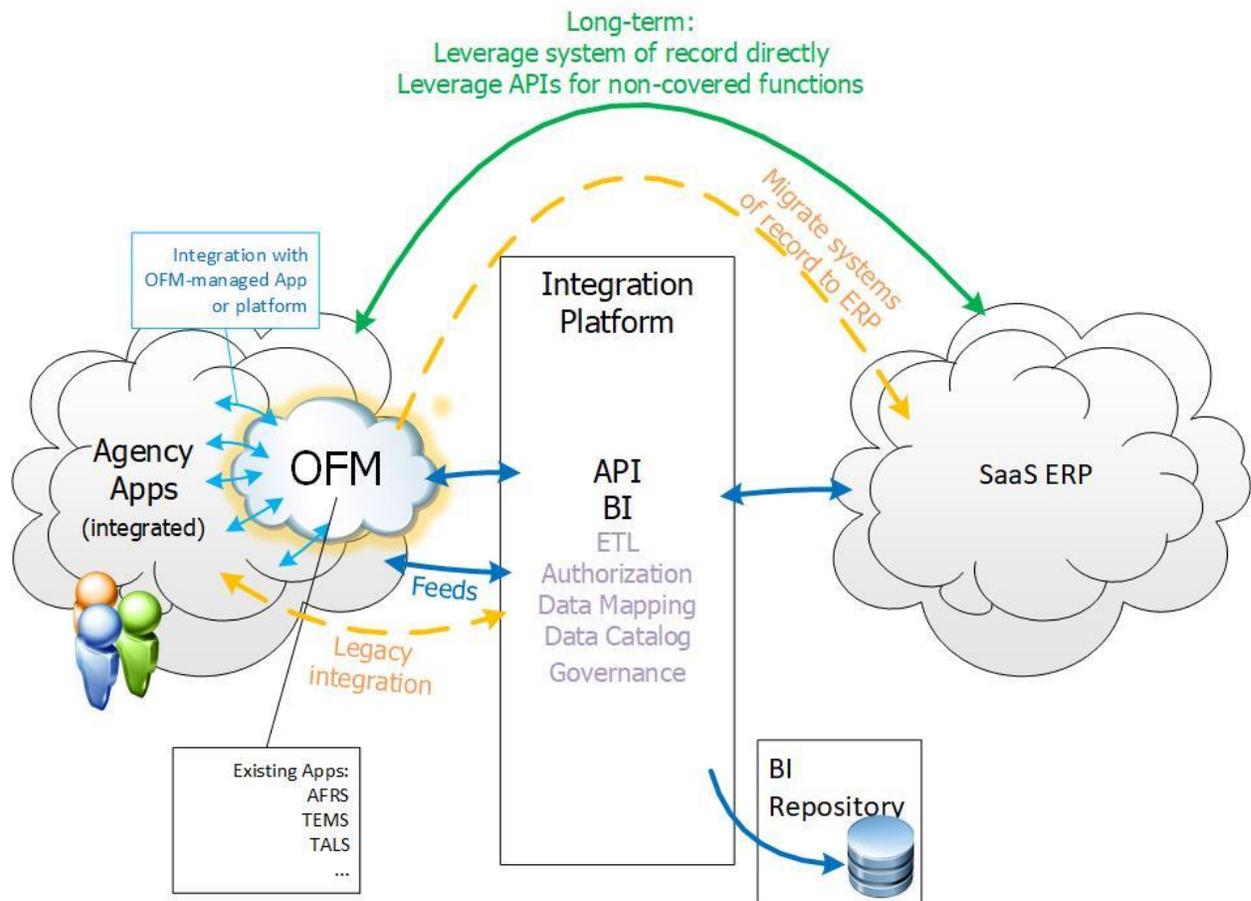
Strategically, the end goal will target a publish/subscribe model to provide a standard set of data that can be available to agencies that need access to all or part of the dataset. Additionally, the objective will be to facilitate active updating of data from transactional changes in the ERP software solution to sync changes as they happen with an external warehouse of data for external agency needs.

In the initial scenario, the integration platform will provide a conduit for legacy applications and any transformation necessary to maintain the interface with the new ERP environment. In the long-term scenario, the integration platform may also play a role in managing the API elements into the new ERP environment that will become a future-state integration for functions that are not already provided adequately by the ERP software solution.

There is a desire to leverage the integration platform to assist in facilitating enforcement of authorized interfaces and transactions with the target ERP environment. The integration layer should be designed to support the acknowledgement and approval of interactions between external applications and the ERP software solution.

Additionally, as the integration layer becomes the conduit of transactional interaction between legacy applications and the new ERP environment, it can also serve to capture and synchronize data in a corresponding data warehouse for the purposes of reducing or eliminating the interim need to extract large data sets from the ERP environment in support of legacy processes that have not yet transitioned to a modernized approach for data access. This approach is outlined in figure 1 below.

Figure 1: High-level approach



7.0 Description

Informatica is already an existing integration platform in use at OFM. The integration platform is comprised of various components in the Informatica ecosystem. The core platform is hosted and operated by OFM. Additionally, there are elements leveraging Informatica's cloud-based platform, hosted by the vendor in the cloud.

The full list of Informatica components currently planned are outlined in Table 2.

Table 2: Informatica components

Component	Description
Data integration hub	Publish and subscribe service for data integration
PowerCenter	Core ETL engine
PowerExchange adapters: VSAM and SAP	Interface modules for mainframe and SAP applications and PowerCenter
Change data capture	Change notification service
Proactive monitoring	System monitoring service
Cloud application integration	Cloud-based data aggregation and integration
Cloud data integration	Cloud-based data processing at scale
Cloud API management	Cloud-based API gateway service
Enterprise data catalog	Data catalog and discovery service
Axon	Data governance module
Data quality	Data quality and assurance module

During implementation, the necessary elements of the Informatica ecosystem will be determined and designed to support the delivery and transition to a new ERP software solution. Note: The Informatica product will be used for more than the ERP software solution. Initially, it is perceived that the cloud-centric elements, ETL loads, adapters, and data quality along with governance modules will play a part in the designed integration with the ERP environment. Further technical detail will be established upon the selection of an ERP software solution.

Middleware involves using a secondary application, which will connect an agency's line-of-business application to the ERP. This secondary application acts as an "interface layer" to the ERP software solution. Middleware typically involves the use of certain applications:

- Service-oriented architecture applications: SOA provides services to integrate different components over a network. It is independent of ERP applications and can be used for a wide variety of purposes, such as extract, transform, load and use of the enterprise service bus.
- Platform as a service: PaaS is a cloud-computing service that allows customers to develop and manage applications to support the ERP. Like SOA, this can also be used for a wide variety of purposes and, in a SaaS solution, provides an effective platform for developing custom applications.

Middleware provides added flexibility by removing limitations imposed by the ERP software solution. Middleware can also provide added capabilities such as data transformation, crosswalk availability (mapping legacy to new solution) and business rules. This would be the recommended interface method and would provide a solution for the following scenarios for the state:

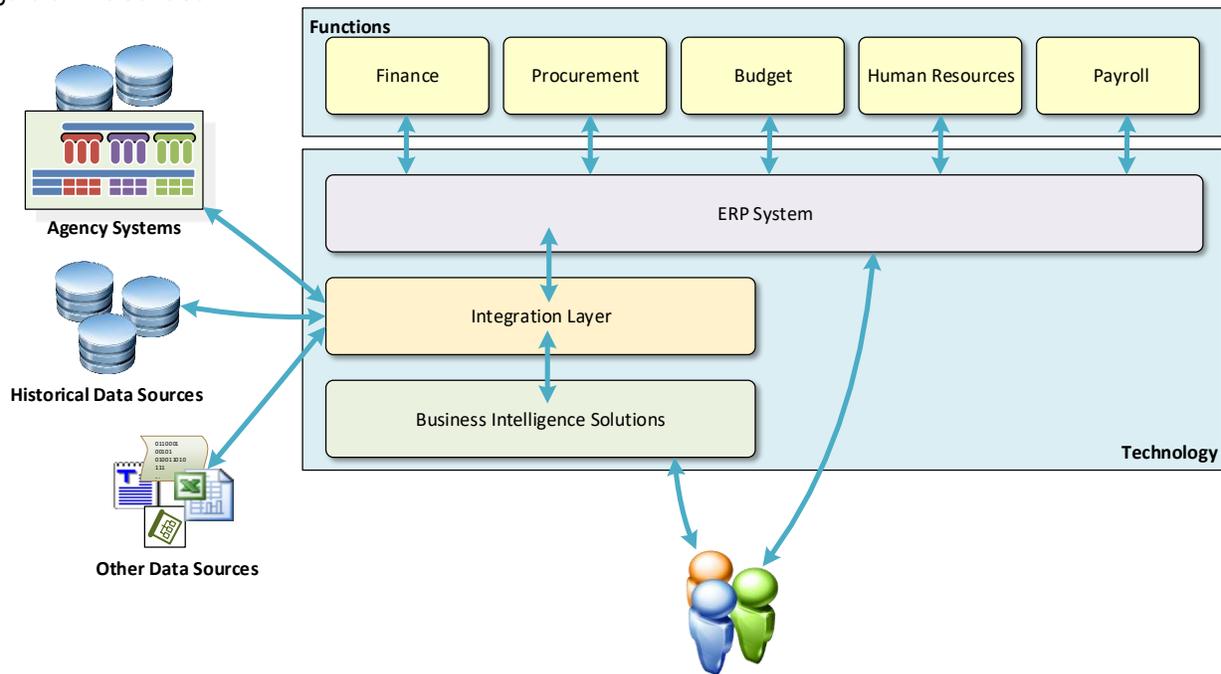
- Business needs that are not met within the ERP application.
- Data processing that has complex functions, rules or requirements.
- The interface requires complex functions or calculations.
- The ERP application does not deliver a holistic enterprise-wide API function for all integrations.

There may be additional scenarios not covered above that may arise during the course of engagement and be dependent upon the selected ERP vendor solution. Therefore, the above list is not intended to be absolute or inclusive of all potential scenarios where the approach may be applicable.

7.1 Transition Plan

The software solution will be selected by March 2020 (although contract negotiations may prohibit the announcement until months later). After the software has been selected, the system integration RFP will be released. The program will be aware of the system integrator by summer 2020 (with contract negotiations scheduled until October 2020). For details, see the [OneWa due diligence process](#) and [modernization roadmap](#). After software selection completion, OneWa will work with the system integrator to transition legacy applications and agency line-of-business applications for finance, procurement, budget and HR/payroll functions. Figure 3 below shows the transition.

Figure 3: The transition



Files generated from the ERP software solution and files that are loaded into the ERP software solution require transport (i.e.: transmitted from or to other applications). The most common solution to perform that transmission is file transfer protocol. [OCIO policy 141.10](#) section 4.4 "Secure Data Transfer" requires the use of encryption for data transmission. Normal FTP servers and programs provide little security and are not encrypted. However, there are two secure and encrypted options: (1) file transfer protocol secure and (2) secure shell protocol file transfer protocol. Some of the protocol features are listed below.

Table 4: Protocol features

FTPS	SFTP
<ul style="list-style-type: none"> Secured connection – FTP using secure sockets Layer (SSL) protocol (SFTP) User ID/password authentication SSL certificate verification Multiple ports – firewall incompatibilities are a potential risk due to port switching 	<ul style="list-style-type: none"> Secured connection – FTP over secure shell (SSH) protocol User ID/password authentication Public key authentication Single port – easy firewall connection

The OneWa program will use an SFTP solution because it is firewall-friendly and supports public key authentication. This solution provides high security without sacrificing ease of use and connectivity. Additionally, SFTP meets all security requirements of OCIO policy 141.10. This solution can also be utilized by all agencies regardless of legacy application capabilities because SFTP programs are independent systems. The only baseline requirement is use of a server to host the file transfer capabilities and files.

Currently, WaTech provides an SFTP solution, referred to as secure file transfer. SFT is considered capable of supporting the file transmission requirements and is compliant with state security policies. The functionality will be examined further to determine if: (1) it is a web-driven FTP service, (2) public key authentication is supported, and (3) connectivity with local SFTP programs for running in batch are supported.

7.2 Processing

Automation is the process of allowing interfaces to run without user intervention. Instead of having a user manually control a process from start to end, interfaces are executed on a schedule that performs the same tasks. These tasks can range from being very simple to very complex. Automating these tasks increases the productivity of users because those users will no longer be involved in a potentially long and complex process. It also decreases the risk that steps may be accidentally skipped in a process or a file is produced with inconsistent data formats.

The OneWa program will utilize the integration environment to manage schedules.

Any additional software required to support the ERP software solution will need to be acquired by the OneWa program.

7.2.1 Inbound

The integration strategy will support capabilities and requirements to inbound files from external applications through the integration (middleware) layer prior to coming into the ERP software solution. During the development of the integration interfaces, the following analysis will be completed to determine the interface type:

1. Review the capabilities of the external applications.
2. Review the requirements of the external applications.
3. Review the data elements and business rules.

7.2.2 Outbound

The integration strategy will support capabilities and requirements to outbound files to external applications through the integration (middleware) layer prior to going out to those agency or other applications. During the development of the integration interfaces, the following analysis will be completed to determine the interface type:

1. Review the capabilities of the external applications.
2. Review the requirements of the external applications.
3. Review the data elements and business rules.

Reviewing the capabilities of the external applications that will be interfaced through the integration (middleware) helps to determine what solution design is required to deliver the interface. For example, if an external application cannot handle a certain API, then other options will need to be explored.

Reviewing the requirement(s) will define any specific data or processing needs of the external application. An example of a requirement would be if a data element in the ERP software solution needs to be transformed into a coded value so that it can be loaded into the external application.

Reviewing the data elements and business rules helps to look at the specific data that is being transmitted through the interfaces. This will help with the integration design for possible data crosswalks with the chart of accounts redesign.

7.2.3 File Types

Below is a list of some of the main file type standards available that can be used across most platforms:

- Extensible markup language: A file format used to create common information formats and share both the format and the data on the internet, intranets and elsewhere using standard ASCII text. XML is similar to HTML and is self-descriptive. It is also multi-dimensional and can handle complex data requirements.
- Flat file: A standard two-dimensional file standard that lists data in a specific format that a program can read. The available formats are:
 - Fixed width: a file standard where the length of each input line must be the same as the other lines. Also, the size of the fields contained within each line must also be of a fixed size for each line in the exact same order.
 - Delimited: a file standard where the data fields in each line of input are separated by a signifier called a delimiter. The file layout must be the same for each line in the file, but the field size need not be consistent across different lines.
- Excel (for spreadsheet uploads): the standard spreadsheet format for office spreadsheets.

Modern ERP software solutions can support all the file types listed above. Older legacy applications mainly use flat files.

The OneWa program recommends the following file types:

1. XML
2. JSON
3. .CSV files
4. Flat files

While all types are viable, XML and JSON are preferred formats as they are the most versatile, robust, descriptive and compatible with newer technology. Flat files are the most widely available option, as most applications are capable of generating and processing flat files but flat files have limitations in ERP software solutions, due to the data being only two-dimensional, whereas ERP software solution data is multi-dimensional.

The capabilities of each of the applications involved must be examined to decide on the file type to be used to integrate. Typically, the file type common to the applications involved would be used to integrate.

7.2.4 Encryption

Encryption is the process of transforming data into coded data to prevent unauthorized access. This process prevents an unauthorized person from viewing the data contents by recoding (or scrambling) the data in a way that no other program can read. The only way to read the data is by decrypting it and that requires the data consumer to have the “key” to the data.

Encryption can be used in two ways:

1. Transport layer encryption: encrypting the communication channel used for data transmission.
2. File encryption: encrypting the data file itself.

Transport mechanisms like SFTP provide an encryption layer that encrypts data through the transmission channel. The encryption of the transmission channel is an example of transport layer encryption and is often acceptable for many organizations’ security requirements.

File encryption is a mechanism that encrypts a file. Once this file is transmitted, an authorized key is required to unencrypt the file.

OneWa will partner with state and agency technical teams to align the file and transmission encryption approach to current and future policies and guidelines.

8.0 Summary

The integration strategy is created in response to a reduction in funding for the 2019-21 biennium. The result is a recommendation for a phased implementation approach, beginning with replacement of AFRS and establishing a strategic integration layer capable of supporting a transition into the new system of record through a legacy interface.

This updated approach will provide reduced requirements per agency to interface existing applications with a new ERP software solution and provide an interim option to support agencies that must transition over a longer period or have functionality needed outside of what the ERP software solution can provide. It gives the state of Washington flexibility in its approach and affords the OneWa transformation a mechanism to handle a variety of uses and interfaces to the new system of record.

9.0 Appendix A

Below are documents that were referenced if you would like to go back and see where the program was at before now based off last few years’ lessons learned.

Archived Documents
Program Blueprint v2
One Washington Integration Plan
One Washington Integration Strategy
One Washington Governance Plan
One Washington Business Intelligence Strategy
One Washington Data Conversion Plan
One Washington Data Management Strategy

