RESO
REAL ESTATE STANDARDS ORGANIZATION

2022-2023 RESO Initiatives

Introduction

This document provides a high-level overview of RESO's current projects and initiatives as well as insight into their origin and impact.

Additional detail is present in the Data Dictionary 2.0 and RESO Certification System sections, as these items represent significant changes and accomplishments at the organization and industry level and establish a strong foundation for future work.

Data Dictionary 2.0

Data Dictionary 2.0 represents a major advance in the standard beyond the data elements it adds. It's also the first dictionary specification that uses information from RESO's Certification Analytics Platform to help identify issues to be addressed. The new version will be released in Q1 2022.

Advertised vs. Available Data Elements

In Data Dictionary 1.7, the focus was on standard resources and fields, automated testing, and correct data type usage, but it only tested what was advertised in the server metadata. This is much different from what's generally available in the payload for data consumers, which often contains much less than what's advertised as well as unexpected or incorrectly formatted data.

Data Dictionary 2.0 adds additional validation to ensure that what's in the payload matches what was advertised.

For example, if *PrivateRemarks* is advertised with a maximum length of 4,000 characters and a record with 4,001 characters is found, testing will fail. Similarly, if two standard enumerations such as *Active* and *Active Under Contract* in *StandardStatus* are advertised but additional lookups are found in the payload, such as *Expired,* this will not pass.

Enforcement of Standard Enumerations

Data Dictionary 2.0 also adds strict enforcement of standard enumerations, such as *ExteriorFeatures* and *StandardStatus*.

Previously, providers were allowed to use their own underlying values in the payload for these items, even if they didn't match what was in the standard. Translation into standard values was done using complicated annotation mechanisms which proved difficult and inconsistent for data
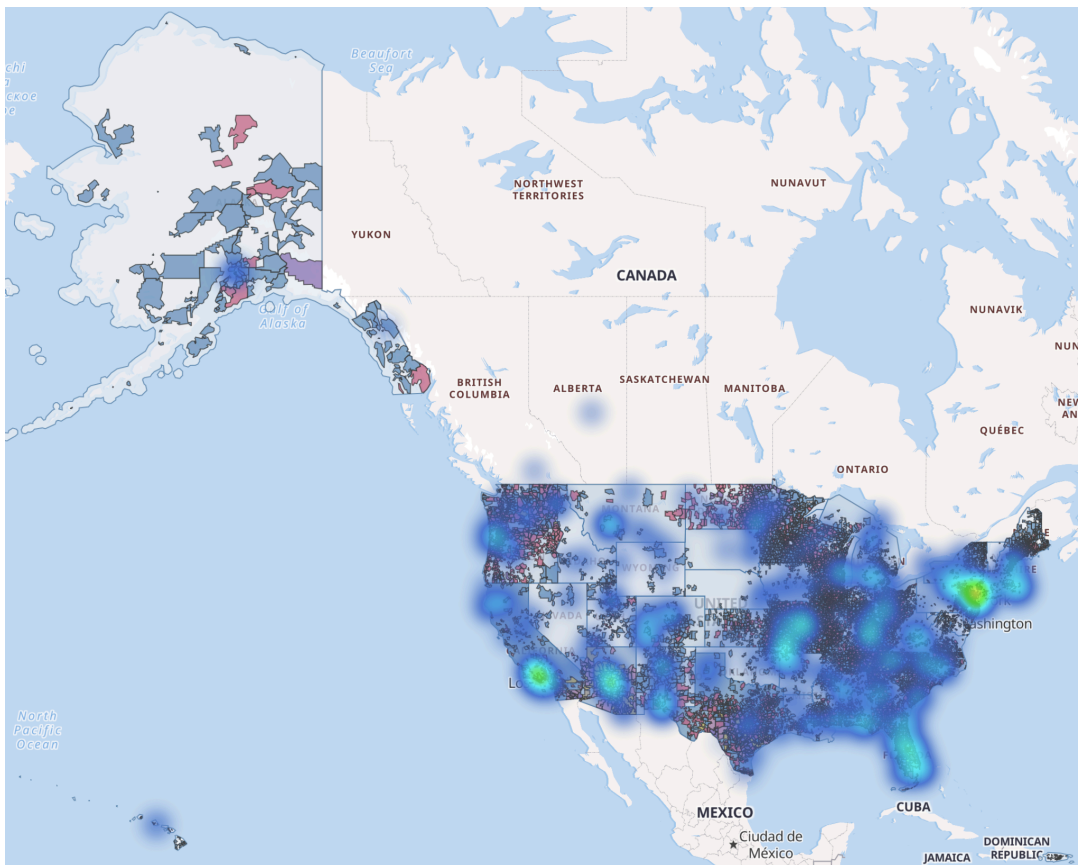
consumers. As a result, there is very little standardization of enumerations at the current time. This causes significant issues with mapping, as there is a far greater number of standard lookups than resources and fields.

Data Dictionary 2.0 will remedy this. RESO will now ensure that standard resources, fields, and enumerations are all being used correctly, which will greatly improve the quality and predictability of the standard.

RESO Certification System

The RESO Certification System is a significant change for both RESO and the industry. It not only provides an analytics and reporting framework that significantly improves consistency and transparency, but also the ability for RESO to become a data-driven organization.

Certification and Reporting Platform

In the past, RESO Certification was predominantly manual verification of compliance and binary issuance of certificates.

Beginning in 2021, with Web API Core 2.0.0 and Data Dictionary 1.7, certification became fully automated with the release of the RESO Commander. Tens of thousands of tests are generated from the specifications and run on each server and hundreds of thousands of records are sampled in each market, with strict validation done at every level.

For example, if RESO queries a server for a date from the current year and a record from the prior year is returned, or the date is formatted incorrectly, testing will fail. This level of rigor creates a foundation that data consumers can truly build and rely on, which wasn't the case previously, particularly for RETS.

The new process is provider-agnostic, using only RESO Standards for testing. In the past, it was common to have special testing parameters or features per provider that deviated from the specifications, creating a challenging and unpredictable environment for data consumers. This was one of the largest pain points for data consumers: if/then vendor logic.

Building on this foundation, an analytics and reporting pipeline has been developed to not only show providers that their systems have passed testing, but what the certification consists of in terms of standard and local data elements and data availability. For instance: How often is StandardStatus being used vs. MlsStatus in a given market or throughout the industry? We can now answer these questions.

The process produces reports which are first shown to data providers, then their customers, so both parties can ensure systems are functioning as intended. After review and approval, the reports are published to help data consumers have certainty in planning for accessing these data sets.

The resulting industry analytics are already being heavily utilized in RESO workgroups. Member concerns regarding resources, fields, or enumerations can be answered with verified usage metrics. This allows RESO to make more informed decisions based on industry adoption rates.

Another new dimension of the new certification platform is the performance reports provided as part of the certification process, which are beneficial for a number of reasons. For one, there have been complaints that the Web API is not as performant as RETS was, which is often cited as a barrier to adoption. We can now show which providers are within "reasonable" bounds according to common industry best practices. These metrics have provided insight into the capabilities of many services, and also where vendors can improve them. In a few cases, initial

testing revealed servers were 20-30x slower than the industry average and they were able to quickly tune them to be 2-3x faster than the average. This provides welcome relief for data consumers and strengthens the case to adopt the RESO Web API.

Industry Alignment Tools

Beyond standards compliance and usage metrics, the RESO Certification System provides an analytics platform that is unlike anything else out there, and it can provide alignment tools for both individual markets as well as across the industry. These can become premium features, due to the amount of value they provide, and there has been much interest in the initial outreach we've done with providers, MLSs, and data consumers so far.

At the market level, it's becoming increasingly common for MLSs to have more than one vendor. However, it's often unclear which data elements are common between all of them, resulting in large amounts of inconsistency and custom mapping. RESO Certification Analytics can provide MLSs with comparison reports amongst their providers to help address this problem.

A similar approach can also be used across markets to show the level of interoperability and any potential problem areas. Say that two MLSs want to do a data share. RESO Certification Analytics can provide detailed information about their alignment ahead of time, which can be used to ensure that their needs, and those of their consumers, are being met.

Finally, the alignment tools are invaluable for data consumers. For example, a CMA or showing product that has certain requirements for data elements it needs to function properly. Vendors can use the certification alignment tools to know exactly which markets they will be able to launch in easily, and which ones might take more work. This not only allows them to plan for success, but also greatly increases the value proposition of adopting RESO Standards.

Plug and play has long been a goal for RESO. While no two markets will ever be exactly the same due to things such as local fields and enumerations, RESO Certification Analytics can tell where there is overlap and interoperability is possible.

Acceptance Testing and Regression Tools for the Industry

One of the most difficult aspects of the software development life cycle is adding new features without causing issues in the current system. QA testing is expensive and time consuming, and software developers have limited resources to ensure there's adequate test coverage. The RESO Certification System can help fill these gaps and improve the quality of vendor software deployments.

RESO encourages data providers to use the RESO Commander and reporting tools each time they make changes to their codebases, beyond the certification process. This helps to ensure, in a rigorous manner, that these systems are still compliant with standards.

The RESO Certification platform has been built in a way that it can run hundreds of jobs at a time, on demand, at a fairly low cost. Some providers have already integrated this process into their development workflows, and over time RESO can provide things like anomaly detection and trendlines to help improve their testing processes.

Did performance improve since the last deployment? Did the number of standard elements decrease for some reason? Beyond passing the tests, this reporting provides valuable insight for quality assurance processes.

Certification Analytics Focus Group

A focus group has been created to help identify and surface trends back to the RESO community, as well as use the insights gained from the system to make recommendations regarding existing or new standards. The group will meet quarterly and produce reports to further improve the standards ecosystem.

State of the Standard

RESO will soon begin producing industry-wide reports illustrating data insights such as resources, fields, and enumerations with the greatest or least adoption, popularity of endorsements, IDX Payload adoption, and areas for improvement.

Having this kind of information at our fingertips is a powerful new benefit for RESO members and it will be pivotal in helping to guide the future of data standards as well as the future direction of the organization.

WWRED: Certification and Technical Modules

The Working with Real Estate Data Business (WWRED-B) course has proven to be very popular since its release. It provides value to those getting started with RESO standards and those looking for a refresher on industry technology initiatives and recent changes. .

This year, we will add additional educational material regarding RESO Certification that will allow MLSs to understand how to better utilize the analytics being provided in order to improve

their systems. There will also be a technical module (RED-T) to help data providers, developers, and analysts understand how to use the standards more effectively.

Add/Edit Endorsement

For the past decade, RESO standards have primarily been focused on consuming data. What about those who produce data, such as tech-enabled brokerages or open house, showing, and tour providers? We refer to this data production for the MLS data set as "Add/Edit."

RETS had some capabilities for Add/Edit to an MLS database through RETS Update, but there was a high degree of variation between implementations and fragmentation among providers.

With the recent improvements made to the standards and resulting industry alignment, Add/Edit is now more viable. The Transport and Certification Workgroups are in the process of finalizing these specifications, and will release an Add/Edit Endorsement this year, for which demand has been strong.

Web API Core 2.1.0

RESO is working on providing additional endorsements which are not part of the Web API Core specification, but add value by increasing the convenience and simplicity of data access for some consumers. While not required, it's crucial that these features be implemented consistently when used.

The endorsement framework also promotes competition within the standards. While all MLS vendors are required to get the Web API Core Endorsement, providers can offer additional value added services to their customers which differentiate them from their competitors.

Endorsements are designed to be lightweight and flexible, and RESO could potentially offer UPI, Internet Tracking, Showing, Rental, or Assessor Endorsements in the future as well.

Unique Licensee Identifier (ULI) Pilot and Case Study

While there are many existing ways to manage licensee information, there is significant momentum in the community to improve what's available.

One of the main issues is that a given participant will have many licensees and roles within a given market, or across them, which currently all appear as separate individuals. Being able to assign a single ULI to each of these licensees is crucial for things like internal reporting and data deduplication

Product Development

RESO has taken a unique approach to this problem l in that a focused and specialized group was formed within the R&D Workgroup to take a deep dive and study the problem and business needs further over the course of the past year. This approach has allowed RESO to develop a potential solution which seems likely to meet the industry's needs.

There is currently a pilot program and case study underway with roughly 150,000 licensees from MLSs in the Pacific Northwest, New England, and the Bay Area in California. The high level of participants and edge cases will help RESO ensure that an effective solution is produced.

The output of this process will be a white paper and presentation at the Spring Conference that provides a detailed look into the problem, and potential solution, with business and technical findings and detailed statistics showing how well the problem has been addressed.

In initial testing, the match rate for identifying roster subscribers to unique identities seems much higher than the other currently available alternatives, but more investigation is needed before any conclusions are reached.

Standard Workflows and Novel Approaches

While RESO's strategic priorities are Data Dictionary and Transport (Web API) standards utilization, the ULI hasn't required much work in these areas, aside from the addition of a new field. Rather, what's been created is a new kind of standard based on business processes and workflows.

There are two main aspects of the proof of concept developed thus far:
- A standard algorithm with flexible matching heuristics
- A community-based collaborative filtering using an aggregate data pool

The process works by using a scoring system to intelligently route potential duplicates to their respective markets so their membership teams can take action, and then coordinates approval between all parties while not exposing information that falls below a certain confidence threshold.

The use of an aggregate pool of information, licensee data in this case, was partly inspired by the efficacy and success of the RESO Certification Analytics platform.

Data Dictionary JSON Payloads

Standards development at RESO has often been focused on a single transport mechanism, the Web API.

For MLS Vendors, adoption and success of the Web API and Data Dictionary is critical for the industry as well as organizational goals.

However, not everyone uses the RESO Web API. There will always be companies, both in the United States and internationally, that continue to develop their own APIs. What if there were a way to make them interoperable with the Data Dictionary and Web API?

RESO has created standards in the Transport Workgroup that provide a common data format between all JSON-based APIs. So far, there have been implementations by a tour provider, a large assessment company in Canada, and an international franchisor.

Importantly, these standards are compatible with the RESO Web API since they use the Data Dictionary format. This provides a significant opportunity for RESO to increase its footprint both in the U.S. and abroad by allowing for integrations not previously possible. This approach is also compatible with RESO's certification and reporting platform.

As there are now many implementations of the RESO DD JSON payloads standard, RESO plans to begin offering an endorsement within the year.

Web API Reference Server

Work on a Web API Reference server began in 2021. This produced a server that both providers and consumers could use in developing their own products and working with the Web API.

Similar to the certification tools, the reference server can be generated from the specification rather than having to write code for it. We have also created tools to generate license-free data sets to provide a realistic test bed for Web API development and training.

The RESO Web API Reference Server will play an important role in the WWRED education modules and allow for the potential of a RESO Web API Client Endorsement.

Replication Reference Implementation

Beyond consistency, data replication had previously been identified as one of the main pain points of the RESO Web API. RESO developed specifications to help address the problem, which had significant engagement and were among the most popular ever approved by RESO workgroups. A couple of large vendors implemented these standards internally, and saw significant improvement in both performance and accuracy.

Since January 2021, RESO has been focused primarily on improving the quality and usability of the Data Dictionary and Web API Core standards. Now that the work has been completed, we can revisit the problem of replication.

Two standards have been produced, one for pull and the other for push replication. The next step is to produce reference implementations. This work began in late 2020, and we will continue to move it forward this year.

Other Initiatives

There are other open initiatives that are either being worked on currently or can be advanced this year:
- Commercial, Tax, Appraisal, Showing, Transaction Management, Consumer Leads, Bulk Sales, New Construction, and Frontage Data Dictionary standards.
- RESO Web API Desktop Client.

Going Forward

RESO's outlook in the short-term is full of opportunities, as we continue to focus our efforts on our priorities of making the Data Dictionary and Web API more productive, efficient, and beneficial to our members. We also see significant opportunities to broaden the benefits to our current and potential membership through new initiatives that allow for more accessible and diverse standards applications.

We're grateful for the intensive work of our volunteer subject matter experts who collaborate to make RESO the innovative and results-driven organizations that it represents today. The

discipline and dedication that brings us to these opportunities in 2022 is due to your investment in this organization.

We look forward to continuing our mission with you: creating and promoting the adoption and utilization of standards that drive efficiency through the real estate industry.