RESQML Overview Guide

For RESQML V 1.1

RESQML Overview	An industry-developed, vendor-neutral format that facilitates data exchange among the many software applications used along the E&P subsurface workflow, which helps promote interoperability and data integrity among these applications and improve workflow efficiency.
Version:	**Overview Guide for RESQML v1.1**
Abstract:	This guide provides a domain/business overview of how RESQML can be used in subsurface workflows.
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1.1	17 Oct 2011	Updated as necessary for version1.1 of RESQML.	Energistics and RESQML SIG

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Executive Summary

RESQML is an XML-based data exchange standard that helps address the data-incompatibility challenges faced by petro-technical professionals when using the multiple software packages required along the entire subsurface workflow, for analysis, interpretation, modeling, and simulation.

The Problem: Data Bottlenecks, Loss, and Inconsistency
The exploration and production (E&P) subsurface workflow is lengthy, iterative and complex. It involves many people from different disciplines, sometimes different companies, and use of many different software packages.

This multi-discipline, multi-company, multi-software environment requires users to move data back and forth between different software packages. Many of these packages use different data formats—often proprietary and incompatible—which results in data bottlenecks, data loss, and data inconsistency.

These problems force petro-technical professional to spend precious time trying to determine and resolve data problems—time they could be spending on the actual domain/subsurface work.

The Solution: RESQML Improves Data Flow and Data Integrity
Software packages that implement RESQML can read and write data to this vendor-neutral, industry-defined, common data format.

RESQML—the successor to RESCUE, the industry-defined data exchange standard used since the late 1990s—leverages newer technologies and established standards, such as XML and HDF. This approach results in a data exchange standard rigorous enough to ensure data consistency but still flexible enough for companies to tailor to their specific needs.

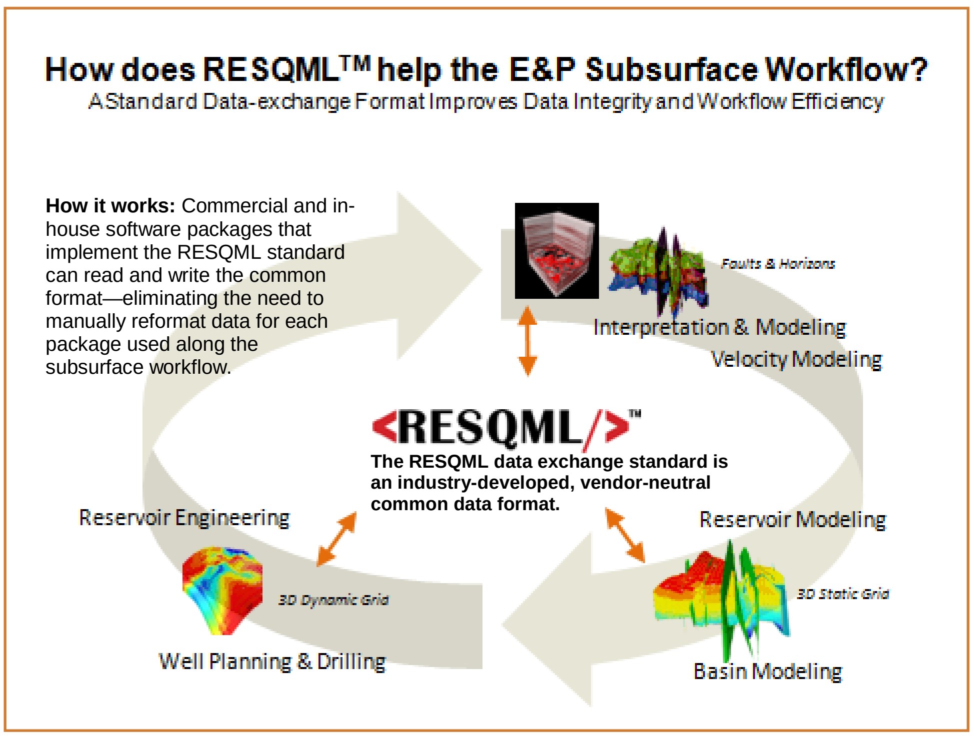

Figure 1 Implementing RESQML in software used in the E&P subsurface workflows streamlines data flow between the many software packages used, improves efficiency in those workflows, and ensures data integrity. This figure shows workflows supported by the current version of RESQML.

Benefits of RESQML
Implementation of RESQML standards includes these benefits:

- **Improves data integrity.** RESQML helps to ensure that all data are transferred and in the right format. RESQML's modular design lets users focus on specific steps in workflow and transfer only necessary data to update a model. New technologies allow RESQML to handle very large grids and data sets quickly and efficiently.

- **Improves efficiency for petro-technical professional, software developers, and workflows.** The ability to exchange data in a consistent, reliable format means petro-technical professionals have more time to focus on domain problems. Software developers can eliminate the need for custom, one-off connectors between applications, allowing them to focus on enhancements for domain functionality.
- **Leverages data so that petro-technical professionals can make better decisions faster, with the potential to improve operations.** The consistent, easy-to-use RESQML data format enables use of more data in new ways, for example, faster model updates and real-time visualization of the subsurface during drilling operations.
- **Supports traceability and regulatory requirements.** RESQML enables traceability for key information in models, such as who, when, and with which software it was last updated. Traceability also supports workflows and regulatory requirements to preserve data.

Development of RESQML

RESQML has been developed by a global consortium of operators, service companies, software vendors, and government agencies—many of which were also involved with the development of RESCUE—under the umbrella of Energistics.

About Energistics

Energistics is a global, not-for-profit, membership organization created to serve as a neutral body to facilitate and manage open data, information and process standards for the upstream oil and gas industry.

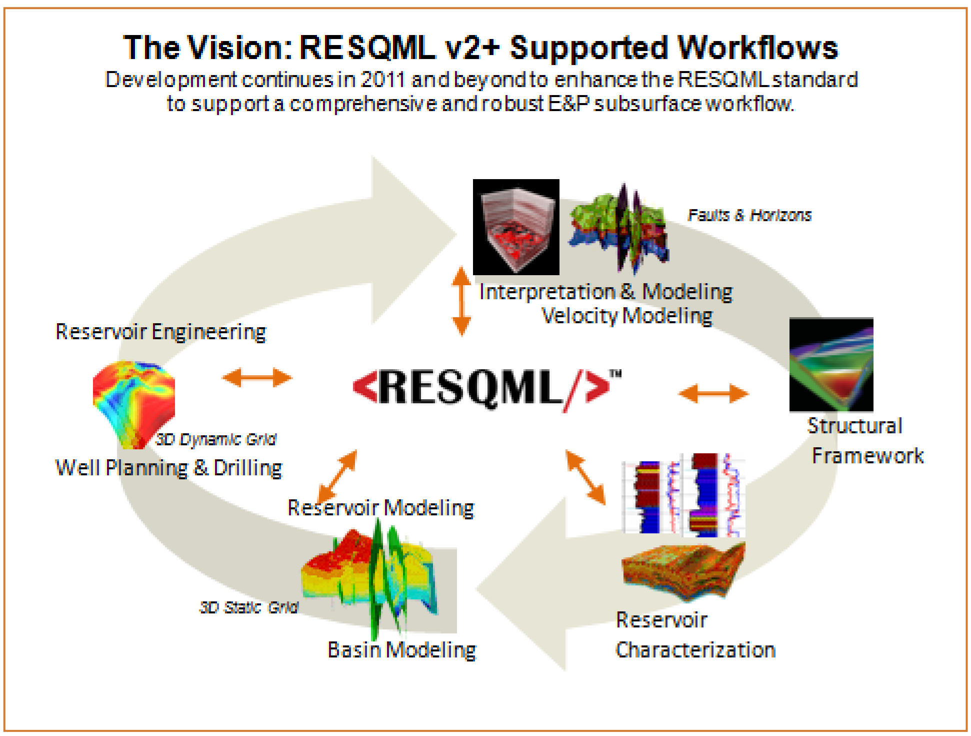

Figure 2 RESQML development is ongoing.
For more information, see the RESQML development road map on page 3.

1. Introduction

RESQML is an XML-based data exchange standard that helps to address the data-incompatibility and data-integrity challenges faced by petro-technical professionals when using the multiple software technologies required along the entire subsurface workflow, for analysis, interpretation, modeling, and simulation.

1.1 Why is RESQML Important to E&P?

RESQML delivers an industry-defined common data format, which helps ensure data integrity and helps to facilitate interoperability between disciplines, companies and software packages.

1.1.1 The Problem: Data Bottlenecks, Loss, and Inconsistency

The exploration and production (E&P) subsurface workflow is lengthy, iterative and complex. It involves many people from different disciplines, sometimes different companies, and use of many different software packages.

This multi-discipline, multi-company, multi-software environment requires users to move data back and forth between different software packages. Many of these packages use different data formats—often proprietary and incompatible—which results in these main problems:

- **Data bottlenecks**. Incompatible formats and time-intensive processes required—by both petro-technical professions and software developers—to reformat data to move between packages.
- **Data loss**. During the transfer data gets dropped or lost, causing incomplete models.
- **Data inconsistency**. Data may be transferred, but is altered in the transfer process (and sometimes undetected), which introduces errors into the model.

These problems force petro-technical professional to spend precious time trying to determine and resolve data problems—time they could be spending on actual subsurface domain work.

1.1.2 The Solution: RESQML Improves Data Flow for Software, People, and Companies

Software packages that implement RESQML can read and write data to this vendor-neutral, industry-defined, common data format.

RESQML-enabled software processes and saves data in the software's native environment, but users can also choose to export data to the RESQML format when they need to move data to the next software package in their workflow. That next software package may be a tool used by another discipline in the workflow or by a partner company in a joint venture. If that software packages in RESQML-enabled, it can then read in the RESQML file and processes the data in its native environment. (For more information, see chapter 3, How RESQML Works, on page 9.)

1.1.3 Benefits of RESQML

Implementation of RESQML standards includes these benefits:

- **Improves data integrity.** RESQML helps to ensure that all data are transferred and in the right format. RESQML's modular design lets users focus on specific steps in workflow and transfer only necessary data to update a model. New technologies allow RESQML to handle very large grids and data sets quickly and efficiently.
- **Improves efficiency for petro-technical professional, software developers, and workflows.** The ability to exchange data in a consistent, reliable format means petro-technical professionals have more time to focus on domain problems. Software developers can eliminate the need for custom, one-off connectors between applications, allowing them to focus on enhancements for domain functionality.
- **Leverages data so that petro-technical professionals can make better decisions faster, with the potential to improve operations.** The consistent, easy-to-use RESQML data format enables use of more data in new ways, for example, faster model updates and real-time visualization of the subsurface during drilling operations.

- **Supports traceability and regulatory requirements.** RESQML enables traceability for key information in models, such as who, when and with which software it was last updated. Traceability also supports workflows and regulatory requirements such as newer, more stringent reserve reporting requirements that requires operators to archive and be able to reproduce models used to generate reserve estimates for seven years.

1.2 Audience, Purpose, and Scope

This guide:

- Serves as an introduction for petro-technical and information technology (IT) professionals and managers to help them understand the business (domain) intent and benefits of RESQML.
- Describes the high-level workflow and some domain scenarios and explains how RESQML can benefit them. These same workflows and scenarios were used for RESQML development.
- Provides an introduction and organization for the use cases that have been developed to aid development, testing, and implementation of the RESQML standard.

To ensure you are reading the latest version of this document, visit the Energistics web site, http://www.energistics.org/current-resqml-standards.

1.3 RESQML Scope and Current Functionality

The first release of RESQML replicated most of the functionality of the final release of RESCUE (RESQML's predecessor) and more. The current version of RESQML provides the following content.

Feature	Description
Infrastructure	A RESQML document contains one XML file and, optionally, one HDF file, a special format that helps speed and efficiency of processing large data sets. Version 1 also includes use of coordinate reference systems (for accurate positioning of models on earth) and global unique identifiers (GUID) for all features and grids to support traceability.
Semantic Information	Metadata, traceability, reference data for property names to enable consistent property name mapping between software packages, units of measure, standard location codes.
Structure	Faults and horizons as individual features.
3D Grids	Static and dynamic property arrays, basic local grid refinement (LGR), faults, and non-neighbor connections (NNC).
Wells	Blocked/IJK wells and infrastructure for support of WITSML data objects.

1.4 Document Set and Resources

The RESQML documentation set includes the following, which can be found at http://www.energistics.org/current-resqml-standards.

Document	Purpose / Audience
RESQML Overview Guide	Overview of workflow and business processes that RESQML was designed to facilitate. A useful introduction to RESQML for both petro-technical and IT technical professionals.
RESQML Usage Guide	Overview of key technical concepts for implementing the RESQML standard in a software package. For IT professionals implementing RESQML.
RESQML Use Case Guide	Lists RESQML use cases. For use by both petro-technical and IT professionals to understand the business/domain application of RESQML.

1.5 History

RESQML is the successor to RESCUE, an E&P industry data exchange used since the1990s for 3D gridded reservoir models, horizons, faults and structural models, and associated well data. RESCUE has been used by many operators and software vendors, many of which were members of the RESCUE consortium that developed the standard.

With advances in computing and the advent of new data structures and technology, the RESCUE standard became obsolete. In 2008, the RESCUE consortium elected to retain the best aspects of RESCUE and upgrade to a next-generation XML-based solution, which was named RESQML.

Stewardship of the standard was transferred to Energistics based on the E&P consortium's experience facilitating the development of other XML-based data exchanges standards for drilling and production, WITSML and PRODML, respectively.

1.6 Future Plans

The ultimate goal for RESQML is to address all key data along the subsurface workflow, using a phased approach, driven by operator SIG member requirements.

The RESQML road map (Figure 3) shows the current development plan. The process of gathering, prioritizing, and implementing standards requirements is a continual effort. Development plans are analyzed and refined based on evolving requirements and priorities.

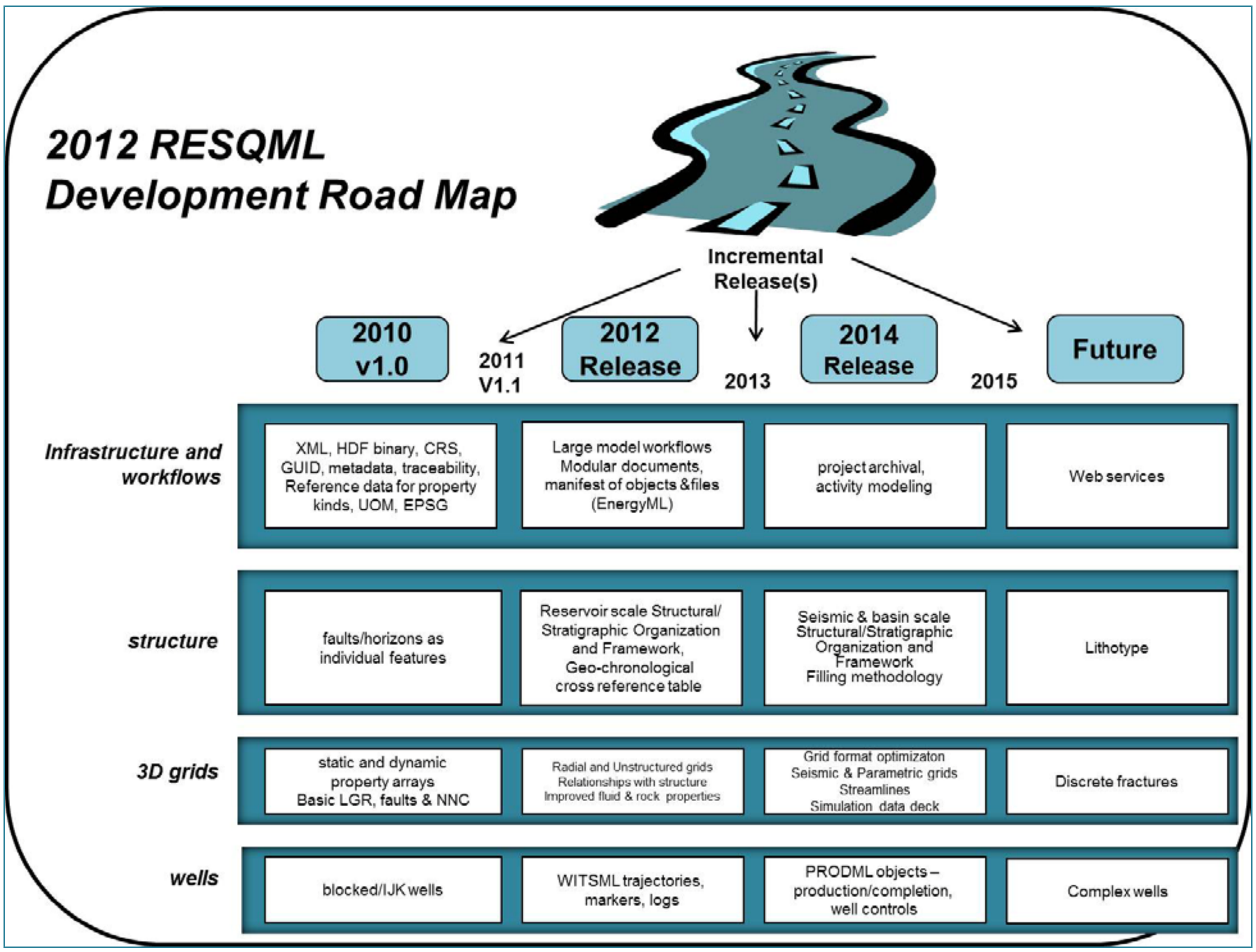

Figure 3 RESQML development road map.

2. RESQML Scope: E&P Subsurface Workflows

Because reservoir modeling and simulation involves lengthy, iterative and complex workflows, many valid approaches exist. However, to develop the RESQML data exchange standard and identify a scope of work to which the standard would be applied, a common, agreed-upon exploration and production (E&P) subsurface workflow had to be defined.

This section describes the high-level subsurface workflow developed by the RESQML SIG. This workflow does not represent the workflow of any particular company, but rather what the SIG determined that a “typical” industry workflow might be.

To show how RESQML helps support and facilitate these workflows, this section also describes some high-level domain scenarios for processes and tasks within the main workflow.

2.1 High-Level E&P Subsurface Workflows

The high-level E&P subsurface workflow supported by the current version of RESQML starts with interpretation and proceeds to simulation (Figure 4). This workflow also considers integration with related discipline workflows and data, such as drilling and production. This high-level workflow has component workflows, processes, and tasks, all of them iterative.

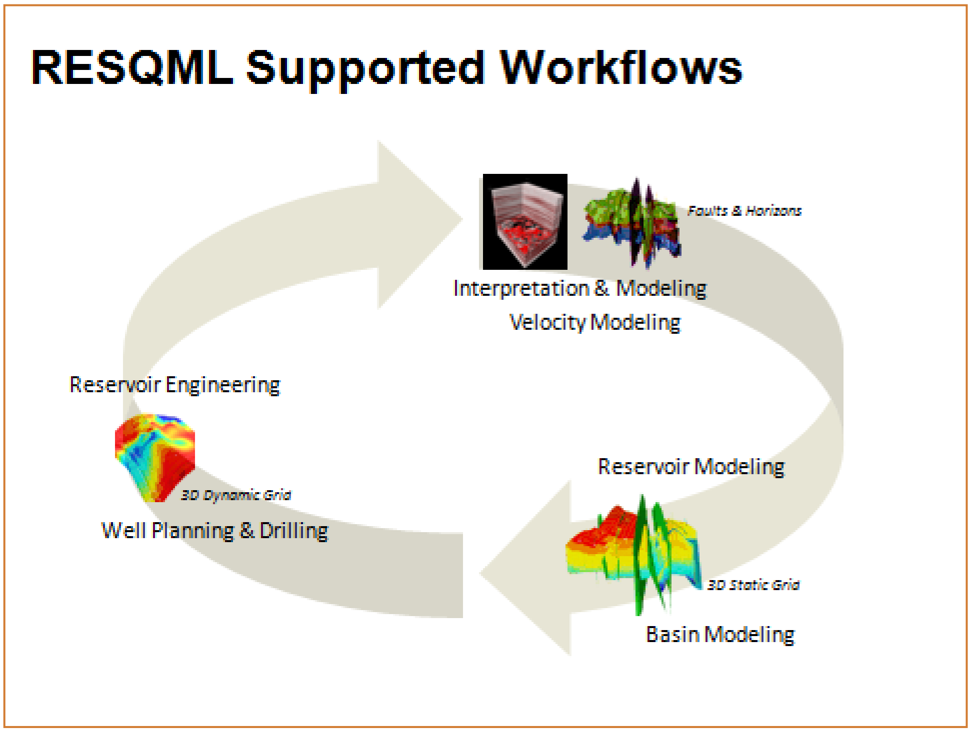

Figure 4 RESQML makes it possible to quickly, easily, and reliably transfer data between software packages used along the E&P subsurface workflow.

Future versions of RESQML will enhance and add data objects and the relationships among them to support an expanded E&P subsurface workflow (Figure 5).

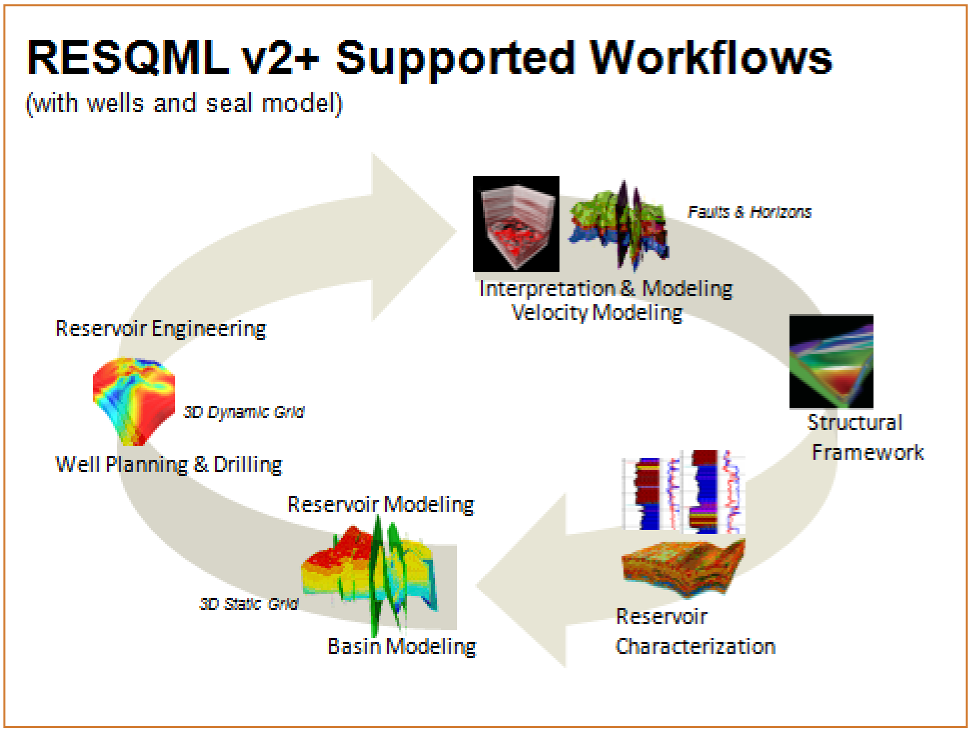

Figure 5 Future versions of RESQML will continue to enhance and add data objects to support richer E&P subsurface workflows.

2.2 How RESQML Supports E&P Subsurface Workflows

This section describes example domain scenarios and shows how software packages that have implemented the RESQML standard support the associated workflows.

These scenarios represent specific instances of and refer to the RESQML use cases. For more information about RESQML use cases, see the *RESQML Use Case Guide*.

2.2.1 Seismic Interpretation (Use Case 2)

Example: A geophysicist interprets a seismic horizon in the time domain in a seismic interpretation software package, and then needs to extract attributes from a seismic volume along the surface, which must be done with a different software package. With RESQML-enabled software packages, he can quickly and easily transfer that horizon to the seismic attribute calculation software package, extract the attributes, and then send the extracted attributes back to the seismic interpretation software.

2.2.2 Geological Interpretation (Use Case 2)

Example: Two geologists are working an asset that covers multiple onshore US townships. Geologist A works townships 1 and 2 in one project, which has 220 wells, and Geologist B works townships 3 and 4 in another project, where 113 wells have been drilled. Geologist A has used data from the 220 wells to generate structure maps for 8 different horizons. Geologist B wants to incorporate those surfaces into his interpretation, to gain a better regional understanding of his own data. So Geologist A exports the 8 surfaces to a RESQML file, and Geologist B can import them into his interpretation project, with no geo-localization problems.

2.2.3 Interpretation and Structural Framework (Use Case 2)

Example: A geophysicist has interpreted 5 different horizons and multiple faults in seismic interpretation software. These horizons and faults were interpreted as grids and sticks. The geophysicist then wants to share those data with the team geologist, who will use it to generate a sealed 3D framework using a different software package. If both software packages are RESQML enabled, the geophysicist can then transfer all of those surfaces to the geologist in a RESQML file.

2.2.4 Reservoir Modeling (Use Cases 1 and 5)

Example 1: The modeler has constructed a reservoir model based on seismic and geological interpretation. The modeler then wants to share that entire model data set, including input horizon, fault and well data and resulting 3D grid and properties, with another person. With RESQML, the modeler can export all of the data with a single export, and the person receiving the data can do a single import. Well data is still handled with a user's current well transfer method, such as WITSML or OpenSpirit (though in the future, RESQML will work with WITSML for simple transfer of complete models that include wells).

Example 2: Also, the modeler wants to share the data not only with another modeler in the same company, but also with a modeler working for one of the field partners. This same RESQML document/file, *with no required changes*, can be shared with that person.

2.2.5 Basin Modeling (Use Case 3)

Example: A petroleum systems expert is tasked with generating a regional basin model. She is given a variety of data, covering various areas, from multiple sources (different software packages and different interpreters), all to be used as input for generating this model. RESQML files are exported from each of the sources and imported into the basin modeling software, resulting in a merge of the various data. This merged dataset can then be saved to a single RESQML file.

2.2.6 Well Planning (Use Case 4)

Example: A technical specialist is building a shared earth model for the purpose of pore pressure prediction for planning a well. The asset geoscientists have interpreted several horizons and faults in the overburden above the reservoir, to be used for building the model. Those surfaces are then transferred to the modeling software using a RESQML file. In addition to surfaces, the specialist will also receive traceability information, for example, who created the grids, what software they used, and when they were last modified, from the RESQML file. By relying on RESQML-enabled software for data transfer, the asset will be assured that the data has geospatial integrity, which is an absolute requirement for an activity such as well planning.

2.2.7 Dynamic Simulation (Use Cases 6 and 7)

Example: A geomodeler has populated a fine-scale geomodel with a set of static reservoir properties, including porosity, permeability, and water saturation. The geomodeler then upscales those properties to a coarser 3D grid, with the intention of sharing those upscaled data with a reservoir engineer (RE). The geomodeler then creates a single RESQML file that contains the property arrays and 3D grid geometry and transfers it to the RE.

The RE then imports the data from the RESQML file into flow simulation software.

The RE runs the flow simulation, generating dynamic time-recurrent properties. These time-recurrent properties are then sent back to the geomodeling software using a RESQML file, so that the geomodeler can visualize the dynamic data with the static data.

2.2.8 "Big" 3D Grids

RESQML uses Hierarchical Data Format 5 (HDF5) technology for better speed and efficiency in processing large data sets.

Example: A national oil company (NOC) has sold interest in a portion of a very mature gigantic oil field to a large international oil company (IOC). The field contains multiple reservoirs, penetrated by several hundred wells, and has been on production for decades. Over the life of the field, the NOC has developed a 72-million-cell geomodel of the field, and as part of the deal, has agreed to share it with the IOC. With RESQML, the NOC can create a single RESQML "document" (2 related files) that comprises the entire model, and the IOC can then import the model.

2.3 Extended Use Case and Testing with Alwyn North Field Data

The RESQML SIG has developed an extended use case and testing data sets that use actual field data from the Alwyn North field. This data, which was contributed by Total, is an ongoing invaluable resource for conducting further development and real-world testing to help ensure the rigor and reliability of RESQML.

Several companies that have implemented RESQML in their software packages then tested the use case with data from the Alwyn field. To date, the results of this testing have been presented at two industry conferences. For more information, see Section 2.3.2 below.

2.3.1 Use Case Overview

The use case covers most of the workflow steps and exchange points that RESQML is working to support and has these objectives:

- Transfer interpretation results from an oil company's in-house interpretation package through a representative sub-surface workflow using software from several different vendors.
- At each step of the data transfer, ensure consistency with the original interpretation.
- At the end of the work flow, transfer the data back into the originating software for a visual check to ensure the model remains consistent with the original interpretation.

The interpretation results (e.g., horizons, faults and well formation markers) from the oil company's in-house software, was transferred as RESQML features (horizons and fault models, reservoir grid geometry) to diverse structural, stratigraphic, and reservoir applications from multiple vendors.

Figure 6 shows the workflow for the use case data exchange. For more details, see the *RESQML Use Case Guide*.

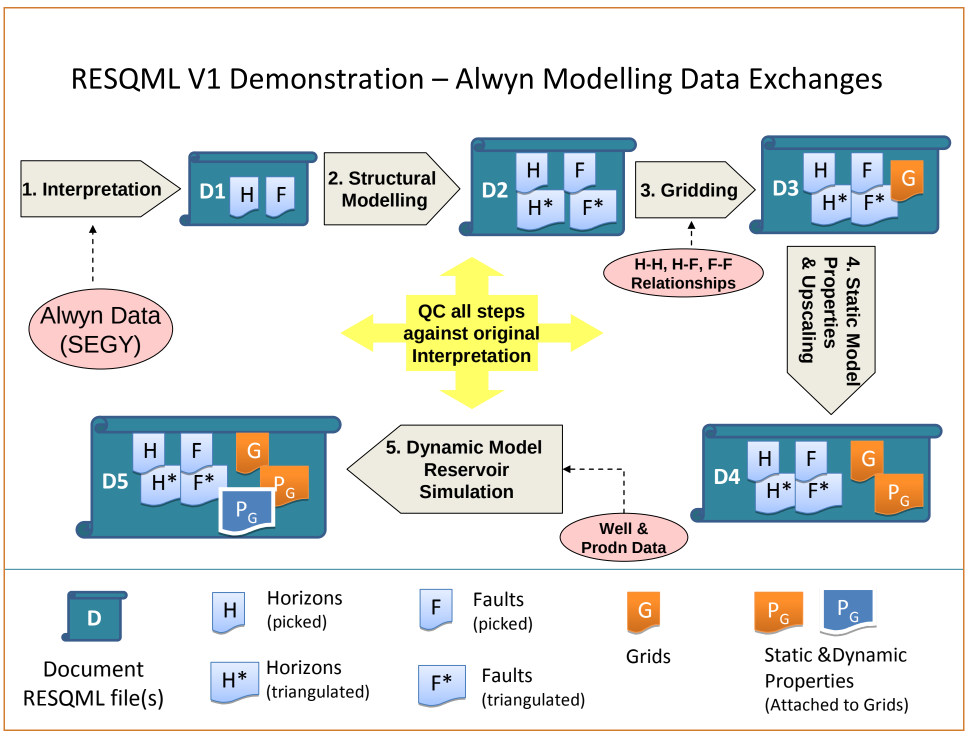

Figure 6 RESQML data exchange by multiple parties/software packages using Alwyn field data set.

2.3.2 Resources: SPE Paper, EAGE Presentation, Video

A number of resources are available documenting this extended use case.

- **SPE Paper 143846-MS**: *Using RESQML for Shared Earth Model Data Exchanges between Commercial Modelling Applications and In-House Developments, Demonstrated on Actual Subsurface Data,* presented at SPE Digital Energy Conference and Exhibition, 19-21 April 2011, The Woodlands, Texas, USA. **<link to abstract at onepetro.org.>**
- **The 73rd EAGE Conference & Exhibition (Vienna '11) Presentation**: *Complete Reservoir Characterization Workflow Involving Several Vendors by Using the RESQML v1.0 Standard*, **<link to abstract at earthdoc.org>.**
- **Energistics Presentation:** Update presented to Energistics Western Europe Region Meeting participants on May 31, 2011. **<link to presentation on energistics.org>**

3. How RESQML Works

Programmers implement the RESQML standard by modifying software so that it can read and write the RESQML format, in addition to the software's native file format. (For information about RESQML technical implementation, see the *RESQML Usage Guide*.)

3.1 RESQML Workflow: Simple Example

Users choose to write (export) data to the RESQML format when they need to move data to the next software package in their workflow (Figure 7). That next software package may be a tool used by another discipline in the workflow or by a partner company in a joint venture. If that software packages is RESQML-enabled, it can read (import) the RESQML file and process the data in its native environment.

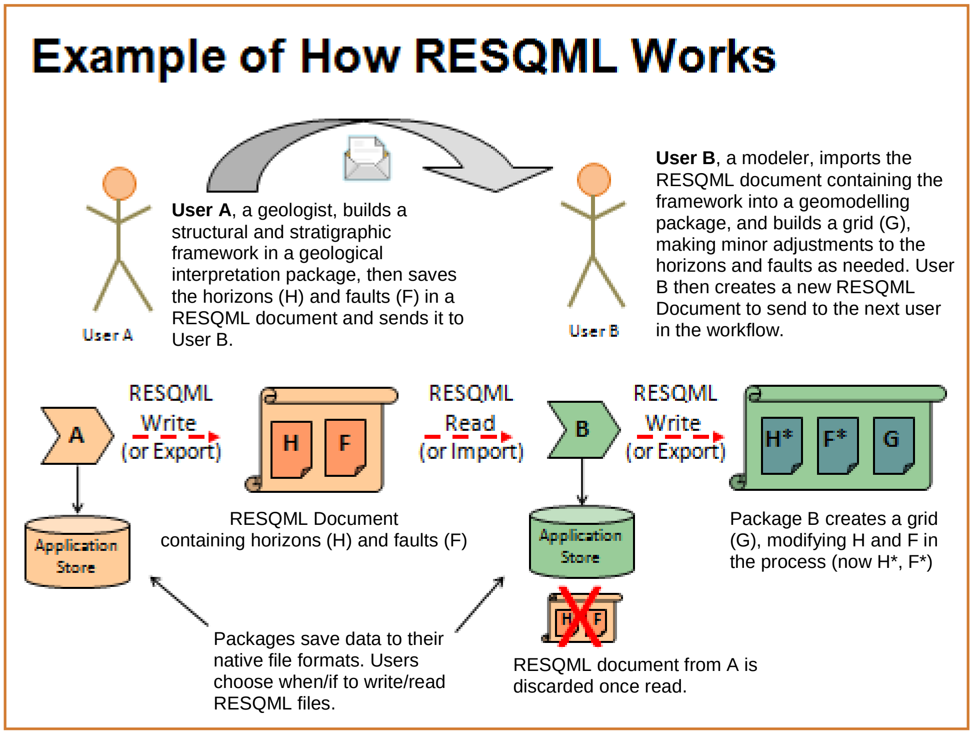

Figure 7 A user writes (exports) a file to the RESQML format, which may be read (imported) by the next software package in the workflow.

3.2 Overview of RESQML

RESQML organizes earth model data into horizons, faults, and grids and their respective static and/or dynamic properties (Figure 8). RESQML also supports blocked wells.

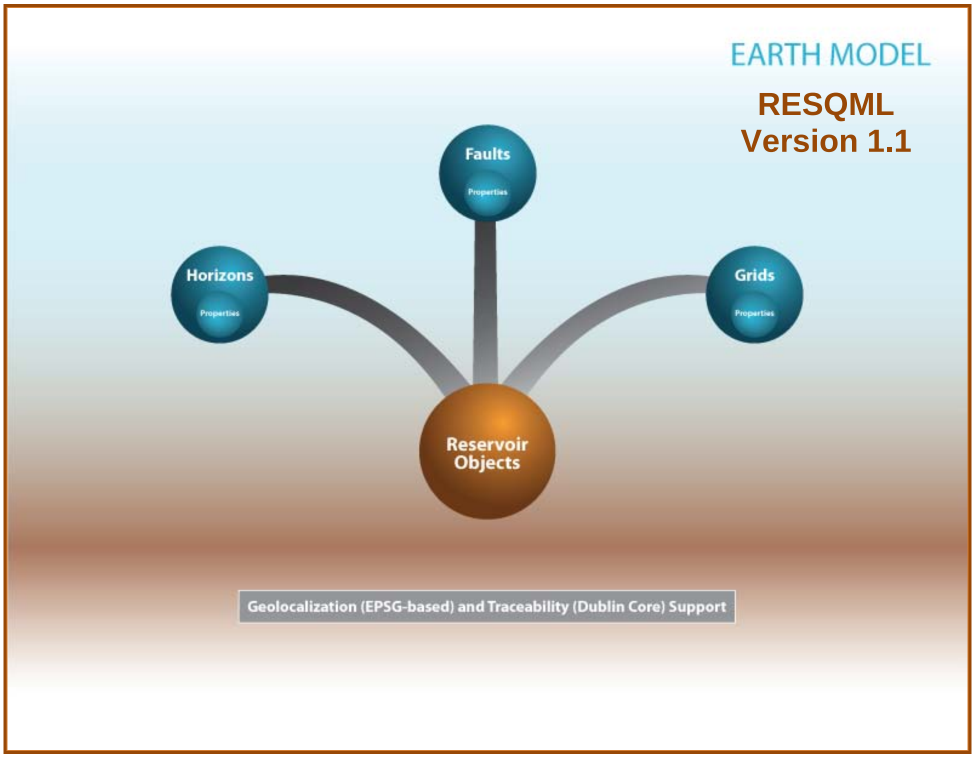

Figure 8 RESQML organizes earth model data into horizons, faults, and grids and their respective properties.

3.2.1 Faults and Horizons

Faults and horizons are considered to be interface features, and they may have multiple versions and multiple geometry representations of each version. (For definitions of features, versions and representations, see the *RESQML Usage Guide*.)

Geometry representations include:

- For horizons: 3D point sets, orthogonal 2D grids, triangulated meshes, and hybrid (orthogonal grid plus triangles).
- For faults: 3D point sets, orthogonal 2D grids, triangulated meshes, and pillar sets (collection of 3D poly-lines).

Each fault or horizon representation may have its own set of associated properties. This approach makes it possible to transfer information about the main structural features of an earth model. Faults and horizons may now be independently transferred—a grid is not required (as it was in RESCUE).

However, in the current version of RESQML, it is not yet possible to declare that a group of individual features together represent an earth model. The current version captures the geometric and topological description of some structural elements of the reservoir, but this description does not include a consistency between these elements or a consistency between these elements and the geocellular (static model) and the reservoir simulation (dynamic model) grid. A near-future version of RESQML will define the concepts of structural organization and structural framework to handle this concept of consistent earth model.)

3.2.2 Property Data

Property data may be static or dynamic and may be associated with a horizon, a fault, a grid, a blocked well list, or a non-standard adjacency list (explained below).

Property groups are used to group, for instance, all of the properties at one time or simulation time step within a RESQML document.

Property kinds help you map field names in your software to RESQML elements.

3.2.3 Grids

- The grid itself is a completely general corner point grid with each cell described by its eight cell nodes and each node, by default, lying on a coordinate line.
- A new indicator clearly shows whether the cell geometry is defined for a cell (addressing a known ambiguity issue in predecessor standard RESCUE).
- Topological indicators are supplied with the grid, not just a geometric description, thereby removing ambiguities in the interpretation of the internal adjacency of a model.
- The grid index origin is preserved and cannot be swapped, thereby preserving the connection to reservoir simulation data, which is often index-based but otherwise not included within a RESQML document.
- For unfaulted grids, each node is described only once but shared among 8 cells.
- Coordinate lines need not be straight and need not be monotonic functions of depth. Additional coordinate line node lists are used on faults to describe fault throw. Additional nodes may also be described individually, e.g., to allow for the description of stair-step faults without forcing the introduction of additional coordinate line node lists.
- Indicators in the grid header are used to indicate the complexity of a grid, so that the reading software knows how complex the grid is without a cell-by-cell analysis of the grid geometry.
- Support for multiple grids, e.g., to support multiple reservoir problems, and flexible definition of local grids.
- Non-standard adjacency consists of a cell-face-pair list that explicitly represents the adjacency between "non-standard" cells, which avoids the differences in interpretation between different applications for faulted corner point grids.

3.2.4 Wells

Wells are defined in the Energistics data exchange standard WITSML (Wellsite Information Transfer Standard Markup Language). The current version of RESQML includes blocked wells and provides a framework for future use of WITSML data objects.

Blocked wells, which consist of the cell list of the grid that is intersected by a wellbore, are ordered by increasing measured depth and include support for multi-lateral wells.

Users can continue to use their current method for transfer of well data, be it WITSML or other products and methods.

3.2.5 Key Metadata

Traceability. Implementation of global unique identifiers (GUID) for RESQML documents and items such as faults, horizons and grids and use of Dublin Core elements for documents and data objects within documents provides traceability of creation and updates of documents and objects for users, software used, and time/date stamp.

Coordinate Reference System (CRS). Use of a global CRS allows models to be accurately located on the Earth. The CRS is specified using Geographic Markup Language (GML), which includes EPSG codes to identify coordinates for specific, well known global locations. For more information about GML and EPSG codes, see Appendix A.

Each geometric representation is specified with respect to a local CRS, which is embedded in the global CRS (with optional rotation, translation and change of units of measure). A Local CRS vertical axis may represent depth (always increases downward) or it can represent time.

3.3 Overview of a RESQML "Document"

A RESQML "document" refers to a grouping, similar to a file, of the RESQML data objects described above. Referring to Figure 7, a user working in a RESQML-enabled software package would write (or export) a RESQML document, which can consist of the two files listed here.

File Type	Required / Optional	Naming Convention	Example File Name
XML	Required	File extension = ***.resqml***	*Myproject.resqml*
HDF5	Optional (though most vendors will implement)	File name = the RESQML file name, including the extension. File extension = .***h5***	*Myproject.resqml.h5*

3.3.1 XML Overview

The XML file is the primary transfer document, containing the data a user chooses to export.

The RESQML XML schemas are based on the design patterns, common types, and reference data from the established Energistics standards, WITSML (Well Information Transfer Markup Language, for drilling and completions data) and PRODML (Production Markup Language). Leveraging these existing standards and schemas allows integration of a rich set of data objects for cross-domain workflows and makes it possible for RESQML to support WITSML well data (such as logs, directional surveys, formation markers, etc.), instead of developing new ones.

3.3.2 HDF5 Overview

Additionally, to handle multi-million cell models, the XML file can reference an auxiliary Hierarchical Data Format 5 (HDF5) file, where geometry and properties can be stored.

HDF5 is a set of open file formats and libraries designed to store and organize large amounts of numerical data, and improve speed and efficiency of data processing. Software vendors choose to implement HDF5 as part of RESQML implementation into their products. Most vendors will probably choose to implement.

3.4 RESQML v2+: Future Development

Planning and development for RESQML v2+ has already begun (see the RESQML development road map on page 3). Future versions will enable relationships between objects for a consistent earth model, better integrate support for wells (from WITSML), integrate production data (from PRODML), and add more functionality based on user requirements and priorities (Figure 9).

Data integration research and development is happening within the RESQML SIG, and also in coordination across other Energistics SIGs to develop solutions to work across related standards. This cross-standard effort will help eliminate redundancy and maximize efficiency.

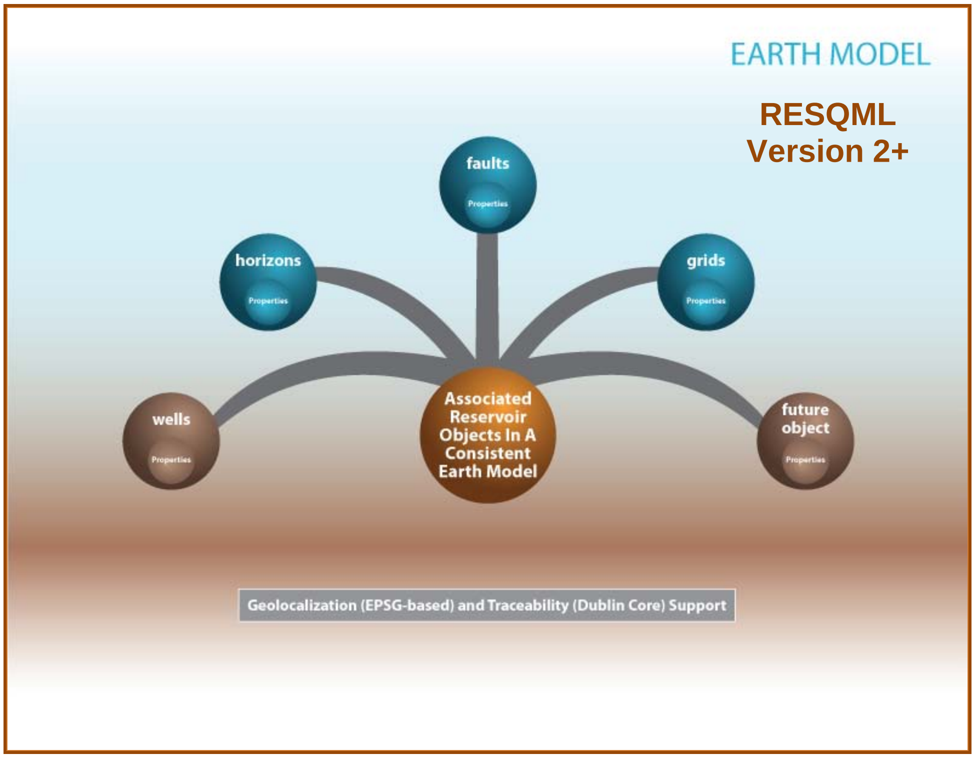

Figure 9 RESQML version 2+ will provide the relationship between objects for a consistent earth model, integrate wells (from WITSML) and production data (from PRODML), and add other future objects based on user requirements and priorities.

Appendix A. Standards References

The following table lists other standards consulted, used, or incorporated in RESQML.

Standards / Organization	Description of Use
XML Schema 1.1 XML Schema Part 1: Structures Second Edition http://www.w3.org/TR/2004/REC-xmlschema-1-20041028/ W3C- World Wide Web Consortium 28 October 2004	Used to define the schema that constrains the content of a RESQML XML document.
XML Schema Part 2: Datatypes Second Edition http://www.w3.org/TR/2004/REC-xmlschema-2-20041028/ W3C-World Wide Web Consortium	Used to define the schema that constrains the content of a RESQML XML document.
Hierarchical Data Format 5 (HDF 5) The HDF Group http://www.hdfgroup.org/	Optional set of open file formats and libraries that can be used with the RESQML schema. Designed to store and organize large amounts of numerical data, and improve speed and efficiency of data processing.
Geographic Markup Language (GML) Open Geospatial Consortium (OGC) http://www.opengeospatial.org/	The OpenGIS® Geography Markup Language Encoding Standard (GML). The Geography Markup Language (GML) is an XML grammar for expressing geographical features.
EPSG Codes International Association of Oil & Gas Producers (OGP) http://www.epsg.org	The European Petroleum Survey Group (EPSG), the globally recognized experts on geodetic issues, has been absorbed into the Surveying and Position Committee of the International Association of Oil & Gas Producers (OGP), which is now the owner of the EPSG database of Geodetic Parameters and assigned codes. RESQML implementations can use EPSG codes as part of defining a coordinate reference system (CRS).
Dublin Core Metadata Elements Dublin Core Metadata Initiative (www.dcmi.org)	A metadata standard that has been adapted for use with RESQML. A set of metadata elements for documents and objects within documents that are used to provide traceability of creation and updates of documents and objects for users, software used, and time/date stamp.
Documentation Standard Internet Engineering Task Force www.ietg.org	The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY" and "OPTIONAL" in this guide are to be interpreted as described in RFC 2119. (http://www.ietf.org/rfc/rfc2119.txt)
RESCUE RESQML predecessor standard. An E&P industry data exchange used since the 1990s for 3D gridded reservoir models, horizons, faults and structural models, and associated well data. RESCUE has been used by many operators and software vendors, many of whom were members of the RESCUE consortium that developed the standard	RSQML Version 1 replaces RESCUE functionality and addresses some of the key user issues with RESCUE.