

# **The Semantic Web & Alignment Theory**

## **Part One (Dispelling Notions)**

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## **Introduction**

Over the last decade we have been working in the area of ontologies and ontology-based technologies that leverage work being done in the area of The Semantic Web. In basic terms, The Semantic Web supports a common framework that allows data to be shared and reused across application, enterprise, and community boundaries.

In this work we try to not only get the foreground in focus, but the background as well. Hence, trying to gain a better understanding of not only relationships, but also the fabric that interconnects the entities involved in those relationships. This paper is intended to be a first step in creating better Strategic, Performance, and Contingency Plans that could be used in aligning social networks through the use of The Semantic Web leveraging preexisting and new technologies to better “align” the parties involved could help to improve communication and efficiency, along with creating new accountability models across the public and private sectors.

## **Not There Yet**

Artificial Intelligence, especially of a sort that holds foreground and background in focus, is a long way off, but there is some very important and useful work going on in the area of predictive marketing. The latest batch of Business Intelligence offerings look promising. And “Big Data” continues to fuel quite a buzz. However, we are not close to creating a seamless Web. As a matter of fact there is more disconnected content than ever to choose from and most is not well-related by our search engines and is not especially useful. It is not a case of “Too Much” information, but information that does not provide value in most instances. While search tools have become more advanced, they have to sift through an ever increasing overload of data from across the globe. From a pragmatic perspective we need to take a step back and see how this information relates to us and our relationships with others.

## **Our Nebulous World**

Consider: within the New York City borough of Queens you can hear over 180 spoken languages. Just taking the E train to the Jackson Heights can be bewildering. About a decade ago Russell was involved in the release of a financial application in Hong Kong. The biggest takeaway was that the application had to be supported in both Mandarin and Cantonese.

This eye-opener gave me a glimpse of what global communication was about and the need for glossaries for terms & definitions that support multiple languages and written formats. At this point in time The Worldwide Web Consortium (W3C) has created vocabularies that define concepts & relationships or “terms” that may be seen at <http://www.w3.org/standards/semanticweb/ontology>, which provides a better understanding of the work that has been done to date.

However, if we want a true Semantic Web, we must promote vocabularies (supporting over 200 spoken languages and multiple written formats) that any entity may access to help initiate or improve the relationships with which these languages are involved. Additionally, the dynamic nature of our interconnected world requires that these vocabularies be updated in real-time including the ability to add any new formats if needed.

*Please Note: W3C efforts such as Resource Description Framework (RDF) provides the foundation for publishing and the linking of data. In addition, important related W3C efforts like Web Ontology Language (OWL) is designed to represent knowledge about things, groups of things, and relations between things. As a result, pieces are being put into place to help create a true Semantic Web, but a great deal of work remains before its potential is realized.*

## **Relationships Do Matter**

Trying to align partners who share similar goals and objectives is most often a worthwhile undertaking that could with careful coordination leverage many of the advantages associated by cohesively formed relationships. Hence, these relationships require careful orchestration of the various pieces to move the project or effort forward. Accordingly, certain mechanisms should be put in place to help insure the success of the project or effort in the form of Strategic, Performance, and Contingency Plans. For example, consider a large-scale (8+) earthquake in the San Francisco Bay-Area. Not only will government entities at the federal, state, and local levels need to be carefully coordinated, but also private sector vendors that provide vital products and, or services must be included in response planning and execution. Case in point: The need to deal with broken sewer lines. With an earthquake of this size portable toilets will have to be brought in to deal with this key part of the services infrastructure. From a holistic view a Strategic Plan that includes partners would clearly define parameters such as earthquake seismic magnitude (8.1, 8.2, 8.3, etc.) and risk areas (North Beach, SOMA, etc.) of the city that are likely to sustain the greatest damage, along with the number of units to be transported and timeframe via related Performance Plan (a.k.a accountability). Also to be considered are variables (e.g., transportation issues, product availability, etc.) that should be incorporated in a well-defined Contingency Plan. As we can see a large-scale remediation of this type requires careful coordination of the partners involved, along with carefully defined plans that outline intentions, expectations, and possible disruptions. It is here where open-standards that span the public and private sectors come into play to help form a common thread between the all of the entities involved.

## **Serious vs. Non-Serious Networking Groups**

Trying to make heads or tails of social networks and the information presented can be a daunting task. It is not that what is presented is inaccurate or misleading, but that there may too much of it to grasp and sift through. While posting pictures and comments may be a “fun” activity, a new social model must be created to better deal with natural (e.g., earthquakes, hurricanes, fires, etc.) and manmade (e.g., terrorist attacks, oil spills, bioterrorist infectious agents, etc.) catastrophic events. “Serious networks” are ones that have the ability to deal with serious issues that mankind most often faces, and members may include entities at the government level, along with major healthcare providers and vendors that can provide needed products and services. It is these types of future networks that will be of great value in events like Hurricane Katrina and the Fukushima nuclear disaster. Accordingly, carefully well thought-out Strategic, Performance, and Contingency Plans will need to be put into place with entities that share similar goals and interests to address the serious nature of an event. However, as outlined earlier, the world is made-up of many different spoken languages, along with a plethora of technologies that make the promotion of The Semantic Web almost an impossible challenge.

## XML – RDF – OWL

These new kinds of collaborations are being brought together by what are called "Communities of Interest" and "Communities of Practice." These communities are based on shared context such as similar information-processing, records-keeping tasks, or government-wide mandates to improve performance and responsiveness to citizens' needs. Similar data, such as employee performance evaluations in different companies or government agencies, as well as similar methods for the intake of customers' or citizens' information, cut across intellectual, economic, social, business and governmental boundaries, jurisdictions or other divisions between categories. In a nutshell, these new types of collaborations come together on the basis of shared contexts. Many of these collaborations are due to increasing acceptance and adoption of several emerging technologies which have been developed or are developing into standards based on the Extensible Markup Language (XML), in which both the Resource Description Framework (RDF) and the Web Ontology Language (OWL) are written. All of these standards have been developed by the World Wide Web Consortium (W3C), and approved for use by many national and international information technology standards bodies.

**Extensible Markup Language (XML)** - Is a non-proprietary subset of Standard Generalized Markup Language (SGML). It is focused on data structure and uses tags to specify the content of the data elements in a document, while XML Schemas are used to define and document XML applications. Web services are components which reside on the Internet that have been designed to be published, discovered and invoked dynamically across various platforms and unlike networks. The methods, which reside in a specific Web service, may use Simple Object Access Protocol (SOAP) to send or receive XML data. Thus, XML eliminates laborious steps involved with creating a remote object. An example of traditional (centralized application development) and Web services (distributed network-centric applications based on XML) models includes CORBA, which requires that the methods written in the language supporting CORBA be converted to interface definition language (IDL) before being used. Another example is calling methods without using the IDL because a programming language needs only be able to make a call across the Internet using HTTP and then handle an XML response.

**Resource Description Framework (RDF)** - Is metadata model for describing objects and the relationships among them. RDF has features that facilitate data merging even if the underlying schemas differ, and it specifically supports the evolution of schemas over time without requiring all the data consumers to be changed. It extends the linking structure of the Web to use URIs to name the relationship between things as well as the two ends of the link (this is usually referred to as a "triple"). Using this simplistic model, it allows structured and semi-structured data to be mixed, exposed, and shared across different applications. This linking structure forms a directed, labeled graph, where the edges represent the named link between two resources, represented by the graph nodes. This graph view is the easiest possible mental model for RDF and is often used in easy-to-understand visual explanations.

**Web Ontology Language (OWL)** - Is a Semantic Web language designed to represent rich and complex knowledge about things, groups of things, along with relations between things. OWL is a computational logic-based language such that knowledge expressed in OWL can be exploited by computer programs to verify the consistency of that knowledge or to make implicit knowledge explicit. OWL documents, known as ontologies, can be published via the Web and may refer to or be referred from other OWL ontologies. OWL is part of the W3C's Semantic Web technology stack that includes RDF, RDF Vocabulary Description Language (RDFS), and SPARQL (Query Language for RDF).

As time moves forward, so do open-standards. For example, the current version of OWL, also referred to as "OWL 2" was published in 2009 with a Second Edition published in 2012.

# StratML

Strategy Markup Language (StratML) is an Association of Information and Image Management (AIIM) open-standard, machine-readable (XML-based) vocabulary and schema for the elements that are common to the strategic and performance plans and reports not only of all organizations, worldwide, but also individuals who choose to lead mission/goal-directed lives. The vision of the standard is "*A worldwide web of intentions stakeholders and results*". This vision can be characterized as the \*Strategic\* Semantic Web, a worldwide network of *human beings* brought together by that which is truly meaningful – shared values and common objectives – unburdened by the needless constraints of time and physical space. Below are Part One, Part Two, and Part Three definitions supplied by Owen Ambur, the leader and long-time supporter of the StratML effort.

## StratML Part 1

The core elements are Vision, Mission, Value, Goal, Objective and Stakeholder, along with the name of the Organization compiling the plan. Sharing such information openly on the Web in a standard, machine-readable format will make it much easier for potential performance partners to discover each other and work together to accomplish their mutual objectives. It will also enable anyone to discover organizations pursuing objectives of interest to them. In addition, it will help organizations engage their stakeholders more effectively and benefit from their input and feedback in order to improve the organization's products and services.

## StratML Part 2

Specifies the Elements of Performance Plans and Reports. The additional elements required to transform strategic plans into performance plans are stakeholder Roles and Performance Indicators. Providing that information will make clear who is responsible for achieving each objective, who is expected to benefit, and how success is defined and progress will be measured. Performance plans establish target results to be accomplished by specified dates, and performance reports document actual results achieved. Publishing such information openly on the Web in a standard, machine-readable format like StratML will enable value-added intermediaries to index, aggregate, analyze, and present such information in ways that are highly useful to myriad stakeholder groups. It will also enable organizations to benchmark their performance against their peers and, ultimately, to improve their performance – in partnership with their stakeholders, via virtuous feedback loops.

## StratML Part 3

Specifies additional elements that may be helpful in providing context and understanding about why particular goals and objectives have been established and prioritized. Some of the most widely used frameworks for determining which goals and objective to pursue include SWOT (strengths, weaknesses, opportunities, and threats) analysis, PESTLE (political, economic, social, technical, legal and environmental) factors, and Driving Forces – any or all of which can be documented. In addition, stakeholders can be categorized under the responsibility assignment matrix as being responsible, accountable, to be consulted or to be informed (RACI). While few, if any, organizations will want to take the time and trouble to use all of those frameworks to inform the compilation of their plans, StratML Part 3 embodies the flexibility to use any of those best practices while enabling each organization to choose which to apply in order to minimize risk and maximize their potential.

With StratML's numerous alignment capabilities it seems logical to explore how it can be leveraged, along with open-standards like XML, RDF, and OWL to help reach the vision of the Semantic Web.

## StratML and Alignment Theory

With the advent of StratML, the Strategy Markup Language, and Alignment Theory which it employs, we get closer to realizing the potential of the Semantic Web. However, it still requires the user to designate the resources which can then be aligned automatically and more easily referenced by the reader of a StratML document. This can be a great benefit, but also can be a vulnerability if the alignments are not well thought out.

That brings us to the need for guidance in developing alignments, Alignment Theory. This pulls together the focused ability of Semantics to provide well-defined domain-specific vocabularies with the unifying ability of StratML to align those vocabularies in the service of organization-wide priorities and the strategies those priorities advance. Alignment Theory puts the weight of evidence from aligned research at one's fingertips to strengthen description and explanation in all kinds of communication. Improving the impact of corporate reasoning will have beneficial consequences one cannot anticipate from advertising of products and services to explanatory collateral documentation to making legal arguments of all kinds. Moreover, these follow-on benefits occur in the service of corporate goals and objectives, achieving a consistency that requires no further special effort

It is important to note that the examples put forward here are fictional, hypothesizing the availability of users of StratML and the Semantic Web, practitioners more sophisticated and with resources already prepared in advance. Consider these scenarios an invitation to visionaries to begin assembling these resources now for the more sophisticated future we anticipate.

For instance, you might find yourself in the position of choosing a technical writing and editing service and you want a high level of professional consistency and reliability. However, you might also want to ensure that the service you choose has values that align with your products and services. A case in point is the value of clarity.

The ability to take complex material and boil it down and make it easy to grasp is a crucial capability in technical communication. Never is it so clearly needed as in a mission statement. So, an early or first task in the decision process, might be to ask for a StratML-based mission statement to see if your professional goals align. Of course, you might want to send along your own mission statement as an organization or for a specific product or service as an example. This could be used as a way to differentiate amongst a number of candidates in order to choose the most closely aligned technical writing service.

Another highly important consideration is follow-through. It is not enough to choose a technical writing service that shares your values for professional consistency and reliability, it is fundamental that their work for you embodies those values, particularly in materials such as instructions for using technological products or services. The value of clarity must extend down into the fabric of the work itself that is performed for you. Thus, whether the writing is aimed at implementers of customizable software or installers of avionics components, your customers will appreciate your diligence.

Likewise, values derived from Semantic Web resources can also be leveraged via StratML to discover potentially useful or lucrative alignments. Specifically, we refer to the use of ontological resources.

Suppose, for example, you are in charge of marketing a new variety of Pluot, the hybrid of Plum and Apricot, on behalf of a growers' association seeking an ad agency and marketing campaign. On one hand, the growers' association wants to tout the taste, high proportion of flesh to seed and long shelf life emphasizing the flesh and shelf life and aiming at supermarket buyers in an effort to gain shelf-space, while on the other hand, the speculative creative campaigns want to tout the taste and texture and the value to the consumer as the ultimate purchaser.

However, you are unsatisfied with the first round of briefings, research and presentations and decide to conduct a little market research to help your clients and potential ad agencies think outside the proverbial box. So you turn to a market research firm that claims it can do this using StratML and the Semantic Web.

What you discover is that there are values and alignments that neither the growers' association nor the ad agencies have uncovered.

On the values side of the ledger, your market research makes you aware that the geneticists that produced this new variety not only produced generous size and long shelf life but also made it late ripening extending the summer tree fruit season well into fall. Additionally, this variety of Pluot has superior drought resistance and thrives in marginal soil. This extended summer tree fruit season value combined with its drought resistance and marginal soil tolerance makes the varietal especially valuable to existing tree fruit growers who can add productive acreage to their orchards. This adds yet another layer of value to the cachet of the fruit since it distinguishes this varietal as producing quality from less fertile land. Doing more with less is a virtue and value that consumers can reward through purchasing the fruit.

On the alignment side of the ledger, your market research, through ontological association, reveals that there are other potential purchasers in addition to direct sales. Institutional buyers like school systems, hospitals and corporate cafeterias all are potential customers. These food services industries are discovered by association with "Food Purchasers."

Additionally, a semantically enhanced search of Food Purchasers will also draw attention to the myriad potential customers buying in bulk for restaurants, including fast food outlets. The upshot is that these additional potential customers greatly enlarge the reach of your marketing effort if you can persuade your client and potential ad agencies to widen their target markets.

Of course StratML also provides the means by which these additional potential alignments can be strengthened by focusing on mutual values.

It should be noted that while our examples are fictitious, it is not that large a leap to see how adopting StratML and Semantic Web Resourcing can come to your aid across a wide variety of business contexts. We advise you to take the step forward to meet your future.

## **Strategic - Performance - Contingency Planning**

From a holistic point of view there are various camps people reside in regarding manmade (e.g., terrorist attacks, oil spills, etc.) and natural (e.g., earthquakes, hurricanes, etc.) catastrophic events. These include strategic, performance, and contingency planning. And is here where an open, machine readable standard like StratML could play across all types of planning to promote a more cohesive approach to Emergency Management (EM) responses.

We seem to hear and see countless pieces regarding the “Big One” or large-scale Bay-Area earthquake. For practical reasons a fabric should be in place at the federal, state, and local levels to deal with such an event. In addition, a fabric to the private sector should be in place to help deal with issues regarding medical attention, food, sanitation, communications, and power. For example, if a large-scale earthquake of 7.4 or greater did hit the Bay-Area then a key topic to be addressed would relate to sanitation and waste removal. At the private level, entities like DHS/FEMA would work with state authorities like the California Emergency Management Agency, along with local entities like the police and fire departments. At the private level, entities that manufacture portable toilets would help to supply needed products and services. In a quake of this magnitude sewer lines would most likely be affected. As a result, portable toilets would be an important services component. In relation to planning, strategic plans could be put into place between the public and private sectors to provide the product and help with waste removal. Say an event did take place, then the mechanism in place (Strategic Plan) would then notify the Vendor A to deliver product to Cow Hollow, while Vendor B delivered product to Nob Hill in predetermined and agreed to time period (Performance Plan with Key Performance Indicators – KPI’s). If for any reason Vendor A or Vendor B could not meet their predefined and agreed to obligations then another option (Contingency Plan) with Vendor C could be in place in order to fill the need.

Improved coordination or alignment of all entities involved would most likely result in a more efficient response to the earthquake scenario mentioned. Taken at face value, strategic, performance, and contingency planning are all intertwined. It is here where open-standards need to be in place “to be viewed” by the entities involved to better deal with these types of foreseeable situations. Bottom line, the greater the cohesion between strategic, performance, and contingency planning, the better response to manmade and natural catastrophic events.

## **Agnostic & Intelligent**

While technologies such as Open Database Connectivity (ODBC) and Java Database Connectivity (JDBC) are meant to work seamlessly with widely used offerings (IBM, Microsoft, Oracle, and SAP), real world environments demonstrate that much work is usually required to foster true bidirectional information flow. Hence, as is most often the case open-standards are often not as open as we would like them to be. From a user perspective “request” and “retrieve” is what is expected regardless of location or data-type.

So we live in a frustrating world in which users expect instantaneous results, but also one that is comprised of countless technologies to support and challenges to overcome. For example, a user may want to register on a site, but their scheduling application is different than the one supported on the registering site, so a problem exists for the user in completing the task. This holds true with file formats, where users are sometimes required to have a special application to open and read a specific type of file. From a holistic view, the current Web is neither agnostic nor seamless in nature, but one in which technologies exist in a true ad hoc fashion.

The future will see a world not only that is better connected, but also one that will be far more focused on human interaction regarding devices and applications. The former will be predicated on creating a Web in which bidirectional information flow will be improved because of new and agnostic international open-standards. The latter will require far more studies on human behavioral patterns relating user-to-device and user-to-application to help create a more connected and respectful world. These research studies will help to help humans not only in their question to access and synthesize information, but also foster congenial behavior to others. As a result, it is this combination that will help promote a true Semantic Web.

## **Postscript**

The words relationship, relationships, and interrelationships will be examined in future articles, blogs, and reports on this subject, but for the moment many important pertinent questions remain. There is little doubt that the W3C and its members are doing an outstanding job in trying to create the Semantic Web and RDF & OWL help to prove this statement. Solutions that help to promote alignment may come in the form of emerging open, machine-readable formats like StratML and others that could lead to fewer misunderstandings and foster improved relationships in the process. Regarding StratML a recent quote sums things up nicely "As information becomes the world's new currency, AIIM is pleased that its StratML standard is providing a structured vocabulary that facilitates the common framework necessary to enable the semantic web and help organizations to manage the volume of information and content that is created" said John Mancini, CEO, AIIM. Caveat: We are being literally “thrown” information every time we open a browser, which in essence promotes an ad hoc and disjointed Web. Accordingly, we need to look at open-standard entities that include W3C, OASIS, and AIIM to help guide us to a seamless and agnostic Web where coherence and not chaos is promoted.

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