

## Interoperability & Rule Languages

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### *Introduction*

Interoperability of rules enables sharing and re-use. Sharing of rules requires standards for rules. Applications within an organization and/or communities within a specific business domain have a felt need to share rules for efficient business processing. In last twelve years we had developed several business rule applications that are used across the mortgage processing eCommerce industry. (<http://www.aaai.org/Resources/Proceedings/IAAI/IAAI-1996/Abstracts/iaai96-282.html>, <http://www.aaai.org/Resources/Proceedings/IAAI/IAAI-1997/iaai97-contents.html>, <http://www.ghrsystems.com/aboutGHR/news/pr-04-09-08.html>) These applications were built using multiple commercial rules products. A large part of our effort during the development of these applications was spent in coming up with a rule representation. Some of that effort would have been simplified if we had an industry wide interoperable rule language.

At a broader level, an interoperable rule language must allow for communities to extend simple ontologies for their own use while allowing sharing of higher-level concepts. An interoperable rule language must also enable applications to dynamically identify, understand and re-use rules as part of meeting their individual objectives. In rest of the paper, we present our position on interoperable rule languages and some basic requirements that these languages must satisfy for broader use.

### *Why share?*

Ability to understand, converse, negotiate and apply rules across different collaborative participants is important for the next generation of eCommerce applications. Currently, most commercial eCommerce business applications share only data. However, many of these applications use business rules to implement their business policy. It is quite conceivable to imagine a scenario where eCommerce applications not only share data but also their business rules. To do this, an application needs to be able to view the rules as a form of data. If one can ship and share data then one must be able to ship and share rules. This must be the guiding principle behind interoperable rule languages.

Another application area for interoperable rules is customer support. Since case data is considered to be part of a company's intellectual property, in addition to its business rules, it is important to be able to express such data along with rules in a format that enables easy and seamless integration with various applications in an organization.

A more practical issue that is currently faced by many organizations is the large number of proprietary rule languages offered by various vendors. As a result, rules cannot be shared across applications that use different rule languages or products, and applications developed using these rule languages remain tied to a specific vendor implementation. It is important to have the ability to import/export rules across various applications, even within an organization.

### *Interoperability*

We would like to see three different levels of interoperability in a rule language. Borrowing from the Natural Language Processing terminology, we propose that an interoperable rule language must allow syntactic, semantic and pragmatic levels of sharing. In other words, interoperability needs to be available for the definition, management and implementation of rules.

From a syntactic perspective, an interoperable rule language must provide a formal definition of the rule structure and its components. These components include format definitions for antecedent and consequent rule terms. It also needs to provide a common format for specifying the underlying object model on which the rules are specified. It is important that an interoperable rule language includes a way to consistently specify various terms and constructs used for rule definition.

From a semantic perspective, an interoperable rule language must allow for the determination of various properties of a rule. These properties must include characteristics such as status, type, version, effective and expiration period, etc. It is important that applications have an opportunity to use these properties to assist in managing rule interoperability.

From a pragmatic perspective, an interoperable rule language must allow a mechanism to specify contextual information that may be useful for evaluating appropriate conditions for sharing rules. For example, it will be important to specify what kind of conflict resolution mechanism is applicable in a rule set when the rules are ambiguous or conflicting. Similarly, one may also want to specify some contextual knowledge for a rule set such as preconditions that need to be satisfied before the rule set can be applied.

### ***Ideal properties for an interoperable rule language***

A standard language for rule interoperability should have the following characteristics:

**Expressional Completeness:** An interoperable rule language should include a canonical set of constructs and building blocks for defining a semantic model and rules. It must allow an easy and accurate capability to export and import rules between applications, even in different software environments, without any loss of information.

**Deterministic Characteristics:** An interoperable rule language should include a simple set of standard characteristics that are well understood, and they can be unambiguously defined or derived for any given rule. Applications can choose to use one or more of these characteristics to determine which rules are shareable.

**Consistent Integration:** An interoperable rule language should include a mechanism to define how to ensure a consistent implementation of rule sets when rules are shared by various applications. It might be in the form of a set of preconditions, or a list of dependencies that needed to be satisfied for successful integration.

### ***Conclusions***

As stated in the [CFP](#) for this workshop, an interoperable rule language needs to focus on the requirements of end users and compatibility with commercial rules technology to be effective, practical, and deployable. Some early work in developing interoperable ontologies was done by an [OML](#) group that was in turn based on the pioneering work of [SHOE](#). Some of the rule language standardization efforts, including [SRML](#) and [BRML](#), have been focused on providing sharable generic rule language constructs. Other standardization efforts such as [XRML](#) attempt to provide rule representations that can be shared between software agents and human beings. We believe that a more comprehensive interoperable rule language needs to support various levels of sharing that include not only the structure of the rules, but also provide mechanism to describe how and when they can be shared. In other words, true interoperability should include rule representation, rule management and rule integration support.

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