IS660G - Lecture 3

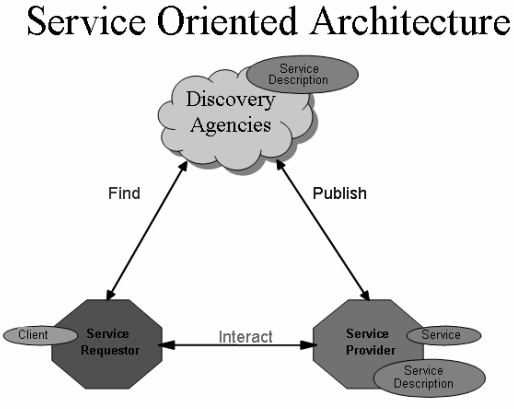
Prof. Burns

Tonight

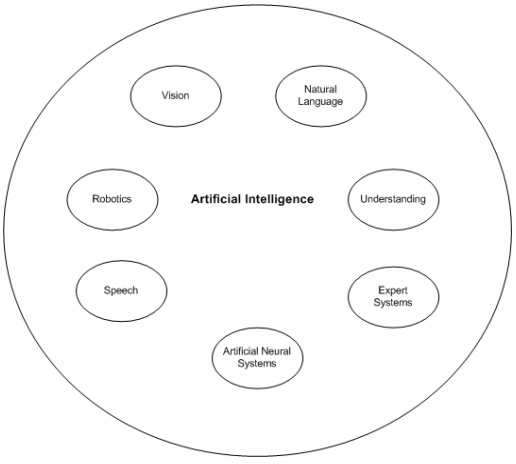
- Review Assignment 1
- Business Rules
- Semantic Web
- Team Projects

Service Oriented Architecture

- A Service Oriented Architecture (SOA) is essentially a collection of services. These services communicate with each other to achieve a desired goal. The communication can involve either simple data passing or it could involve two or more services coordinating some activity. Some means of connecting services to each other is needed.



Business Rules



Expert Systems

Expert Systems are a branch of AI that makes extensive use of specialized knowledge to solve problems at the level of the human expert. Two definitions of an Expert System are:

- *"A model and associated procedure that exhibits, within a specific domain, a degree of expertise in problem solving that is comparable to that of a human expert."*
- *"An expert system is a computer system which emulates the decision-making ability of a human expert."*

Expert System

Expert Systems are generally designed differently from conventional (algorithmic or procedural) programs because the problems usually have no algorithmic solution and rely on inferences to achieve a reasonable solution - knowledge is of primary importance. Based on Wirth's classical expression, the conventional definition of a computer program is usually:

algorithm + data structures = program

In an expert system, the definition changes to:

inference engine + knowledge = expert system

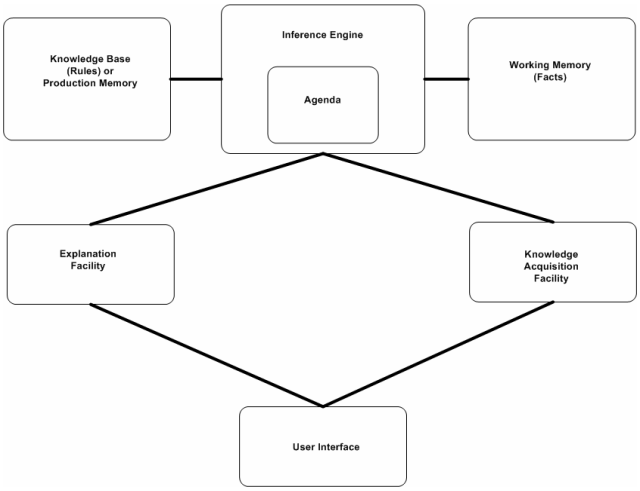


Figure 20 - Components of an Expert System

Web Services

- Web services offer a number of advantages over traditional callable code blocks. They are location independent - the code need not be physically owned, stored, or maintained by the using entity; they have a standardized access protocol; and they can be updated and repaired without affecting other parts of the application.
- In their ideal realization, Web services provide a way of exposing business assets that empowers business users to specify complex business functionality in a clear, building-block fashion that can be quickly implemented and just as quickly modified.

Business Rules

- Business-rules management has many of the same goals, barring the obvious aspects of Web-based availability. It's used to separate business decision processes from the mechanics of application I/O and control code. Rule services represent well-defined action determination tasks that can be called upon from many different applications. Business rules can be maintained and updated separately from the remainder of the program code. And they offer greatly improved visibility and comprehension to nontechnical business policy makers who wish to define and control business operations without worrying about programming syntax.

What is a Business Rule?

Business Rules from the business perspective
… a business rule is guidance that there is an obligation concerning conduct, action, practice, or procedure within a particular activity or sphere. Two important characteristics of a business rule are:

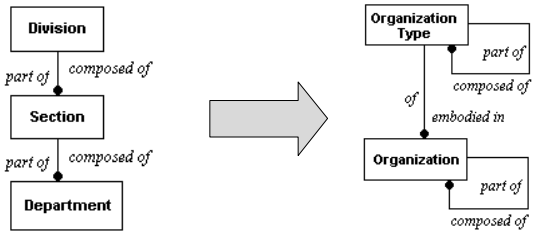
- there ought to be an explicit motivation for it
- it should have an enforcement regime stating what the consequences would be if the rule were broken.

Business Rules from the I/S perspective
...a business rule is a statement that defines or constrains some aspect of the business. It is intended to assert business structure, or to control or influence the behavior of the business.

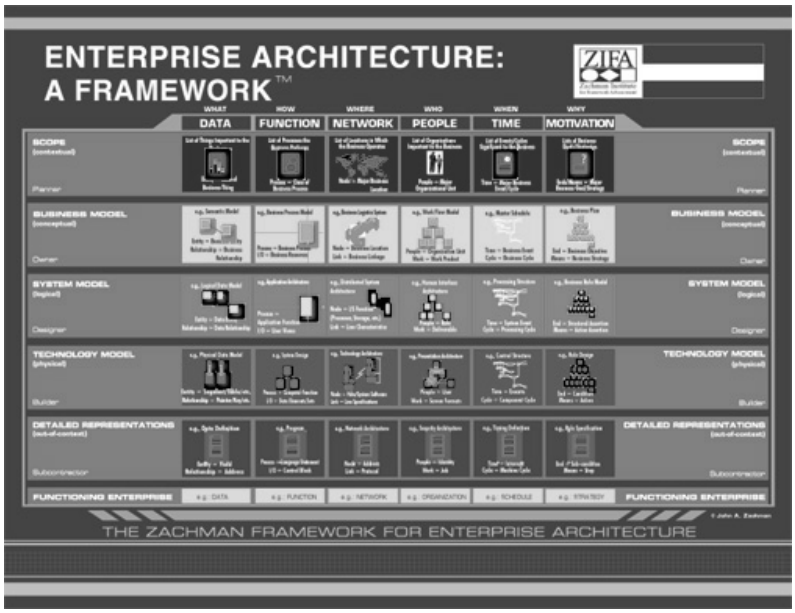
Examples

Some examples of business rules found in many businesses are:

- Regulation and constraints: parts of laws can be implemented using rules (constraints, validations) and processes (mandatory procedures).
- Pricing and billing: rules describe pricing policies that depend on customer profiles or promotion campaigns.
- Quality of Service: making sure the service level agreement is respected by the service provider. Rules check for performance, service defects, proposed workarounds, ect.
- Events: rules describe how the company should react to events (coming from various sources), to the correlation of events, to the occurrences of events within time patterns.
- Process flow: rules describe routing decisions, participant policies (such as if the process is late, then assign it to the most experienced person).

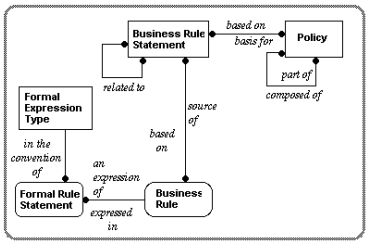


Model of an Organization



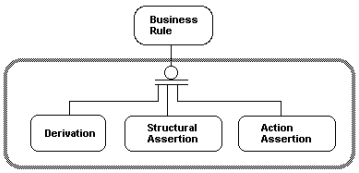
Categories of Business Rules

- Definitions of business terms - The most basic element of a business rule is the language used to express it. The very definition of a term is itself a business rule that describes how people think and talk about things. Thus, defining a term is establishing a category of business rule. Terms have traditionally been documented in glossaries or as entities in a conceptual model.
- Facts relating terms to each other - The nature or operating structure of an organization can be described in terms of the facts that relate terms to each other. To say that a customer can place an order is a business rule. Facts can be documented as natural language sentences or as relationships, attributes, and generalization structures in a graphical model.
- Constraints (here called "action assertions") - Every enterprise constrains behavior in some way, and this is closely related to constraints on what data may or may not be updated. To prevent a record from being made is, in many cases, to prevent an action from taking place.
- Derivations - Business rules (including laws of nature) define how knowledge in one form may be transformed into other knowledge, possibly in a different form.



The Origin of Business Rules

Types of Business Rule:
Each (atomic) business rule must be one of the following:
A ***structural assertion*** -- a defined concept or a statement of a fact that expresses some aspect of the structure of an enterprise. This encompasses both terms and the facts assembled from these terms.
An ***action assertion*** -- a statement of a constraint or condition that limits or controls the actions of the enterprise.
A ***derivation*** -- a statement of knowledge that is derived from other knowledge in the business.



Rule Representation and XML

- Rules can be stated (1) in natural language, (2) in some formal notation, or (3) in a combination of both. XML provides a mechanism for describing rule-based languages as its document tree structure is very similar to the parse trees used to represent the grammatical structure of languages. A grammar is a system of rules by which a language can be produced.

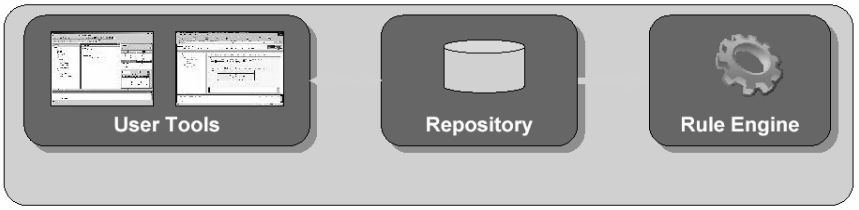
Rule Representation and XML

- Knowledge Sharing Effort
- Business Rules Markup Language (BRML)
- The Rule Markup Initiative (RuleML)
- CommonRules
- A Semantic Web Rule Language (SWRL)

BRMS

- Business Rule Management Systems (BRMS) support the *agility* of enterprise *policies* which define the enterprise's values when running its business. Agility is defined as the ability to move quickly from an unstable and unsafe position to a robust and safe one.
- Both new and legacy applications can take advantage of a BRMS.
  - Existing applications that have embedded policies can be reviewed to extract hard-coded policies and to interact with the business rules engine to evaluate those business rules.
  - The architecture of new applications must be designed to take full advantage of BRMS technology. All business-sensible policies are identified and developed with the BRMS.

Components of a BRMS



BRMS

- Business processes ideally should separate the business logic (conditions that depend on business decisions) from the process logic (conditions that depend on the organization) and should in turn rely on a technology like BRMS to support business logic.

Sources

- http://www.businessrulesgroup.org
- http://www.ruleml.org/

Semantic Web

The Semantic Web

- Expressing Meaning
- Knowledge Representation
- Two important technologies for developing the Semantic Web are already in place: eXtensible Markup Language (XML) and the Resource Description Framework (RDF).
- The Semantic Web is not a separate Web but an extension of the current one, in which information is given well-defined meaning, better enabling computers and people to work in cooperation. The first steps in weaving the Semantic Web into the structure of the existing Web are already under way. In the near future, these developments will usher in significant new functionality as machines become much better able to process and "understand" the data that they merely display at present.

RDF

Meaning is expressed by RDF, which encodes it in sets of triples, each triple being rather like the subject, verb and object of an elementary sentence. These triples can be written using XML tags. In RDF, a document makes assertions that particular things (people, Web pages or whatever) have properties (such as "is a sister of," "is the author of") with certain values (another person, another Web page). This structure turns out to be a natural way to describe the vast majority of the data processed by machines. Subject and object are each identified by a Universal Resource Identifier (URI), just as used in a link on a Web page. (URLs, Uniform Resource Locators, are the most common type of URI.) The verbs are also identified by URIs, which enables anyone to define a new concept, a new verb, just by defining a URI for it somewhere on the Web.

Ontologies

- Two databases may use different identifiers for what is in fact the same concept, such as *zip code*. A program that wants to compare or combine information across the two databases has to know that these two terms are being used to mean the same thing. Ideally, the program must have a way to discover such common meanings for whatever databases it encounters. A solution to this problem is provided by the third basic component of the Semantic Web, collections of information called ontologies. In philosophy, an ontology is a theory about the nature of existence, of what types of things exist; ontology as a discipline studies such theories. Artificial-intelligence and Web researchers have co-opted the term for their own jargon, and for them an ontology is a document or file that formally defines the relations among terms. The most typical kind of ontology for the Web has a taxonomy and a set of inference rules.

Agents

- The real power of the Semantic Web will be realized when people create many programs that collect Web content from diverse sources, process the information and exchange the results with other programs. The effectiveness of such software agents will increase exponentially as more machine-readable Web content and automated services (including other agents) become available. The Semantic Web promotes this synergy: even agents that were not expressly designed to work together can transfer data among themselves when the data come with semantics.

Digital Signatures

- Another vital feature will be digital signatures, which are encrypted blocks of data that computers and agents can use to verify that the attached information has been provided by a specific trusted source. You want to be quite sure that a statement sent to your accounting program that you owe money to an online retailer is not a forgery generated by the computer-savvy teenager next door. Agents should be skeptical of assertions that they read on the Semantic Web until they have checked the sources of information.

Sources

- Tim Berners-Lee
- http://www.w3.org/2001/sw/