

# Ontology Development for E-Marketing Mix Model Mapping with Internet Consumers' Decision-Making Styles

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**Abstract** - Based on a literature review of E-Marketing mix and Internet consumers' decision-making styles, we develop an ontology for e-marketing mix that is mapped with Internet Consumers' decision-making styles. This ontology defines the concepts for the relationships between the E-Marketing mix model and the psychological factors of Internet consumers. Based on the understanding of Internet consumers' decision-making styles, businesses can make use of their corresponding e-marketing mix to match with individual Internet consumers' decision-making styles in order to attract more targeted Internet consumers. As a result, it can generate profitable and sustainable revenue streams.

## I. INTRODUCTION

Today there are billions of home pages on the web; many of which provide an E-commerce environment. From the consumers' viewpoint, they do not know which web sites are suitable for them to buy their products and need to choose a business web site that matches their preferences. They may be confused by the number of business web sites available to them. From the business service providers viewpoint, they cannot increase their revenue if their target consumers are confused by the plethora of business web sites that are available to them.

For different types of products, Sam K. M. & Chatwin C. R. [1] introduced different consumers' decision-making styles in an E-Commerce environment. Based on those decision-making styles, Sam K. M. & Chatwin C. R. [2] established the relationship between businesses' E-Marketing Mix and Internet Consumers' decision-making styles in E-Commerce. This relationship is important to describe as we can create a situation where both of the two-parties become winners in the E-Commerce environment. In this paper, this relationship is defined by developing an ontology, which is described as machine interpretable definitions of basic concepts in the domain and the relationships between them [3].

*Tools used to develop the ontology: Protégé 2000 and Jess*

### 1) What is Protégé?

Protégé is a tool that can allow users to create a model and collect information. It is a rich modelling language that can show inheritance relationships, constraint "overriding" and expresses "webs" of relationships.

### 2) Why use Protégé?

- A. The ontology editor is free and open source.
- B. Protégé ontologies can be exported into a variety of formats including RDF(S), OWL and the XML Schema.
- C. Protégé is based on Java, which is extensible and provides a plug-and-play environment that makes it a flexible base for rapid prototyping and application development.

### 3) What is Jess (Java Expert System Shell)?

It is a free license rule-based engine software developed at Sandia National Laboratory for non-profit organizations.

### 4) Components of Jess Inference (Rule) Engine

- A. **Pattern Matcher** – decides what rules to fire and when.
- B. **Agenda** – schedules the order in which activated rules will fire.
- C. **Execution Engine** – is responsible for firing rules and executing other code.

### 5) Why use Jess?

- A. It is easy to create rules in Jess
- B. Jess can be integrated with Protégé. Fig. 1 shows the relationship between Protégé and Jess.
- C. Jess is also integrated with Java as it is a fully developed Java API. As a result, it is easy to create rule-based expert systems.

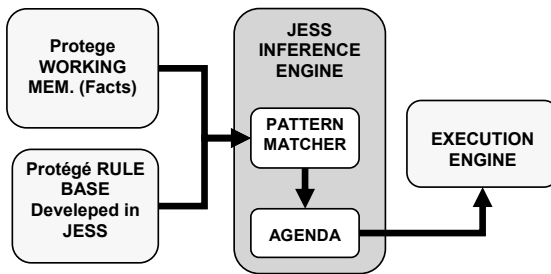


Fig. 1. Relationship between Protégé and Jess

## II. OUR APPROACH

Since businesses' E-marketing mix and consumers' decision-making styles are characterized by two different models, we use rules to integrate the two models together. Before describing the rules, the design of classes for these two models are described as follows:

### *Businesses' E-Marketing Mix Model represented in the Ontology*

All instances of the class Model have a slot SoldByComp, the value of which is an instance of the class Comp (Fig. 2). All instances of the class Comp have a slot Model\_Selling, the value of which is an instance of the class Model. All instances of the class Model have a slot BelongTo, the value of which is an instance of class Product.

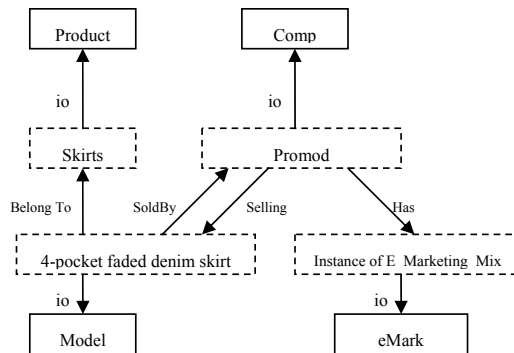


Fig. 2. Some classes, instances and relationships between them in the business domain. Black box: class and dotted box: instance. Links represent slots and instance of.

The following figure (Fig. 3) shows the slots of the class Comp (Company). In a business web site, it offers many different product models. Therefore, the cardinality of the slot Model\_Selling is multiple. Furthermore, each business web site has its own unique E-Marketing Mix, which is a slot in this class.

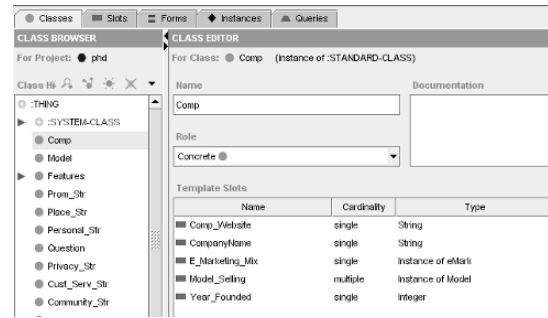


Fig. 3. Snapshot from the slots of the class Comp

Inside the eMark class, it defines the different elements of the e-marketing mix model as shown in Fig. 4. Each element, in turn, has different elements supporting their corresponding e-marketing mix elements as shown in Fig. 5.

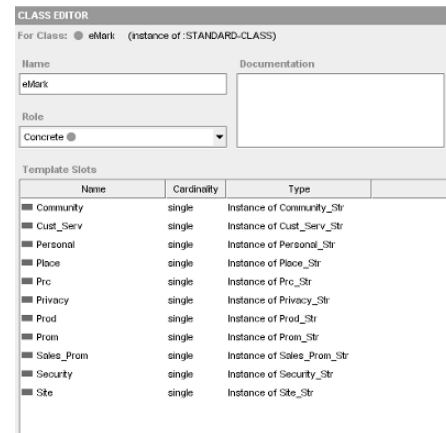


Fig. 4. Different Elements of E-Marketing Mix indicated by slots in eMark class

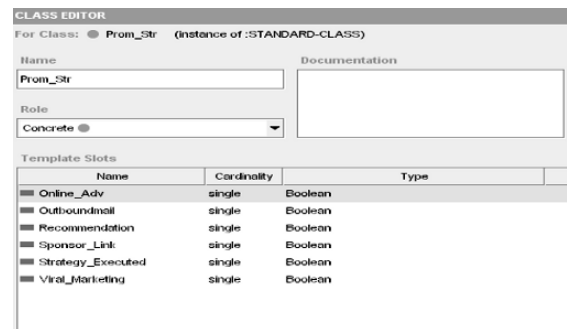


Fig. 5. Different supporting elements for Promotion Strategy