

Chapter XVII

Dynamic Matching of Supply and Demand in an M-Commerce Services Marketplace: Using Intelligent Agents and Semantic Technology

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ABSTRACT

Mobile users desire customized bundles of services that need to be dynamically created from the service providers. However, services are unique and since unused services do not generate revenues they present a lost 'economic rent' for organizations that are not part of the network of service providers and, as a result, not a part of the customised bundle of services. The dynamic discovery of a bundle of individual services from such a network that meets the unique needs and constraints of the mobile user requires intelligent agent technology. Such agent technology would match personal needs of the user with the available services in a cost-efficient manner. This chapter provides a mechanism to create dynamic service bundles from ad-hoc user requirements using intelligent agents. The authors apply this technique to a mobile commerce environment and illustrate the composition of user-specific service "bundles" by intelligent agents that represent the interests of the m-commerce user. Such agent-based architectures provide users customized solution 'bundles' that reduce their cognitive burden, while improving the utilization of resources for organization that are part of the service provider network.

INTRODUCTION

Forecasts show that mobile Internet users were to grow to 729 million in 2005 (Juptner, 2002), which translates into worldwide mobile commerce (m-commerce) revenue growing from \$400,000 in 2000 to over \$22 billion in 2005 (Macklin, 2001). Currently, mobile Internet users make up 16% of the total Internet users worldwide, with the number expected to grow to near 57% of total Internet users by 2007 (Magura, 2003). With the growing use of mobile devices by consumers to purchase products and services, businesses have an opportunity to meet the unique needs of mobile consumers.

M-commerce is described as the purchase of goods and services via the Internet—much like e-commerce—using mobile devices such as mobile phones and personal digital assistants (PDAs) as the interface. The widespread adoption of mobile phones in the United States, with 140 million phone subscribers in 2002 (Kurzweil, 2004), presents a significant consumer base. Consumers using portable wireless devices such as mobile phones or PDAs for m-commerce activities are often constrained by location and time dependencies (Magura, 2003). A major hindrance to mobile consumers is the low processing power on portable devices to compute and display large amounts of information related to services of interest.

Services

Unlike products, services are intangible goods, but are solutions to consumers' needs and requirements. Services have distinct characteristics, such as location and time dependencies that must be considered in matching consumers and service providers. Services have a temporal aspect where the value is realized, where product's value can be consumed at many times. Products can be shipped from across the world, but services are bound to a

general location. Consumers will only consider services provided in their general area due to travel time and effort required to consume services offered in disparate locations.

Service providers have unique needs, since unused services do not generate revenues and constitute lost 'economic rent' for the provider organizations. For example, in airline seat reservations, the airplane still uses the same amount of fuel whether or not the seat contains a passenger, but the empty seat brings no revenue to defray fixed costs. Another example is a hotel that has rooms available, but still has to pay staff the same amount of money whether the hotel is completely booked or only half-full.

Consumers in need of services, and businesses offering those services, require a way to efficiently communicate their specific needs and capabilities required to fulfill each requested service. In addition, consumers often require a set of services that go beyond the individual capabilities of a single organization (such as food, a taxi, and a hotel room). Such a collection of services, referred to herein as *service bundles* that are sets of individual capabilities of service providers that represents a closer match to the consumers, need then the current process.

The concept of creating a repository for services that facilitates easier discovery is not new. Existing research shows the ability to create ontology to assist in the discovery of services (Hopmans, Klundert, Braspenning, & Kruijsen, n.d.). However, this research does not perform the creation of bundles that truly satisfy mobile users' demands. The AgentCities project is an effort to explore the use of agents to discover and communicate between one another (Agentcities.RTD, 2005). The AgentCities initiative has sparked interest in the area of using agents to support m-commerce activities (Sadeh, Chan, & Van, 2002). However, this research has been focused on suggesting one particular service based on the

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