Commerce, E-Commerce, and M-Commerce: What Comes Next?

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In ancient times, people exchanged their goods and services to obtain what they needed (such as clothes and tools) from other people. This system of bartering compensated for the lack of currency. People offered goods/services and received in kind other goods/services. Now, despite the existence of multiple currencies and the progress of humanity from the Stone Age to the Byte Age, people still barter but in a different way. Mainly, people use money to pay for the goods they purchase and the services they obtain.

Commerce

Notwithstanding the technologies that are involved, undertaking commerce can be associated with one of the four types of exchange: bargaining, bidding, auctioning, and clearing [3]. The first two types of exchange are bilateral and the last two types of exchange are trilateral (that is, a third party intervenes).

- Bargaining involves one user that negotiates with a provider until an agreement between both is reached. First, the user looks for a provider, browses their products, and then negotiates with the provider for an agreement. If the negotiation fails, the user continues searching for other providers until an agreement with one of them is reached.
- Bidding involves one user and several providers. First, the user calls for bids. Next, the user compares the offers that providers have submitted after receiving the call for bids. Finally, the user selects the provider that has made the lowest offer (that is, the offer that minimizes the user's expense).
- Auctioning (English scenario) involves one provider, several potential users, and one broker. First, the provider fixes the lowest price of the product. Through the broker, the provider advertises their products and calls for auctions. Next, the different users respond to the call for auctions by making offers to the broker. Acting on the provider's behalf, the broker selects the user who has made the highest offer regarding the first offer of the provider (that is, the user's offer maximizes

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the provider's income). Besides the English scenario of auctioning, Dutch and Vickrey also exist as additional scenarios of auctioning.

- Clearing involves several users, several providers, and one broker. Users and providers submit their respective requests to the broker in terms of needs to satisfy for the users and services to offer for the providers. The role of the broker is to match needs to services. If there is a successful match, the broker notifies both users and providers about the match. As soon as they are informed, users and providers start interacting together, bypassing the broker.

E-Commerce

The Internet and Web technologies have tremendously changed the way of doing business in general, and commerce in particular. Users have more opportunities to be informed about the current trend of the market before making any decision. Users are continuously browsing the Internet as well as being overwhelmed with information from different online sources (for example, money.cnn.com/). In addition, there is no longer any need to go to a library to purchase one's favorite sports magazine. Several Web sites exist that allow users to submit online orders. This way of doing business constitutes a part of what is commonly known as e-commerce). Web shopping is only a small part of the whole e-commerce picture that covers several types of businesses that range from customer-based retail sites like Amazon.com (business-to-consumer), to auction and music sites like eBay, and to business exchanges trading goods/services between corporations (business-to-business). E-commerce is seen as a general term for any type of business, or commercial transaction, that involves the transfer of information across the Internet.[1]

E-commerce puts new demands not only on support and delivery IT, but also on the way business processes have to be designed, deployed, and maintained. Several people in different locations and with different hardware and software resources may simultaneously initiate purchase requests for the same product but with different selection criteria. Reliability, efficiency, scalability, and fault-tolerance are among the features that should be embedded in e-commerce processes. To assess the value-added of these processes, it is crucial to be aware of their type. Processes that help potential customers, whether individuals or businesses, in locating the goods/services they need are essential. At the same time, processes that allow suppliers to make customers aware of their products are also important. At the present time, Web sites are full of advertising banners that enable users to enter and visit provider sites with one click (for example, shopping.netscape.com/main.adp).

E-commerce as part of the whole e-business evolution has been the object of major changes [3]. First, businesses started the digitalization of their data to make it available online. This data included the business's profile and catalogues. Initially, businesses did not attempt to adapt their business processes (that is, the know-how). Later, businesses decided to undertake the reengineering of their processes due to the pressure to remain competitive. The traditional way of satisfying users' needs could no longer cope with the challenges presented by the new context with its complex features: profitability, competition, alliances, and market volatility. Adjusting the business's know-how to the context, therefore, became critical. The third stage consisted

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[1]E-commerce FAQ; ecommerce.about.com/library/weekly/aa21502a.htm?PM=ss11_ecommerce (visited July 2002).

of offering online forms to capture users' needs efficiently and accurately. There was no longer the need to send faxes or call vendors to get orders completed. To conclude any purchase transaction, financial partners were invited to join the shopper-vendor relationship. Ensuring the security of the payment process and the exchange of private information was and still is a major concern. The next stage in the e-business evolution was the offering of personalized services. The purpose of personalized services is to include the profiles of users in terms of preferences and interests when working to fulfill their needs. Now, the trend of e-business is towards joint ventures where business processes are merged.

Despite the growing number of e-commerce sites, conducting e-commerce operations is still challenging. Various obstacles exist. First, relevant Web sites with access to catalogues have to be discovered. Second, the way these sites operate has to be understood. Third, needs have to be specified according to the characteristics (terminology) of the sites. Last but not least, security problems can occur when sensitive information is submitted. Many times, obstacles that face novice users upset them and the whole e-shopping experience ends in frustration. Instead of supporting users, IT is making things more complex. As a direct consequence, users may simply turn to the competition or decide to go back to the traditional way of shopping: ask friends to accompany them, visit shops, talk to vendors, and bargain for better deals. It should be noted that once IT is introduced into the process, the "social context" is ignored. One of the challenges that needs tackling in the near future is how to integrate the social context into the development of any user-oriented systems. Schummer argues that while e-commerce applications aim at easing the process of shopping by simulating real world experiences, these applications unfortunately do not include social factors in their simulation [4]. Users are mainly kept separated and everyone is shopping as if they were alone in an empty store. A survey done in Schummer reported the importance of the social factors and showed that 90% of shoppers prefer to communicate while shopping [4]. Furthermore, according to Kraft, Pitsch, and Vetter, the current malls on the Internet are characterized by a 2D representation, navigation according to links, single-user environments, and static environments that lack realism and interactivity [2]. In contrast, the shopping process in real life is definitely a social one where people can get advice and share their experiences with others. To deal with some of the obstacles to e-commerce, several experimental technologies (for example, software agents, Web services) that aim at supporting users are now available. The purpose of these technologies is to attract more consumers and encourage them to participate in online business.

M-Commerce

It is acknowledged that the Internet is playing an important role in our daily life. The Internet has become a vehicle for services rather than just a static repository of information. Airline booking and hotel booking are examples of these services. Besides the new role of the Internet, we are witnessing rapid progress in wireless and handheld technologies. Telecom companies are offering new opportunities to users over mobile devices like cellular phones and personal digital assistants. Reading emails and sending SMS messages between cellular phones are becoming natural. Surfing the Web thanks to the Wireless Application Protocol is further evidence of the wireless technology development. We are convinced that the next stage (if we are not already in it) for telecom

companies in partnership with businesses is to allow users to buy and sell without being connected to any wired network. Mobile commerce (m-commerce) is the new trend and is expected to drive the future development of e-commerce.

Being able to buy and sell goods/services over mobile devices is an important step towards achieving an anywhere, anytime paradigm. Location and time will no longer constrain people from completing their transactions. Suppose that a person would like to buy a gift for her son's birthday while she is on a bus. Instead of postponing the errand, she can use her mobile phone to search for the perfect gift. Her search can be narrowed by such criteria as the maximum price she is willing to pay, the desired delivery time, and the age of her son. It would be even more interesting if this person could outsource the entire transaction to intelligent components that could act on her behalf. Software agents are among the components that will have an important role to play in the worldwide spread of m-commerce.

An e-commerce value-chain represents a set of business processes that implement interactions between online shoppers and e-commerce systems. Song and Whang suggested a value chain of eight processes: attract, interact, customize, transact, pay, deliver, service, and personalize [5]. Applying the above value chain to m-commerce requires an adjustment to the processes because of the features of wireless communication channels and mobile devices. Communication channels are unwired and suffer from latency and low bandwidth. Devices are also unwired and suffer from low computing resources and small screen sizes. Following is an explanation of the processes that would require adjustment based on the features of m-commerce:

- **Attract:** because users of mobile devices are not attached to any physical location, their location at a specific time can be used to identify the businesses that are in the users' area and have special offers. Being aware of the users' interests and preferences ensures that users receive relevant offers according to their profile.
- **Interact:** since mobile devices' display and keypad are limited in term of size (compared to fixed devices), it is difficult for users to display and browse online catalogues. Potential assistance to users from intelligent components could be very appropriate here.
- **Transact:** since users of mobile devices cannot be constantly connected to the network, they have to go offline. This means that the transaction process has to be undertaken without the direct involvement of users. Intelligent components are needed to follow-up the progress of this process.
- **Pay:** when payments are due, the exchange of sensitive information has to be made secure. Specific security protocols and techniques are required and should deal with the characteristics of wireless networks and mobile devices.

Mobile applications have their own set of obstacles. This definitely translates into an additional burden on application developers. Developers are put on the front line for satisfying the promise of businesses and service providers in delivering Internet content to mobile devices. Varshney, Vetter, and Kalakota report issues that developers must address to successfully define, design, and implement the necessary hardware and software infrastructure for m-commerce [6]. The screen size of mobile devices is very crucial when designing interfaces for customers. Communication channels and their reliability and efficiency are still a concern (for example, how to recover from a disconnection). Despite all of these impediments, more advances continue to drive the wireless field. Indeed, new wireless standards are constantly surfacing, and the

number of devices and programming languages that support mobile applications and content delivery continues to grow. 3G systems with their data-transmission rate up to 384Kbps for wide-area coverage and 2Mbps for local-area coverage will provide high quality streamed Internet content [1]. In addition, since 2001 Java-enabled I-mode mobile phones are available on the Japanese market; it is becoming possible to download Java applets from servers to be run on these phones.

What Comes Next?

Figure 1 illustrates our perception of the importance of creating an e-commerce application that integrates elements from the social context. A different perception is definitely needed for m-commerce applications due to the types of devices and communication channels that are used in such applications. Designing e-commerce applications that simulate the feeling of being in a real market will definitely give more confidence to users in carrying out commerce transactions. Similar to 3D video games, the e-commerce applications will enhance the customers' shopping experience by allowing them to walk around the streets of the market, visit shops, read adds, and chat with vendors. Several research opportunities—for instance, from the intelligent virtual agents field—are emerging in this context.

The deployment of a virtual e-commerce application suggests a 3D representation that consists of e-shops, e-floors, e-lanes, and so forth. The representation should provide shoppers with a new type of virtual experience where shoppers are associated with components that act on their behalf. Components bind to shoppers with the help of profiling mechanisms. Furthermore, components need to be embodied with mechanisms that enable them to sense the market conditions, assess the presence of other components and their type, and communicate with these components when needed. Because of the different components that could be involved in a virtual e-commerce environment, the following contexts and their features are identified in our work:

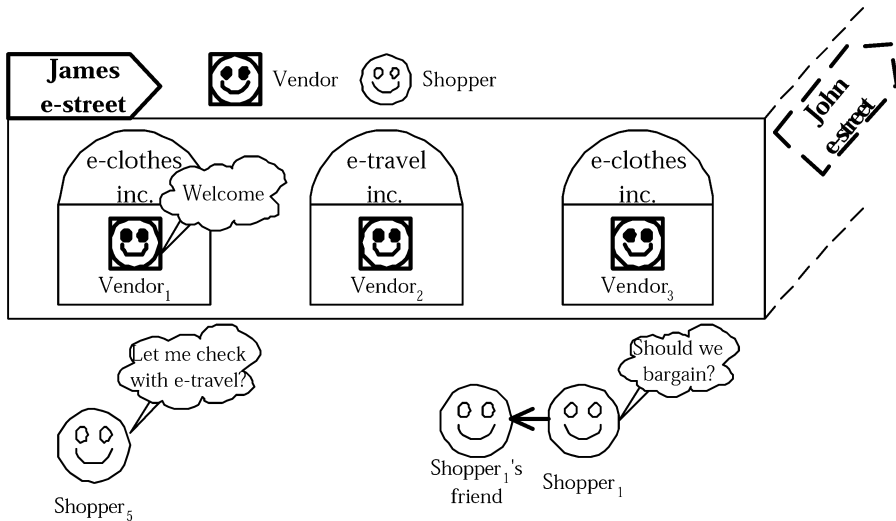| Context	Features
Shopper-Vendor (traditional)	Sell, bargain, buy
Shopper-Friend	Request for advice
Shopper-Shopper	Compete/Cooperate/ Be interested in
Vendor-Vendor	Compete/Cooperate
(Vendor, Friend)-Shopper	Influence to convince
(Shopper, Friend)-Vendor	Help to convince

Figure 1. A suggested representation of a virtual e-commerce environment.

- **Shopper-Vendor** context is not discussed because of its simplicity.
- **Shopper-Friend** context
  - *Request for advice* feature: the shopper asks her friend for a recommendation regarding the goods she would like to buy. If the shopper's friend returns a positive recommendation, the shopper pursues her purchase. Otherwise, the shopper may change her intention. When the shopper's friend does not provide any recommendation, the final decision of pursuing or stopping the purchase goes back to the shopper.
- **Shopper-Shopper** context
  - *Compete* feature: two shoppers are in competition for the same goods; the shopper who offers the highest price will get the goods. However, the final decision of selling goes back to the vendor who has to take into account his interests. If the vendor accepts the offer of the first shopper, he has to reject the offer of the second shopper and vice-versa.
  - *Cooperate* feature: two shoppers are in cooperation and join efforts to get a better deal from a vendor. For instance, the shoppers decide to introduce a unique order to ask for a discount and at the same time to share transportation fees. Acting on behalf of both shoppers, one of them submits a purchase request to the vendor. The vendor either accepts or rejects the offer.
  - *Be interested in* feature: the shopper is interested in the goods of another shopper. Therefore, she decides to get the same goods probably from the same vendor as the other shopper. If the shopper is aware of the purchase conditions under which the other shopper has obtained the goods, she may request the same conditions if these conditions meet her requirements.
- **Vendor-Vendor** context
  - *Compete* feature: two vendors are in competition for the goods to be offered to the same shopper. For instance, a vendor cuts the prices of his goods. If the shopper accepts the offer of one of the vendors, she has to reject the offer of the other vendor and vice-versa.

- *Cooperate* feature: if a vendor runs out-of-stock for certain goods, he recommends to the shopper another vendor who has the goods in stock.
- **(Vendor, Friend)-Shopper** context
    - *Influence to convince* feature: the vendor aims at influencing the friend of the shopper regarding the goods and the selling conditions he is offering. The objective of the vendor is to influence the shopper's friend to provide a positive recommendation to the shopper about the goods of the vendor. This may aid the shopper in making her purchase decision.
- **(Shopper, Friend)-Vendor** context
    - *Help to convince* feature: the shopper asks her friend to talk on her behalf to the vendor regarding the goods she would like to purchase with certain conditions.

Despite the different technologies used for the development of e- and m-commerce applications, the social context has to be part of these applications. This context is needed and reflects the interactions occurring between consumers, providers, and sometimes third parties. Working on a workstation or using a mobile device is definitely efficient. However, various aspects that are difficult to assess are missing from the transaction, such as personalized handling, trust, and face-to-face interactions. How do you measure a customer's trust in a provider she has never met? And, how do you ensure that a customer is satisfied with her order? Online questionnaires and forms can be used, but will they be able to accurately reflect the user's behavior and feeling after concluding a deal? The need for strategies to address the social as well as technology issues is critical. Can we expect a new generation of commerce systems that will combine both strategies in the same framework? This could pave the way towards the next stage after m-commerce.

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