Integration of Payments into GDM

3.3 Integration of Payments into GDM

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3.3.1 Introduction

Global Digital Museum (GDM) (1)is a virtual museum on the Internet; the GDM system realizes a worldwide workspace, through which people are able to access multimedia exhibits provided by museums located all over the world. The system has been developed for applications in the area of museum education. It provides a global search function for "global access," that is, finding and browsing interesting exhibits from museums. It also allows people to create their own collections of the exhibits, show the collections to other people, and have discussions by making textual annotation on the exhibits.

These functions bring three kinds of value to people:
1) The value of each multimedia exhibit,
2) the value of "global access," and
3) the value of collection and annotation.

On the other hand, museums are keen to start a business on the basis of their resources and expertise. The business style in which an individual consumer purchases goods or services provided by a company is called Business–to–Consumer (BtoC). The size of the BtoC market is becoming very large, as shown in Figure 1. For example, the sales of Amazon.com (2)was 16 M$ in 1996, 148 M$ in 1997, and 1,200 M$ in 1999;

>   Sales grew 75 times in three years.
>   There are expectations that the market size will continue to grow rapidly.
>   This growth provides a business opportunity for museums.

In this paper, we describe what kinds of pay services are possible based on the GDM, and what kind of payment system should be integrated into the GDM.

This paper is organized as follows:

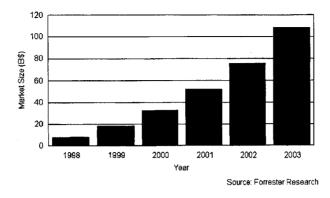Section 2 describes the GDM system, Section 3 introduces a general model and it

Fig. 1 Market Size of Business–to–Consumer EC in US

simplified notation of commerce, Section 4 shows three possible scenarios in each of which the GDM is used to provide a pay service, Section 5 gives a short summary of this paper.

3.3.2 Global Digital Museum (GDM)

As described in the introduction, the GDM is a virtual workspace on the Internet that allows people to access multimedia exhibits, execute global search, create their own collections, and have discussion on the exhibits. The technical details are described in (1). This section only describes several concepts that are important in discussing the theme of this paper, that is, pay services based on the GDM.

Global search:
Each museum has its own database management system (DBMS), in which metadata for the exhibits are stored. Global search is a function for answering queries by accessing all the DBMS at one time.

This function allows a user to find interesting exhibits located at various museums with a single transaction.

Collection (or book):
This is not a physical one; The GDM allows a user to have his/her own virtual collections of multimedia exhibits provided by multiple museums.

The entity of a collection is a set of pointers to the exhibits, stored in a DBMS separately from the exhibits. By using this function, for example, the user can create new educational material.

Textual annotation:
This function is provided as a part of the collection function described above. The

annotation are also stored in a DBMS separately from the exhibits. The GDM provides a Java applet in order to realize a client–side user interface.

3.3.3 A Generic Model of Commerce

This section describes our model of general commercial activities, which includes four roles and five activities (Fig. 2).
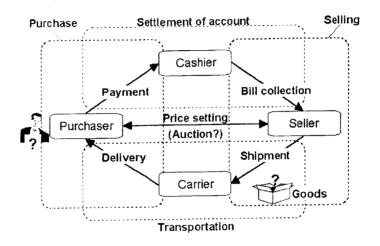

Fig. 2 A general model of commerce

3.3.3.1 Roles
Seller:
This role, located at the righthand in Figure 2, sells something. A seller is called a vender, a provider, or a supplier, in accordance with the business model or situation.

Purchaser:
This role, located at the lefthand in Figure 2, purchases what the seller sells. A purchaser is called a consumer, a customer, or a client, in accordance with the business model or situation.

Cashier:
This role, located at the upside in Figure 2, mediates the flow of money from purchaser to seller. There can be zero or more cashiers; the number of cashiers and their types depend on the business model or situation. An example of this role is a credit company.

Carrier:
This role, located at the downside in Figure 2, mediates the flow of goods or services.

Carrier:
This role, located at the downside in Figure 2, mediates the flow of goods or services. There can be zero or more carriers; the number of carriers and their types depend on the business model or situation.

An example of this role is a post office. There can be another role to help set the price. An example of this role is an auctioneer. However, because our work does not deal with such a case, this role was dropped from our commerce model.

3.3.3.2 Activities
Price setting:
This activity should happen before money is paid. It is set through communication between the seller and the purchaser.

Settlement of account:
This activity deals with the flow of money from the purchaser to the seller. When there is no cashier, this activity is a prompt payment. When there are one or more cashiers, this activity is separated into two or more subactivities.

Payment:
The purchaser pays some money for what s/he will have. When there are one or more cashiers, the seller does not receive money directly.

Bill collection:
The seller collects money for what s/he has already sold. When there are one or more cashiers, the purchaser does not give money directly.

Transportation:
This activity deals with the flow of goods or services from the seller to the purchaser. When there is no carrier, the transportation is a prompt delivery. When there are one or more carriers, this activity is separated into two or more subactivities.

Shipment:
The seller ships what s/he has already sold. When there are one or more transporters, the purchaser does not receive the good or service directly.

Delivery:
The purchaser receives what s/he has already purchased. When there are one or more transporters, the seller does not give the good or service directly.

3.3.3.3 Examples
In order for the seller to determine what kind of commerce system should be adopted, it is necessary to consider what kind of people the purchasers are and what kind of

The model of a sweet shop:

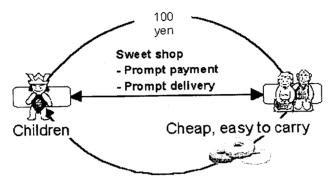The purchaser is a kid, and the good is a sweet such as a candy, a donut, or a chocolate bar (Fig. 3).

Fig. 3 The model of a sweet-shop

Since kids do not have credit cards, and since the price is quite low, payment is prompt. On the other hand, since the good is so small that the kid can carry it by him/herself, and since the kid would be eager to have the sweet as soon as possible, delivery is prompt.

The model of a shoe shop:

The purchaser is a grownup, and the good is a pair of shoes (Fig. 4). Since the grownup usually has a credit card, s/he would use it to pay for the shoes. Since the shoes are not so heavy and the purchaser can take them home by him/herself, delivery is prompt. The difference with the model of the sweet shop is that a cashier (i.e. a credit card company) mediates the flow of money.
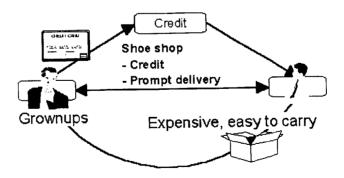

Fig. 4 The model of a shoe-shop

The model of a furniture shop:

The purchaser is a grownup, and the good is furniture such as a desk, a chair, or a
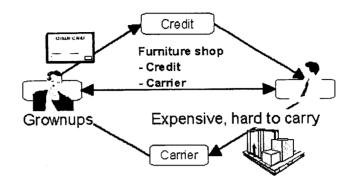
bookshelf (Fig. 5).

Fig. 5 The model of a furniture-shop

Since the grownup usually has a credit card, s/he would use it to pay for the furniture. Since the furniture is quite heavy, the purchaser could not take it home by him/herself. The difference with the model of the shoe shop is that a carrier mediates the flow of goods.

3.3.3.4 Simple Notation
As shown above, the seller should see what kind of goods s/he sells and what kind of people are supposed to purchase the goods —in other words, what kind of business s/he carries— before s/he determines what kind of commerce system s/he has to adopt.

In the rest of this paper, a commerce model is illustrated as shown in Figure 6. This model includes at least two roles (a purchaser and a seller) and three activities (price setting, settlement of account, and transportation).
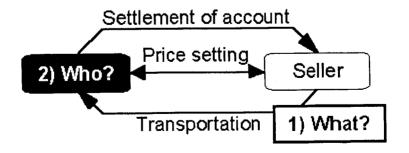

Fig. 6 A simplified model

3.3.4 Pay Services based on GDM

This section introduces three cases of possible pay services based on the GDM, and discusses what kind of payment system should be integrated into the GDM. As shown in the previous section, it is important to understand the two points —what kind of people the purchasers are, and what kind of goods or services are sold— to determine the payment system.

3.3.4.1 Case 1: Education service
In this case, the GDM provides all the features as educational services only to those who paid for their user accounts (Fig. 7).
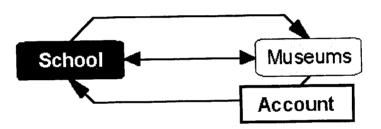

Fig. 7 Pay for an account

The purchaser is supposed to be a school, a university, or an institute. Any access to the GDM is impossible without purchasing a user account. In other words, an admission fee should be paid before entering the workspace of the GDM. Therefore, all the three values mentioned in section 1 are charged for. This is realized by integrating an authentication and authorization system into the GDM.

3.3.4.2 Case 2: Educational Material
In this case, the GDM provides educational material as a collection or a book with a charge (Fig. 8).

The purchaser is supposed to be a school, a university, or an institute. The charge of this case corresponds to the third value mentioned in section 1. Note that access to each exhibit is free, because the exhibit is stored separately from the collection. This is realized by integrating an authentication and authorization system into the GDM.

3.3.4.3 Case 3: Exhibition Service
In this case, the GDM charges for access to multimedia exhibits (as shown in Figure 9). The purchaser is supposed to be an individual, for example, a general net-surfer. The charge in this case corresponds to the first value mentioned in section 1.
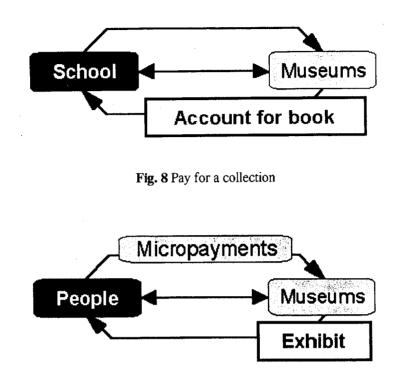
Fig. 8 Pay for a collection

Fig. 9 Pay for an exhibit

This is realized by integrating a micropayments system such as IBM Micro Payments (3) or Compaq MilliCent (4). These micropayments systems provide an electronic settlement system and a client–side user interface; the settlement system is able to deal with a small amount of money such as 100 yen or 50 cents, unlike conventional systems such as a credit card company; the user interface displays a prompt to confirm payment for the user, when s/he clicks a hyperlink for pay content such as a multimedia exhibit.

3.3.5 Summary

This paper described the possibilities of integrating payment systems into the Global Digital Museum (GDM). It showed three possible cases of pay services based on the GDM: educational service, educational material providing service, and exhibition service.

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Notes

1) Junichi Takahashi, et al., *"Global Digital Museum: Multimedia Information Access and Creation on the Internet"*, ACM DL '98, 1998.
2) Amazon.com. http://www.amazon.com/
3) IBM Micro Payments.
   http://www.alphaworks.ibm.com/tech/micropayments
4) Compaq MilliCent.
   http://www.millicent.com/ and
   http://www.millicent.gr.jp/