Online Travel Planning Survey

Technical report

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1. Introduction

The huge growth of the Internet, and particularly of the World Wide Web, has led to a big mass of companies participating in a global online marketplace. The resulting activity, known as electronic commerce, can be shortly defined as "doing business electronically" (European Commission 1997). Electronic commerce means electronic trading of physical goods, but also of services or information. In this paper we will focus on a particular branch of electronic commerce, the on-line flight reservation systems, touching also some aspects of a wider area - online travel agencies.

Why on-line reservation systems? As a commercial medium, the Web offers a big number of advantages for both customer and companies. From the customer point of view, using the web instead of a traditional approach (call for tickets or go to a travel agency) means access to a greater amount of information and also more flexibility in choosing, analyzing and comparing the offers. Having more choices "just a click away" helps customers find a better deal, in possible less time. For the companies, the use of Web means reduced costs for information processing, reduced costs to suppliers, the possibility of building stronger customer relationships (by having customers interact directly with the web site), the possibility of creating user profiles (to be used in marketing development) and also an easy way of information partnership, involving the cooperation between different companies [2].

Worldwide, electronic commerce will generate USD95 billion by the end of this year, according to the last report from Activmedia [5]. The same report predicts that global e-commerce revenues will achieve USD1.3 trillion by 2003. As for online travel industry, a Jupiter Communications report states that it will worth USD16.6 billion by 2003, with air travel representing 60 percent of the industry's revenue; currently air travel generates over 80 percent of online travel revenue [5].

The following graphs (Nua Analyes) show the US spending on-line, in 1997 and 1998; the amount spent on online travel products multiplied by almost 5 times, from USD276 million in 1997 to USD1.35 billion in 1998.

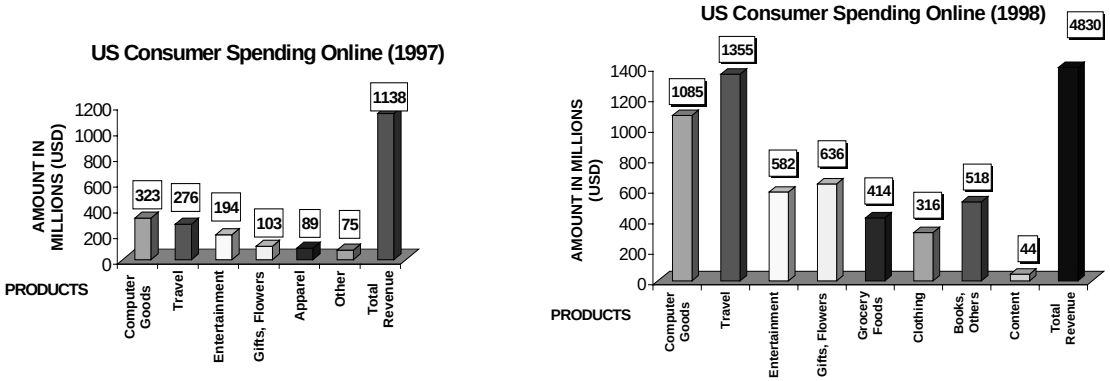

Figure 1 US Consumer Spending Online in 1997 and 1998

In Europe, the e-commerce is still at its beginnings, compared to US. According to a Datamonitor report, the European online travel industry is expected to generate USD1.7 billion in sales by 2003 (compared to USD16.6 billion for US). Currently, the most developed sector of online travel market is flight sales, which also represents the biggest future opportunity; however, the online package holiday sales are expected to grow substantially in the future (Nua Internet Surveys, June 1999).

All these facts and numbers express the same thing: online travel industry is in full process of developing, in a more advanced (US) or beginning (Europe) phase. In this paper we will take a look at ten of the current reservation systems, focusing on some key aspects of online commerce: the models of electronic business which they use, the customer needs they satisfy and the commerce protocols applied by these systems in the interaction with their customers.

2. A Survey of existing on-line flight reservation systems

We chose ten reservation systems for our survey: six online air companies: SwissAir (www.swissair.ch), Lufthansa (www.lufthansa.de), British Airways (www.britishairways.com), KLM (netherlands.klm.com), American Airlines (www.aa.com), Air France (www.airfrance.com) and four online travel agencies: Expedia (www.expedia.com), Travelocity (www.travelocity.com), ITN – Internet Travel Network (www.itn.com), Yahoo!Travel (travel.yahoo.com). First, we will analyze the electronic business aspects for all these systems, then we will focus on the customer needs and interaction protocols in air travel planning.

2.1. Models of e-business

A definition of a business model, as stated by Timmers is the following: An architecture for the product, service and information flows, including a description of the various business actors and their roles and a description of the potential benefits for the various business actors [7]. He is presenting eleven business models, currently used or in experimental phase. We will take a look at five business models (some of them described also by Timmers) and see how the online travel systems are applying them.

2.1.1. Models presentation

Internet presence

Internet presence represents in our opinion the basic model for electronic business. It provides a virtual "presence" for a company, giving detailed information about the company's products or services. The information usually consists of text and image. As information pages can take very sophisticated forms, the organization and navigation aspects are playing a very important role in the success of the business.

The benefits for the company are evident, this represents a good marketing strategy involving much lower costs than the traditional approaches and addressing a greater number of potential customers. From the customers' point of view, it is a more convenient way for getting information about the company's offerings; the customers will have to contact the company only in the case they are interested in the promoted products or services.

Online store

The next step in the hierarchy of electronic business models, after Internet presence, is the online store. The online store contains all the features described in the Internet presence model, but enhanced with the possibility of reserving, booking, and /or buying. Some more benefits for both company and customers are added: cost reduction for sales and increased demand (as company

benefits) and lower prices, wider choice, convenience for selecting and buying (as customer benefits).

Third party marketplace

In the case of a third party marketplace, the companies leave the online marketing to a 3rd party. They all have in common that they offer at least a user interface to the suppliers' product catalogues. Some of the online travel agencies can be considered third party marketplaces, mostly regarding air travel reservations, as they offer flights from a variety of airline companies (usually with certain priorities).

Virtual communities

The value of virtual communities is coming from their members (customers or partners), who add their information about the environment provided by the virtual community company. It is a way of building customer trust and loyalty and also receiving customer feedback. The virtual community is becoming an additional function to enhance the attractiveness and the opportunity for new services of several of the other business models like online stores or third party marketplaces.

There already exist some virtual communities in different market sectors, in the online travel sector, Yahoo!Travel is offering message boards, virtual clubs and chat. Customers can share information about places they visited, about the quality of services, can ask or give advice.

2.1.2. Reservation systems analysis

Internet presence and online store are the two business models most frequently used by the travel reservation systems we studied. We will discuss more detailed how these two models are applied.

As shown in the following figure, the services offered in the two models are related: in Internet presence, the customers find information about the service, while in Online store, they have the possibility of buying the service. Some examples are: *check flight* in Internet presence and *book flight* in Online store; *get car information* in Internet presence and *rent a car* in Online store, etc. There are also two different services, *information about special offers* in Internet presence and the possibility to *save the itineraries* already defined in Online store (an itinerary consists of a flight, usually round trip and possibly of a rented car and reserved rooms in one or more hotels).

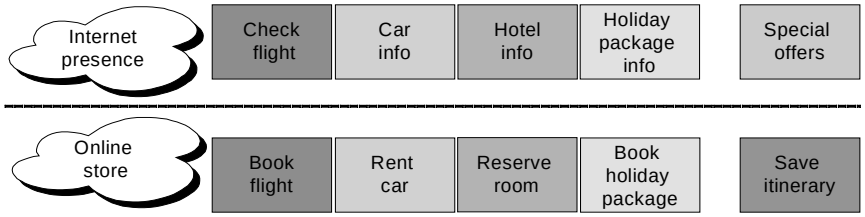

Figure 2 Services offered in Internet Presence and Online Store

The following table summarizes the characteristics of the ten systems. As we can see, the online travel agencies are the most complex.

From this point of view, KLM is the leading air company (missing just the holiday packages), followed by American Airlines, which offers holiday packages, but not car rental or hotel reservation.

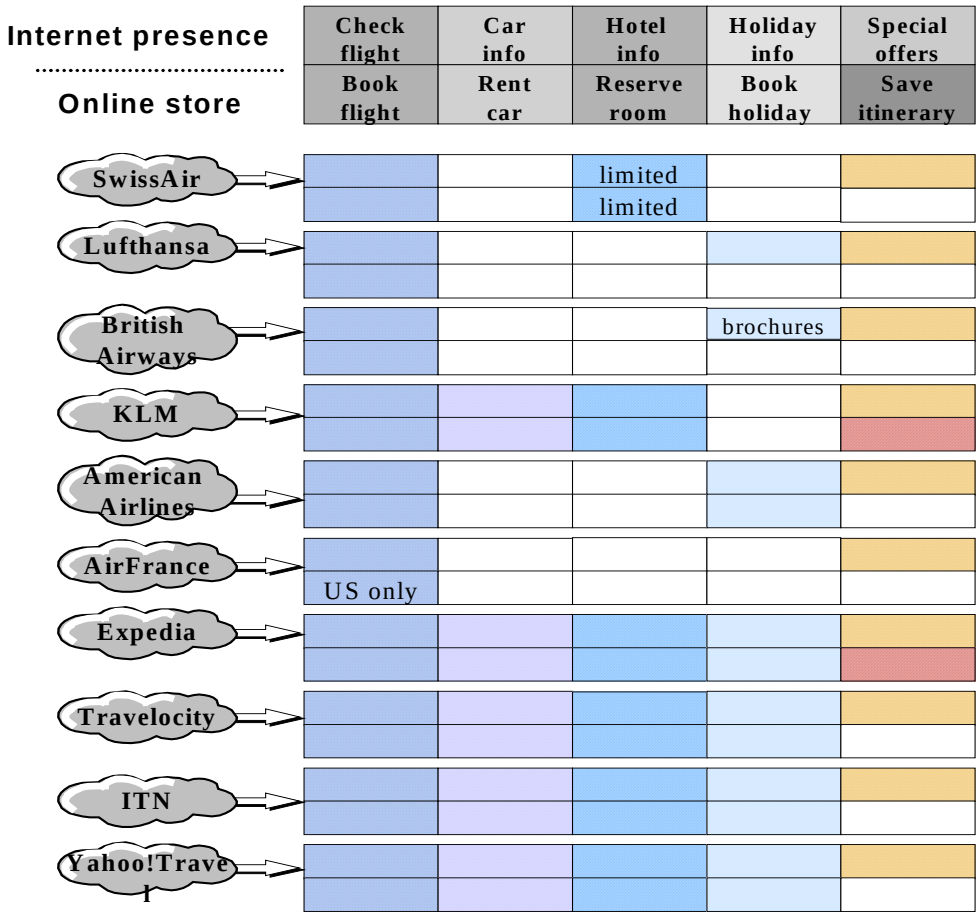

Figure 3 Comparative Table for Electronic Business Models

All systems allow customers to book flights (with the exception of Air France, which has a special booking service only for customers starting their travel in the US) and all have special offers (as Internet presence information). Car rental and room reservation is beginning to be a common feature, implemented for now by all travel agencies and KLM; SwissAir offers hotel information and room reservation, but only for hotels in Geneva or Zurich.

A good facility for online stores (implemented only by KLM and Expedia) is to save the already chosen itineraries. A useful future development could be the implementation of a tool which helps customers in comparing their itineraries and taking purchase decisions, as right now the customer has to decide alone which itinerary is the best.

2.2. Customer needs

One of the main priorities in developing e-commerce applications is to satisfy the customer needs[3]. One must remember that electronic commerce has to compete with the real-life methods of making purchases and completing customer transactions. Customers can choose between different

shopping methods (electronic or real-life) and they will always prefer the one which best satisfy their needs.

2.2.1. Customer needs presentation

In the case of online reservation systems we identified six important customer needs:

- ease of use
- quality of solutions display
- system status information and feedforward
- error tolerance and system stability
- query refinement for achieving customer's goal
- customer profiles

We will explain each one of them and see in which degree are they satisfied by the ten systems we analyzed.

Ease of use

Ease of use is an acknowledged problem for customers. The user interface of the online systems should be designed in such a way that all services are easy to understand and use. It can often happen that customers may want to use a service, but they don't know how to do it or the user interface does not allow them to do so. It is the case of the registration process when using online travel reservations. Some of the systems allow timetable consultation only after registering (which can take quite a lot of time), or they allow consultation but there is no price information before registration.

The existence of a help system is more than welcomed either in the implicit form or on demand.

A very useful feature is an online booking map, a schematic representation of the steps of the reservation process, indicating at each moment the current customer position and allowing an easy navigation (forward or backward) between the steps.

Saving already chosen itineraries (air travel, car rental, and hotel reservations) could also be very useful especially when customers want to compare the different possibilities. A tool for helping them doing this would be appreciated, but until now, none of the systems that we studied offer it.

Quality of solution display

In the case of a round trip, or a trip with multiple segments, most of the current air reservation systems post a table with results for the first segment, wait for the customer to select one flight, then show results for the next segment, and so on. A better alternative is to show from the beginning the possible results for the entire trip, organized in the following way: one solution for the whole itinerary, then next solution, etc.

System status information and feedforward

The status of the system (e.g. accessing database, computing solutions) must be always indicated to the customer. Different mechanisms should be employed to give clear feedback to the customer, for error messages, data input required, no solutions found, etc. When possible, the messages should contain explanations and provide suggestions for future actions (e.g. no solution was found, customer has to try to enlarge the domains for his travel constraints: dates, airlines, time).

Mechanisms for feedforward (especially of consequences of actions) should be available. If the customer has asked to see all possible solutions (and the system estimated their number around

2000), he should be informed about the time needed for displaying all of them, so he can choose to see less solutions or to wait, but knowing for how long.

Error tolerance and system stability

An easy and efficient way out should be provided in case of errors. This makes customers feel more confident and at ease. In the case of a customer mistake, it is important that the reservation process is restarted from a point close to the one where the mistake was generated, the customer shouldn't be sent back to the beginning.

Query refinement for achieving customer's goal

It often happens that customers are not satisfied with the first solutions they get from the online air reservation system. In this case, most of the current systems allow customers to search for flights next day, or on a newly defined day. If they are still not happy with what they get, they can come back to the query definition and change their input data.

This way of interaction is quite heavy and time-consuming, using a lot of the system and customer resources.

In the second part of our paper, we propose a new interaction model in which the customers can modify their initial queries directly in the result table. It is easier for customers to find exactly what they want (or to find out if what they want exists or not), starting from possible existing solutions.

Customer profiles

The use of customer profiles in online reservation systems is connected to the registration process. The same question arises, when is the best moment to ask customers to register and/or to create their own profiles. The systems we studied have different approaches, but most of them leave the profile creation at customers' control, they can do it when and if they want.

The customer profiles are currently used in the same way by all the systems, but each system has its own profile implementation, which makes difficult a possible communication and data interchange. A future improvement in online travel industry would be a standard personalization technique to be adopted by all online systems providing in this way both efficiency and interoperability.

2.2.2. Reservation systems analysis

We will take a look at the modalities in which the analyzed systems are implementing mechanisms for satisfying the already described customer needs.

Ease of use

The registration policy is different from one system to the other, varying from mandatory registration to no registration at all.

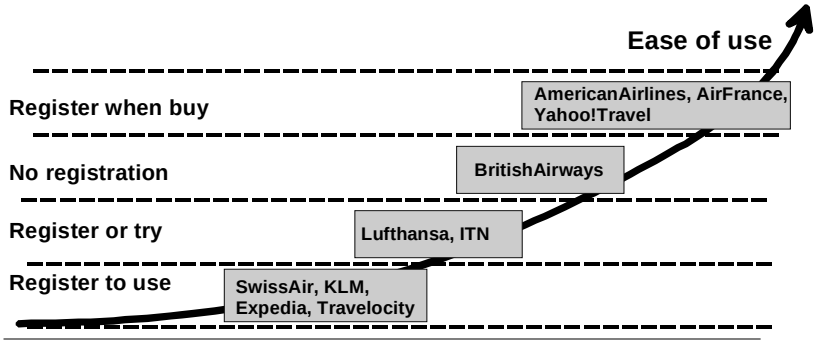

Figure 4 Ease of Use in Online Reservation Systems

British Airways and ITN offer maps for guiding the user in the reservation process, while KLM and Expedia allow users to save their itineraries.

Quality of solution display

Three different modalities of displaying the solutions are employed in the ten online systems. Swiss Air, Lufthansa, American Airlines, Air France and ITN present the results in different tables on different pages, first for the first travel segment, then for the second, etc. British Airways has a similar approach, but the tables are on the same page, one after the other. In KLM, Expedia, Travelocity and Yahoo!Travel the results are organized in one table, easy to read and understand.

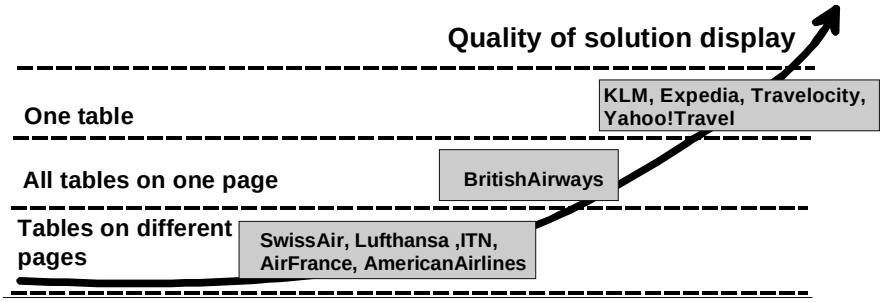

Figure 5 Quality of Solution Display in Online Reservation Systems

System status information and feedforward

Only British Airways, KLM and Expedia provide information about system status when searching for solutions or getting flight details. In the case of no solutions found, all systems provide messages with possible reasons for failure and suggestions.

Query refinement for achieving customer's goal

Lufthansa, American Airlines and ITN do not offer any possibility of seeing more flights or modifying the query. The only solution is to go back to booking menu and start a new search. SwissAir, Air France, Travelocity and Yahoo!Travel have a direct link from solution page to a new flight search, while British Airways and SwissAir have also the possibility of viewing flights for the previous, next or a new defined day. KLM and Expedia move one step forward, by allowing the customer to modify the dates and times of the travel in the solution page.

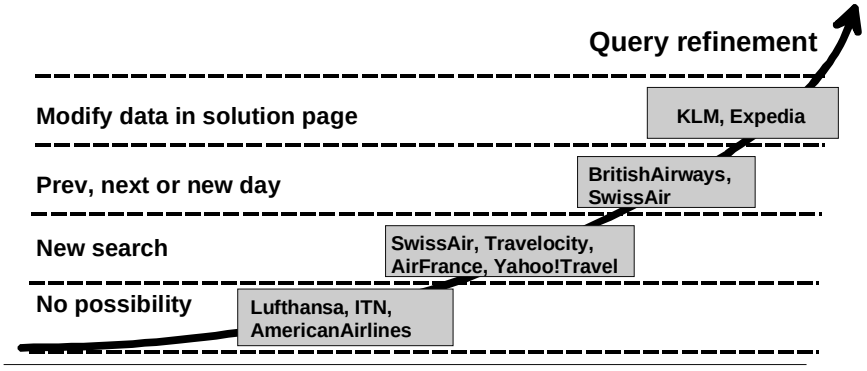

Figure 6 Query Refinement in Online Reservation Systems

Customer profiles

With the exception of British Airways and Air France, all the online systems offer the possibility of creating user profiles, containing the basic information needed for a travel reservation: travel preferences, payment and ticketing information. KLM, American Airlines and Expedia profiles memorize also the user login and password, so he is immediately recognized, no need to spend time typing or remembering.

2.3. Protocols for electronic commerce

Commerce in the real world is a very rich set of interaction protocols with a very complex set of constraints [1]. The protocols used in electronic commerce systems must respect at least some of the real world models and add also new interaction techniques. Flexibility combined with ease of use and understanding are primary requirements, as rigid and restricted protocols lead to frustration for both users and developers [4].

One of the most commonly used real-life protocols is *"select-evaluate-pay-get"*. It can be found in all types of shops, from books to cloth and aliments. The customer selects one of the products offered by the shop, evaluates it, in case he likes it he buys (pays for it) and then go home with it. The *"undo"* option is sometimes included (when the customer is not satisfied, he gives back the product and receives a refund).

For the real-life travel agencies, the protocol is slightly different:

"decide on some constraints – receive possible options – evaluate – select – pay - get".

A customer has always constraints regarding dates and places of travel, hotel reservations or car renting. The travel agent is trying to find possible solutions that will satisfy the customer's request. The customer (with or without the help of the agent) evaluates the existing options, chooses the best of them and buys it, then go and travel.

The same type of protocol must be implemented by the online travel systems, with possible improvements facilitated by advanced search, visualization and decision support techniques.

2.3.1. Consumer-application protocols

All existing online travel systems offer consumer-application protocols. The customer must interact directly with the system in order to receive results for his query. A general model for the protocols offered by the online travel systems for booking flights is the following:

"[register] – input data (travel constraints) – see results – evaluate – book & buy"

The registration step can be sometimes avoided (customers have the possibility to use the system as guests or to register only if they want to make a booking or purchase). In some of the systems, hotel reservations and car rentals may be added for a complete travel itinerary.

2.3.2. Reservation systems analysis

We can differentiate two main categories of reservation systems: systems which offer only air reservations and systems which offer air, car and hotel reservations.

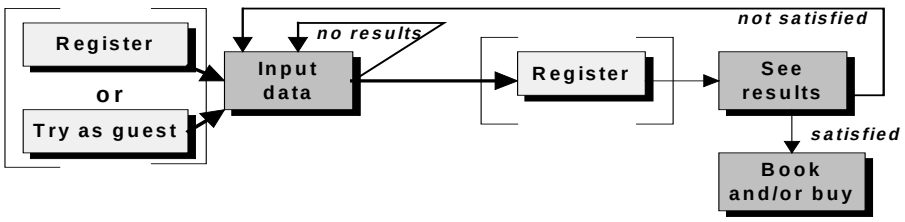

Figure 7 General Protocol for systems offering air reservations

SwissAir, Lufthansa, British Airways, American Airlines and Air France can be included in the first category. A general protocol for all of them is the following:

Customers must register before using Swiss Air, but they can use Lufthansa as a guest; still registration is needed before making any reservation. British Airways is allowing reservations without any registration, while American Airlines and Air France ask the customer to register only before he wants to make a reservation or to buy a ticket.

If no results were found for the customer's itinerary, he is sent back to the input data page.

The evaluation is done by the user, in all systems, without any help from the application. In case that he is not satisfied with the results, he usually has to change his input data, going back to the first page. Exceptions are British Airways and Swiss Air which allow the search for flights one day before, one day after or on a new defined day.

KLM, Expedia and ITN allow the customer to reserve complete itineraries, consisting from air, car and hotel reservations. The next figure shows a general protocol for these systems:

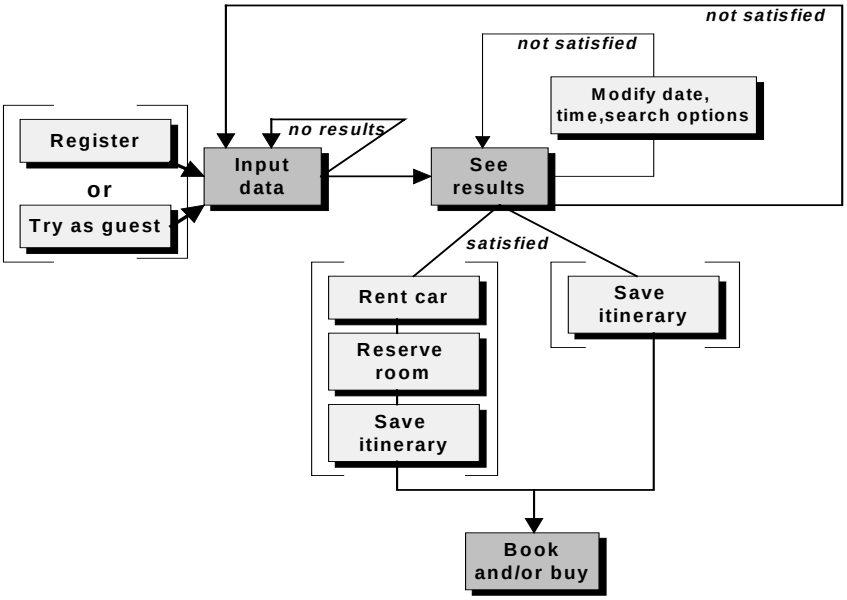

Figure 8 General Protocol for Systems Offering Air, Car and Hotel Reservations

KLM and Expedia have mandatory registration, while ITN allows the "guest" option. All three systems have the possibility of renting one or more cars and reserving hotel rooms, after choosing an airline route. The chosen itineraries (any combination of air, car and hotel reservation) can be saved in a list for further comparison or just storage.

If no results were found, the customer has to change the input data. In case that he is not satisfied with the solutions, KLM and Expedia allow the modification of date, time and search options (like non-stop flights) in the solution page, or the modification of the input data in the search page. ITN allows only the last option.

Travelocity and Yahoo!Travel offer air, car and hotel reservation, but eacjh type of reservation has to be made separately, there is no notion of "itinerary" as in KLM, Expedia and ITN. The protocol for air reservation is the same as for SwissAir .

There is an important aspect to be addressed when designing protocols for travel applications: how to avoid loosing the customer during the search and reservation process.

As we saw in the protocols described above, most of the systems ask for user registration before allowing any interaction with the system. If the user is not willing to register, being afraid of giving his coordinates, or just because of time constraint reasons, he will quit the system. A second case when a customer may decide to quit is when, obtaining a set of solutions and not being satisfied with either one of them he has, repeatedly, to go back and change the input data. It is a very time consuming and annoying activity. If the searching process is long and the user does not have any information about the system status, it is possible that he will stop waiting and quit, not knowing if the system is still working, or it is blocked or something else happened.

Some improvements are possible, in order to avoid these problems. The customer should be asked to register at a moment when he is ready to do it, for example when he wants to buy the ticket or make the reservation. There also exists the option of trying the system as a guest, but some personal information is still needed in the case of purchasing. If the customer is using the system just for planning his trip, with no buying intentions, then the "try as guest" approach is suited.

The problem of the user, moving between the solution page and input data page, could be avoided if the user would be able to change his trip constraints directly in the solution page. Expedia and KLM are trying to overcome this problem by allowing the customer to modify the dates and times of the travel in the solution page.

As already said tools for indicating the system status are mandatory. The customer must feel that he is in control of the system, he should know what the system is doing in each moment. If the response time is very short, so the user does not have to wait, the status indication may be omitted.

3. Summary and Conclusions

In this paper we analyzed the current online reservation systems, focusing on some key aspects of online commerce:

- The models of electronic business : internet presence, online store, third party marketplace and virtual communities.
- The customer needs: ease of use, quality of solution display, system status information and feedforward, error tolerance and system stability, query refinement for achieving customer's goal and the use of customer profiles.
- The commerce protocols: for systems which offer only air reservation and also for systems which offer air, car and hotel reservation.

First we described each one of these electronic commerce aspects. Then we took a look at the way in which they are implemented by ten of the current online reservation systems: six online air companies: SwissAir, Lufthansa, British Airways, KLM, American Airlines, Air France and four online travel agencies: Expedia, Travelocity, ITN – Internet Travel Network, Yahoo!Travel.

This study of the existing online travel reservation systems highlights several significant issues. Web technology has the potential to transform the way in which travel agencies do business with their customers and suppliers. Although a lot of work has already been done in moving the reservation business on the Web, all current systems share the same implementation approach: the user has to input his/her travel preferences then choose from existing possibilities. This way of interaction is good for simple user demands, but when more complex travel planning is desired, it is not sufficient.

An alternative to the current reservation techniques could be to give users the power of configuring their own trips, starting from existing basic blocks. Artificial intelligence methods, like constraint satisfaction techniques, can be employed for solving configuration problems. User-interface

interaction protocols for allowing easy manipulation of configuration blocks, criteria and algorithms are to be investigated. Appropriate visualizations of solutions according to predefined or user-defined tradeoff criteria can also be implemented for helping customers in the decision process.

As a final conclusion, much work has already been done in implementing online reservation systems, but there are still a lot of new directions to be explored and many problems to be solved.

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