Let's Get Social in e-Tourism: The "itchy feet" Way

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Abstract. In this paper we outline an e-Tourism environment that takes a community-driven approach to foster a lively society of travellers who exchange travel experiences, recommend tourism destinations or just listen to catch some interesting gossip. Business transactions such as booking a trip or getting assistance from travel advisors or community members are constituent parts of this environment. All this happens in an integrated, game-like e-Business application where each customer is impersonated as an avatar. We present "itchy feet", a prototype implementing this 3D e-Tourism environment to showcase first visual impressions. This new environment is a perfect research playground for examining heterogeneous societies comprising humans and software agents, and their relationship in e-Tourism.

1 Introduction

Tourism is the leading market in B2C commerce [1]. The number of online sales is increasing steadily with a large number of successful online booking platforms in the various areas of tourism such as transportation, accommodation, package deals or regional offers. In addition, the Internet is a main source for gathering information since an abundance of online services concerning tourism information exists. These services are either created and maintained by editors, or community-based such as Usenet groups, *Lonely Planet's Thorn Tree* forum or *VirtualTourist*, to name but a few. In essence, Tourism has illustrated how the Internet can change the structure of an entire industry and, in the process, create new business opportunities [2]. The development of more specialized services and further consumer integration will lead to smart marketplaces integrating all stakeholders.

Even though the number of online sales of tourism products is increasing, people still appreciate social interaction with travel agents because of their expertise and ability to help with impulse decisions. The trust towards travel agents tends to be more distinct compared to online tourism portals. Indeed consumers feel more secure about booking with people. Contrarily, fast responses to requests and the possibility of accessing various information sources on the Internet are important advantages of booking online. In addition, the personal experience of others is a valuable good and acts

as guidance for own decisions. Above all, people enjoy the convenience of making decisions in their familiar environment [3].

Tourism products cannot be observed or manipulated through direct experience prior to purchase - they are "confidence goods". An a priori assessment of product quality is virtually impossible. Hence, consumers need to rely on indirect or virtual experience when making their decisions [4]. Tourism also demonstrates the importance of emotional aspects, because the decision for a tourism product is not purely rational. Consequently, appealing presentations of products, e.g. travel destinations, have always been an important factor for success in tourism. Traditional media used by travel agents are quite effective in creating illustrated catalogues that provide potential customers with a significant amount of information and useful tips jazzed up with highly aesthetic photos, maps and much more.

In a nutshell, we consider sophisticated visualization of tourism products, the consulting role of travel agents, the social interaction and information exchange between travellers, as well as taking advantage of the information richness of the Internet as being the key features for successful e-Business in tourism. We are developing a system that embraces all of these diverse issues. In particular, we are setting up a multi-agent system in the tourism domain that embeds human support for online inquiries and offers consumers innovative visualization of tourism products. A 3D game engine is used for sophisticated visualization, allowing humans to interact with the environment. This 3D e-Tourism environment provides an integrated, game-like e-Business application where participants are impersonated as avatars capable to interact with their surroundings in a variety of ways. They will be able to perform commercial transactions such as booking a trip, or getting advice from travel agents. In the end, acting in the electronic environment should also make fun [5].

The remainder of this paper is structured as follows. In Section 2 we provide a review of related work. The technological groundwork is outlined in Section 3. Then, in Section 4, we present "itchy feet", the concept of a 3D e-Tourism environment that allows interaction between humans and agents in a 3D virtual world. Finally, we draw some conclusions in Section 5.

2 Related Work

Nowadays individuals are the product of a particularly mobile and entrepreneurial society. As a result, individuals are socially constituted and socially situated in everyday business activities. Preece criticizes that the satisfaction of social needs, despite of its great importance, is widely neglected in contemporary interactive systems [7]. A truly feasible e-Business system that supports business activities can hardly be obtained without taking care of the social issues behind these activities. Some operators of e-Business systems even believe that online communities supporting social interactions serve the same purpose as the "sweet smell of baking cakes" does in a pastry shop [8]. Both evoke images of comfort, warmth, happiness and probably even trust. Most system analysts, however, perceive such systems from a purely technical viewpoint neither bearing in mind the social norms that companies and consumers comply

with nor acknowledging the importance of human consultancy in a decision making process.

Tourism is dominated by rather conservative approaches in user-interface design that disregard these social issues. A number of online booking platforms exist on the Internet where interaction is based on form fill-ins and selection from dropdown lists. Still in line with this conservative view but with the goal of providing extensive support to customers, Fesenmaier et al. developed a recommendation system for tourism, DIETORECS, which offers various form-based ways to interact with the system [9]. In particular, users express their needs by choosing from a fixed set of attributes represented by radio buttons or dropdown lists. Due to the domain diversity a multitude of attributes is available, and unfortunately, this plethora of options results in a dramatically overloaded interface. As a possible way to compact the interface we suggested to incorporate natural language dialogue to access tourism information. The findings of a field trial show that natural language interaction is accepted by the tourism community. So, the burdens associated with traditional form-based tourism environments can be reduced [10].

A current strand of research in e-Tourism is the delivery of content to mobile devices. This is especially important for on-trip assistance of travellers as addressed in [11]. A multi-agent system in tourism is described in [12]. In this system agents are employed to gather up-to-date information from online sources. Another focus of e-Tourism research lies on the integration of B2B business processes rather than on the consumer. In [13], for instance, a virtual enterprise of independent tourism service providers is designed as a multi-agent system. An attempt to combine multi-agents systems with 3D visualization is described in [14]. The authors propose a framework using 3D game engines in order to visualize military simulations in a 3D virtual world.

Immersive environments such as 3D virtual worlds address the satisfaction of users' social needs and are complemented with a realistic experience. Virtual worlds support the way humans act and communicate in real life to a certain extent and offer an environment to meet people. Such interfaces go beyond the form-based approaches dominating the Internet and graphically represent the user in terms of an avatar [15]. Users are literally *in* the Internet rather than *on* it. 3D virtual worlds implicitly address the issue of social interactions since location awareness, presence, as well as direct communication are intrinsic elements. Inspired by the success of 3D graphical user interfaces in application domains such as computer games or medical and scientific visualization, this emerging technology is applied to new domains [16,17,18]. Quite interestingly, the line between virtual and real world tends to blur in current online games such as *Second Life* and *EverQuest*. In particular the trade in items for the game provide some gamers with a notable source of real income [19]. For EverQuest an economic study has revealed that the virtual *Norrath* was the 77th richest country of the world in 2000, roughly equal to Russia [20].

A 3D e-Business environment featuring animated products, which act as navigational aids and guide users through the 3D representation of the online shop is proposed in [21]. 3D product visualizations literally move around and assist users in finding the appropriate section within the shop. Another system fostering social interactions is described in [22]. It incorporates a novel, spatially-organized and interactive

site map that provides visibility of people, activities and mechanisms for social inter-
actions.

3 Technological Groundwork

Multi-agent systems have proven to be a perfect paradigm for modelling environ-
ments that are composed of many autonomous individuals. In order to develop com-
plex multi-agent systems, sophisticated methodologies supporting the entire develop-
ment life cycle including design, analysis and deployment are needed [23]. Method-
ologies that distinguish between the social (macro-level) and agent (micro-level) as-
pects of the system are preferable. However, considerable research efforts take an
agent-centred view, ignoring social aspects of individual participants. So, most re-
search concentrates on theories, languages and methodologies whereof *Electronic
Institutions* [24] are a prominent representative.

3D Electronic Institutions combine the two paradigms of *Electronic Institutions*
and *3D virtual worlds* while retaining the features and advantages of both. An Elec-
tronic Institution is an environment populated by agents that interact according to
predefined conventions on language and protocol. Furthermore, Electronic Institutions
guarantee that certain norms of behaviour are enforced. This allows agents to act
autonomously and make their decisions within the limits imposed by the set of norms
of the institution [25]. 3D Electronic Institutions broaden this view and are environ-
ments that enable humans to participate in a heterogeneous society of individuals
visualized in a 3D virtual world. The essence is to transcend the agent-centred view on
Electronic Institutions, take a human-cantered perspective and concentrate on the
relationship between humans and agents in the amalgamation of the two paradigms.

Technically speaking, 3D Electronic Institutions are built according to a three-
layered architecture [6]. The first layer hosts the runtime environment *AMELI* for
arbitrary Electronic Institutions [26]. These institutions are specified with
ISLANDER [27], a UML-like editor that verifies the institution with respect to integ-
rity, protocol correctness, and norm correctness.

The second layer contains the *Causal Connection Server* that causally connects the
Electronic Institutions' runtime environment AMELI with the 3D virtual world at the
third layer. The execution of the multi-agent system itself is represented in terms of a
3D virtual world consisting of avatars, rooms, doors and other graphical elements. So,
the causal connection needs to materialize in two directions. Messages uttered by the
agent in the multi-agent system have immediate impact on the 3D representation.
Actions performed by the human in the 3D virtual world are translated to messages
uttered by the agent.

The third layer of the 3D Electronic Institutions' architecture contains the *User In-
terface*, which, in our application, is realized using the *Torque Game Engine*[1]. This
particular game engine provides a comprehensive set of design and development tools
including a *World Editor*, a *GUI Editor* and a *Terrain Editor*, which facilitates the

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[1] http://www.garagegames.com/

creation of arbitrary games. Moreover, it supports all major operating systems and integrates with 3D Electronic Institutions.

4   The 3D e-Tourism environment "itchy feet"

The role model for our e-Tourism environment "itchy feet" is the concept of Massively Multi-User Online Role-Playing Games (MMORPGs). Every day, millions of users interact, collaborate, socialize and form relationships with each other through avatars in such online environments [28]. We address the aspect of social interaction by providing instruments to interact and exchange experiences with other customers that go beyond conventional text-based chat rooms. "itchy feet" offers sophisticated visualization of tourism products, integrates travel agents and enables access to the information richness of the Internet.

A simplified specification of the Electronic Institution "itchy feet" is shown in Figure 1. It consists of five scenes represented as nodes in the graph including *Entry Point* and *Exit*. Scenes are activities following a structured dialogue that agents can engage in and are connected via one or more transitions. In this particular case, "itchy feet" is accessed via the *Travellers' Lounge*. The *Travel Advisory Service* and the *Travel Agency* are connected to the *Travellers' Lounge*. Participants leave "itchy feet" through the *Travellers' Lounge*.
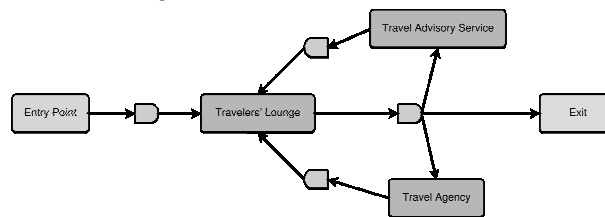

Fig. 1. A simplified specification of the Electronic Institution "itchy feet".

This specification is used to manually generate a floor plan of the e-Tourism environment, see Figure 2. We are currently working on the automation of floor plan generation from Electronic Institutions' specifications. In a straightforward approach, scenes are mapped onto rooms; transitions between scenes are represented as doors limiting the access between scenes. Note that transitions are directed and, hence, two doors are needed to bidirectionally connect adjacent rooms. The maximum number of participants per scene determines the size of each room. This institution imposes all security issues and agents are free to join the environment, interact and engage in conversations.
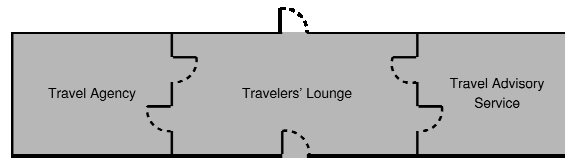
Fig. 2. Corresponding floor plan of "itchy feet".

Based on the floor plan we modelled a 3D virtual world that constitutes the user interface of "itchy feet". This representation allows integrating important aspects of e-Tourism into a single framework. For instance, there is a designated area, the Travel Agency, where travel agents perform business such as selling a holiday package. In this area the actual negotiation process takes place.

The Travel Advisory Service mainly serves information gathering and visualization purposes. Here, information material in a multitude of media is accessible for searching and browsing. The material ranges from highly reputable independent information sources of, say, the *Lonely Planet* type, over advertising brochures of tour operators to sometimes perhaps questionable resources from the Internet. Additionally, participants may travel to destinations that are represented in a three-dimensional way. This may range from *Google Earth* type presentations to virtual tours along, say, a particular slope in a skiing resort.

The Travellers' Lounge provides room for meeting other community members. The embodiment of participants as avatars in the 3D virtual world creates exceptional opportunities to involve people in social interactions just by the fact of their presence. Being aware of someone's position or her/his line of sight allows observing the environmental context of each particular member. The presence of others creates a more open and a less formal environment. We argue that people are more likely to engage in conversations if they perceive the social context as well. 3D virtual worlds stimulate social interactions just by simple visual presence of other visitors. These interactions range from discussions with other participants, exchanging information about destinations, sharing personal travelogues and experiences, to visiting game zones or discussion groups. The goal is to foster the growth of a community feeling among the members of "itchy feet" where a particular person visits not only for travel booking but also for enjoying the interaction with other people.

The exchange of real-life experiences provides up-to-date information which is more complete and more personalized than any available guidebook. This claim is supported by the findings of the study described in [29] which assessed the quality of information available from online travel communities compared to commercial guidebooks. With that in mind and inspired by MMORPGs, we introduce reward mechanisms for competent and helpful members of the community sharing their travel experiences. First, to show appreciation for their active participation and refrain from just lurking in the e-Tourism community and, second, to tie them to the online platform in order to establish long-term customer relationships. As an example, a community member might receive a gift for repeatedly providing informative travelogues. The usefulness of the travelogue is assessed by other participants of the community.

It is important to understand that the purpose of the e-Tourism environment reaches beyond the traditional "just selling trips" business. In fact, the agent stays in contact

with the human during her or his travel - even at a time the human is not actively participating. It remains proactive and collects potentially useful information based on the participant's profile. The agent provides tips and pointers to, e.g., local events in the travel region.

Fig. 3. The entrance to the premises of ``itchy feet''.

The user interface of our 3D e-Tourism environment "itchy feet" is presented in Figures 3 and 4. It is visualized in terms of a 3D representation of a building surrounded by a grassy area. As soon as a community member enters the e-Tourism environment she or he is impersonated as an avatar and positioned somewhere near the premises of "itchy feet". In this particular case, Figure 3 depicts the view of *Elaine*. The appearance of *Elaine's* avatar is guided by the preferences kept in her profile. Moreover, the profile stores information on her travel likings, special interests and maintains a history of interactions she made during previous sessions. *Elaine* interacts with the environment via mouse and keyboard. The mouse is used to change the viewpoint and to trigger events such as opening doors or selecting other participants. If the mouse is pointed towards an avatar, the individual's name as well as her or his interests are displayed in a transparent bubble. In this case, *Elaine* points her mouse on *Francesca* and reveals that she is interested in backpacking, skiing and travelling Asia. The lower left corner of the interface shows the interaction module, i.e. the *Communicator*. This module allows to chat with other participants including agents, to obtain messages regarding the status of the environment, e.g. number of participants, to receive news from the maintainer of the e-Tourism environment, and to send and receive mail. Additionally, the *Communicator* is used to change the appearance of the avatar by clicking on the little figure. This opens the repository of available avatars and accessories such as clothes, bags, headdresses or gestures.

The premises of "itchy feet" is accessed via the main entrance located beneath the "itchy feet" sign, cf. Figure 3. The interior contains different areas including a room for conducting business such as booking trips or auctioning, an area for information gathering and information exchange, a section devoted to gaming as well as a community area, the Travellers' Lounge as shown in Figure 4. Though realized in a rather simple way, it is fully functional and fosters the development of an easy going society. This area enables participants to engage in conversations, talk about experiences they made during their travel, recommend or dissuade particular tourism destinations or just enjoy a relaxed get-together with other "travel addicts". Figure 4 depicts the view of *Sebastien* on the Travellers' Lounge. Besides *Sebastien*, a number of other visitors are present, some engaged in a conversation or about to join, others just waiting and observing the scene. The two video walls in the rear of the room are visual representations of agents. In this scene, the agents deliver information about particular travel destinations based on the requests of participants standing in front of the video walls.

Fig. 4. The Travelers' Lounge of "itchy feet".

5   Conclusion

Tourism has illustrated how the Internet can change the structure of an entire industry and, in the process, create new business opportunities. The development of more specialized services and further consumer integration will lead to smart marketplaces integrating all stakeholders. However, current e-Tourism applications are dominated by rather conservative approaches in user-interface design. Considering the current success of Massively Multi-User Online Role-Playing Games on the one hand, and the growing market share of tourism products being bought online on the other hand, the

combination of entertainment and business has the potential of creating enormous synergies for e-Tourism.

Therefore, we argue that appealing visualization of tourism products, the consulting role of travel agents, the social interaction and information exchange between travellers, as well as the information richness of the Internet are the key features for successful e-Business in tourism. With "itchy feet" we are developing a system that embraces all of these diverse issues. This e-Tourism environment follows a community-driven approach to foster a lively society of travellers who exchange travel experiences, recommend tourism destinations or just listen to catch some interesting gossip. Moreover, business transactions such as booking a trip or getting advice from human travel agents are constituent parts of this environment. All this happens in an integrated, game-like e-Business application where each community member is impersonated as avatar. We applied 3D Electronic Institutions, a framework developed and employed in the area of multi-agent systems, to the tourism domain. The system interface is realized by means of a 3D game engine that provides 3D visualization and enables humans to interact with the environment. We have showcased first visual impressions of "itchy feet". This new environment opens a playground for exciting research to examine the collaboration in heterogeneous societies comprising both humans and agents and investigate their relationship in e-Tourism.

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