

Bon Voyage: Social Travel Planning in the Enterprise

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ABSTRACT

A proliferation of travel-related web sites enable people to share their travel plans, review hotels, offer advice, and more. In this paper we study social travel planning in the enterprise. While business travelers and leisure travelers have different preferences and needs, employees may benefit from sharing information and travel plans within the enterprise. We present a study collecting the requirements for social travel from employees, detail the design principles of a social travel application in the enterprise, and present Voyage, the outcome. We evaluated Voyage based on qualitative and quantitative data and discuss the results using four perspectives: collaborative activities, social information impact, usage patterns, and sharing behavior. Employees expressed their growing satisfaction from the social information contributed by fellow employees. Moreover, we observed that Voyage shortens the reservation time, thus saving costs for the enterprise.

Author Keywords

Business travel, social activity.

ACM Classification Keywords

H.5.3. Information interfaces and presentation: *Computer-supported cooperative work*.

General Terms

Human Factors; Experimentation; Measurement.

INTRODUCTION

Online social travel sites play a valuable role in helping people plan and book their trips. These sites typically provide the most relevant information about places people can visit, transportation options, and services available. This information is accompanied by social information such as reviews and ratings.

Studies report that 80% of leisure travelers are influenced by of consumer-generated media such as videos, reviews, and blogs [18]. Moreover, the popularity of online social travel sites becomes obvious when looking at the flow of online travel traffic [6]. In online travel sites such as

TripAdvisor, Hotels.com, and Yelp, some people share their opinions and experiences about places they visit, hotels they stay in, and services they use. Recently, people have also begun sharing their itinerary details with a select list of friends through services such as TripIt and Dopplr.

Shared social data provides travelers with a variety of benefits, such as feeling actively involved in and satisfied with the trip planning process, more concrete expectations, and greater confidence in the decisions they make [7]. Further, travel-related content contributions have become an important information source for travelers and the majority trust this content [8]. In online hotel bookings, for example, the most important influencing factors are recommendations of friends and online reviews [3]. In addition, travel recommendation systems tend to accelerate the decision-making process [2].

Although social data has proven to be beneficial, findings [8] show that only a small number of travelers engage in content contribution and there is a difficulty in increasing the number of people willing to share information on the web. This is explained, among others, by the lack of a need to post or even the negative effect it might have [14].

People are willing to share more information within the enterprise than on a public site because they are less concerned about the ramifications of sharing personal identifying information [4]. Employees are open to meeting each other on a social networking site for both personal and professional reasons, perhaps because of existing common ground. Likewise, in a study on a social bookmarking service, it was found that in an enterprise there is a willingness to share informational resources for the benefit of the organization [11]. These findings are expected for business travel as well, where employees would be more willing to share their travel plans inside the organization. They would also feel more accountable for the reviews they are providing since their identity is known and they are more likely to trust a recommendation of a fellow worker than of a stranger.

Enterprise (business) travel and leisure travel differ in many aspects [16, 17], including control over the destination, co-travelers, lead time (the time from reservation to trip start), and more. In addition, they have different preferences in services they use in various categories such as planning, reservations, safety and health. Business travelers focus less on the leisure aspect of the trip. For example, one of the

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most important requirements of a business traveler from a hotel room is the internet connectivity, which might be less important for a leisure traveler. In another example, a business traveler on a tight-schedule might be less interested in leisure activities in the city and more interested in the nearest shop where he can quickly buy presents for his family.

Several studies have found [1, 19] that enterprise travel applications are valuable for the enterprise as a whole. The applications reduce the time spent searching for travel information, reduce the time of discussion with an agent, and also lower travel costs. Providing social capabilities as part of the enterprise travel application is expected to lower travel costs further, as employees are provided with the opportunity to share travel reservations and even travel less, since more business meetings on the same trip may be facilitated due to social awareness. These business meetings can lead to new business opportunities which are one of the goals of the enterprise.

The apparent success of social travel web sites raises the question of whether large enterprises and their employees would also benefit from a social travel application. The expected benefits are both for the employees and for the enterprise. Q1: Would employees feel comfortable sharing their travel plans in the enterprise since they feel less concerned about privacy issues? Q2: How involved would they be in coordinating plans? Q3: Will social information influence them when making a reservation? Q4: How often would they share a taxi ride to save costs? Q5: Would awareness of travel plans from other employees facilitate ad-hoc meetings and reduce travel? Q6: Would it also contribute to the creation of new business opportunities, for example, by learning that a potential customer is going to be at a travel destination?

In this work, we try to answer these questions. We asked employees about the social features they would benefit from when planning a trip using an enterprise travel application. We experiment with Voyage, an enterprise social travel application that is deployed in a big global enterprise. Voyage is based on the Web 2.0 paradigm and is built as a social layer on top of an existing enterprise travel application. We explore potentially valuable social features in an enterprise travel application and its usage patterns.

The contribution of this study is twofold. First, it highlights how including social features as part of enterprise travel can benefit both employees and the organization. Second, based on a thorough analysis of broad data, it reveals patterns for how people use social travel information.

This paper is organized as follows. First we describe a field study aimed at understanding the benefits employees foresee from having a social travel application in the organization. Then we describe the main design principles that guided the implementation of Voyage. We describe the primary features of Voyage and discuss the results of a field study. We conclude with a summary and future work.

SOCIAL TRAVEL NEEDS IN THE ENTERPRISE

To understand the social needs of employees from an enterprise travel application, we collected data from two sources. (1) We conducted qualitative interviews with ten employees, asking which methods and tools they use for travel planning, the issues they encounter, and capabilities they are missing. (2) A user survey was sent to frequent travelers, querying their willingness to share their travel plans and the benefits they envisioned in knowing about others' past reservations and future plans (1431 employees answered this survey). We collected data from employees in Asia, Europe, the Middle East, and North America.

We divide the results into three facets of social capabilities: awareness, sharing, and collaboration.

Awareness

Employees see value in knowing what other employees selected in the past. Of those surveyed, 81% indicated that it is useful to know at which hotel other people from the enterprise usually stay; 83% look for employees they know who stayed at a hotel they are considering; and 69% find it useful to know who recently visited your travel destination.

Many interviewees also indicated that they would like to have a better way to obtain all the relevant information they need to know while preparing for travel. They complained that they need to collect this information from many different sources such as maps for directions, location of offices and the office support items (printers, floor plans, and conference room reservations), weather forecasts, and daily meal allowances.

When circumstances change, employees would want the application to recommend what they should do. One employee who ran into a flight delay scenario suggested: "*If I had known in advance it was delayed, I might have waited elsewhere or taken a train. I would use that time to meet/talk with other employees*".

Sharing

Employees mentioned that they often use external internet web sites to look for hotel reviews and ratings since the travel reservation application used in the enterprise does not contain user reviews. Our survey indicates that employees value reviews and ratings of other employees. Of those surveyed, 75% stated that it can be very useful for them. As one person noted, "*I should be able to see other company traveler's reviews of hotels, and should be able to add reviews concerning specific features of the hotel. For example, how to access their Wi-Fi, specific directions to/from the company office that reflect traffic reality, and comments on really great (or bad) staff*".

From the interviews, we learned that employees are willing to add reviews for the benefit of others and asked to receive an email reminding them to do so.

Employees also appreciate the recommendations of local employees: "*Wouldn't it be nice to know what the locals are*".

saying if you were travelling to Cambridge?" They are also willing to contribute such data on their home location: "A place for local people to give local recommendations".

From the survey it is evident that employees are willing to share their travel plans with different groups of employees in 95% of the cases. Table 1 depicts the willingness of employees to share their travel information with anyone in the enterprise (Anyone), their social network (SN), specific people (Specific), or not at all (No one). As can be seen, there are differences in willingness to share future planned trips versus past trips.

With Share	Anyone	SN	Specific	No one
Future plans				
Flight	32%	35%	28%	5%
Hotel	34%	39%	24%	4%
City	29%	37%	28%	6%
Past travels				
Flight	45%	34%	18%	3%
Hotel	48%	37%	13%	3%
City	47%	35%	14%	3%

Table 1: Sharing travel plans

As for sharing resources e.g., car rental, 35% indicated they would share with anyone in the enterprise; 45% would share only with known people; and the other 20% are not willing to share at all. One of the interviewees noted: "I don't want to sit next to another co-worker on a plane. But I don't mind sharing rides to and from the airport".

When asked about the importance of controlling the sharing defaults in the system, 16% responded that it is critical for them, 45% indicated it is important for them, 31% said it is slightly important for them, and 8% said they don't care.

Collaboration

Both the interviews and the survey indicate that employees have a need to coordinate their trip plans with others (30% of them indicated so in the survey). Moreover, 35% find it a difficult task. One of the interviewees noted: "Coordination is the trickiest thing". Coordination is done using diverse tools, such as email, phone, instant messaging, and face-to-face conversations. All these tools are separate from the travel reservation application that is used in the company. Employees would like better systems for coordination that would ease the task of reserving the same flight and hotel if traveling together, sharing rides, and meeting after hours: "I should be able to share my specific travel plans with any other employee that I select; that would really help when planning group trips, since then my teammates would see when I'm flying, so we can share ground transport".

When it comes to coordinating travel plans, 70% of employees stated that it is beneficial to know what flight a colleague is going to take, and 70% want to know who else

is attending a meeting/conference/event. On average, 70% of employees find this type of information very useful, while only 2% of employees indicated it is not useful at all. These benefits were raised by employees: "It's useful to have rough itineraries of when people are arriving", and "It's good to take the same flights so we can chat in the terminal". Employees also see value in coordinating while traveling: "Would like to know who else is currently traveling to location xyz. Set status message as 'Looking for someone with whom to eat dinner'".

DESIGN PRINCIPLES

Prior to the development of Voyage, employees used an enterprise travel application (such as Expedia or Orbitz), deployed worldwide that did not include any social features. When designing Voyage, we took the requirements from the previous sections into account so we could provide these social capabilities to the employees. During this process we were confronted with various design decisions, several of which are described below.

Voyage Position

One of the first design decisions we had to make was how Voyage would relate to the existing enterprise travel application. We inspected the following options:

1. Develop Voyage as a separate application, providing social travel features, in such a way that employees can search Voyage for reviews, learn from past travelers, and make decisions. Once settled with their selections, they could use the enterprise travel application to make the actual reservations and purchase.
2. Develop Voyage as a separate application (as in option 1) with integration points to enable exporting/importing a trip itinerary from one application to another and ease the travel reservation process.
3. Tightly integrate Voyage with the enterprise travel application, providing the social features as part of the travel reservation process.

We chose the last option as it seemed optimal for our users, although it was the most complex for implementation. This option did not require the users to learn a new application. The travel reservation process they were familiar with would remain the same, and they would get the benefits from the social features throughout the travel reservation process. The drawback of this approach was that users who were used to the flow of the enterprise travel application might not pay attention to the new social features.

Privacy Controls

Before we introduced social features to the enterprise travel application, each employee would use the application solely for planning her travel, with the travel details visible only to herself. They could have shared travel plans using email or any other means of communication, but could not do so through the travel reservation application itself. Since we were designing a social travel application, we wanted to

facilitate the sharing of travel plans through the application. We decided to introduce three levels of privacy to trips: Private, Public, and Confidants.

The 'Private' level allows employees to keep their plans private when confidentiality is required (e.g. when an executive is traveling to a new customer). The 'Public' level enables employees to share their travel plans with anyone in the enterprise.

The 'Confidants' level is meant for employees who do not feel comfortable sharing their travel plans with anyone in the enterprise. It provides a level of sharing that falls somewhere between private and public. We looked at how other social applications share information. Many of them provide a symmetric “friending” mechanism: users can invite others to be their friends. A friend request is sent to the invitee and upon acceptance, the friending relation is formed. In addition, some applications (e.g., Facebook, see <http://www.facebook.com>) let users arrange friends into different groups and define privacy controls separately for each group. We decided not to follow the Facebook paradigm for the following reasons:

1. We wanted to relieve users from the need to maintain yet another list of friends, this one only for travel.
2. The relation that sharing travel plans imposes in the enterprise context is not symmetric. For example, an employee might want to share his travel plans with a manager, but not vice versa.
3. We believe that there is no fixed group of employees with whom someone wants to share all travel plans, as the purpose of the trip might vary, and the group of people that needs to be aware of it might vary as well.

In keeping with the above, the 'Confidants' level enables users to define the list of people they would like to share their travel plans with on a trip-by-trip basis. To ease this process, the application suggests a list of people with whom to share. This list is based on the user's enterprise social network (calculated by SONAR [9]) and the list of Confidants from past travels. The 'Confidants' relation is asymmetric. The people who are declared as Confidants of a trip can look into its details but not the other way round.

As for reviews entered by employees, we decided that they would be declared public, since we did not see any reason someone would post a review of a hotel, for example, if not for the benefit of all.

Trip Coordination/Conversation

One of the requirements raised by users was the ability to coordinate travel plans. It was clear that we needed to support some place where people could discuss/exchange travel plans. We debated where to best position the conversation place and who should be allowed to participate in it. We decided to attach the conversations to trips. This decision was reinforced by the special asymmetric 'Confidants' relation we defined for trips, which

enables only Confidants of this trip to see the travel plans. We used a commenting mechanism to facilitate the conversation. The trip owner and its Confidants are allowed to participate in the conversation by adding comments on a trip and reading comments added to the trip by others. Trip comments inherit the privacy level of the trip itself. If the trip is declared private, only the trip owner can place comments on it and they are visible only to her. This can be used, for example, for personal note taking. If the trip is declared public, its comments are visible to all employees and anyone can add comments. For a 'Confidants' trip, the comments are visible to the trip owner and the trip's confidants, and only they can add comments.

Alerting and Discovery

To encourage ongoing use of the application, and inspire users to add reviews and share their travel plans, it was important to consider mechanisms that notify users of relevant activity in the application. Various notification mechanisms have been shown to contribute significantly to sustaining online interaction in other collaboration applications [12]. We therefore decided to use alerts to notify users of relevant activities in the application. These may include: being added as a confidant to a trip, a new comment added to the user's trip, and more. In addition we use email notifications to encourage users to add reviews of their recent trips for the benefit of others, a few days after the employee returns from a trip.

Serendipity

Support for serendipity was one of our design goals. We perceived it as one of the important aspects of making the travel reservation process more social, especially since meeting with relevant (possibly unfamiliar) people is one of the goals of business travel. Serendipity can raise the awareness of other employees who may not be familiar with each other and helps establish communication. In our opinion, serendipity for business travel is different from serendipity for leisure travel. Leisure travelers care about different types of serendipity, for example, that a festival is taking place during their visit. Business travelers care more about the business context of serendipity.

Hence, we tried to identify places in the application and during the travel reservation process where it would be beneficial to show other people traveling to the same place at the same time. This would facilitate meetings and discussions that were not otherwise planned.

Extensibility

We see Voyage, and its social data, as beneficial to other travel-related applications in the organization. For example, the enterprise expenses reporting system could benefit from the reviews provided. This required enabling capabilities to be exploited programmatically through REST APIs [5]. These capabilities include, for example, the ability to obtain a list of reviews for a travel item, show a list of imminent trips of a user, get useful country information, and more.

Business Considerations

Along with new social features for Voyage, the business aspects that interest the enterprise should also be taken into account, such as enhancing collaboration among employees, promoting new business opportunities and saving costs. These interests are part of the design principles discussed above (coordination, serendipity, sharing) and thus to be also addressed in Voyage.

VOYAGE – TRAVEL MEETS SOCIAL

Voyage extends the enterprise travel reservation application and makes the egocentric travel reservation process more social. The original enterprise travel application supports a travel reservation process similar to common web-based travel reservation applications. It already includes the enterprise policies, such as the list of approved hotels and preferred airlines. The application enables users to search for flights, hotels and car rentals, explore the results, make selections and continue to purchase. Voyage introduces new social features which are divided into the three facets of social capabilities: awareness, sharing, and collaboration. Although similar features are already available in travel applications on the web, we developed these features in the context of the enterprise taking into account their different goals. Table 2 highlights the difference in the context between social travel facets in the enterprise and social travel on the web. A thorough description is provided throughout the following sections.

Context Facet	Travel in the enterprise	Travel on the web
Awareness	Business awareness	Social awareness
Sharing	Business alignment	Socializing
Collaboration	Business activities	General purpose

Table 2: Enterprise vs. web comparison of social facets

Awareness

Features belonging to this facet enhance awareness to business travel, enabling employees to ask for business tips (who should I meet in the location I am traveling to, what meeting rooms are available), coordinate business meetings, enhance business collaboration and lead to new business opportunities. In addition, the collective knowledge of where people are traveling can be used to negotiate better rates for flights, hotel reservations, and car rentals, thus saving costs for the enterprise. Similar features on travel web sites are mostly meant for social awareness, enabling users to get local tips and coordinate social activities.

Personalized Welcome Page

The original welcome page contained general information such as announcements about changes in the application and enterprise policies, quick links to other features of the application, or links to external travel-related applications that might be useful. With Voyage, we changed this page to be more personalized. This page presents users with their

list of upcoming trips, a list of recent trips, and a list of other people's upcoming trips. When collecting the list of other people's trips, Voyage searches for people that the user is likely to know. This list includes confidants of past trips, people from the enterprise social network, and people who shared their trip plans with the user. General details of each trip are shown, including its title, dates, and destinations. Hovering over a trip name opens a popup with a more detailed view of the itinerary. A selection of relevant reviews is also shown. These reviews are related to the user's upcoming trips, such as a review of a hotel with a future reservation. Figure 1 shows a segment of the welcome page, where the user's upcoming trips and the trips of others are shown.

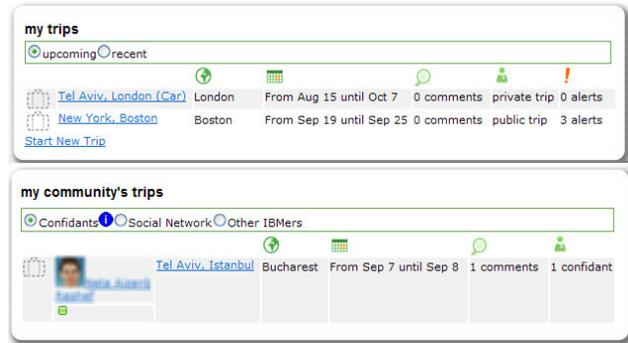


Figure 1: Welcome page

Travel Information in One Place

Voyage introduces the 'places' page where users can find all the travel-related information relevant for a specific city/country in one place. The information is gathered from publicly available sources (such as weather sites and sites providing electrical outlet information) and enterprise-specific sources (such as a meal limit DB or a list of allowed hotels). This frees users from having to search around the Internet and company intranet to collect it. Some of this information is presented in Figure 2(a). Information about other employees who recently traveled to this city or plan to travel there soon is depicted in Figure 2(b).

Learn from Past Travels

During the reservation process, users are presented with different options regarding hotels, flights, and other travel items. To indicate the popularity of the different choices Voyage aggregates information from past reservations of employees and presents statistical measures, such as: the percentage of people renting a car in a specific city, the most frequently reserved hotel, or the flight route usually taken when traveling from one place to another. Statistical measures were also used to help users in an online travel booking service [15]. The statistical measures are mainly shown on result pages. For example, after a user searches for a flight reservation, the search results are augmented with statistical measures of information such as the percentage of employees who flew the same route with the same air carrier in the past. Figure 3 shows one hotel from

the outcome of a hotel search within a specific period of time. Along with general hotel details such as name, address, and price, section (a) includes a cue for the percentage of reservations made for this hotel in the past out of all hotel reservations in the city



Figure 2. People traveling to a location



Figure 3. Hotel options augmented with social cues

People Page

Similar to other social applications that contain a 'Home' page showing general information about the user and her latest activity, Voyage includes a 'people' page. The 'people' page shows the latest user activities, such as upcoming trips, recent reviews added by the user and her list of confidants. This page also provides information on other employees. A user can enter the name of another employee and see his recent activity (depending on privacy controls).

Sharing

Features belonging to this facet enable sharing of business travel information with others for better business awareness. Sharing reviews and ratings have impact on both the individual employee and the enterprise as a whole. For the employee, these reviews are business oriented and hence more aligned with the business traveler preferences than those that are found on external sites (e.g. the quality of Internet access services). For the enterprise, aggregating reviews and ratings provided by employees can be used for negotiating for better quality and rates. This aspect is less relevant for travel sites on the web.

Share Feedback

Users can provide reviews and ratings and see information entered by others for any travel-related item in their itinerary such as hotels, flights, airlines, car agencies, airports, and destinations. This capability is provided as part of the search result pages, and the trip itinerary page (e.g., cart). Figure 3(b) shows an example of the reviews and average rating (in a red circle) for a hotel.

Share Travel Plans

Users can share their trips and select the sharing level for each trip. They can set the privacy level of a trip when they are in the last stage of purchasing it. Users can also define a default privacy level to be used for all of their travel plans, without the need to reset it for every trip. Once the trip is purchased, the user can add confidants on the trip details page and change its privacy level. Figure 4 shows one trip itinerary and the people with whom it is shared.



Figure 4. Sharing travel plans

Collaboration

By raising the awareness of other employees' travels and the ability to share travel plans, Voyage encourages communication. In addition, Voyage provides a trip commenting mechanism to facilitate conversation and enable coordination. This feature can save immediate costs (e.g. when used to share transportation) and can facilitate collaboration thus strengthen existing and lead to new business opportunities. On general travel web sites, such a feature is usually used for social coordination.

EVALUATING VOYAGE

In this section, we describe a field study we performed to better understand how enterprise employees are using Voyage, how much they are using the new social features as part of the travel reservation process, what features they value most, and to what extent they are willing to share their travel plans.

Research Setting

We conducted our research in a large distributed organization, collecting data from employees in Asia, Europe, the Middle East, and North America. Voyage has been deployed as a beta version since February, 2010. We used two methods to gather data about Voyage usage to increase the findings' trustworthiness: (1) After Voyage was deployed and employees started to use it for their travel planning, we conducted a survey asking them about the actions they took while planning and the usefulness of the new social features. Of 290 employees who made travel plans through Voyage, 100 answered the survey; (2) We inspected Voyage's logs to determine the actions users took and decisions made throughout the reservation process. Included in the log files are user actions, specific parameters for each action, the user name, and a time and date stamp. The user activity analysis presented here was based on log files covering a 14 month period from February 2010 to March, 2011. During this period, 2500 individuals accessed Voyage, of whom 12% purchased travel components using the tool. Some 700 employees visited Voyage more than once.

The analysis combines qualitative and quantitative results, which involve comparison of triangulated data sources and thick narrative to strengthen each finding.

Result Analysis

We divide the results into four aspects. The first aspect is social actions usage, which reports actions taken by users that involve social activity. The second aspect is the social information impact, which analyses how the social information shown in Voyage impacts decisions taken by employees during the travel reservation process. We list interesting usage patterns as the third aspect. The fourth aspect, the sharing behavior, is of particular interest, since the success of social applications requires a “critical mass” of user participation to provide value, ensure sustainable contribution levels, and encourage vibrant interaction.

Social Actions Usage

Inspecting Voyage's logs, we found that most people used the social feature to see reviews. Indeed, this was found [3] to be the most influential factor for people making travel reservations. The second most used social feature was the addition of confidants to a trip. When we inspected how confidants are added, we saw that most people added confidants from the list Voyage suggested and only a few added confidants manually by typing in names. This finding confirmed our decision to offer users a default list of people from which to select their confidants. Moreover, it confirmed that the list of people suggested was adequate, freeing them, in most situations, from adding confidants manually. As expected, users added confidants to a trip is primarily after trip purchase.

We also noticed that most users examined destination information and read available reviews (via the 'places' page) before making the purchase. This finding is somewhat surprising, since we assumed the 'places' page would become relevant closer to the trip. We estimated that people would want to be updated with the weather, currency exchange rates and latest medical alerts a few days before the trip. This tells us that the 'places' page has the potential to influence users' behavior before they make the reservation, for example by increasing awareness to reviews, ratings, and others' reservations.

Looking at how the 'people' page was used, we were surprised to see that employees mostly viewed other people pages and trip details after they had completed their own trip purchase. This might indicate that 'people' pages did not influence reservation selections still the exposure to others' plans could have been used to enhance communication.

We also examined social actions that involve another person, specifically the following actions: (1) Add a confidant to a trip; (2) Invite someone to use Voyage; (3) View the 'people' page; (4) Explore trip itinerary.

We set out to explore whether the social actions (actions 1-4) imply anything about the nature of the relationships

between the people involved. To obtain evidence of these relationships, we used SONAR [10]. SONAR can provide evidence for relationships between two individuals based on different enterprise social media applications. It distinguishes between familiarity evidence items, such as 'they are connected on a social network site' or 'both co-authored a wiki page', and similarity evidence items, such as 'both commented on the same blog post' or 'both used the same tag'. We compared the average number of evidence items for people with whom actions 1 or 2 were performed (overall 309) versus people with whom actions 3 or 4 were performed (overall 174).

When comparing the familiarity relationships, we found that actions 1 and 2 were performed with people who were generally more familiar to the user. On average, there were 3.77 evidence items indicating familiarity for actions 1 and 2, compared to 3.3 for actions 3 and 4. It is indeed natural that users would share travel plans with people they know better, and inform them about a new application they used and liked.

For similarity, we observed the reverse effect. On average, each person with whom actions 1 and 2 were performed had 2.68 evidence items indicating similarity with the user compared to an average of 3.57 evidence items for actions 3 and 4. Both viewing someone else's page and exploring one's itinerary indicate interest in another person's travel plans. These results suggest that employees value the information about other people plans even if these people are not directly known to them. It might also imply that people with similar interests as reflected in enterprise social media activity also share similar travel preferences.

We further investigated the usage of social actions in an enterprise context by referring to the organizational hierarchy and comparing actions of managers to regular employees. Out of the 578 users performing social actions, 151 are managers (26%). Table 3 presents the percentage of actions performed among: two managers (M-M), by a manager to a regular employee (M-E), by an employee to a manager (E-M) and among regular employees (E-E).

Action	M-M	M-E	E-M	E-E
Add confidant to trip	13	12.5	13.5	61
Invite to use Voyage	5.4	3.6	20	70
View 'people' page	8.4	9.6	16.7	65.3

Table 3: Social actions across managers and employees

We observed that a natural social network has evolved, since managers and regular employees add confidants proportionally to their distribution in the sample (25.5% vs. 74.5%). We present two trends that emerge from the data, one for employees and one for managers:

- Employees tend to invite others to join Voyage much more than managers do, and invite managers or

employees proportionally to their distribution in the sample (20% vs. 70%). This finding indicates that regular employees play a key role in early diffusion of the tool within the organization.

- Managers seem to watch the travel details of regular employees more often than watching those of other managers. We estimate that in time the trend will become more concrete since managers will use Voyage as a travel management tool to see whether their employees comply with enterprise policies and set examples for others by publishing their own itinerary.

Social Information Impact

In the survey we asked users how useful different pieces of information were for them in making their reservation decisions. From the survey results we learned that users generally find the social information shown on the search result pages to be beneficial (significantly more useful than not useful using One-Way ANOVA $p < 0.01$, $df=1$). This information includes, for each result (e.g., hotel, flight), the percentage of employees who had the same reservation in the past, other people having the same reservation at the time period searched, and any reviews and ratings that are relevant for this reservation. Figure 5 depicts the results for the usefulness of these social features for hotels. It is clear that for all information types the values of usefulness are greater than their counter values.

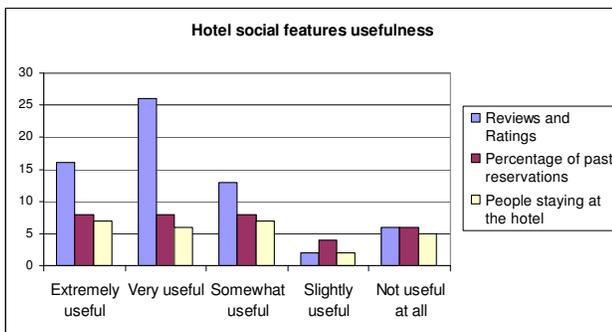


Figure 5. Hotel social features

Looking more deeply into the results, we found that people mostly value reviews and ratings (significantly, using One-Way ANOVA, $p < 0.05$, $df=1$). This aligns with the finding from the previous section of looking into reviews being the most used social action. In addition, for flights and car rentals, people found the information about other people having the same reservation as less useful. This finding is demonstrated in Figure 6. This result for flights aligns well with the observation we got from the interviews that some employees do not feel comfortable sitting next to a colleague during the flight. As for car rental, employees may be less willing to share car rentals with others (20% are not willing to share with anyone).

From the survey we learned that many of the people did not notice the social information (on average 35%). This can result from two reasons: first, the social cues are not

prominent enough, and second, the social data is still sparse during the ramp-up period of the system.

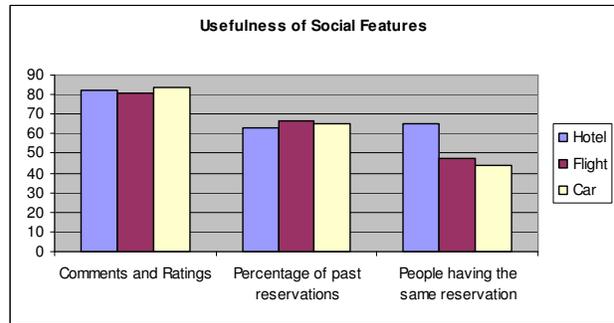


Figure 6. Usefulness of social features

We examined our findings over time, aiming to inspect the evolution of the application's adaptation in the enterprise. Although we cannot say that we crossed the chasm, we found that the number of users is continuously increasing and the user satisfaction is improving. Figure 7 presents the evolution of the survey answers for hotel reviews and ratings; the frequency of extremely useful and very useful answers rises over time. Similar phenomena were observed for other social features as well. This implies that having more social data in the application increases its usefulness.

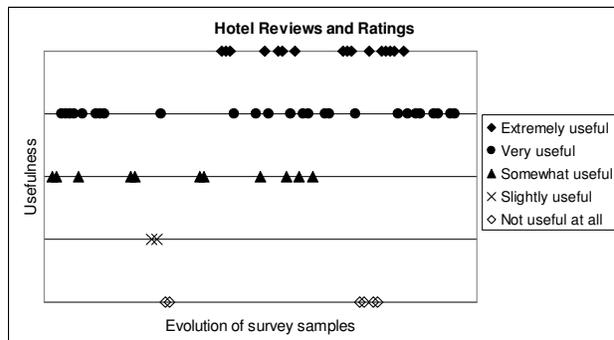


Figure 7. Usefulness over time

Inspecting the reservations made by Voyage users in practice, we found that 76% of the users selected the most popular air carrier in the route they were flying. For hotels, 36% of the reservations were made for the most popular hotel. The difference compared to air carrier can be explained by the wider variety of hotels and also by the fact that the enterprise offers a list of preferred hotels, from which users can choose. Yet, numbers for both hotels and flights are rather high, indicating that many users tend to follow the most popular. As for user input, 37% of the reserved hotels had reviews and ratings. These results indicate that employees found the social information to be useful, and actually used it during the reservation process.

Of the respondents, 78% answered that it was useful for them to see information about other employees traveling to

the same destination. Learning about past/future travels of other employees was useful for 40% of them.

As for relieving the users from the need to collect relevant information from many sources, 78% found it useful to see this information in the 'places' page. In addition, 54% agreed that Voyage saved them from having to go to external sites to look for this information.

Usage Patterns

Out of the many possible usage patterns in Voyage, we inspected the existence of the following social patterns. We believe these patterns indicate that Voyage makes the travel reservation process more informative and secure, and enables users to coordinate and communicate. We divided the patterns into categories according to their role in the travel reservation process.

Travel Decisions. In this category we identified patterns that include a travel decision such as which hotel to reserve. We distinguish between social-based travel decisions, where the decision was made based on general social information (the percentage of employees who stayed in a specific hotel in the past), and enterprise-based travel decisions, where the decision was made based on information of a related employee (e.g., a hotel that was reserved by your manager). We believe that these two types of information influence the employee in different ways.

Patterns of social-based travel decisions: 1) before making a reservation, say for a hotel, explore any or all of the general social information about this hotel, such as: the percentage of employees who stayed there in the past, the hotel rating, the reviews on the hotel, etc. 2) On the welcome page, explore relevant reviews for your upcoming trips and decide whether to change any of the reservations.

Patterns of enterprise-based travel decision: look at someone else's itinerary to decide on your reservations or change a reservation you already have.

Travel Coordination. This category includes patterns for coordinating travel plans and communicating before the trip. Patterns in this category: 1) On the 'places' page you see someone else that is traveling there at the same time as you. Enter his trip details page to leave a comment. 2) On the hotel results page you see someone else with a reservation for a hotel. You observe that she is currently online. You start a chat with her to discuss travel plans.

Personal Feedback Contribution. This category includes patterns for contributing reviews and ratings for travel-related items. This category could include, for example, the pattern: On the flight results page you see an air carrier you flew with in the past, you add a review to this air carrier.

For all categories of usage patterns, we examined the logs to find user activity sessions that include both a purchase action and social activity in order to identify any of the above patterns. We found that several of the patterns were followed in different ways.

The following is a purchase scenario from the logs, which includes social-based decision making, feedback contribution, and some indication for intended travel coordination: The user started at the welcome page, moved to search for a flight, and made a flight selection. Then the user searched for a hotel and looked at ratings and reviews, decided to add a review for another hotel and made a hotel selection. He then purchased the trip. After that he looked at the trip itinerary and added several confidants. We believe this was done either for awareness or for coordination.

We did not find a strong indication of people using the trip commenting mechanism for trip coordination. The next scenario does indicate that such a trial was made, but the conversation was not established: The user started at the welcome page and checked the definition of confidants and invited several people to join Voyage. Then moved to look at the general section of the page, where enterprise travel information is presented. He then searched for a hotel and made a selection, then moved to search for a flight and made a reservation. Then the user purchased the trip. After purchase completion he looked at the trip itinerary page, added several confidants and added his plans as a comment.

Sharing Behavior

Few employees (1.5%) added reviews and these were mainly for hotels (79%). The ratio of people who read reviews to people who contributed them is still less than the expected 80/20 rule [13]. This could result from Voyage not being the natural place for adding reviews, as people are less likely to add reviews when they are planning their trip, and more likely to do so during or after the trip. Using Voyage REST APIs we plan to integrate the reviewing capability into both a mobile client and the expense-reporting system.

Looking at the privacy settings of travel reservations made in Voyage, we found that employees were less open to sharing than indicated in the survey. While more employees defined their trip as public than declared in the survey (44% vs. 34%), a much higher percentage than expected from the survey defined their trip as private (47% vs. 5%). This behavior was observed both for managers and regular employees. It seems that in theory employees tend to be more open than when they are confronted with the actual travel reservation and must make a real decision. While in theory users want to control who they share their trip with, in practice they tend to opt for the quickest options (private or public), which do not require further input. Nevertheless, employees were willing to expose more about their travel details after they returned from a trip. When queried, 91% of Voyage users who defined their actual travel plans as private expressed this willingness.

SUMMARY AND FUTURE WORK

We studied the topic of social travel planning in the enterprise. We found that social travel planning in this context has unique concepts and characteristics compared

to travel on the web. Business considerations are taken into account in all stages of design, development, deployment, and regulations. Although the features are similar to what can be found in travel applications on the web, their meaning and impact are different in the enterprise.

Attempting to answer the questions that we set out to explore, following are the main observations:

Regarding sharing travel plans (Q1): We found out that employees are comfortable sharing their travel plans with others: the second most used social action was sharing travel plans with a confidant. In addition, 44% of employees shared their travel plans with someone. Most of the employees who did not share their upcoming travel plans agreed to share them after returning from the trip.

With respect to trip coordination (Q2, Q4): We did not find a strong indication of people using the trip commenting mechanism for trip coordination; although we found evidence that a trial was made. Possibly, it was not clear enough who is exposed to these comments and how to facilitate a discussion using this mechanism. However, employees indicated that Voyage shortened the travel reservation time, which represents a significant cost savings factors for an enterprise [1, 19].

As for social information impact (Q3): We found that employees see value in different types of social information provided by others, even if these people are not known to them. They used it throughout their travel reservation process and expressed their improved satisfaction from it. Reservation actions tend to follow the popularity indicator, which is calculated and exposed through Voyage.

Regarding business awareness and new opportunities (Q5, Q6): We observed that employees use travel plans of other people with whom they share similar interests to assist in their trip planning. We believe that in the long term, this can lead to new business relationships, which probably would not have been established without Voyage. Such relationships can contribute to better collaboration, contribute to the overall cohesiveness of the enterprise network and help with career development.

We present three directions for future work:

Tooling connectivity and traceability. A tighter integration with common collaboration tools (such as email and instant messaging) is suggested to better facilitate collaboration and track the continued communication that was initiated among employees.

Feature enhancement. More explicit support is required for group travel as part of the evolution of such an application in the enterprise context. For example, this could be used to conduct a large project meeting or to organize a joint trip to a big event. Group recommendation techniques can be applied to identify the optimal location for a meeting, taking into account budget, distance, and even 'green' considerations.

Business value. It is very difficult to show the value of social activities to the enterprise. In this paper we found hints for potential savings from using Voyage. Hence, we suggest developing a quantitative model that could be used to measure the monetary value of adding social features to enterprise travel.

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