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# Geocollaborative Portals And Trip Planning: Users' Perceptions Of The Success Of The Collaborative Decision Making Processes

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# GEOCOLLABORATIVE PORTALS AND TRIP PLANNING: USERS' PERCEPTIONS OF THE SUCCESS OF THE COLLABORATIVE DECISION MAKING PROCESSES

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## Abstract

As more and more travelers wish to create their personalised trip itineraries, the provision of geographical information and services on travel websites is an unavoidable necessity. The evolution of geoportals, geocollaborative portals and web 2.0 present numerous opportunities and services for making the trip planning process less complex and time consuming, more efficient and more social and collaborative for travelers and their travel companions. This paper aimed at exploring the use and impact of geocollaborative portals on the success of collaborative trip planning processes. To that end, the literature was reviewed for analyzing the functionality of geoportals and geocollaborative portals and demonstrating how these can support and facilitate the collaborative decision making processes for trip planning purposes. A framework for measuring the impacts of geoportals' use on travellers' collaborative decision making processes was developed and tested by collecting primary data through an experimental study based on students' perceptions using Yahoo! Trip Planner for planning a group trip. The paper provides useful practical guidelines for designing the functionality of geoportals and/or geocollaborative portals for trip planning purposes.

**Keywords:** *Geoportals, Trip Planning, Decision Process, Collaborative, Success*

## 1 INTRODUCTION

The increasing adoption of dynamic packages demonstrates the strong preference of a majority of travelers to design and book their personalized tourism packages and itineraries online (Sigala, 2009). However, trip planning can be a very complex and multi-staged process requiring the identification, filtering, evaluation and selection of a massive amount of information (Moutinho, 1987; Fesenmaier & Jeng, 2000), which is very frequently dependent on geographical content and capabilities. Moreover, as trips are usually realized with the companion of others, a trip planning process may also represent a collaborative decision making process involving several persons that may also be located in different places. Consequently, in order to design personalized trips in an efficient and an effective way, trip planning tools should provide travellers with mapping information and services as well as support (geographically distributed) collaborative decision making.

Recognizing the critical role of geographical content and services, more and more travel websites incorporate geoportals into their applications (Sigala & Marinidis, 2009). Geoportals have been identified as distributed Geographic Information Systems (GIS) (Duran et al., 2004; Tait, 2005) that utilize the ubiquity of the Internet for providing distributed users with access to web mapping services. Nowadays, advances in free web map services and web 2.0 have democratized the creation and dissemination of geographical content and services and so, they have further enhanced the functionality and the information richness of geoportals (i.e. the emergence of geocollaborative portals). By using web mapping services, tourists can more quickly, precisely and accurately find all travel information for organizing their itineraries (Ilies & Ilies, 2006). As a result, the trip planning process is transformed from a frustrating (Pan & Fesenmaier, 2006) to a more enjoyable and efficient experience (Pan et al., 2007) that can also be changed from an solitary process to a social collaborative process that supports and fosters the active participation of several (geographically distributed) people. However, although previous studies have heavily investigated the use of geoportals for developing geophysical applications, e-government practices as well as applications related to regional/spatial policy making, planning and development (e.g. Sayar, Pierce & Fox, 2005; Beaumont, Longley, and Maguire, 2005), limited research currently exists regarding the use of geoportals for trip planning purposes (Pan et al., 2007). Specifically,

there is limited knowledge regarding: the travellers' use of geoportals' geographical information and capabilities for supporting their trip planning processes; and the impacts and the results of geoportals' use on the travellers' decision making processes. Current literature on geoportal assessment is also inappropriate for investigating its impacts on travelers' decision making processes, since the majority of previous studies (e.g. Crompvoets et al., 2004) have focused on measuring solely the macro-economic impacts of geoportals on the society (i.e. the economic, social and environmental impacts of geoportal applications).

In this vein, this study has a dual goal. First, it aims to analyze the role and the utilization of geoportals' information and services for enabling travelers to facilitate and enhance their trip planning processes. Secondly, the paper focuses on developing and testing a framework for measuring the impacts of geoportals' use on travellers' decision making processes related to trip planning tasks. To achieve these aims, the paper first discusses the functionality and the evolution of geoportals' information and services by paying particular attention to their web 2.0 enabled functionality. Hence, an emphasis is given on geocollaborative portals, their geocollaboration capabilities and the ways they enable and support collaborative decision making processes for trip planning purposes. As geocollaborative portals represent Group Support Systems (GSS), the paper reviews the literature in the field of GSS in order to develop a framework for measuring the impact of geocollaboration portals on travellers' collaborative trip planning processes. To test the framework, the study carried out an experimental evaluation by gathering primary data from graduate students that were assigned to collaboratively design a trip by using the Yahoo!'s Trip Planner (a web 2.0 enabled geocollaborative tool). Findings from students' evaluation of Yahoo!'s Trip Planner system provide several theoretical and practical implications regarding the functionality and the services of geoportals that are required for designing online service processes enabling travellers to create a personalized trip (either individually or collaboratively). Thus, the paper also contributes to the literature related to the design of user toolkits for creating personalised services.

## **2 GEOPORTALS**

### **2.1 Definition, types, evolution and users' role**

Geoportals represent a key application of distributed GIS services (Tait, 2005; Longley & Batty, 2003) that use web service standards (Sigala & Marinidis, 2009) for integrating and providing user-friendly accessibility to many GI systems from a single virtual system. Technically speaking, a geoportal is essentially a master website, connected to a web server, which contains a database of metadata information about geospatial data and services. A geoportal is implemented using three distributed GIS (Service Oriented Architecture) components (Tait, 2005): a web site presenting the geographic application or portal; web services that publish geographic functionality as a web service; and data management software providing a managed relational environment for both raster and vector geographic content. In this vein, Tait (2005) defined geoportals as websites acting as entry points to web-based geographic content, where such content can be discovered. Maguire & Longley (2005) have also defined geoportals as the '... gateways that organise geographic content and services-capabilities such as directories, search tools, community information, support resources, data and applications'. Being WWW gateways-portals, geoportals provide web environments for a user (or a community of users and information providers) to aggregate and share content and information flows as well as to build consensus (Maguire & Longley, 2005). In other words, geoportals facilitate the storage, sharing, discovery of and access to geospatial resources (that can be either offline or online geospatial content) that are described (and so, searched) by using metadata.

The most typical geographical web service functionalities of geoportals include (Tait, 2005): map rendering; feature streaming; data projection; geographic- and attribute-based queries; address geocoding; gazetteer/place name searches; metadata query and management; network analyses; 3D terrain visualization; and data extraction. Maguire & Longley (2005) further analysed geoportals'

functionality and subdivide them into two groups: catalogue geoportals and application geoportals. Catalogue geoportals are primarily concerned with organizing and managing access to geo-information. Thus, they are consisted of data catalogues, which are systems using metadata for publishing, querying, discovering and offering access to spatial data (Maguire & Longley, 2005). For publishing data, the data providers need to create metadata for describing their data and then, publish them through the catalogue client (either by manual inputs or metadata harvesting). For data discovery, the catalogue services are equipped with tools to query and present metadata records, as users initiate searches for data or services they require. In this conception, most geoportals have a cataloging function, concerned with organising geospatial data and providing access to it. However, in addition to a cataloguing capability, application geoportals provide on-line, dynamic geographic web services that represent capabilities that do not only query metadata records of data services, but they also link directly to the data services themselves. Geographic web services may refer to routing, calculation of geographical distances, geocoding and mapping services. For example, Mapquest provides routing services ([www.mapquest.com](http://www.mapquest.com)) and National Geographic provides mapping services (<http://www.nationalgeographic.com/maps/>).

Traditionally, the development of GIS information and services has been relying with experts. This represents a top-down authoritarian, centrist paradigm that has existed for centuries, in which professional experts produce, dissemination is radial, and amateurs consume (Goodchild, 2007). However, the diffusion of distributed GIS and geoportals have given opportunities to develop community-based participatory mapping development activities (i.e. bottom-up approaches). For example, Aditya (2008) described an application of a geo-community portal whereby a local community could upload and share geo-data in order to participate and assist in collaborative decision making and activities for disaster management. Beaumont et al. (2005) also described numerous other bottom-up approaches for developing geoportal applications in several e-government and e-democracy projects that aimed to increase citizens' involvement in democratic processes and policy decision making activities.

Nowadays, advances in web 2.0 have further expanded and democratized the development of geoportals by offering Internet users the tools to participate in the development and distribution of web mapping services. Moreover, advances in free web map applications including the availability of Application Programming Interfaces (API) from popular web applications (e.g., GoogleMaps, YahooMaps, and Microsoft Live Maps) have opened up more possibilities for involving public users and group communities in participatory mapping. Goodchild (2007) used the term volunteered geographic information (VGI) for describing the users' web 2.0 empowerment to participate in geoportals' development and diffusion and analysed three levels of users' engagement in developing VGI: a) users' involvement in geo-data creation and publication by incorporating (geo)-tags in maps; b) volunteers' geo-content contributions of substantial technical content that require volunteers/users to have some level of expertise in GIS use and the website's software (e.g. in geographic measurement and the website's system for classifying streets); and c) services that allow contributors to make their own comparatively complex geo-information available to others within easy-to-use web 2.0 environments (e.g. Google Earth's API allows any user to create and publish new content, or *mash it up*). Several other publications (e.g. Erle, Gibson & Walsh, 2005; Scharl & Tochtermann, 2007; Sigala & Marinidis, 2009) analyse numerous case studies illustrating how the two features of web 2.0 (i.e. collective intelligence and social networking) foster and support the users' (collaboratively) involvement in the creation, information enrichment and diffusion of geoportals' information and services. Turner (2006) advocated that these web 2.0 implications lead to a new era called neogeography. The increasing size and impact of this neogeography (Turner, 2006) is also reflected in the rise of specialized conferences, e.g. the Where 2.0 conference series ([conferences.oreillynet.com/where](http://conferences.oreillynet.com/where)), and of specialized websites such as, Google Earth Hacks ([www.gearthhacks.com](http://www.gearthhacks.com)).

Overall, it becomes evident that geoportals can be used not only by a single user, but also by a group of users, thereby enabling geocollaboration, i.e. collaboration efforts using geospatial information and

tools (MacEachren, 2001). This has tremendous implications for users when they use geoportals for trip planning and decision making purposes, as trip planning is very frequently a collaborative decision making process involving many travelers that may also be geographically distributed. As geoportals can be accessed and used online, geocollaboration can enable the collaborating actors to decide together by interacting, accessing and exchanging geospatial information, sharing specific and local knowledge, and assessing choices to support actions (MacEachren et al., 2005; Aditya & Kraak, 2009). The following section focuses on analyzing how geoportals as well as their web 2.0 enabled functionality and geocollaboration capabilities can facilitate travelers' (collaborative) decision making process for planning their personalized trips.

## **2.2 Web 2.0 functionality and geocollaboration capabilities of geoportals**

Tait (2005) identified four major functionalities of geoportals namely search, mapping, publishing and administration capabilities. Sigala & Marinidis (2009) expanded these four functionalities into their social dimension in order to incorporate the new web 2.0 enabled geoportals' capabilities that empower users to create, disseminate, share, read and combine (mash-up) geographical content and metadata within social networks. These four web 2.0 enabled functionalities of geoportals have been referred to as follows (Sigala & Marinidis, 2009): *social search* that enables users to search for geo-content based on other users' profiles, geo-tags, personal maps, favourites, reviews, feedback etc.; *social mapping* referring to the dissemination and sharing of maps within social networks; *social publishing* referring to the collaborative creation and publication of a map within a social network and/or amongst a group of users; and *social administration* referring to the collaborative development of new value-added mapping services by combining (mashing-up) and collaboratively administrating multiple geo-information and services. In fact, the web 2.0 enabled evolution of the social (collaborative) functionalities of geoportals are best illustrated by the emergence of geocollaborative portals that are used to support group-work applications related to geographical resources. The development of geocollaborative portals is rooted in the collaborative GIS that are defined as a process of making collaborative use of GIS technology and data amongst group members that can be (Applegate, 1991): at the same place and same time (synchronous & co-located); same place different time (asynchronous & co-located); different place same time (synchronous & distributed); and different place different time (asynchronous & distributed).

## **2.3 The impact of geocollaborative portals on collaborative trip planning and decision making processes**

The literature provides several arguments on how geoportals and geocollaborative portals can significantly enhance the success and the results of a group work. Indeed, geocollaborative portals afford several capabilities for positively influencing the many factors (including the cognitive, organizational work setting as well as the social and cultural factors of group members) affecting the success of group work.

As regards the impact of geoportals on the cognitive and organizational (collaborative) work settings, geocollaborative portals can be used for increasing the visualization of information (by using for examples maps, graphics, and images) related to the group work. Information visualization supports the intelligence, design, and choice phases of a group decision making (Simon 1981), because it increases cognitive resources, reduces the search complexities, eases the pattern determination, and fastens the perceptual inferences (Thomas & Cook, 2005). Research investigating the impact of external representations on groupware effectiveness also confirms the positive influence that information visualization on maps can have on the performance of a group work. External Representations are '... physical symbols (e.g. written symbols, beads of abacuses) or external rules, constraints or relations embedded in physical configurations (e.g. spatial relations of written digits, visual and spatial layouts of diagrams, physical constraints in abacuses etc) (Zhang & Norman, 1994). Larking & Simon (1995) showed

that diagrammatic representations (and so, map based representations) require less search, comprehension and inference than sentential representations. For example, a map showing the itinerary and stops of a trip is processed quicker than a table or a paragraph describing the same information. Zhang & Norman (1994) provided evidence that external representations have a positive effect on group work task performance, because the former provide memory aids, directly perceivable information, structured cognitive behaviour and change the task. Work group members can use geocollaborative portal for visualizing their information, comments and thoughts on a map by using unique map based representations. Geocollaborative portals can also enable team members to integrate and coordinate several external representations (e.g. develop mash-up services) to be referenced during the decision making process. In addition to providing a method for creating and sharing external representations, geocollaborative portals can also address the conceptual barriers that may arise across different users or communities of practice, since different users and groups share different experiences and meanings. Resnick (1991) showed how knowledge management systems for teams can be used for resolving the meanings of ideas and concepts between individuals through shared understanding. Since input to a given externalisation is coming from multiple individuals, reflective conversations occur not only between a member and an artifact, but also between all members. Thus, when a geocollaborative portal enables and supports communication, this will offer a stimulus for divergent thinking similar to the method of collaborative sketching (Shah et al, 2001). As a result, the emerging members' discussions should lead to a more complete creation and understanding of the collective team knowledge. However, discussions can lead to an intense information exchange based on a wide range of views that can in turn create high levels of cognitive complexity. However, when group knowledge is systematically categorized and members share awareness of who knows what, this decreases the cognitive processing capacity in which greater expertise can be achieved as there is less redundancy of effort (Wegner, Erber & Raymond, 1991). The system allowing the creation, share and "pooling" of a group memory through which one member uses the other as memory aids to supplement limited memory is referred to as transactive memory (Mohammed & Dumville, 2001) and it has been found to facilitate groups to accomplish complex (Vandenbosch & Higgings, 1996). In a similar vein, geo(tags) and tag clouds enabling the members of a geocollaborative portal to create, share and search for their generated social intelligence (user-generated content) create a transactive memory capability that in turn supports their collaborative map based tasks. In reviewing the literature, Sigala (2008) also provided evidence of the role of (geo)tags to facilitate and foster collaborative knowledge management group processes, such as collaborative learning, group social networking and knowledge creation and exchanges. Overall, by providing external representations to work groups, collaborators are able to create and share a collective and easily searchable group memory to continually reference during the decision making process.

Geocollaborative portals have also emerged as a good solution for improving group work, because maps can play a crucial role in enhancing the formation, cohesion and collaboration of work groups. MacEachren (2005) identified three roles that maps can play for supporting group work: a) an object of the collaboration; b) a visual depiction to support dialogue; or c) a device to support coordinated activity. Other studies have also provided evidence of these three roles of maps in collaboration environments. Armstrong & Densham (1995) discussed the design of a map to facilitate location selection (i.e. maps as an object of the collaboration), Rinner (2001 and 2006) described the use of geo-referenced discussions on top of a map for facilitating group dialogue in a planning context (i.e. maps as a device to support dialogue). Specifically, Rinner (2006) developed an annotated map that was aimed at providing a medium for several stakeholders involved in spatial planning to share and exchange their arguments. Aditya (2008) described the development of a geocollaborative portal for coordinating a group work by using a map-based portal. Analytically, Aditya (2008) demonstrated how the geocollaborative portal facilitates distributed collaboration by enabling different stakeholders (including analysts, decision makers and local residents) to: a) share their perspectives on the problems, cause, and possible solutions concerning their neighborhood's infrastructure problems on the top of a map; b) facilitate discussions; and c) actively contribute to the decision-making processes related to disaster

mitigation and actions. MacEachren & Brewer (2004) identified the following collaborative tasks involving maps (and graphics) that can assist collaborative work group: collaborative exploration, collaborative confirmation or analysis, collaborative analysis and collaborative presentation. This typology of collaborative tasks can be easily related to the four processes required in group work: generate (idea and options), negotiate, choose, and execute (MacEachren & Brewer, 2004). These are also parallel to the notion of Rinner's (2006) collaborative decision-making phases, who has also added a post-decision group task namely, review (i.e. intelligence, design, choice, and review).

Overall, the aforementioned analysis provides several reasons for justifying the incorporation of geocollaborative portals into trip planning tools. First, maps can play any of the three roles (as advocated by MacEachren, 2005) for supporting and facilitating group decision making related to trip planning purposes. Trip planning requires travellers to gather and assess a huge volume of geographical related information in order to assist them with three types of decisions (Fesenmaier & Jeng, 2000): 1) core decisions including information related to travel budgeting and costs, lodging, length-duration of trip, route-itineraries, primary, travel group; 2) secondary decisions prior to the trip (information related to secondary destinations, activities and attractions); and 3) en route decisions (information regarding stops for different purposes, gifts etc). In order to better answer these three types of questions, travellers can use the social intelligence and social networking functionalities of web 2.0 empowered geoportals for searching, reading, writing and sharing a vast amount of travel information and experiences on the top of a map. Geoportals also allow travellers to store information for future retrieval as well as to upload information after their trip. Hence, geoportals facilitate travellers with their post trip planning decision making as well.

Trip planning is a complex process that very frequently involves multiple collaborators that are limited by spatial (across distance), temporal (across time), conceptual (across different perspectives, knowledge and experiences) and technological barriers. Trip planning is also consisted of the following six stages (Moutinho, 1987), that are comparable to the previously identified group work decision making tasks (e.g. MacEachren & Brewer, 2004) (illustrated in Table 3): problem identification (i.e. generation of ideas and options for traveling), information search, information evaluation (negotiation and assessment), choice (choose, design), book (execute) and post choice (review). In this vein, geocollaborative portals can be regarded as important group collaboration tools for facilitating collaborative trip planning and decision-making processes amongst (geographically and temporarily) distributed users that may have different travel expertise and access to knowledge.

### 3 MEASURING THE SUCCESS OF GEOCOLLABORATIVE PORTALS FOR COLLABORATIVE TRIP PLANNING DECISION MAKING PROCESSES

The previous section debated on the role and impact of geocollaborative portals in facilitating and impacting collaborative group work. However, how can one measure the success of geocollaborative portals on the results of collaborative decision making processes such as collaborative trip planning processes? To achieve that, this sections reviews literature in the field of measuring collaboration success and Group Support System (GSS) effectiveness. The majority of studies (e.g. Reinig, 2003; Duivenvoorde, Kolfshoten, Briggs & Vreede, 2009) have showed that the success of collaboration should be measured with respect to both its outcomes (goal achievement) and the process itself (successful joint effort). Table 1 summarises the success constructs identified by several studies that have done a meta-analysis of studies investigating the measurement of collaboration success in GSS.

Fjermestad & Hiltz (1999 and 2001) 230 studies	McLeod (1992) 13 studies	Baltes et al (2002) 27 studies	Hwang (1998) 28 studies	Dennis & Wixon (2001) 61 studies	Duivenvoorde et al. (2009) A synthesis of meta-analysis studies
Efficiency	Time to	Time to	Speed	Time	Process is

Decision time Time spent in activities	decision	decision			efficient Focus on the goal
Effectiveness Communication Number of comments Idea quality Decision quality Decision confidence Task focus	Decision quality Task focus	Effectiveness	Communication Quality of outcome	Number of ideas Decision quality	Goals/results are achieved Mutual learning There is a bond developed, respect & trust in the group
Satisfaction Participation	Satisfaction Participation	Member satisfaction	Satisfaction Participation	Satisfaction outcome Satisfaction process	Satisfaction outcome Members' support of the outcomes Satisfaction process Fun Participation – commitment Members' committed to the goal & willing to share & compromise Members listen to each other Participants feel their contribution was useful Participants feel free to contribute
Consensus – agreement	Consensus				
Usability of result					

Table 1. Collaboration success constructs in GSS

#### 4 RESEARCH METHODOLOGY

This study aimed at measuring the success of geocollaborative portals in supporting collaborative trip planning processes from a users' perspective. A number of methods are proposed in the literature to evaluate IS, but experimental evaluation is amongst the most powerful method for system evaluation (Dix & Mynatt, 2004). To that end, Yahoo! Trip Planner was selected as a representative geocollaborative portal for online trip planning practices, as it is one of the most widely known and used by the e-travel community, and the following experiment was set up for gathering primary data by the system's users regarding their evaluations of the system's impact on their collaborative trip planning decision making processes. Specifically, groups of students of the researchers were assigned the task to use Yahoo! Trip Planner for co-organizing and co-planning a hypothetical group trip to Athens, Greece. Students took had previously attended two courses on e-tourism and so, they were familiar with e-tourism applications. Overall, 247 students participated in the experiment (37 groups and each group



consisted of 4-7 members) that lasted for 3 months. After this period (irrespective of whether group trips have been finalized or not) all students were asked to fill in the research study's questionnaire measuring their perceptions about the impact of Yahoo! Trip Planner on the success of their collaborative trip planning decision making processes. In order to measure collaboration success, the study's instrument used Duivenvoorde et al.'s (2009) GSS success constructs, as their study has confirmed the validity and reliability of its constructs as well as it has provided evidence of the former's positive impact on members' satisfaction with the GSS supported collaboration process and outcome. Overall, 188 usable questionnaires were collected providing a high response rate of 76,1%, which is mainly attributed to the fact that the use of the system and students' feedback was linked to their course assessment.

#### 4.1 Study's context: Yahoo! Trip Planner geocollaborative portal

Yahoo! Trip Planner represents a platform enabling and supporting knowledge sharing, discussion building, team collaboration and collaborative decision making for trip planning purposes. Users can explore/browse, (co)-create and share their personalized trips on the top of a map, while the whole trip planning tool is enhanced with several other web 2.0 (e.g. tags, customer reviews, discussions, voting etc). The software allows a user to present a trip by two major ways: a) the trip journal consolidating all discussions and comments written about the trip and the elements constituting it, e.g. companies, places of interest, activities in places etc. and b) the trip plan which allow users to see and search every trip based on different criteria such as explore all days or every trip day separate, search per type of trip activity and/or search based on cities included in the trip. Whatever information the user searches and reads about the trip, this information is represented and mapped (geotaged) on the Yahoo! Map of the website. Other users can customize and enhance these maps by adding geotags, feedbacks, reviews, taking part in discussions etc. Later, personalized maps can be shared with all other users, e-mailed to friends and / or keep them accessible only to selected friends that can also further enhance them. In other words, the Yahoo! Trip Planner can be characterized as a web 2.0 geocollaborative portal and a GSS supporting collaborative trip planning processes on the top of a map. Table 2 analyses the web 2.0 functionality of the geocollaborative portal of Yahoo! Trip Planner based on Sigala & Marinidis' (2009) framework.

Functionality	Description
Social search	<p>Users can search – explore trips based on:</p> <ul style="list-style-type: none"> <li>Users' tags describing and categorising personal trips</li> <li>Geo(tags) incorporated by users on an interactive map</li> <li>"Hot cities" and "Hot in this week" representing places included and used by the majority of the users</li> <li>the profile of the users that are creating and sharing their trips online. Profile information include: place where one has already been and where he/she wants to go (showed on an interactive map), photos and trips shared, rating and reviews/feedback provided, future trips planned.</li> <li>the number of popular votes given to trips by other users</li> <li>the number of other users that have copied and customised an existing trip</li> <li>other users' perceptions and votes about the image and appropriateness of a place (e.g. for romantic, sightseeing etc)</li> <li>the theme of the trip (e.g. honeymoon, family, ski, winter) and explore what other trips users have created and shared based on this theme</li> </ul>

Social mapping	<p>User(s) can (co)-create a personalised map and itinerary of his / her trip by:  copying others personalised maps (the number of people that have copied and customised each maps is also given in order to help the user(s)' decision on whether the trip is popular and/or favourite by a travel community)  customising others' maps by adding (geo)tags of places to visit and things to do. In order to identify and select things to add in personalised maps, the user(s) decision is supported by the following collaborative (geographical supported) tools:  read other users' discussions and feedback/reviews about places, companies and activities;  contribute to discussions and start a constructive dialogue with others about these places-activities  check the popularity of its place-activity by: looking at the number of users that have included this place-activity into their trip; the average user rating of the item; by reading others' comments-feedback about this place-activity; as well as calculating the travel distances and driving directions to and from this place to other places.  Viewing the photo-album of items that others have shared online or search for other photos of the item uploaded on Flickr.com  Identify other similar items based on: items belonging on the same category; proximity to other items; their neighbourhood items; their accessibility (getting there); their proximity to other cities; and their popularity as reported (suggested) by other users</p>
Social (collaborative) publishing of special interest maps	<p>Users can create personalized maps and share them with others (by e-mail as well as by making them open to the public users). Later, their friends can further enhance, distribute and customize the personalized maps by adding (geo)tags, comments, ratings-voting, taking part in discussions. All this user activity is plotted on the map, and this representation and map visualization significantly enhances the group decision processes.</p>
Mash-up map enabled services	<p>Mash-up capabilities for enhancing the functionality and information of Yahoo! Trip Planner maps include the following:  Users can enhance the content of (geo)tagged items by including information from the web, photos from material uploaded on flickr.com</p>

Table 2. Yahoo! Trip Planner's web 2.0 enabled geocollaborative functionality

Having analysed the functionality of Yahoo! Trip Planner, Table 3 demonstrates how this geocollaborative tool supports and facilitates assist groups of travelers to effectively and efficiently accomplish the decision making tasks-processes of trip planning. To achieve that, Table 3 uses the tasks of work group as they were identified by the literature (MacEachren & Brewer, 2004; Rinner, 2006) and then, it explains how Yahoo! Trip Planner supports these tasks.

Geocollaborative portals' functionality (MacEachren & Brewer, 2004; Rinner, 2006)	Collaborative tasks	Examples describing the collaborative trip planning and decision processes
Collaborative presentation	See, observe, perceive, distinguish, understand	<u>Problem Identification</u> Yahoo! Trip Planner provides a rich and huge amount of (user-generated) trip related information represented on a map, which users can explore for generating ideas on where to travel, what to do and see etc. For example, trips undertaken and experienced by other users can help other group of users identify how they can solve their own trip problem, e.g. where did other honeymoon couples went? What did they do and how they have voted, commented on their trip experiences?
Collaborative discovery/exploration	Search, browse, identify, compare, associate	<u>Information Search</u> Yahoo! Trip Planner offer numerous (social) search possibilities for exploring and browsing the trip/travel related information that it offers on its maps (see Table 2)

Collaborative analysis	Discuss, assess, examine, scrutiny, breakdown, investigate	<u>Information Evaluation &amp; choice</u> Yahoo! Trip Planner provides several mechanisms that help users evaluate and choose an appropriate place, activity to do or tourism supplier to use: Voting of users for each place, activity and operator Comments and feedback provided by users Discussions amongst users Tools calculating the distances and providing the driving directions to places, activities and firms Popularity of places, trips and activities based on the number of users that have included them on their trips
Collaborative synthesis	Combine, share, join, link, separate	<u>Book – Execute</u> Yahoo! Trip Planner provides the links to several cyberintermediaries from where users can book their selected hotel, museum, airline to travel to destination etc Yahoo! Trip Planner is also part of Yahoo! Travel portal whereby users can synthesise and book their own personalized dynamic package, and/or book different travel – tourism products and services
Collaborative review	Assess, re-design, feedback, simulation	<u>Post choice</u> Yahoo! Trip Planner allow users to also upload information/feedback/photos etc and create their personalized trips after their return home, so that they can share their experiences with others as well as assist others with their own trip planning process.

Table 3. Geocollaborative portals' functionality and group based decision making processes of trip planning

## 5 RESEARCH FINDINGS

A two stage approach was used for measuring the reliability, validity and convergence of the scale measuring the factors of the collaboration success supported by Yahoo! Trip Planner. First, an exploratory factor analysis (EFA) was undertaken for identifying the particular factors that students perceived had influenced the impact of Yahoo! Trip Planner on the success of their collaborative trip planning decision making processes. The appropriateness of the data for running EFA was examined by the Kaiser-Meyer-Olkin (KMO=0.85) measure of sampling adequacy and Bartlett's test of sphericity ( $p < .001$ ). Factors were extracted by conducting a principal component analysis and the factor matrix was rotated using the varimax method. At a second stage, confirmatory factor analysis was also conducted for validating the dimensionality of the collaboration success factors of Yahoo! Trip Planner. The following statistical data provided evidence of the appropriateness of the model's fit with the data:  $\chi^2/df = 2.053 < 3$  ( $p < 0.001$ ), CFI=0.92 > 0.9, NNFI=0.94 > 0.9, RMSEA=0.088 < 0.10. Convergent validity was assessed by checking the statistical significance of the factor loadings in CFA. The t-tests of all factor loadings were significant (at  $p < 0.001$ ) and so, the convergence validity is passed. Discriminant validity was checked by calculating the intercorrelations between constructs. As none pairwise correlation between factors was found to exceed 0.85, the discriminant validity was proved and it can be concluded that the four factors of collaboration success measure different dimensions.

The four factors explaining the 61.41% of the variance (Table 4) with a high level of reliability ( $\alpha > 0.7$ ) are the following: 1) effectiveness factors supporting and facilitating the work group trip planning tasks; 2) community building and supporting factors; 3) efficiency factors for completing the work group trip planning tasks; and 4) results assessment factors. Students perceived the effectiveness factors as the most important impact of Yahoo! Trip Planner tool on their collaborative trip planning process, as it explained 22.4% of the variance and all items had high average scores, except the item related to the capability of the tool to support the booking process that actually had a relatively low average score. This is not surprising as students were not required to proceed to the booking stage of the trip planning (the study was only an experimental exercise). It is important to note that the items confirmed to be included in this category of factors refer to all the stages-tasks of the trip planning process as reported in Table 3 (e.g. information search, synthesis, evaluation etc). Factors related to the capability of Yahoo! Trip Planner to build group bonding, commitment and participation by team members was also found as the second more important factor explaining 19.7% of the variance. In other words, findings confirmed the previous literature regarding the importance of the tool to support, foster and facilitate

collaborative decision making processes was confirmed. Students' perceptions regarding the impact of Yahoo! Trip Planner on enhancing the efficiency of the collaborative trip planning processes were also significant but less important explaining 10.3% of the variance. This might be explained by the fact that students may had limited previous experience on collaborative trip planning through other conventional methods, as well as students may still prefer to meet face to face with peers for deciding on trip plans. Factors related to the impact of Yahoo! Trip Planner on the quality of the results of the collaborative decision making process received the smaller importance explaining 9.01% of the variance. This may be not surprising when considering that only very few groups (only 12) had reached a consensus and finalized their trips at the time when students completed the survey questionnaire.

To what extent do you agree (or disagree) that Yahoo! Trip Planner has assisted you and your team with the following collaborative trip planning decision making processes and issues? (1 – 5 Likert scale, from strongly disagree to strongly agree)	N=188		F1	F2	F3	F4
	M	SD	$\alpha=0.86$	$\alpha=0.81$	$\alpha=0.83$	$\alpha=0.78$
A lot of ideas and information were identified for planning our trip	4.23	0.92	<b>0.84</b>			
Authentic and reliable trip ideas and information were generated	4.19	0.98	0.85			
Information search was well supported	4.07	1.02	0.78			
Group discussions were facilitated and fostered	4.01	1.11	0.81			
Comments and feedback amongst group members were fostered	3.98	0.78	0.77			
The tool supported the generation of trip suggestions by group members	3.97	0.93	0.80			
The evaluation of generated trip ideas and information by group members was effectively supported	3.92	1.02	0.81			
Trip itineraries were effectively designed and developed	3.87	0.87	0.78			
It was easy to complete the booking of the trip	3.70	0.93	0.78			
Group bonding is enhanced	4.12	1.04		0.79		
My willingness to participate and contribute to the trip planning process has been boosted	3.89	0.95		0.76		
I feel more committed to the trip planning process	3.86	0.88		0.77		
Members listen to and learn from each other	3.77	0.76		0.68		
Every member was empowered to participate in the trip planning process in an equal way	3.71	0.92		0.72		
It was easier for me to contribute and participate to the trip planning process	4.04	0.99			0.75	
The coordination and synthesis of members' contributions was handled effectively	3.76	0.86			0.68	
The trip planning processes required fewer and less intensive efforts by members relative to other trip planning methods	3.65	0.74			0.64	
The trip planning process is completed in less time relative to other trip planning methods	3.38	0.69			0.70	
Trip suggestions and comments generated were of high quality	3.87	0.95				0.66
Trip suggestions and plans met everyone's expectations and needs	3.45	1.04				0.63
Trip suggestions and comments were appropriate to the members' profile and preferences	3.36	1.16				0.60

Trip suggestions and plans received everyone's approval	3.01	0.95				0.61
Trip suggestions and plans were feasible to be implemented by the group in real life	2.89	1.05				0.59
A trip plan agreed by all members was achieved	2.67	1.28				0.60
<b>Percentage of variance explained</b>			22.4	19.7	10.3	9.01
<b>Cumulative percentage of variance explained</b>			22.4	42.1	52.4	61.41

Table 4. Factors affecting the impact of Yahoo! Trip Planner on the success of collaborative trip planning decision making processes

## 6 CONCLUSIONS AND IMPLICATIONS FOR FUTURE RESEARCH

As more and more travelers wish to create their personalised trip itineraries and experiences, the provision of geographical information and services on travel websites is an unavoidable necessity. The current evolution of geoportals and geocollaborative portals (that facilitate work group based on the top of a map) coupled with the enhancement of their functionality with web 2.0 tools and capabilities, present numerous opportunities and services for making the trip planning process less complex and time consuming, more efficient and more social and enjoyable for travelers and their travel companions. This paper aimed at exploring the use and impact of geocollaborative portals on the success of collaborative trip planning processes. To that end, the literature was reviewed for analyzing the functionality of geoportals and geocollaborative portals and demonstrating how these can support and facilitate the collaborative decision making processes for trip planning purposes. A framework for measuring the impacts of geoportals' use on travellers' collaborative decision making processes was developed, and primary data were collected through an experimental study based on students' perceptions using Yahoo! Trip Planner for planning a group trip. The theoretical discussion and the study findings provide useful practical guidelines and suggestions for designing the functionality of geoportals and/or geocollaborative portals for trip planning purposes. However, given the limitations of the study's methodology (e.g. small sample consisted only by students, booking of trips was not required, focus on a specific geocollaborative tool, a hypothetical case without any trip constraints in terms of time, budget, etc), future larger-scale and real-life research is required in order to further enhance and refine the study's findings.

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