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Abstract

This deliverable reports on the dissemination activities undertaken during the ETIHQ project towards all major stakeholders of interest: researchers in the tourism and semantic web areas; tourism managers and the larger business community. Additionally, it also discusses potential strategies for exploiting the results of the project: the ETIHQ linked data repository and the decision support dashboard built on top of that repository. To that end, we performed a market overview and a SWOT analysis. We also gathered feedback from potential user community during the TourMIS workshop held in September 2014 through a survey completed by 37 tourism practitioners. We concluded that the unique characteristics of the dataset, in particular its highly granular coverage of European tourism statistics, put the ETIHQ repository and the tools that exploit it in a favourable position for future exploitation.

Executive summary

The first part of this deliverable details the various dissemination activities carried out during the ETIHQ project which aimed to ensure the following expected impacts: (i) supporting data owners in publishing their data as Linked Data; (ii) deriving guidelines for data publishing; (iii) enabling tourism managers to leverage the created dataset in the scenario of tourism decision making and (iv) educating potential adopters of the Linked Data technology.

In terms of scientific dissemination, two detailed deliverables have been prepared and a set of publications are currently being planned based on these deliverables. We put much focus on reaching out to the tourism practitioners' community including presentations at tourism specific events and dissemination through professional networks during the entire duration of the project as well as a strong presence during the TourMIS'2014 Workshop. Last but not least, to connect to the broader business community and the public at large, we created a project web-site and actively engaged with the Austrian news media to promote the project in the Austrian press.

The second part of the deliverable presents an analysis of the potential exploitation value of the created dataset and decision support dashboard. The analysis includes multiple aspects. Firstly, we identify a set of decision support scenarios in tourism and conclude that the 4th scenario (referring to the visualisation of statistical indicators across domains) is poorly covered by the state of the art tourism tools although it would be very useful for tourism managers. Then, through a market watch we conclude that the ETIHQ dataset and the decision dashboard are unique and cover an important market (that of making decisions using detailed European tourism statistics and allowing the exploration of statistical indicators from multiple domains).

An important step to prepare exploitation was a survey we performed with 37 participants to the TourMIS workshop. According to the survey, (1) multi-domain questions are important but generally performed rarely, and this needs to be considered when building a system as the system should provide value all year around; (2) the main approach to answering such questions is manual data collection , and therefore the data integration strengths of Linked Data technologies are highly desirable; (3) extension of TourMIS with additional domain statistics is deemed very useful, in particular regarding economic data; (4) at least 50% of the participants has already heard about Linked Data before and 71% claimed that the basic principle of this technology is easy to grasp; (5) the decision support system was also considered as very useful; (6) generally, many positive comments were received with several participants being very interested in using the system.

After a SWOT analysis, performed both for the dataset and the decision support dashboard, we conclude on three major future exploitation strategies for the dataset, the decision tool as well as the technology know-how created during the project.

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Keywords	Decision support dashboard, linked tourism data, dissemination, exploitation

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Abbreviations

ETIHQ	Exposing Tourism Indicators as High Quality Linked Data
LD	Linked Data
DMO	Destination Marketing Organizations
QB	RDF Data Cube Vocabulary

1   Introduction

The ETIHQ project focused on exposing TourMIS[1] [2], a large-scale and frequently used repository of European tourism indicators, as high quality Linked Data. The semantic modelling aspects and the resulting Linked Data repository have been described in deliverables D26.1 [3] and D27.1 [4] respectively. In order to demonstrate the benefits of Linked Data technologies, the project also built a decision support dashboard that allows tourism managers to inspect and interact with statistical tourism data from multiple sources and domains.

ETIHQ's expected impacts which were set out in the project proposal reflect the goals of PlanetData, especially concerning the tasks of:

(i) *supporting data owners in publishing their data as Linked Data*: to achieve this impact we described our technical solutions in two detailed deliverables D26.1 [3] and D27.1 [4].

(ii) *deriving guidelines for data publishing*: we wrote (and are in the process of writing) several research papers aimed at sharing our technical solutions that can be re-used as guidelines for publishing other tourism data sets. Additionally, our ontologies and DSD files are publicly available on the project's web-site.

(iii) *enabling tourism managers to leverage the created dataset in the scenario of tourism decision making*: to this end, we built a decision support system that leverages the created linked data and publicised it to the user community of TourMIS.

(iv) *educating potential adopters of the Linked Data technology*: besides writing deliverables and research papers describing our work, we also organized several talks collocated with the annual TourMIS workshop in 2014.

The project's dissemination activities have focused on ensuring that the above expected impacts are reached. As such, it was important to reach out not only to researchers but, most importantly, to the tourism managers community through events and contacts in this area.

Given the short time-span of the project and the finalisation of the decision support prototype in the last month of the project, exploitation activities focused primarily on understanding the business context and drawing up perspective exploitation plans.

This deliverable contains a report of the dissemination carried out during the ETIHQ project (Section 2) and perspective exploitation activities (Section 3).

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[1] http://www.tourmis.info

2 Dissemination Activities

Dissemination activities focused on reaching out to three core stakeholder groups: (1) the tourism and semantic web research communities (Section 2.1); (2) practitioners in the tourism domain, especially tourism managers (Section 2.2); and (3) the wider business community and general public (Section 2.3).

2.1 Scientific Dissemination

Dissemination of our concrete technical solution has been performed through the public deliverables D26.1 [3] and D27.1 [4] which were made available on the project web-site together with other results such as ontologies.

Based on these deliverables, scientific dissemination is ongoing and focuses on sharing the lessons learned during the project with the tourism and semantic web communities. The following papers are currently being planned and prepared:

- *Linked Data for Cross-domain Decision Making in Tourism*, to be submitted to ENTER'2015[2] on 12.09.2014. Organized by the International Federation for Information Technology and Travel & Tourism (IFITT), ENTER is the leading conference on the application of information and communication technologies to travel and tourism.

- An extended version of the ENTER'15 paper will be submitted to the Journal of Information Technology and Tourism (Springer)[3] by December 2014.

- A paper focusing on the application of linked data technologies in tourism will be submitted to the In-use Track of ISWC'15 after the extensive evaluation of the decision support portal.

2.2 Dissemination to the Tourism Community

Besides disseminating the ETIHQ results and findings in tourism focused academic venues, several efforts were made to reach out to the community of tourism practitioners. A highly relevant venue for achieving this goal is the TourMIS workshop series, organized yearly and attracting on average a hundred participants from the European tourism industry, mostly tourism managers (e.g., city tourism organization representatives) from all over Europe.

During the TourMIS 2013 workshop in September 2013 (110 participants), one month before the official start of ETIHQ, Dr. Irem Onder held a presentation entitled "*Linked Data for Tourism*". The main focus of the talk was to introduce the notion of Linked Data technologies to the tourism community and to answer the question "How can linked   data technology be used in the tourism domain? ". In doing so, the talk presented related work performed preliminary to ETIHQ and advertised the goals of the upcoming project.

The 2014 TourMIS workshop is the 10th in its series and co-organized by major European travel organizations such as the European Travel Commission (ETC)[4], the United Nation World Tourism Organization (UNWTO)[5], European Cities Marketing (ECM)[6] and MODUL University Vienna. This workshop attracted 95 participants over two days. Taking advantage of this workshop, we organized a set of events:

- On September 11th, during the discussion of future developments for TourMIS, Dr. Marta Sabou and Dr. Irem Onder presented the major outputs of ETIHQ and their relevance for the further development of TourMIS. The talk was entitled: *From Multi-Domain Statistical Data to Complex Decisions and Actions: A Linked Data based Approach* and its content can be summarized as follows: Complex decision making processes in tourism often need to be based on an understanding

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[2] http://www.enter2015.org
[3] http://www.springer.com/business+%26+management/business+information+systems/journal/40558
[4] http://www.etc-corporate.org/
[5] http://www2.unwto.org/
[6] http://www.europeancitiesmarketing.com/

of how economy and environment indicators correlate with tourism specific data, for example, how do GDP changes in Japan influence arrivals to Europe from Japan? how do arrivals to Spain correlate with changes in its environment in terms of the emitted CO_2? In this talk we describe the ETIHQ decision support tool that allows such complex decisions and therefore goes beyond the mono-domain (i.e., only tourism data based) investigations currently enabled by TourMIS. We also highlight aspects of the underlying technical solution which is based on the novel Linked Data technology.

- On September 11th, the talk describing ETIHQ has been followed by a brainstorming and feedback session where participants to the talk were asked for their feedback both by using a short survey and through open discussion. The major conclusions of this feedback session are described in Section 3.4 as an important input for drafting the perspective exploitation plan

- On September 12the, Prof. Arno Scharl presented the capabilities of the ETIHQ decision support system in his talk entitled: *A Big Data Approach to Knowledge Integration and Visualization for Tourism Destinations*.

Figure 1: ETIHQ talk at TourMIS'2014 by Marta Sabou

Figure 2: TourMIS'2014 talk by Prof. Scharl

Additional talks were given as follows:

- Prof. Karl Wöber: Clemens Költringer, Irem Onder, K. Wöber, *"TourMIS: Benchmarking the Performance of DMOs' Websites"*, 49th meeting of Tourism Research Center, Innsbruck, 10-12 April 2014

- Prof. Arno Scharl: *"Web Intelligence zur Entscheidungsunterstützung im Tourismus",* Tourismus 2020[7]

Dr. Irem Onder has been continuously reporting on and disseminating information about the ETIHQ project to the European City Marketing (ECM) organization especially during its meetings held at the following dates and locations:

- 4-7 June 2014, Dresden, 110 participants

- 26-28 February, 2014, Belfast, 80 participants

The aim of the above events was to:

- educate practitioners about Linked Data technologies and best practices in their use;

- showcase a decision support system that can be built using Linked Data;

- get feedback on potential exploitation of the platform from the target user community.

2.3   Web and Media Presence

The project web-site[8] has been built in the first month of the project and extended during the time-span of the project with news and project results such as deliverables and ontologies.

To reach out to the larger business community and the general public, ETIHQ has been covered by several Austrian news outlets, including:

- "Smarte Daten für erfolgreiche Tourismus-Projekte"[9], 15.05.2014, COMPUTERWELT.AT

- "Smarte Daten für Tourismus"[10], 16.05.2014, MediaNet, pp:66

- "Datenanalyse hilt Touristikern, Fehlinvestitionen zu vermeiden"[11], 16.05.2014, Wirtschafts Blatt, pp:24

- "Big data für den Fremdenverkehr"[12], 17.05.2015, Die Presse, pp:68

- "Big Data statt Fehlinvestitionen: Smarte Daten für erfolgreiche Tourismus-Projekte"[13], 19.05.2014, PRPLUS.AT

- "Neue Daten für Investoren: EU Projekt ETIHQ"[14], 28.05.2014, A3GAST, pp:86

- "Entscheidigungshilfe Im Tourismus", 06.06.2014, COMPUTERWELT, pp:56

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[7] http://www.tourismus2020.com/2014/programm

[8] http://www.etihq.eu/

[9] http://www.computerwelt.at/news/technologie-strategie/big-data/detail/artikel/103620-smarte-daten-fuer-erfolgreiche-tourismus-projekte/?utm_source=daily&utm_medium=RSS&utm_campaign=rss%2Bdaily

[10] http://www.etihq.eu/wp-content/uploads/sites/18/2014/06/MEDIANET_20140516_SEITE_66.pdf

[11] http://www.etihq.eu/wp-content/uploads/sites/18/2014/06/WIBLATT_20140516_SEITE_24.pdf

[12] http://www.etihq.eu/wp-content/uploads/sites/18/2014/06/PRESSE_20140517_SEITE_68.pdf

[13] http://prplus.at/press/2014/big_data_statt_fehlinvestitionen_smarte_daten_fuer_erfolgreiche_tourismus-projekte.html

[14] http://www.etihq.eu/wp-content/uploads/sites/18/2014/06/A3GAST_20140528_SEITE_86.pdfs

3   Perspective Exploitation Plan

The main exploitable results from the ETIHQ project are:

- The ETIHQ linked open data set based on TourMIS data, publicly available for access at http://data.etihq.eu/;

- The decision support dashboard based on the ETIHQ repository, available at http://etihq.weblyzard.com, username: demo@etihq.eu; password: etihqdemo.

- Additionally, a non-tangible result of the project, is the knowhow of exposing tourism data as linked data and building concrete applications with this data.

In order to devise a perspective evaluation plan for these results (see Section 3.5), we performed the following steps:

- we investigated the types of decision scenarios that could potentially be achieved in the tourism domain and determined those that provide the most value to tourism practitioners and are difficult to achieve with current technologies (Section 3.1);

- we performed a market watch for similar datasets and systems (Section 3.2);

- we conducted a SWOT analysis for both our data set and decision support dashboard (Section 3.3);

- we solicited feedback from the potential user community, that is tourism managers present at the TourMIS workshop in 2014 (Section 3.4).

3.1   Decision Support Scenarios in Tourism

The strength of Linked Data technology is that it simplifies combining information from various data sources by making explicit links between those entities that are the same (e.g., two cities) or explicitly stating the relation between similar things (e.g., stating that one statistical indicator is narrower than another). The ETIHQ dataset is linked to various data sources and as such it allows integrating data from multiple statistical sources. Depending on the number of statistical data sources combined (e.g., TourMIS, Worldbank) as well as the number of indicators visualised from this sources (e.g., bednights, arrivals) a range of practical decision support scenarios can be supported.

Sources/Indicators	1 indicator	2 indicators
1 source	**Scenario 1**: Inspect one indicator from one source e.g., *how do the arrivals from UK and JP in Vienna compare?* e.g., *where do more UK tourists arrive when comparing Vienna and Linz?*	**Scenario 2**: Inspect two indicators from the same source e.g., *which percentage of tourists arriving in Vienna actually sleep there? (as a delta between arrivals and bednights)*
2 sources	**Scenario 3**: Inspect one indicator from two sources e.g., *How do arrivals to Vienna compare as recorded in TourMIS and WorldBank?*	**Scenario 4**: Contrast two indicators from two data sources e.g., *How does the GDP of a market country (e.g.,Japan) correlate with Arrivals/ Bednights in one (or more) cities (e.g., Vienna vs. Amsterdam)?* e.g., *How does tourism impact the environment of the host country?*

Table 1: Overview and examples of decision support scenarios depending on the number of combined data sources and indicators.

Table 1 provides an overview of the various decision support scenarios depending on the number of visualised data sources and indicators. It also provides concrete example decisions that can be supported with each scenario. The four scenarios are:

- **Scenario 1**: Inspect one indicator from one data source, such as showing the TourMIS bednight indicator over a period of time, is the simplest and most straightforward scenario that corresponds to the current functionality offered by TourMIS.

- **Scenario 2**: Inspecting two (or more) indicators from the same source - for example, by display bednights and arrivals from the same market to a destination one could infer the percentage of the arriving tourists which sleep at hotels at that destination. Based on feedback from our tourism colleagues, this scenario is however rarely used in practice.

- **Scenario 3**: Inspecting values of the same indicator (e.g., arrivals) from two (or more) data sources, e.g., comparing arrival indicator values from TourMIS and WorldBank. When implementing such a scenario, it must be ensured that the indicator in the two data sources is measured in the same way, i.e., it has same (or comparable) meaning and it has same (comparable) semantics for its dimensions. While useful to verify the correlation of data between data sources, this scenario could lead to problematic cases by suggesting to users that the indicator data from one source is incorrect. Therefore, our tourism colleagues advise against focusing on such scenarios.

- **Scenario 4**: Investigating two (or more) indicators from two data sources in different domains with the general goal of comparing how one indicator influences the other. Examples include, investigating TourMIS arrivals from one market vs. GDP growth in the market country or contrasting TourMIS arrivals to a destination vs. CO_2 emissions at that destination. Such cross-domain indicator comparisons, are, according to our tourism colleagues, the really interesting cases, not covered (or really difficult to cover) by traditional database-style systems and where linked data technologies could provide a real benefit. When implementing such scenarios it is important that the two indicators are linked based on the value of one of their dimensions, that is the same or compatible (e.g., if one has cities and the other country data, city data from that country can be added up). Additionally, indicator value ranges should be the same, or compatible in the sense that higher granularity data can be obtained from lower granularity data by additions (e.g., month vs. year, city vs. country).

From this analysis we conclude that decision scenarios of type 4 are (1) useful to support complex decision making processes but are (2) currently difficult to achieve with state of the art database-style technologies due to the high data integration effort that they require. Therefore, these scenarios will provide not only practical value for tourism managers but will also allow benefiting from the strengths of linked data and semantic technologies in the area of data integration based on semantic links.

3.2   Market Watch

We performed a market watch both for:

- tourism statistics datasets exposed as linked data;

- decision support systems aimed at tourism managers.

In terms of *tourism statistical datasets*, the ETIHQ repository is unique in terms of its content when compared to other sources of tourism statistics (see Table 2). Given their importance, tourism indicators are published by a variety of international organisations along with indicators in other areas such as economy and sustainability. The UN provides a multitude of datasets from its offices, including also various tourism indicators from UN's World Tourism Organization (UNWTO), such as, among others, arrivals, departures and tourist expenditures, measured per country and year. Much of this data is open, however, only provided in the proprietary Excel format. Additional UNWTO data is only available as PDF downloads[15]. Eurostat provides a wealth of European level statistics[16], including various tourism indicators (capacity, arrivals, bednights, expenditures etc) for all European countries. Measurements are provided on a monthly basis. Data can be downloaded in a variety of formats including Excel, CSV, HTML, SPSS and PDF. The World Bank

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[15] http://www.unwto.org/facts/menu.html
[16] http://epp.eurostat.ec.europa.eu/portal/page/portal/statistics/search_database

provides open access to over 8000 indicators[17], including also a variety of tourism indicators measured annually and at a country level. The available datasets can be downloaded in XML and Excel formats, as well as accessed through an API.

Dimension/Source	UNWTO	Eurostat	WorldBank	ETIHQ
Country	Y	Y	Y	Y
Destination	N	N	N	Y
Year	Y	Y	Y	Y
Month	N	Y	N	Y
Access format	Xls/pdf	Xls/csv/pdf/ spss	Xml/xls/API	RDF

Table 2: Overview of the main sources of tourism indicators, the dimensions they cover and the offered data access formats.

ETIHQ is comparable to the sources of tourism statistics described above (see Table 2), but it is more detailed and this makes its publishing beneficial to European tourism stakeholders. Indeed, while other sources provide annual measurements (except Eurostat), at country level, ETIHQ contains both annual and monthly measurements and it focuses on individual cities. Additionally, ETIHQ also identifies key markets based on tourists' origin, a feature not offered by any of the data sources we surveyed, although market information is essential for tourism promotion organizations in developing their international advertising campaigns.

We conclude that there are various sources that offer a multitude of indicators in the area of tourism and beyond. A general trend is offering this data as open data, primarily through downloading it in popular (non-semantic) encodings. For now, the publication of these datasets as LD has been primarily undertaken by third-parties rather than data owners (Eurostat[18,19,20], WorldBank[21,22]), resulting in low-quality datasets that simply expose database tables into an RDF format without enriching them with domain-specific metadata or linking them to other datasets. Upon inspection, many of these datasets were slow or returned erroneous (or no) data. Furthermore we are unaware of tourism statistics data published using the RDF Data Cube Vocabulary (QB).

Tourism decision support systems have been implemented in various areas such as destination recommendation systems. Some examples of previous research in this area include studies about case-based travel recommendations [7], travel decision styles and destination recommendations [10], and creating adaptive recommender systems using neural net approaches [6]. There are some destination recommendation systems that have been developed as well such as DieToRecs [8], TourBO [5] and MobyRek [9]. However, the studies related to travel recommendation systems are directed towards the consumer (i.e., the individual tourists) rather than the tourism managers therefore focusing on different content (i.e., destinations, touristic offers, events) than the ETIHQ decision dashboard. Other types of decision support systems such as yield management systems are available for tourism managers, which have been used primarily within the hospitality industry.

BASTIS[23] is a system that combines different types of data under one online system. It has three parts, a wiki page, a blog and a forum where individuals can get information about heritage tourism in Baltic Sea region. The data comes from EUROSTAT, TourMIS, Statistisches Bundesamt Deutschland (German Statistical Office) and Deutsche Zentrale für Tourismus (National Tourism Organization of Germany). The heritage sites include churches, castles, museums, natural sites and attractions, and national parks from 10 different Baltic countries, 13 source markets and more than 40 heritage sites. Each heritage site has a profile that has basic information regarding the location of the site, the number of visitors, source markets,

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[17] http://data.worldbank.org
[18] http://ontologycentral.com/2009/01/eurostat/
[19] http://www4.wiwiss.fu-berlin.de/eurostat/
[20] http://www.w3.org/wiki/SweoIG/TaskForces/CommunityProjects/LinkingOpenData/EuroStat
[21] http://www.esds.ac.uk/international/access/LDaccess.asp
[22] http://wbwrap.ontologycentral.com/
[23] http://www.bastis-tourism.info

satisfaction of visitors and the duration of their visit at the heritage site. Furthermore, the heritage sites can be benchmarked with each other and the information can be used by decision makers involved in heritage tourism in the Baltic Sea region. However, this system is limited since it covers the Baltic Sea Region alone , the information is only about tourism domain although it comes from different sources and the data is integrated by hard-coded data source connectors.

The TourMIS interface already supports a variety of decisions such as detecting trends in specific source markets, monthly development of European city tourism and best performing European cities according to bednights in comparison to the previous quarter, which would help Destination Marketing Organizations (DMO) to take appropriate actions. For instance, a DMO can use TourMIS and can decide to invest more in a source market (country of origin of tourists) that shows an increasing trend such as the Russian market. However, the main limitation of TourMIS is that the data is limited to that contained in the system's database. Although TourMIS is a good tourism information system, the data does not include external factors such as economy of a source market or sustainability indicators that are linked to tourism industry, which can explain the trends as well. One advantage of this system is that it is free to use and open to anyone, access to the website requires only a we-form based registration.

PATA (Pacific Asian Travel Association) mpower[24] is a tourism decision support system regarding the Asia Pacific countries. This system is a closed one; the detailed information is only accessible to members, which requires a fee to be paid. Its members include 80 national and regional tourism offices, more than 30 major airline companies, major hospitality groups and travel agencies. The indicators that are available are visitor information (e.g. number of international arrivals, gender, mode of transport, etc.), expenditure, source markets, aviation information including flight frequency, seat availability and air passenger traffic, accommodation (e.g. occupancy, number of available rooms, RevPAR (revenue per available room), etc.) digital indicators (e.g. top 10 travel websites, time spent on websites, % of internet users, etc.) and forecasts of arrivals and expenditure.

From the above we conclude that (1) the majority of tourism DSS are aimed at tourists rather than tourism managers; (2) while some tourism DSS systems aimed at managers include data from other data sources, these are from the tourism domain and are integrated in a hard-coded manner. In terms of the previously discussed decision support scenarios, all reviewed systems focus on Scenario 1. We therefore see an important market niche for the ETIHQ dashboard and especially in its ability to automatically integrate cross-domain indicators thus catering for Scenario 4.

3.3   SWOT Analysis

Based on the analysis of the decision support scenarios as well as the market watch, we derived a SWOT analysis both for the ETIHQ repository and DS dashboard detailed in Table 3 and Table 4.

Strengths	Weaknesses
granular content (destination level, monthly measurements)	complex licensing due to aggregated nature
European content	
exposed using ontologies and RDF Cube	
links to other datasets	
based on a TourMIS, which is a long standing system, used extensively and with clear future plan	
Opportunities	**Threats**
become a model for publishing tourism linked data;	similar datasets;
become a hub of tourism linked data;	uptake challenges: novelty and complexity of LD technology might hamper uptake

Table 3: SWOT analysis for the ETIHQ data set.

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[24] http://mpower.pata.org/

Strengths	Weaknesses
allows cross domain analysis; can provide knowledge from external sources thanks to links; based on a TourMIS, which is a long standing system, used extensively and with clear future plan	visually complex, requires some training
Opportunities	**Threats**
extension with further indicators combination with web and social media content	similar systems

Table 4: SWOT analysis for the ETIHQ decision support portal

3.4 Feedback from (Potential) User Community

We have taken advantage of the TourMIS 2014 workshop to disseminate the project results and to collect feedback from the workshop participants. These are mostly tourism practitioners and academics and as such represent the target user community for the data set and decision support system we developed in ETIHQ.

The approach we took consisted of a combined presentation and survey, where participants were asked to fill in a survey during the presentation - the presenter prompted the audience to fill in the survey as she was explaining the content of her talk. The slides of the presentation are available online[25] and the survey used has been reproduced in ANNEX 1 of this document.

The presentation and survey were structured on five corresponding parts with clearly specified goals as summed up in Table 5.

Table 5: Overview of the structure and goals of the TourMIS'14 presentation and survey.

Part	Topic	Presentation	Survey
I	Introduction	Introducing the speakers and the project	Asking for the participants' occupation and country of origin
II	Multi-domain decisions in tourism	Explaining the notion of complex questions relying on multi domain statistical data	Asking participants about: how often they perform complex questions; examples of questions; data collection method; usefulness of extending TourMIS with statistics from other domains; most useful domains to combine with tourism data.
III	Linked Data	Explaining the principles of Linked Data and how it can be used to integrate statistics from different data sources	Asking participants for their level of familiarity with LD technology and whether it is easy or confusing to understand the basic principle of this technology.
IV	Decision Support System	Explaining the decision support portal	Asking participants for the importance of having access to such a system
V	Conclusion	Concluding the talk; Questions and Answers session	Asking participants for any additional comments

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[25] http://www.modul.ac.at/uploads/files/user_upload/Workshop_2014-Sabou-Onder.pdf

From approximately 50 participants to the session, a total of 37 forms have been filled in and 30 participants indicated they are interested in further news about the project by sharing with us their email address. Therefore, the topic of the project is of high interest to the user community.

Part I: Survey Population: The majority of the participants (24 out of 37, i.e. 65%) were tourism practitioners. Nine academics also completed the survey. Two respondents did not fill in this field of the form, while other two came from the travel industry and a non-for-profit organization respectively. In terms of geographic spread, participants originated from 19, primarily European countries, mostly from Hungary followed by Austria and Belgium. Figure 3 depicts this information graphically.
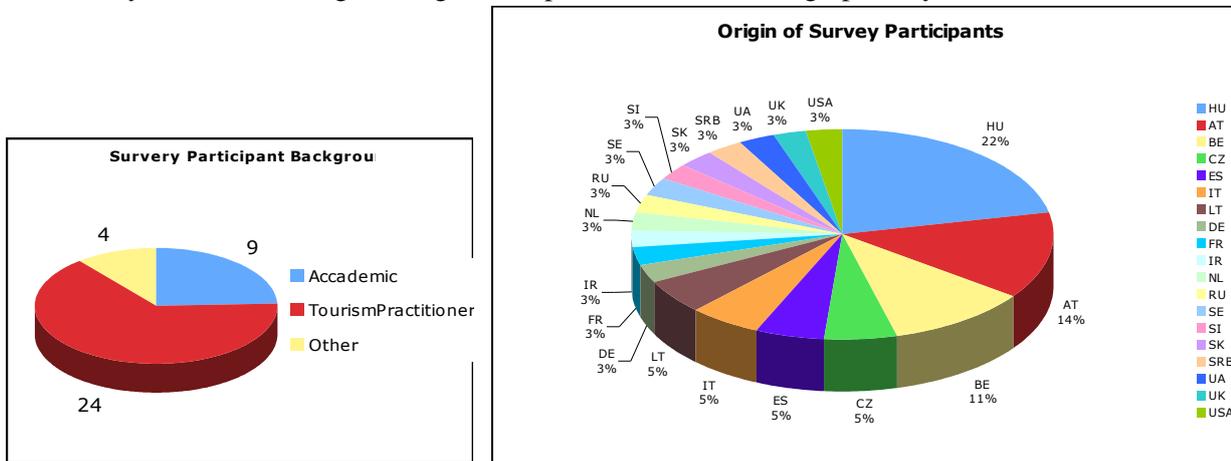

Figure 3: Survey population characteristics in terms of professional background and country of origin.

Part II: Multi-domain decisions in Tourism: We wanted to find out how often tourism practitioners and academics need to perform tasks that involve questions relying on multi-domain indicators. 70% of respondents need to answer such questions, although not on a daily basis. In our survey population, most participants (40%) answered complex questions about once a month, 16% once a week, 11% daily and 3% once an year (see Figure 4). One participant commented that they performed such decisions "Everytime we see smth strange on the statistics. Once a year when we observe the markets at the moment to prepare the actions plan for next year"[26].
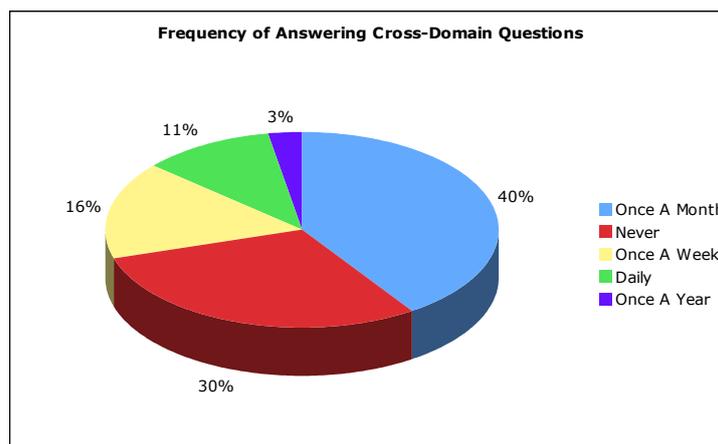

Figure 4: Frequency of answering cross-domain questions in tourism.

Examples of multi-domain questions provided by the participants were:

- How does market GDP/weather/market consumer confidence/exchange rate influence arrivals to HU?

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[26] All comments in the survey have been reproduced verbatim.

- Hotel Data Statistics with community tax data
- Impact of consumer confidence, exchange rate, GDP on arrivals/bednights etc
- To study evolution of arrivals vs. consumer/business confidence, exchange rate, weather (for museum and attractions visitors);
- Does GDP per capita influence the locals to travel (or not) abroad?
- How does the government influence the domestic business?
- Visitors at sights/attractions Arrivals (Accomodation) X Balance of Payments

Data Collection Approaches: In 74% of the cases, participants use a manual approach to finding, downloading and combining diverse indicator data. No answer was given to this question by 12% of the participants, while the rest of 14% relied on other approaches including:
- Using TourMIS
- Using statistics applications
- Inspecting citytourismbenchmark.com
- Using internal warehouses;
- Using external tools: Smith Travel Research

Comments for this question included:
- planning subscription to Euromonitor
- Data Collection is Manual from Eurostat, UN data, OECD, national and regional statistic offices, weather data.

We asked participants to rate, on a scale from 1 (useless) to 10 (very important), the usefulness of extending TourMIS with capabilities to combine multi-domain statistical data. To this question 3 respondents did not provide a value, one participant provided "10+" and another "100". After excluding the void answers and changing the other two values to "10", we obtained an average rating of **8.35** with a standard deviation of **1.47**, thus demonstrating a very strong positive opinion towards the proposed extensions to TourMIS.

In terms of the most interesting domains that could be combines with TourMIS data, most participants were interested in economic indicators, followed by infrastructure, climate change and health related statistics as graphically depicted in Figure 5.
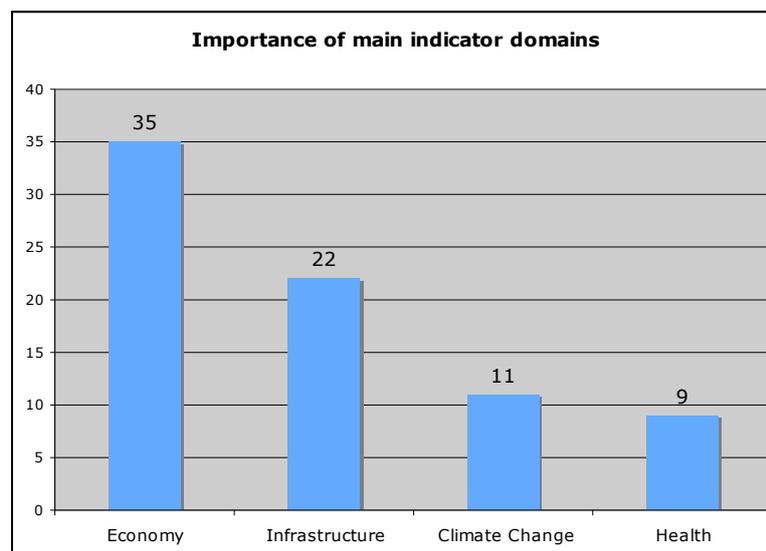

Figure 5: Number of votes given for the four main categories of indicators shown in the survey. Multiple choices were allowed for this question.

Additional indicator suggested were:
- confidence, employment, exchange rate
- Media, Vox Populi (consumer confidence, expectations, popular topics, trends)

- demographic, maps to see country/city borders
- Airline
- Sustainability
- Tourist Preferences
- Online coverage
- Visa data, currency rates, visa applications
- Weather
- Safety
- Trends(if Canadians like wine maybe we can approach them with an eno tourism campaign)
- Public Transport

Part III: Linked Data. The notion of Linked Data technologies is not totally unknown in the tourism community. Indeed, 51% of the respondents have heard about Linked Data before, with 32% claiming to have a vague understanding of the technology, 3% actually making use of this technology and 16% having no understanding of the technology principles. Furthermore, after the talk 71% of the respondents found the principles of Linked Data easy to understand. Figure 6 depicts this information graphically.
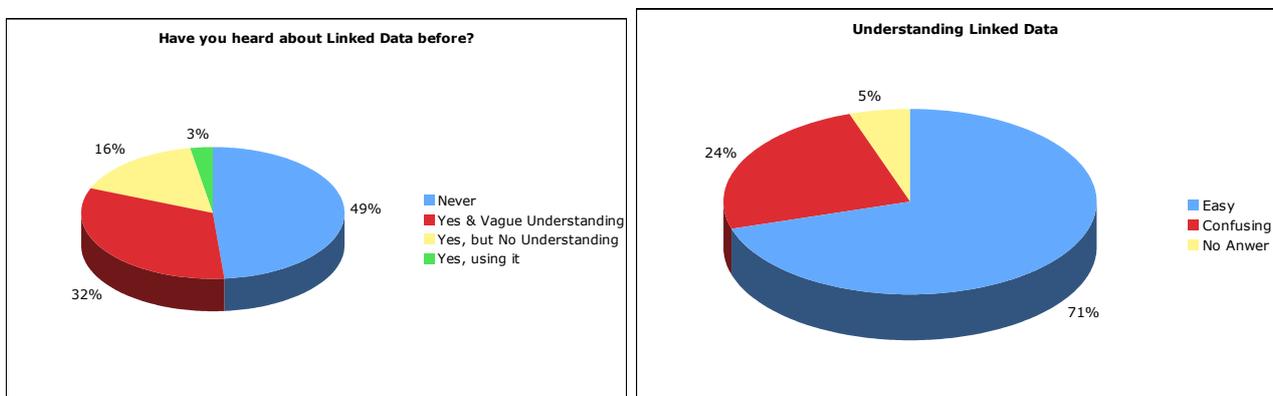

Figure 6: Understanding of Linked Data technologies in the Tourism domain.

Part IV: Decision support system

We asked participants to rate, on a scale from 1 (useless) to 10 (very important), the usefulness of a decision support system as the one presented during the talk. After removing 5 void answers, the average was **8.22** (standard deviation **1.68**), thus indicating a positive perception of the usefulness of such a tool.

Part V: Further Comments:
The following free-form comments were provided:
- What are your plans with this? The fancy system could be too expensive but a "brut" version would be useful for me as researcher.
- We wanted to create a "indicators system" but had no "hands" to collect the data. If you develop it within TourMIS it would be great.
- The DSS system needs to provide benefit throughout the year. Usually we do analysis on multi-domain data once a year, therefore the question is, if a live monitoring system creates continuous value.

The most important conclusions we derive from this survey, are:
- Multi-domain questions are important but generally performed rarely, and this needs to be considered when building a system as the system should provide value all year around
- The main approach to answering such questions is manual data collection , and therefore the data integration strengths of Linked Data technologies are highly desirable.
- Extension of TourMIS with additional domain statistics is deemed very useful, in particular regarding economic data.

- At least 50% of the participants has already heard about Linked Data before and 71% claimed that the basic principle of this technology is easy to grasp.
- The decision support system was also considered as very useful
- Generally, many positive comments were received with several participants being very interested in using the system.

3.5   Perspective Exploitation Plan

Based on the above considerations we envision perspective exploitations of all project results as follows.

Exploiting the ETIHQ data set. The ETIHQ repository will be further maintained and developed at MODUL University. A next step will consist in its extension with detailed licence information (based on each contributing party). After that, a business strategy will be developed. For example, the entire data set will be offered for free to all contributor parties but payment will be perceived for external users based on one of the following models:

- *payment per usage* - a certain amount of queries per month will be free, the rest will require some payment.

- *payment for the newest data* - historic data will be open and payment will be perceived only for data from the most recent time period (potentially the last 1-2 years).

Exploiting the ETIHQ decision dashboard. The decision dashboard currently exposes statistical data from the ETIHQ dataset and datasets that it links to. The dashboard has been built by adapting the webLyzard framework from visualising text documents to exposing statistical data. In the future, this portal technology will be used by webLyzard, a spin-off of MODUL university as follows:

- *adaptation to new domains*: webLyzard will use the statistical data visualisations for its clients operating in other domains than tourism, more specifically: sustainability, finance and biomedicine.

- *extensions with web media functionality*: we plan to extend the tourism decision portal with the original webLyzard media analysis functionalities. This will lead to a product that visualises both statistical and web media data and allows exploring correlations between those. For example, a peak in tourist arrivals to a destination derived from statistical data can be used as a search over text media (news snippets, social media) for the given destination and the peak's duration thus allowing the manager to determine events that happened at that destination (e.g., concerts, sport events) and might explain the peak of tourist arrivals.

Exploiting technology know-how. The technology know-how is an asset of MODUL university which could be exploited for setting up consultancy services in publishing tourism (and potentially other) data sources as linked data. Knowledge gained from building the decision support dashboard will be harnessed to build similar portals and visualisations suitable for inspecting statistical data in tourism, and beyond, in domains such as sustainability or financial analysis.

4   Summary

In this deliverable we described dissemination and exploitation activities carried out during ETIHQ.

In terms of scientific dissemination, two detailed deliverables have been prepared and a set of publications are currently being planned based on these deliverables. We put much focus on reaching out to the tourism practitioners' community including presentations at tourism specific events and dissemination through professional networks during the entire duration of the project as well as a strong presence during the TourMIS'2014 Workshop. Last but not least, to connect to the broader business community and the public at large, we created a project web-site and actively engaged with the Austrian news media to promote the project in the Austrian press.

The second part of the deliverable presents an analysis of the potential exploitation value of the created dataset and decision support dashboard. The analysis includes multiple aspects, such as:
- the identification of the main decision support scenarios in
- a survey we performed with 37 participants to the TourMIS workshop
- a SWOT analysis, performed both for the dataset and the decision support dashboard.

We conclude that ETIHQ has been highly successful in its dissemination and that, based on our analysis, it resulted in a unique and very high value technology (both in terms of the dataset and the decision support system) that opens up ample exploitation scenarios in tourism and beyond.

ANNEX 1- TourMIS Survey

Survey on Multi-domain Statistics in the Tourism Domain

Dear TourMIS participant,

We would be grateful if you could support our research by answering a few simple questions during this talk! Please hand in the completed form to Marta Sabou, Irem Önder or Karl Wöber at the end of the talk.

Thank you very much for your active participation!

Part I: About Yourself

I am:
       O An academic   **O** A tourism practitioner

I come from (City, Country): _____

Part II: About Multi-domain decisions in tourism

How often do you need to answer complex questions relying on multi-domain indicators?
       O Never   **O** Once a month   **O** Once a week **O** Everyday

Examples of other similar questions:

        _____

        _____

When I need to answer such questions I:
       O Collect data manually from different systems
       O Use a tool that combines multi-domain statistics. The name of the tool is: ___
       O Other Approach:_____

On a scale from 1 (useless) to 10 (very important) how useful would it be to extend TourMIS with capabilities to combine multi-domain statistical data?_____

Which domains would be the most useful to integrate into TourMIS?
       O Economy& Growth
       O Climate Change
       O Health
       O Infrastructure
       O Others: _____

Part III: About Linked Data

Have you heard about Linked Data before?
       O Never
       O Yes, but I have no idea what it means
       O Yes, I have a vague idea about it
       O Yes, I am using it in my projects

The principle of Linked Data as presented in the talk is:
    O Easy to understand
    O Confusing

Part IV: About the decision support system

On a scale from 1 (useless) to 10 (very important) how useful would a decision support system be (as the one presented during the talk)?_____

Any other comments:

    _____

    _____

    _____

    _____

    _____

    _____

I'm interested in this work and would like to receive further information on the following email[27]:
_____

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[27] The provided email address will not be shared with any third parties and will be solely used to disseminate information related to the topic of this talk.

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