2 Presentation: Information Technology, a Powerful Tool for Tourism — Antonio Guevara-Plaza, Andrés Aguayo-Maldonado, and Roman Egger

7 Specific Intercultural Features in On-Line Distribution — Roman Egger, Mario Jooss, and Sabine Schmeisser

14 Context-based Matchmaking to enhance Tourists’ Experiences — Carlos Lamsfus, Christoph Grün, Aukrene Alzua-Sorzabal, and Hannes Werner

22 Testing Delivery Systems in Transnational Virtual Learning: The Vocational Management Training for the European Tourism Industry (VocMat) Case Study — Cathy Guthrie and Lluis Prats-Planagumá

30 Technological Tools to support Online Marketing: SEGITTUR’s Role — Carlos Romero-Dexeus

33 Technological Innovation, a Challenge for the Hotel Sector — Patricia Miralles

39 Technology Map: Bringing R&D+1 Benefits to SMEs in the Tourism Sector. The Case of TOUREG Project — Mateo Amengual-Rigo, Jaime Bagur-Mora, Sandor Van der Meer, and Anne-Laure Debrux

48 From Informatick Spektrum (GI, Germany, and SI, Switzerland) Health Informatics
Large-Scale Antibody Profiling of Human Blood Sera: The Future of Molecular Diagnosis — Andreas Keller, Nicole Ludwig, Sabrina Heisel, Petra Leidingen, Claudia Andres, Wolf-Ingo Steudel, Hanno Hower, Bernhard Burgher, Matthias Hein, Joachim Weickert, Eckart Meese, and Hans-Peter Lenhof

55 Selected CEPIS News — Fiona Fanning

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Technology Map: Bringing R&D+I Benefits to SMEs in the Tourism Sector. The Case of TOUREG Project

Mateo Amengual-Rigo, Jaime Bagur-Mora, Sandor Van der Meer, and Anne-Laure Debrix

This paper presents the approach and methodology followed in TOUREG Project (a 7th Framework Programme European project) in order to obtain a Technology Map across the different regions and countries participating in the project. This Technology Map is intended to be built from supply and demand perspectives (i.e. what technological solutions are provided by technology suppliers and what are the needs demanded by potential end users). Apart from the methodology the initial results that are described here include a web based tool (available on the Internet) that will help to the final construction of the Technology Map as long as it is used by suppliers and end users to introduce their information. Final results are expected to be available at the end of the project however some preliminary ones will be also shown.

Keywords: FP7, ICT, SME, Technology Transfer, Technology Map, Tourism R&D, Virtual Marketplace.

1 Introduction
The purpose of this paper is to present the approach and methodology followed in the TOUREG Project, a 7th Framework Programme Project, promoted by the European Union, that is being led by the General Directorate for R&D+I of the Regional Government of the Balearic Islands, Spain. The project is aimed at the construction of a Technology Map, from the supply and demand points of view, for the Tourism sector in several regions across the European Union.

"Competitiveness and knowledge in the tourism sector" TOUREG is a European project with the strategic objective of "improving the competitiveness and strategic position of the services sector and in particular tourist-oriented sectors in European regions, through the establishment of a platform for the generation and transmission of knowledge based on technological innovation and research in the tourist sector”.

1.1 Who is behind this Project? Profile of the Participating Regions
Balearic Islands, Spain: The Balearics is a group of islands in the Mediterranean: Majorca, Minorca, Ibiza and Formentera. Its population of over 1,000,000 people, triples in the summer. The services sector is the main employer in the region: more than 50% of the region’s businesses work in this sector. In fact more than 80% of the regional GDP is generated by the services sector, most of it coming from the tourism industry.

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Madeira, Portugal: Madeira accounts for 2.81% of the country’s GDP at market prices, and services is the major economic sector in the region, with 81.85% of the regional GDP. Specifically, the tourist industry subsector contributes roughly 37.12% of the sector GDP. With some 115,200 employees, Madeira accounts for 2.25% of the total number of Portuguese workers. 74,700 people work exclusively in the services subsector.

Crete, Greece: Crete accounts for 5.49% of the National GDP at current prices. In the regional economy, in 2000 the services activities accounted roughly for 75% of the regional GDP. In 2004 the region of Crete had roughly 250,300 employees, accounting for 5.49% of all national employees. The regional services sector employed 157,900, i.e. a good 63% of the regional total.

Mehedinti, Rumania: The region of Mehedinti in Romania accounts for 9.04% of the national GDP at basic prices, the services sector being the main economic sector in the region, as it accounts for 42.96% of the regional GDP.

South West, Bulgaria: The South West region of Bulgaria accounts for 55.78% of the national GDP at basic prices. The services sector has the biggest influence in the regional economy with 64.82% of the regional GDP. With roughly 1,603,000 employees, the South West region of Bulgaria accounts for 44.53% of the national employee total. 713,900 of them (work exclusively in the subservices sector.

Norrbottens Iän, Sweden: The Norrbottens Iän region accounted for 5.2% of the national GDP at basic prices in 2004. The services sector is the most influential in the regional economy with 62.24% of the regional GDP. With some 231,200 employees, the region of Norrbottens Iän accounts for 5.35% of the national employee total. The services sector employs around 173,400 people, i.e.75% of the regional employment total.

The different partners in the project are coming from these regions and may be grouped into three major classes, each one bringing priorities, and specific interests rewarding the outputs:

- As regions composed by Mediterranean islands with over 20 years of experience as leisure tourism destinations:
  1. Regional Government of the Balearic Islands, Spain
  2. IBIT Foundation, Balearic Islands, Spain
  3. AREAM, Madeira, Portugal
  4. Expedita, Madeira, Portugal
  5. Technical University of Crete – TUC, Greece
  6. Science and Technology Park of Crete-FORTH, Greece
- As an area with major technological development in knowledge-intensive areas such as IT:
  7. Project Management Consulting - PEMENCO, Norrbotten, Sweden
  8. CDT- Lulea University, Norrbotten, Sweden
- As new EU member states that are proving to be major tourist destinations thanks to their heritage and history:
  9. CG&GC. Mehedinti, Rumania
  10. ARC Fund, Sofia, Bulgaria
  11. Madeira Tecnopol, Portugal

1.2 What are the Specific Objectives of the Project and its Timeframe?

The project started in January 2008 and initially is expected to last 30 months.

The main objectives of the project are:
- Promote, diversify and specialize in R&D+I activity in the tourist sector.
- Facilitate the establishment of a platform for the generation of knowledge in the tourist sector.
- Help suit the research to the real business requirements concerning new technologies, equipment, etc.
- Establish mechanisms giving Small and Medium Enterprises, SMEs, bigger access to knowledge about tourism-related R&D+I.
- Diffusion of best practices and knowledge about R&D+I, and about the strategic importance and the mechanisms for promoting such activity as a basis for regional development.
- Creation of regional working networks to improve competitiveness in the tourist-oriented services sector, with the idea of transferring knowledge, technology and experiences to the other regions involved.

The best way to accomplish these objectives is to inform and involve the largest possible number of businesses interested in the definition of needs, and the instrumentation of recommendations and action proposals.

Therefore businesses in the sector have been taking part in the project since the beginning. This is enabling them to express their needs and let us know what are, in their opinion, suitable measures which satisfy them.

1.3 What are the Expected Results for the Project?

The following tangible and intangible results are expected for the project:

1. Structuring of research driven cluster at international and regional level.
2. Strengthening of the R&D+I public policies linked to the tourist sector.
3. The definition of an itinerary for the generation and transfer of knowledge in tourist-related R&D+I.
4. The construction of a Technology Map for the generation of knowledge in the tourist sector.
5. Battery of conclusions and recommendations to improve and adapt public R&D+I policies.
6. Joint action plan for the members of the research-driven international cluster.
7. Study the feasibility of creating an international research-driven cluster in the tourist-oriented services sector, in the participating regions, lasting beyond the end of the project.
8. Definition of a joint action project that can be financed in future Frame Programme calls.

1.4 What is the Relevance of the Technology Map
within the TOUREG Project?

After realizing a complete analysis of the R&D in the Tourism sector of each region, reinforced by SWOT analysis in depth, we entered the second phase of the project based on field work.

The idea is to ensure the active participation of SME and trying to seek the maximum impact on SME and in particular on their implemented R&D+I activities.

One of the main results of TOUREG is the production of a Technology Map. The Technology Map collects the field work carried out by all partners in their respective regions. The field work consisted of the identification of the main technologies presented in all the regions taking part in the project and also the needs of the SMEs related to the technology areas considered in TOUREG, over 200 interviews in all participating regions have been carried out.

The fieldwork in each region, including the realization of interviews with 25 companies and 10 important players. It is a good starting point for the future and provides a sustainable point of reference in order to build a tool that allows for the incorporation of new requirements and technology solutions.

The development of the mapping technology has meant a considerable effort on the part of the partners. The Technology Map alone would have been a project in itself. It is perhaps one of the most ambitious elements of the project TOUREG.

This Technology Map will be a privileged source of information for the next steps in the project which are the creation of a Handbook on how to apply efficiently the IT to tourist sector and works on technology transfer itinerary.

1.5 How are the Technologies Classified?

There are three important areas within the tourism sector technologies which are the focus of the TOUREG project: Information and Communication Technology - ICT, Energy and Environmental Technologies.

These areas are considered strategic in the competitiveness of the tourism sector. Their impact is critical for promoting and achieving sustainable tourism and a sector based on knowledge and technology.

While tourism is an important sector for some regions taking part in TOUREG, in the generation of employment and wealth, it also provides an option for others to diversify their economies. Tourism is a services sector where innovation has been difficult to measure. However, innovation and technology implementation in other sectors has had an important impact on tourism competitiveness, for example in: transport, building, energy, ICT, environmental technologies, audiovisual, etc.

The Technology Map aims to bring the benefits of R&D+I to SMEs through highlighting the practical use (application) of the benefits of the technologies. Furthermore, this tool will become a useful reference in other initiatives, particularly in the technological development of the tourism sector in European regions.

From now on the Technology Map will be focused on the identification of potentially transferable ICT technologies to other European regions and their possible effects on the tourism industry.

2 Concept and Purpose of the Technology Map

The main objective of the Technology Map is to identify the supply and demand of the ICT technologies. The map sets out to define these key technologies and look at their current status within each region, examining the influence of each sector and their potential to provide more competitive tourism through their extended use.

The concept of Technology Map is to have a picture that includes available technologies in the ICT arena of the Tourism Sector as well as end user ICT needs in that sector. As the picture is moving the Technology Map will include a web based tool that will permit updating of the picture with information of new products or regarding new demands.

The purpose of this Technology Map is to build interrelationships between businesses and other entities involved in the tourism sector; in supply and demand not just in their respective home markets, but also between participating regions in the TOUREG project. The starting point of the Technology Map has been the identification of existing technologies in all the regions involved and the definition of those that might potentially be transferred. This identification of technologies has been carried out through the comprehensive analysis of the tourism sector in the participating regions, as well as through direct contact with the tourism industry and technology providers. So far the Technology Map includes over 80 SME’s offering over 200 technological products but the on-line tool remains open and will be sustained after the end of the contract with the EC and other regions. Non members of the consortium are also free to register their SMEs on our Technology Map.

The map uses an interactive tool for matching and offering all available technologies provided by companies located in each region while showing what is used and needed by the demander (hotels, destination management organization, etc...). This tool has been initiated and will be maintained in the long term, acting as a virtual market place of technologies for tourism.

The design of the Technology Map is a starting point for analyzing existing technologies in the tourism sector, which involves the study of emerging research lines in the industry, the technological applications that are far reaching in the market as well as those companies and entities that are developing emerging technologies.

In addition, the methodology of the Technology Map includes a comprehensive analysis of the needs of the institutions established in the regions involved in the project. This will serve as an indicator of future technologies associated with the tourism sector. As a result, the Technology Map will enable the classification of solutions for technology areas and the degree of future development.

The Technology Map is designed to produce a global
Information Technology in the Tourism Industry

analysis with local results. With regard to the global analysis, the conclusions drawn from the activities implemented by the research-driven cluster will lay the foundations for a guide on how to apply IT efficiently in the tourist industry. This guide will include elements applicable in different European regions.

From a local perspective, the on-line tool is free of charge and will offer all registered companies an interactive catalog of solutions. This means that, on filling out an online questionnaire, the user will have the possibility of finding a specific technological solution to meet their needs. The solution could be offered by another company from anyone of the region partners. The tool will present the possibility of a clear description of the technologies on offer along with full contact details.

To develop this tool three dimensions have been considered:

- **Supply**: Identify all available ICT technologies in participating regions affecting the tourism sector. Analysis includes technology companies and research centers with transfer potential to other European regions.

- **Demand**: The demand analysis obtained from the Technology Map will focus on the needs of SMEs involved in the field of ICT. The Technology Map will collect the needs of specific technological applications of SMEs that have a relationship with the tourism sector.

- **Technology Transfer**: Through the online tool, tourism enterprises seeking technological solutions will have access to information on existing applications on the market, which are offered by other firms in the territory of the regions associated with the TOUREG Project. It is a pairing or matching tool that links the demand and supply of technologies associated with the tourism sector. The tool will facilitate contacts between companies interested in selling and acquiring applications.

### 3 Methodology

The methodology has been detailed as presented and its scheme is shown in Figure 1.

#### 3.1 Classification of Technologies into Subcategories

As a starting point, ICT has been divided into subcategories (these different categories are shown in the online application <http://www.tourisminnovation.eu>). These categories may be common to all regions or specific to some. This subdivision is very important in facilitating the further development of the project. Thanks to this ground-work only a simple cross check point was used during the interviews.

#### 3.2 Interviews & Surveys

The field work to collect all the data for the Technology Map was realized by each partner for its region. Table 1 below shows the number of interviews done by each region.

#### 3.2.1 Supply

During the interviews, the work focused on the collection of information based on the already available technology. The information obtained will be useful to understand what specific technological applications are available in the tourism sector in the participating regions.

The information obtained will be used to classify the identified technologies and determine the future potential for tourism as well as their degree of transferability to other regions.

![Figure 1: Scheme of the Methodology used in the TOUREG Project.](image-url)
Furthermore, the interviews have served to establish direct contact between businesses and will encourage them to take part as experts in the next steps to be taken in the project. One of these stages takes the form of regional round tables where technological transfer will be discussed and agreed.

3.2.2 Demand
A similar series of interview were carried out for the collection of information regarding technological needs or requirements (regional analysis survey results). In this case the objective was to analyze by means of the interviews what the technological gaps of companies working in the tourism sector in each region were.

3.2.3 Policy Markers
To complete this study, we all agreed the importance of the views of policy makers like tourism board who are giving support to the tourism technologies. This way, a similar series of interview were carried out for the collection of information regarding technological needs or requirements (regional analysis survey results).

3.3 Results Analysis
In the same spirit, the Technology Map is made up of regional reports prepared by each region describing their particular technology supply offer and demand needs.

With regard to supply, the analysis of the interview results defined the basic characteristics of each technology and its developers, while also evaluating the real or potential impact on tourism sectors and subsectors.

In addition, the interview results have helped to identify synergies with others technologies or characteristic elements of the tourism sector, as well as:

- Detection of areas for improvement or R&D lines to be covered.
- Technology situation and ways to transfer it.

With regard to a demand analysis based on the technology needs of businesses, it has to be remarked that it has offered qualitative and quantitative information analysis obtained from questionnaires-interviews and needs description per area.

3.4 Validation
PEMENCO & CDT Lulea are in charge of validating the Technology Map, based on their experience and specialization. Their work will include the reviewing of all relevant documents to ensure quality and functionality of the online tool.

3.4.1 Technology Map Validation Process
The task of Validating the Technology Map in the Toureg project was based on the following steps:

1. A preliminary evaluation of the Technology Map is done by CDT/Pemenco. The report is sent to the project members for consideration. The comments indicated an overall positive impression of the Technology Map, while identifying areas to improve which would increase the usability of and the ease of understanding the Technology Map, especially with regard to new users outside the Toureg Project.

2. A short questionnaire is put together with questions regarding the usability of the Technology Map. The questionnaire is sent to the project members, to be returned to CDT/Pemenco.

3.4.2 Preliminary Evaluation
The questionnaire included three tasks to be performed by the person filling out the questionnaire. The intention was to ensure that participants have had a hands-on experience of the Technology Map.

The responses have generally been positive, with suggestions to improve usability and consistent use of terminology. An important comment is the need to align the tools for the supply and the demand side (the version of the Technology Map at the time consisted mainly of the demand side).

Following the evaluation a series of teleconference were

<table>
<thead>
<tr>
<th>Region</th>
<th>Demand</th>
<th>Supply</th>
<th>Policy Makers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Balearic Islands (Spain)</td>
<td>10</td>
<td>14</td>
<td>10</td>
</tr>
<tr>
<td>Madeira (Portugal)</td>
<td>6</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>Creta (Greece)</td>
<td>15</td>
<td>15</td>
<td>9</td>
</tr>
<tr>
<td>Mehedinti (Romania)</td>
<td>13</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>South West (Bulgaria)</td>
<td>5</td>
<td>15</td>
<td>5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>49</strong></td>
<td><strong>59</strong></td>
<td><strong>27</strong></td>
</tr>
</tbody>
</table>

Table 1: Interviews conducted in the Regions involved.
held among the partners to improve the aspect and func-
tions of the Technology Map.

3.5 Technology Map

The Technology Map in the shape of the online tool is
the most visible outcome of the tasks carried out so far. The
Technology Map is accessible for anyone via internet
through the site <http://www.tourisminnovation.eu>. The
following pages describe the configuration of the online
application of the Technology Map. This should make it
easier to upload data into the online application in terms of
demands and technology offerings.

The structure of the Technology Map is divided into two
main areas:

- Solutions/Technologies
- Needs

4 Development and Operation of the Technology
Map

As already mentioned, the Technology Map has been
uploaded to the TOUREG project website <http://
www.tourisminnovation.eu>. It is necessary for companies
to register in advance to get access to the database. Once
registered, companies obtain a password and are assigned a
username which allows them to complete the questionnaire
for suppliers or technology applicants. They will be able to
use the tool to see the available technology applications
and the demands arising in the participating regions.

The logic behind the generation of the map is based on:

- A simple and intuitive interface to input all the in-
formation and contents about the technological applications
and demands identified in the participating regions.
- A regular update of information contained in the
Technology Map.
- The information is processed and transformed into
a structured knowledge base available for the firms estab-
lished in the partner regions of the TOUREG Project.
- The knowledge base automatically loads the informa-
tion to a query interface;
- The interface is dynamic.
- The interface is designed to connect the suppliers
with the technological demands of the participating regions
(matching process) and vice versa.

To obtain homogeneous information in all project par-
ticipating regions, the following methodological tools were
defined by the coordinator of this work package:

- General schema of contents for the regional reports
including the information on the current situation in the
tourist-oriented services sector.
- Questionnaire for in-depth interviews of the major
Information Technology in the Tourism Industry

5 Input Requirements

Upon entering the private area of the website, each company can access the SMEs area and fill in the questionnaire (either demander SMEs or suppliers). To allow this, the main input requirements are:

- To obtain a password for access to the private area;
- Each partner or SME interested must be registered in the SMEs area, so they can insert the answers to be collected;
- All the questionnaires must be filled in using the online forms.

The questionnaires will be saved in a specific structure, in order to build the Technology Map, based on the responses received.

In a first step, each region, having carried out an average of 30 questionnaires is responsible for the uploading of the questionnaire responses to the online tool in order to create a primary database and generate interest in this tool. However, it has been decided that after this initial impulse to the tool, all companies will register directly.

5.1 How to fill in the on-line Questionnaires?

Each company will access the private area by entering their respective username and password in the homepage in the TOUREG website, <http://www.tourisminnovation.eu>.

In the private area there is a link to each of the questionnaires. This way, both suppliers and consumers can submit their answers.

After choosing the questionnaire, the questions will be presented with the format of a word documents as defined earlier. To complete the questionnaire, the answers just need to be submitted. The responses will all be saved in a database.

Figure 2 shows the home page of the website.

5 Output

5.1 Technology Map Description

The Technology Map is aimed at two different public targets: the Demand (users/consumers) and the Supply (technology providers). This approach is intended to link the technological solutions available in the regions with the demands

<table>
<thead>
<tr>
<th>Region</th>
<th>ICT</th>
<th>Energy</th>
<th>Environment</th>
<th>Others</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Balearic Islands (Spain)</td>
<td>59</td>
<td>1</td>
<td>1</td>
<td></td>
<td>61</td>
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<tr>
<td>Madeira (Portugal)</td>
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<td></td>
<td>19</td>
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<tr>
<td>Mehedinti (Romania)</td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>South West (Bulgaria)</td>
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<td></td>
<td></td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Norrbottens (Sweden)</td>
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<td></td>
<td></td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>88</td>
<td>9</td>
<td>3</td>
<td></td>
<td>100</td>
</tr>
</tbody>
</table>

Table 2: Registered Technological Solutions.

<table>
<thead>
<tr>
<th>Region</th>
<th>ICT</th>
<th>Energy</th>
<th>Environment</th>
<th>Others</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
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<td>4</td>
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<tr>
<td>Creta (Greece)</td>
<td>20</td>
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<td></td>
<td></td>
<td>36</td>
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<td>Mehedinti (Romania)</td>
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<td>17</td>
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</tr>
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<td>Norrbottens (Sweden)</td>
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<td></td>
<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>87</td>
<td>43</td>
<td>0</td>
<td>2</td>
<td>132</td>
</tr>
</tbody>
</table>

Table 3: Registered Demands.

players in the sector in question in all the project regions;
- Identification file specifying the most interesting features of all the technologies used;
- SMEs survey methodology: simple questionnaires to identify their specific problems and needs.

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made by companies working in the tourism sector.

5.2 Consumers Map

Consumers are always looking for the right solution for their problems, so the following levels have been defined:

- **1st level**: The most common problems in each sector are listed in relation to energy, water, waste, land transport, ICT and management, and those with greater potential for optimisation, of which the user selects one.

- **2nd level**: The map details some available solutions and technologies for the resolution of the problem selected. This step can be considered as a catalogue of solutions. To further detail the map the following two levels have been introduced.

- **3rd level**: Once the solution/technology is chosen, the map gives feedback in the form of a Results Sheet containing technical and financial information, and a suppliers list organized according to region.

- **4th level**: Once the supplier is chosen, the map presents the available contact information of the supplier and a link to their website.

5.3 Suppliers Map

Suppliers are providing a series of technologies responding to the market demand. With this in mind, the levels are structured as follows:

- **1st level**: The supply map includes the following list of technologies by sector:
  - Communication and hardware.
  - Environmental solutions.
  - ICT Solutions.
  - Renewable energy use and energy saving solutions.
- **2nd level**: The map presents all the solutions that were mentioned as needed by the demand companies through the questionnaires.
- **3rd level**: Once the solution is chosen, the map responds with a description of the specific solutions, the complexity of its implementation, benefits, return of investment and a cost indicator as well as the list of companies that supply that kind of solution ordered by country.
- **4th level**: after choosing the company, the map responds with the contact of the supplier, including address, phone, fax, e-mail and description.

The next page contains two specific examples. On one hand there is a map of technology demands and on the other there is another including technology provider as shown in the online tool.

5.4 The Technology Map in Figures

From the interviews conducted by the different partners, the initial results of the global picture by regions related to the Technology Map are presented below in Tables 2 and 3.
These tables show that the ICT group is the one that is representing the biggest amount of technological solutions as well as demand so we can see that this sector the market is well adapted to the needs of the tourism companies, and there are more possibility to create a market transfer in this area.

Secondly we can see a gap: The Energy solution demand is higher than the amount of technologies available.

As far as the Environment sector is concerned, the tables show a lack of technological demand which is a surprising data. Nowadays, we cannot ignore the global climate change situation, what should lead to adopt environmental technologies in the tourism companies.

Figures 3 and 4 show examples of consumers map and suppliers Map.

6 Point of Situation and Next Steps

This paper is a description of the work realized to elaborate the Technology Map of the TOUEG Project. It includes different aspects like:

The methodological process, as well as the vision of the partners on how it has to reflect the technological situation of the SME in each region.

An on-line web based tool is part of the project backbone and has been presented to the SME during the regional meeting with a lot of interest demonstrated by the participant. This format is very well adapted to our project as it is in continuous evolution, in the way that a new SME can register any time and update the information to the market reality.

Taking into account that the final objective of the project is the technological transfer the on-line Technology Map is aimed to be a "virtual market place", a place to facilitate a meeting point between the technological industry and the consumers.

Final results of the Technology Map will depend on data introduced by end users from both perspectives (supply and demand) into the on-line tool. It is important to have both quality and quantity. To achieve this some Marketing and Communication activities will be carried out next at the short term.

Additionally, next steps will include the definition of the itinerary of the transfer and give practical recommendations and best practices in a practical handbook to the SME in the Tourism Sector.