E-commerce, e-business and e-tourism
Trends and Challenges

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Content

• Introduction – e-tourism
• Forecasts and situation
• Challenges
e-tourism – some observations

- Travel and tourism among most important application domains in b2c e-commerce
- But IT already important in the past (CRS/GDS in the 60s)
- Successful use of ICT – example of growth potential of tourism
- In Europe 82% of accommodations have Web site, Austria 94% (DG Enterp., EU 2005)
- In Europe in 2004 51% increase in Online bookings (Phocuswright, 2004)
- In the US in 2004 Internet sales represented about 18% of all travel / tourism sales, in Europe about 8% (Marcussen, 2005)
- Fast development – in 6 years from *online presence* over *transaction support* to *customer retention* (3 system generations)
- Changed information, booking as well as travel behavior
- Tourism is information based, it is an “information business”
e-tourism (2)

- Tourism industry sees IT as a strategic issue
- IT industry takes travel & tourism seriously
- Uptake by and emergence of a research community journals and numerous conferences – starting point: **ENTER conference 1994**
- International and several national (research) programs

- Distributed over different areas (computer science, IS, geography, sociology, tourism research)
- And it already starts to be differentiated
Forecasts

• Huge growth
• Increasing transparency and falling prices
• Further IT push – (e.g., mobile applications)
• „Reversed“ markets und new market forms
• Flexible cooperations
• Disintermediation
• More democratic structures – „relative“ advantage for smaller companies
Situation

• **B2C rather evolutionary development**
• 16% of all companies sell online, but only 9% of them do more than 5% of turnover – Web as additional channel / Multichannel management (Eur. e-business report; 04)
• Sectoral differences – **Tourism**
• Smaller companies lag behind, problem know how and costs
• Tourism: destinations behind – operational and business model? integrated processes (incl. booking) or aggregated content / linking
• Market: low entrance barriers facilitated new players and their strategic positioning
• “Traditional” players react(ed) with competitive response, branding and multi channel approaches
Situation – 2

• Mobile applications – missing business model (focused on telcos) and unknown „acceptance“ patterns
• Decreasing prices – only partly (Walden et al., 2002)
  – Individualization, individual prices and recommendation
  – Branding (Amazon)
• Disintermediation and re-intermediation
• Immediate imitation of business models and technology
• e-commerce favors, in tendency, buyers – individualization / personal prices, also online journals (travel blogs) and personal recommendation sites; active in product definition (priceline) from customer focused to customer driven
• New market forms – auctions and comparison shopping
And ...

• "Informatization" of entire value chain
• From e-commerce to e-business – Internet based integration of processes – e-commerce transforms industry
• Not only process reengineering, but also network engineering towards smart business networks
• Services become commodities – deconstruction of value chain
• In parallel trend towards concentration – Winners take it all
  In Europe the top five online travel agencies have approx. 60% of the online travel agency market; in the USA the top five approx. 80%; four out of five Europeans bought by US companies
• Web: Evolution of order and disorder
Challenges

• Markets
  – Business models (in networks, e.g., for destinations)
  – Market design – dynamic structures and pricing

• Users
  – Enabling access everywhere anytime
  – Behavior analysis and user modeling (from evaluation to explanation and prediction)
  – Support of tourist decision process
  – On-site companion

• Supply side
  – Support of autonomous networked “nodes”, dynamic network configuration in a heterogeneous and distributed environment
  – Semantics – interoperability
  – Intelligent cooperation
  – Destinations as cooperative networks

• General issues
  – Increasing complexity: structures, processes and technology
  – “Permanent” innovation and development
Conclusions

• E-commerce – e-business transforms industries
• Integration of processes and network management
• IT a strategic issue in the travel / tourism industry, and this industry is a rich field for applications and research
• Integration of research and application as well as industrial innovation
• Multidisciplinarity major issue

Digital divide

Thank you for your attention
Intelligent cooperation

- Middleman looks for 100 hotels with ski lifts nearby in the Tyrol within 50 km to bundle them with flights
- He has contracts with some of the providers, but not all
- He starts communication sessions with some of them
- In the search specific business rules
  - Supplier ones: minimal occupancy / price
  - Middleman ones (contract rules, preferred partners) and his utility function
- For “automatic” bundling specific techniques are needed (constraint reasoning, multi-value optimization, …)
- Utility function depends on type of middleman

Package max cost: 450 $
Date: 05/12/05 – 15/12/05
Services: half board
Interface to: Flight xxxx
Requirements

• Needed
  – Homogeneous repositories (data and services)
  – Unified system of meanings
  – Unified system of interaction (semantic web services)

• To support
  – Autonomy and decentralization
  – Dynamism (need for dynamic configuration and discovery)
  – Coordination (mappings of meanings)
  – Mapping of business rules and models to implementations
  – Turning applications into problem solving environments
Semantically enabled Serviced-Oriented Architecture

<table>
<thead>
<tr>
<th>Problem-solving Layer</th>
<th>Security/Trust</th>
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<tbody>
<tr>
<td>Common Service Layer (CSL) = <strong>WSMX</strong></td>
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<td><strong>Semantically Empowered SOA (SESA)</strong></td>
<td><strong>WSMO</strong></td>
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<td><strong>WSML</strong></td>
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<td><strong>WSDL-S, WSRF-S, OGSA-S</strong></td>
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<td>Resource Layer (OpenGrid, WWW, ...)</td>
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[Brodie et al., 2006]
Harmonise  [Fodor and Werthner, 2005]

• EU research project for a mediation service for information exchange, not being forced to adapt to one standard. No single institution/company has power to impose a standard (as the CRS/GDS in the past)
• To develop an “organizational” network to support this service Based on a social consensus process;
• Partners
  – International tourism organisations
    ✓ TTI / OTA – Travel Technology Initiative / Open Travel Alliance
    ✓ WTO – World Tourism Organisation
    ✓ IFITT – International Federation for IT and Travel & Tourism
  – National Tourist Board such France, Portugal, Spain, Sweden, Finland, supported by European Travel Commission
  – Co-operation with other initiatives
    ✓ ebXML (E-business extensible mark-up language)
    ✓ CEN (Comité Européen de Normalisation)
  – Private companies
Harmonise Context

- Business Process
  - Protocol
    - Exchange Data
      - Transport Data
  - e.g. reservation
    - e.g. query, await response, and process response

XML

Network
Tries to solve conflicts such as

- Different naming
- Different value domains
  - Different measures (e.g. for temperature)
  - Different levels of granularity (e.g. near airport vs. distance to airport)
- Different abstraction levels
  - Generic terms vs. more specific
    (e.g. swimming pool vs. indoor and outdoor pool)
- Different structuring
  - Separate type vs. part of a type (e.g. address)
Harmonise Space

H1, H2, H3: Customized Harmonise Gateways

TO1

H1

TO2

H2

Tourism Ontology

H3

TO3

Harmonise Space
Two steps towards harmonisation

1. Lift to the Conceptual Level (Normalisation)
   - Resolves structural heterogeneity caused by different data representations
   - Ontology and local data models are represented at the same level as graphs of concepts and properties (relations, attributes)

2. Semantic Mapping and Reconciliation
   - Resolves semantic heterogeneity caused by different understanding of the same world
   - Semantic Map - declarative definition of transformation rules
Local Conceptual Schema (RDFS)

Customisation phase

Semantic mapping

C-Norm

Semantic Map

Ontology Repository

Ontology Schema (RDFS)

Cooperation phase

Local Normalized Data (RDF)

Reconciliation Engine

D-Norm

HIF Instance

Two phases
Harmonise

- Harmonise implemented with Web Services (open source)
- Ontology Building manual process with partners
  - Events
  - Accommodation
  - Duration 5 and 2 months
  - Supported by Consensus and Ontology Building Tools
- Real and test ontology (over 400 concepts)
- Targeting at interoperability at level of information exchange was successful
- Used in several other projects (e.g., European portal)
Supporting the user

- Integration of pre-, on- and after-tour support
- Support in product selection
- Not only search for single ‘components’, needed support for bundling of different components
- Complexity:
  - **User**: Match personal characteristics (socio-economics, user goals, psychological/cognitive factors) and product attributes – complex structure (data structures)
  - **User interface**: Navigation for different kind of users, supporting many functions (e.g., search, browsing, booking, comparing, filtering), types of devices and modes of interaction (“pro-active”)
- But not only a rational process, tourism products multi-sensory nature – support associative and emotional aspects
Trip@vice - as an example

• The system helps the user to select products and to bundle personalized travel plans

• The user is supported by the system, by means of:
  • Recommendations
  • Conversational aspects – query refinement (relaxation & tightening)
  • Bundling

[Ricci et al., 2002]
Case-Based approach

1. Search the catalogue
   - Current Case
   - Travel components
   - Objects from Catalogue

2. Search Similar Cases
   - Case Base
   - Case Base used for
     - Ranking
     - Bundling
     - Attribute selection/ranking

3. Output Reference Set
   - 3. Output Reference Set
   - Ranked Items

4. Sort objects obj by similarity to objects in reference cases
   - Ranked Items
   - obj1
   - obj2
   - obj3

Suggest Q changes

Input

- Q

Output

- Reference Set
- Ranked Items
- obj1
- obj2
- obj3
8 Locations found.

The elements found meet all research criteria for your request. For more information, click on the location in your travel plan.

MADONNA DI CAMPILGIO
Valle Rendena, Madonna di Campiglio
Situated between Presanella and the secchi, this location offers:

- Altitude: 1500 meters
- Activities: 
  - Walking
  - Skiing

VETRIOLO
Alta Valsugana, Panarotta
Water springs with curative properties flow from Vetrilo mountain, near Levico. The first spa establishment was built in Vetrilo at the end of the last century. Later the waters were canalised to Levico where a new establishment was built.

- Altitude: 1500 meters
- Activities: 
  - Walking
  - Spa

PASSO BROCON
Valsugana Orientale, Tesino, Passo Brocon
In winter Brocon Pass is the main skiing resort of Tesino and links the highland with Vano: here you can practice cross-country and downhill skiing thanks to a number of drag lifts and a chair-lift.

- Altitude: 1600 meters
- Activities: 
  - Skiing
  - Cross-country skiing

**Travel preferences**

- Brett's travel preferences: 
  - Travel with family
  - Stay in hotel
  - Budget: Between 200 and 400 €
  - Car

- Your preferences:
  - Travel with family
  - Stay in hotel
  - Budget: Less than 200 €
  - Car

- Interests: 
  - Sports
  - Adventure
  - Relaxing
  - Art and Culture
  - Enogastronomic
  - Landscape
  - Environment
  - Ecology

**Why this recommendation for you?**

- Search on the web
- Other User's feedback
- Give us your feedback

**Go to the top**
Simplified Case Structure

- twc (travel wish): defined at start and modified during session
- tb (travel bag = product bundle): generated during session
- u (user data)
- r (user feedback): for each element und entire travel bag
- But complex model (tree) with many different elements
With Cases $c = (twc, tb, u, r)$ and $c' = (twc', tb', u', r')$ similarity is

$$\text{Sim}(c, c') = \left( \frac{1}{\sum_{i=1}^{5} W_i} \right) \left[ W_1 \text{Sim}(twc, twc') + W_2 \text{Sim}(tb, tb') + W_3 \text{Sim}(twc, tb') + W_4 \text{Sim}(u, u') + W_5 \text{Rew}(r') \right]$$

$$0 \leq W_i \leq 1$$
Link with mobile application

The initial list of best candidates

Details of restaurant
User can give feedback on features

Additional user feedback
... and browsing
Results

• With two systems (with / without recommendation module)
• Two groups with search for defined Travelplan
• Result:
  – Less queries and information objects / pages
  – Similar session duration (“users read more”)
  – Selected item higher in list
• Also evaluation of mobile application good results (paradoxon: number of elements in result list)
• Used as module in other applications (e.g., European portal)
• But: pre-defined personalities, to be selected by user, produce also good results – without complicated algorithm (Gretzel et al., JITT 7/1; 2004)