

# e-tourism

## History and Challenges

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Based on numerous contributions of many colleagues and friends



## Outline

- Tourism
- Short history of e-tourism
- Reflection
- Some future issues

## Tourism



- Tourism huge industry, and steadily growing in 2020 estimated 1.6 Bn intern. arrivals
- World-wide networked industry
- In Europe 1.3 Mio enterprises, 95% very small
- Few big players and complicated value chain
- World-wide demand (but different context, „non-frequent“ users)
- Product/service is complex (bundle), emotional and confidence good

Tourism (stated already in 94/95)

- **information business**
- **(future) is electronic**
- **structural change**

## e-Tourism

- Travel and tourism a major domain in e-commerce/e-business
- IT of **strategic** importance for the tourism / travel industry  
-> reciprocal relationship
- IT already important in the 60s (CRS/GDS - Computerized Reservation Systems / Global Distribution Systems: Start/Amadeus, Sabre, Galileo, Worldspan)
- Systems restricted to few and strong players (e.g., airlines, CRS/GDS, tour operators, travel agents' and hotel chains)
- Expensive technology, proprietary protocols, limited bandwidth
- IT with CRS/GDS changed tourism => mass tourism

## e-Tourism

- **e-tourism:**
  - Design, Implementation and Application of IT / e-commerce solutions in the travel and tourism industry
  - Analysis (of the impact) of the respective technical / economic processes and market structures
- **Practically:** everything that happens electronically in the travel and tourism industry

## Short History: Early Beginning

- In tourism “outside” CRS/GDS it started in the late 80s
- Fast evolving electronic consumer market in the 80s (with PCs)
- First “electronic” tourism destinations, with connected PCs via telephone lines, content distribution to Minitel / France, Teletext, and CRS/GDS – in early 90s
- **No Web**, Internet not used, proprietary protocols
- First system: TIS (Tirol Information System), Austria, 1989

## The Web Start

- Starting with simple online presence in 1995 / 96
- Tourism one of the first sectors „moving“ to the Web
- Early forecasts
  - Enormous growth
  - Transparent markets and decreasing prices
  - Free / open market access, suppliers with direct link to consumers
  - More democratic structures – benefits for smaller companies
  - Flexible cooperation between different suppliers
  - Lower transaction costs (search, negotiation, settlement)
  - Simpler and more interactive systems for users
- Web is a strategic issue (at that time an academic statement)

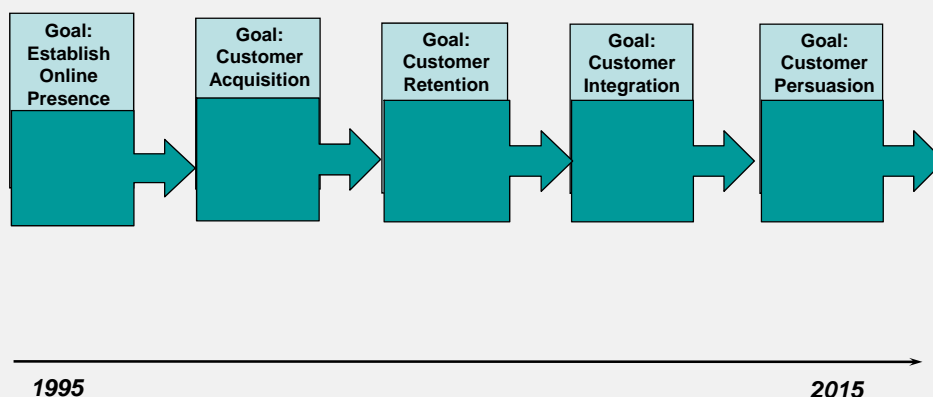
## Excursus: Early e-tourism Research Topics European Research Program (1998)

- Interfaces for different context (non frequent users)
  - ➔ *Intelligent Interface*
- Different data sources with different formats and semantics
  - ➔ *Interoperability, metadata models*
- Distributed systems from planning to distribution
  - ➔ *Mediated software / service architectures*
- Merge TV, Web and mobile
  - ➔ *New multimedia frameworks / applications*
- Active research and development since early beginning
  - Analytical as well as constructive and applied
  - Challenge: combination of different disciplines and methods

## The Take Off

- Tourism “really” electronic in late 90
- Traditional players (TA, TO) were reluctant
- E-commerce facilitated consumer trends
  - More and shorter stays
  - Late decision
  - More personalized services with consumer integration and empowerment
- E-services developed from pure online presence over booking systems to consumer integration
- Today: well developed business landscape, high “penetration” on supply side and high user numbers
- Many new players

## Several Generations in Few Years





## Innovation

- In essence from outside, with two types:
  - Copying (or extending) existing services and players
    - Travel agents / tour operators (expedia)
    - Domain specific transaction / booking support - (bookings, airline systems)
  - New services
    - New market forms / negotiation / auctions (priceline, e-bay)
    - Search and compare (Google, trivago, checkfelix)
    - Community / user integration (tripadvisor, facebook)
    - Exchange / sharing (Airbnb)

## Innovation – 2

- Disruptive innovation following a platform strategy
- Platform:
  - Technology & service opened for broader independent “ecosystem” of users & companies creating network effect;
  - Benefit from innovations from others, also competitors
- Focus on market transaction, do not “own” product
  
- Paradox: destination organizations, initially innovation leader, lost their position, despite being “network” organizers

## Summary

- From *customer focused* to *customer driven* / Users are content & service providers (prosumer and user empowerment)
  - Already in 2001 *Not just business, also fun*
- “Informatization” of value chains, market efficiency increased
- Services became commodities – deconstruction of value chain
- Complex structure (dynamic network structures)
- At the same time concentration trend – Winners take it all
- Web: Evolution of order and disorder
- Issue: not *process reengineering*, but *network engineering*
- *Chance for small companies*: digital divide (geography and size)

## Future Developments

- Further network effects (multi-sided markets) / concentration
- Commoditization of services with always new services on top
- Further segmentation and personalization
- Bundling vs. unbundling issue
- Total customer care (along transaction phases and different customer life cycles) vs. "do it yourself"
- Platforms will prevail:
  - Also in the P2P (sharing) markets
- Competition between electronic players will lead to blurring boundaries and to
  - Breadth of offering (coverage of further products, choice)
  - Richer interaction / recommendations (emotional based, implicit)
  - .....

## Research Issues

- Using concept of *Digital infrastructure* with 5 layers (Werthner et al., 2015):
  1. Individual
  2. Group / social
  3. Corporate / enterprise
  4. Network / industry
  5. Government / policy layer (more principles!)
- Both service and technology view





## Research Issues – 2

1. Individual
  - Counseling, recommendation, persuasion and enjoyment
  - Mobility, context awareness and service proactivity
  - Switch-off button
2. Group / social
  - Group decision making, also with ad hoc groups
  - Sharing group experience
  - Collaborative and sharing markets
3. Corporate / enterprise
  - From performance analysis to action (incl. innovation)
  - Rapid software development and implementation
  - Multi-channel incl. social platforms
4. Network / industry
  - Technology/innovation diffusion models
  - Analysis of network structure and dynamics
  - Cross platform approaches

## Recommender Systems

- **Problem:** Selecting and proposing a tourism product (hotel, destination) and related services / products
- **Complexity:**
  - **User:** preferences (constraints on products), travel means, travel party, personality
  - **Product complexity:** product / service might be fuzzy; the same product might serve different needs (example: one or two bed room); product is a bundle
  - **Data and knowledge:** tourism information repository complex (“models the world”) and heterogeneous (data structure), distributed
  - **User interface:** ease different needs (browsing, searching, playing) of non-frequent users, probably not knowing the product terminology
- **Some issues**
  - Personality and preferences
  - Bundling
  - Group experience

## 1. Personality Based Approach

- Tourism (holiday) product emotional / non “rational”, and non every day product
- Non frequent users -> problem with users' product preferences
- In addition, users might not be aware (not explicitly given)
- Distinguish between the user's product dependent attributes (preferences) and user specific characteristics (e.g., personality)
- Complex user profile with at least two layers
  - Personality – user (“longer lasting”)
  - Preferences – product

## Personality

### Starting points

- Framework by Gibson and Yiannakis
  - Comprises 17 tourist roles such as *Sun lover*, *Action seeker*, *Organized mass tourist*, *Explorer*, ...
- “Big 5” personality traits
  - *Extraversion*, *agreeableness*, *conscientiousness*, *neuroticism*, and *openness*
- Survey (1.000 participants) relates tourist roles to personalities
- (Delic et al., 2015) show relation between personality and roles (“Sun lovers are nervous”)
- Factor analysis led to 7 factors (profile patterns), e.g.:
  - Connected and sun loving
  - Educational
  - Seeker
  - Culture loving
  - .....

## Personality Elicitation

- (Berger et al., 2007) show relation between pictures and roles
- (Neidhardt et al., 2014) relate pictures, personality and roles
- Use pictures for identifying / eliciting user profiles
- Based on these profiles system can offer specific products

## Picture-based Search

pixmeaway

sign up | login | home

my selection

3 places found  
3 travellers found

[show all](#)  
[show overview](#)

### You are ...

#### Toby

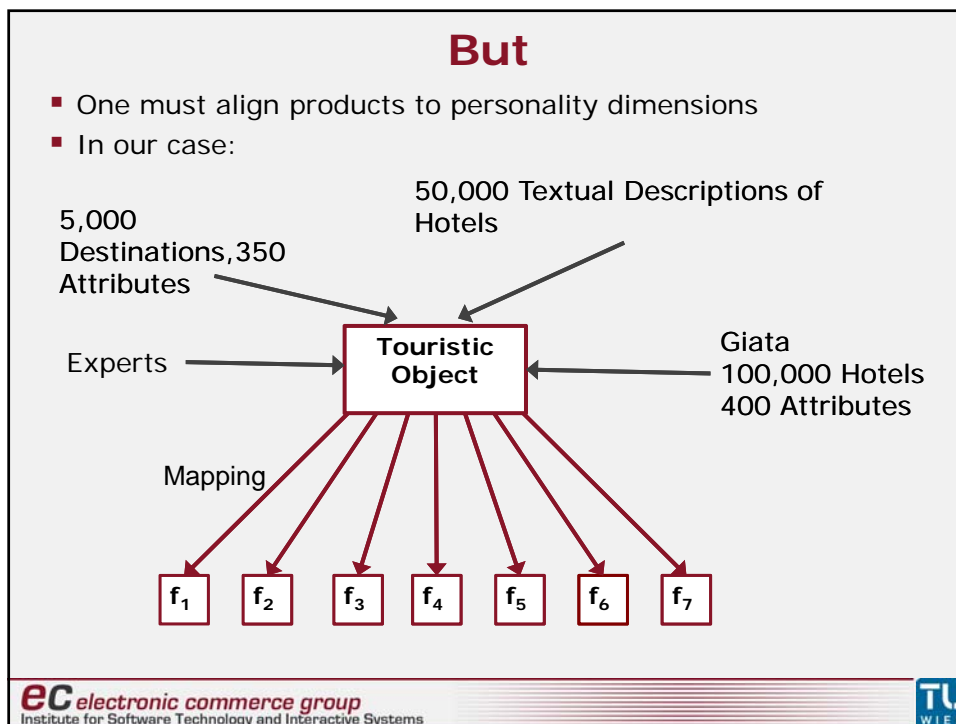
The independent traveler

**You like:**  
traditions, history, famous places, back to the roots, explore the meaning of life, self-organize traveling, planning your own route.

**You are:**  
open minded, a seeker, philosophical, sentimental, a thinker, flexible, curious.

**You don't like:**  
packaged vacations, crowded parties, artificial places, uninspiring places.

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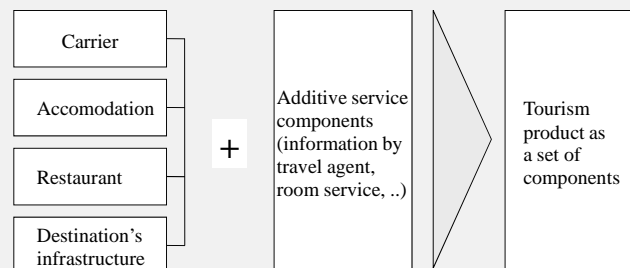
## Mapping

Different approaches

1. Experts (10 „independent“)
  2. Machine learning from text to identify concepts, to be matched to profiles
    - 50.000 hotels with description: in total 210.000 from 67 TO
  3. Machine learning using hotel attributes to be used for mapping
    - GIATA provides 100.000 hotels with 400 attributes (e.g., stars, ...)
- Experts work well, but .....
  - Machine learning works well for **sunlover**, but not for **seeker**, ...
  - **Proof of concept**: in event sector purchase rate of e-mail marketing campaign increased by 60% (A/B test with 50.000 users)

## 2. Bundling

- Experience depends on bundle of items (product and service)



- Bundling is a hard task
  - Bundle assembled from a huge set of (pre-defined) components
  - Components may serve different needs
  - Specific connection points between components / complex interfaces w.r.t. profiles, preferences, space and time
  - Domain knowledge that rules out invalid assemblies
- Task is to find a composition of components that is valid w.r.t. all applicable restrictions

## Bundling – 2

Attributes on two levels:

- Components: location, arrival and departure date, category, price, etc
- Bundle: function of components' attributes: total travel time period, price

Bundle solution:

- Optimal, or a satisfying one
- Backtracking

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## 3. From Individuals to Groups

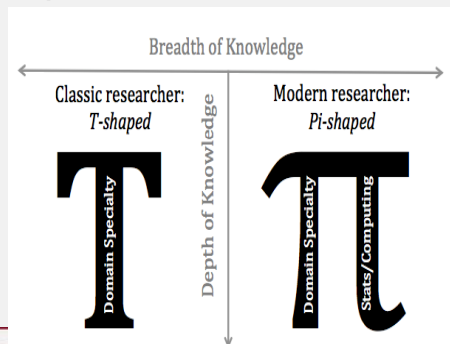
- Tourism is a group experience
- Group: aggregation on profiles (complex: personality and preference) or on recommendations
- Group model has to take in consideration
  - Individual level - individual characteristics of members (personality and preferences)
  - Group level with group characteristics & composition
  - Network structure of group
  - Group dynamics (e.g., emotional contagion & conformity)
- Group decisions are a result of a process, built during a group discussion process
  - Opportunistic behavior? May depend on personality
- Evaluation framework to cover different levels
  - No ground truth

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## Short Note on Research Approaches

- Multidisciplinary and interdisciplinary, with different methods / paradigm
  - In Computer Science: formal, engineering, science
  - Methods from application domain and other sciences (e.g., Psychology)
  - Applications needed – especially issue of data driven “paradigm”
- Banerjee and Ceri (2015) see move from **T-shaped** to **Pi-shaped** model
  - T-shaped: domain specialization (vertical axis) with horizontal knowledge (i.e. general and cross-disciplinary competences)
  - Pi-shaped – another vertical competence: specific **mathematical, statistical, and computational** abilities



## Conclusions

- Several forecasts were wrong, some issues are still open, but many developments were foreseen
- IT changed tourism (not only structure, also, e.g., tourism experience, counseling process)
- Further disruptive innovation: technology & service waves
- Innovation from outside
- Further concentration as well as new services
- Complexity will not decrease (structures & technology)
- Importance of research with **Π** shaped model

