Future research issues in IT and tourism

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Future research issues in IT and tourism[1]

A Manifesto as a result of the JITT workshop in June 2014, Vienna.

The objective of this manifesto (as a result of the JITT workshop in June 2014) is to identify a list of pivotal research topics and issues in e-tourism. E-tourism can be seen as everything that happens electronically related to the travel and tourism industry/experience; more formally it is defined as the design, implementation and application of IT and e-commerce solutions in the travel and tourism industry as well as the analysis of the impact of the respective technical and economic processes and market structures on all the involved actors and especially on the traveller's experience.

With tourism being an "information business", Information Technology has always played an important role since the 60s; Computerized Reservation Systems / Global Distribution Systems (CRS/GDS) were some of the first world-wide electronic networks. And since the beginning of the Web in the early 90s, travel and tourism was and is a major application domain for Web-based services. As such, the domain is also a major driver of technological innovation.

This manifesto provides guidelines on strategic research issues for the research community, but as such it is also conceived as a basis document for industry and policy makers. We believe that the need for such a strategic view is further motivated by the following observations:

- The field is mature, the industry has been radically changed and users have adopted an ever growing range of new information and communication technologies.
- On the other hand, the field of ICT and Tourism is continuously opening new technical and business possibilities and challenges, leading to a rather complex situation where some guidance and consensus might be needed.
- Finally, specific problems arise since the issues are, very often, at the interface between scientific research and development, and require inputs from multiple disciplines, such as computer science, management science, economics, communication, cognitive technologies or tourism research. Consequently, this interdisciplinary nature of research leads to a mix of different approaches and methods such as quantitative as well as qualitative behavioral research, constructive research or formal methods.

In this first workshop we concentrated on research topics and their relationships. This manifesto will therefore describe these topics according to a layered view, shown later. Future workshops will, based on these first results, discuss how these issues could be approached - and also identify the needed "multidimensional cube" of disciplines.

As a starting point we would like to denote current and future technical developments that appear to be very influential and will probably become reality in the near future[2]:

- Mobile applications running on many different devices, not only one
- Internet of Things with permanent connectivity

[1] The two-day workshop was organised by the JITT editorial board, with approx. 15 participants (editorial board members).

[2] In the following, and in order to keep the document short, we use bullet points to highlight specific issues.

- Novel paradigms of the interaction between humans and computers such as new search and recommendation approaches (emotional, implicit, sensor based, pro-active)
- Data analytics (not using the buzzword "big data") on all different levels - person, group, enterprise, sector specific – with applications building on the advancement of machine learning techniques
- Collective intelligence, or the intelligence of the crowd, resulting from crowdsourcing processes
- Light weight software engineering and tools, enabling ubiquitous applications of new system engineering paradigms and leading to more prototype and "try and error" based approaches

Moreover, at the market and service level, we attribute high importance to the following issues:

- Strong network effects (in multi-sided markets) and further market concentration
- Introduction of new services and ongoing commoditization of existing services
- Further segmentation of consumers - will also lead to more personalized offerings
- Interesting dialectic of bundling vs. unbundling (see airlines vs. other tourist sectors)
- New Peer-to-Peer (P2P) markets, where we can also expect that strong intermediaries will appear as well as the entrance of established players with product offerings and sharing (probably similar to information sharing)
- Total Customer Care services (across transactions and different customer life cycles)
- Competition between different electronic players will lead to blurring boundaries and to:
    - greater breadth of offerings (coverage of the market, choice);
    - improved quality of search (for customers with complex queries) and recommendations;
    - more and "better" content (for orientation, assurance and trust);
    - enriched contextual information (e.g. destination, local info, weather);
    - and, strong booking engines may replace destination management systems.
    - Sophisticated, adaptive advertisements.
- In general, we assume that platforms and platform approaches will prevail.

Finally, we foresee that the complexity gap, which is supposed to narrow with new solutions, will in fact remain or even increase, since all new types of applications and available data necessarily increase complexity. The gap will be shifted to a next higher level. In essence, this never ending development underlines the importance of R&D.

Research Issues

There are several possibilities to structure research topics in the field. However, since the issues discussed refer to innovation and change, or more radically, to digital disruption[3], we based our approach on this particular view. Digital disruptions are closely related to issues concerning digital infrastructure, where one can identify the following five layers, based on Stefan Klein's presentation at ENTER 2014 in Dublin, Ireland: (1) individual, (2) group/social, (3) corporate/enterprise, (4) network/industry, and (5) government/policy. Figure 1 sketches the layers, and they will serve as the basis to classify the discussed research topics.

[3] Defined as changes enabled by digital technologies that occur at a pace and magnitude that disrupt established ways of value creation, social interactions, doing business and even more generally our thinking.

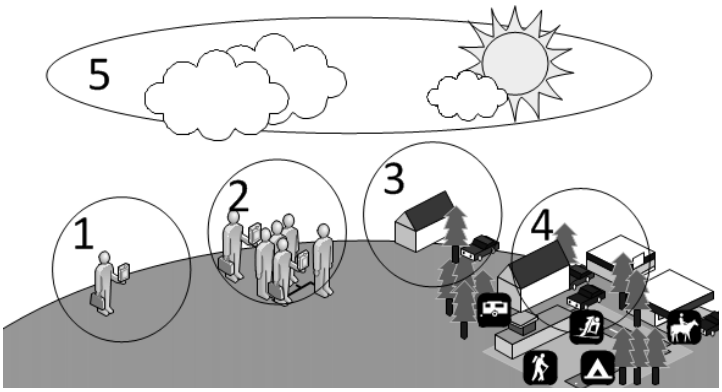

Figure 1: Sketch of layered tourism ecosystem

The description of the five layers tries to follow a common structure: definition of the layer, a further description and context information, and, finally, open issues.

Layer 1 – Individual

In this document individuals are defined as any person or human being from the demand or supply side; furthermore, residents but also any other stakeholder may be taken into account. Another categorization of individuals would be producers, consumers and "by-standers". One can differentiate between e.g. producers and consumers of information, producers and consumers of experiences / products / services. One should keep in mind that most of the users are "passive" consumers and "by-standers", thus, non-frequent users.

Obviously, here the focus is on the interaction between a user (in her/his different roles and identities) and any ICT device or service, using different forms of interaction (human computer interaction - HCI). Furthermore, new types of ICT services are nowadays accessible through a range of different devices and a variety of screens; everyday objects have network connectivity and become "smart" devices (Internet of Things).

With regard to the interaction (being explicit or implicit; lean forward or laid back/enjoying) between users and any of these devices one needs to take into account the heterogeneity of users, their different expectations as well as their cognitive capacities. Furthermore, the new type of customer wants to be engaged and s/he wants to contribute – it is all about the perception of experiences in the various travel stages. There is quite a lot of potential when it comes to surprising users as well as providing features that support exploration.

There is a need for tailored applications and more sophisticated user models that account for differences between users and let the service better adapt to the user's needs and wants. Applications should reduce the cognitive load of users, make sense and, ultimately, increase individual well-being.

Issues are:

- Different level types of user models and their coverage
- Understanding user needs by relying on explicit and implicit preference elicitation techniques
- Mobility, context awareness and service proactivity
- Synchronization of data and functions through multiple devices and platforms
- Adaptation and personalization (with its many dimensions)

- Attention and sentiment
- Technology adoption and diffusion issues – on the individual and group level
- Phases of experience – interaction part of the travel experience
- Optimization of decision making (for different users) vs. enjoyment of the human computer interaction
- Counseling, search, recommendation, argumentation and persuasion approaches, not only of products but also of user-generated content (e.g., an appropriate review)
- Switch-off button – letting users control the technology
- Privacy management
- Evaluation methodologies for a reliable assessment of the benefits of the new technologies

Layer 2 – Group/Social

Groups are defined as two or more humans being in some relation to one another. Groups can be identified along shared similar characteristics, shared purpose or co-presence (on a trip together; at same location). Groups can have many characteristics – size (small, large), established vs. ad hoc, reflecting traditional social structures (e.g. family with 2 adults and children) or new forms of social groupings ("patchwork families"); and group members may or may not directly interact. Furthermore, groups have a structure and roles within: e.g. opinion leaders can emerge. Moreover, the distinction between influencers and followers can play a role in the design as well as in the adoption of technology. Overall, groups are not static, they are dynamic (in structure and/or in size) and can also reach a critical mass with quite an impact on overall decision making. This is especially important when recognizing that groups operate within a context (e.g. local, tourists, and suppliers). Groups engage in joint decision making, collaborative shopping, etc. and have joint experiences.

Technology can actually support interaction, push a non-interactive group to one that interacts or help them to come to agreements; and technology can provide opportunities for virtual extensions of groups (e.g. family skyped in while on trip). Thus, group characteristics determine technology needs (e.g. different size groups have different problems).

Issues:

- Technology to support ad hoc groups throughout formation, travel and sharing phases (a seamless plug and play mechanism)
- Full-fledged support for group bookings and decision making
- Devices for sharing group experience (e.g., for cultural heritage)
- Modeling and analyzing large groups, their dynamics and internal/external relationships
- Crowd decision making
- Common-based peer production or social production
- Collaborative markets or P2P markets
- Forecasting / simulating group behavior
- Reputation and social influence (and related issues such as credibility perceptions of the group and within the group or social space; or self-expression on social platforms)

Layer 3 – Corporation / Enterprise

This layer refers to any organization in the tourism/travel domain such as a private or public enterprise, for profit or for non-profit organization. This covers entities such as primary suppliers as well as intermediaries, tour operators or travel agents, and also Destination Management Organizations (DMOs). These organizations have different objectives and structures, and they act on- and/or offline.

One can observe that they function in a networked environment, both with users and other companies; and company boundaries are blurring. They are confronted with permanent ("new speed") innovation (on a technical as well as service level) coming from different stakeholders, leading also to disruptive innovation and new business models, such as "peer-to-peer travel" (e.g. home/apartment sharing), supported by adequate platforms. They are permanently forced to define and prove their business value to the market, and need a permanent feedback loop, observing their performance, that of competitors and the market in general as well as that of users and technology (technology screening).

In a networked environment one can foresee cross-company (inter-organisational) processes and ongoing network engineering (in an organizational sense). Thus, it is not primarily an issue of process optimization but of networking with the right partners using the proper channels and means. In doing so corporations increasingly have to take into account needs of various stakeholders and immerse themselves into the environment more than ever (e.g., embracing the culture, customs and traditions, cooperate with other organizations) to be able to provide more unique and more authentic experiences.

Issues:

- Cross platform issues (in a technical sense - referring to development and interoperability; but also when managing different platforms) enabling seamless access and control
- Innovation management and open innovation/adoption models
- Knowledge management
- Data/services storage & data quality control: data and services could be stored only once and used/invoked by the providers (open data / services)
- ROI considerations in marketing where companies invest a lot in web marketing
- Understanding customers and markets
- Online reputation management and management of user generated content
- Multi-channel communication and advertisement on Social Web platforms and integration with CRM systems
- Performance analysis, process mining (process and business performance)
- Business model innovation, disruptive innovation, open innovation
- ROI calculation, planning and decision support
- Value of information (quality, how to add value to information, costs)
- Software / tool development, implementation and use

Layer 4 – Network/ Industry

This layer refers to the overall (market) structure of the sector. One can distinguish internal relationships, subsectors of the industry, type of layers and finally the relationships to other industrial sectors. Obviously, not only relationships are important, but also the respective strength and economic "power". Also on this layer one can see the disruptive nature of ICT which has deconstructed classic

business models in various sectors of the economy. It finally led to a radical transformation of the industry.

Lessons learnt from other sectors such as media and telecommunications – as well as from the tourism sector –show that Internet-based newcomers capture the most profitable part of the business by destroying the former monopoly and value chains and by reducing the product to simple commodities.

When discussing impacts of Internet technologies on the value chain in the tourism sector, the rise of Online Travel Agencies (OTA) is a crucial element to consider. Online distribution is progressively shifting away revenue streams from traditional direct and indirect (i.e. DMO, or Tourist Organization) sales channels and actors to the new network-based online intermediaries. Cybermediation or Internet-based new entrants in the travel value chain can play intermediation roles in several ways such as between traditional suppliers and customer ("vertically") or also horizontally between peers (P2P) - up to the point where "every consumer is a potential supplier". Especially this case blurs the boundaries between supply and demand.

Leveraging network effects where the winners take it all as well as economies of scope and scale, these newcomers are taking the lead as distribution channels, allowing them to increasingly control the value chain in the travel industry, mainly in SME-dominated sectors (e.g.: the role of OTAs in the accommodation sector). The transparency of prices, products and user evaluations pushed by these newcomers through Internet technologies has resulted in a customer- and price-driven economic system. As a result, the commoditization of the tourism product is increasing.

Issues:

- Technology/innovation diffusion models – also in different sectors with different speed
- Features that facilitate network effects or specific structures
- Features that facilitate mediation vs. intermediation
- Network dynamics
- Influence analysis
- Cross sectoral input / output analysis
- National and international benchmarks (or their design)
- Sector wide data analytics
- Design, policy and business issues of sector wide systems
- Cross platform approaches – seamless interoperability and common service layers, on different levels (e.g. geographical or sectoral)

Layer 5 – Government/ Policy

This layer is – at least for scientific research – the most delicate one. From a definitional point of view this layer refers to outlining the rules and regulations of the ICT and tourism "game" on a regional, national as well as on an international context, as well as on laying the cornerstones for a sustainable development from an economic, political, socio-cultural and environmental perspective. However, this layer also has to deal with innovating institutional structures and mechanisms for participation in governance processes.

Consequently, the following points refer to general policy or regulatory issues:

Sustainability of the tourism ecosystem needs to be seen from several perspectives:

- Environmental sustainability with respect to resource consumption for building and maintaining the tourism infrastructure and transportation.
- Economic sustainability (including regulation to avoid oligopolistic and monopolistic structures).
- Democratic, participatory development.
- Social sustainability, also with respect to the wealth gap between tourists and employees in tourism and the involvement of local business actors in tourism destinations.
- Cultural sustainability, i.e. to preserve and respect different cultures.

Data Privacy, i.e. sensitive and trustworthy treatment and avoidance of misuse of the data collected about individuals

Data collected by business mediators such as OTAs, National Tourism Organizations (NTOs) and DMOs, by service providers as part of their business activity, by other providers such as telecommunication companies as part of their roaming business, and by public entities due to taxation of tourism services, flight-data exchange agreements, usage of transport infrastructure (e.g. motorways, tolling stations) or visa regulations.

Freedom of movement and **personal safety** for travelers and tourists

Management of authorization processes (visa- and custom-related issues), and of public safety in the host country, as well as management of safety for own citizens in foreign countries.

Self-governance and participation/public bodies

Public tourism bodies such as NTO and DMO platforms have a long tradition in facilitating a self-governing process of the industry. However, they become continuously obsolete as they are not allowed to facilitate bookings, although e-commerce inherently requires one-stop-shops.

Fairness

Traditional players encounter new players that act under more favorable regulations and rules. For instance, large business entities, e.g. in the OTA sector, do business with tourism service providers that cannot be taxed by national authorities. Furthermore, new private sharing platforms offer tourism services that compete with traditional service providers without having to follow comparable regulation and taxation rules.

Perspectives for future development

Research is a main driver for developing and advancing a field. For research on the interface between tourism and technology innovative funding models will be required (for instance, new forms such as crowd-sourcing platforms) that help to integrate the different disciplines and cultures involved as well as academia and industry. Such novel approaches will also require new models for intellectual property rights. When discussing development, valid mechanisms for measurement are necessary: measurement mechanisms such as proper statistics for benchmarking on different levels; these include exchange of data to develop benchmark standards or the development of industry Key Performance Indicators (KPIs) to assess the efficiency of different sectors in specific regions of the industry.

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