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### Editorial

## Special section on generative smart tourism systems and management: Man-machine interaction

Tourists today can search information on their target regions, destinations, restaurants, and entertainment programs in real-time, and often choose the places where people share their experiences (Oliveira and Carlos, 2016). With the advent of smart technologies, tourism is moving towards a new era that includes an ‘on-demand economy’ and a ‘sharing economy.’ These new phenomena are based on Information and Communication Technologies (ICT), which have a significant influence on the operating methods and processes involved in current travel-related industries (e.g. [AirBnB.com](#), [Couchsufing.com](#), and [Uber.com](#)) (Gretzel, Koo, Sigala, & Xiang, 2015). The on-demand economy implies “instantaneousness” and “transparency” (Forbes.com, 2015). Various applications enable the processing of travelers’ requests instantly and transparently. Travelers can decide while they are on the move, such as “booking a hotel room” as they simultaneously check hotel room availability and prices. Conversely, the sharing economy focuses specifically on allowing the sharing of assets (e.g. houses, cars, parking lots, etc.), thereby enabling a collaborative consumption (Economist.com, 2013). This peer-to-peer rental has become cheaper and more convenient when facilitated by new technologies. These phenomena have opened a new paradigm in the tourism industry, called ‘smart tourism.’ Explicitly, we can state that smart means “optimized for a specific need” (Gretzel, Sigala, Xiang, & Koo, 2015) supplied by individual assets in a specific context either on demand or real-time basis.

With the growth of innovative businesses in tourism, travel-related activities and electronic commerce certainly require an infrastructure, such as knowledge-based systems and management (Werthner and Ricci, 2004), cloud computing (Gretzel, Sigala et al., 2015), re-engineering processes (Law, Buhalis, & Cobanoglu, 2014), and smart tourism systems (Werthner, Koo, Gretzel, & Lamsfus, 2015). Because of the new systematic approach, tourism businesses are becoming more affordable. Werthner et al. (2015) stated that smart tourism should be understood as having the overall ingredients of smartness and systems integration with machine and management. We also assert that the notion of smart tourism systems and management lies in digital networks, platforms, and devices that integrate current systems, connected technologies and machines for anyone, anywhere, and anytime while all travel relevant stakeholders mutually benefit from being connected to one another. Previous studies (Gretzel, Koo et al., 2015; Gretzel, Sigala et al., 2015; Gretzel, Werthner, Koo, & Lamsfus, 2015) defined smart tourism as the “use of a technological solution with the

development of mobile applications in the context of travelling phases (pre-trip, during trip, post-trip) by integrating data derived from physical infrastructure; whereas, smart tourism systems focus on managing and delivering intelligent touristic experiences and services produced by smart tourism ecosystems such entities (producers, distributors, consumers, government agencies, travel agencies etc.)”

Poon (1988) addressed that the tourism industry is closely associated with Information Technology (IT) and management in its early years. Through the years, the roles of IT and management have evolved considerably. Their functions have been bound with digitally networked organizations (Kim, Lee, & Han, 2010; Koo, Gretzel, Hunter, & Chung, 2015; Van Heck and Vervest, 2007) through smartphones and open application programming interface (API), which instantly generates creative tourism business models in the mobile age. This trend has led to the emergence of “generative smart tourism systems.” Even though this concept has not yet been explored and defined fully, generative smart tourism can be explained as providing personalized, location-based, and context-aware travel information services on demand, based on the generative process of state-of-the-art IT and management engaging humans and machines. Generative solutions can be created through the use of additional multi-dimensional data from a wide variety of sources. The increase in the variety of data, including image, text, video, equally increases continuous data from clickstream, which in turn increases the quality of the suggested generatively optimized solutions. A generative process can be conceptualized by using the biological notion of genotype and phenotype (Eldridge, 2005). Genotype invariably acts to structure a pre-specified form, whereas phenotype indicates the creation process through travelers’ engagement. More specifically, we believe that high-context solutions will be created by organizationally aggregated data, including transaction, clickstream, and social media. If genotype specification includes mechanisms that are promptly responsive to environmental feedback, travelers or businesses can interact further with the phenotype and potentially affect future outcomes of the system.

Smart tourism systems look for patterns where there may be none, commonalities rather than uniqueness, and predictability rather than rationality. Consequently, the new paradigm would be cheaper but more meaningful and context-driven. Theoretically, an experience-based modification of genotype mechanisms is the key to the creation of inexhaustible and variable phenotype possi-

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bilities. In sum, information management embedded in smartness indicates that the network of cooperating businesses can create better results intelligently than others in a particular context. Being generative and smart in tourism means that the tourism business requires a design that bridges all of the fields' components by collaborating with a man-machine system and management. This type of man-machine interaction enables users not only to design their own personalized tour itinerary, but also to obtain new tour experience by themselves. The new era of the Internet of Things (IoT), which refers to the networked interconnection of things (Xia, Yang, Wang, & Vinel, 2012), may generate additional smart intelligence. Naturally, IoT can raise smart tourism by integrating travelers and things for interaction via embedded smart tourism systems. IoT in smart tourism systems can generate a highly distributed network of devices communicating with travelers as well as other devices, which ultimately could improve the quality of travel. Genotype tourism specification and a digital generative process can be implemented by using the open-ended dynamics of data and the chemical transformation of human experience and machine sensory data. Such implementation can lead to a change in existing traditional facilities, agents, players, and processes (Xia et al., 2012). Lately, IoT has been offering the most seamless transaction process for the main tourism infrastructure and things in the context of accommodations, transportations, as well as food and beverage. A variety of products and intelligence automation systems are now connected in the travelling context and are managed strategically. The challenge and opportunity will be linked together in this tourism area.

Smart tourism aims to uncover the areas and challenges in the execution of smart tourism systems. In particular, selected papers in this special section will unveil the four key components, principally, 'technology,' 'applications,' 'man-machine interaction,' and 'systems and management,' as shown in Fig. 1. The first component, 'technology,' illustrates the various issues that must be fundamentally provided; the second component, 'application,' stands for various business models demonstrating how the value of smart tourism should be generated; and the third component, 'man-machine interaction,' stands for various issues describing how travelers can utilize citizen services and public services to guarantee the quality of tourism through the interaction between travelers, connected objects, and things based on real-time analytics and promotions. The final component, 'systems and management,' examines how the value of smart tourism can be optimized and managed strategically through acquisition, processing, analytics, retrieval, and dissemination in travelling activities at various levels in travel organizations as well as by individuals. In the following sections, we will discuss these four components and how the papers in this special section relate to these components.

## 1. Technology

Recently, various technologies pertaining to travel-related activities and experiences have been in the focus of increasing attention. We addressed the necessity of three layers of interactions to accomplish smart tourism functions, including achieving data, interconnecting with data and processing for analysis, presenting visualization and interface through the integration with other devices and current systems (Gretzel, Koo et al., 2015).

- For collecting data, one of the methods used is 'cookies,' which provide a convenient feature to save online users' time automatically. This technology simplifies the process of recording online users' personal information, such as billing and shipping addresses to allow easy retrieval of information they previously

provided, as well as to allow travelers simpler use of the travel websites features they customized (Park and Sandhu, 2000).

- Web analytics refers to the evaluation, achievement, analysis, and reporting of web data used to estimate how data traffic occurs in a website, including the number of page views. Destination tourism organizations and travel business organizers can find an available potential tourist; thus, web analytics provide what, how, and when to visit the travel websites.
- Geotagging is the process of adding geographical identification metadata to various media, such as a photograph or video. Geotagging can assist users in finding various location-specific information from a device (wikipedia.org, 2016).
- User-generated Content (UGC) is any type of content created by online users, such as blogs, wikis, discussion forums, posts, chats, tweets, podcasting, pins, digital images, videos, audio files, and advertisements. UGCs have been posted and shared on social media platforms, such as Facebook, Twitter, and Instagram.
- Global Positioning System (GPS), Wireless Local Area Network (WLAN), and Bluetooth have been widely adopted in mobile devices and products; furthermore, Near Field Communication (NFC) is also being introduced gradually.
- Virtual reality refers to "a real or simulated environment in which a perceiver experiences telepresence" (Steuer, 1992, p.76). Users frequently wear a headset, which looks like a pair of oversized goggles, to experience a virtual world. This headset can provide travelers with 3D experience in mapping out actual places (Fry, 2015). Virtual maps and navigation apps make travelling in unfamiliar destinations easier, and provide real-time translating service by Google translator.
- Augmented Reality (AR) refers to the seamless overlay of computer graphics onto the real world to add extra information and enhance perception reality. When travelling, travelers spend a significant amount of time actively looking for information. AR could offer rich information tailored to the individual's needs and interests (mixedrealitystudio.com, 2016).

## 2. Applications

Applications with API and other devices (e.g. augment reality, virtual reality, etc.) have recently been in the focus. Generally, smart tourism envelops information and communication based on infrastructure (e.g. software, hardware, and networks) and systems and capabilities (e.g. governance, management, and process) to gain traveler experiences, as well as sustainable competitiveness of tourism and destinations (Gretzel, Werthmer et al., 2015; Hunter, Chung, Gretzel, & Koo, 2015; Koo et al., 2015). Business Insider (2012) also recently noted the growing popularity of free mobile apps that designed to assist travelers. The travel applications include the apps that create the customized itinerary for travelers tracking their flight and hotel reservations, search the available cheapest flights and find the nearby public Wi-Fi hotspots.

## 3. Man-machine interactions (i.e. IoT)

IoT is another wave that connects every object to the Internet and enables these objects to identify themselves to other things (i.e. devices). Furthermore, IoT can gather, store, and retrieve data for traveling purposes. The people in destinations temporarily share their goods and services, such as houses and cars, with tourists. In sharing facilities and services through apps, the exchange of assets and demands of citizens and travelers have become easier than ever before. This type of economic interaction provides travelers with limitless choices in diverse areas of accommodation, transportation, and other travel services, incorporating smart networked businesses based on the recent growing man-machine

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