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2007

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citation for published version (APA)

Simao Da Graca Dias, E. (2007). *The added value of contextual information in natural areas: Measuring impacts of mobile environmental information*. Vrije Universiteit.

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THE ADDED VALUE OF
CONTEXTUAL INFORMATION IN
NATURAL AREAS

*Measuring impacts of
mobile environmental information*

Amsterdam, December 2007

ISBN: 978-90-8659-173-2

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This research was financially supported by the Portuguese National Science Foundation (FCT/MCT) under the PhD grant SFRH/BD/12758/2003.

VRIJE UNIVERSITEIT

THE ADDED VALUE OF
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*Measuring impacts of
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ACADEMISCH PROEFSCHRIFT

ter verkrijging van de graad Doctor aan
de Vrije Universiteit Amsterdam,
op gezag van de rector magnificus
prof.dr. L.M. Bouter,
in het openbaar te verdedigen
ten overstaan van de promotiecommissie
van de faculteit der Economische Wetenschappen en Bedrijfskunde
op woensdag 12 december 2007 om 15.45 uur
in de aula van de universiteit,
De Boelelaan 1105

door

Eduardo Simão da Graça Dias

geboren te Portalegre, Portugal

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dr. E. Beinat

Summary

In the past decades, the recreational use of natural areas has changed from a passive and minimalist use into an explosion of tourism as a highly active and dominant driving force of change and influence in the rural areas and associated communities. The direct and indirect negative impacts of tourism are more associated with the behaviour of visitors and with weak visitor management policies rather than with absolute visitor numbers. Good management choices based on the correct information can mitigate negative effects and maximize visitation benefits. Additionally, most protected areas have environmental education and recreation as major goals, beyond the mandate of nature protection.

This thesis addresses the use of Information Technology, in particular of mobile context-aware information systems, in order to realize these human-focused objectives and facilitate information access, exchange and provision in Natural Areas. The basic assumptions are (1) by introducing or improving information flows, it is possible to affect user's behaviour towards a more sustainable use of natural resources, while (2) providing park managers with tools to manage the visitors' distribution and geographic behaviour.

A specific tool that enables the delivery of context-aware information was developed within the framework of a research and development project, WebPark. WebPark developed a series of services for users of recreational and/or protected areas based on wireless technology. It enables users to request information from databases using their Smartphone or PDA and filters the information based on location, time and user profile relevance. Information services include: flora and fauna description linked to the habitat the tourist is visiting; routes, hotels and restaurants close to the visitor; current position on a map; and more. Two specific trial products have been developed to test these concepts for two study areas: The Texel Dunes National Park (the Netherlands) and the Swiss National Park.

These implementations show that Mobile Information Services can play a role in helping visitors achieve full awareness of the richness of natural and cultural resources, improving awareness levels and contributing to eco-friendly visits. Nonetheless the main scientific contribution of this thesis is on the assessment phase. The assessments extend simple usability tests and developed different methodologies to measure and quantify the impacts and added value the mobile information services have on the visitors. To assess the added value, it was necessary to compare different information dimensions: having information or not; and, for the visitors with information, which delivery medium is the most efficient. The visitors were assigned to one of four groups. A group without additional information, the (1) *No info* group, used as the control

group, and three test groups with the same information but delivered with different media: (2) conventional information in the form of a *Paper booklet*; (3) *Digital information*, accessed on a digital handheld device; and (4) *Context-aware information*, whereby visitors had the same information and the same device as (3), but augmented with location sensitivity. More than 400 visitors to the Texel Dunes National Park participated on the experiments and the results yield significant differences in the behaviour and valuation between the groups from different perspectives. The empirical research assessed multidisciplinary effects within the frameworks of (a) Geographical science: the spatial behaviour of the visits, (b) Environmental psychology: the appreciation of nature by the visitors, (c) Economic science: measuring contingent valuation of the information using stated preferences, and (d) information science: applying the technology acceptance theory. The implemented methodologies successfully show how and to what extent the developed context-aware tool is able to influence and produce benefits for the visitors.