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Salzburg Research Forschungsgesellschaft m.b.H.
Cartography Research Group, Vienna University of Technology
Engineering Geodesy Research Group, Vienna University of Technology

Editors:

Univ. Prof. Dr. Georg Gartner
Institute of Geoinformation and Cartography
Vienna University of Technology
Erzherzog-Johannplatz 1
1040 Vienna, Austria
georg.gartner@tuwien.ac.at

Sven Leitinger, Karl Rehrl
Salzburg Research Forschungsgesellschaft mbH
Mobile and Web-based Information Systems
Jakob Haringer Straße 5/III
5020 Salzburg, Austria
{krehrl, sleeting}@salzburgresearch.at

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The Impact of Location-Awareness on the Perception of Information Services

Eduardo Dias
SPINLab, FEWEB/RE, Vrije Universiteit Amsterdam
Room 4A-42, De Boelelaan 1105, 1081 HV Amsterdam, The Netherlands
edias@feweb.vu.nl

Abstract: This paper presents an empirical research designed to answer the question: "What is the impact of location-awareness in the appreciation of information systems' content?" We presented the same information to visitors to a natural park using different media (paper booklet, PDA and LBS). The information included a map of the park and a collection of pages about the park. The difference in valuation yields the impact that being digital has (paper vs PDA) and the impact of location awareness (PDA vs LBS). While the interest in the information was similar for all groups, the LBS group excels in the appreciation of the map and screen.

Introduction

While the main goal for most Natural Parks is the conservation of Nature, many areas have Education and Recreation as additional goals (Europarc & IUCN 2000;IUCN 1994). The development of informative websites and multimedia CD-Roms is a recognition from Park managers about the importance to inform the visitors, but do not work for the field visit when most questions arise (Dias, Beinat, & Scholten 2004). Mobile technology can be used to satisfy the visitors' information needs anytime anywhere and when connected to a GPS receiver it can intelligently filter or push the right information at the right place/time. But, is the added-effort of making a location-aware application compensated by the added perceived value? In this paper we propose a methodology to determine the changes in perception of added-value for delivering location-aware information.

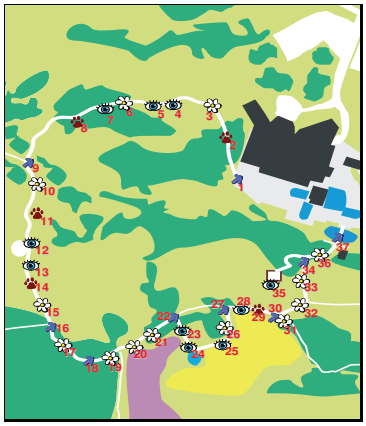
Test set-up

A mobile information tool was introduced in the Texel Dunes National Park as a way to improve information flows in Protected Areas. To test the effects of this tool on visitors' perception, a research framework was designed using different information dimensions as control and test groups. These information dimensions acted as an independent variable so that the effects of each of the dimensions could be isolated and measured. The visitors who participated in the research were divided into four groups. A first group of subjects: the Paper booklet group, were provided with information in the form of a paper booklet composed of an area map with points of interest (POIs) on it that were indexed to pages explaining these particular interesting places with text and photos; a second group of visitors: the Digital info group, were given the same information, but it was delivered using a digital handheld device; the fourth and last group was issued with the same information as the first group and used the same device as the forth group, but it was augmented with location sensitivity. Connecting the device to a GPS receiver, the system was aware of the visitors' location and could therefore enhance the information delivery in two ways: 1) a shifting cross on the map represented the visitor's moving position; and 2) the system alerted the visitor, by means of a soft cuckoo sound when it was the right time/place to read the information.

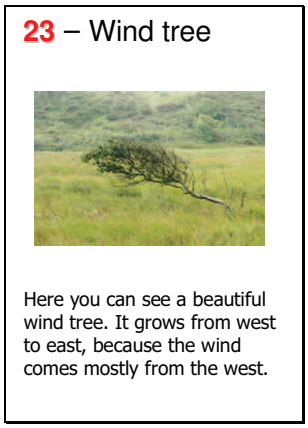
Random visitors were approached and asked if they would be interested in participating in this research. The composition of the groups was controlled to ensure their profiles were as similar as possible. In addition, all subjects set out to follow the same route, in similar weather

conditions. Since the information is the same, we can assume that if differences are found between the paper and the PDA group, these are caused by the "digital medium effect" (or the PDA novelty effect) and if differences between the simple PDA and the LBS group (as the devices are the same) are ascribed to the presence of location sensitivity.

The information provided to the subjects comprised of a map of the route with the locations of a number of Points-of-Interest (PoI) displayed, see Figure 1.



Area Map, indexing the information



Landscape information sample

Figure 1 – Samples of content available to the visitors

Results

This paper reports on three tests: 1) the overall interest of the information the, 2) Perception of the Map quality (how good it was in terms of overview, detail and for orientation), and the screen visibility. The last test was only applicable to the digital groups, PDA and LBS. All perception were measured using a 7-point symmetric Likert. The interest test ranged from "very uninteresting" to "very interesting" and the map and screed quality ranged from "very bad" to "very good".

Information interest

No significant differences were found between the groups on the test of how interesting the visitors found the information they had just experienced, see Table 1 and Figure 2. These results were expected (since the information was the same) and are consistent with the protocol assumptions that the only difference between the groups is the delivery mechanism and not the information in itself.

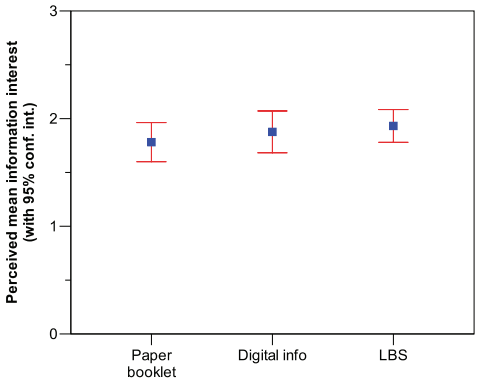


Figure 2 – Information perception according to the information groups

Info interest	Mean	Mean Std. Error	Std. Dev.	N
Paper	1.78	0.09	0.90	96
Digital	1.88	0.10	0.83	73
LBS	1.91	0.08	0.88	138

Table 1 – Statistics of the perceived interest of the information available during the dune walk

Map perception

The map was exactly the same for the three information groups, with an identical scale, similar extent and even comparable resolutions (naturally, the Paper booklet had a superior resolution than the one that could be delivered by the digital devices). Nevertheless, the visitors with access to the location-sensitive information perceived the map has having better detail, a better overview and even that it could help them to orientate better (see Figure 3 and Table 2).

Group	Statistics	Detailed	Overview	Orientation	Average Quality
Paper booklet	Mean	0.76	0.74	0.70	0.70
	Std. Error of Mean	0.15	0.15	0.17	0.15
	Std. Deviation	1.40	1.46	1.67	1.42
	N	91	91	93	88
Digital info	Mean	0.76	0.79	0.44	0.67
	Std. Error of Mean	0.16	0.14	0.19	0.15
	Std. Deviation	1.32	1.22	1.57	1.23
	N	72	73	72	71
LBS	Mean	1.44	1.57	1.79	1.60
	Std. Error of Mean	0.10	0.09	0.09	0.08
	Std. Deviation	1.10	1.08	1.00	0.98
	N	134	136	135	134

Table 2 - Statistical descriptives for the map quality indicators for each information dimension.

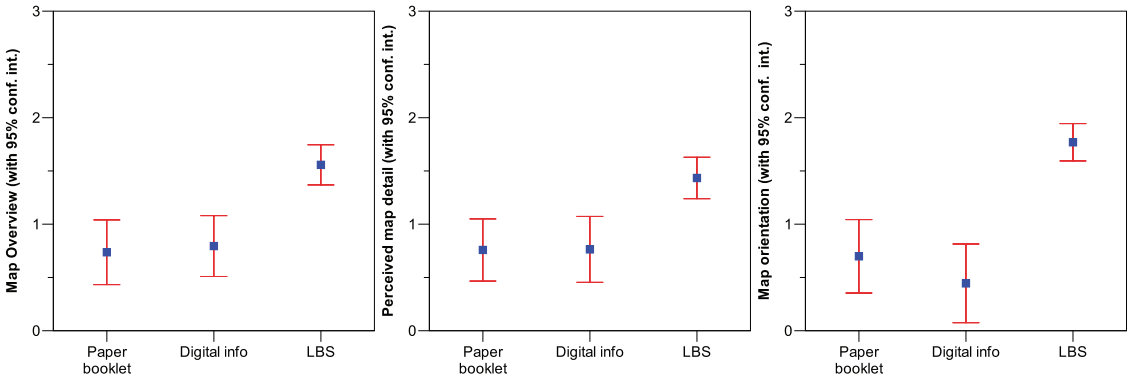


Figure 3 – Map quality indicators (perceived detail, overview and orientation facilitation respectively) for the different information dimensions.

Screen visibility

For the screen visibility, again no differences between the information groups were expected, but, in fact, major differences in the perception of the visitors were found (see Table 3 and Table 3). This variable was collected using a 7-point Likert scale ranging from the minimum negative labelled 'very bad' to the maximum on the positive side labelled 'very good'. The average results for both groups were negative, meaning that both groups perceived the screen visibility to be 'bad'. Nevertheless, the LBS group shows a higher average value that can be interpreted as, when using the location sensitive information, the screen is perceived as 'not so bad' as without location-sensitivity.

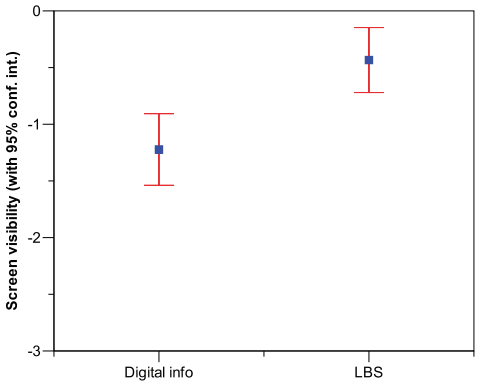


Figure 4 – Subjects' perception of the screen visibility, according to the information dimension

Visibility	Mean	Mean Std. Error	Std. Dev.	N
Digital	-1.22	0.16	1.35	72
LBS	-0.39	0.14	1.70	141
Total	-0.67	0.11	1.63	213

Table 3 – Screen visibility per group.

Conclusions

While the information itself is perceived as equally interesting across the groups, the map related characteristics were perceived as of higher quality by the LBS group. These results confirm the expectations that the location aware component makes people more geographically aware and made also reading the map easier (since their location was indicated) therefore assuming the map was better. In addition, also the screen was perceived as a better screen for the LBS group. This result was unexpected, it could be explained by the fact that the LBS group found the application as nicer application (with the location based warnings), and therefore were more tolerant to the bad screen, rating it higher. It can be concluded that LBS has an added value, since the information was accessed via the map and by considering the map better the all application was perceived as better.

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