D6.4: End User Perception of Semantic CMS Applications

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Interactive Knowledge Stack for Semantic Content Management Systems

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IKS in a Nutshell

"Interactive Knowledge Stack" (IKS) is an integrating project targeting small to medium Content Management Systems (CMS) providers in Europe providing technology platforms for content and knowledge management to thousands of end user organizations. Current CMS technology platforms lack the capability for semantic web enabled, intelligent content, and therefore lack the capacity for users to interact with the content at the user's knowledge level. The objective of IKS therefore, is to bring semantic capabilities to current CMS frameworks. IKS puts forward the "Semantic CMS Technology Stack" which merges the advances in semantic web infrastructure and services with CMS industry needs of coherent architectures that fit into existing technology landscapes. IKS will provide the specifications and at least one Open Source Reference Implementation of the full IKS Stack. To validate the IKS Stack prototype solutions for industrial use cases ranging from ambient intelligence infotainment, project management and controlling to an online holiday booking system will be developed.

1 Executive Summary

This deliverable develops and tests a user-oriented content-support acceptance model (CSAM) which helps to better understand the phenomena of content service adoption. Additional, it provides recommendations on how to improve existing IKS-related content services. In this regard, a literature review on adoption constructs is conducted from which then CSAM is developed. The major advantage of CSAM is its flexibility to incorporate various empirical constructs and dimensions such as content service characteristics (e.g. interactivity, relevancy, perceived ease of use), service utility (e.g. perceived usefulness) or service utilization (e.g. likeliness of reuse) that can be particularly applied to the evaluation of concrete CMS applications. This flexibility will be shown in this report by applying CSAM to a traditional CMS application in a business situation (i.e. the IKS Tourism use case) as well as to a ubiquitous CMS application in a private situation (i.e. the IKS AmI use case). Results show, that CSAM is supported by the empirical data and that informed decision can be derived for a revision of existing IKS-related content services.

2 Introduction

The following description for Task 6.4 is provided in the description of work (p. 76f):

> *Since we want to assess the impact of advanced technology on the productivity of the end user, it is necessary to include end users of the systems in the impact studies. We envisage the following empirical approach.*
>
> - *Develop and test a user-oriented content-support acceptance model (CSAM) for semantic CMS applications that provides application designers and developers with empirically validated guidelines.*
>
> - *Review existing evaluation methods for software-based applications, such as DEC's Standard Usability Scale test, ISO 9241, operational methods, such as thinking aloud protocols, focus group discussions and other kinds of interviews, cognitive walkthrough, and other kind of simulation methods, guideline-oriented approaches, such as GOMS, but also empirical evaluation models such as the*

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Technology Acceptance Model (TAM), Moore and Benbasat's model and other models based on the Innovation Diffusion Theory.

- *Development of an empirical user content-support acceptance model (CSAM) for semantic CMS applications on the basis of the previous review.*
- *Application of CSAM on all three application cases: ambient environment, project controlling, tourist information system (or similar application domain).*
- *Refine recommendations to application development groups*

The overall goal of this deliverable is therefore to develop and test an evaluation model for content-centered information system (IS) services, which is denoted as Content-support Acceptance Model (CSAM). Such an adoption model would help both academia and industry to better understand critical success factors of technology use and thus, to manipulate and revise services in a profound and validated manner accordingly. The following questions could be answered in this regard: What influences IS service usage? Is the developed IS service interactive, relevant and useful? Or: Does the IS service fit to a given task? In order to answer these kinds of questions, relevant predictors of adoption are identified and incorporated into CSAM first before it is tested with exemplary CMS applications of the IKS project. The anticipated usefulness of CSAM is, however, its ability to be reused and refined to various CMS applications. CSAM represents therefore a generic assessment tool for CMS provider companies that has the potential to identify several customer-oriented and end-user-oriented obstacles and problems with particular CMS services.

The remainder of this deliverable is structured as follows. In the next chapter, related work on evaluation instruments and practices are provided that are common in information systems research. Then, based on prior work, CSAM is motivated and described in more detail. Afterwards, CSAM is tested and applied to two exemplary CMS applications developed within the IKS project.[1] Results of the evaluations are discussed and recommendations on how to improve the exemplary CMS applications are provided, too. This report closes with a summary in the final chapter.

3 Related Work on Evaluation Instruments

Over the course of the last decades, research in the IS community has addressed the “effective design, delivery, use and impact of information technology in organizations and society.” (Avison & Fitzgerald 1995, p. xi) The overall goal here was and is to make business organizations more efficient (Hevner et al. 2004). Empirical evaluations are adequate means for assessing the utility of IS in this regard. Accordingly, various evaluation instruments were informed by IS models such as the (Updated) IS Success Model (DeLone & McLean 1992; DeLone & McLean 2003), task-technology fit theory (Goodhue & Thompson 1995), the technology Acceptance Model (TAM) (Davis 1989), TAM 2 (Venkatesh & Davis 2000) or the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al. 2003). These theories and models were originally developed and tested in and with business organizations rather than in consumer-centric settings in which they were adapted to in more recent work (e.g. Kamis et al. 2008; Kowatsch & Maass 2010; van der Heijden 2004; van der Heijden 2006; Venkatesh et al. 2012).

[1] It was planned to apply CSAM to a third IKS application, i.e. the IKS project controlling tool. However, the maturity of this tool hindered the members of the project to apply CSAM to it at the end of 2012.

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One of the key empirical constructs and their dimensions that are usually used to evaluate IS services are listed in the following:

- **Usefulness:** perceived usefulness (Davis 1989; Kowatsch & Maass 2010), relevancy (Bailey & Pearson 1983; Palmer 2002), performance expectancy (Venkatesh et al. 2003; Venkatesh et al. 2012)
- **Ease of use:** perceived ease of use (Bailey & Pearson 1983; Davis 1989; Kowatsch & Maass 2010), effort expectancy (Venkatesh et al. 2003; Venkatesh et al. 2012), usability (Brooke 1996; Palmer 2002), interactivity, navigation and responsiveness (Palmer 2002)
- **Outcome expectations:** expectations, understanding of systems, confidence in the system, feelings of participation, feelings of control, degree of training, job effects (Bailey & Pearson 1983; Wixom & Todd 2005)
- **Usage:** usage intentions (Davis 1989; Kowatsch & Maass 2010; Palmer 2002; Venkatesh et al. 2012), actual usage (Davis 1989; Venkatesh et al. 2012):
- **Social influence** (Venkatesh et al. 2003; Venkatesh et al. 2012)
- **Enjoyment:** perceived enjoyment (Kowatsch 2012; van der Heijden 2004), hedonic motivation (Venkatesh et al. 2012)
- **Facilitating conditions** (Venkatesh et al. 2003; Venkatesh et al. 2012)
- **Price value** (Venkatesh et al. 2012)
- **Habit** (Venkatesh et al. 2012)
- **System quality:** accessibility, timeliness, language, flexibility, integration, efficiency (Bailey & Pearson 1983; DeLone & McLean 1992; DeLone & McLean 2003; Wixom & Todd 2005)
- **Information quality:** accuracy, precision, reliability, currency, completeness, format volume (Bailey & Pearson 1983; DeLone & McLean 1992; DeLone & McLean 2003; Wixom & Todd 2005)
- **Service quality:** relationship with IS service staff, communication with IS service staff, technical competence of service staff, attitude of service staff, Schedule of products or services, time required for new development, processing of change requests, vendor support, response time, means of input with IS service center (Bailey & Pearson 1983; DeLone & McLean 1992; DeLone & McLean 2003; Wixom & Todd 2005)
- **Organizational factors:** top management support, error recovery, security of data, documentation (Bailey & Pearson 1983; Wixom & Todd 2005)
- **Situation-service fit:** situation-service fit, behavior-service fit, spatial-service fit and modality service fit (Kowatsch 2012; Kowatsch & Maass (submitted); Maass et al. 2012)
- **Task-technology fit:** quality, locatability, authorization, data compatability, ease of use, training, production timeliness, system reliability, relationship with users (Fuller &

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Dennis 2009; Goodhue 1995; Goodhue & Thompson 1995; Klopping & McKinney 2004; Zigurs & Khazanchi 2008)

- **Privacy concerns** (Bélanger & Crossler 2011; Dinev & Hart 2006; Kowatsch & Maass 2012a; Kowatsch & Maass 2012b)
- **Perceived compatibility** (Kowatsch 2008; Moore & Benbasat 1991)
- **Relative Advantage** (Maass & Kowatsch 2008; Moore & Benbasat 1991)

From a methodological point of view, self-report instruments such as questionnaires have been primarily used post hoc to capture and evaluate not only emotional phenomena related to IS services such as hedonic motivation or perceived enjoyment (Kamis et al. 2008; Maass & Varshney 2012; van der Heijden 2004; Venkatesh et al. 2012) but also other relevant IS constructs such as effort and performance expectancy (Kowatsch & Maass 2010; Venkatesh et al. 2003; Venkatesh et al. 2012), task-technology fit (Goodhue & Thompson 1995) or situation-service fit (Kowatsch & Maass (submitted); Maass et al. 2012). By contrast, verbal reports, for example, applied in think-aloud protocols (Ericsson & Simon 1987; Ericsson & Simon 1980; Kuusela & Paul 2000) are rather seldom used for IS service evaluations.

4 The Content Support Acceptance Model (CSAM)

In the context of CMS, no prior work from the information systems community has developed an empirical instrument for the evaluation of CMS services. Only the work of Palmer (2002) that addresses web site usability, design and performance metrics fits into the CMS context as well as to the objectives of the current deliverable to some degree. However, for the IKS AmI use case in particular, i.e. the interactive content-enhanced bathroom environment, and but also with respect to CMS that are more and more embedded in everyday environments and that are used in everyday situations, one relevant dimension is missing. That is, one has to consider explicitly the degree to which a particular content service fits to the actual usage situation. Task-technology fit theory (Goodhue & Thompson 1995) and the related situation-service theory (Maass et al. 2012) may be potential solutions in this regard.

The development of the Content-support Acceptance Model (CSAM) has therefore considered several relevant IS evaluation constructs from prior work as described in the last chapter. CSAM is depicted in Figure 1 and the rationale for CSAM is provided in the following.

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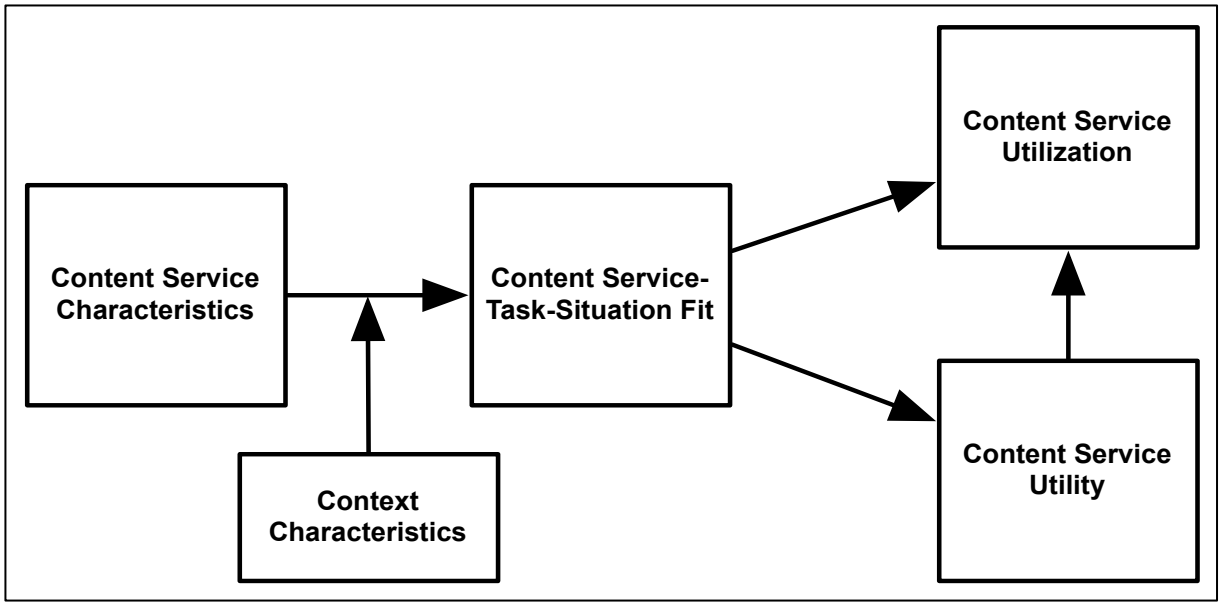

Figure 1. Content-support Acceptance Model (CSAM) Note: boxes in the figure represent empirical constructs and arrows positive relationships between these constructs (e.g. content service utility has a positive relationship with content service utilization).

First of all, content service characteristics summarize content-related attributes such as the degree of interactivity with content, ease of use while interacting with the content service, flexibility and adaptability of the content service, relevancy of the content provided by the service, cross-linkage capability, understandability of content service and readability of content provided by the content service (Davis 1989; Palmer 2002; Venkatesh et al. 2003; Venkatesh et al. 2012).

Second, content service characteristics are hypothesized to positively influence the second CSAM construct denoted as content service-task-situation fit. Content service-task-situation fit is defined as the degree to which content service fits to a given task and usage situation. This construct incorporates dimensions such as those from task-technology fit (Goodhue & Thompson 1995) and situation-service fit (Maass et al. 2012). Behaviour content service fit or modality content-service fit would be two examples here (ibid.).

Third, it is assumed that the relationship between content service characteristics and content service-task-situation fit is moderated by context characteristics. These characteristics describe the context in more detail in which particular situation a CMS-related task is performed and which kind of person performs that task. For example, one could differentiate between content authors and content consumers on the one hand and private situations and business situations in which CMS-related tasks are performed on the other hand. Other moderating effects such as technology affinity, gender, age and prior experience of the end users might be relevant, too (Venkatesh et al. 2003; Venkatesh et al. 2012). In contrast to the content service-task-situation fit, context characteristics do not measure the fit between a service, task and usage situation but represent contextual factors on their own.

Fourth, content service-task-situation fit is hypothesized to be positively related to the degree of content service utilization. Content service utilization indicates the degree to which a content service is actually used. Exemplary dimensions of this construct are behavioural intentions to use content (Davis et al. 1989; Venkatesh et al. 2003; Venkatesh et al. 2012), the likeliness to reuse content and frequency of content usage (Davis et al. 1989; Palmer 2002).

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Fifth, content service-task-situation fit is also assumed to have a positive relationship with content utility. That is, higher degrees of content service-task-situation will probably reveal a higher utility of a particular content service with regard to, for example, task performance in case of a content author.

Finally and inline with TAM (Davis 1989), TAM 2 (Venkatesh & Davis 2000), UTAUT (Venkatesh et al. 2003) or UTAUT 2 (Venkatesh et al. 2012), a positive relationship between content service utility and content service utilization is hypothesized. That is, the higher individuals perceive the utility of a content service the more frequently the content service is probably used by those individuals.

Due to the overall objective of CSAM, i.e. its flexibility to be used for the evaluation of various content services, Table 1 depicts some exemplary dimensions that provide insights on how concrete instances of CSAM can be derived in terms of an empirical evaluation instrument. Consistent with prior IS research (Kamis et al. 2008; Moore & Benbasat 1991; e.g. Venkatesh et al. 2003; Venkatesh et al. 2012), the questionnaire items are measured on seven-point Likert scales that usually range from one (strongly disagree) to seven (strongly agree). However, it is recommended to vary the measurement scales in order to address common method bias (Podsakoff et al. 2003). For example, one should also use a semantic differential as it was adopted by van der Heijden (2004) for the construct perceived enjoyment.

Table 1. Exemplary questionnaire items of CSAM

No	Construct	Exemplary Questionnaire Items	Related Work
CSC	**Content service characteristics**		
INT1	Interactivity	This content service provides significant user interaction.	(Palmer 2002; Raney et al. 2003)
INT2	Interactivity	This content service offers customization.	(Palmer 2002; Raney et al. 2003)
RT1	Reaction Time	The speed in which this content service provided information was fast enough.	(Palmer 2002)
RT2	Reaction Time	The rate at which this content was displayed was fast enough.	(Palmer 2002)
PD	Presentation delay	When I use this content service, there is very little time between my actions and the service's response.	(Palmer 2002; Wells et al. 2011)
PEU1	Perceived ease of use	I would find this content service easy to use.	(Brooke 1996; Davis 1989)
PEU2	Perceived ease of use	The interaction with this content service is clear and understandable.	(Brooke 1996; Davis 1989)
PEU3	Perceived ease of use	Learning to use this content service is easy for me.	(Brooke 1996; Davis 1989)
CC	**Context characteristics**		
TA1	Technology affinity	I am open towards new technologies / content services.	(Kowatsch & Maass 2012b)
TA2	Technology affinity	It is easy for me to use new technologies / content services.	(Kowatsch & Maass 2012b)
FC1	Facilitating conditions	I have the resources necessary to	(Venkatesh et al. 2003;

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No	Construct	Exemplary Questionnaire Items	Related Work
		use this content service.	Venkatesh et al. 2012)
FC2	Facilitating conditions	I have the knowledge necessary to use this content service.	(Venkatesh et al. 2003; Venkatesh et al. 2012)
LC	Location context	I would use this service at primarily at home.	(Vodanovich et al. 2010)
AC	Activity context	I would use this service at primarily for private / business purposes.	(Vodanovich et al. 2010)
CSTSF	**Content service-task-situation fit**		
SSF	Situation-service fit	The content service fits well to the situation in which I performed the task.	(Goodhue & Thompson 1995; Maass et al. 2012)
BSF	Behaviour-service fit	In order to perform the task, this content service would fit well to my behaviour in this situation.	(Goodhue & Thompson 1995; Maass et al. 2012)
MSF	Modality-service fit	The modality of content presentation fits well to this content service to perform the task.	(Goodhue & Thompson 1995; Maass et al. 2012)
SPSF	Spatial-service fit	I found that the spatial placement of the contents fits well to the [...] service.	(Goodhue & Thompson 1995; Maass et al. 2012)
TSF	Task-service fit	This content service fits well to this task.	(Goodhue & Thompson 1995; Moore & Benbasat 1991)
TSC	Task-service compatibility	This content service is compatible with this task.	(Goodhue & Thompson 1995; Moore & Benbasat 1991)
CSU	**Content service utilization**		
IU	Intention to use	I intend to use this content service for this task.	(Davis 1989; Venkatesh et al. 2003; Venkatesh et al. 2012)
LRU	Likeliness of reuse	I would reuse this content service for this task.	(Davis 1989; Venkatesh et al. 2003; Venkatesh et al. 2012)
FRU	Frequency of use	I would frequently use this content service for this task.	(Davis 1989; Venkatesh et al. 2003; Venkatesh et al. 2012)
	Content service utility		
PU1	Perceived usefulness	I would find this content service useful for this task.	(Davis 1989; Venkatesh et al. 2003; Venkatesh et al. 2012)
PU2	Perceived usefulness	This content service would increase my efficiency in performing this task.	(Davis 1989; Venkatesh et al. 2003; Venkatesh et al. 2012)
PU3	Perceived usefulness	This content service would increase my productivity in performing this task.	(Davis 1989; Venkatesh et al. 2003; Venkatesh et al. 2012)

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5 Application of CSAM & Empirical Studies

In the following sections, CSAM is adapted to particular IKS use cases and tests with potential end-users. For that purpose, an overview of each IKS use case is provided first. Then, it is detailed how CSAM and its constructs and questionnaire items are tailored to the particular IKS use case. Afterwards, the evaluation procedure is described in more detail before the results are presented and recommendations for future work are discussed.

5.1 IKS Vertical Use Case – Tourism

As described in the description of work (p. 103), Pisano[2] "is one of the most innovative companies within the tourism sector. Among its clients are the top-10 of the tourism industry (for example, the opodo travel portals of the UK and Germany, Dertour, Thomas Cook Group. TUI-Group, FTI-Group, etc.) as well as highly specialised companies in travel distribution and tour operation." The focus of the current evaluation lies on the CIC packagemaster[3], a CMS used by travel managers. The primary task for those managers is to create trips and cruises such that they can be offered online to customers. For that purpose, enriching descriptions of trips and cruises with additional information (e.g. information about countries, regions and cities) is of high interest. Due to this fact, the following two dedicated tasks have been identified as the most relevant to be supported by IKS technology:

1. **Content Generation:** The description of an existing trip needs to be enriched with additional information. For that purpose the product manager has log into CIC packagemaster and has to navigate to the detail view of the corresponding trip. He is then able to add further information to the description of the trip, which is done manually today. However the IKS functionality "Content Generation" allows extracting automatically relevant terms of the description of the trip (e.g. countries, regions, cities or persons) and to retrieve corresponding content from web sources (e.g. from DBpedia). This content can be finally attached to the description of a particular trip.

2. **Content Enrichment:** The description of an existing trip needs to be enriched with additional information. For that purpose the product manager has log into CIC packagemaster and has to navigate to the detail view of the corresponding trip. Here, he is able to add further information to the description of the trip. This is done manually today but the IKS functionality "Enhance Text" allows to extract automatically relevant terms of the trip description (e.g. countries, regions, cities or persons) and to link these terms with available web sources (e.g. Wikipedia)

These tasks are usually performed in the office on a desktop-based personal computer. In contrast to the IKS AmI use case (cf. Section 5.2), this use case represents therefore a traditional organizational setting.

In the following sections, it is detailed how CSAM has been adapted to this IKS Tourism use case and how the evaluation two particular content services with end users has been conducted. Finally, the results of the empirical study are presented and discussed from which then recommendations for future refinements are derived.

[2] http://www.pisano-holding.com
[3] http://www.packagemaster.de
[4] Blog post: http://blog.iks-project.eu/listen-to-what-your-bathroom-is-telling-you/
Teaching material: http://www.iks-project.eu/academy/designing-interactive-ubiquitous-information-systems

5.1.1 CSAM Operationalization

CSAM was adapted to the two content services *Content Generation* and *Content Enrichment* as described above. The applied strategy of reuse of CSAM can be interpreted as an instantiation of the general CSAM constructs. That is, content service characteristics are represented by interactivity, relevancy and perceived ease of use of content services, content service-task-situation fit is represented situation-service fit and task-service fit, content service utility is represented by perceived usefulness and finally, content service utilization is represented by the more concrete dimension likeliness of reuse. Context characteristics are measured by technology affinity of the end users. The adapted CSAM research model with its hypotheses in the form of positive relationships between the constructs is shown in Figure 2. The corresponding questionnaire items are provided in Table 2.

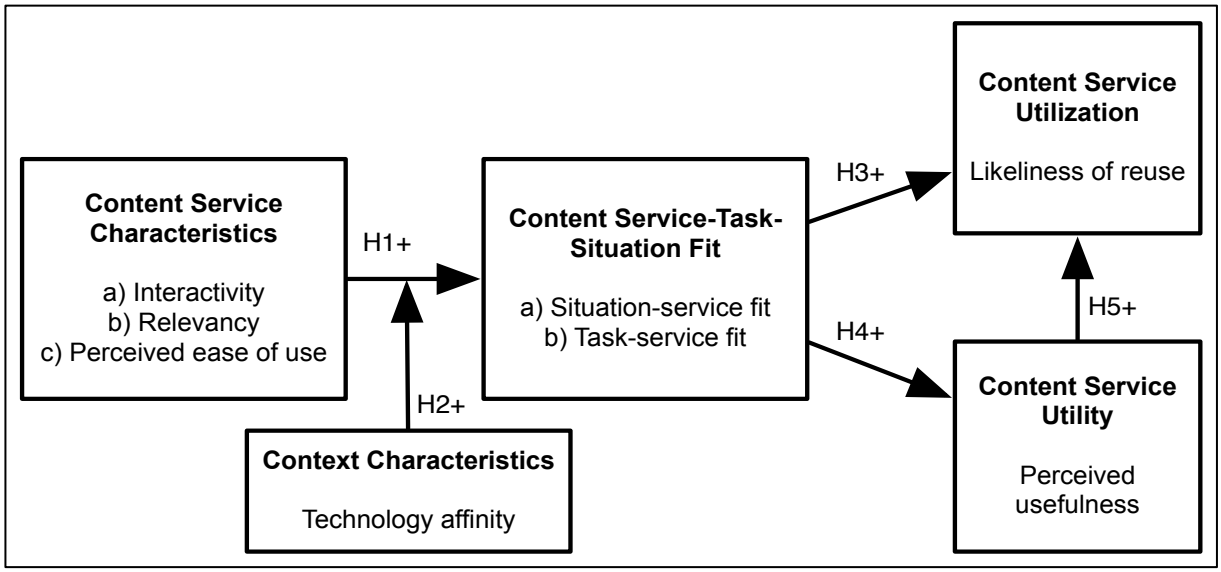

Figure 2. Research model of the IKS Tourism use case

Table 2. Survey instrument for the IKS Tourism use case. Note: "this content service" was replaced by the actual name of the service. Furthermore, the wording of the items was enriched with service-specific examples (e.g. for the weather information service it was described that a person interacts with the service by approaching the mirror).

No	Construct	Item	Scale
CSC	**Content service characteristics**		
INT	Interactivity	I find this content service static (1) … interactive (7).	Seven-point semantic differential
REL	Relevancy	I find this content service irrelevant (1) … relevant (7).	Seven-point semantic differential
PEU1	Perceived ease of use	Using this content service was unclear (1) … clear and understandable (7).	Seven-point semantic differential
PEU2	Perceived ease of use	Using this content service was complicated (1) … easy (7).	Seven-point semantic differential

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No	Construct	Item	Scale
PEU3	Perceived ease of use	Learning to use this content service is easy for me.	Seven-point Likert scale from strongly disagree (1) to strongly agree (7)
CC	**Context characteristics**		
TA1	Technology affinity	It is easy for me to use new technologies / content services.	Seven-point Likert scale from strongly disagree (1) to strongly agree (7)
TA2	Technology affinity	I am open towards new technologies / content services.	Seven-point Likert scale from strongly disagree (1) to strongly agree (7)
CSTSF	**Content service-task-situation fit**		
SSF	Situation-service fit	This content service fits generally well to a product manager and his tasks.	Seven-point Likert scale from strongly disagree (1) to strongly agree (7)
TSF	Task-service fit	I found that this content service fits well to the task.	Seven-point Likert scale from strongly disagree (1) to strongly agree (7)
CSU	**Content service utilization**		
LRU	Likeliness of reuse	I would reuse this content service for this task.	Seven-point Likert scale from strongly disagree (1) to strongly agree (7)
CSU	**Content service utility**		
PU1	Perceived usefulness	This content service would increase the efficiency of a product manager performing this task.	Seven-point Likert scale from strongly disagree (1) to strongly agree (7)
PU2	Perceived usefulness	This content service would increase the effectiveness of a product manager in performing this task.	Seven-point Likert scale from strongly disagree (1) to strongly agree (7)
	Further constructs		
TCT	Task completion in time	I was able to complete the task in the pre-defined time. *(for each of the two tasks; for task 1 / 2 pre-defined durations 8 / 4 minutes was set)*	Seven-point Likert scale from strongly disagree (1) to strongly agree (7)
TR	Task relevancy	This task could be typical for a product manager in the tourism industry. *(for each of the two tasks)*	Seven-point Likert scale from strongly disagree (1) to strongly agree (7)
CMSE	CMS expert	I am a CMS expert.	Seven-point Likert scale from strongly disagree (1) to strongly agree (7)
STE	SemTech expert	I am an expert in semantic web technologies.	Seven-point Likert scale from strongly disagree (1) to strongly agree (7)

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No	Construct	Item	Scale
IMP	Improvements	What needs to be improved with regard to a particular content service?	Free text feedback
UND	Understandability of the instructions.	I found that the instructions of the study were easy to understand.	Seven-point Likert scale from strongly disagree (1) to strongly agree (7)
LEN	Length of the study	The study was too long.	Seven-point Likert scale from strongly disagree (1) to strongly agree (7)
AGE	Age of the subjects	How old are you?	Ratio scale (actual age)
GEN	Gender of the subjects	Are male / female?	Nominal scale (male, female)

5.1.2 Evaluation Procedure

The evaluation procedure started with a brief introduction into the IKS project and the objectives of this evaluation. The role of a product manager and his typical tasks were described, too. Then, the evaluation consisted of two steps for each particular task. First, subjects were asked to read through the task description. This description included not only the general task of a product manager as such but also the individual steps that were required to complete the task within CIC packagemaster. For that purpose, CIC provided a standardized instance of CIC packagemaster with a pre-defined trip. While the individual steps were described the new IKS functionality – either Content Generation or Content Enrichment - was highlighted such that participants of the study did exactly know which functionality was meant. After finalization of the particular task, participants were asked to evaluate the new IKS functionality of the CIC packagemaster with the help of an online survey. In this survey, a screenshot of the action button that triggered the new functionality was shown to the subjects as a reminder of the relevant functionality. Having completed the evaluation of the first functionality, subjects were then asked to perform the second task and to complete and evaluate the second functionality. Finally, subjects were asked for some demographic data as well as the remaining constructs from Table 2.

Subjects were sampled from the doctoral program of the Institute of Technology Management at the University of St.Gallen. They were given no monetary compensation for participation. After each subject had participated, the supervisor of the evaluation ensured that the tasks had been actually completed. This was done visually by logging into CIC packagemaster and by checking whether the new content was actually generated (in case of the first task) and whether the content was enriched with at least one external link (in case of the second task). After each participant, the CMS was restored into its original state such that it was ready for the next participant.

5.1.3 Results of the Empirical Study

Overall 10 subjects or, in more detail, 10 male PhD students participated in the study. Their age was on average 26.0 (Std. Dev. = 2.3). By conducting one-sample t-tests with a test value of 4 (the neutral scale value of a seven-point Likert scale), the instructions were perceived as easy to understand (Mean = 6.30, Std. Dev. = 0.7, $p < .001$) and the study was not perceived as being too long (Mean = 2.00, Std. Dev. = 1.6, $p < .01$). Furthermore, participants were neither CMS experts (Mean = 2.6, Std. Dev. = 1.4, $p < .05$) nor experts in semantic web technologies (Mean = 2.2, Std. Dev. = 1.4, $p < .01$).

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With regard to the constructs and dimensions perceived ease of use, technology affinity, content service task-situation fit and perceived usefulness, four multi-item constructs were adopted in the current study. For all of these constructs and dimensions and both tasks (if applicable), Cronbach's alpha yielded values over the recommended threshold of .70 (Nunnally 1967). Thus, an average score was calculated.

The descriptive statistics of the CSAM constructs, the results of one-sample t-tests and the qualitative feedback, i.e. the recommended improvements are listed in Table 3. It must be noted that in particular the quantitative results should be interpreted carefully because of the rather low size of the sample. The quantitative results must be therefore cross-validated to add external validity and to derive educated decisions. However, the qualitative feedback on the improvements of the two content services is valuable.

Table 3. Descriptive statistics, results from one-sample t-tests with a test value of 4, i.e. the neutral scale value on the semantic differential and Likert-scale, and qualitative feedback (N=10). Note: * p < .05, ** p < .01, *** p < .001, Standard deviation = SD, NS = non-significant

No	Construct	Content Generation Service	Content Enrichment Service
CSC	**Content service characteristics**		
INT	Interactivity	Mean: **4.80**^{ns} SD: 1.5 Interpretation: subjects found that the service is neither static nor interactive.	Mean: **5.80**** SD: 1.2 Interpretation: subjects found that the service is interactive.
REL	Relevancy	Mean: **5.30*** SD: 1.6 Interpretation: subjects indicated that the service is relevant.	Mean: **5.30*** SD: 1.7 Interpretation: subjects found that the service is relevant.
PEU	Perceived ease of use	Mean: **4.70**^{ns} SD: 1.5 Interpretation: subjects had no preference, i.e. they found that the service is neither hard to use nor easy to use.	Mean: **6.30***** SD: 1.1 Interpretation: subjects found that the service is easy to use.
CC	**Context characteristics**		
TA	Technology affinity	Mean: **6.00***** SD: 1.0 Interpretation: technology-savvy subjects participated in the study.	
CSTSF	**Content service-task-situation fit**		
SSF & TSF	Situation-service fit and task-service fit	Mean: **5.55***** SD: 1.1 Interpretation: subjects found that the service fits well to both task and situation.	Mean: **5.90***** SD: 1.0 Interpretation: subjects found that the service fits well to both task and situation.
CSU	**Content service utilization**		

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No	Construct	Content Generation Service	Content Enrichment Service
LRU	Likeliness of reuse	Mean: **5.50*** SD: 1.7 Interpretation: product managers – as indicated by the subjects of the study – are likely to reuse this service for similar tasks.	Mean: **5.90**** SD: 1.4 Interpretation: product managers – as indicated by the subjects of the study – are likely to reuse this service for similar tasks.
	Content service utility		
PU	Perceived usefulness	Mean: **5.50***** SD: 1.1 Interpretation: subjects found that the service is useful.	Mean: **6.00***** SD: 0.9 Interpretation: subjects found that the service is useful.
	Further constructs		
TCT	Task completion in time	Mean: **5.60**^{ns} SD: 2.3 Interpretation: some subjects were not able to complete the task in time (i.e. in 8 minutes).	Mean: **6.80***** SD: 0.4 Interpretation: subjects were able to complete the task in time (i.e. in 4 minutes).
TR	Task relevancy	Mean: **6.20***** SD: 0.9 Interpretation: subjects found that the task is relevant with regard to the job of a product manager.	Mean: **6.20***** SD: 0.9 Interpretation: subjects found that the task is relevant with regard to the job of a product manager.
IMP	Improvements (consolidated from qualitative feedback)	▪ Response time of the service needs to be improved, i.e. to be reduced ▪ Interaction buttons without labels should be named explicitly / the explanatory power of the symbols of the interaction should be increased ▪ The user interface should be improved such that it is more intuitive (e.g. confirmation of changes should be only one action / trigger / mouse click) ▪ The number of steps should be reduced in order to perform the task ▪ Legal information should be provided when additional content is incorporated ▪ The process about which information is going to be generated / incorporated should be made more transparent to the user.	▪ Response time of text enrichment needs to be improved, i.e. to be reduced ▪ Recommendation should be made available to all relevant terms (e.g. nouns) ▪ The amount of recommended links for each term should be increased ▪ The color-coding is not self-explanatory and thus, should be described in more detail ▪ Some terms were highlighted but links were recommended, i.e. each highlighted term should also provide at least one external link ▪ The button labels “enhance” and “done” were not self-explanatory and thus, terms should be used that help user to better understand their underlying functionality (e.g. does “done” save the content edits?)

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In order to test the hypotheses of the research model, Pearson correlation coefficients were calculated. The results or the correlation analyses are provided in Table 4.

Table 4. Pearson correlation coefficients (N=10). Note: * p < .05, ** p < .01, *** p < .001 (1-tailed)

Hypothesis	Content Generation Service	Content Enrichment Service
Content service characteristics x Content service-task-situation-fit (with TA moderator)		
$H1_a$ INT x CSTSF	.502^{ns}	**.734****
$H2_a$ INT x CSTSF moderated by TA	.425^{ns}	.541^{ns}
$H1_b$ REL x CSTSF	.256^{ns}	**.721*****
$H2_b$ REL x CSTSF moderated by TA	.051^{ns}	.516^{ns}
$H1_c$ PEU x CSTSF	**.634***	**.867***
$H2_c$ PEU x CSTSF moderated by TA	**.585***	**.775****
Content service-task-situation-fit X Content service utilization		
H3 CSTSF x LRU	**.866*****	**.705***
Content service-task-situation-fit X Content service utility		
H4 CSTSF x PU	**.865*****	**.895*****
Content service-task-situation-fit X Content service utility		
H5 PU x LRU	**.860*****	**.789****

5.1.4 Discussion and Recommendations

Although with ten participants the overall number of subjects was rather small, some preliminary trends can be discussed. First and foremost, the descriptive statistics listed in Table 3 show that none of the two content services was perceived significantly negative or low. It was rather the case that with only three exceptions (i.e. interactivity, perceived ease of use and task completion in time with regard to the content generation service) subjects rated both services on all remaining dimensions positive or high. Based upon this observation, it can be recommended that in particular the usability and interactivity of the content generation service should be improved. The qualitative feedback with regard to this service confirms this recommendation.

The content enrichment service, on the other hand, was rated throughout positively. However, according to the qualitative feedback it is also recommended to improve the service particularly by increasing the number of content sources in order to *enrich* more terms. In addition, some explanations should be incorporated into the user interface such that the service experience is more intuitive (e.g. by providing a legend of the color-coding scheme).

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With regard to CSAM, results indicate that all hypotheses are supported by at least one concrete dimension (cf. Table 4). But again, it must be noted that these quantitative results are preliminary results due to the small sample size. In more detail, interactivity, relevancy and perceived ease of use are significant predictors of content service-task-situation-fit for the content enrichment service while only perceived ease of use had a significant influence on the latter construct. That is, interactivity and relevance are probably suppressed by perceived ease of use, which, in turn, leads to the recommendation to increase the usability of the content generation service.

All in all, both services, i.e. the content generation service as well as the content enrichment service, have reached an over average maturity. Concrete recommendations on how to improve those services can be obtained from the qualitative feedback. Moreover, CSAM was supported by the empirical data but future evaluations with at least 30 participants and more advanced analyses (e.g. partial least square analysis) are required here to add validity to the current findings such that the quality of implications is increased.

5.2 IKS AmI Use Case

The ambient intelligence (AmI) use case, also known as intelligent bathroom use case, represents a "far out" vision of IKS for direct user interactions with embedded contents that are organized by a "Semantic CMS Technology Stack". This case combines advanced content and knowledge management with ubiquitous computing scenarios in a place everybody is familiar with – the bathroom. The use case shows how users can interact with contents in physical environments in a way that leaves the dimension of "small windows to the info sphere" as known by the "monitor paradigm". More details about this use case can be obtained from prior work (Janzen et al. 2011; Janzen et al. 2010a; Janzen et al. 2010b; Kowatsch 2012; Kowatsch & Maass (submitted); Maass & Janzen 2009; Maass & Janzen 2011; Maass et al. 2012). A recent blog post with a video clip is available as well as a lecture material on how to design interactive ubiquitous information systems.[4]

Three content services of the IKS AmI use case are of interested to the empirical studies with end users according to the current deliverable. These content services wit a brief description and tasks that are supported are listed in Table 5.

Table 5. Relevant content services and tasks supported

No	Service	Service Description	Task Supported
1	Weather information service	A content service that provides local weather information.	Requesting local weather information in the bathroom while preparing for the day.
2	Event recommendation service	A content service that recommends local events such as a theatre play, a concert or a movie.	Requesting local events in the bathroom while preparing for the day.
3	Ticket order service	A content service that allows users to order tickets for an event.	Ordering tickets for recommended events while preparing for the day.

The situation in which the services are provided to end-users is described in the following narrative (Janzen et al. 2010a, p. 216):

[4] Blog post: http://blog.iks-project.eu/listen-to-what-your-bathroom-is-telling-you/
Teaching material: http://www.iks-project.eu/academy/designing-interactive-ubiquitous-information-systems

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Anna gets site-specific weather information when she is brushing her teeth in the bathroom. Based on weather information and her calendar, free-time event suggestions are given, e.g. "Today, 8 p.m. - Sneak Preview at CinemaOne. Do you want to order tickets?"

In the following sections, it is detailed how CSAM has been adapted to the IKS AmI use case and how the evaluation of particular content services with end users has been conducted. Finally, the results of the empirical study are presented and discussed from which then recommendations for future refinements are derived.

5.2.1 CSAM Operationalization

CSAM was adapted to the three content services and everyday situations as described above. In this IKS use case, content service characteristics are represented by interactivity, relevancy, satisfaction and perceived ease of use of content services, content service-task-situation fit is represented by situation-service fit, behaviour-service fit, modality-service fit and spatial-service fit, content service utility is represented by perceived usefulness and finally, content service utilization is represented by the more concrete dimension intention to use a content service. Context characteristics are measured by technology affinity of the end users. The CSAM research model with its hypotheses in the form of positive relationships between the constructs is shown in Figure 1. Accordingly, the relevant questionnaire items are provided in Table 6. It must be noted that contextual information with regard to the items was incorporated. That is, the narrative of the everyday situation was included into the first section of the survey instrument.

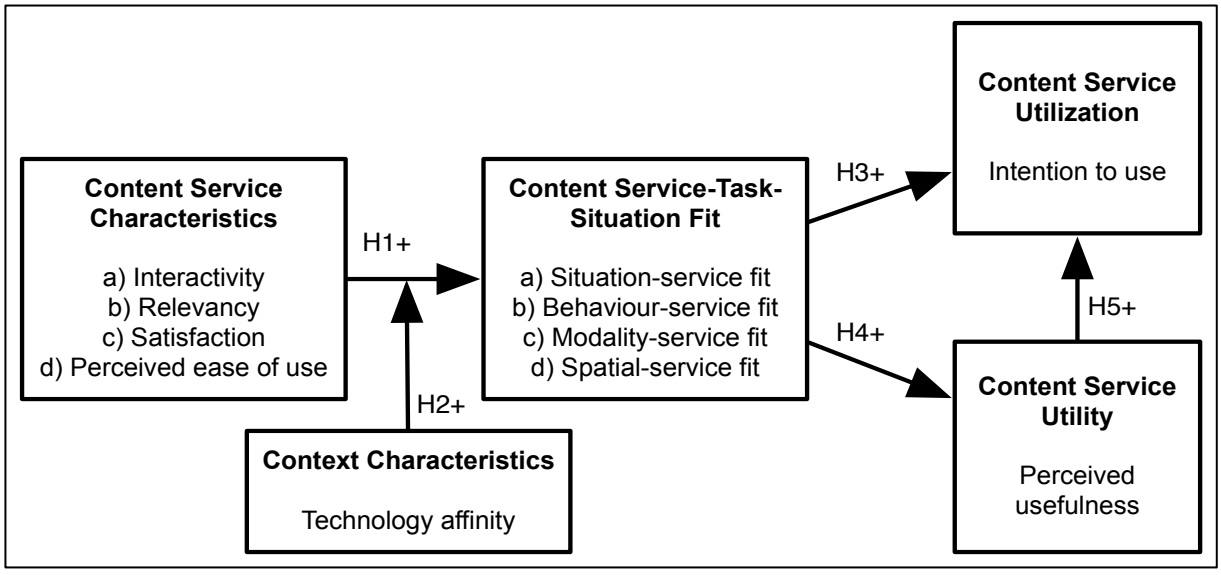

Figure 3. Research model of the IKS AmI use case

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Table 6. Survey instrument for the IKS AmI use case. Note: "this content service" was replaced by the actual name of the service. Furthermore, the wording of the items was enriched with service-specific examples (e.g. for the weather information service it was described that a person interacts with the service by approaching the mirror).

No	Construct	Item	Scale
CSC	**Content service characteristics**		
INT	Interactivity	I find this content service static (1) … interactive (7).	Seven-point semantic differential
REL	Relevancy	I find this content service irrelevant (1) … relevant (7).	Seven-point semantic differential
SAT	Satisfaction	Using this content service is frustrating (1) … satisfactory (7).	Seven-point semantic differential
PEU1	Perceived ease of use	I found that this content service was easy to use.	Seven-point Likert scale from strongly disagree (1) to strongly agree (7)
PEU2	Perceived ease of use	The interaction with this content service is clear and understandable.	Seven-point Likert scale from strongly disagree (1) to strongly agree (7)
PEU3	Perceived ease of use	Learning to use this content service is easy for me.	Seven-point Likert scale from strongly disagree (1) to strongly agree (7)
CC	**Context characteristics**		
TA1	Technology affinity	It is easy for me to use new technologies / content services.	Seven-point Likert scale from strongly disagree (1) to strongly agree (7)
TA2	Technology affinity	I am open towards new technologies / content services.	Seven-point Likert scale from strongly disagree (1) to strongly agree (7)
CSTSF	**Content service-task-situation fit**		
SSF	Situation-service fit	This content service fits well to the situation in which I performed the task.	Seven-point Likert scale from strongly disagree (1) to strongly agree (7)
BSF	Behaviour-service fit	In order to perform the task, this content service would fit well to my behaviour in this situation.	Seven-point Likert scale from strongly disagree (1) to strongly agree (7)
MSF	Modality-service fit	The modality of content presentation fits well to this content service to perform the task.	Seven-point Likert scale from strongly disagree (1) to strongly agree (7)
SPSF	Spatial-service fit	I found that the spatial placement of the content fits well to this content service.	Seven-point Likert scale from strongly disagree (1) to strongly agree (7)
CSU	**Content service utilization**		

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No	Construct	Item	Scale
IU	Intention to use	I would use this content service in the bathroom.	Seven-point Likert scale from strongly disagree (1) to strongly agree (7)
	Content service utility		
PU1	Perceived usefulness	I would find this content service useful for this task.	Seven-point Likert scale from strongly disagree (1) to strongly agree (7)
PU2	Perceived usefulness	This content service would increase my efficiency in performing this task.	Seven-point Likert scale from strongly disagree (1) to strongly agree (7)
PU3	Perceived usefulness	This content service would increase my effectiveness in performing this task.	Seven-point Likert scale from strongly disagree (1) to strongly agree (7)
	Further constructs		
IMP	Improvements	What needs to be improved with regard to a particular content service?	Free text feedback
FCS	Further content services	Which kind of other services would like to use?	Free text feedback
UND	Understandability of the instructions.	I found that the instructions of the study were easy to understand.	Seven-point Likert scale from strongly disagree (1) to strongly agree (7)
LEN	Length of the study	The study was too long.	Seven-point Likert scale from strongly disagree (1) to strongly agree (7)
AGE	Age of the subjects	How old are you?	Ratio scale (actual age)
GEN	Gender of the subjects	Are male / female?	Nominal scale (male, female)

5.2.2 Evaluation Procedure

The evaluation procedure adopted for the empirical study of the current deliverable is similar to the procedure of the empirical study conducted in IKS Task 4.1. The only major difference is the CSAM-derived survey instrument as detailed in the last section as well as a focus on only three services, i.e. weather information service, event recommendation service and ticket order service. Thus, the following description is adapted from IKS D4.1 (Janzen et al. 2011).

The sampling procedure was as follows. A small study invitation card was developed and distributed to students at Saarland University. In this invitation, the study was promoted by claiming that each participant will receive 7 Euro. Furthermore, it contained a web link – which was also embedded in a 2D barcode – to a website, on which the students were able to register for the study by choosing one out of 35 time slots – each 45 minute slot intended for one student.

The evaluation procedure consisted of four steps. First, subjects were given an introduction to the project and were briefly introduced in the use of the interactive bathroom environment with regard to a particular situation. Second, the subjects played through the everyday situation as described above twice to account for learning effects and to get more reliable evaluations afterwards. The spatial placement of the three content services and the physical

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composition of the bathroom is shown in Figure 4 whereas the detailed timeline of interactivity with the services is shown Figure 5. In addition, details on how to interact with the services are provided in Table 7. Third, each subject had to evaluate the situation and its embedded content service by a questionnaire. The objective of this questionnaire was to get quantitative and qualitative evaluations. Finally, subjects received 7 EUR after they had participated. In general, the subjects were allowed to ask questions throughout the study. In addition, the supervisor supported the subjects in case a service did not work as expected (e.g., a predefined speech command was not recognized).

Figure 4. Spatial placement of the three content services evaluated

Table 7. Input and output functionality of the three content services

No	Service	Input	Output
1	Weather information service	Distance sensor – in front of the interactive mirror	Interactive mirror: Today's local weather information is shown.
2	Event recommendation service		Interactive mirror: Three local events are shown.
3	Ticket order service	**Step 1:** Distance sensor – In front of the mirror and event recommendations are displayed **Step 2:** Interactive mirror: Ticket order request by touching an event **Step 3:** Array microphone: Acceptance or rejection of the ticket order request by voice command "yes" or "no".	Speaker: Verification question after Step 2: "Do you want to order tickets for the event ...?"

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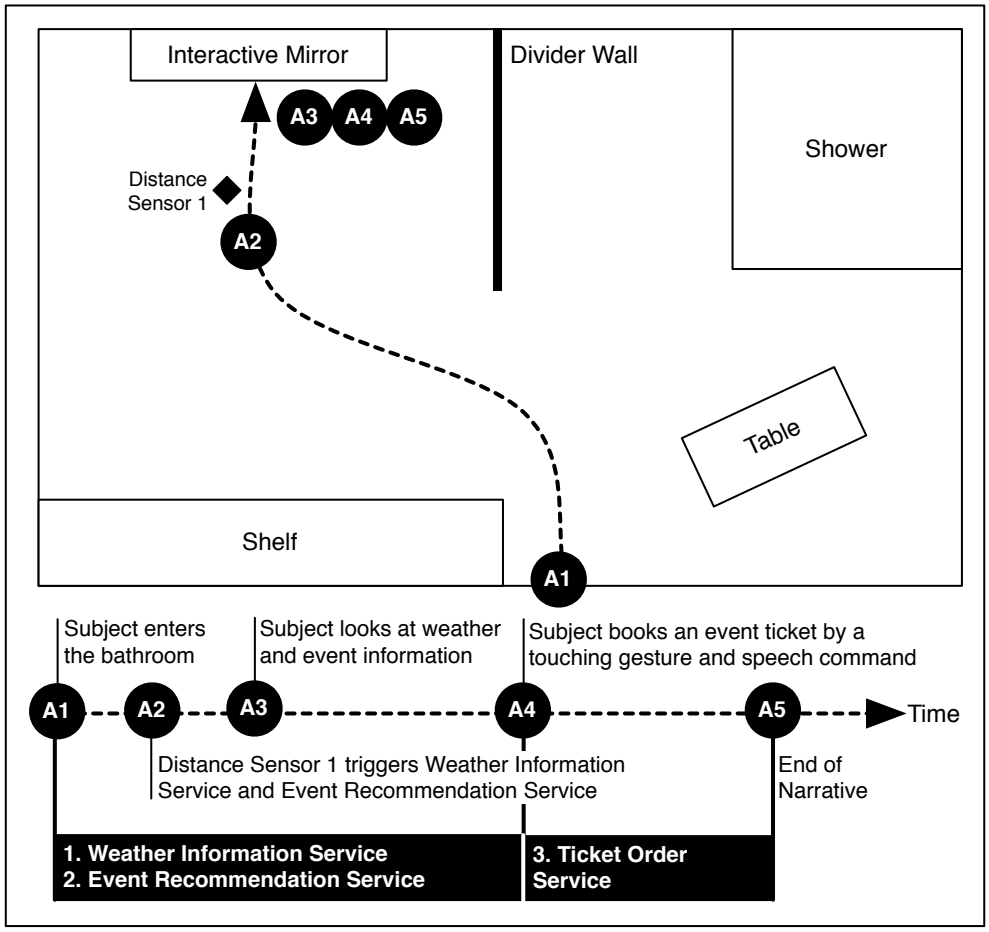

Figure 5. Timeline of interactivity of the three content services

5.2.3 Results of the Empirical Study

Overall 30 subjects or, in more detail, 19 female students and 11 male students participated in the study in the third quarter of 2012. Their age was on average 24.7 (Std. Dev. = 4.0). By conducting one-sample t-tests with a test value of 4 (the neutral scale value of a seven-point Likert scale), the instructions were perceived as easy to understand (Mean = 5.83, Std. Dev. = 1.1, $p < .001$) and the study was not perceived as being too long (Mean = 1.87, Std. Dev. = 0.9, $p < .001$).

With regard to the dimensions perceived ease of use, technology affinity and perceived usefulness, three multi-item constructs were adopted in the current study. For technology affinity and perceived usefulness, Cronbach's alpha yielded values over the recommended threshold of .70 (Nunnally 1967). That is, Alpha values resulted in viable .903 for the two technology affinity items and .861 for the weather information service, .911 for the event recommendation service and .907 for the ticket order service of the three perceived usefulness items. Thus, an average score was calculated for perceived usefulness and technology affinity. By contrast, the three perceived ease of use items yielded Alpha values below the recommended threshold of .07 for the weather information service and the event recommendation service – probably because of the quite simple mode of usage by just approaching the mirror. Therefore, the overall ease of use item, i.e. PEU1, was used for these services and for further calculations. Only for the ticket order service, an aggregated score was calculated for perceived ease of use because Alpha yielded .847.

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The descriptive statistics of the CSAM constructs, the results of one-sample t-tests and the qualitative feedback are listed in Table 8.

Table 8. Descriptive statistics, results from one-sample t-tests with a test value of 4, i.e. the neutral scale value on the semantic differential and Likert-scale, and qualitative feedback (N=30). Note: * p < .05, ** p < .01, *** p < .001, Standard deviation = SD, NS = non-significant

No	Construct	Weather Service	Event Service	Ticket Service
	Content service characteristics			
INT	Interactivity	Mean: **3.37**^{ns} SD: 2.0 Interpretation: subjects found that the service is neither static nor interactive.	Mean: **4.90**** SD:1.7 Interpretation: subjects found that the service is interactive.	Mean: **5.20***** SD: 1.6 Interpretation: subjects found that the service is interactive.
REL	Relevancy	Mean: **5.60***** SD: 1.7 Interpretation: subjects indicated that the service is relevant.	Mean: **4.07**^{ns} SD: 1.8 Interpretation: subjects indicated no preference w.r.t. relevancy of the service.	Mean: **4.07**^{ns} SD: 1.8 Interpretation: subjects indicated no preference w.r.t. relevancy of the service.
SAT	Satisfaction	Mean: **5.77***** SD: 1.3 Interpretation: subjects were satisfied with the service.	Mean: **5.13***** SD: 1.4 Interpretation: subjects were satisfied with the service.	Mean: **5.00***** SD: 0.2 Interpretation: subjects were satisfied with the service.
PEU	Perceived ease of use	Mean: **6.53***** SD: 0.8 Interpretation: subjects found that the service is easy to use.	Mean: **6.27***** SD: 0.8 Interpretation: subjects found that the service is easy to use.	Mean: **5.76***** SD: 1.3 Interpretation: subjects found that the service is easy to use.
	Context characteristics			
TA1	Technology affinity	Mean: **5.78***** SD: 1.4 Interpretation: technology-savvy subjects participated in the study.		
	Content service-task-situation fit			
SSF	Situation-service fit	Mean: **6.07***** SD: 1.2 Interpretation: subjects found that the service fits well to the situation.	Mean: **4.23**^{ns} SD: 2.1 Interpretation: subjects had no preference on whether the service fits well to the situation.	Mean: **3.97**^{ns} SD: 2.0 Interpretation: subjects had no preference on whether the service fits well to the situation.

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No	Construct	Weather Service	Event Service	Ticket Service
BSF	Behaviour-service fit	Mean: **5.80*** ** SD: 1.2 Interpretation: subjects found that using the service fits well to their behaviour.	Mean: **3.5**^{ns} SD: 1.8 Interpretation: subjects had no preference on whether the service fits to their behaviour.	Mean: **2.90**** SD: 1.7 Interpretation: subjects found that using the service fits definitely not to their behaviour in this situation.
MSF	Modality-service fit	Mean: **5.80*** ** SD: 1.2 Interpretation: subjects found that the service offers the right modality.	Mean: **5.07**** SD: 1.8 Interpretation: subjects found that the service offers the right modality	Mean: **5.03**** SD: 1.8 Interpretation: subjects found that the service offers the right modality
SPSF	Spatial-service fit	Mean: **5.90*** ** SD: 1.2 Interpretation: subjects found that the service was spatially located at the right spot in the bathroom.	Mean: **5.17**** SD: 1.9 Interpretation: subjects found that the service was spatially located at the right spot in the bathroom.	Mean: **5.17**** SD: 1.8 Interpretation: subjects found that the service was spatially located at the right spot in the bathroom.
	Content service utilization			
IU	Intention to use	Mean: **6.33*** ** SD: 1.0 Interpretation: subjects would use this service in the bathroom.	Mean: **3.70**^{ns} SD: 2.0 Interpretation: subjects are undecided whether or whether not to use this service.	Mean: **3.27*** SD: 1.9 Interpretation: subjects would not use this service in the bathroom.
	Content service utility			
PU1	Perceived usefulness	Mean: **5.83*** ** SD: 1.1 Interpretation: subjects found that the service is useful.	Mean: **4.01**^{ns} SD: 1.7 Interpretation: subjects were undecided whether the service is useful or not useful.	Mean: **3.63**^{ns} SD: 1.7 Interpretation: subjects were undecided whether the service is useful or not useful.
	Further constructs			

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No	Construct	Weather Service	Event Service	Ticket Service
IMP	Improvements (consolidated from qualitative feedback)	▪ Text and graphics should be increased in size ▪ More information should be displayed (e.g. also moisture) ▪ The information should be more interactive, e.g. by touching gestures and day-by-day weather information ▪ Animated weather information	▪ More information should be provided for each event (e.g. trailer ▪ Events should be categorized (e.g. movies, concerts, theatre play, etc.) ▪ More events should be presented to the user ▪ Font size was too small ▪ Calendar information of the user should also be shown	▪ Price of the ticket should be displayed ▪ Seats with categories should displayed ▪ Repeated and final question whether a person wants to book the event tickets ▪ Integration of social media (Twitter, Facebook) and the function to ask / invite friends to an event ▪ Several locations should be provided for movies, from which the person would select the preferred location

Further content services that participants mentioned are listed in the following:

- News and newsletter service (sport news, new ticker, etc.)
- Traffic jam service
- Radio and music service
- Television and YouTube service
- Social media (e.g. Facebook, Twitter, etc.)
- RSS feeds
- eMail service
- Calendar service
- Web search service
- Online shopping service
- Clothing recommendation service
- Karaoke service
- Notes service
- Synchronized communication service (e.g. phone)

In order to test the hypotheses of the research model, Pearson correlation coefficients were calculated. The results or the correlation analyses are provided in Table 9.

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Table 9. Pearson correlation coefficients (N=30). Note: * p < .05, ** p < .01, *** p < .001 (1-tailed)

Hypothesis	Weather Service	Event Service	Ticket Service
Content service characteristics x Content service-task-situation-fit (with TA moderator)			
$H1_{a,a}$ INT x SSF	.165^{ns}	**.363***	.076^{ns}
$H2_{a,a}$ INT x SSF moderated by TA	.112^{ns}	**.368***	.054^{ns}
$H1_{a,b}$ INT x BSF	.285^{ns}	**.417***	.118^{ns}
$H2_{a,b}$ INT x BSF moderated by TA	.251^{ns}	**.426***	.105^{ns}
$H1_{a,c}$ INT x MSF	**.308***	**.426****	.168^{ns}
$H2_{a,c}$ INT x MSF moderated by TA	.277^{ns}	**.461****	.154^{ns}
$H1_{a,d}$ INT x SPSF	.269^{ns}	**.533*****	.130^{ns}
$H2_{a,d}$ INT x SPSF moderated by TA	.231^{ns}	**.532*****	.117^{ns}
$H1_{b,a}$ REL x SSF	**.453****	**.729*****	**.750*****
$H2_{b,a}$ REL x SSF moderated by TA	**.460****	**.740*****	**.758*****
$H1_{b,b}$ REL x BSF	**.400***	**.742*****	**.535*****
$H2_{b,b}$ REL x BSF moderated by TA	**.393***	**.757*****	**.518****
$H1_{b,c}$ REL x MSF	-.003^{ns}	**.408***	**.356***
$H2_{b,c}$ REL x MSF moderated by TA	**.400***	**.432***	**.322***
$H1_{b,d}$ REL x SPSF	.228^{ns}	**.710*****	**.579*****
$H2_{b,d}$ REL x SPSF moderated by TA	.208^{ns}	**.710*****	**.563****
$H1_{c,a}$ SAT x SSF	**.471****	**.486****	**.576*****
$H2_{c,a}$ SAT x SPSF moderated by TA	**.390***	**.479****	**.538****
$H1_{c,b}$ SAT x BSF	**.324***	**.588*****	**.652*****
$H2_{c,b}$ SAT x BSF moderated by TA	.231^{ns}	**.586*****	**.630*****
$H1_{c,c}$ SAT x MSF	**.572*****	**.328***	**.362***
$H2_{c,c}$ SAT x MSF moderated by TA	**.507*****	**.321***	.299^{ns}
$H1_{c,d}$ SAT x SPSF	**.474****	**.509****	**.307***
$H2_{c,d}$ SAT x SPSF moderated by TA	**.382***	**.507****	.259^{ns}
$H1_{d,a}$ PEU x SSF	**.414***	**.639*****	**.351***
$H2_{d,a}$ PEU x SSF moderated by TA	.236^{ns}	**.613*****	.181^{ns}
$H1_{d,b}$ PEU x BSF	**.336***	**.643*****	.262^{ns}
$H2_{d,b}$ PEU x BSF moderated by TA	.170^{ns}	**.610*****	.160^{ns}
$H1_{d,c}$ PEU x MSF	**.369***	**.437****	**.594*****
$H2_{d,c}$ PEU x MSF moderated by TA	.128^{ns}	**.326***	**.500****
$H1_{d,d}$ PEU x SPSF	**.562*****	**.450****	**.414***
$H2_{d,d}$ PEU x SPSF moderated by TA	**.379***	**.466****	**.335***

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Hypothesis	Weather Service	Event Service	Ticket Service
Content service-task-situation-fit X Content service utilization			
H3$_a$ SSF x IU	.809***	.879***	.842***
H3$_b$ BSF x IU	.799***	.952***	.922***
H3$_c$ MSF x IU	.514**	.410*	.571***
H3$_d$ SPSF x IU	.661***	.749***	.629***
Content service-task-situation-fit X Content service utility			
H4$_a$ SSF x PU	.581***	.883***	.878***
H4$_b$ BSF x PU	.778***	.894***	.842***
H4$_c$ MSF x PU	.460**	.503**	.532***
H4$_d$ SPSF x PU	.541**	.745***	.646***
Content service-task-situation-fit X Content service utility			
H5 PU x IU	.757***	.887***	.874***

5.2.4 Discussion and Recommendations

Based on the list of descriptive statistics (cf. Table 8), it can be concluded that in particular the weather information service was perceived high and positive on almost all constructs and dimensions. That is, the likelihood that end users are adopting this service in their everyday life is relatively high. By contrast, the ticket order service was rated significantly low or negative with regard to behaviour-service fit and usage intentions. That is, this service will probably require major revisions before it will be adopted und continuously used in a bathroom situation as described at the beginning of this section. The event recommendation service was generally perceived positive and subjects had no preference on whether or not to use it in the bathroom. Thus, it is strongly recommended to incorporate the qualitative feedback as provided in the last row of Table 8. For example, more detailed information about events and tickets should be taken into consideration here. It is additionally recommended to extend the range of potential content services in the bathroom according to the list provided by the participants of the study (e.g. TV, radio, calendar, etc.).

With regard to CSAM and the correlation results depicted in Table 9, it can be concluded that all hypotheses are supported by the data of the event recommendation service. Furthermore, relevant predictors of content service-situation-fit, i.e. content service characteristics, are in particular relevancy, satisfaction and perceived ease of use. However, on a construct level, all hypotheses that consider content service characteristics are supported by at least one dimension and all other hypotheses are supported by the empirical data. It can be therefore concluded that CSAM is a useful model in explaining the phenomena of content service adoption.

Future research should, however, apply more advanced methods for hypothesis testing (e.g. by applying regression analyses or structural equation models with partial least square analyses) and should recruit end users with a lower degree of technology affinity in order to add external validity to the current findings.

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5.3 Project Controlling Use Case

The IKS project controlling tool was described in detail in IKS D4.4 (Behrendt et al. 2011). This tool is a Web-based project-reporting tool using HTML5 features. It provides interfaces needed to access relevant information sources, which then assist in aggregating the necessary information items so that they become content for the report. For the development of the tool, Jackson's Problem Frames are used as requirements methodology to extract the necessary domain specific knowledge. The underlying knowledge model is divided into three abstraction layers: foundational, content management specific, application domain specific. Based on the Alpha-implementation of the IKS Stack, we explored how semantic web technologies can extend the current industrial technology stacks. This IKS use case contrasts with the parallel, AmI use case of IKS where semantic web technology was used throughout. Thus, the two use cases show the range of options available to developers when implementing functionality for semantic content management.

Due to the low maturity of the tool from an end-user perspective at the end of the IKS project, it was not possible to conduct an empirical study. However, the following two subsections provide a brief overview on how CSAM could be applied to such a tool and some reasons why the study was not conducted.

5.3.1 Recommended CSAM Operationalization

Due to the similarities of the desktop-based office environment of the IKS Tourism use case, it is recommended that the CSAM dimensions from section 5.1.1, in particular Table 2, are reused for the IKS project controlling use case.

5.3.2 Critical Discussion

Work on the project controlling tool was abandoned in year 4 because there was little interest from CMS providers to develop their product into such a direction. SRFG pursued development for a few months, but then also decided to focus on the development of Stanbol.

There are several reasons why this line of the work was not successful:

1. The project manager envisioned a knowledge-intensive and rule-based tool, with knowledge-based linking to actual content. Contrastingly, the CMS partners and the development team focused on semantic lifting of arbitrary and pre-dominantly text-based content. Hence IKS never developed the type of infrastructure that the controlling tool was supposed to exploit.

2. The project manager wanted to experiment with development tools that are not RDF based and that are not OWL-DL based. Such experimentation happened in the second phase of prototype development in year two (using CouchDB and MapReduce) but there was only one developer who had the necessary skills and therefore this was not a sustainable route towards a convincing demo case. A third option would have been logic programming, but this is an art that has been completely lost in Europe.

3. The project controlling application appears to be the type of application that at present is of no interest to any CMS players dealing with semantic content.

For these reasons, work on the project controlling tool could have only been pursued further if the project manager had forced this route onto the development team. Given the good re-

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sults of the project in all other aspects of IKS, this would have been counterproductive. We have recently submitted a national research proposal focused on logic programming of Knowledge-based Systems.

6 Summary

In this deliverable, four objectives were addressed: (1) to review existing evaluation methods for software-based applications, (2) to develop and test a user-oriented content-support acceptance model (CSAM) for semantic CMS applications on the basis of the previous review, (3) to apply and test CSAM and (4) to provide recommendations for revisions of the evaluated CMS applications. Accordingly, a review was conducted and the generic CSAM was developed. The major advantage of CSAM is its flexibility to incorporate various dimensions that particularly apply to concrete CMS applications. This flexibility of CSAM was shown by applying it to a traditional CMS application in an office and business context (i.e. the IKS Tourism use case) as well as to a ubiquitous CMS application in a private environment (i.e. the IKS AmI use case). Results show, that CSAM helps to better understand the phenomenon of content service adoption. Particularly, all hypotheses of CSAM are supported by the empirical end user data by at least one concrete dimension (e.g. the perceived ease of use of the content characteristics construct). In addition, concrete recommendations were provided based on empirical as well as on qualitative data.

Future work on CSAM should, however, add external validity to the current findings by adopting and adapting the various constructs and dimensions to other application domains and by recruiting end users from CMS customer companies.

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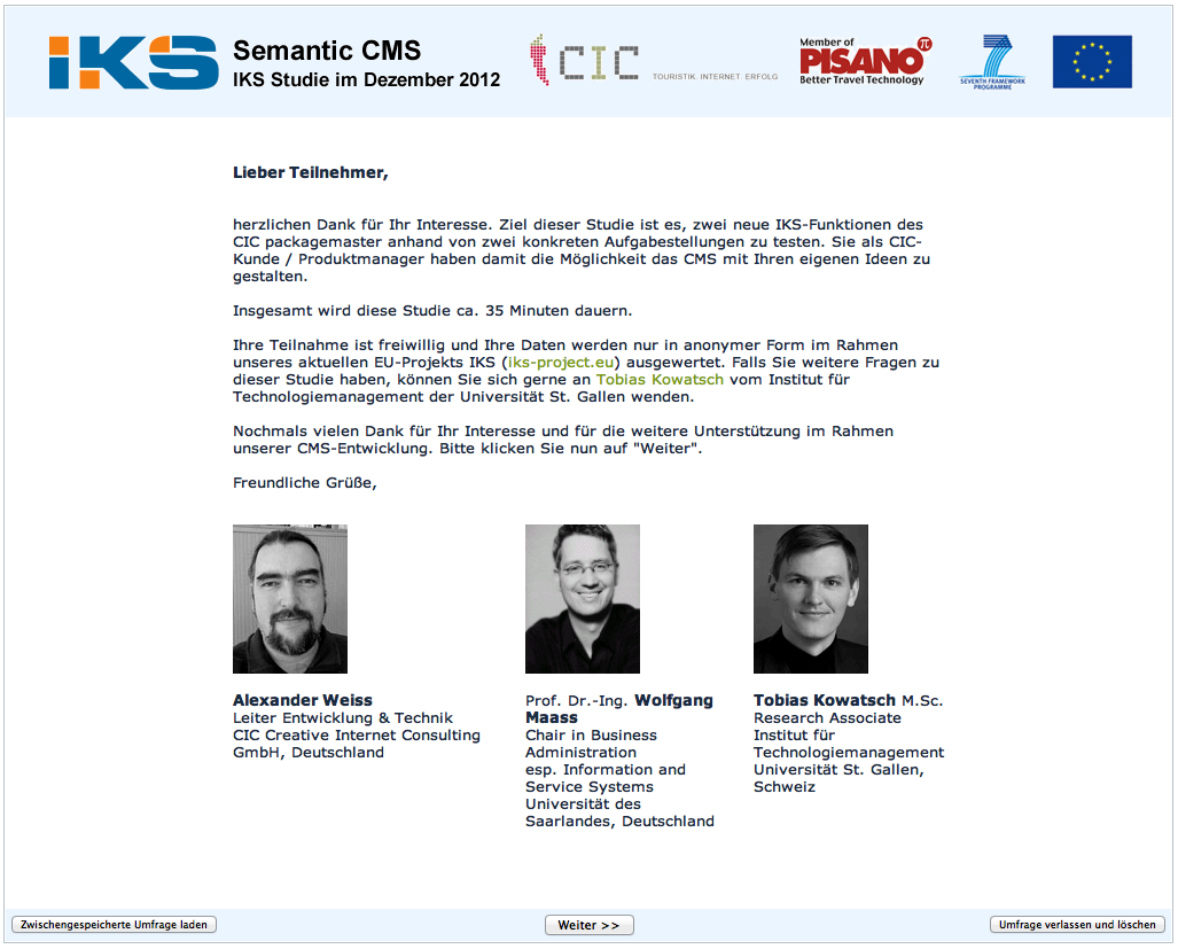
Appendix A: Survey Instrument – Vertical Use Case

6.1 Survey[5]



[5] It must be noted (1) that this survey instrument was designed for CMS customers in the tourism industry and that it was adapted to PhD students for the preliminary study as described in this report and (2) that in addition to CSAM-related constructs and dimensions, further questionnaire items were incorporated for future evaluations and analyses.

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IKS Studie im Dezember 2012

Teil 1 von 2: IKS-Funktionalität "Zusatzinformationen generieren"

- **Bitte bewerten Sie nun folgende Aussagen.**

	gar nicht 1	2	3	weder noch 4	5	6	voll und ganz 7
Dies war eine typische Aufgabenstellung für einen Produktmanager.	○	○	○	○	○	○	○
Dies wird eine typische Aufgabenstellung für einen Produktmanager in Zukunft sein.	○	○	○	○	○	○	○
Ich konnte diese Aufgabenstellung innerhalb von 8 Minuten erledigen.	○	○	○	○	○	○	○

Bitte beurteilen Sie nun die neue IKS Funktionalität "Zusatzinformationen generieren", die es Ihnen erlaubt die Reisebeschreibung um zusätzliche Informationen zu ergänzen.

- **Im Rahmen der Aufgabenstellung fand ich die Nutzung des IKS-Dienstes "Zusatzinformationen generieren" ...**

	3	2	1	weder noch	1	2	3	
frustrierend	○	○	○	○	○	○	○	zufriedenstellend
verwirrend	○	○	○	○	○	○	○	verständlich
einfach	○	○	○	○	○	○	○	schwer
sinnvoll	○	○	○	○	○	○	○	unnötig
langweilig	○	○	○	○	○	○	○	interessant
erschreckend	○	○	○	○	○	○	○	erfreulich
uninteressant	○	○	○	○	○	○	○	aufregend
angenehm	○	○	○	○	○	○	○	unangenehm
unnötig	○	○	○	○	○	○	○	hilfreich
relevant	○	○	○	○	○	○	○	irrelevant
statisch	○	○	○	○	○	○	○	interaktiv
effizient	○	○	○	○	○	○	○	ineffizient
effektiv	○	○	○	○	○	○	○	unnütz
unpassend	○	○	○	○	○	○	○	passend

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* **Wie würden Sie die Qualität des IKS-Dienstes "Zusatzinformationen generieren" beurteilen?**

	3	2	1	weder noch	1	2	3	
sehr geringe Qualität	○	○	○	○	○	○	○	sehr hohe Qualität

Nennen Sie die drei grössten Schwachstellen des IKS-Dienstes "Zusatzinformationen generieren".

1.
2.
3.

* **Bewerten Sie bitte die folgenden Aussagen.**

	gar nicht 1	2	3	weder noch 4	5	6	voll und ganz 7
Ich würde diesen IKS-Dienst für ähnliche Aufgabenstellungen wieder nutzen.	○	○	○	○	○	○	○
Die Nutzung dieses IKS-Dienstes ist leicht zu erlernen.	○	○	○	○	○	○	○
Ich kann mir generell sehr gut vorstellen, diesen IKS-Dienst zukünftig zu nutzen, sobald er im packagemaster CMS integriert ist.	○	○	○	○	○	○	○
Ich fand, dass die Informationen des IKS-Dienstes zur Aufgabenstellung gepasst haben.	○	○	○	○	○	○	○
Dieser IKS-Dienstes unterstützt generell die Arbeit eines Produktmanagers.	○	○	○	○	○	○	○
Ich würde diesen IKS-Dienst zukünftig häufiger nutzen.	○	○	○	○	○	○	○
Dieser IKS-Dienst würde meine Effektivität und Produktivität für ähnliche Aufgabenstellungen erhöhen.	○	○	○	○	○	○	○
Dieser IKS-Dienst wäre mir eine große Hilfe um ähnliche Aufgaben effizient zu erledigen.	○	○	○	○	○	○	○
Insgesamt bin ich mit der Qualität dieses IKS-Dienstes sehr zufrieden.	○	○	○	○	○	○	○

* **Falls Sie in Zukunft mit einer ähnliche Aufgabenstellung konfrontiert wären wie groß wäre die Wahrscheinlichkeit, dass sie nochmals den IKS-Dienst "Zusatzinformationen generieren" nutzen würden?**

	3	2	1	weder noch	1	2	3	
sehr unwahrscheinlich	○	○	○	○	○	○	○	sehr wahrscheinlich

Was wünschen Sie sich für die weitere Entwicklung dieses IKS-Dienstes?

Später fortfahren | << Zurück | Weiter >> | Umfrage verlassen und löschen

Semantic CMS
IKS Studie im Dezember 2012

Teil 2 von 2: IKS-Funktionalität "Text bereichern"

Bitte nehmen Sie sich nun ca. 5 Minuten Zeit und folgen den Instruktionen der zweiten Aufgabenstellung, die Sie ebenfalls gerne ausdrucken dürfen: Aufgabenstellung2.pdf (780KB)

Klicken Sie danach bitte auf "Weiter".

Später fortfahren | << Zurück | Weiter >> | Umfrage verlassen und löschen

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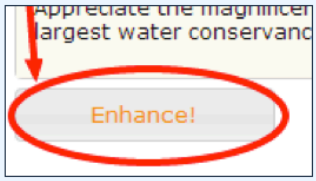
Semantic CMS
IKS Studie im Dezember 2012

Teil 2 von 2: Evaluierung der zweiten Aufgabenstellung

* **Bitte bewerten Sie nun folgende Aussagen.**

	gar nicht 1	2	3	weder noch 4	5	6	voll und ganz 7
Dies war eine typische Aufgabenstellung für einen Produktmanager.	○	○	○	○	○	○	○
Ich konnte diese Aufgabenstellung innerhalb von 5 Minuten erledigen.	○	○	○	○	○	○	○
Dies wird eine typische Aufgabenstellung für einen Produktmanager in Zukunft sein.	○	○	○	○	○	○	○

Bitte beurteilen Sie nun die neue IKS-Funktionalität "Text bereichern", die es Ihnen erlaubt einzelne Begriffe mit weiteren Informationen zu bereichern.



* **Für die Aufgabenstellung fand ich die Nutzung des IKS-Dienstes "Text bereichern" ...**

	3	2	1	weder noch	1	2	3	
frustrierend	○	○	○	○	○	○	○	zufriedenstellend
verwirrend	○	○	○	○	○	○	○	verständlich
einfach	○	○	○	○	○	○	○	schwer
sinnvoll	○	○	○	○	○	○	○	unnötig
langweilig	○	○	○	○	○	○	○	interessant
erschreckend	○	○	○	○	○	○	○	erfreulich
uninteressant	○	○	○	○	○	○	○	aufregend
angenehm	○	○	○	○	○	○	○	unangenehm
unnötig	○	○	○	○	○	○	○	hilfreich
relevant	○	○	○	○	○	○	○	irrelevant
statisch	○	○	○	○	○	○	○	interaktiv
effizient	○	○	○	○	○	○	○	ineffizient
effektiv	○	○	○	○	○	○	○	unnütz
unpassend	○	○	○	○	○	○	○	passend

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* **Wie würden Sie die Qualität des IKS-Dienstes "Text bereichern" beurteilen?**

	3	2	1	weder noch	1	2	3	
sehr geringe Qualität	○	○	○	○	○	○	○	sehr hohe Qualität

Nennen Sie die drei grössten Schwachstellen des IKS-Dienstes "Text bereichern".

1.
2.
3.

* **Bewerten Sie bitte die folgenden Aussagen.**

	gar nicht 1	2	3	weder noch 4	5	6	voll und ganz 7
Ich würde diesen IKS-Dienst für ähnliche Aufgabenstellungen wieder nutzen.	○	○	○	○	○	○	○
Die Nutzung dieses IKS-Dienstes ist leicht zu erlernen.	○	○	○	○	○	○	○
Ich kann mir generell sehr gut vorstellen, diesen IKS-Dienst zukünftig zu nutzen, sobald er im packagemaster CMS integriert ist.	○	○	○	○	○	○	○
Ich fand, dass die Informationen des IKS-Dienstes zur Aufgabenstellung gepasst haben.	○	○	○	○	○	○	○
Dieser IKS-Dienstes unterstützt generell die Arbeit eines Produktmanagers.	○	○	○	○	○	○	○
Ich würde diesen IKS-Dienst zukünftig häufiger nutzen.	○	○	○	○	○	○	○
Dieser IKS-Dienst würde meine Effektivität und Produktivität für ähnliche Aufgabenstellungen erhöhen.	○	○	○	○	○	○	○
Dieser IKS-Dienst wäre mir eine große Hilfe um ähnliche Aufgaben effizient zu erledigen.	○	○	○	○	○	○	○
Insgesamt bin ich mit der Qualität dieses IKS-Dienstes sehr zufrieden.	○	○	○	○	○	○	○

* **Falls Sie in Zukunft mit einer ähnliche Aufgabenstellung konfrontiert wären wie groß wäre die Wahrscheinlichkeit, dass sie nochmals den IKS-Dienst "Text bereichern" nutzen würden?**

	3	2	1	weder noch	1	2	3	
sehr unwahrscheinlich	○	○	○	○	○	○	○	sehr wahrscheinlich

Was wünschen Sie sich für die weitere Entwicklung des IKS-Dienstes "Text bereichern"?

Später fortfahren | << Zurück | Weiter >> | Umfrage verlassen und löschen

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Semantic CMS
IKS Studie im Dezember 2012

CIC TOURISTIK. INTERNET. ERFOLG

Member of PISANO Better Travel Technology

SEVENTH FRAMEWORK PROGRAMME

Abschließende Fragen

* **Bewerten Sie bitte die folgenden vier Aussagen.**

	gar nicht 1	2	3	weder noch 4	5	6	voll und ganz 7
Ich bin CMS-Experte.	○	○	○	○	○	○	○
Ich kenne mich mit semantischen Web-Technologien sehr gut aus.	○	○	○	○	○	○	○
Neuen Technologien stehe ich stets aufgeschlossen gegenüber.	○	○	○	○	○	○	○
Ich lerne sehr schnell mit neuen Technologien umzugehen.	○	○	○	○	○	○	○

* **Wie lange sind Sie schon Produktmanager?**

[ ] Jahre.

* **Ihr Geschlecht?**

○ männlich ○ weiblich

* **Wie alt sind Sie?**

Ich bin [ ] Jahre jung.

* **Bewerten Sie bitte abschließend die folgenden zwei Aussagen.**

	gar nicht 1	2	3	weder noch 4	5	6	voll und ganz 7
Ich fand den Fragebogen klar und verständlich.	○	○	○	○	○	○	○
Ich fand diese Studie zu lang.	○	○	○	○	○	○	○

Haben Sie letzte Anmerkungen?

Später fortfahren | << Zurück | Absenden | Umfrage verlassen und löschen

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6.2 Task Description 1

Aufgabenstellung 1 „Zusatzinformationen generieren“

Autor: Alexander Weiss

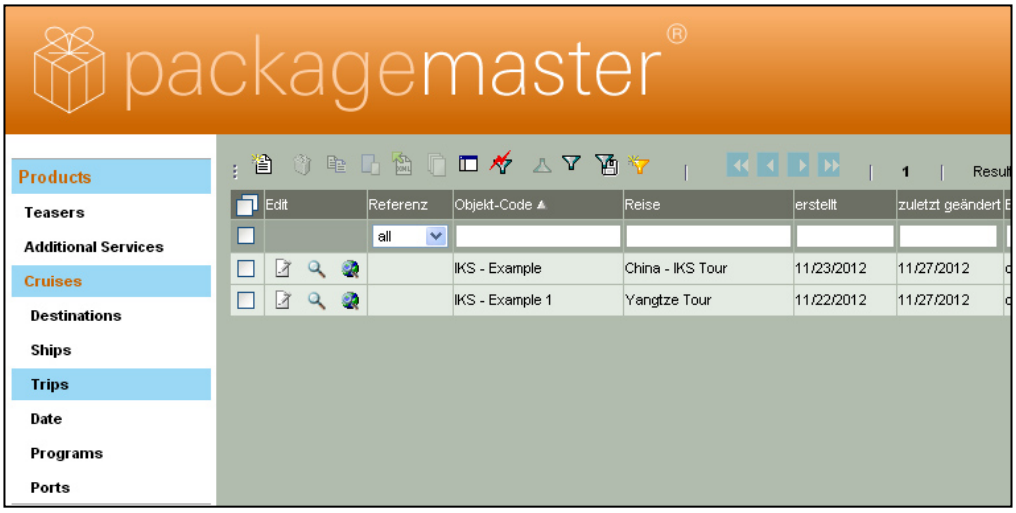
Bitte lesen Sie sich zunächst folgende erste Aufgabenstellung genau durch:

Eine neue Kreuzfahrt wird in der nächsten Saison verfügbar sein. Diese Reise soll im packagemaster von Ihnen als Produktmanager angelegt werden. Hierzu sollen allgemeine Informationen wie Zielgebiete, Merkmale, Bilder und Beschreibungen eingepflegt werden. Bei den Beschreibungen soll der Abschnitt „Ausführlicher Reiseverlauf“ gefüllt und um zusätzliche Informationen durch die IKS-Funktionalität ergänzt werden.

Vorgehensweise:

1. Melden Sie sich bitte mit *Google Chrome (aktuelle Version)* oder *Firefox ab Version 16* über folgenden Link am IKS packagemaster System an: BLINDED
(Nutzer: **BLINDED** | Passwort: **BLINDED**)

2. Klicken Sie bitte auf der Übersichtseite im Menu auf „Products“ > „Cruises“ > „Trips“



3. Legen Sie bitte dort eine neue Reise mit einem Klick auf die „create“-Schaltfläche an.

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4. Pflegen Sie bitte nun die folgenden Reisedaten ein:
Daten / Informationen für eine neue Reise.
Bitte die Inhalte in den deutschen und englischen Feldern einpflegen, wenn vorhanden.
Reiter: Allgemein
Aktiv: ja (für beide Sprachen)
Objektcode (Beispiel): IKS-0002
Bezeichnung (Beispiel): Yangtze Tour
Saison: All Seasons
Zielgebiet: China
Reiter: Merkmale
Reiseart: Flussreisen
Reiter: Beschreibungen (bitte fahren Sie mit Schritt 5 fort)

5. Klicken Sie in der Beschreibung „Ausführlicher Reiseverlauf“, Abschnitt „Standard“ auf den **englischen Reiter** und fügen Sie dann den folgenden Beispieltext ein:

Arrive in Shanghai
Your personal tour guide will greet you at the arrival hall of the airport. The driver will help you with the luggage and transfer you directly to the hotel via a comfortable private vehicle.

Attractions: Yuyuan Garden, Shanghai Museum, The Bund, The Shanghai World Financial Center, Jiangnan Silk Shop and Workshop

The highlights packed in a day. You'll learn about the city from different angles. Relax in a yuyuan tea house gardens, the collonial waterfront, China's best museum and a bird’s eye from Shanghai's highest building.

Shanghai to Chongqing
Attractions: Panda Room in Chongqing Zoo, Ciqikou Old Town

A two hour flight will get you to the mountain city where the Yangtze River cruise starts, a panda visit tops the day.

Yangtze River Cruise
Attractions: Taichi exercise, Welcoming Banquet, Dancing Party, Fengdu Ghost City

A half day shore excursion to the Ghost City will make sure that you get the best knowledge of China’s ghost culture, a formal welcoming banquet follows.

Yangtze Cruise to Yichang
Attractions: Taichi exercise, Qutang Gorge, Wu Gorge, Shennong Stream

Take a sampan to go deep into the beautiful narrow gorges of Shennong Stream, the once torpidly flowing water is now tamed and it is ideal for a sampan-pulling performance.

Yichang, Fly to Shanghai
Attractions: Three Gorges Dam Site

Appreciate the magnificent Three Gorges Dam and pick up more background information on this largest water conservancy project. Fly back to Shanghai for your last night in the metropolis.

Depart Shanghai
Your guide will meet you at the hotel lobby at a set time and transfer you to the airport with the driver, safely and on time!

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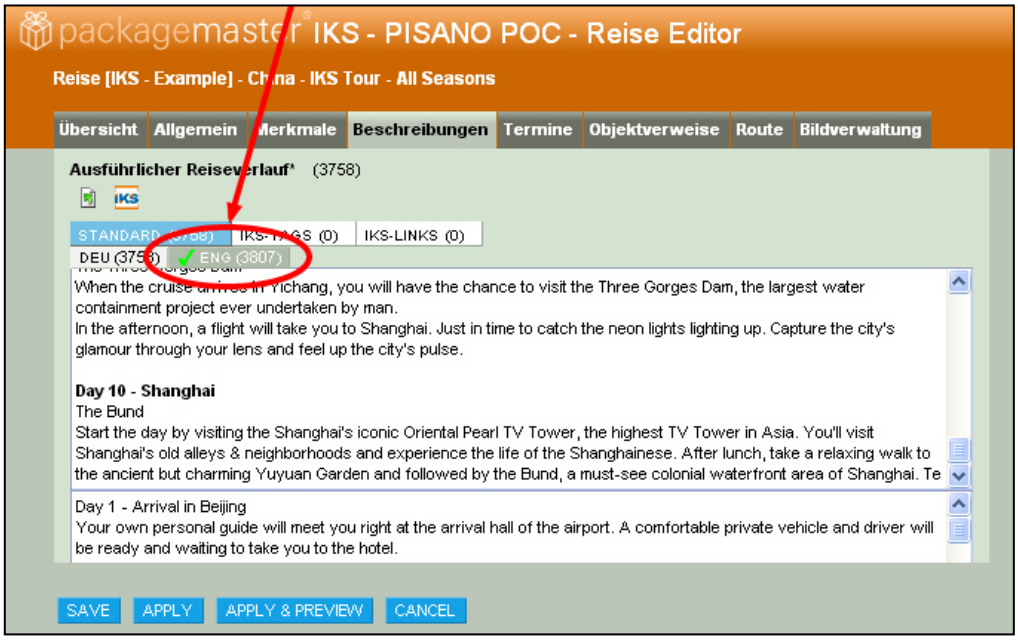

>> Ab jetzt nutzen Sie die neue IKS-Funktionalität: Zusatzinformationen generieren <<

6. Dann klicken Sie bitte auf das IKS Symbol über den Reitern der Beschreibung.

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Es öffnet sich nun ein neues Fenster mit dem Titel „Enhancements“, Hier werden die im Text erkannten Inhalte zu den jeweiligen Bereichen „Person“, „Place“ und „Organisation“ angezeigt.

7. Nun soll zu einem gefundenen Begriff eine neue Infoseite für die Website erstellt werden. Gehen Sie z.B. für **China** folgendermaßen vor:

a) Klick Sie bitte auf das „**+**“ vor China.

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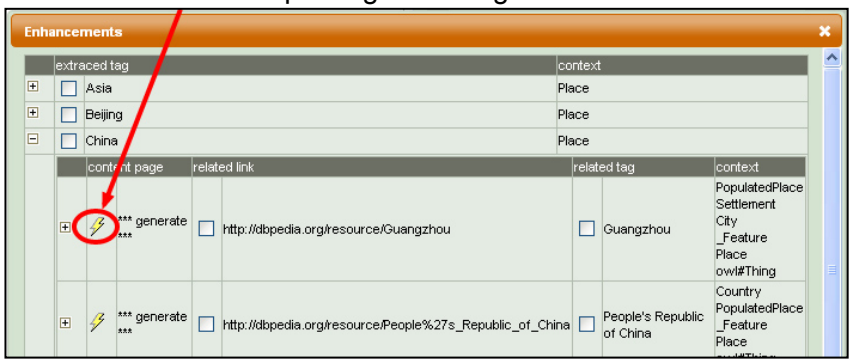
b) Daraufhin werden die gefundenen Inhalte zum „Place“ China angezeigt. Der Blitz zeigt nun an, dass man eine Infoseite automatisiert erzeugen kann. Klicken Sie bitte daher auf den Blitz und die neue Infoseite wird im packagemaster generiert.



c) Die folgende Infoseite öffnet sich direkt in einem neuen Fenster *(berücksichtigen Sie bitte, dass Pop-Up Blocker deaktiviert sind)* und kann dort bearbeitet werden. Bitte begutachten Sie kurz die neuen Inhalte im Reiter „Overview“ und speichern Sie diese dann über einen Klick auf die „Save“-Schaltfläche. Daraufhin schließt sich das Fenster.

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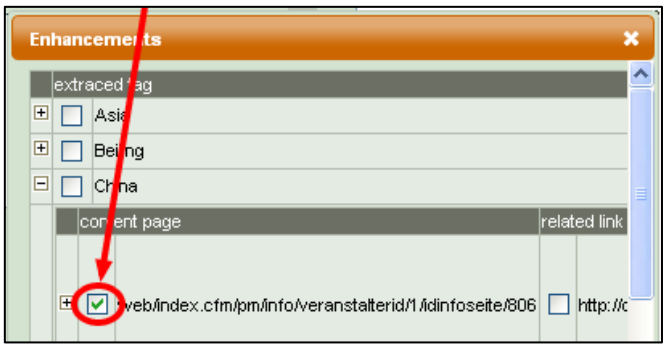
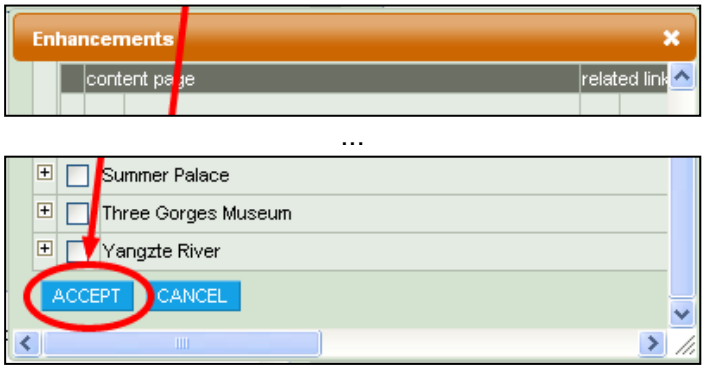
Sie sind nun wieder zurück in der Bearbeitung der Reise. Jetzt hat sich der Blitz in eine Auswahlbox gewandelt und der Link auf die neu erstellte Infoseite wird dahinter angezeigt.

d) Um die neue Infoseite mit diesem Produkt zu verbinden, haken Sie bitte diese Auswahlbox an.



e) Schließlich klicken Sie dann bitte im Fenster „Enhancements“ auf die „Accept“-Schaltfläche.



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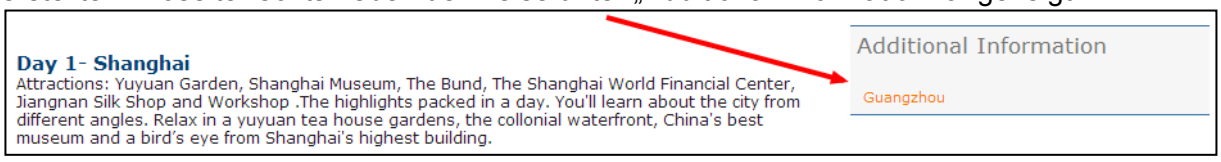
8. Danach speichern Sie bitte die Reise mit einem Klick auf die „Save“ Schaltfläche.

Damit wurde eine neue Reise angelegt und auf Wunsch auch zusätzliche Infoseiten dazu erzeugt.
Betrachtet man nun die Reise in der Detailansicht auf der Website, wird der Link zu der neu erstellten Infoseite rechts neben der Reise unter „Additional Information“ angezeigt.



9. Melden Sie sich nun von der Website mit Klick auf „Sign out“ wieder ab und wechseln Sie nun auf die ursprüngliche Website der „IKS Studie im Dezember 2012“ zurück und klicken Sie bitte dort auf „**Weiter**“.

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6.3 Task Description 2

Aufgabenstellung 2 „Text bereichern“

Autor: Alexander Weiss

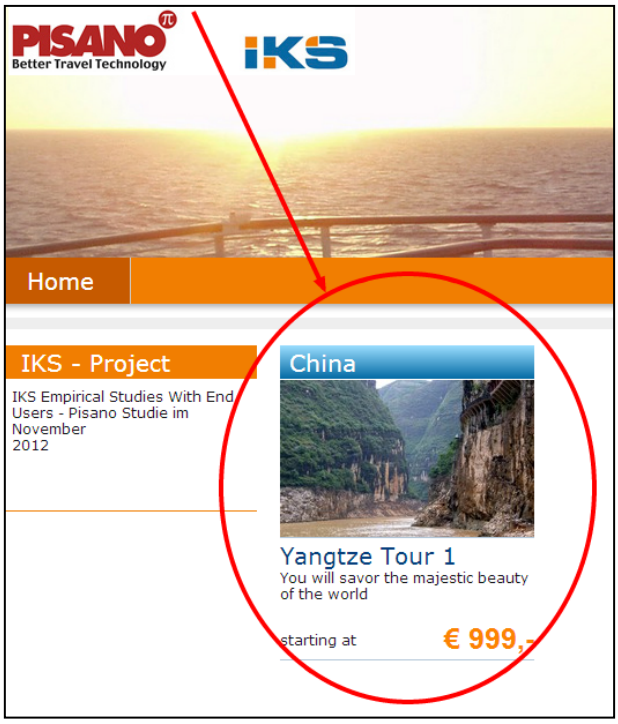
Bitte lesen Sie sich folgende Aufgabenstellung genau durch:

Der Reiseverlauf einer bestehenden Kreuzfahrt muss geändert werden. Dazu navigieren Sie zur Detailansicht der zu ändernden Reise und melden sich auf der Website an. Dann bearbeiten Sie die Inhalte in der Reise und nutzen die IKS-Funktionen um die Inhalte automatisch zu erkennen und mit Zusatzinformationen zu erweitern. Danach melden Sie sich wieder ab.

Vorgehensweise:

1. Bitte navigieren Sie mit *Google Chrome (aktuelle Version)* oder *Firefox ab Version 16* zu folgender Website: BLINDED

2. Klicken Sie bitte auf der Startseite auf das Bild der „Yangtze Tour 1“.



3. Nun wird die Detailansicht der Reise dargestellt. Auf dieser Ansicht haben Sie nun die Möglichkeit, den Text der Reise direkt in der Website zu bearbeiten und gegebenenfalls mit weiteren Informationen zu bereichern. Klicken Sie nun auf den Link „Sign in“ und melden Sie sich mit dem Benutzernamen **BLINDED** und dem Password **BLINDED** auf der Website an.

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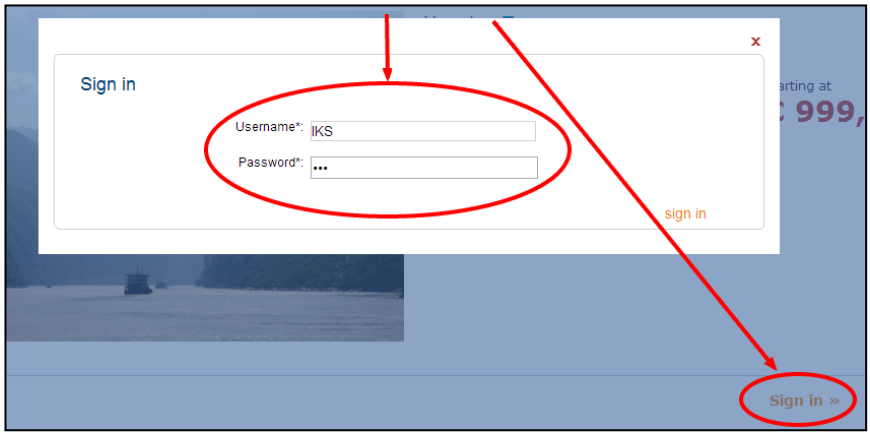
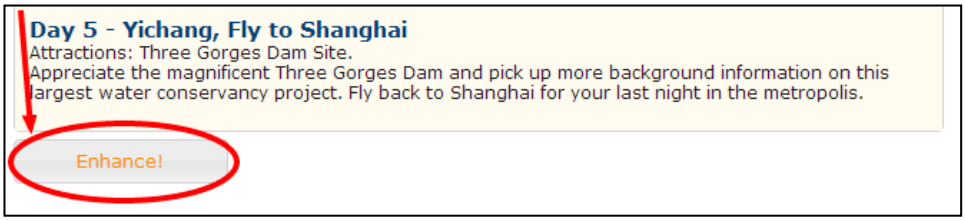


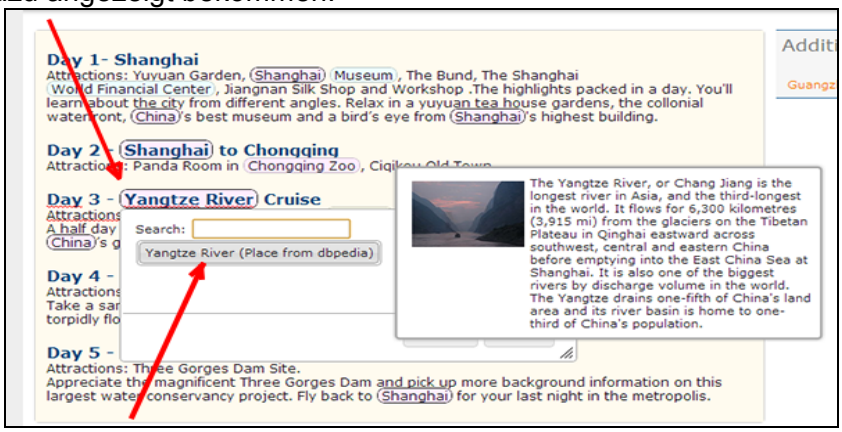
Nach der Anmeldung läßt sich der Text der Reisebeschreibung direkt auf der Website editieren.

>> Ab jetzt nutzen Sie die neue IKS-Funktionalität: „Text bereichern“ <<

4. Die IKS-Funktionalität in diesem Bereich ist das automatische Hinzufügen von weiteren Informationen innerhalb eines Textes. Dazu muss der Text von dem IKS-Dienst zuerst durchsucht und relevante Informationen herausgelesen werden. Klicken Sie dazu bitte auf die „Enhance!“-Schaltfläche unterhalb des Textes.



5. Nach Auswahl dieser IKS-Funktionalität dauert es ca. 2-5 Sekunden, bis die vom IKS Service erkannten Informationen hervorgehoben werden.
Um zu sehen, welche zusätzlichen Informationen zu den erkannten Begriffen angeboten werden, klicken Sie bitte mit der Maus auf den gewünschten Begriff. Gehen Sie mit der Maus über den gefunden Inhalt (hier „Yangtze River (Place from dbpedia)), damit sie die zusätzlichen Daten dazu angezeigt bekommen.



6. Damit diese Information zukünftig auf der Detailseite in dem Text anzeigt wird, wählen Sie bitte den Begriff aus. Sie können diesen Schritt gerne für andere Begriffe wiederholen.

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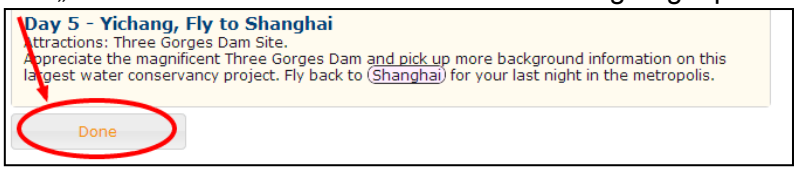
7. Haben Sie alle gewünschten Begriffe ausgewählt, beenden Sie die Bearbeitung mit einem Klick auf den „Done“ Button. Damit werden alle Änderungen gespeichert.



8. Melden Sie sich danach von der Website mit Klick auf „Sign out“ wieder ab.

9. Rufen Sie nun bitte die Detailansicht der Reise wieder auf. Jetzt sind sowohl die Textänderungen als auch die Links zu den erweiterten Informationen innerhalb des Textes sichtbar.

10. Bitte wechseln Sie nun auf die Website „IKS Studie im Dezember 2012“ zurück und klicken Sie dort auf „**Weiter**“.

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Appendix B: Survey Instrument – AmI Use Case

In the following are some selected screenshots of the survey instrument adopted for the evaluation of the IKS AmI use case.[6]

...

[6] It must be noted that in addition to CSAM-related constructs and dimensions of the current report, further questionnaire items were incorporated for future evaluations and analyses.

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* **Nachdem Sie gerade selbst die Situation im Bad durchgespielt haben, bewerten Sie nun bitte nochmals den Event-Empfehlungsdienst.**

	trifft gar nicht zu 1	2	3	4	5	6	trifft voll zu 7
Die Nutzung des Event-Empfehlungsdienstes im Bad würde meine Effektivität erhöhen (z.B. bei der Auswahl des richtigen Kinofilms).	○	○	○	○	○	○	○
Ich fand die Nutzung des Event-Empfehlungsdienstes im Bad interessant.	○	○	○	○	○	○	○
Ich würde den Event-Empfehlungsdienst im Bad nutzen.	○	○	○	○	○	○	○
Ich habe schnell gelernt, wie man den Event-Empfehlungsdienst nutzt.	○	○	○	○	○	○	○
Die Nutzung des Event-Empfehlungsdienstes im Bad würde gut zu meinem Verhalten passen, d.h. ich wäre der Typ dazu.	○	○	○	○	○	○	○
Ich finde den Event-Empfehlungsdienst im Bad nützlich.	○	○	○	○	○	○	○
Die Interaktion mit dem Event-Empfehlungsdienst war klar und verständlich.	○	○	○	○	○	○	○
Die Positionierung der Inhalte des Event-Empfehlungsdienstes im Spiegel fand ich gut.	○	○	○	○	○	○	○
Mir hat die Nutzung des Event-Empfehlungsdienstes im Bad Spaß gemacht.	○	○	○	○	○	○	○
Die Nutzung des Event-Empfehlungsdienstes im Bad würde meine Effizienz erhöhen (z.B. müsste ich nicht extra eine Website auf dem PC in einem anderen Raum zu Hause aufsuchen).	○	○	○	○	○	○	○
Ich fand den Event-Empfehlungsdienst einfach zu nutzen, d.h. durch Herantreten an den Spiegel.	○	○	○	○	○	○	○
Ich fand die Nutzung des Event-Empfehlungsdienstes im Bad angenehm.	○	○	○	○	○	○	○
Die Art und Weise, wie mir die Inhalte des Event-Empfehlungsdienstes präsentiert wurden, d.h. in Form von Text und Grafik, fand ich gut.	○	○	○	○	○	○	○
Der Event-Empfehlungsdienst würde gut in die o.g. Situation passen.	○	○	○	○	○	○	○

* **Ich finde den Wetterdienst im Bad ...**

	3	2	1	weder noch	1	2	3	
statisch	○	○	○	○	○	○	○	interaktiv
frustrierend	○	○	○	○	○	○	○	zufriedenstellend
relevant	○	○	○	○	○	○	○	irrelevant

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UNIVERSITÄT DES SAARLANDES

Universität St.Gallen

Studie Das Badezimmer der Zukunft 2012

7. Abschließende Fragen

Was hat Ihnen überhaupt nicht an den drei Diensten gefallen?

	Das war nicht gut:	Mein Verbesserungsvorschlag:
1. Wetterdienst:		
2. Eventdienst:		
3. Ticketdienst:		

Welche weiteren Informations- und Kommunikationsdienste würden Sie gerne im Bad nutzen?

*** Bewerten Sie bitte die folgenden zwei Aussagen.**

	trifft gar nicht zu 1	2	3	4	5	6	trifft voll zu 7
Neuen Technologien stehe ich stets aufgeschlossen gegenüber.	○	○	○	○	○	○	○
Ich lerne sehr schnell mit neuen Technologien umzugehen.	○	○	○	○	○	○	○

*** Kreuzen Sie bitte nur eine der untenstehenden Aussagen an, die am besten den Grad Ihrer Wachheit bzw. Schläfrigkeit während der letzten 45 Minuten beschreibt.**
Choose one of the following answers

Please choose...

*** Ihr Geschlecht?**

○ weiblich ○ männlich

*** Wie alt sind Sie?**

Ich bin ____ Jahre jung.

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