Carl Stolze
Torben Penke
Deniz Özcan
Oliver Thomas

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What do Universities do Outside the Classroom?

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What do Universities do Outside the Classroom?

Carl Stolze, Torben Penke, Deniz Özcan, Oliver Thomas

Informationsmanagement und Wirtschaftsinformatik
Universität Osnabrück
Katharinenstraße 3, 49074 Osnabrück
{carl.stolze|tpenke|deniz.oezcan|othomas}@uni-osnabrueck.de
http://www.imwi.uos.de

IT's impact on as well as its potential for organisational sustainability has been well documented in the literature. Universities are places of innovation and cutting-edge thinking as well as teaching. This paper discusses whether they are also at the forefront when it comes to acting with respect to sustainable IT. Our findings are based on a survey with over 120 participants from universities in Germany, Austria and Switzerland. Taking a multi-perspective approach, not only IT managers but also persons on other leadership positions with a connection to sustainable IT were surveyed. Our initial results reveal a focus on the data centres rather than other parts of the IT.

1 Motivation and Background

Ever since the so-called Brundtland report created general awareness for sustainability in 1987, organisations of all kind are facing a public pressure for acting sustainable (Sarkar and Young 2009). This is especially true for universities as the places of cutting-edge thinking (Lukman and Glavic 2006). Also organisations acting sustainable are doing better in times of economic turmoil (Iacobelli, Olson and Merhout 2010).

Information technology (IT) as a – if not the – cross-sectional technology has to do its part for answering the connected sustainability questions of today and tomorrow (Elliot 2011). It is estimated that IT could help to reduce carbon dioxide emissions up to 15% by 2020 in a conservative scenario. The economic impact of cost savings through smarter "things", such as smart grids, smart buildings or smart logistics, alone is estimated as high as 600 billion euro (The Climate Group 2008).

The traditional role of universities has been the fostering of critical thinking without adherence to specific approaches (Adams and Zanzi 2004). Within a discipline, such as information systems (IS), knowledge should be created through research and distributed through teaching (Gill and Bhattacherjee 2009). Therefore, it is no wonder there has been a lively discussion within academia and especially the IS research community about sustainability and sustainable IT (Elliot 2011; Van Osch and Avital 2010; Stolze, Janßen, and Thomas 2012).

Whilst in the beginning the focus was on energy efficiency under the umbrella terms Green IT or Green ICT (Ozturk et al. 2011), the debate shifted to cover questions of resource efficiency of IT itself and through IT as a means to an end (Boehm et al. 2011; Jenkin, Webster, and McShane 2011). Approaches to integrate sustainability have been discussed for IT management (Schmidt et al. 2009), IT management training programs

(Stolze et al. 2011) and business process management (Nowak, Leymann and Mietzner 2011; Stolze, Semmler and Thomas 2012).

Although the concept of a sustainable university is not entirely new (Lukman and Glavic 2006), an interesting aspect is if sustainable IT approaches are actually employed and not only researched in universities. Therefore our research is guided by the following research question (RQ): *How is the topic of sustainable IT perceived and acted upon in universities?* In this paper we outline the first results of a survey among universities in Austria, Germany, and Switzerland.

2   Methodological Study Design

As our research is guided by the before outlined RQ, we explore the status quo of sustainable IT at universities rather than testing for exact hypothesises. Hypothesis and theories could be based on the gained insights afterwards. In this sense we are conducting an exploratory study (Blumberg, Cooper and Schindler 2011). As the goal is to examine more than one case (university) and for multiple variables (at least perception and use of sustainable IT), we chose a cross-sectional research design: Such a design contains more than one case, locked at one point in time for quantifiable data with two or more variables. It can be conducted in different ways: structured observation, content analysis, official statistics and surveys (Bryman and Bell 2011).

Given constraints in time and resources together with the aim to look at many cases, we chose a survey design as our research methodology. A survey is a form of communication study in which a researcher asks a subject personally or impersonally with the goal of collecting its answers (Blumberg, Cooper and Schindler 2011).

To operationalize our study a questionnaire was drafted. It is organized into the following groups of questions or sections: sustainability, data centre and office, supply and purchase, ecology, and social aspects. Each section includes multiple, mostly closed questions. When appropriate a horizontal, table-based format with an even-numbered Likert scale was used to facilitate readability. An even-numbered scale was used to avoid the usage of the middle category as an escape option. This questionnaire was tested in a first step with an academic expert. The feedback of the expert led to the introduction of questions only visible to certain groups based on previous answers, e.g. questions about specific technologies only for those who answered to be responsible for those. In a second step an internal pre-test was run with graduate students. Feedback from both tests was incorporated into the final web-based, self-completion questionnaire.

The complete population for our study encompasses all persons in universities responsible for IT or parts of IT or who have an impact on the sustainability of IT. As this theoretically might include nearly all employees of all universities, we selected as a potential sample persons on the following positions from universities (including universities of applied science) in Austria, Germany and Switzerland: environmental officers, equal opportunity commissioners, vice chancellors, commissions for IT and/or sustainability, IT directors, researchers with a focus on IS or computer science as well as officers responsible for purchasing and supply.

3   Sample Demographics

Based on our sampling criteria, 990 individuals in total were identified as relevant and their email addresses collected. We sent all an email invitation to participate in our study. From 990 email addresses 982 (99.2%) seemed to be valid. Out of these, 157 times (16%)

the questionnaire was opened and the survey started. In total 121 valid and complete responses were collected. First, this confirms that the underlying research related to a problem of interest for multiple entities (Offermann et al. 2009). Second, the response rate of 12% is inside the likely response rate span of 10% to 35% in IS research (Falconer and Hodgett 1999). Thereby, we regard the response rate as acceptable. In the following, we refer to the 121 valid and complete responses as sample – being aware of its potential limitation due to the non-responses (Bryman and Bell 2011).

Of the 121 respondents in the sample 71 or (59%) hold a leadership position with responsibility for personnel. On average each person is assigned to work for 1.12 organisational units or groups. Then geographical distribution and university size based on enrolled students was analysed (Table 1).

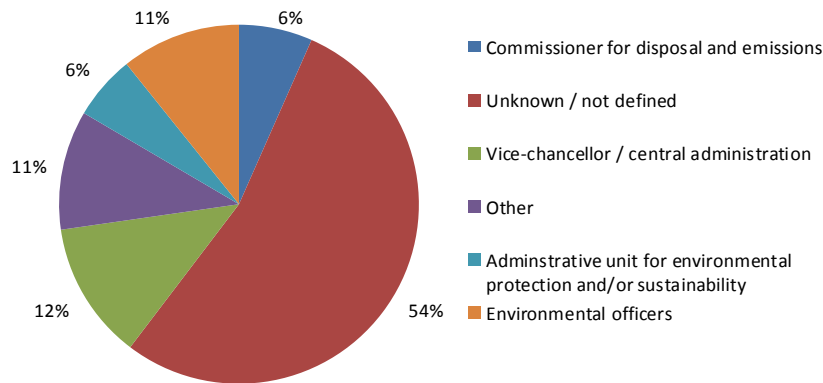**Table 1.** Sample Demographics: University Size by Country

University size	Austria	Germany	Switzerland	Total
<9.999	2	4	3	9
10.000 - 14.999	3	17	5	25
15.000 - 19.999	1	48	2	51
20.000 - 24.999	0	18	0	18
>25.000	2	16	0	18
Total	8	103	10	121

The majority of respondents are from Germany (85%), which is not surprising having in mind the absolute number of universities. Most respondents work at universities with 15.000 to 19.999 enrolled students (51 absolute or 42%). The second biggest group, with 25 (21%) cases, comes from institutions with 10.000 to 14.999 students. To summarize the basic demographics: most responses come from persons working at mid-sized universities between 10.000 and 19.999 students and on a leadership position.

4   Initial Results

The sample was analysed for different aspects with regard to the RQ. When asking whether sustainable IT is actually done at universities, the question arises if there is a responsibility defined for general environmental protection and/or sustainability (figure 1).

Although we broadened the question to explicitly include purely ecological aspects of sustainability, in over half the cases no defined responsibility exists or is unkown. An unkown answer might result from a general lack of interest, but as the collected data shows the respondents are pretty aware of sustainability and believe it will stay important in the future – independent of whether they are in a leadership position or not (table 2).

Figure 1. Defined Responsibility

Table 2. Average Support of Statements Regarding Sustainability, n = 121
(scale from 1 = "not supporting at all" to 6 = "fully support this statement")

Statement	Leadership	Non-leadership	U test (p)
Sustainability is a requirement in our time.	5.010	5.160	0.429
Sustainability will stay important in the future.	5.100	5.330	0.287
Sustainability is only a temporary trend.	2.150	2.160	0.534
Sustainability is an over-valued topic.	2.350	2.200	0.123
Ecological, economic and social aspects are equally important.	4.460	3.940	*0.044*
Universities have to be a role model by acting sustainable.	4.660	5.000	*0.015*
Sustainable IT is important for universities.	4.930	5.040	0.360

At the same time some support statements describing sustainability as only a temporary trend or over-valued topic. Values between 2.150 and 2.350 on a scale from 1 ("not supporting at all") to 6 ("fully support this statement") are reached here without significant difference between leadership and non-leadership answers. To assess the significance of differences a so-called U test (also known as Mann-Whitney U test or Wilcoxon rank-sum test) is applied. It calculates a number p, which indicates a significant difference between the values in both groups for values below 0.05.

But there are statements significantly seen different between leaders: First, the support to see the different aspects of sustainability (social, ecological, economic) as equally important is higher among those in leadership positions (4.460) than among those in non-leadership roles (3.940). Second, the non-leading persons see universities much more obliged to be a role model for acting sustainable (5.000) than the leaders in the sample (4.660). Last but not least, both groups see Sustainable IT as an important topic for universities with a support value of 4.930 and 5.040 respectively.

In the next step we look more precisely on aspects of sustainable IT (Table 3) like energy consumption and social aspects.

Although energy efficient IT is preferred in general and energy consumption should be considered for new purchases, quite a few respondents seem not to know about the energy efficiency of their IT. There is also significant difference between the leading and the non-leading level: Whilst respondents on the leadership level more often reject the lack of knowledge (3.07), the non-leading ones agree way more (3.94). This might be connected

to the fact, that the energy efficiency is not well communicated inside the organisations. The rejection, to deny an influence of a well working IT on satisfaction with work, is shared among all respondents. It shows that IT has become an integral part of everyday work and which impact on social aspects IT can have.

Table 3. Average Support of Statements Regarding Sustainable IT, n = 121, except 5 and 6: n = 17
(scale from 1 = "not supporting at all" to 6 = "fully support this statement")

Statement	Leadership	Non-leadership	U test (p)
Energy efficient IT should be preferred.	5.00	4.98	0.590
Energy consumption should be considered when purchasing new IT.	5.17	5.26	0.419
I do not know if energy efficient IT is used.	3.07	3.94	*0.005*
A good working IT does not affect satisfaction with work.	1.44	1.50	0.745
Old but working IT should be donated to charity.	3.63	4.00	0.744
The university's IT concept includes sustainability and Green IT adequately.	3.19	5.00	0.171

The two last questions from table 3 were only presented to respondents working directly at the universities' IT departments (n = 17): This subset has a tendency to only modestly agree with donating old but still usable IT to charity, although this would limit the ecological effects of e-waste (Zhang, Liu and Li 2011) and have positive impact on the social side. When looking at the grounding of sustainability or even the more focused concept of Green IT in the university's IT conception, participants who had to answer this question have different opinions between leadership (3.19) and non-leadership (5.00) position holders. But due to the small number of respondents, the difference is not statistically significant.

When taking a closer look at the purchasing patterns regarding IT, 15 respondents evaluate certificates or labels. The labels Energy Star, TCO, Blue Angel, EU Eco-Label and 80 plus have been reported.

Energy star is focused on energy efficiency and power management (EU-Komission 2011). The TCO certification goes further and includes additional requirements for the manufacturing processes and looks at the whole product lifecycle (TCO Development 2012). The Blue Angel label for computers is less demanding as it mainly is about energy consumption, recyclable design and the avoidance of environmentally harmful materials (Blue Angel 2012). The European Union's Eco-Label is awarded to products based on an assessment of their whole lifecycle with respect to their environmental impact (Commission 2012). The initiative 80 plus is focused entirely on power supplies for computers (Ecova 2012). Form all labels TCO is the only one to incorporate social aspects and not only environmental ones.

Upon analysing, we found that certain labels are often used together whilst others are not (table 4).

We found that Energy Star and TCO are highly correlated with each other (correlation 0.683) when it comes to their use as decision criterion. Both also have a significant positive correlation with Blue Angel (0.291 and 0.378) and 80plus (0.508 and 0.565). The EU Eco-label's use is not significantly correlated with any other labels but negatively with Blue Angel (-0.272). Thereby, it can be assumed that the international and globally accepted labels Energy Star and TCO also found their way into universities' purchase processes for IT.

Table 4. Correlation Between Different Labels Regarding Sustainable IT, n = 15

		Energy Star	TCO	Blue Angel	EU Eco-Label	80 Plus
Energy Star	Correlation					
	Significance (p)					
TCO	Correlation	0.683				
	Significance (p)	0.000				
Blue Angel	Correlation	0.291	0.378			
	Significance (p)	0.031	0.004			
EU Eco-Label	Correlation	0.021	-.156	-0.272		
	Significance (p)	0.881	0.254	0.044		
80 Plus	Correlation	0.508	0.565	0.214	0.184	
	Significance (p)	0.000	0.000	0.117	0.180	

5   Discussion and Outlook

Sustainable IT seems to have reached the universities as organisations. But its current state can be best described as focussed on technology and individually driven. This is supported by the fact that over half of the sample answered there is no or no known entity responsible for sustainability at their university. Also on a more general level, sustainability is seen as an important topic for now and the future, but with some doubt and uncertainty surrounding it. Statements like "only a temporary trend" or "an over-valued topic" still have support. Therefore, a holistic introduction of sustainable IT needs to work on these underlying doubts and fears as well. To sum up: Sustainable IT is outside the classroom at universities, but there is still a lot to do to unleash its full potential.

As a next step in our research we are planning to examine the gained data further. Especially, we plan to compare different sized universities for differences in their practices and attitudes. This step should help to develop a theoretical construct to explain better the partially only lukewarm welcome of sustainable IT in universities' organisational practice. The gained insights and results should be helpful to other organisations and businesses as well.
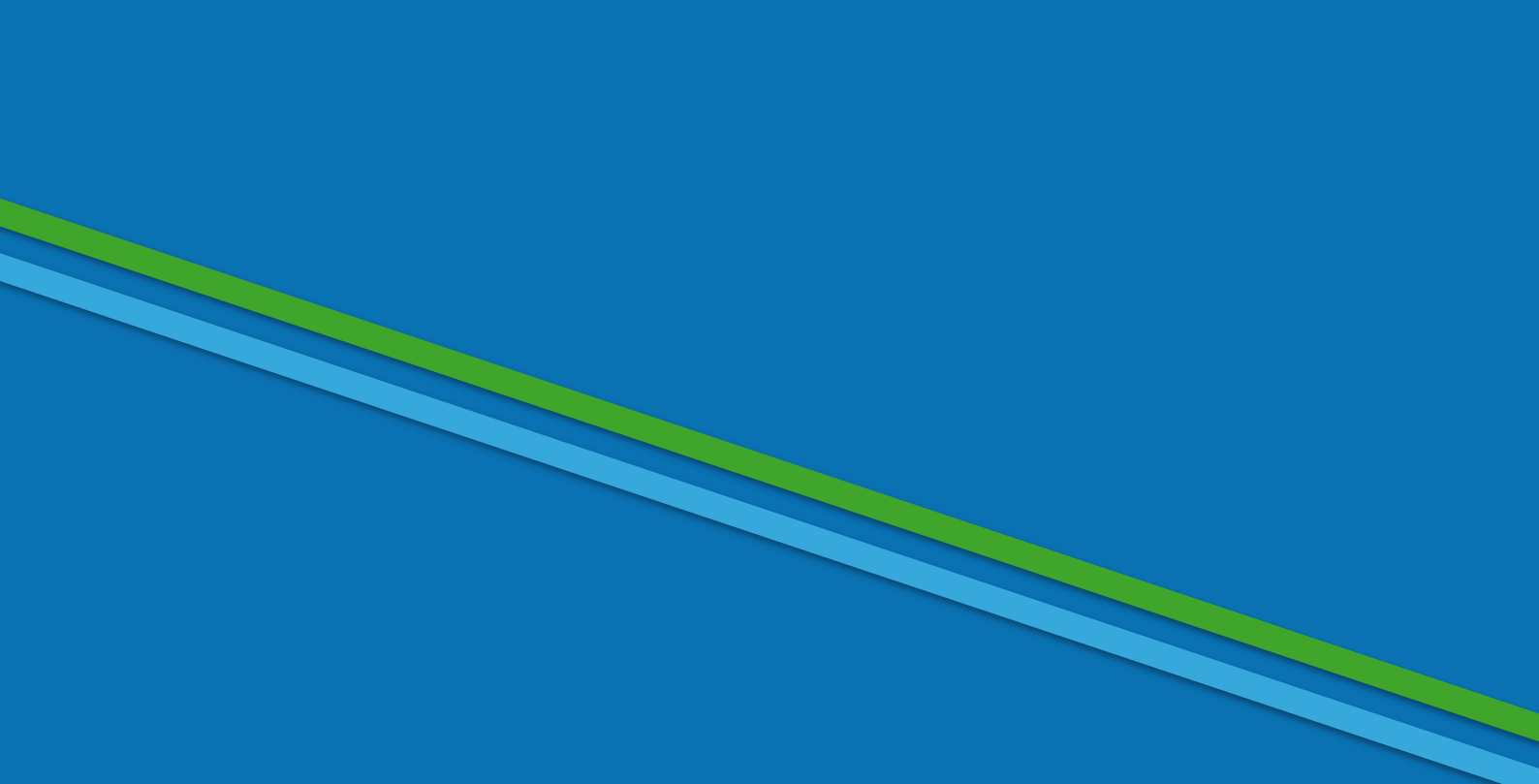
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