Project Report TUMcloud

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To the cloud and beyond

"I've always been a connected person. Ever since I got my first computer I've used technology not just for work, but also to stay connected to those who matter most to me. In my opinion, the Internet is all about collaboration, about sharing, about being close to people even if in reality they are on the other side of the planet. It is fascinating to see how the pace of innovation seems to be ever increasing. Life is so much more convenient nowadays."

The Internet has always been a place for great innovation. Over the years it has fueled the rocket-like rise of young startups, some even eater crashes and the phoenix-like resurrection of a whole industry. Today, major parts of our everyday life heavily depend on the Internet. One of the latest trends stimulated by the world wide web is so-called "Cloud Computing". Since giving a precise techni- cal definition about what "the cloud" really is seems to be impos- sible, let us stick to what it means for most people: The cloud is a simple way to store and share data of all kind and to have it avai- lable no matter where you are and no matter what device you have with you.

A centralized system for data storage that is universally acces- sible no matter what device you have with you.

For many different solutions seemed to be available, but often they were hard to find and a great degree of fragmentation led to incon- sistencies that made work feel inefficient. Furthermore, most systems just were not flexible enough to support true collaboration. In consequence, a lot of my colleagues decided to use commercial alternatives, including all disadvantages this implies in an academ- ical context.

Universities are all about collaboration. Modern IT systems can drastically reduce the overhead that comes with working in a team - no matter how small or large it is. In consequence, they can help to better connect teams, increase their productivity and make collaborative work a much more pleasant experience for all involved parties. At TUM, a lot of effort is being spent on con- tinuously introducing such innovative systems, on improving the overall user experience, unifying existing systems and promoting them amongst the members of the university. Nevertheless, there is still a room for improvement towards a consistent IT infrastructure that really fosters collaboration.

Futhermore, IT is a rapidly changing field with new trends arising at an enormous rate. Trying to be at the forefront of innovation is a huge challenge. Impetuous provided by somebody with an unbiased view can be beneficial to identify aspects that might need addi- tional work.

"To be honest, when I first came to the university and started working with its IT systems, I felt a little bit disappointed. It’s not that I missed anything specific, but my overall impression wasn’t exactly what I had imagined IT at a leading technical university would be like. I had had experiences with the easy to use systems from some of the commercial IT vendors. At TUM, to me it felt like they got most things right, but very little was perfect.

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"It is important that decision makers really focus on innovation. To me, part of that is listening to the ideas and concerns of students. There are some great efforts especially among student initiatives. I discovered that they can really set up a lot of impressive things. It seems like in the end it’s a lack of communication that prevents those efforts from being turned into something really great!"

We started project TUMcloud because we are convinced that even a small group of students can have a great positive impact on the whole university by making contributions towards further impro- ving university IT. The original idea was to create a simple, consist- ent and collaborative platform for data management at TUM in more concrete terms this means that we wanted to create a system combining functionalities of Dropbox, Eduroam and Google Docs. Realizing that there already are several initiatives aiming into the same direction, we decided early on to expand the scope of our project.

Over the course of the following months we started collec- ting suggestions and feedback from fellow students and university personnel, generated our own ideas and established connections to relevant institutions within the university.

In the beginning our focus was placed on comparatively minor, rather concrete pain points and on ways to overcome them, but over time we started to think in a much more visionary way about what we call the "digital academic workplace of the future". We tried to point out the trends that will have the greatest impact in the next years and subsequently started deriving actions and deci- sions that we think need to be discussed today in order to be well prepared for future developments.

Assuming that a group of nine students can radically change and innovate IT at a whole university would be presumptuous. We see ourselves in a very different position: First, we are focused on listening to the people who are behind the core parts of university IT. We wanted to learn more about their specific tasks, services and ideas. Furthermore, we tried to better understand the different inter- rests and concerns those people have. Afterwards, we worked on bringing our ideas to the agenda, to promote them and to explain what benefits they will generate for all members of the university.

By directly implementing some of these ideas in the form of soft- ware prototypes we demonstrated for example how system inter- faces can be used to access information in a more convenient way, how two distinct systems can be connected for additional user benefit and how existing systems can be augmented to enable collaboration. Details about the results of our work can be found in the report on the following pages.

"It’s been quite some years since I’ve last sat foot on the univer- sity campus, but now that I am back all those memories came up again. Considering for example the remarkable innovations in IT, everything seems to be so much easier nowadays. Systems got so smart, it feels weird if they are not there anymore. I wish I could have used this new "digital workplace" back in my days. Being a student would have been so much easier!"
Abstract

IT services have become an omnipresent factor in everyday student-life. The TUMcloud team set out to discover how new trends in IT can help to simplify common tasks, foster collaboration, and boost productivity.

1. Background

In the light of strong competition between universities, partly trig-gered by intensified international mobility of students and the regu-lar release and consultation of university rankings, rankings are increasingly viewed as customers of services offered by the university. Therefore, the institution and especially the IT solutions it offers to students are evaluated with regard to the quality of service they manage to provide (Alt et al., 2010, pp. 186). ’Student lifecycle’ is one of the keywords mentioned in this con-text (Alt & Börmann, 2009, pp. 109), indicating not only that the student is explicitly viewed and treated as a customer of the uni-versity he or she attends, but also signifying the necessity to di-vide a student’s interaction with the university into several phases, keying in on the orientation and decision for a certain field of study and university, followed by the core studies, graduation, and career stages as alumna or alumnus (Alt et al., 2010, pp. 186). All of these phases impose different requirements on the university’s IT systems.

Students are increasingly viewed as customers of services of-fered by the university

While the university’s IT infrastructure with the campus manage-ment system as its core should support all of the phases men-tioned above, our role as current students enabled us to focus spe-cifically on the demands this target group might have. Students often experience difficulties in trying to adopt some of the major technological trends from the consumer or entertainment sector and embrace innovative approaches towards collaboration within the student community and between students and lecturers as well as the convenience of checking email, editing, sharing digital content, and engaging in open social learning (pp. 9) and the flipped classroom approach (pp. 15) as two major innovations in the area of education. Ano ther field of development that over the past few years has already found its way into private and corporate use (Gandhi et al., 2012) and possibly yields a lot of potential for applications in the academic context, are cloud storage services. They might help to solve the challenge of providing convenient access to cheap, central-ized and secure data storage and could serve as the fundamental technological basis for the effective implementation of innovative educational concepts.

As already mentioned, the consideration of major technological trends from the consumer or entertainment sector has to be accompanied by an analy-sis of established IT systems that are already in place and acti-vely used by students on a regular basis. Our approach towards identifying potential areas of innovation with regard to IT services therefore incorporates not only the assessment and evaluation of current and future trends in education and technology, but also the potential of ad hoc improvements to the IT systems currently in use. Furthermore, the question remains whether all major technol-oogical trends can be transferred successfully for use within institutions of higher education and whether they would actually contribute to the fulfillment of the university’s core mission. In the following we would like to provide an overview of the goals of the project, the methods harnessed, our key findings and the implica-tions we can derive from these findings regarding the IT systems at TUM.

2. Goals and Methods

Goal

The project started with a simple idea: Help students at TUM spend less time on gathering lecture material from numerous places to have more time to focus on their actual studies by simplifying both access to data and digital collaboration. Often, extracurricular pro-jects like these start extremely ambitiously, with the idea of chang-ing the very heart and soul of the university. However, we knew that again from first principles. However, this approach usually does not work in practice and most of the time people are brought down to earth rather soon. We knew that we could not change the entire IT landscape at TUM being only a handful of students. Instead, we focused on finding ways to make the transition as painless as possible and embraced our key ability: providing a customer’s perspective to the people who are responsible for today’s IT systems to help plan their goals of tomorrow. This strategy enabled us to put some of the greatest concerns of students as well as many innovative ideas to the top of the agenda of the individual decision makers.

Methods

In order to really understand all restrictions that might limit the application of common and new devices and trends that were discussed in the project, we tried to gather realistic ideas and requests from the students. We knew that the system we were working on had to be firstly used by students and not by an assessment of the IT systems established at other universi-ties in Europe, North America, and Asia. Furthermore, we worked on developing a visionary concept of how a student’s daily life in the future could look like in order to understand the fact that technology will without doubt play an even greater role.

All acquired and developed points for improvement were bundled together into a portfolio of ideas and were presented to a group of students, and IDSS (Integration of DSS for students and supervisors) as well as to project team meetings. We designed and developed prototype implementations as a proof of concept for other teams and used these to help identify the most urgent tasks to be assigned. In cases where there have already been independent efforts to solve a given problem, we reached out to the respective parties to measure how those efforts were perfectly aligned with the user needs we identified.

3. Outcome and Discussion

In the following paragraphs we will discuss some key results of the survey we conducted regarding the use of IT systems at TUM among students. Amongst these findings we present key requirements for IT sys-tems at TUM. A common wants list was distributed both on paper in selected lectures and online for promotion in social network student groups. The analysis of this survey ena-bled us to make evidence-based recommendations to responsible individuals about the degree of urgency required to fix existing issues and about which new features should be considered for IT systems first. A number of short-term initiatives have already been fixed as a result of our efforts and members of our team de-veloped prototype implementations as a proof of concept for other teams. Therefore, we are more than happy and excited about the conversion from first principles.
Cloud Storage and Collaborative Systems

Inextricably linked to the growing use of cloud storage is the topic of privacy and data protection. The survey results on this subject are, however, somewhat contradictory. While 48% indicated that privacy is ‘important’ or ‘very important’ to them, only 41.8% of the respondents stated that they take active measures to protect their data in a cloud storage service. This can be explained with 60.4% using them for university and 60.4% for personal purposes. Almost three out of four respondents would use a cloud storage system offered by the university. When given the choice between placing the focus on privacy or ease of use for such a system no clear consensus is reached with 54.6% voting for a focus on privacy and 45.4% favoring ease-of-use.

Shortly after we started the TUMcloud project we learned that there had already been ongoing efforts in the direction of introducing a cloud storage solution on campus. The software architects expressed great interest in participating in the development of such a system. The net gain so far is that they are often merely due to configuration or data administration issues that are fixable in the short term by the respective university or faculty. Overall the meeting has been highly productive and of great benefit for both parties. At this point we can disclose that the next major version of CAMPUSonline to be released in 2016 and to be introduced at the universities for the first time will be available in a cloud storage system.

One of the weaknesses we could identify in the current environment is the lack of systems that directly support collaboration. In the future Sync&Share could be the central place to store data that a user works on at the same time, right now on the necessary functionality to support such applications is not yet available. We have already introduced a system of only shared files that any user of a shared project can access. In the future we plan to use Sync&Share as a drop box for projects such as Dropbox at TUM. The initiative is coordinated by the Leibniz-Institut for Information Infrastructure from moving forward with interesting ideas such as solutions for simplified collaborative project work.

Adoption rates of the university’s primary platform for e-learning are, as expected, very high: 95.3% indicated that they had used Moodle before. This being said, a large majority of the students indicated that their lecture materials are located on two or more platforms and a majority of 89.3% considers the current distribution of lecture materials to be ‘uncomfortable’ or ‘extremely uncomfortable’. As an improvement to the way material is currently distributed through Moodle, an overwhelming majority of 89.3% would like to be notified about changes to existing documents.

Another topic investigated by the survey was demand for and use of collaborative features. 63.3% rated a proposed functionality to add comments and feedback to uploaded documents as ‘helpful’ or ‘very helpful’. Around half of the respondents use Moodle’s built-in forum on a regular basis. For those reporting their use of the forum to be less than once a month, ‘No need for forum’ was the most frequent answer with 48.8% of responses, followed by use of alternate means for asking questions with 46.4%. Facebook groups as an alternate means of discussing study-related content were reported to be used only by 4.6% of respondents. A majority of 73.3% consider it important for the university to consider the use of cloud storage systems for sharing and storage of lecture material.

One of the concerns that was raised repeatedly is the fact that Moodle at the moment is mostly used as a platform for the unilateral distribution of PDF documents. Our research indicates that increased consulting efforts directed towards lecturers is a promising way to promote the use of advanced features of the central e-learning platform and an arbitrary cloud storage provider. User feedback has been very positive and TUM’s Medienzentrum is the center of competence for e-learning at the university and the owner of the Moodle platform at TUM has expressed great interest in the idea and the code behind our prototype.
In the course of our research we have obtained deep insight into the introduction of a centralized system by launching a pilot project. On one hand the university’s current portfolio seems to be weak compared to other leading institutions. We have, however, identified two strong trends that we think require additional effort: On the other hand initiatives in the direction of universally accessible, mobile and property management), as well as Lucas Reeh and Michael Folgmann (Coordinator for e-learning), Dimitri Vorona (Moodle Development), Ina Schmitz (Lecture Recording), Ralf Kossul (ITW), Werner Baur and his team (Storage Group LRZ), Dr. Friedrich Käck, Tina Pellegrino-Fesl and their team (ZA4 building), Karmen Lorenzoni from TU Graz.


Being part of the TUM: Junge Akademie community has opened a lot of doors for us and thus definitely contributed to the overall success of the project. Our research has attracted great interest from many institutions and individuals within the scope of the university and beyond. User feedback with regard to our ideas, prototypes and test instances has been overwhelmingly positive and very encouraging.

For a number of projects we have attracted strong partners who have agreed to pursue our work in evaluating individual systems and aiming towards the goal of making innovative functionalities available to all members of TUM. These partnerships enable us to move forward with our ideas on a scale that is far beyond what a small team of students could achieve on its own. Overall the IT landscape at TUM seems to be in good shape, especially compared to other leading institutions. We have, however, identified two strong trends that we think require additional effort: On the one hand the university’s current portfolio seems to be weak with respect to systems that support collaborative work.

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