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ROADMAP ON BLOCKCHAIN TRANSFORMATION FOR ORGANIZATIONS – EVALUATION THROUGH TEACHING

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ABSTRACT:
Even though blockchain technology is currently a widely discussed topic, it is hard to get a straightforward overview or understanding of this topic. For many organizations blockchain causes excitement about the opportunities for innovation but raises also doubt and fear of losing their competitiveness. Most managers have heard of blockchain technology before and feel the pressure to go with the market and implement the technology. However, most organizations do not know how to develop their company towards blockchain. The lack of knowledge includes how to build up knowledge, launch a suitable project, finding a use case that matches the organization, aligning it with their strategy, which kind of blockchain to focus on and how to start a business transformation.
As a part of a research project about blockchain teaching and business transformation, a roadmap was developed that aims to support organizations in their transformation towards blockchain technology and in understanding the potentials of this new technology. This artifact was then evaluated through a proof-of-concept by gathering data on relevance and practical applicability of the roadmap. This was done by using the roadmap in a university class environment and an industry questionnaire. With the evaluation of the artifact in a class environment, a current state-of-the-art topic could be taught to students and, additionally, the learning process of the students enabled research contributions to the project results.

Keywords: business transformation, higher education, case learning, innovation, blockchain

1. INTRODUCTION

Since 2018 blockchain technology has become a widely discussed topic in the media (information age, 2018), in research (Holotiuk, Pisani, & Moormann, 2017) and in a wide array of businesses (Anthes, 2018). It has been predicted to cause as big as an impact as the internet protocol (Ito, Narula, & Ali, 2017) and that this disruptive technology will change the way we work together (Tapscott & Tapscott, 2016). Blockchain technology is regarded as a driver for innovation which can launch ideas for founding new organizations or induce new sources of income for existing businesses (Anthes, 2018), which could have the potential to disrupt whole industries (Trautman, 2016).
However, also risks, especially for current businesses, have been identified. Business leaders hear about the blockchain projects of their competitors and are afraid that the technology could make whole industries obsolete (Shin, 2018). KPMG mentions three main risks for organizations: “1) not understanding how blockchain can affect your business or industry; 2) investing too early, perhaps when your customers or suppliers are unaware; 3) Your competitors taking the first advantage thereby reducing their costs and pricing” (KPMG, 2018).
This situation raises different questions in regard of teaching business executives and business students about blockchain:

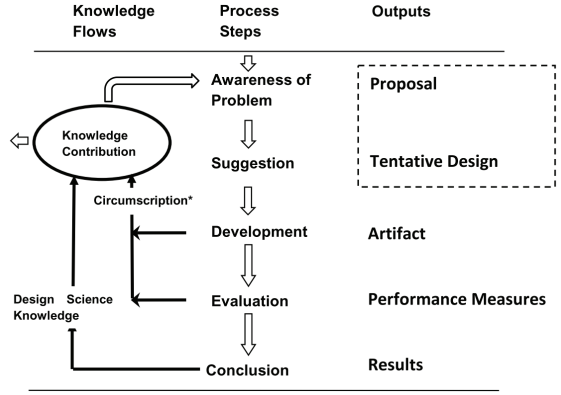
- What is the best approach for organizations to adopt blockchain technology?
- How much technology understanding is necessary to make relevant business decisions?
- How can blockchain be taught to business people with few technical skills?

So far, no standard syllabus for blockchain teaching for business students has been established (Dettling, 2018). Our research goal is to develop a teaching method for blockchain which considers the fact, that the teaching topic is a moving target with unknown destination. Under these circumstances it is important to change from a pure knowledge transfer to a self-activated learning experience in the form of a “blockchain-lab” for business students (Dettling, 2018, p.222).
In the research project “Roadmap on Blockchain Transformation for Organizations – Evaluation through Teaching” an artifact based on Design Science Research was developed. The goal of the research project was to develop a roadmap that supports organizations in their transformation towards blockchain technology. This research product had been developed and was then evaluated by students. With this, a current state-of-the-art topic could be taught to students and the learning process of the students enabled again a research contribution to the project.

2. METHODOLOGY

The research of this project was based on a Design Science Research approach. This approach is mainly used in Information Systems research. It includes the following process steps: Awareness of Problem, Suggestion, Development, Evaluation and Conclusion. The aim of this approach is to develop an artifact, based on a problem, evaluate this artifact and give a conclusion that serves as a contribution to the knowledge base (Vaishnavi, Kuechler, & Petter, 2004), see Figure 1.

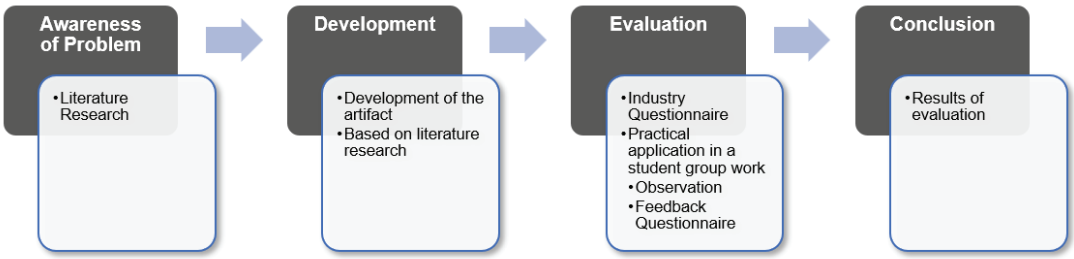
Figure 1: Design Science Research



Source: Vaishnavi et al., 2004, p.8

In Figure 2 the application of the Design Science Research for this research project can be seen. The awareness of the problem is based on literature research. After that a tentative design of the structure of the roadmap was suggested. Then, the artifact – Roadmap on Blockchain Transformation - was developed. The evaluation was done by two questionnaires and an observation. Finally, the conclusion was derived from the proof-of-concept of the artifact.

Figure 2: Design Science Research for the Blockchain Roadmap



Source: Authors

The evaluation of the artifact was done in a mixed method research with a focus on qualitative research. A questionnaire survey was conducted with employees of organizations that are already working with or at least evaluating blockchain technology. These results were used to evaluate the relevance of the roadmap in a business context. At the same time, the roadmap became part of teaching a blockchain elective course for business students on bachelor's level (Figure 4).

3. ARTIFACT: ROADMAP ON BLOCKCHAIN TRANSFORMATION (RBCT)

The artifact in this research project is a roadmap, that aims to support organizations in their blockchain projects and transformation. There is an assumption that many organizations would like to learn more about blockchain, develop use cases for this technology and lead a successful blockchain project. However, for many organizations this seems rather difficult. Studies also show, that most blockchain projects are not successful or are not launched at the end (Trujillo, Fromhart, & Srinivas, 2017). The roadmap consists of six different phases: Starting with building knowledge on blockchain technology, managing innovation, finding a valuable use case, discussing strategy and technology and ending at the transformation concept.

Figure 3: The six phase of the Roadmap on Blockchain Transformation RBCT
Source: Authors

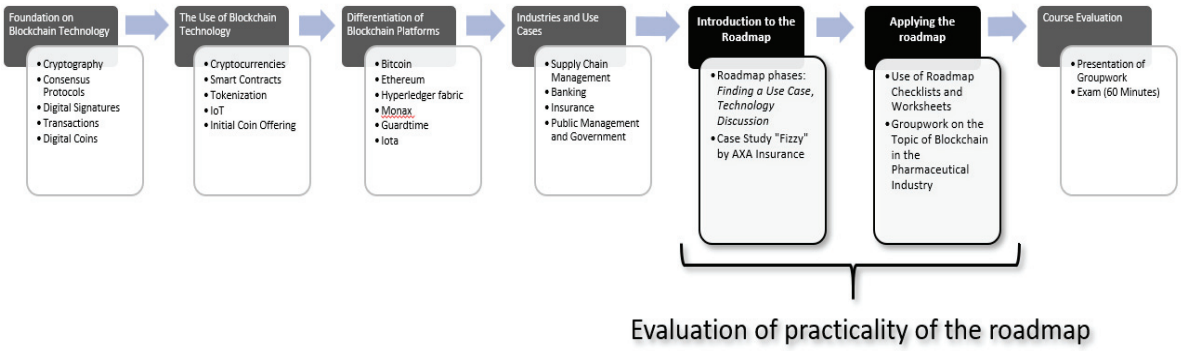
The roadmap has been developed by using existing and documented frameworks and methods from business development. A central role plays the Technology-Organization-Environment Framework TOE (Tornatzky & Fleischer, 1990; Baker, 2012), which describes the process of technology adaption within an enterprise. The main elements of TOE are the technological, organizational and environmental context. TOE differentiates within each context the relevant aspects depending on industries or state of the individual case and still maintains a holistic approach which is most important for our topic. Elements of TOE are represented in all six phases of RBCT. Also important is the Value Process Framework (Enders, König, Hungenberg, & Engelbertz, 2009) for the central phases *Finding a Use Case* and *Strategy Discussion*. Other methods used in the artifact are Porter's Value Chain (Porter, 1985), Porter's Generic Strategies (Porter, 1980) and the PEST analysis (Ward & Rivani, 2005). The different steps and methods in RBCT are build up in modular way, which allows to choose the most appropriate methods for each case. In practice we expect that companies working with RBCT will prefer methods they already know, or which suits best to their situation.

Six phases build up the roadmap on blockchain transformation. The roadmap phases include the three aspects of "technology" (Phase 1,3,5 in figure 3), "organization" (Phase 2 and 5 in figure 3) and "environment" (Phase 4 in figure 4) by the TOE-Framework for technology adoption. The technology aspects within the roadmap are focused on topics specific to blockchain technology. Technology specific challenges in blockchain projects include understanding the technology and having enough human resources within the organization who understand the technology, finding a suitable use case which matches the organization and corresponds with the attributes and characteristics of blockchain and, finally, the decision on which blockchain platform or technology best matches the developed use case. Organizational aspects are mainly included in the phases *Project/Innovation Management* and *Transformation*. Finally, the only environment specific phase is *Strategy Discussion* as this focuses on the competitive standing of the organization and on its situation in its environment. However, the distinction between the TOE aspects does not have clear boundaries. As the development of the roadmap targets organizations, all aspects include the organizational view point.

4. EVALUATION OF THE ARTIFACT

The main evaluation of the roadmap was its use in a case environment during a blockchain elective course with mostly part-time business students on bachelor's level. These students are all professionals working part-time and hence are used to expect practical relevant teaching material. This was matching our evaluation scope of usability and practicality of the roadmap. After having learned the foundation of blockchain technology, the students simulated a blockchain project while they developed their own blockchain use cases (Figure 4). This setting was used for an evaluation of the roadmap.

Figure 4: Program and syllabus of blockchain elective program used for roadmap evaluation



Source: Authors

The evaluation was done in two ways, by an observation during a group work phase of the lecture and by a feedback questionnaire filled in by the students after the group work. The observation, as well as the feedback questionnaire to evaluate the practical application of the roadmap by the students, served to get

feedback on the usability of the roadmap. The group work was based on the case study “Blockchain – A boon for the Pharma Industry?” (Hussain, 2018), which was then further split into sub-topics to enable a variation between the groups.

The students were guided through the roadmap on an abstract level in order to achieve results within the given time. However, they had to find their own answers and ideas to develop a valuable use case. First, the students read the case study. Second, they chose a sup-topic and informed themselves about this sub-topic. Third, they applied the worksheets and checklists from the phases *Finding a Use Case* and *Technology Discussion* of the roadmap with the content of their sub-topic. Third, they filled in the feedback questionnaire which served as the result of this part of the research. Finally, they presented their results in front of the class.

The observation was done during class work on the application of parts three to five of the roadmap. Two teachers noted all impressions and the behavior of the students during the group work. The observer in this case was an “observers-as-participant”, as the observers role were clear to the participants – here: the students – and the observers interacted with the students (Saunders, Lewis, & Thornhill, 2009). The aim of using this method, was to get feedback on the usability of the roadmap right in the moment it was used. The feedback, therefore, was direct and valid at this moment. The shortcoming or limitation of this research method was a potential bias from the side of the observers. As some feedback was influenced by the impression of the observers, the feedback might not fully reflect the opinion of the students. However, in combination with the feedback questionnaire (see below), the observation data serves as a complement.
The feedback questionnaire aimed to receive written feedback from the students who used the roadmap for their group work case study. The survey method was a web-based self-completed questionnaire. The research had a descriptive approach, as the population’s characteristics and opinions were aimed to be described and analyzed. The questionnaire could give the possibility to evaluate the artifact in a structured but qualitative way, as each phase of the blockchain roadmap, that the students have worked with, could be evaluated. The questionnaire could show the opinion of the students, who could answer in an anonymous and honest way. The bias, however, can lie on the learning in the problem-solving process of the students. After going through ups and downs during two weeks of group work, not all aspects of the feedback might had still been remembered.

5. CONCLUSION

In this research project, a Roadmap on Blockchain Transformation RBCT was developed and evaluated based on the Design Science Research process. A specialty of this research study was the evaluation of the artifact or product in a class environment. After being taught basic knowledge about blockchain technology in class, the students had to apply their knowledge on a case study, by using the Roadmap on Blockchain Transformation for their group project. This enabled, on the one hand, the learning process of the students and, on the other hand, the collection of research data for the evaluation of the artifact within the research project.
Not part of the research project was the course evaluation at the end of the semester, where the students gave feedback of their learning experience and how they evaluated their progress in this blockchain elective. This feedback was within the average of other (conventional) classes, positive aspects were relevance and closeness to current and practical topics. Negative annotation was given for the complexity of the teaching situation where the students got sometimes confused by the different levels of interaction which was caused by the research project. Also, outside the research project was the final exam of the course. The final grade was based on answering multiple choice questions about theory as well as giving arguments for different aspects of technology decisions within a given business context. All students passed this final exam and the average of the class was about 80% of the maximum points. This high grade matches the observation of several students who noted that this class demanded much more hours of work than the offered credits had announced.

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