

Distributed Ledger Technology in the Banking Sector: A Method for the Evaluation of Use Cases

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Abstract. Distributed ledger technology (DLT) is seen as an opportunity for the banking sector with high potential to achieve complexity reduction, cost savings, and further benefits in diverse processes. These high expectations and a limited technology know-how lead to bank internal challenges during the selection of suitable use cases for DLT. We apply Design Science Research (DSR) to address this challenge by developing a method for evaluating the business needs and the feasibility of deploying DLT in a certain use case in the banking sector. Devised using the letter of credit (LC) process as reference, our results suggest that various requirements and beside bank internal also external parties should be included in the evaluation. This implicates, that a more detailed study is needed on including external stakeholders in use case evaluation. Our method can be customized and applied as a structured evaluation approach in the banking sector.

Keywords: DLT, use case evaluation, Method Engineering

1 Introduction

DLT is seen as an opportunity in various industries with high potential to achieve a complexity reduction and cost savings in diverse processes [1], [2]. For instance, in the banking sector several use cases such as bond issuing have been discussed (cf. e.g. [3]).

The growth of expectations regarding DLT leads to bank internal challenges identifying feasible and value increasing use cases for it [4]. However, because of a lack of deep technical in-house expertise [5], a solid decision base is missing.

To tackle this challenge, various DLT use case evaluation methods were introduced recently [6]. However, none of the analyzed methods is specifically tailored to the needs and accuracy we identified as required within banks. They often focus on single issues (cf. e.g. [6]), or do not prescribe concrete procedures, but merely give general advice (cf. e.g. [7].) A guideline which addresses the most important thematic fields enabling a structured and consistent evaluation of possible DLT use cases was not found.

We develop a situational method allowing the structured and efficient evaluation of the business needs and the feasibility of deploying DLT in a particular use case based

on the needs observed in the banking practice. In the course of our study, requirements of the method are gathered based on a literature review and interviews conducted with experts for the reference use case LC and for DLT in cooperation with a German bank.

2 Research Background and Method

DLT, including but not limited to blockchain [8], is a combination of the computer science, cryptography and economic concepts: linked lists, distributed networking, hashing, digital signatures, asymmetric encryption, ledgers and incentive mechanisms for coordination of participants towards building consensus [10]. It allows “secure processing of transactions between untrustworthy parties in a decentralized system” [9], while maintaining a single point of truth [10]. Thereby DLT is especially relevant for interorganizational cases, where more parties interact [11]. Recently, more than 1000 DLT systems emerged with diverse architectures and feature sets [12]. Banking consortia for DLT in trade finance mainly rely on Corda or Hyperledger Fabric [13].

In a wide range of DLT platforms, smart contracts can be implemented [14]. A smart contract is a computer program which can be used by the participants inside a DLT network [15]. It automatically executes transactional events, if pre-specified contractual terms are fulfilled [16] and can e.g. be used to avoid manual document checking [17].

Extant literature describes various evaluation methods for DLT use cases considering different perspectives and granularity [6], [3]. For instance, a decision tree diagram is amongst others used in [6] to evaluate the right type of database for a specific use case from a technical perspective and in [18] to assess if DLT is useful for a certain problem based on technical and business criteria. In another example, guidelines for a structured workshop are presented as a method for developing DLT use cases [5].

We develop an evaluation method using the LC process as a reference. LC is “the most common trade finance product provided by banks” [19], but is still mainly based on analog documents and manual checking [17]. It is recommended for commercial trading in opaque legal situations [20], where no trust in the honesty of the counterparty exists [21]. Hence, involved parties integrate a bank to hedge the uncertainty [22], [21]. To gather documents needed in the LC, further parties are involved [23]. We chose this process as reference, since given this process setup, extant literature has already acknowledged the potential of DLT for digital LC solutions (cf. [19], [17], and [24]).

We follow the DSR methodology [25] and construct our method in accordance with Situation Method Engineering [26]. Based on the requirements gathered in an iterative proceeding, we identify thematic fields relevant for the evaluation of the business needs and feasibility of deploying DLT in a certain use case in the banking sector. Therefore, we analyzed existing DLT evaluation methods and conducted semi-structured, interviews [27] with 11 bank internal and external experts for the LC

process and DLT. All interviews were recorded, transcribed, and 402 relevant quotes were coded.

The identified requirements were grouped regarding similarities and interconnections to derive the main thematic fields important for an evaluation. The seven arisen fields illustrate the extent and complexity of a comprehensive DLT use case evaluation. The major requirements gathered under these fields were further grouped into focus points. To evaluate them, for each point a method chunk were developed, that is an “autonomous and coherent part of a method” [28] which present a process and product for that part [29]. The final method is a guideline presenting a stepwise approach how the main thematic fields can be structured evaluated and which points must be considered to get a valid statement regarding each field.

3 The Developed Method

The following main thematic fields have been identified:

1. Build up necessary knowledge: Know-how about DLT, relevant existing solutions, and related technologies should exist in the bank. Furthermore, all parties involved in the evaluation should have a basic understanding of DLT and its capabilities.
2. Analysis of the current process: Decisive for a DLT project should be the weaknesses of the current process and if DLT is the best fitting technology to improve them.
3. Analysis of the environment: It must be ensured that the use of DLT is fundamentally possible in the near future regarding the degree of standardization, as well as legal and technical requirements in the use case.
4. Evaluation of added value and risks: A clear vision of the goals should exist. What added value can be reached from all required parties and is it a sufficient incentive to justify the risks?
5. Define a new process with DLT: It should be analyzed how a new process can look like to achieve this added value and what is necessary to implement it.
6. Requirements for the technical solution: For the new process, it must be ensured that a technical implementation is possible with DLT that can meet all requirements.
7. Governance structure: Because multiple organizations with different requirements and potentially diverging interests must work together to successfully implement a DLT solution, a governance structure between the involved parties often requires substantial effort and must be individually developed for each project.

To build the method, these thematic fields are broken down into different focus points, which are with regard to interdependence constructed to five consecutive stages with corresponding intermediate objectives (cf. Figure 1). Stage 0 plays a special role, since the contained topics should not be evaluated for each use case but fundamentally within the bank to ensure that the general prerequisites for further evaluations are given.

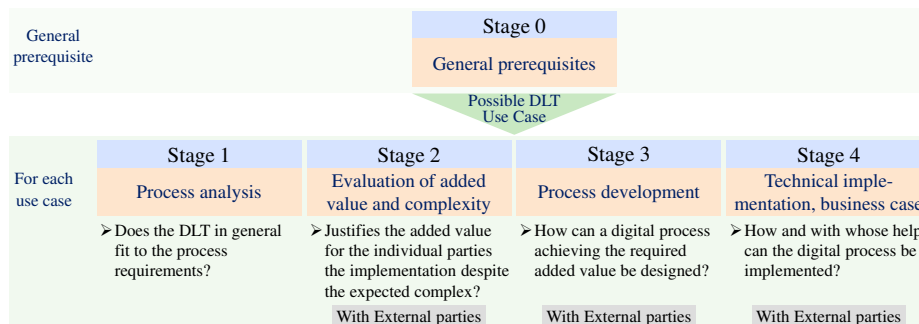


Figure 1: The five stages of the DLT use case evaluation method

The other stages should be conducted successively for each use case. After each stage, the stakeholders can draw a conclusion, whether the use case seems promising up to that point. Each stage consists of focus points relevant for different thematic fields, and their corresponding method chunks. The latter address how a specific focus point should be evaluated, which stakeholder groups are needed (e.g. based on a stakeholder diagram [30]), and the possible outcomes. Through the chunk structure, the adaptability of the method is facilitated: particular chunks can easily be in- or excluded depending on the requirements of the specific use case characteristics.

To determine which stakeholder groups are needed for the evaluation of each focus point, we analyzed the existing methods and the conducted interviews. The interviews showed consistent that next to bank internal departments, also external parties needed for a reasonable DLT based process, must be included in the evaluation to receive valid results. These parties must be determined for each use case individual in the first stage.

The method is aligned to DLT and the banking sector. In the iterative requirement analysis, existing DLT use case evaluation methods and DLT experts were included. Therefore, DLT specific topics like its specific suitability for interactions between un-trustworthy parties are considered. The distributed nature of DLT is taken into account as well, since also external parties needed in the process are included. The method is aligned to the banking sector as points like the strict regulatory situation are considered, which were gathered through the interviews with experts of the reference use case LC.

4 Discussion and Conclusion

In this research in progress, we develop a method to evaluate the business needs and the feasibility of deploying DLT in a particular use case in the banking sector. Therefore, we gathered requirements and relevant stakeholder groups from literature and interviews with LC and DLT experts. Our analysis shows that none of the existing evaluation methods covers all derived requirements. Moreover, information about which stakeholder should be involved in the evaluation is missing in the

methods. This is a drawback, since our findings suggest that additional to the internal all relevant external parties must be included in the evaluation to receive valid results.

Our method addresses seven main thematic fields and provides a guideline with five processing stage for evaluating them comprehensively. The required stakeholder groups (bank internal and external) are associated to each chunk of these stages.

There are limitations to our research. As the method is developed together with one bank using the LC as reference, the method chunks are adapted to this specific process and organization. Under the assumption that most of them can be applied in another context, future research is needed to justify this claim. Additionally, as there currently was no access to applications in productive version, the validity of the method's results is bound to PoCs. We expect future research to shed more light on the evolving application in practice and help overcome the limitations.

However, we do believe that our work is of value for research and practice. It shows that the theory should consider external stakeholders for the analysis of DLT use cases. For practitioners, the developed method can help to find reliable use cases for the further deployment of DLT, by giving a structured evaluation process for the banking sector. Thereby the method can help banks to invest in the most promising DLT use cases and exploited the full potential of the technology.

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