Polkadot Analytics prospective query service: a case study

Article

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Web3 Foundation Grants Program

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1. Research overview

The current research grant tackles the development of a conceptual framework for the Polkadot multi-chain ecosystem. In the long run, this framework will be used to promote data integration, knowledge reasoning, and better communicability for the ecosystem community. It is a first step towards creating a rich and convenient asset for performing query searching and data analytics on Polkadot's ecosystem.

In the second milestone [1] of the current research grant, we designed a case study to explore a possible application of the draft ontology POnto delivered in Milestone 1 [2]. We proposed a prospective query engine in Polkadot's multi-chain ecosystem, called Polkadot Analytics. The case study discussing aspects of its design and implementation are described in a technical report [3]. The methodology used to devise this case study is discussed in the Section 2 below.

The Polkadot Analytics query service aims at supporting a broad range of queries and data visualization strategies. Query results are structured as artifacts with multimodal content, representing the data results and summarization aspects. Ultimately, users may integrate multiple informative artifacts to compose their own dashboards. To describe a possible interaction with this service, we created a specific Polkadot-related use case through a descriptive scenario [4].

2. Methodology

Several works have discussed planning and modeling of qualitative research process in the qualitative research design literature, particularly by authors within the Social Sciences such as Marshall and Rossman [6], Creswell [7, 8], Flick [9, 10], Maxwell [11, 12], Yin [13], and summarized by Brandão [14]. Yin claims that "every type of empirical research has an implicit, if not explicit, research design" [13].

As Brandão discusses in his PhD thesis [14], there are two common strategies in the literature aiming at modeling the qualitative research process. One strategy is to offer a variety of basic structures of research methods that are in their own specific way undoubtedly coherent and logical, for instance the five approaches suggested by Creswell [7] and the discussion over case study methodology by Yin [13]. Commonly, this strategy involves models with a logical (linear or cyclic) sequence of procedures or tasks, from problem formulation to generation of conclusions or theories. Both authors list a number of issues to be decided about the components (procedures) involved in their proposed approaches, presenting difficulties and problems usually faced when performing crucial procedures. This way, researchers may rely on these basic designs for instantiating their own research.

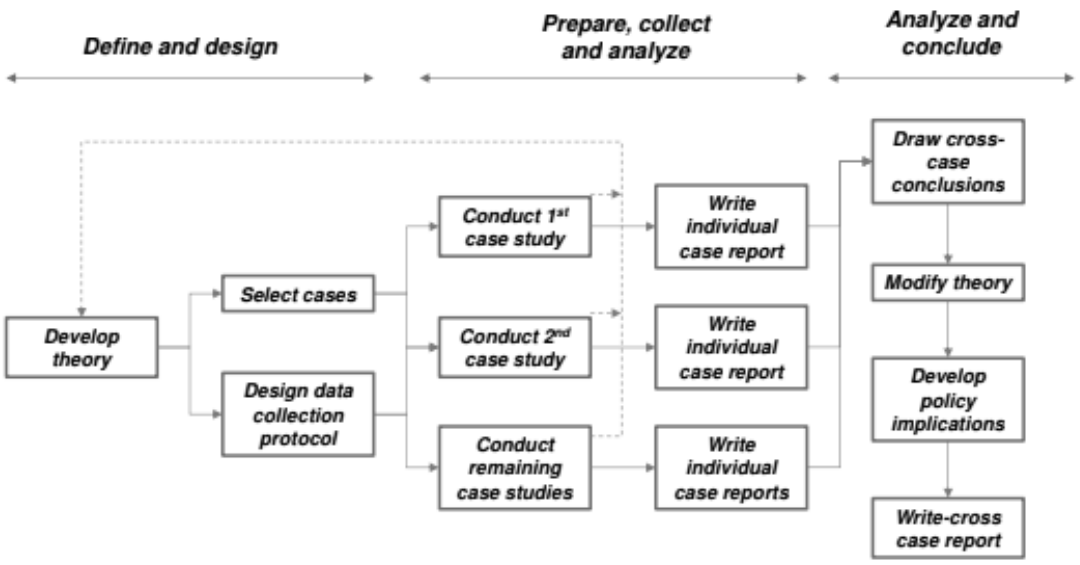

Fig. 3 – Overview of the case study method suggested by Yin [13].

The other observed approach is to present a list with a rundown of the common issues and conflicts the researcher may face when planning and conducting a qualitative research process. This is the case with Maxwell's [12] interactive model, which makes explicit the implications that each component (design decisions) has with respect to other components. He argues that the traditional approach (typological or linear) provides a prescriptive model for the research. Researchers must use them as a guide, arranging the components and tasks involved in planning and carrying out a study in an order considered optimal by design. In Maxwell's perspective, this research design modeling does not properly represent the qualitative process, which must be reflective and operate through all stages. He proposes an interactive model with five main elements with goals, conceptual framework, validity and methods connected through a central "research questions" element. This model emphasizes the interactive nature of design decisions. Components are interrelated and influence each other along the qualitative research process.

The work proposed in the current scope is a simplified case study aligned with Yin's perspective. We loosely followed the steps of defining and designing a data collection methodology; to prepare, and collect data; and finally, analyze and conclude findings.

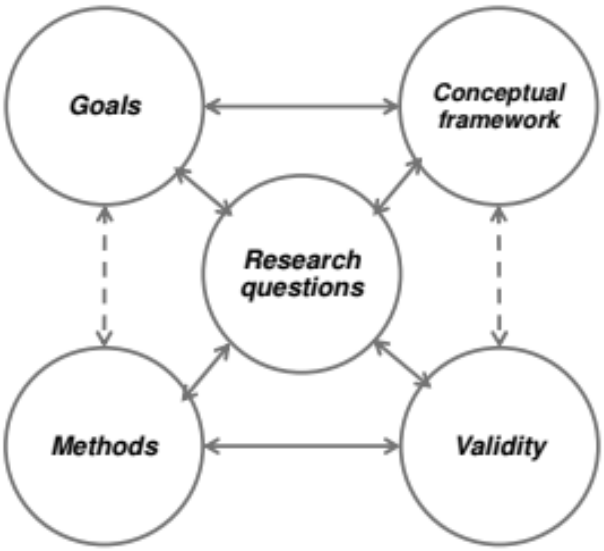

Fig. 4 – Simplified view of the interactive model proposed by Maxwell [12].

The proposed case study follows a protocol aiming at a transparent methodology to ensure reproducibility and minimize bias. Figure 1 illustrates the overview of the process. It comprises eight steps including, defining the study objectives, defining and selecting participants, developing a questionnaire to gather information, pilot-testing the questionnaire, collecting data through surveys, analyzing the gathered data, summarizing findings and gathering feedback over achieved results.

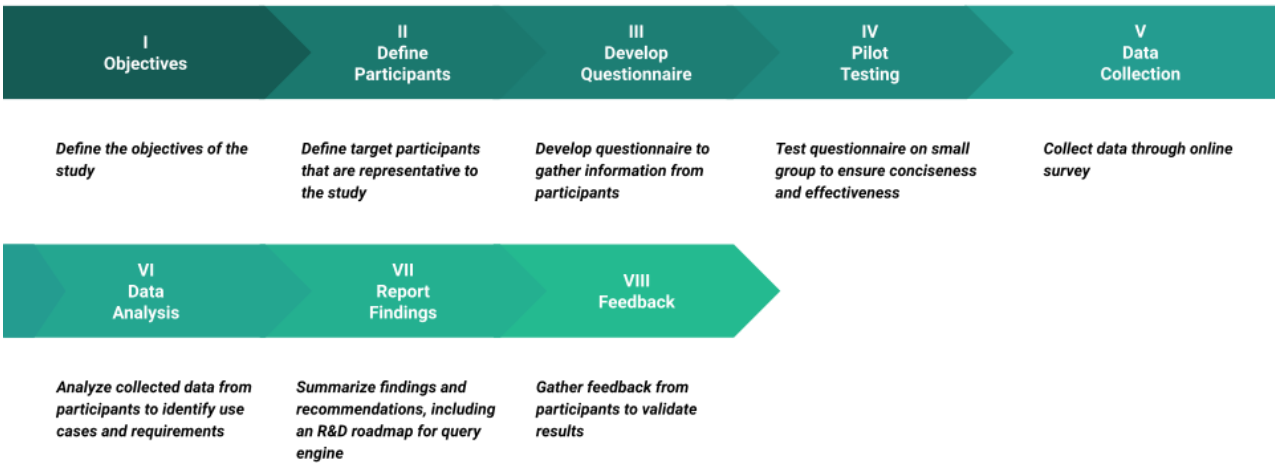

Fig. 3 – Case study methodology.

Concerning the execution of this case study, steps I, II, and III are part of Milestone #2 (Case study for query engine). Details about these steps are presented in the technical report [1].

Steps IV to VIII, i.e. pilot testing, data collection and analysis, report findings, and feedback will be part of Milestone #3 (Polkadot team brainstorming / workshop). The definition of participants and the data collection strategy must be discussed and aligned with the W3F team before their execution (M3).

3. Final remarks

The main goal of the proposed case study methodology is to assess the potential of a query engine service for accessing and analyzing data from distributed ledgers. Specifically, the relevance of having an ontology and a controlled natural language supporting this service.

By providing a mechanism to specify queries through a CNL for accessing and analyzing data, it will be possible to enable a wider range of users to participate in distributed ledger ecosystems. As blockchain technology continues to evolve, we believe that tools like the one we are proposing will become increasingly important not only to enhance community engagement but also for enabling the next generation of blockchain-based applications.

The pilot testing and data collection steps should be defined along with the Web3 Foundation grants program team, as part of the next milestone (M3) of our roadmap. Since, we need to define the best strategy for selecting representative participants for surveying as well as the brainstorming / workshop proposed for M3.

Acknowledgement

This work was supported by a research grant from the Web3 Foundation and is publicly available at [5].

References

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[2] Milestone 1 – Literature review and conceptual framework specification. Available on github at https://github.com/w3f/Grants-Program/blob/master/applications/Knowledge-Oriented-Framework.md#milestone-1--literature-review-and-conceptual-framework-specification

[3] Technical Report – Case Study. Available on github at https://github.com/mobr-ai/POnto

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