A Case Study on itsVALUE with an Exemplary Case

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Abstract

This paper presents a case study of the itsVALUE method, a value-oriented approach used to model and analyze IT services. The case study investigates the application of the itsVALUE method in the exemplary case of the Business Informatics Research Conference 2022 organisation. Finally, this paper also intends to discuss the method's effectiveness, which include pointing out some weaknesses and providing suggestions for improvement. A semi-structured interview with the conference organizers was conducted to collect the value streams and administrative processes for the event. The phases "Understand and Define Stakeholder Value" and "Understand and Define the Current Value Stream" of the itsVALUE method were applied, modelled using the ADOxx Modeller and afterwards assessed. The results indicate the strengths of the method regarding structured value stream analysis but also pinpoint challenges, especially with respect to the usability of the ADOxx Modeller. The framework for structuring the evaluation was done as a balanced scorecard: method documentation, process efficiency, and practical utility of results were some key evaluated aspects. The paper concludes by giving recommendations for refinement of the itsVALUE method, improvements regarding the ADOxx-based modelling tool, along with some propositions for future research by expanding and generalizing the evaluation results.

Keywords

itsVALUE, value stream modeling, value streams, ADOxx, ITIL, case study, semi-structured interview, balanced scorecard

1. Introduction

Under modern, competitive, and rapidly changing market conditions, each organization should regularly reassess and enhance its processes in order to stay efficient and provide added value for all stakeholders. Therefore, one of the aspects involved in optimization includes value modeling, reflecting a systematic way of understanding how value flows within an organization. Value modeling is indispensable in practice since it enables organizations to find and eradicate inefficiencies, align processes to the stakeholder needs, and ensures every component of the workflow adds to value creation in general [1] [2]. Traditional value modelling methods usually focus on economic transactions alone and do not consider intangible benefits like stakeholder satisfaction, ease of use, or sustainability like e³value for example. [3]

Due to this lack, the method itsVALUE was developed as an integrated framework for the modeling and analysis of IT services from a value-oriented viewpoint. itsVALUE takes into consideration not only explicit, measurable forms of value but also integrates implicit, perceived values relevant to a variety of stakeholders. Such a holistic approach is required by modern IT services to satisfy complex demands coming from a diverse set of stakeholders. Further, the itsVALUE approach consists of a method framework, a notation, and a modeling tool called ADOxx Modeller, which allows putting the method into practice to easily create and manage models. [4]

A first case study and evaluation have already been carried out for the itsVALUE approach using a real-life example with a company [5]. Based on the results of this initial evaluation, itsVALUE did undergo significant revisions. The main focus of this paper is the evaluation of the revised version of the itsVALUE method by conducting a thorough case study on the application of the approach in the

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organization of the Business Informatics Research (BIR) Conference 2022. An interview is conducted with the conference organizers and the information from this interview is used to apply the itsVALUE method. The evaluation of the method will be conducted and presented by using a Balanced Scorecard approach. Ulf Seigerroth and Kurt Sandkuhl demonstrate in their article 'Method Engineering in Information Systems Analysis and Design: A Balanced Scorecard Approach for Method Improvement' how this approach can be used for method improvement [6]. Building on that, we can show those aspects that need further refinement and give suggestions for improvements in respect to the practical utility and usability of the method.

2. Theoretical Background

This chapter summarizes the most important theoretical background relevant for this research project. First, the theory behind value streams and value stream modeling will be explained, followed by the development of the itsVALUE method so far.

2.1. Value Streams & Value Stream Modeling

Value streams encompass all activities necessary to develop and deliver a product or service to the customer. They include both value-adding and non-value-adding business processes, providing a comprehensive view of a company's entire operations. By organizing a company's activities into value streams, a clear overview is created, showing what the company truly delivers. Services can be analyzed for elements that obstruct the workflow and for activities that do not add value. Such activities, often referred to as 'waste', should be eliminated. [7] Value Stream Modeling has its origins in Lean Production. Value Stream Mapping is a general approach used to visualize all necessary steps within a value stream, aiming to optimize processes. This optimization can target areas such as lead times, waiting times, or transportation times. [3] There are various approaches to value stream analysis, each with different focal points. Traditional approaches focus on the value being created, outlining the necessary steps and processes to generate that value, with particular emphasis on the timing of each process. [8] [9] [10] Modern approaches go beyond this perspective. They analyze, for example, the flow of information within the value stream and explore optimization opportunities. [11] Additionally, aspects like the IT infrastructure used are given greater consideration in modern approaches. [12] In summary, value streams consist of all activities necessary to create a service, and Value Stream Modeling aims to represent these activities in order to optimize existing value streams.

2.2. itsVALUE

The itsVALUE method is an innovative approach to modeling and analyzing value creation in IT services. It was developed to address existing gaps in value stream analysis and value modeling approaches, which traditionally focus on optimizing process times and exchanging economic value. The method builds on established concepts from service, value, and enterprise modeling and specifically integrates the requirements and recommendations of ITIL 4, chosen for its practical relevance. The method consists of several components that describe the steps for modeling, analyzing, and (re)designing value streams in IT services. These components are summarized in a methodological framework that considers both existing and new value streams. A key feature of the method is its iterative approach: Four iterations are recommended to develop the necessary insights into the analyzed value stream, especially when modeling a completely new service. This recommendation is based on the positive results achieved by applying similar iterative approaches in other contexts like in [13] [14] [15] [4] [5].

Another central aspect of the itsVALUE method is the inclusion of stakeholder perspectives and consideration of digitalization. The method aims to analyze and model the perceived benefits, importance, and advantages of an IT service from the stakeholder's viewpoint. This goes beyond traditional approaches that mainly focus on economic transactions and process optimizations. Concepts such as

digitization rate, data availability and data usage are incorporated to enable a comprehensive evaluation of value streams [13] [14] [15].

The itsVALUE methodology integrates various established modeling approaches. These include the Value Stream Method (VSM) and Value Stream Method and Notation (VSMN), which extend traditional value stream modeling by considering both information processing and stakeholder perspectives. Additionally, the IT-Self-Service Blueprint (IT S-SB) concept is used to integrate IT technologies into traditional service blueprinting approaches. Another key element is the 4EM, a participatory enterprise modeling procedure that supports stakeholder integration and provides concepts for modeling the impact of context on value creation [13] [14], [15].

The practical application of the itsVALUE method has been evaluated in one case study. This study demonstrated that the method and its associated models are highly relevant for value-oriented IT service modeling. Participants in these studies showed significant interest in the future application of the method and the itsVALUE modeler. Experienced modelers found the itsVALUE notation supportive, while less experienced users occasionally faced difficulties with its complexity. However, it was also recognized that further iterations and adjustments of the method are needed to improve its applicability and user-friendliness [13] [14] [15].

3. Case Study

The case study is divided into two main parts: the case study itself and its evaluation (section 4). The aim of this approach is to identify potential weaknesses in the itsVALUE method and to evaluate the entire method based on evaluation criteria. The conduction of the method as well as the evaluation are carried out by three of the authors that have not worked with itsVALUE in any way before. Because of that, they were able to use and experience the method like a normal real first time user.

As an example case to apply the method, we chose the organization of a scientific conference (BIR 2022). We precisely chose this case to see if and how itsVALUE is applicable for non-profit oriented processes as well as because we have the organizers of the conference in house, enabling us to collect the necessary data for modeling in high detail. A semi-structured interview was conducted with the organizers of this conference to collect the data. The interview is described in detail in section 3.1. The different itsVALUE models were modeled based on the data collected from this interview using the ADOxx Modeller. The results are described in section 3.3. However, during the application of the itsVALUE method, only the phases ”Understand and Define Stakeholder Value” and ”Understand and Define the Current Value Stream” regarding existing value streams were considered. The phase ”Create a New Value Stream Supporting Stakeholder Value” was not conducted, because only existing value streams should be considered and it is not necessary to create no processes for this case.

3.1. Interview Planning & Guide Development

The central method of data collection in this study are semi-standardized interviews. This choice is based on the methodological guidelines of Robert K. Yin, as described in his book ’Case Study Research: Design and Methods’ [16], as well as on the concepts of Kallio et al. [17]. Semi-standardized interviews make it possible to collect detailed information about the experiences, opinions and attitudes of the experts interviewed. The interview guide, additionally based on the recommendations of Gläser et al. [18], allows for both open-ended and targeted questions tailored to the specific objectives of the study. This type of interview offers the flexibility to adapt to the dynamics of the conversation while ensuring that all relevant topics are taken into account.

3.1.1. Development of the interview guide

Following the recommendations of Gläser et al., the interview guide was designed to allow for open discussion, but also to include targeted questions geared towards the specific research objectives. This

methodological approach promotes effective communication, takes into account the cultural context of the interviewees and avoids the uncritical adoption of subjective theories as facts. The development of the guide followed a structured five-phase approach that includes the design, development, piloting, implementation and evaluation of it [18] [17]:

Phase 1: Establishing the basic premises and objectives
In the first phase, a "deep understanding of BIR Conference 2022 organizers' perspectives on their daily interactions with the administrative and organizational processes of the conference" was identified as the main objective of the guide. Another focus was on analyzing cost structures and value streams of the conference. The aim of the interview was to document the experiences, challenges and needs of the organizers and to identify the different value streams of the conference.

Phase 2: Integration and analysis of existing knowledge
The second phase focused on the integration of existing knowledge and an in-depth literature review to refine the content and methodological direction of the guide. The aim was to create a sound basis for the development of the guide, including specific questions that encourage open answers. This approach should provide deep insights into the experiences of the organizers and the different aspects of the value streams.

Phase 3: Development of the structured interview guide
In the third phase, the preliminary interview guide was created, which is divided into several key areas: Introduction, project identification and definition, data collection and analysis, evaluation of benefits, detailed process steps, registration and venue, cost analysis, evaluation of the conference, general questions, final questions and a debriefing.

Phase 4: Piloting and ethical considerations
During the piloting phase of the interview guide, particular attention was paid to ethical aspects in order to comply with research standards. This included maintaining the confidentiality of the experts and obtaining consent for the use of data. The pilot test was conducted with two individuals who had relevant expertise but were not part of the main study sample. The first participant was a retired expert in event planning with over 30 years of experience. Their extensive background in managing complex projects provided valuable insights into the practical aspects of the interview. The second participant was an academic with experience in qualitative research methodologies, allowing us to evaluate the guide from both practical and theoretical perspectives. Several specific adjustments were made to the interview guide based on the feedback from the pilot test:

- Flow of the Interview: The sequence of questions within each section was adjusted to improve the logical flow and the rapport-building process with interviewees. In particular, we moved questions regarding the project scope earlier in the interview (e.g., shifting the question on external service providers) to provide more context before discussing the stakeholders' roles.
- Duration of the Interview: It became apparent that the original guide could extend the interview beyond the planned 80 minutes. To address this, several questions were condensed or merged. For instance, in the section on cost analysis, the questions regarding distribution of the total budget and cost distribution over the lifetime were combined into a single, streamlined query, which helped reduce redundancy without sacrificing the depth of the responses.

These refinements, guided by the pilot test as recommended by Yin [16], ensured that the interview guide was both effective in capturing the required data and manageable for the participants.

Phase 5: Finalizing and conducting the interviews
In the final phase, the final interview guide was carefully prepared for conducting the planned interview. The interview, which lasted around 80 minutes, made a significant contribution to supporting the objectives of the study and creating a sound data basis for the subsequent analysis.

3.1.2. Selection of experts

The selection of experts is crucial for the quality and type of information to be collected in an interview. Suitable interview partners were identified on the basis of several criteria, but most importantly of the direct involvement of the individuals in these administrative and organizational processes of the BIR conference 2022. This means that the selection of experts is mostly based on convenience sampling, because they were easy to access and fulfilled the criteria. The availability and willingness of potential interviewees and their ability to provide accurate and relevant information were also taken into account to ensure the depth and quality of the data collected [18].

3.2. The Semi-structured Interview Guideline

The interview guideline is systematically structured into nine key sections, each designed to guide the interviewer through distinct areas relevant to the research objectives, focusing on BIR 2022. This approach ensures both comprehensive data collection and sufficient flexibility to explore participants' individual experiences and perspectives. Each section is timed and organized as follows:

- **Introduction (3 min):** The interview begins with a brief introduction, outlining the purpose of the research and explaining the significance of the interview. Inter-viewees are informed about how their data will be used, and consent for recording is obtained. A transparent and open atmosphere is created by allowing interviewees to ask questions or request breaks at any time.

- **Project Identification and Definition (22 min):** This is the longest section, where interviewees discuss the key objectives and scope of the BIR Conference. It begins with questions about the conference's main goals and how they align with the university's broader strategic goals. The scope of the project is explored, including roles, stakeholders, external service providers, and the timeline. Specific focus is placed on stakeholders' involvement and expectations, and the organizers' roles and values are analyzed in depth.

- **Data Collection and Analysis (10 min):** This section examines the financial aspects of the BIR Conference. It includes questions about initial, ongoing, and hidden costs, as well as the expected benefits of the event. The goal is to understand both the tangible and intangible outcomes of the conference and how these benefits will be quantified.

- **Evaluation of the Benefits (10 min):** The interview shifts towards assessing how the benefits of the BIR Conference are measured and evaluated. This section includes questions about the methods used to quantify the benefits, historical benchmarks, and how strategic advantages are evaluated, particularly in relation to the university's long-term goals.

- **Detailed Process Steps (10 min):** The focus here is on the detailed steps of organizing the conference, from planning and registration to peer review processes and session planning. Interviewees are asked to provide a thorough description of the processes involved, including the management of paper submissions and reviews, to capture the operational workflow.

- **Registration and Venue (4 min):** This shorter section looks at the logistical aspects of the conference, such as registration fees and venue arrangements, including any special agreements with local accommodation providers.

- **Cost Analysis (5 min):** Cost-related questions are explored in greater depth, focusing on the distribution of the conference budget, cost reserves, and the tech-nical infrastructure required to support the event. Specific attention is paid to contingency planning for technical failures.

- **Evaluation of the Conference (8 min):** The interviewees are asked to provide insights into the post-event evaluation processes, including the documentation of outcomes, the structuring of results, and recommendations for future actions. The aim is to capture how the success of the conference will be assessed and what improvements can be made.

- **General Questions (8 min):** This final section wraps up with broader reflections, including lessons learned from previous IT projects and the identification of best practices. Success criteria for the BIR Conference are also discussed, along with continuous improvement mechanisms for future events.

3.3. itsVALUE Modeling

For modeling, we focused on one key value stream of the case study: the conference paper submission process. This process was selected as it provided the richest information from the interviews and therefore allowed for accurate modeling. The paper submission process is central to the case study, as it involves a variety of stakeholders and interactions. The detailed information gathered during the interviews provides a solid foundation for modeling and analyzing this process. Furthermore, various stakeholders were identified during the paper submission process:

- **Scientists:** The authors who submit their work to the conference.
- **Host (University of Rostock):** The institution that may act as host or co-organizer.
- **Participants:** The conference attendees who will benefit from the work presented.
- **Review committee:** The reviewers who evaluate the submitted papers.
- **Conference organizers:** The individuals or organizations who plan and run the conference.
- **External service providers:** These include, for example, hotels and catering companies that provide services for the conference.

After identifying the stakeholders, the different values for these groups were determined. These values were then modeled in VPM for each stakeholder and a VSB. In addition to modelling the value streams, an SVM was created that visualizes the relationships and values for all the stakeholders. This map provides an overview of the interests and added value that each stakeholder derives from the paper submission process. Because of page restrictions, no models are shown here, but are available upon request.

4. Evaluation

After finishing the application of the itsVALUE method by creating the recommended models, the method should be evaluated. In the first step of the evaluation, evaluation criteria were defined (section 4.1) and then applied. The results of the evaluation will be described in section 4.2.

A Balanced Scorecard approach was chosen for the evaluation. The article [6] describes in detail the process of developing a Balanced Scorecard and its use as a tool for optimizing specific methods. Four perspectives relevant to the corresponding method were identified for the Balanced Scorecard. Criteria were defined for each perspective, related to the previously identified goals. Various indicators were then defined and described for each criterion, explaining how they can be measured. The Balanced Scorecard was developed for the "Method for Information Demand Analysis" and demonstrates its application for various user groups [19]. Furthermore, the transferability of the approach to other methods was investigated, using the 4EM method as an example [20]. However, only two of the formerly four perspectives were considered, as the other two perspectives were not applicable. Based on the experiences gained, the authors provided recommendations for indicators that can be used with other methods [6]. These two perspectives, namely the quality of the method documentation and process efficiency, were also considered for the Balanced Scorecard in this work. Additional perspectives stem from the already conducted case study on the evaluation of itsVALUE by Henning D.

Richter and Birger Lantow. The evaluation was published in two separate articles. The first article focuses on the method and the associated results [4], while the second article addresses the notation, the tool, and the conducted modeling session [5].

Based on the already conducted evaluation, the method results, the ADOxx modeler, and the notation were also included as respective perspectives in the Balanced Scorecard. Thus, the Balanced Scorecard developed for this case study comprises the following perspectives:

- Quality of the method documentation
- Efficiency of the process
- Practicality of the method results
- Perceived benefit of the modeling tool
- Understandability of the notation

For each of these perspectives, various sub-goals and additional research questions were formulated. To make these sub-goals measurable, corresponding indicators were defined for each sub-goal. In the evaluation, each indicator is assigned a value justified by the detailed answering of the associated research question. This helps the reader understand how the writers came up with the indicators. The evaluation questions, sub-goals, and indicators for the individual focal points are presented in the following section 4.1.

It should be emphasized that the values were selected based on the subjective perception of the authors of this paper. They were established during a joint discussion and thoroughly debated among the authors. It is important to emphasize that the values are heavily influenced by our personal assessments as well as the challenges we encountered.

4.1. Evaluation Criteria

As explained previously, we identified five focal points for the evaluation and determined appropriate evaluation criteria for each. These evaluation criteria will be presented in detail in this section. Each table contains an abbreviation for the sub-goal (e.g., D.1, D.2.1), the corresponding sub-goal, the associated research question, and the respective indicator.

The first table presents the selected evaluation criteria for the quality of method documentation. In total, five sub-goals have been identified:

Table 1
Evaluation Criteria for the Quality of Method Documentation

	Subgoal	Question	Indicator
D.1	Quick Learning	How much time was required to learn the method or to go through the documentation?	Learning time in hours (h)
D.2	Few Deficiencies	What deficiencies in the documentation were identified?	Number of identified deficiencies
D.3	Completeness	Was the documentation perceived as complete?	Rating on a scale (1-5)
D.4	Correctness	Was the documentation perceived as correct?	Rating on a scale (1-5)
D.5	Understandability	Was the documentation perceived as understandable?	Rating on a scale (1-5)

Table 2 shows the evaluation criteria for the focus on process efficiency. We considered 6 sub-goals and formulated the corresponding evaluation questions. The sub-goal P.2 is further divided into the phases of the method to clarify the time required for each respective phase.

Table 2
Evaluation Criteria for Process Efficiency

	Subgoal	Question	Indicator
P.1	Appropriate Time Investment	How much time was required to apply the ItsValue method to the entire case study?	Learning time in hours (h)
P.2	Appropriate Time Investment	How much time was required for each section of the ItsValue method for the entire case study?	Learning time in hours (h)
P.3	Goal-Oriented Process	Was the process considered goal-oriented?	Rating on a scale (1-5)
P.4	Completeness	Was the process perceived as complete?	Rating on a scale (1-5)
P.5	Correctness	Was the process perceived as correct?	Rating on a scale (1-5)
P.6	Understandability	Was the process perceived as understandable?	Rating on a scale (1-5)

For the focus on methodological results, five sub-goals were considered. The sub-goal M.1 was divided into three subordinate goals corresponding to the three models. This is shown in Table 3.

Table 3
Evaluation Criteria for the Results of the Method

	Subgoal	Question	Indicator
M.1	Purpose Fulfillment of the different Models	How helpful were the models / Did the models fulfill their purpose?	Rating on a scale (1-5)
M.2	Usable indicators	How well could the metrics be determined and what significance do they have in the considered case study?	Rating on a scale (1-5)
M.3	Completeness	Is the overall result of the method perceived as complete?	Rating on a scale (1-5)
M.4	Correctness	Is the overall result of the method perceived as correct?	Rating on a scale (1-5)
M.5	Understandability	Is the overall result of the method perceived as understandable?	Rating on a scale (1-5)

For the focus area 'Perceived Benefits of the ADOXX Modeler', four sub-goals have been identified. These sub-goals are listed in Table 4.

Table 4
Evaluation Criteria for the ADOxx Modeller

	Subgoal	Question	Indicator
T.1	Few Perceived Deficiencies	How many deficiencies or improvement opportunities were identified?	Number of identified deficiencies
T.2	Completeness of the itsVALUE Tool	Was the itsVALUE Tool perceived as complete?	Rating on a scale (1-5)
T.3	Correctness of the itsVALUE Tool	Was the itsVALUE Tool perceived as correct?	Rating on a scale (1-5)
T.4	Understandability of the itsVALUE Tool	Was the itsVALUE Tool perceived as understandable?	Rating on a scale (1-5)

For the focus 'Clarity of the notation', four sub-goals have been identified (see Table 5).

Table 5
Evaluation Criteria for the Notation

	Subgoal	Question	Indicator
T.1	Completeness of the Notation	Was the notation perceived as complete?	Rating on a scale (1-5)
T.2	Correctness of the Notation	Was the notation perceived as correct?	Rating on a scale (1-5)
T.3	Understandability of the Notation	Was the notation perceived as understandable?	Rating on a scale (1-5)
T.4	Few Perceived Deficiencies	How many deficiencies or improvement opportunities were identified?	Number of identified deficiencies

The values of the evaluation scale are defined as presented in Table 6. Other values were only used to include the learning time in hours or the perceived deficiencies.

Table 6
Evaluation Scale

Value	Description
1	Very Poor
2	Poor
3	Satisfactory
4	Good
5	Very Good

4.2. Evaluation Results

In this section, the results of the evaluation are presented, categorized by the respective focus areas from the quality of method documentation (Section 4.2.1), the process efficiency (Section 4.2.2), the practicality of method results (Section 4.2.3), over the perceived usability of the ADOxx modeller (Section 4.2.4) to the notation (Section 4.2.5).

4.2.1. Quality of Method Documentation

The review of the method documentation, including the application manual and the Installation Guide, took three hours. The application manual comprises 23 pages, while the Installation Guide is relatively brief. The documentation was generally perceived as complete. The application manual provides a compact overview of the notation and the corresponding metamodels, and in its second part, it details the itsVALUE method, examining each phase individually. Installation procedures are described in the Installation Guide available on the OMiLAB Community platform.

The content was deemed accurate, with no errors found in the method section. The Application Manual effectively and clearly explains the notation, metamodels, and models, without going into excessive detail. The table of Visual Representations offers an excellent overview of the available class relations and their associated visualizations. The 'Important Notes on the ADOxx Modeller' may not be particularly clear for newcomers to the method. To enhance understanding, these notes could be improved with the inclusion of relevant screenshots or more detailed descriptions.

The second part of the Application Manual is very clear and comprehensible. The exemplary fictional case is well-chosen, and it is particularly helpful that the method is described step-by-step through this case. This approach allows newcomers to quickly engage with the method and understand it progressively through a concrete example. Additionally, the language used in the explanations is sufficiently simple to introduce even non-experts to the method effectively. The selected graphics effectively guide the user through the process of the method. However, the explanation of the calculation of the S and H scores could be improved for greater clarity. The Application Manual would be more useful with detailed information and screenshots from the ADOxx modeller.

The installation guide requires significant improvement to enhance its clarity and comprehensibility. Currently, it is disorganized and presents numerous ambiguities to the reader. Firstly, there is an error in the initial paragraph, rendering the sentence incomprehensible. The reader is left to infer the intended message.The guide proceeds with a step-by-step explanation for downloading and installing the environment. However, there are critical issues with these instructions. It would be beneficial to provide a direct link to the specified modeling toolkit, as the current description does not clearly identify which toolkit is being referred to. Additionally, the guide references a tutorial on the adoxx.org website. Unfortunately, the specified tutorial cannot be found on the website. To address this, including a direct link to the intended tutorial or offering a more precise description would be advantageous.A screenshot of the installation guide is attached.What the authors of this paper additionally wish for is the integration of a modeled case study into the ADOxx Modeller as an example. This would allow users to familiarize themselves with the corresponding functions in the Modeller. Furthermore, it would be desirable to include a more complex case study in the documentation to demonstrate how the various models would appear in in a larger and more detailed context. Due to many issues with the tool, it would also be beneficial to maintain a public database of known errors and their corresponding solutions. Thus, the following two deficiencies have been identified: "Better description of the use of the ADOxx Modeller" and "unclear and difficult-to-understand installation guide". The scorecard with the corresponding evaluations is shown in Table 7.

Table 7
Scorecard for Method Documentation

	Subgoal	**Score**
D.1	Quick Learning	4
D.2	Few Deficiencies	2
D.3	Completeness	4
D.4	Correctness	5
D.5	Understandability	4

4.2.2. Process Efficiency

The entire process took 28 hours. Table 8 shows how the effort is distributed across the different sections of the method. The 'Understand and Define Stakeholder Value' section took 6.5 hours. The second part, 'Understand and Define the Current Value Stream,' required 16 hours. It should be noted that most of this time was spent calculating the KPIs, which had to be done manually due to issues with the ADOxx Modeller. These problems are discussed in more detail in Section 5. Without this additional effort, i.e., with automatic calculation by the tool, the time required would have been significantly less. The effort for the third step, 'Enhance Stakeholder Value: Define the Future Value Stream,' was about 5 hours. With the successful calculation of the KPIs, the effort required for the process was considered satisfactory. The process was considered effective because the various phases and resulting models created a clear and understandable structure. This structure allows the modeler to gain a comprehensive overview of the entire process. Each phase contributes to capturing and optimizing the value streams in the chosen case study. By the end of the process, all value streams deemed essential by the modeler are fully identified and optimized. The process was perceived as correct.The scorecard with the corresponding evaluations is shown in Table 9.

4.2.3. Practicality of the Method Results

The VPM was considered extremely helpful in identifying the baseline and the values of the stakeholders. However, it is difficult to estimate the level of detail at which the corresponding values should be identified and incorporated into the model without making the model overly complex and losing its significance. Additionally, it was challenging to determine which stakeholders are relevant enough to include in the analysis.

Table 8
Overview of the distribution of time expenditure by phases of the method

Part	Time Investment in Hours
1.Understand and Define Stakeholder Value	**7**
Gather Information from All Relevant Stakeholders	3
Make These Value Perceptions Explicit for Each Relevant Stakeholder (VPM)	3
Understand and Define the Relations Between All Stakeholder Values (SVM)	1
2.Understand and Define the Current Value Stream	**16**
Collect and Order All Process Steps from Demand to Delivery	1.5
Collect All Supporting Components and Show Where They Interface	0.5
Determine for Each Process its Data Requirements (DA, DU and DR)	4
Map All Components of the Current Value Stream to the Stakeholder Values	2
Detect Waste and how Components Affect Stakeholder Values	8
3. Enhance Stakeholder Value: Define the Future Value Stream	**5**
Define Value Opportunities, Problems, Constraints and Causes	2
Derive Development Actions, Eliminate Media Breaks and Maximize the Flow	1.5
Model the Future Value Stream and Affection on the Stakeholder Value	1.5
Total Time Invested	**28**

Table 9
Scorecard for Process Efficiency

	Subgoal	Score
P.1	Appropriate Time Investment Total	28
P.2	Appropriate Time Investment per Phase	N/A
P.2.1	Understand and Define Stakeholder Value	7
P.2.2	Understand and Define the Current Value Stream	16
P.2.3	Enhance Stakeholder Value: Define the Future Value Stream	5
P.3	Goal-Oriented Process	4
P.4	Completeness	5
P.5	Correctness	4
P.6	Understandability	4

After the second phase, the VPM can quickly become confusing, as all identified components of the value stream must be mapped with the value perceptions. The SVM was also very helpful as it clearly represents all stakeholders, their values, and the relationships and dependencies among them. The relation class “Affects” does not really provide valuable information as it is theoretically applicable to all objects. Distinguishing between “Contradicts” and “Hinders” was also often not easy.

The VSB provides a precise overview of the individual steps within a value stream, clearly representing the sequence of process steps. This helps in understanding process flows and identifying fail points. However, it was challenging to choose an appropriate granularity for the process. The “Environments” can be effectively used to group activities and different actors, helping to keep the model organized.

The PSM clearly illustrates how the supporting components support the activities and processes. However, the definition of a supporting component could be clearer. It should be more precisely defined when a component qualifies as a supporting component. Additionally, the distinction between the PSM and the VSB could be more clearly highlighted.

The support and hindrance factors S and H are theoretically very meaningful as they help analyze the effectiveness and efficiency of the value stream and identify targeted improvement measures. In practical application, however, it has been shown that difficulties in determining and calculating the metrics impair their significance. One challenge is determining the probabilities of occurrence, as these can only be based on estimates without precise data. It is also essential that the automatic calculation of the KPIs works, as manual calculation would significantly reduce the usefulness of the KPIs in the practical modeling process.

The method itself was considered complete, understandable, and correct. However, the models can become very confusing in complex case studies. Additionally, the information required for the

individual models is substantial. Many pieces of information have to be estimated because it would be too time-consuming to survey all stakeholders, or the stakeholders would also have to estimate this information. This leads to the information being less authentic and potentially incorrectly estimated.

The scorecard with the corresponding evaluations is shown in Table 10.

Table 10
Scorecard for Practicality of the Method Results

	Subgoal	Score
M.1	Purpose Fulfillment of the Models	4
M.1.1	Purpose Fulfillment of VPM	4
M.1.2	Purpose Fulfillment of SVM	4
M.1.3	Purpose Fulfillment of VSB	5
M.1.4	Purpose Fulfillment of PSM	4
M.2	Usable indicators	3
M.3	Completeness	5
M.4	Correctness	4
M.5	Understandability	3

4.2.4. Perceived usability of the ADOxx Modeller

The ADOxx Modeller encountered numerous difficulties during the modeling process. The first problems arose during the installation. Only one out of three people was able to successfully install the software. For the other two individuals, installation was not possible due to an ”SQL database” error. Despite several attempts, the error could not be resolved. Nevertheless, the ADOxx Modeller was installed on one system. However, further difficulties arose while working with the tool. One problem was that the names of the components could not be changed, only the descriptions could be adjusted. This could lead to problems when viewing the models, as the components retain their default names and are therefore difficult to identify. Additionally, the automatic calculation of KPIs was not possible, requiring manual calculations. Manual calculation is very time-consuming and could only be partially completed in our case. The links between the models, which should have been set automatically, also did not work in this case. Overall, the user interface could be made more intuitive to facilitate ease of use.

All these small problems led to significant limitations in the application of the method. In this specific case, it is unclear whether the problems arose due to user errors or if they are general issues with the ADOxx Modeller. However, it can be generally concluded that the user-friendliness of the modeling tool has significant room for improvement.

In conclusion, it should also be mentioned that when all functions work properly, the ADOxx Modeller is a very useful tool for the method. Particularly, the automatic calculation of KPIs would be a great help in applying the method. The tool is theoretically complete, as it covers all phases of the itsVALUE method and can also calculate the corresponding KPIs. All relations and components of the method are also present. The accuracy could only be assessed with difficulty, as the corresponding functions could not be fully utilized in this case. The comprehensibility is improvable, as many errors and questions arose during use, and, as described above, the operation could be made more intuitive. The results in form of the scorecard are shown in Table 11.

Table 11
Scorecard for the ADOxx-Tool

	Subgoal	Score
T.1	Few Perceived Deficiencies	3
T.2	Completeness	5
T.3	Correctness	4
T.4	Understandability	3

4.2.5. Notation

The notation could be made more understandable, especially regarding the visual representations. The "Constraint" class is shown as a white box on a white background, making it hard to distinguish. Many of the classes are differentiated only by color, which might be confusing for viewers with little experience with the method. To make the classes clearer, it would be helpful to add symbols to the rectangles. For example, a computer symbol could be used for IT systems.

Another critical point is the color scale used for the ”Relevant Factor” and”Current Performance Level” Green stands for ”High” and Blue for ”Outstanding” which is not intuitive. Additionally, the symbols for the ”Relevant Factor” and ”Current Performance Level” are too small, they would be better if they were larger. The symbols for events (Start, Common, End) and the labels on the arrows of the relation classes could also be clearer.

Overall, the notation is understandable after some practice. It is correct, with no obvious errors. The notation is complete, and all models and components of the method are well represented. Because of that, the scores rank from middle to high for this are (see Table 12).

Table 12
Scorecard for the Notation

	Subgoal	Score
N.1	Few Perceived Deficiencies	3
N.2	Completeness	5
N.3	Correctness	5
N.4	Understandability	3

5. Limitations

This study has several limitations that should be considered for a comprehensive evaluation. These limitations pertain to both the execution of the case study and the evaluation process.

The case example was not optimally chosen, as it involved a process that was too unstandardized and extensive. As a result, modeling was only possible at a high level of abstraction. Furthermore, it should be noted that we lack expertise in organizing scientific conferences such as BIR. Our knowledge about the conference and its procedures is based solely on publicly available information and an interview we conducted. The interview lasted only 1.5 hours and was our main source of information. Consequently, data collection was relatively challenging and required many assumptions, which may not always accurately reflect actual conditions. Therefore, we decided to consider only the submission of the conference paper as a value stream in order to limit the scope of the case study. A validation of these assumptions with experts and stakeholders did not take place. Another limiting factor was that the modeling tool, due to previously mentioned issues, could only be used by one person, which affected the duration and quality of the modeling. Several functions of the tool were not usable, so the KPIs could only be calculated manually or not at all. Finally, the section *Create a New Value Stream Supporting Stakeholder Value* was not conducted, as our case study focused on existing value streams.

The evaluation had several limitations. Firstly, we are not method experts and are new to the applied method. A method expert would likely evaluate the method differently, as they would prioritize different aspects. Our time for the evaluation and the conduct of the case study was limited due to various factors. Additionally, the evaluation was influenced by issues with the ADOxx Modeller. These technical difficulties could have impacted our impressions of the method, even though we tried to disregard them. The chosen case example also influenced the evaluation. With a more intuitive case example, the evaluation might have turned out differently. The evaluation is solely based on the experiences of the three authors, who jointly modeled a case example. The applied balanced scorecard method is explicitly recommended for methods that are used by many practitioners and applied in numerous use cases.[6] A separation between the persons who create and evaluate the assessment and those who evaluate the

method could not be maintained for various reasons. The rating using a score of 1-5 based on only one evaluation has very limited significance. To reduce subjectivity, it would have been important to have the evaluation conducted by multiple individuals. We tried to enhance our rating with a textual description to better explain the scores. Due to these limitations, the evaluation can only provide a limited implication for the evaluation of the method and does not possess strong evidence. It could be argued that another limitation would be that end-users were not involved in the evaluation of the modeling technique, but we argue that the three researchers who applied the technique can be seen like end-users, because they had not got any previous experience with itsVALUE before like a new end-user would have. However, it is a limitation that the balanced scorecard approach does not address the distinction between modeling experts and end-users.

6. Summary & Outlook

The aim of this case study was to conduct an evaluation of the itsVALUE method. The purpose of this evaluation was to assess the method from the user's perspective, identify weaknesses, and suggest potential improvements. These insights are intended to contribute to the further development and optimization of the method. For this purpose, a case example was selected and the method was applied to it. The chosen case example was the organization of the BIR, a scientific conference. The information for the case example was gathered through an interview with the conference organizers. The evaluation shows that various aspects have potential for improvement. The methodology documentation was generally rated positively, but a more precise description of the installation process would be desirable to enhance the installation guide. Despite this limitation, the comprehensibility of the installation guide must be emphasized, as it clearly and vividly explains the method. The process of the method was assessed as efficient and understandable, with the different phases building logically and coherently upon one another. The various models provide a good overview and serve their purpose in many cases. However, there is a risk that these models may become confusing in complex scenarios. The indicators could only be evaluated theoretically, as automatic calculation was not possible. The biggest weakness of the itsVALUE approach is the ADOxx modeller. Many difficulties were encountered while using the modeller, indicating that user-friendliness can be improved. This is particularly unfortunate, as the functions offered by the ADOxx modeller are very practical and useful. The notation is generally good but could be made more understandable, especially in its visual representation. It is important to consider the limitations associated with both the case study and the evaluation. For our case study, the primary constraints were the complexity of the chosen scenario and the issues encountered with the ADOxx Modeller. These factors should be taken into account in the assessment. It would have maybe been more straightforward to select a more clearly defined case with monetary value streams. The evaluation has several limitations that need to be mentioned: The results were obtained solely by us, representing a very small user base. Furthermore, the outcomes are heavily influenced by our subjective perceptions, specific issues, and the chosen case study. Overall, the results provide only limited implications for the assessment of the method and do not constitute strong evidence. For future research, several fields of action arise from this. Firstly, the evaluation should be conducted with a larger number of users to obtain a broader data base and to verify whether the results of our evaluation can be generalized to other users. In this context, it would also be sensible to select various case studies to exclude potential influences of specific case studies on the evaluation. The results from this extended evaluation could then be compared with the results of our initial evaluation. Furthermore, it is advisable to integrate the weaknesses and improvement suggestions we identified into the method and subsequently re-evaluate using our evaluation criteria to assess the impact of the measures. Additionally, it would also be conceivable to conduct an evaluation focusing on specific aspects, such as documentation, to examine particular elements in more detail.

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