Object-centric process mining for public sector transformation

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Abstract

Digital transformation allows public organizations to create value for diverse stakeholders. To improve organizational capabilities, internal changes in processes are often needed. However, resistance can pose challenges to such changes, especially when new technology is to be used by staff. We propose a framework that combines low-code tools with a new object-centric process mining technique, called OCCN, to empower staff to identify requirements for such changes and apply them. To evaluate the feasibility of the framework, we developed a prototype, which was evaluated using semi-structured interviews in a tax administration agency. The results show that the framework can enable new technology adoption by public servants for value creation.

Keywords

digital transformation, digital government, object-centric process mining, object-centric causal nets

1. Introduction

Digital transformation evokes both excitement and concern within organizations, offering new opportunities while introducing significant risks and challenges. For players in private companies, the risks are mostly associated with strategic positioning in the digital space and threats from competitors [1]. In the public sector, where competitive advantage plays a less important role compared to the private sector, delivering higher public value and meeting citizens' expectations play more significant roles in a rapidly evolving digital world [1]. This demands agility, cultural transformation, continuous learning, and responsiveness to internal and external dynamics [1, 2].

The use of technology in public administrations can help offer citizens higher public value; however, integrating new technology is challenging from the organizational perspective, involving change, culture, and rethinking business models [1]. Solutions are needed that enhance organization-wide dissemination, enabled by user-friendly interfaces, to forge a digital-oriented mindset and culture. In addition, the Industry 5.0 paradigm [3] goes beyond the focus on the use of new digital technologies for efficiency, as proposed by Industry 4.0, and calls for human-centric and sustainable technology integration, advocating for systems that adapt to workers rather than the reverse [3]. In this way, low-code solutions can provide a viable way to reduce uncertainty and support changes in business models and work processes when applying digital transformation in practice [1].

Process mining enables organizations to better understand business processes and uncover weaknesses, thereby harnessing capabilities for process improvement and enhancing business value delivery. While traditional process mining typically analyzes processes from one perspective, object-centric process mining offers a more holistic approach because it considers the whole ecosystem of a business process [4]. Various object-centric process discovery techniques exist [5, 6, 7, 8, 9], among which Object-centric Causal nets (OCCN) [8, 9] excels in robustness, simplicity, and expressiveness [8, 10]. However, disseminating the use of this new technology to staff who lack coding skills can be challenging, with the risk of being confined to top management or isolated institutional silos. Our research aim is to empower public servants to use Object-centric Causal nets [8] in a user-friendly way.

BIR-WS 2025: BIR 2025 Workshops and Doctoral Consortium, 24th International Conference on Perspectives in Business Informatics Research (BIR 2025), September 17-19, 2025, Riga, Latvia.

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In this paper, we propose a novel framework that facilitates organization-wide process improvement recommendations using recent advances in process mining [8]. It enables civil servants to improve business processes with data-driven insights [11] by combining Power Platform low-code tools [12] with the OCCN algorithms [8] to forge a digital-oriented mindset and culture. We demonstrated it by showing how it can be used in a tax administration scenario to allow staff to analyze the process from different perspectives, such as the taxpayer, the tax administration, the public servant, the request, and the tax debt, all in one model. The framework was empirically evaluated with six semi-structured interviews. The results set the basis for future quantitative assessment of its impact and iterative improvement of its prototyped solution.

The remainder of the paper is structured as follows: Section 2 discusses digital transformation challenges in the public sector and presents the theoretical background of object-centric process mining and OCCN. Section 3 outlines the methodology, and Section 4 elaborates on the proposed framework. Section 5 details the implementation and its evaluation, and Section 6 discusses the results. Finally, Section 7 concludes the paper and outlines future research directions.

2. Background

The unprecedented pace of digital transformation presents challenges in integrating new technologies in a human-centered way, particularly in the public sector, where bureaucratic culture often impedes change [1]. Most public organizations do not have integrated information systems that support both transactional operations and analytical needs. Thus, a data analytics environment developed on top of operational systems provides valuable insights for decision-making needed to enhance management and eventually create value [13]. However, becoming data-driven and fostering a digital mindset requires overcoming challenges across governance, organizational structures, people, and technology - particularly in developing digital skills [13, 14]. Moreover, rigid structures and organizational culture can be barriers to digital transformation [1]. To be successful, digital transformation relies on people, and employee empowerment is key to fostering a data-driven mindset and overcoming resistance [11, 15].

Our research focuses on leveraging new technology [8] to support long-term organizational outcomes [1]. This requires public servants to adopt new mindsets and develop relevant competences [1]. However, building up capabilities is a complex process in which culture plays a key role in linking resources to capabilities [16]. Low-code solutions may help disseminate underlying new technology in a user-friendly way at all levels of the organization. Microsoft Power Platform is a suite of no-code/low-code tools that empowers staff in the institutional environment to build and deploy tailored solutions regardless of their expertise [12]. It is designed to upskill the workforce in developing tailored solutions to business problems that accelerate innovation by increasing automation and collaboration [12].

Furthermore, our research supports organizations undergoing digital transformation by enabling staff to adopt the latest technologies [8, 17] to unlock better performance and value creation in the tax administration. While digitalization helps transition from paper-based processes to online services, digital transformation in the public sector implies deeper changes, and transformational government occurs when practices and structures are transformed [14]. Process mining supports the digital (re)design of business process models by helping organizations create value propositions that meet stakeholder needs [18], through better process understanding and weakness identification [19]. It allows improvement by identifying bottlenecks and enabling better resource or process management [20], and facilitates conformance [19].

Traditional process mining is case-based, meaning it analyzes the process from a single viewpoint (the case) while abstracting away other relevant perspectives. In real-world scenarios, however, a process event is often associated with multiple object types [4, 7, 21]. Conversely, in object-centric process mining, the different object types and their interactions are considered to depict the process analysis [4, 21, 22, 23, 24]. For example, in the tax administration scenario, an event can refer to one taxpayer, different debts, and multiple payments, and object-centric process mining allows the analysis of the object types taxpayer, debt, and payment in a single model to show their interdependencies. In

Table 1
Comparison of implementations of different object-centric discovery techniques

Feature	OCPN [26, 25]	OC-DFG [26]	OCCN [8]
Deals with noise	-	-	✓
Shows concurrency	✓	-	✓
Shows choice	✓	-	✓
Simplicity	-	✓	✓

our research, object types (including taxpayer, tax administration, public servant, request, and tax debt) can be related through one-to-one, one-to-many, or many-to-many relationships, based on business rules.

Object-centric Petri nets (OCPN) and Object-centric Direct-Follows Graphs (OC-DFG) offer alternative approaches to process discovery [4], but they have limitations either in dealing with log noise or in capturing concurrency and choice in business processes, which is common in real-world scenarios [8]. To overcome these limitations, a new technique called Object-centric Causal nets (OCCN) [8, 9] is used due to its robustness, simplicity, and expressiveness. OCCN can deal with event log noise because it discovers dependencies between activities to determine causality. Also, it can show concurrency and choice relations between activities, due to the use of bindings - a special graphical construct that visually represents concurrency and choice [8].

Table 1 compares implementations of different object-centric discovery techniques and their features. OCPN is implemented in OC-PM [25] and PM4PY [26]. It is able to show concurrency and choice, but cannot handle noise and is visually challenging to understand. OC-DFG in OC-PM [25] has relative simplicity but cannot show choice and concurrency. OCCN as implemented in [8] has a clear model visualization and can handle choice and concurrency by using bindings. It is able to deal with noise in the log by calculating dependency measures. We refer to [8] for details on the OCCN implementation and its comparison to other object-centric approaches.

Nevertheless, integrating this new technology [8] at all levels of the organization can be challenging for staff who lack coding skills in Python. User-friendly tools can facilitate new technology adoption, especially when they improve daily work [11]. Low-code tools developed with Microsoft Power Platform [12] can bridge the gap between the use of OCCN algorithms to create business value through data-driven insights [11] and staff. This unique combination can offer a friendly interface to empower civil servants, break resistance, and forge a digital-first mindset to potentially impact internal stakeholders and benefit society with improved services in the public sector realm.

3. Approach

This study adopts a Design Science Research (DSR) approach [27] to address practical challenges in public institutions, particularly the limited IT skills among staff during digital transformation efforts. The aim of our study is to support public organizations in enabling civil servants to adopt advanced technology for improved performance and process enhancement. This research emphasizes two core DSR activities: implementation and evaluation.

In the implementation phase, a framework is proposed to address the challenges identified in the literature. It combines low-code tools [12] with OCCN algorithms [8] in a user-friendly way, as presented in Section 4. A solution prototype was implemented to support its validation, and a use case scenario shows its applicability in the tax administration. To validate the framework, six semi-structured one-on-one interviews were conducted via video conferencing with specialists in business process modeling, strategic planning, organizational innovation, and top management of a tax administration agency. The interviews lasted between 40 and 60 minutes, were recorded and transcribed, and all participants provided previous written informed consent.

Initially, the prototype of the solution was presented allowing interviewees to ask questions and

ensure they fully understood the framework with the purpose of evaluating it. In the future, user acceptance can be assessed with the Technology Acceptance Model (TAM) [28] and quantitative metrics can measure the framework's impacts on performance, as used to evaluate many business process management support artifacts [29, 30, 31]. Next, the participants rated the proposal's usefulness on a scale from 1 (low) to 10 (high). Finally, open-ended questions regarding the proposal's strengths and challenges enabled the researcher to develop the interview based on participants' contributions [32], followed by the interviewees' optional final remarks about the framework.

The interviews were transcribed and the data anonymized and de-identified according to the guidelines of the Qualitative Data Repository protocol at Syracuse University [33], including roles and ages of the participants. Thematic analysis [34] was used for the qualitative analysis, with a focus on the participants' experiences and reality. Coding was performed both deductively and inductively, based on the interviewer's assumptions on benefits, challenges, and enablers found in the extant literature. Granularity was set to capture concise data extracts while preserving contextual meaning [34].

Notably, the analysis began during the interviews themselves, as the interviewer explored nuances in participants' responses [34]. In the coding phase, the full context of each interview and cross-interview patterns were taken into account. After data extracts were collated, patterns among the codes were searched to define categories and themes iteratively, checking back the interview transcripts and recordings to understand the underlying context. DSR serves two primary purposes: solving practical problems and generating knowledge about the solution [27]. Section 6 discusses the explicit knowledge [27] gained regarding the benefits and challenges of the implementation.

4. Framework

We explain our framework using a scenario, shown in Figure 1, in which the tax administration enables taxpayers to resolve tax disputes through an administrative procedure - a formal case [35]. Tax debt disputes can impose significant burdens on both governments and citizens, including high costs, emotional stress, and prolonged litigation. Several countries have tax programs that offer avenues for taxpayers to resolve tax liabilities for less than the total amount. By doing so, taxpayers can comply with legal obligations, while governments can reduce the volume of disputes and recover resources that might otherwise be difficult to realize. Such initiatives usually target specific groups of taxpayers and selected tax debts. Some programs are temporary, introduced in response to economic conditions; others are permanent fixtures within the tax administration. The rules and requisites vary greatly from program to program.

In this case, the taxpayer submits a request to reach a mutual agreement, as shown in Figure 1. First, the taxpayer accesses the online service, completes the form, attaches the necessary documents, selects an installment plan, and sends the request (1), which is formalized in the organization's register system (2). The request is received by the tax administration, where the staff performs a preliminary check for documentation completeness (3). If the documentation is incomplete, the taxpayer is notified and must submit the missing documents (4). The taxpayer can use the web information system (5) or contact the administration via chat or phone (5). In some specific cases, the questions are answered by domain specialists (6).

When the initial analysis is complete, the formal case is sent to a tax officer (7) who checks all information (8), including taxpayer eligibility, debt eligibility, and agreement conditions. If all criteria are fulfilled, both parts can reach an agreement on the amount to be paid and the installment plan (9). If not, the officer ends the case (10). The installment plan is continuously monitored and the agreement can be revoked if payment fails. The whole process impacts different areas of the organization, such as taxpayer registry, debt control, payment control, and dispute management. Object-centric process mining provides the analysis of intertwined process object types for conformity and improvement.

Our framework enables the tax administration staff to detect performance deficiencies in the whole process, like bottlenecks, to improve service to society with data-driven insights and communicate them to different stakeholders. Event logs from the register and the case handling systems, supporting

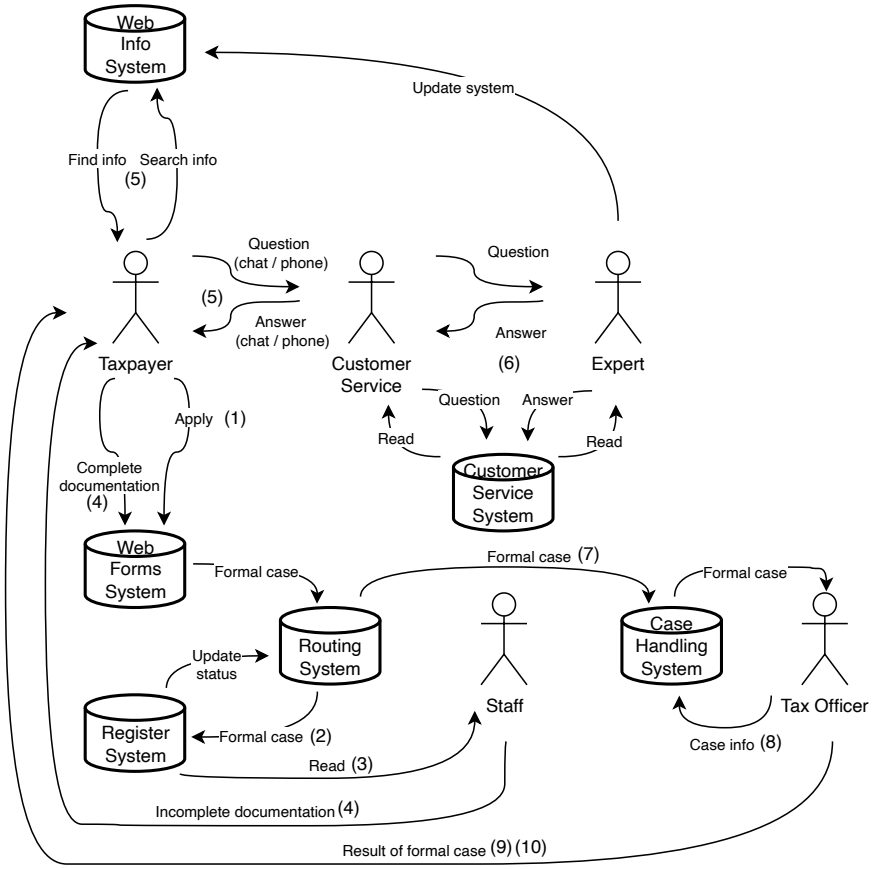

Figure 1: Taxpayer request, adapted from [35].

databases, and the website workflow enable conformance and improvement analysis. The OCEL log is prepared with data related to different object types collected from several systems and linked through event-to-object and object-to-object relationships. Once domain specialists prepare the OCEL log, it can be imported for modeling in the OCCN App. The solution combines Power Platform [12] and the OCCN algorithms [8] loosely coupled in a flexible business-aligned IT solution [35].

4.1. Architecture

The framework architecture is detailed in Figure 2. The main benefits associated with Power Platform are integration, automation, relative simplicity (low code), and access control. By combining the OCCN algorithms with the suite, our solution relies on Power Platform to handle organization-specific policies and environment characteristics, already in place due to the provider's contract. In the framework, OCCN App (a Power Apps canvas application) is the user interface, Power Automate does the orchestration, and OCCN is executed in Azure Function. The user account is used to access OCCN App. A separate service account manages all backend interactions within the framework.

To generate a new process model, the user opens the OCCN App and selects a target process. The app passes the process log ID to a Power Automate flow, which retrieves the file from Dataverse. For the pre-processed OCEL event logs, we use Dataverse, Power Platform's integrated cloud platform, due to its scalability and seamless suite integration. Next, Power Automate passes the associated log object types (OT) to OCCN App to collect the user-defined OT list. The OCCN algorithms require two inputs: the log file and the selected list of object types. If the user does not select any OT, the model includes all available object types by default.

The following step involves Power Automate sending an HTTP POST request to Azure Function with the JSON payload. Azure Function parses the payload, stores it temporarily, runs the OCCN algorithm,

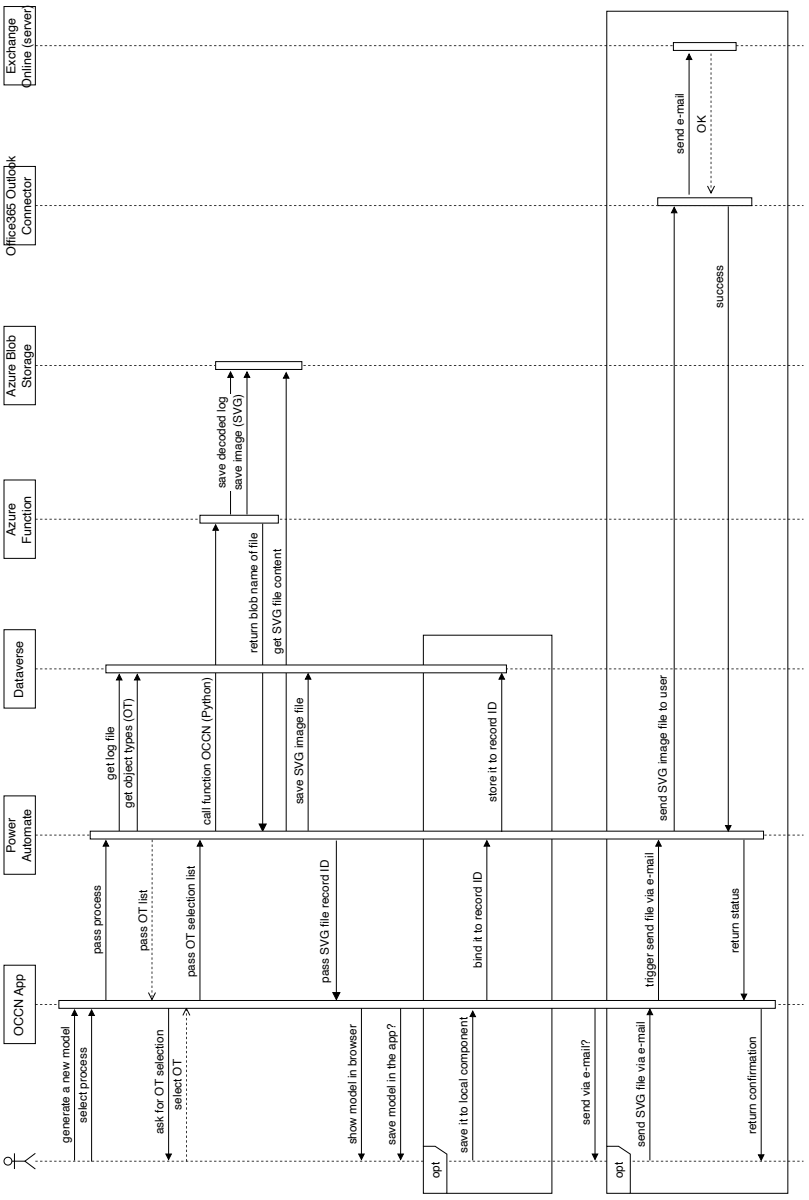

Figure 2: Framework architecture.

and saves the model image to a blob container. The output is stored as an SVG in Azure Blob Storage, secured through Azure Active Directory (Azure AD) with managed identity authentication. Access is restricted to accounts within the organization. Next, Power Automate retrieves the file name with a service account connector, gets its content, saves it in a Dataverse table, and passes its record ID to OCCN App for user visualization. Additionally, the user can save the model for future use in OCCN App “My Models" functionality and/or distribute it via e-mail using MS Outlook, through the Office 365 Outlook Connector and Exchange Online server.

5. Implementation and Evaluation

To validate our framework, a prototype of the solution was designed in Power Platform. The solution includes a Power Apps application, Power Automate flows to automate the necessary interactions among the solution components, tables in Dataverse to store the OCEL log files, an Azure function to run the OCCN discovery and visualization algorithms [8] in Python, and Azure Storage for temporary files.

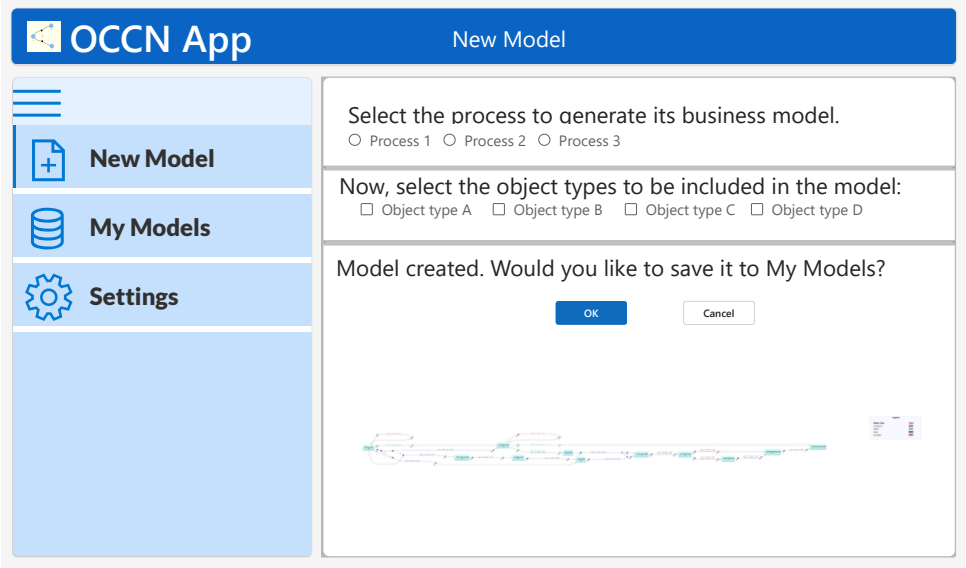

Figure 3: "New Model" screen - mockup.

Power Platform uses the authentication already in place in the organization environment, and according to its policies. For the user interface, the OCCN App is developed in Power Apps and published in the organization environment in two versions: desktop and mobile. OCCN App offers staff the complex object-centric process mining technique in an intuitive and simple way. Next, we detail the app.

OCCN App has four screens: "Welcome", "New Model", "My Models", and "Settings". The "Welcome" screen has a brief description of the app. "New Model" is the main screen (Figure 3), and it presents a list of the available processes to be modeled for user selection. It is possible to select only one process. After selecting the process, the user can select which object types should be included in the model. If the user does not select any object type, all object types will be included by default. After these selections, the app triggers Power Automate flows that orchestrate the model generation to return the file ID to OCCN App. Next, the app presents the process model with options to save it and send it by e-mail via MS Outlook. "My Models" has all models saved by the user, and "Settings" allows app configuration.

5.1. Evaluation

Process mining impacts organizations that undergo digital transformation in diverse spheres. Since it is a change driver, it triggers reflections and changes in different dimensions of the organization, such as its structures, culture, information systems, budget, policies, regulations, and sustainability, to name a few. To evaluate the framework that enables staff to discover and visualize OCCN models [8], the prototype of the solution in Power Platform was presented to specialists in the areas of business process modeling, innovation, strategic planning, and top management of a tax administration agency. The participants were selected for the interviews due to their professional experience and educational background. Two of them have a master's degree in business management, and others have education degrees in ICT. All of them have worked in the organization for more than five years. The participants' de-identified demographics are presented in Table 2.

In the interviews, after the presentation of the solution prototype in Power Platform and clarification about the OCCN models [8], the participants were asked to assess, in a scale from 1 to 10, the usefulness of the framework in the organization, presented in Figure 4, followed by open-ended questions about strengths and challenges regarding the implementation of the framework in the organization. The analysis resulted in three overarching themes: Strategic, Organizational, and Technological. The complete thematic map, with codes, categories, and themes, is presented in Section 6.

Table 2
Participants' Demographics

Participant	Gender	Age Range	Area
Interviewee1	male	30-39	Business Process Modeling
Interviewee2	male	30-39	Business Process Modeling
Interviewee3	female	50 and above	Business Process Modeling
Interviewee4	female	30-39	Innovation
Interviewee5	male	50 and above	Top Management
Interviewee6	male	40-49	Strategic Planning

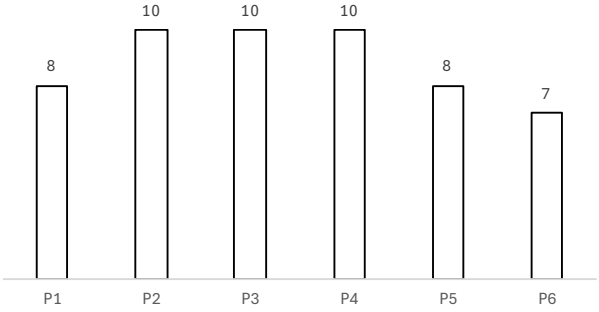

Figure 4: Framework Usefulness.

6. Discussion

Process mining aims at helping organizations improve their processes for value creation. Its role and the benefits it can bring depend on the organization and how individuals perceive it [1]. Digital transformation is seen as a cultural change [1], which is permeated by the organizational delimiting structures. Our findings show that three main themes are present in the interviews: Strategic, Technological, and Organizational. The focus of our participants' views was rather technological and organizational, in how to implement the framework face to delimiting aspects, than strategic. The cultural shift that object-centric process mining brings is still not clear to the interviewees, even at the top management level, which is understandable given its novelty to them, despite the increasing attention it receives in business process intelligence.

6.1. Strategic theme

We begin with the strategic aspects of the framework that proposes the adoption of object-centric Causal nets [8] in a facilitated way via Power Platform. Under the Strategic theme, categories regarding the framework features and their contribution to business value creation were present, as well as the strategic impact of the framework adoption in the agency, as presented in Figure 5.

The framework may positively impact the way process modeling is viewed in the organization and drive cultural change due to aspects like model objectivity. Since process mining generates models based on log events, it provides insights based on objective data to create value by allowing process redesign cross-functionally. Interviewee6 develops in Power Platform, has experience in strategic planning and an ICT background, while Interviewee4 has a master's degree in business management. Both highlight how the framework can help change the strategic vision:

"it is useful for the institution. We will use it [...] a framework that makes it much easier for us to model this process [...]" - Interviewee6

"I see it as a very useful tool [...]. So, when you were talking, I already understood the importance [...] I think people are resistant to valuing process mapping. Maybe this is the chance to break this barrier, this resistance that causes us harm. [...] Will this application use data or have some interface with the

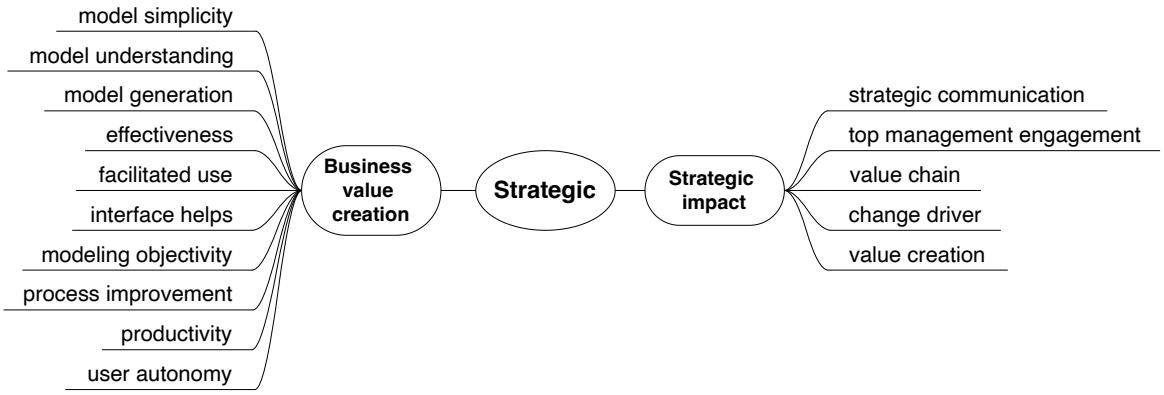

Figure 5: Codes, categories, and theme - Strategic

value chain? With the macro-processes? (Researcher: Yes, it will.) I think the idea is really interesting." - Interviewee4

To be effective, top management support is crucial to communicate the business value that the framework can create and train staff in understanding and interpreting OCCN models:

"The idea of the app itself is excellent. I don't see any weaknesses in it. It's there to add value. [...] you need a structure, like, outside of the application, so that you can reach people with this idea, explain better what it's for [...] and extract information that will be useful [...] so that it has the strength that I believe it needs to have." - Interviewee2

Also, the literature shows that staff tend to adopt user-friendly tools that improve their routine work [11]. Effectiveness, productivity, facilitated use, easy interface, modeling objectivity, process improvement, and user autonomy are characteristics related to business value creation that favor the framework adoption:

"I think it definitely deserves support. [...] making all areas converge so that the work can generate models that are ultimately useful, right? - Interviewee6

"[...] having a process mapped out in a very quick and simple way has value. You can see where the process has a bottleneck [...] today, when we talk about process mapping, at least what comes to my mind is, wow, we're going to have endless meetings [...] and in the end the result will be minimal." - Interviewee4

"[...] ease of use, right? That's fundamental. [...] You don't have to acquire any technical knowledge, especially about tools, [...] It's very intuitive." - Interviewee2

"[...] generating this model in a way that is, let's say, autonomous, right? [..] you won't need to keep asking someone else [...]" - Interviewee2

"[...] integrated and visual environment. And simplicity." - Interviewee5

"We are taking something that does not depend on the vision of one person or another person. It is the log and that's it [...] Comparable between the various processes. This problem (subjectivity) will be overcome." - Interviewee6

6.2. Technological theme

The Technological theme is related to the categories IT infrastructure, security, and log generation, as shown in Figure 6. Main concerns were related to the event log preparation for its use in the framework. Difficulties of integration with legacy systems, lack of data in manual processes, and data governance limitations were noted, which require strategic alignment beyond technology to be overcome and to realize organizational change:

"[...] a difficulty, which is not necessarily related to the Power Platform, but to how we set up our infrastructure in the institution. It's not impossible, but it's a barrier that needs to be overcome if you want to do some kind of direct integration." - Interviewee6

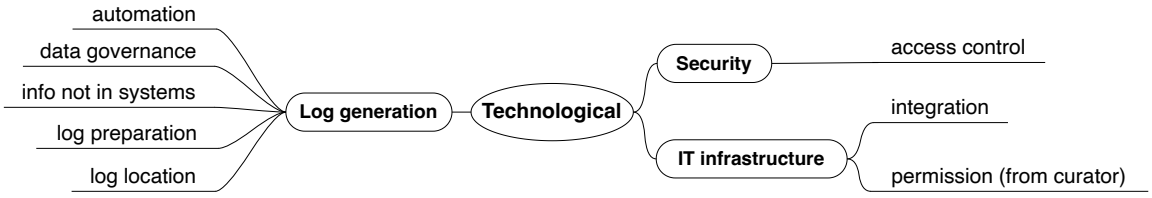

Figure 6: Codes, categories, and theme - Technological

"There are many things that are not registered in the system, right, and that my process needs [...] a good part of it is the person sending an email, returning an email. [...] There are logs that we do not have access to. It is not within our governance, it is outside the institution." - Interviewee3

"Would it be automatic, the log processing to generate the model? [...] I think a weak point is that you need this prior treatment of the log. It still generates a technical need outside the context" - Interviewee5

However, data extraction, transformation, and load (ETL) is needed whenever data mining and analytics is the focus. The OCCN algorithm allows the analysis of different perspectives of the process in the same model, such as the taxpayer, and the request, and may involve data from several systems. Once compliant with the OCEL event log structure to show event to object and object to object relationships, data could be extracted automatically. Also, some participants were concerned with overloading the log with irrelevant data and compromising model quality and simplicity. After clarification on log preparation to guarantee data quality and granularity, the OCCN models were deemed simple and understandable, even with many object types:

"The biggest difficulty I see is being able to use this at the appropriate granularity [...] If I look at the log, I'll say the user logged in. Then they accessed the menu. Then,[...]. This detail doesn't add much to the process mapping, does it?" - Interviewee3

"[...] since it will be taken from the source (the logs), it could bring a "whirlwind" of information, right? [...] But you have shown that you are on the right track, right? It seems to be going really well. [...] It is about finding a middle ground in relation to the level of complexity." - Interviewee1

"[...] I think it could end up being very complicated and confusing [...] [Researcher: Did you find this model very complex? (after clarification)] No, [...] Since the original version is already quite understandable, right? So, that's the most important thing." - Interviewee1

Security is a crucial aspect to guarantee that only authorized staff have permission to access data in system event logs, especially in public organizations. One of the benefits of using Power Platform to generate OCCN models via the OCCN App is that authentication is compliant with the policies in the organizational environment:

"I would just make an observation, right? Because we are concerned about the issue of security, right?" - Interviewee3

"Things in the Power platform integrate relatively smoothly. It also abstracts the entire authentication issue from the Power Platform. It makes it very easy to implement. So, this will be a huge advantage in terms of both the work of those who will implement this framework, as well as the security of those who will use it, because this is already within the Microsoft authentication umbrella." - Interviewee6

6.3. Organizational theme

The Organizational theme includes the organizational culture and the structures involved in the adoption of the framework, presented in Figure 7. Organizational structures need to converge for the use of the framework. To achieve this, change management and top management involvement are needed to guarantee that key players participate. Data curation by expert areas plays a central role to guarantee model quality, in defining and validating log data as well as the needed permissions. These areas have expertise in their processes as they dynamically evolve, which directly impacts data model quality too:

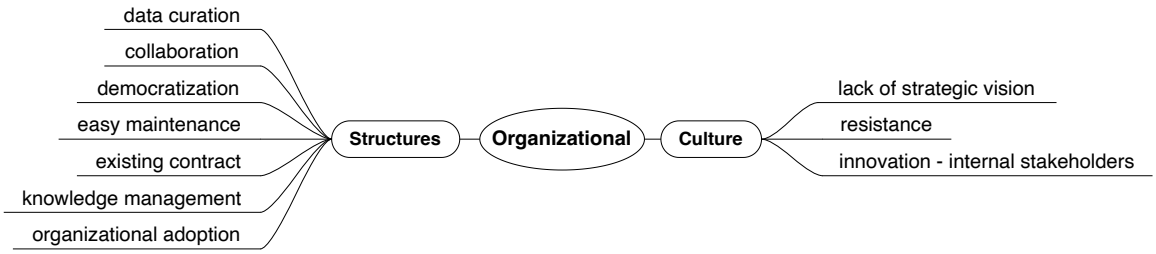

Figure 7: Codes, categories, and theme - Organizational

"Technologically speaking, that is still a little complicated within the institution. Not only in relation to development, but also permission for this to happen[...] from the responsible areas." - Interviewee6

"We are talking about a methodology that is very systems-centric, [...] in some cases, [...] the systems don't define the process. That's actually good. [...] processes change, [...], systems continue to generate the same logs." - Interviewee6

"We need the support of the areas that execute these processes. So that these logs are incorporated correctly within the framework and [...] have the curation they need, right? So that they are actually validated." - Interviewee6

Since the framework uses pre-processed logs and proposes a loosely coupled architecture with the OCCN App and the OCCN algorithms, it allows easy maintenance and integration. In terms of provider, the framework assumes contracts and licenses already in place in the organization:

"[...] It's our supplier, so we already have a contract with Microsoft, [...]. It won't add any cost to the contract we already have, I believe." - Interviewee6

Although the benefits associated with object-centric process mining are clear, dissemination and knowledge management can be challenging if staff lack technical skills. Democratization of access to new technology can be facilitated if low-code tools deal with its intricacies under the hood. Model objectivity, based on systems data, can foster collaboration among different areas of the organization and favor a digital-driven mindset in a practical way:

"[...] have a vision of the entire process [...] which areas you need to work with together [...] So we can have this tool that you only need one user to generate the model. - Interviewee4

"[...] ease of use, right? That's fundamental. [...] You don't have to acquire any technical knowledge, especially about tools, to be able to use it, right? It's very intuitive." - Interviewee2

"[...] generating this model in a way that is, let's say, autonomous, right? [..] you won't need to keep asking someone else [...]." - Interviewee2

"[...] integrated and visual environment. And simplicity." - Interviewee5

"I think the initiative is fantastic, [...] It's really about knowledge management. [...] using a knowledge base that's there, ready, right? And that's very little used. The log." - Interviewee3

Digital transformation involves deep changes in the organization [1] and its success depends on culture and structures. Projects that focus only on frontend services and overlook needed internal process changes can lead to failure [14]. Object-centric process mining enables organizations to view processes holistically for improvement. Our framework uses new technology to discover OCCN models [8] leveraged by Power Platform capabilities to assist public servants in improving business processes to create public value with innovation that focuses on redesign of internal processes:

"Here at the institution, we see a lot of innovation, but very much focused on the external public. And so, perhaps a few or to a lesser extent for the internal public. As this is for the internal public, I think it's really cool." - Interviewee1

"[...] I think it's a way to make everyone rethink how we define flow in our norms. How we define products and flows in systems, in solutions." - Interviewee2

7. Conclusion

Digital transformation involves deep changes, many of them related to culture and resistance. We propose a framework that aims to enable the use of OCCN discovery and visualization algorithms organization-wide by using Power Platform tools to integrate the new technology into business process analytics, for improvement and value creation. Since internal process redesign impacts the quality of public services, long-term improvement is expected that benefits internal and external stakeholders. Our findings show that its implementation involves challenges and opportunities in strategic, organizational, and technological dimensions.

Our research confirms the extant literature with empirical data regarding the relevance of top management involvement, data governance for integration, and internal process (re)design to overcome challenges and drive service improvement in the highly interdependent public sector ecosystem. However, this study focused on one use case, and its application could be assessed in other scenarios to ascertain its generalizability and scalability, relying on assumptions about Power Platform that may vary depending on contracts, licenses, and policies. In this vein, the architecture diagram can be simplified for diverse audiences. Also, the prototype used to demonstrate the framework can be refined based on user feedback. Future evaluation of the framework should focus on its impacts on performance through quantitative metrics, while user acceptance can be measured using the TAM model to help identify if the framework is effective in driving user-centered digital transformation.

Declaration on Generative AI

The authors have not employed any Generative AI tools.

References

[1] I. Mergel, N. Edelmann, N. Haug, Defining digital transformation: Results from expert interviews, Government Information Quarterly 36 (2019) 101385. doi:10.1016/j.giq.2019.06.002.

[2] T. O'Reilly, Government as a platform, Innovations: Technology, Governance, Globalization 6 (2011) 13–40. doi:10.1162/INOV_a_00056.

[3] European Commission: Directorate-General for Research and Innovation, Breque, M., De Nul, L. and Petridis, A., Industry 5.0 – Towards a sustainable, human-centric and resilient European industry, Publications Office of the European Union, Luxembourg, 2021. doi:10.2777/308407.

[4] W. M. P. Van Der Aalst, Object-centric process mining: Unraveling the fabric of real processes, Mathematics 11 (2023) 2691. doi:10.3390/math11122691.

[5] W. van der Aalst, Object-centric process mining: Dealing with divergence and convergence in event data, in: P. C. Ölveczky, G. Salaün (Eds.), Software engineering and formal methods. SEFM 2019, volume 11724 of *Lecture notes in Computer Science*, Springer, 2019. doi:10.1007/978-3-030-30446-1_1.

[6] W. M. Van Der Aalst, A. Berti, Discovering object-centric petri nets, Fundamenta Informaticae 175 (2020) 1–40. doi:10.3233/FI-2020-1946.

[7] A. Jalali, Object type clustering using markov directly-follow multigraph in object-centric process mining, IEEE Access 10 (2022) 126569–126579. doi:10.1109/ACCESS.2022.3226573.

[8] E. de Moura Figueiredo, A. Jalali, Discovering object-centric causal nets with edge-coarse-graining in process mining, in: Business Informatics Research. Proceedings of the 24th International Conference, BIR 2025, LNBIP, Springer, 2025. Accepted June 25th, 2025.

[9] L. Liss, C. Mensing, W. M. van der Aalst, Object-centric causal nets, in: International Conference on Advanced Information Systems Engineering, Springer, 2025, pp. 94–110. doi:10.1007/978-3-031-94571-7_6.

[10] E. de Moura Figueiredo, Discovering object-centric causal nets by merging causal nets from independent object type analyses, Master's thesis, Stockholm University, Stockholm, Sweden, 2024.
[11] M. Berndtsson, D. Forsberg, D. Stein, T. Svahn, Becoming a data-driven organisation, in: Proceedings of the 26th European Conference on Information Systems: Beyond Digitization - Facets of Socio-Technical Change, ECIS 2018, Association for Information Systems - AIS, Portsmouth, United Kingdom, 2018.
[12] Microsoft power platform documentation, 2025. URL: https://learn.microsoft.com/en-us/power-platform/.
[13] R. Vidgen, S. Shaw, D. B. Grant, Management challenges in creating value from business analytics, European Journal of Operational Research 261 (2017) 626–639. doi:10.1016/j.ejor.2017.02.023.
[14] A. F. V. Veenstra, B. Klievink, M. Janssen, Barriers and impediments to transformational government: Insights from literature and practice, Electronic Government, an International Journal 8 (2011) 226–241. doi:10.1504/EG.2011.039838.
[15] M. M. Gobble, Digital strategy and digital transformation, Research-Technology Management 61 (2018) 66–71. doi:10.1080/08956308.2018.1495969.
[16] R. M. Grant, Developing resources and capabilities, in: Contemporary Strategy Analysis, 7th ed., John Wiley & Sons, Chichester, UK, 2016, pp. 154–169. doi:10.3794/ijme.83.res.
[17] F. Graetz, M. Rimmer, A. Lawrence, A. Smith, Understanding change, in: Managing organisational change, 2. australasian ed., John Wiley & Sons Australia, Milton, Qld, 2006.
[18] N. Kano, Attractive quality and must-be quality, Journal of the Japanese Society for Quality Control 31 (1984) 147–156.
[19] W. M. P. van der Aalst, Process mining: Data science in action, 2nd ed., Springer Berlin, Heidelberg, 2016. doi:10.1007/978-3-662-49851-4.
[20] I. Bider, A. Jalali, Limiting variety by standardizing and controlling knowledge intensive processes, in: 2016 IEEE 20th International Enterprise Distributed Object Computing Workshop (EDOCW), IEEE, 2016, pp. 1–9. doi:10.1109/EDOCW.2016.7584366.
[21] S. Khayatbashi, V. Sjölind, A. Granåker, A. Jalali, AI-enhanced business process automation: A case study in the insurance domain using object-centric process mining, in: BPMDS, Springer, 2025, pp. 3–18. doi:10.1007/978-3-031-95397-2_1.
[22] S. Khayatbashi, N. Miri, A. Jalali, OLAP operations for object-centric process mining, in: International Conference on Advanced Information Systems Engineering, Springer, 2025, pp. 111–118. doi:10.1007/978-3-031-94590-8_14.
[23] S. Khayatbashi, N. Miri, A. Jalali, Advancing object-centric process mining with multi-dimensional data operations, arXiv preprint arXiv:2412.00393 (2024). doi:10.48550/arXiv.2412.00393.
[24] N. Miri, A. Jalali, Uncovering patterns in object-centric process mining: An approach using drill-down and roll-up techniques, in: International Conference on Information Integration and Web Intelligence, Springer, 2024, pp. 49–54. doi:10.1007/978-3-031-78093-6_4.
[25] A. Berti, W. M. P. Van Der Aalst, OC-PM: Analyzing object-centric event logs and process models, International Journal on Software Tools for Technology Transfer 25 (2023) 1–17. doi:10.1007/s10009-022-00668-w.
[26] A. Berti, S. Van Zelst, D. Schuster, PM4Py: A process mining library for python, Software Impacts 17 (2023) 100556. doi:10.1016/j.simpa.2023.100556.
[27] P. Johannesson, E. Perjons, An introduction to design science, Springer, Cham, 2014. doi:10.1007/978-3-319-10632-8.
[28] F. D. Davis, Perceived usefulness, perceived ease of use, and user acceptance of information technology, MIS Quarterly 13 (1989) 319–340. doi:10.2307/249008.
[29] A. Jalali, F. M. Maggi, H. A. Reijers, A hybrid approach for aspect-oriented business process modeling, Journal of Software: Evolution and process 30 (2018) e1931. doi:10.1002/smr.1931.
[30] A. Jalali, Weaving of aspects in business process management, Complex Systems Informatics and Modeling Quarterly (2018) 24–44. doi:10.7250/csimq.2018-15.02.

[31] A. Jalali, Evaluating user acceptance of knowledge-intensive business process modeling languages, Software and Systems Modeling 22 (2023) 1803–1826. doi:10.1007/s10270-023-01120-6.
[32] M. Denscombe, The good research guide: For small-scale social research projects, 5th. ed., Open University Press, Maidenhead, 2014.
[33] De-identification, 2017. URL: https://qdr.syr.edu/guidance/human-participants/deidentification.
[34] V. Braun, V. Clarke, Using thematic analysis in psychology, Qualitative Research in Psychology 3 (2006) 77–101. doi:10.1191/1478088706qp063oa.
[35] M. Henkel, E. Perjons, E. Sneiders, Business and IT architecture for the public sector: Problems, IT systems alternatives and selection guidelines, in: Information Technology Governance in Public Organizations, volume 38 of *Integrated Series in Information Systems*, Springer, Cham, 2017, pp. 157–175. doi:10.1007/978-3-319-58978-7_7.