Legal compliance wizards with BPMN*

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Abstract
The enactment of the GDPR, the AI Regulation, and the rules governing the data markets known as 'Common European Data Spaces' have introduced a new layer of legal obligations for IT companies in Europe. This paper introduces a web-based tool designed to help non-experts perform first-level compliance checks. By translating formal Business Process Model and Notation (BPMN) workflows into a user-friendly wizard, this tool enables IT engineers and decision-makers to intuitively assess their alignment with relevant regulations. We demonstrate its application with examples from the data spaces and copyright domains, offering visual diagrams and an online demonstrator to illustrate the method's potential.

Keywords
Compliance, AI Regulation, BPMN

1. Introduction

Legal compliance is the process of ensuring that a certain operation adheres to all applicable laws, regulations, and standards. Compliance encompasses a wide range of areas, including labor laws, environmental regulations, financial reporting, data privacy, and industry-specific rules. In particular, the emergence of regulated data markets in Europe (e.g., Common European Data Spaces) alongside the enactment of the AI Regulation has heightened the need for IT companies to comply with a very recent and specific set of legal requirements.

While large companies possess the expertise to navigate detailed compliance frameworks, many small and medium-sized enterprises (SMEs) lack the resources for constant legal consultation. This gap leaves business leaders in need of a tool that can provide a first-level understanding of whether their operations adhere to relevant legal standards. Whereas only legal departments can provide a thorough answer, supporting IT engineers and decision makers with any sort of tool –even if not precise or complete– might be of much interest.

This paper presents one such possible tool, a web-based application that transforms formal Business Process Model and Notation (BPMN) compliance verification processes into an intuitive wizard, enabling non-experts to perform preliminary legal checks with ease. Thus, the work presented in this paper describes a process and a software to quickly transform legal compliance-related workflows into actionable web wizards. Section 2 presents the background on wizards, BPMN and their use in the legal domain. Section 3 illustrates the idea with two examples in the data spaces and copyright domains including their corresponding diagrams. Section 4 presents the demonstrator design, which is publicly available online[1], and and whose pros and cons are discussed in Section 5.

2. Background

To the best of the knowledge of the authors, the idea of using BPMN to encode a legal compliance process and hence quickly implement a web wizard has not been much explored. In the past, modeling

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languages such as UML had been used to design websites [9], or even web-specific languages had been devised, such as the Web Modeling Language (WebML) [8]. In fact, one of these schemas had used BPML as well [6], but none of these were in a law-oriented domain nor were intended to create wizard-like webs. This section will describe first BPMN, then the use of web wizards for compliance, and finally relevant use cases of BPMN in the legal domain.

2.1. BPMN

Business Process Modeling Notation (BPMN) is a technical specification to visually model and standardize business processes for easy understanding and communication across stakeholders in a variety of fields. The official specification of the standard is maintained by the Object Management Group (OMG), and its latest version (2.02) was published about ten years ago.

One of such business processes can be, indeed, the verification of certain conditions in order to assess the legal compliance of a specific business operation. In general, using BPMN makes the execution of business workflows more effective and efficient[1]. With BPMN, the expert can specify in a diagram with precision the flow of operations, while its consumer can grasp the planned business process at a glance —BPMN is useful for both technical and non-technical sides, potentially avoiding any misunderstandings or misleading messages during the implementation of the business process.

Moreover, a precise XML serialization of BPMN diagram has been specified to detail the execution logic of the processes: BPEL (Business Process Execution Language). BPMN diagrams can be transformed into executable BPEL code to automate the processes modeled with BPMN, easing the technical development of service-oriented architectures (SOA) and autonomic computing[2]. BPEL is parseable and easy to execute with tools like Camunda Modeler [2] and bpmn.io[3]. Editing diagrams using these and other similar tools is easy and convenient even for non-experts, enabling the specification of interoperable processes that can drive the logic of other applications.

With the elements and symbols that the specification provides, BPMN can accommodate processes ranging from simple to complex. Some of the most relevant signs follow.

1. Flow objects: These include the most common elements within a diagram, including Events, Activities, and Gateways. They respectively represent what happens, the work being done, and the process flow based on conditions.
2. Connecting objects: These include Sequence Flows, Message Flows, and Associations. They respectively represent the order of activities, communication between different process participants, and the object links artifacts and data
3. Swimlanes: These include Pool and Lane to represent the participants in the process and the parts of the process for which they are responsible.
4. Artifacts: The purpose of Artifacts is to provide additional information to the process. These include data object, group and annotation.

2.2. Wizards for compliance

Wizard-like webpages are a common style in today's web design because they can easily guide users through complex processes on the site. Simply put, a wizard-like webpage is an interactive web interface that leads users through a series of steps in a linear fashion, making all operations easy to understand and execute, thereby increasing the completion rate. The key to designing a guided webpage is to provide clear instructions, progress feedback, and readability for the user, effectively enhancing the user experience. Moreover, the interactive features on the webpage are also key to making it easier for users to engage with the entire process.

One example of wizard to grant compliance, related to GPDR, is the TNO's PET Explorer[4]. This Privacy Enhancing Technology (PET) implements a decision tree that helps determining the need for a

[2]https://camunda.com/bpmn/
[3]https://bpmn.io/
[4]https://pet-explorer.sensorlab.tno.nl/decision-tree/

Type	Symbol	Usage
Event	 Start Event	The process begins with the user being presented with the initial session.
Event	 End Event	The final process involves returning the classification result based on the specific conditions of each user.
Activity	 Task	This represents the process in which users clarify their situations during an interaction session.
Gateway	 Exclusive	This is the point at which the user makes a decision; a distinct choice will lead to a different result.
Gateway	 Inclusive	This is the point at which the user makes a decision between more than two options; it can be used for text-input answers or multiple-choice questions.

Table 1
Symbols and their usage

Data Protection Impact Assessment (DPIA). The tool exemplifies the practical application of guiding users through a decision-making process, displaying the core principles of wizard-like design.

In a similar fashion, Golpayegani et al. (2023) [5] presented an application using semantic web technologies that helped users to assess whether their AI system is classified as high risk or not based on the Annex III of the EU AI Act.[5]. In this case, a single-page form provides users with several drop-down lists to fill in features of the AI system, including the domain, purpose, capability, user, and entity. These five concepts, mentioned in Annex III, are required for determining high-risk AI. After submitting the answers, the application analyzes the combination of the user's answers and returns the assessment result. The system is considered safe if it identifies the AI as "likely to be Not High-Risk." However, if the combination meets any risky condition listed, the application will flag it as high risk and indicate which part of Annex III mentions such a condition. Additionally, the tool provides a list of the answers as a summary of the users' choices. This feature is useful to allow users to review their answers and ensure the correctness of the assessment.

A third example of wizard for legal-compliance is the tool published by the UK's Information Commissioner's Office (ICO) to help SMEs in data protection compliance tasks[6]. This tool has the form of a structured checklist, where users first identify their role as either data controller or processor, then proceed to answer regulation-specific questions with four standardized options: 'Not yet,' 'Partially,' 'Successfully,' and 'Not applicable.' Each question includes guidance to aid understanding. Once completed, the tool aggregates responses to generate an overall compliance score and suggests actions to address any identified gaps.

Finally, the ValidaCripto RGPD[7] is another tool presented by the Spanish agency of data protection for validating cryptographic systems, which are designed to protect personal data during processing. The "Guidelines for the Validation of Cryptographic Systems in Data Protection" [8] document, based on GDPR requirements, provides a detailed description of the standards and procedures for effective encryption techniques. Most importantly, it evaluates various elements of the encryption system, including message space, key management, and encryption protocols, among others.

[5]https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A52021PC0206
[6]https://ico.org.uk/for-organisations/advice-for-small-organisations/checklists/data-protection-self-assessment/
[7]https://validacriptorgpd.aepd.es/
[8]https://www.aepd.es/guides/guidelines-validation-cryptographic-systems-data-protection-processing.pdf

All of these examples illustrate the usefulness of web tools but are created ad hoc for each of the problems, lacking a generic character.

2.3. Previous uses of BPMN in the legal domain

The use of BPMN to encode norms is not new. Palmirani and Governatori (2018) [3] demonstrated a use-case scenario related to the data protection aspects of an online academic platform that provided students and parents access to academic information and interaction with teachers. In particular, the safeguards contained in Art. 8 GDPR were considered "*Conditions applicable to child's consent in relation to information society services 1. Where point (a) of Article 6(1) applies, in relation to the offer of information society services directly to a child, the processing of the personal data of a child shall be lawful where the child is at least 16 years old. Where the child is below the age of 16 years, such processing shall be lawful only if and to the extent that consent is given or authorised by the holder of parental responsibility over the child. Member States may provide by law for a lower age for those purposes provided that such lower age is not below 13 years.*". Moreover, in order to access the platform, the student must agree to general service condition and provide the consent for the controller's processing of personal data (Art. 4 GDPR), including sensitive data (Art. 6 GDPR). In their study on modelling legal knowledge for GDPR compliance checking, Palmirani and Governatori (2018) illustrated the process in Figure 1.

In this case, Palmirani and Governatori first analysed the tasks throughout the entire process and indicated the related GDPR articles of each tasks. The whole process used four fundamental BPMN elements: the start event, which initiates the process; the end event, signifying the completion of the process; tasks, which represented the questions for the users (and could involve a decision-making process or a confirmation of certain information); and exclusive gateways, which helped decision-making by directing the process flow based on conditions.

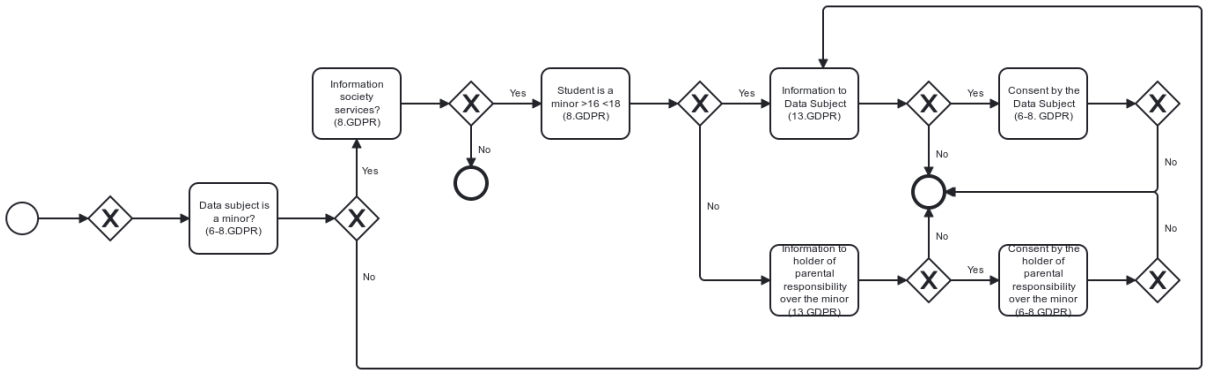

Figure 1: BPMN modelling of an eGovernment service (Palmirani & Governatori, 2018, p. 104)

S. Agostinelli et al. (2019) [4], also in a GDPR-compliance problem, focused on the obligations of the data controller, who need to adhere to a list of constraints to be compliant. These obligations included the reporting of a data breach, the retrieval of consent to use the data, the satisfaction of data subject requests (right to access and rectification, right of portability, right to withdraw consent, or the right to be forgotten). Figure 2 presents the process in BPMN as modelled by the authors –including steps such as the identification of the affected data subject, the notification to the National Authorities or the evaluation of whether data subjects needed to be informed or not.

Finally, Zorzanelli et al. presented more recently a work where Requests for Standardizing the Interpretation of Federal Laws in Brazil were analysed and the result encoded as BPMN [10], and Pullonen and Matulevicius [11] proposed a multilevel model as an extension to BPMN, allowing for the visualization, analysis, and communication of privacy-policy attributes within business processes [11].

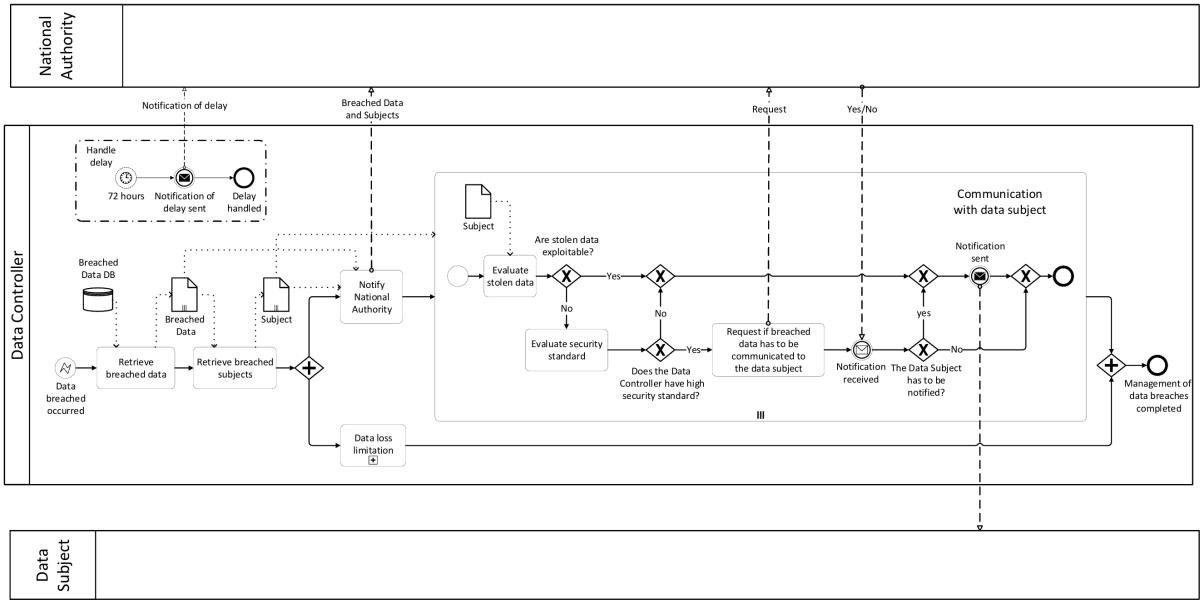

Figure 2: BPMN model for pattern Data Breach (S. Agostinelli et al, 2019)[4]

3. Scenarios

3.1. Copyright Scenario

Copyright is relevant in relation to both AI model training and data spaces. Very often an IT expert will wonder whether a certain piece of data is protected by copyright and can be shared. This means determining whether the work qualifies for copyright protection, and if it does, whether a license exists that permits the intended use. A very high number of elements have to be considered in order to give a reliable answer. Was the work original? Have exploitation rights expired? Does any copyright exception apply? Whereas tackling all of the possible angles is difficult, a workflow can be devised that considers some of the most important.

In this analysis, the following questions have been tackled, for they illustrate the usefulness of this paper while showing all the complexities.

1. *Is the work an intellectual creation?* A human (or group thereof) must be the author of an intellectual endeavour that conveys enough creativity. Legislation does not provide an exhaustive list, but some categories of creations are usually mentioned: literary, dramatic, musical, poetry, novels, movies, songs, computer software, and architecture. The first question consists of asking whether the work falls into one of these categories or similar.
2. *Is the work in the public domain?* There are different reasons for a work to fall into the public domain. For example, orphan works are in the public domain. Or works whose author died more than seventy years ago. Therefore, we might wonder whether the authors are still alive, or if 70 years have passed since the death of the author.
3. *Does a copyright exception apply?* Copyright exceptions or fair use conditions vary from legislation to legislation, but still, some situations are recurrently mentioned across them: education, quotation, parody, news reporting, research, private study, text & data mining or simply adapting a text for blind people (Marrakesh treaty). A three-step test is usually performed to determine if a copyright exception applies: the case must be specific (allowed only in certain cases), without conflict with normal exploitation, and without unreasonable harm to rightsholders.
4. *Has the copyright owner licensed the work for public use?* Since the use of licensed works varies depending on the nature of the license it possesses, this question verifies whether the work is licensed for public use or is limited by the restrictions of the license.

5. *Is your use covered by the license?* The type of license can determine how others may use the work. Therefore, it is essential to check if the intended use is authorized by the work's license.

When translating into BPMN, every question would correspond to a decision node, using arrows to represent the flow direction from one node to another. Each node would have two options, pointing to different directions respectively. This method represents the basic functionality of the website, where the users can guide themselves through the process by clicking on the answer buttons. In this case, all the questions have only two options, making the operation intuitive and simple –but not much different from a binary decision tree.

The BPEL excerpt in Listing 1 illustrates an example of the process, which includes starting the assessment, checking if the work is protected by copyright, determining if the copyright holder is still alive, and directing the flow towards different decisions based on the evaluation results. Each step is connected by sequence flows, which guide the process through decisions that ultimately determine whether the work can be used legally. Every element has its own unique ID, and outgoing/incoming IDs where applicable. These IDs enable the application to link all the steps and decisions for dynamic interaction on the website.

Listing 1: BPEL Excerpt

```
<bpmn:process id="Process_0o9fbrm" isExecutable="false">
    <bpmn:startEvent id="StartEvent_1dbwegp">
        <bpmn:documentation>Assessment for ensuring that the use of creations complies
            with copyright regulations.</bpmn:documentation>
        <bpmn:outgoing>Flow_1lrf5u7</bpmn:outgoing>
    </bpmn:startEvent>
    <bpmn:task id="Activity_1no874j" name="Is the work you intend to use one of these
        categories?">
        <bpmn:documentation><b>Categories: Literary, dramatic, musical, poetry, novels,
            movies, songs, computer software, and architecture.</b> Verify the category
            of the creation, only certain types of works are protected by copyright.</
            bpmn:documentation>
        <bpmn:outgoing>Flow_102ntjb</bpmn:outgoing>
    </bpmn:task>
    <bpmn:exclusiveGateway id="Gateway_05f3eis">
        <bpmn:outgoing>Flow_1jdk2p3</bpmn:outgoing>
        <bpmn:outgoing>Flow_1ihu1pe</bpmn:outgoing>
    </bpmn:exclusiveGateway>
    <bpmn:task id="Activity_0vsgn8x" name="Does the author still alive?">
        <bpmn:documentation><p>In EU countries, copyright protects an author's
            intellectual property until 70 years after their death or 70 years after the
             death of the last surviving author in the case of a work of joint
            authorship.</p><a href="https://europa.eu/youreurope/business/running-
            business/intellectual-property/copyright/index_en.htm#inline-nav-1" target="
            _blank">More info</a></bpmn:documentation>
        <bpmn:outgoing>Flow_143ponq</bpmn:outgoing>
    </bpmn:task>
    <bpmn:endEvent id="Event_0y3o764" name="Use it!">
        <bpmn:incoming>Flow_1jdk2p3</bpmn:incoming>
    </bpmn:endEvent>
</bpmn:process>
```

After uploading the BPEL to the website, the website converts the XML files into scenario option buttons. Figure 3 shows the a sample question for that scenario.

The text input allows for a free text to be provided, that is analysed. A NLP LLM-based classifier provides one answer from a set of possible categories, hence the use of a BPMN Inclusive Gateway. The BPMN diagram of the implemented workflow is displayed in Figure 4.

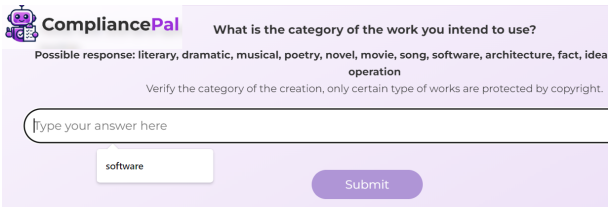

Figure 3: Sample question in the copyright scenario

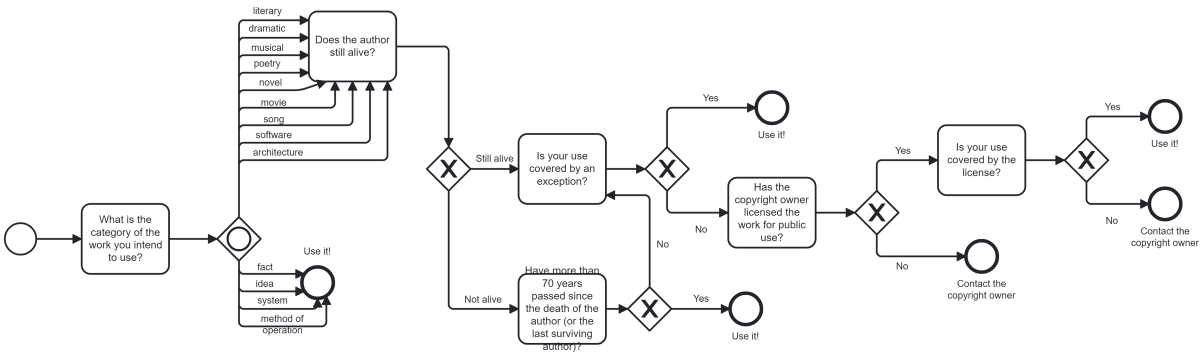

Figure 4: BPMN diagram for the copyright scenario

A text box is provided for entering the answer to this question. The system suggests potential answers in the description section under the question for error prevention purposes. The process design allows the user to enter the answer in either lower case or upper case, and subtle typos can also be processed. If the user's input does not match any potential answers included in the BPMN diagram, an error message "Please try again. No close match found for the input." will be returned, and the user can re-enter the answer. If a match is found between potential answers and the user's input, the process will move forward accordingly.

3.2. Data Spaces Scenario

This Data Spaces scenario aims to help non-legal experts conduct an initial assessment of whether their data is suitable to be shared in the Data Space. This process is divided into five levels: Initial Assessment, Proprietary Data Check, Data Usage Approval, Legal Compliance Check (Data Governance Act), and Compliance with the Data Act.

1. *Initial Assessment*. The first level is a preliminary check to ensure that the participation is related to accessing or manipulating data in the Data Space. If it is not involved, then it is not necessary to continue with the compliance-checking process ("Does your participation in the Data Space involve accessing or manipulating data").
2. *Proprietary Data Check*. The second level checks the propriety and confidentiality of the data. If the data is proprietary or confidential, it is required to assess whether the data is necessary for the decision according to Lawfulness of processing in GDPR Art. 6. If it is not, then the user should consider other data sources. ("Is the data considered proprietary or confidential?", "Is the data necessary for the decision?")
3. *Data Usage Approval*. The third level ensures the data usage complies with established policies. If data usage policies exist, the proposed usage method needs to be checked for compliance with these policies. If there are no policies, relevant authorization from stakeholders needs to be sought. This level corresponds with GDPR Art. 24 Responsibility of the controller, which requires that *"the controller shall implement appropriate technical and organisational measures to ensure and to be able to demonstrate that processing is performed in accordance with this Regulation."*: "Is

there a data usage policy in place for the Data Space?" or "Does the proposed usage align with the policy?"

4. *Legal Compliance Check (Data Governance Act).* To be consistent with the Data Governance Act, it is important to ensure the legitimacy of personal data processing. The fourth level checks whether the decision involves processing personal data. If personal data is involved, it is mandatory to obtain consent or have another legal basis for processing. If personal data is not involved, the user can proceed to the fifth level to check compliance with the Data Act. For example: "Does the decision involve processing personal data?" or "Has the necessary consent or any other legal basis been obtained for processing?"
5. *Compliance with Data Act*. The fifth level aims to examine whether the data sharing involves any transfer of personal data which are undergoing processing or are intended for processing after transfer to a third country or to an international organisation. If it does, then a lawful basis is required to comply with the Data Act. If a lawful basis does not exist, it is recommended to seek legal advice or alternative methods. "Does the data sharing in the data Space involve cross-border data transfers?" or "Is there a lawful basis for transferring data outside the EU/EEA?".

Figure 5 shows the BPMN diagram generated based on the five-level assessment for Data space data sharing.

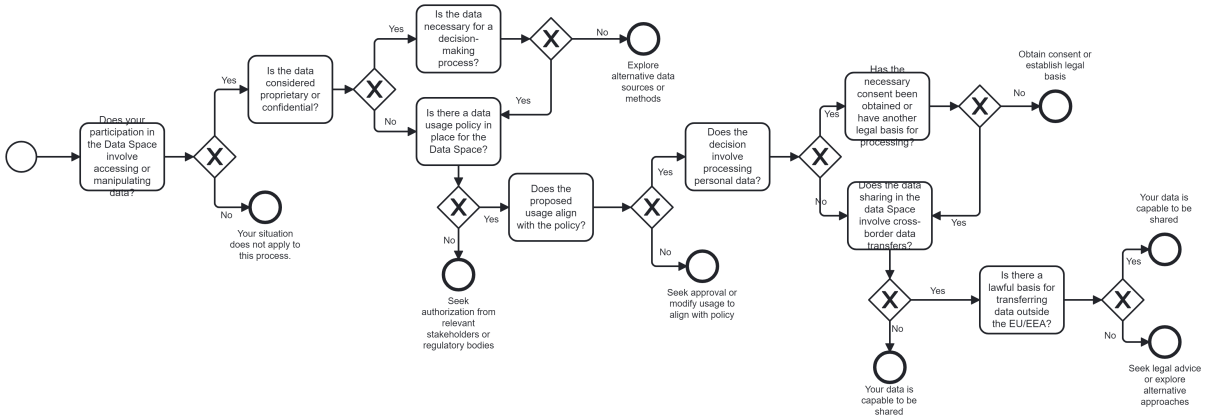

Figure 5: BPMN diagram of "Data Spaces" scenario

4. Application design

In order to demonstrate the idea of this work, a website application named "CompliancePal" was developed to assess data compliance with relevant EU regulations (TRL3). Data and software were openly licensed adhering to the FAIR principles.

In order to demonstrate the use of the tool, different sample processes were modeled and integrated into the wizard-like webpage. The tool achieved a complete process from XML document parsing to user interaction through collaboration between the front end and the back end. The front-end design allowed users to select the appropriate scenario from the buttons displayed on the page, and then presented the corresponding questions and options. The back end was responsible for providing BPEL files.

In this architecture, the user starts the process by selecting a scenario, which triggers a series of dynamically generated questions presented on the webpage. Each scenario corresponds to a BPEL file that structures the decision-making flow and ensures that the user's input is processed logically.

The XML parsing mechanism allows the front end to adapt to the user's input. Each element in the flow has a unique ID, which is used to locate the element and adjust the subsequent questions in real time, making it possible to change answers in the middle of the process. Each question provides the

user with relevant information to assist in making decisions if needed. This ensures that users can guide themselves through the process without requiring a professional legal background.

The back-end (a Flask application) provides BPEL files for display on the front-end. Since both ends are separated, new scenarios or modifications to existing processes can be integrated into the tool by updating or adding BPEL files to the designated folder without needing to modify the main source code.

The main requirements the application implement follow, which should be similar to any application of its kind:

1. The application must be able to read and parse BPEL file from a designated source.
2. The application should be able to dynamically generate and display questions based on the BPMN elements parsed from the BPEL file. These BPMN elements include Start Event, Task, Exclusive Gateway, Inclusive Gateway, and End Event.
3. The application should keep the decision-making process visible to the user; this enables the possibility of reviewing the process and ensuring the correctness of the assessment result.
4. The application must provide functions for users to change their answers, including the ability to remove or add subsequent questions based on these changes.
5. The application should be capable of handling text-input questions and adjusting the decision-making flow based on the text input content.
6. The application should allow users to download the XML file for the provided scenarios.

5. Conclusions

BPMN provides a visual process management framework for describing legal compliance verifications, also in the data and AI services. The most valuable results of this research are: (i) A novel method for transforming BPMN processes into web-based wizards; (ii) A practical, open-source tool that simplifies legal compliance tasks, highlighting the ease of adding new scenarios and (iii) an extensibility mechanism enables the tool to parse text input, demonstrating the possibility of incorporating complex evaluations.

This design has several advantages: (i) drawing the diagrams with tools like Camunda make the legal design quick and easy, therefore the solution can easily scale up; (ii) BPMN is a standard language, and the number of BPMN-literate users is high, ensuring a broad understanding among users, allowing them to grasp the whole intent of a legal provision from the mere representation of the process diagram; and (iii) the use of BPMN in the context of AI services or data-spaces related domains is a logical choice: in the International Data Spaces Association reference architecture model, the process layer already specifies interactions using BPMN (these operations being the onboarding, the data exchange and the data app publication and use)[7].

Among the disadvantages are the following: (i) the analysis condensed in a BPMN diagram is necessarily shallow and incomplete; (ii) web wizards can be routinely followed by users without the necessary reflection; and (iii) BPMN lacks specific constructs for the legal domain –an extension that includes the ability to represent rights and obligations natively, or incorporates Hohfeldian relations, would greatly improve precision.

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References

[1] Education, I. C. (2022, January 6). The Basics of Business Process Modeling and Notation (BPMN) - IBM blog. IBM Blog. https://www.ibm.com/blog/bpmn/

[2] Khalaf, R., Keller, A., & Leymann, F. (2006). Business processes for Web Services: Principles and applications. IBM Syst. J., 45, 425-446. https://doi.org/10.1147/sj.452.0425.
[3] Palmirani, M., & Governatori, G. (2018, December). Modelling Legal Knowledge for GDPR Compliance Checking. In JURIX (Vol. 313, pp. 101-110).
[4] Agostinelli, S., Maggi, F. M., Marrella, A., & Sapio, F. (2019). Achieving GDPR compliance of BPMN process models. In Information Systems Engineering in Responsible Information Systems: CAiSE Forum 2019, Rome, Italy, June 3–7, 2019, Proceedings 31 (pp. 10-22). Springer International Publishing.
[5] Golpayegani, D., Pandit, H. J., & Lewis, D. (2023, June). To Be High-Risk, or Not To Be—Semantic Specifications and Implications of the AI Act's High-Risk AI Applications and Harmonised Standards. In Proceedings of the 2023 ACM Conference on Fairness, Accountability, and Transparency (pp. 905-915).
[6] Cognini, R., Marani, M., Polzonetti, A., Re, B. (2016). webBPMN: A Language to Design Web Applications Regulated by Workflows. In: Rocha, Á., Correia, A., Adeli, H., Reis, L., Mendonça Teixeira, M. (eds) New Advances in Information Systems and Technologies. Advances in Intelligent Systems and Computing, vol 444. Springer, Cham. https://doi.org/10.1007/978-3-319-31232-3_54
[7] Boris O., et al. (2019) Reference Architecture Model, International Data Spaces Association
[8] Koch, N., Kraus, A. (2003) Towards a common metamodel for the development of web applications. In Lovelle, J., Rodrguez, B., Gayo, J., del Puerto Paule Ruiz, M., Aguilar, L., eds.: Web Engineering. Volume 2722 of Lecture Notes in Computer Science. Springer Berlin Heidelberg 497–506
[9] Ceri, S., Fraternali, P., Bongio, A. (2000) Web modeling language (webml): a modeling language for designing web sites. Computer Networks 33(1) pp 137–157
[10] Zorzanelli, M., Guizzardi, G., Almeida, J. (2022) On Capturing Legal Knowledge in Ontology and Process Models Combined. In Legal Knowledge and Information Systems, JURIX 2022, E. Francesconi et al. (Eds.) https://doi.org/10.3233/FAIA220478
[11] P. Pullonen, J. Tom, R. Matulevicius, and A. Toots (2019) Privacy-enhanced BPMN: Enabling data privacy analysis in business processes models, Software and Systems Modeling, pp. 1–30.