Guidelines for the semi-structured interview

1. Introduction

1.1. Hello <INTERVIEWEE>, thank you for agreeing to participate in this study.

*1.1.1. My name is <INTERVIEWER 1> (and this is <INTERVIEWER 2>). I will be the one conducting this interview, (while <INTERVIEWER 2> will act as an observer and advise me in the background if I missed anything.) First, I'll provide you with some **general information** on the process of this session.*

*1.1.2. The interview will take up to **60 minutes**, and please feel free to ask for a **break** at any time. You also have **the right to end the interview** at any time without the need to give any reason.*

*1.1.3. We will **record the session** to be able to transcribe and analyse the interview. The recordings will be **deleted** immediately after the transcript is generated. We will then **remove all personal identifiers**, such as your name or company name, within the transcript. You will have **two weeks to review** the transcript and request any changes or withdraw your data.*

*1.1.4. The analysed data will be **published in an anonymised** form only, and we are happy **to provide you with the publication**s. The raw data, such as the interview transcripts, will not be published, but they will **be stored indefinitely** to guarantee reproducible research.*

*1.1.5. Do you have any **questions** about the data policies?*

*1.1.6. So, now let me explain to you the **purpose** of this study.*

*1.1.6.1. In our research, we are looking at the **compliance checking** processes of buildings and how those processes can be **automated**. One option for automating compliance checks is **implementing** regulatory requirements directly in a **software system**, which can access the relevant data from the proposed **building design and evaluate the conformity** to the requirement. Since this process **hides the implementation details** of the legal requirement, we are looking at **alternative ways to make regulatory requirements understandable for computers**. This can be done by converting the regulatory requirements into a **formal language**, such as **logical or semantic representations** (semantics refers to the meaning of language, i.e., it's a structured meaning representation).*

*1.1.6.2. With this study, we would like to understand **who** should create such a **formal representation** of legal requirements and **how** this could be done. Therefore, we are interested in **how the regulatory requirements are authored**, what is a **regulator's perspective on such formal languages**, and if there might be possibilities in **drafting** regulatory requirements **in such a formal language** or creating the **formal language in parallel**.*

*1.1.6.3. Therefore, the interview will consist of **three main parts**. First, we will ask some **general** questions on how regulatory requirements are **authored**. Second, we would like to get your **perspective**, as an expert in drafting legal requirements, **on such formal representations of regulatory** requirements. In this second part, we will **show you some exemplary** representations of regulatory requirements, and we'd like to know how well the **representation captures the regulatory requirement**. Finally,*

*we'd like to get your opinion **on if and how such formal requirements could be created** best.*

1.2. Do you **have any questions** before we start the interview?

1.3. I will now start the recording.

1.4. [START RECORDING]

2. Warm-up questions

2.1. **How long** have you worked as a regulator or helped developing regulations?

2.2. What **training or education** is required to become a regulator?

2.2.1. What was your pathway to becoming a regulator?

2.3. What **types of regulations** are you working with?

2.4. What are your **exact tasks** related to regulations?

3. Understanding the rule authoring workflow

3.1. **Why or when** are existing provisions **amended** or **new** ones published? What are common triggers?

3.2. What are the **major processes/steps** (from initial draft to publication) in authoring new regulations?

3.2.1. **Who** is involved in those processes?

3.2.2. How are they **informed**?

3.2.3. What **tools** are used? Microsoft Word?

3.2.4. How are the regulations **published**, and how are they **stored internally** (e.g., PDF, HTML, ISO-STS)?

3.3. How is **amending** a regulation **different** to authoring a **new** regulation?

3.3.1. Are there **restrictions for amendments**?

3.3.2. [OPTIONAL] Can you rewrite existing clauses completely?

3.4. How is the **quality** ensured? How do you avoid **ambiguities and conflicting** requirements?

3.5. Is there specific **legal or domain terminology** to be used (e.g., controlled vocabularies or classification systems)? If yes, please give examples.

3.6. To what extent do you consider **if and how** the requirements will be **evaluated in practice**?

3.6.1. Do architects typically provide the information asked for? E.g., in **BIM**.

3.6.2. Could the requirements evaluated **automatically**?

3.7. Do you have any **questions**, or do you want to add anything related to the rule authoring workflow?

4. The understanding of formal representations

4.1. What is **your understanding** of formal representations of building regulations?

*4.2. [**SHOW EXAMPLE**] This is an example of a **business process requirement** in a semantic representation called **LegalRuleML**. This is an **XML**-based format that was developed to **encode legal requirements**.*

*4.2.1. It allows one to differentiate between **prescriptive and constitutive statements**.*

*4.2.2. The **paraphrase** tag contains an alternative wording of the provision.*

*4.2.3. With hasStrength the **defeasibility** of the rule can be specified. That means if it is a strict requirement, which always needs to hold, or if there can be exceptions to the requirement that would defeat it.*

***4.2.4.** Next, the **logic** of the requirement is encoded as an **if-then** rule. If the **conditions** are **met**, then the **conclusion must/may/must not hold**. In the*

*example, that would be **if** there is a **complaint** and **no resolution** and an **external dispute resolution, then** the **service must not be terminated.***

```
<lrml:PrescriptiveStatement key="ps_tcpc_8_1_1_a_x_E">
  <ruleml:Rule key="tcpc_8_1_1_a_x_E">
    <lrml:Paraphrase>The supplier must implement, operate and comply with a
      Complaint handling process that is transparent, including E. prohibiting
      a Supplier from canceling a Consumer's Telecommunications Service only
      because, being unable to Resolve a Complaint with their Supplier, that
      Consumer pursued their options for external dispute resolution.
    </lrml:Paraphrase>
    <lrml:hasStrength>
      <lrml:DefeasibleStrength
        iri="http://spin.nicta.com.au/spindle/ruleStrength#defeasible"/>
    </lrml:hasStrength>
    <ruleml:if>
      <ruleml:And>
        <ruleml:Neg>
          <ruleml:Atom>
            <ruleml:Rel>resolution</ruleml:Rel>
          </ruleml:Atom>
        </ruleml:Neg>
        <ruleml:Atom>
          <ruleml:Rel>complaint</ruleml:Rel>
        </ruleml:Atom>
        <ruleml:Atom>
          <ruleml:Rel>external dispute resolution</ruleml:Rel>
        </ruleml:Atom>
      </ruleml:And>
    </ruleml:if>
    <ruleml:then>
      <lrml:Obligation iri="http://test.org/deontic#OM">
        <ruleml:Neg>
          <ruleml:Atom>
            <ruleml:Rel>terminate Service</ruleml:Rel>
          </ruleml:Atom>
        </ruleml:Neg>
      </lrml:Obligation>
    </ruleml:then>
  </ruleml:Rule>
</lrml:PrescriptiveStatement>
```

Governatori et al. (2016)

4.3. Are you already conducting any **steps towards formal representations**?

4.3.1. **Organisation** of codes and standards.

4.3.2. **Semantics** of requirements.

*4.4. We will now show you multiple examples of formal representations and ask for your opinion on the **readability** and **understandability** of these representations. We will then ask about **how well** the representation **captures the meaning** of the original regulation.*

4.4.1. The first is an example from Korea (Lee et al., 2016), where the requirement is captured in a domain-specific language with a syntax close to a programming language.

```
Check (BA_64_1) {
IF (getBuildingStoriesCount () >= 6
    AND getGrossFloorArea () >= 2000)
        THEN isExist (Elevator) = TRUE
ENDIF
}
```

The corresponding provision *is the following:*

> *[Enforcement Decree of Building Act, article 64]*
> *A project owner of a building with six or more floors and a total floor area of 2,000 square meters or more shall have an elevator installed therein.*

4.4.1.1. **How understandable** is this representation? What is your first impression?

4.4.1.2. How well does the formal representation **reflect the intended meaning** of the regulation?

4.4.1.2.1. Is there any **information that should be included/removed/abstracted** in a formal representation?

*4.4.2. The second formal representation is a **tabular format**, which was intended to be **human-readable and writable**, and used potentially used for drafting in this representation.*

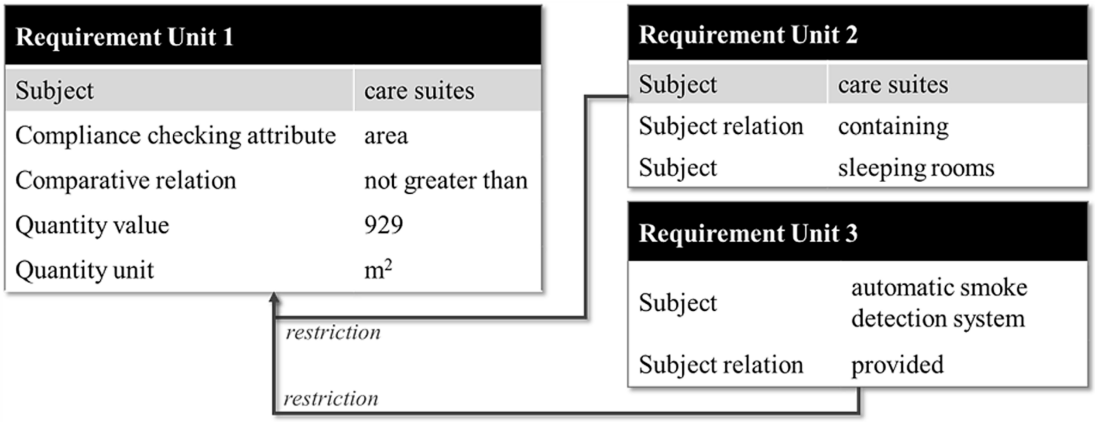

Illustration from Zhang and El-Gohary (2022)

The corresponding regulatory statement is the following:

> *Care suites containing sleeping rooms shall be not greater than 929 m^2 in area where an automatic smoke detection system is provided.*

4.4.2.1. **How understandable** is this representation? What is your first impression?

4.4.2.2. How well does the formal representation reflect the intended meaning of the regulation?

4.4.2.2.1. Is there any **information that should be included/removed/abstracted** in a formal representation?

4.5. Please **reflect** on the previously seen examples.

4.5.1. Which of the representations would you **prefer**?

4.5.2. What are the **differences and similarities**?

4.5.3. What are the **most important aspects to be encoded** in a formal representation?

4.6. Do you have any **questions or comments** about the examples?

5. The potential of authoring regulations as formal representations

5.1. Do you see **benefits** in creating formal representation concurrently with the human-interpretable form?

5.2. Do you see yourself **capable** of creating a formal representation in parallel with the natural language text?

5.2.1. What **skills or teams** would you require to do this task?

5.2.2. What **tool support** would be required to make the process feasible?

5.2.2.1. What might be a feasible **workflow** to create formal representations for existing regulations?

5.2.2.2. **Who** should be responsible?

5.3. Would you rather **draft** regulatory requirements **in a natural language** and create the formal representation in **parallel**, or **draft in the formal representation** and **generate** the natural language representation?

5.4. How would you deal with **formalising existing regulations** that are ambiguous or subjective?

5.4.1. If existing regulations are subjective or ambiguous, would it be better to change the regulations or resolve the ambiguities in the formal representation and certify them as equivalent?

6. Wrap up

6.1. **Thank you** so much for your time. Is there **anything** you would like **to add**?

6.2. **Who else** should we talk to? – Would you be willing to forward the invitation mail to them?

6.3. Perfect, thank you again for your participation. It was a very pleasant and informative conversation. We will get back to you once we have produced the transcript of the interview. (Once we've analysed the interviews and written down the results, we will send you the resulting documentation.)

References

- Governatori, G., Hashmi, M., Lam, H. P., Villata, S., & Palmirani, M. (2016). Semantic business process regulatory compliance checking using LegalRuleML. In *European Knowledge Acquisition Workshop* (pp. 746-761). Cham: Springer International Publishing.
- Lee, H., Lee, J. K., Park, S., and Kim, I. (2016). Translating building legislation into a computer-executable format for evaluating building permit requirements. Automation in Construction, 71:49–61.
- Zhang, R. and El-Gohary, N. (2022). Natural language generation and deep learning for intelligent building codes. Advanced Engineering Informatics, 52:101557.