Ontology-based Questionnaires

Legends:

* **Requirement category** – The corresponding requirement category within Dimension 1 of the RE4AI ontology. Questions that did not correspond to a specific category but encompassed broader aspects spanning multiple categories were categorized as "general."
* **RE stage** – The corresponding requirement stages within Dimension 2 of the RE4AI ontology. Questions which correspond to whole stages are labeled "Full".
* **Stakeholders' roles** – The corresponding requirement stages within Dimension 3 of the RE4AI ontology. This column specifies the stakeholders to whom the survey question is intended to be directed. Questions which correspond to multiple stakeholders are labeled "Multiple".
* **Question** – States the question(s) to be asked. Rephrased or new questions added in response to experts' validation are highlighted in Table 2 with a bracket - 'EV'.

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| SQ # | Requirement category | RE stages | Stakeholders' roles | Question |
| 1 | General | Elicitation | Customer | 1.1 – (EV-rephrased) What was the business need or motivation that caused the initiation of the AI-driven project?  1.2 – What are the factors that influence the decision to use AI over conventional methods? |
| 2 | General | Full | Multiple | 2.1 – (EV-rephrased) What are the effective methods, procedures and tools for developing and managing the complete requirements for AI-powered systems? |
| 3 | General | Full | Multiple | 3.1 – What are the roles and responsibilities of different stakeholders in the process of developing requirements of AI systems, both functional, quality, performance and design?  3.2 – (EV-rephrased) How can we ensure and encourage their effective participation and collaboration, ensuring that their feedback is properly considered and integrated? |
| 4 | General | Analysis | Multiple | 4 - How can we assess the readiness and suitability of AI solutions for specific tasks and contexts? |
| 5 | General | Validation | Multiple | 5 - What are the tools and techniques that can be used for verifying and validating the requirements of AI systems? |
| 6 | General | Management | Multiple | 6 - (EV-rephrased) What are the primary causes of requirement changes in AI-powered systems, and what are the best practices for managing these changes? |
| 7 | Contradictions and trade-offs | Analysis, specification | Multiple | 7.1 – (EV-rephrased) What are the interdependencies and contradictions between different requirements categories?  7.2 – What are the common trade-offs that need to be handled?  7.3 – How are they prioritized, balanced, resolved and managed? |
| 8 | Model | Full | Developers, AI experts, data scientists. | 8.1 – What challenges and best practices should be considered when selecting the most suitable AI model?  8.2 – (EV-rephrased) What is the projected evolution of the model, and how can this evolution be managed?  8.3 - How can we verify that AI model deviations or failures of the system are properly detected and addressed? |
| 9 | Data | Full | Multiple | 9.1 – (EV-rephrased) What are the most critical data qualities?  9.2 - What data preparation steps are necessary for the successful implementation of AI capabilities?  9.3 - What are the requirements for measuring and evaluating data quality and data drifts along the system life-cycle?  9.4 – (EV-rephrased) What data and model requirements are necessary to prevent biases that could affect the system's fairness?  9.5 – (EV-new) How does noisy data impact system performance, and what strategies can be implemented to mitigate its effects?  9.6 - What are the requirements for designing and implementing the data governance and management system for AI systems? |
| 10 | Data | Full | Data scientists, data engineers, AI experts | 10.1 – What are the roles and responsibilities of data personnel in the requirement development process for AI systems?  10.2 – (EV-rephrased) How data scientists are involved in the agile project development? |
| 11 | Performance | Elicitation, specification, validation | RE and system engineers, customers, users, AI experts | 11.1 – (EV-rephrased) What methods and techniques are used to define performance metrics and key performance indicators (KPIs) in the project's initial phase, and how is success criteria determined?  11.2 – How do stakeholders overcome the challenge of defining performance expectations without the ability to observe the performance until the conclusion of the training period?  11.3 - What are the most effective methods and tools for validating the performances?  11.4 - In what stages along the system lifecycle do you validate the performances? |
| 12 | Explainability | Elicitation, analysis, specification | Users, AI experts, domain experts, ethical and safety experts, regulators | 12.1 - How do you define the level of explanation required for different stake-holders based on their roles?  12.2 – (EV-new) What are the requisite levels of explainability for diverse stakeholders, particularly users and developers?  12.3 What methods are used for explainability?  12.4 – (EV-rephrased) How does the need for explainability impact the selection of models and the decision to opt for traditional methods?  12.5 - Could the explainability requirement issue be a "show stopper" for the decision not to use AI for a specific task? |
| 13 | Ethics | Analysis, validation, management | System engineers, ethical experts, AI experts, ethical experts, developers | 13.1 – How can we ensure that ethical considerations are effectively integrated into the development and deployment of AI systems?  13.2 – How can we ensure that ethical requirements are managed along the system life-cycle?  13.3 - How can we measure and validate the fairness of AI systems?  13.4 – How can we hold the system responsible for any violations of ethics? |
| 14 | Trust | Elicitation, validation | Users, domain experts, ethical experts | 14.1 – What are the key factors that contribute to user trust in AI systems?  14.2 – How do these factors vary across different contexts and applications?  14.3 - What are the best practices for evaluating and measuring user trust in AI systems? |
| 15 | Privacy | Elicitation, specification | AI experts, data scientists, data engineers, designers, security experts, ethical experts | 15.1 - How can existing privacy frameworks and regulations, such as GDPR, be adapted and extended to effectively govern the use of AI systems and protect privacy?  15.2 - (EV-new) What is the impact of including privacy requirements on system design and performance? |
| 16 | Trainability | Specification, validation | AI experts, data scientists, architects and designers | 16.1 - What are the factors that should be considered when defining the frequency of retraining an AI-powered systems?  16.2 - How can we effectively design, measure, and evaluate the trainability of AI systems to ensure optimal performance? |
| 17 | Human-system interaction | Elicitation, analysis | Users, ethical experts, safety experts, regulators | 17 - (EV-new) What is the anticipated level of human involvement in the system? |
| 18 | Security | Analysis, specification | AI-experts, cyber security experts | 17 - (EV-new) What vulnerabilities arise from using AI models? |