

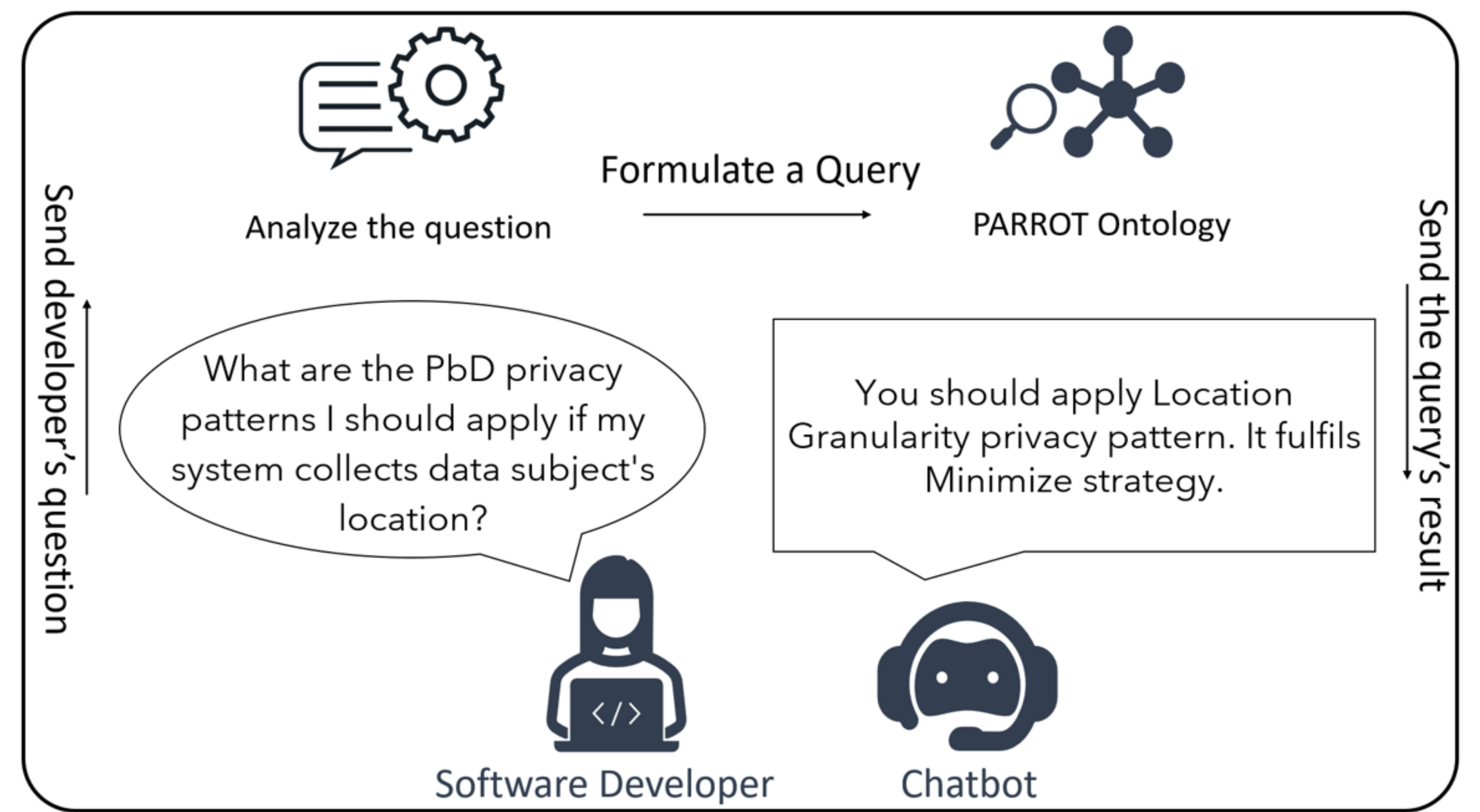
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## Motivation

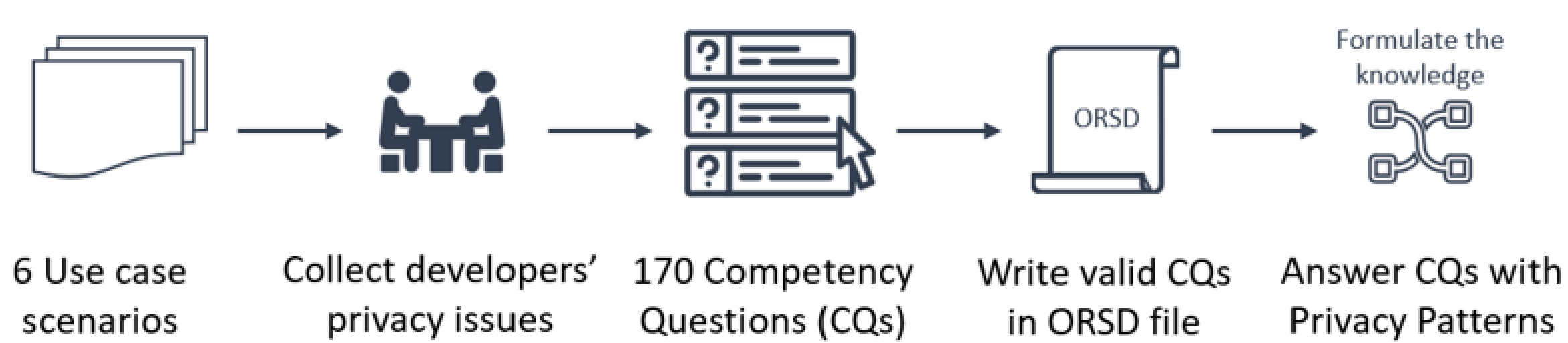
### Research Questions:

- What are the common PbD questions that software engineers have when designing an IoT application?
- What information need to be modeled in a privacy knowledge ontology to answer these questions?
- How much proportion of software developers' questions can a chatbot that is enhanced with the ontology answer?



## Gathering Information Needs

The ontology was assessed within a user study with software engineers. The ontology was assessed.



## Analysis

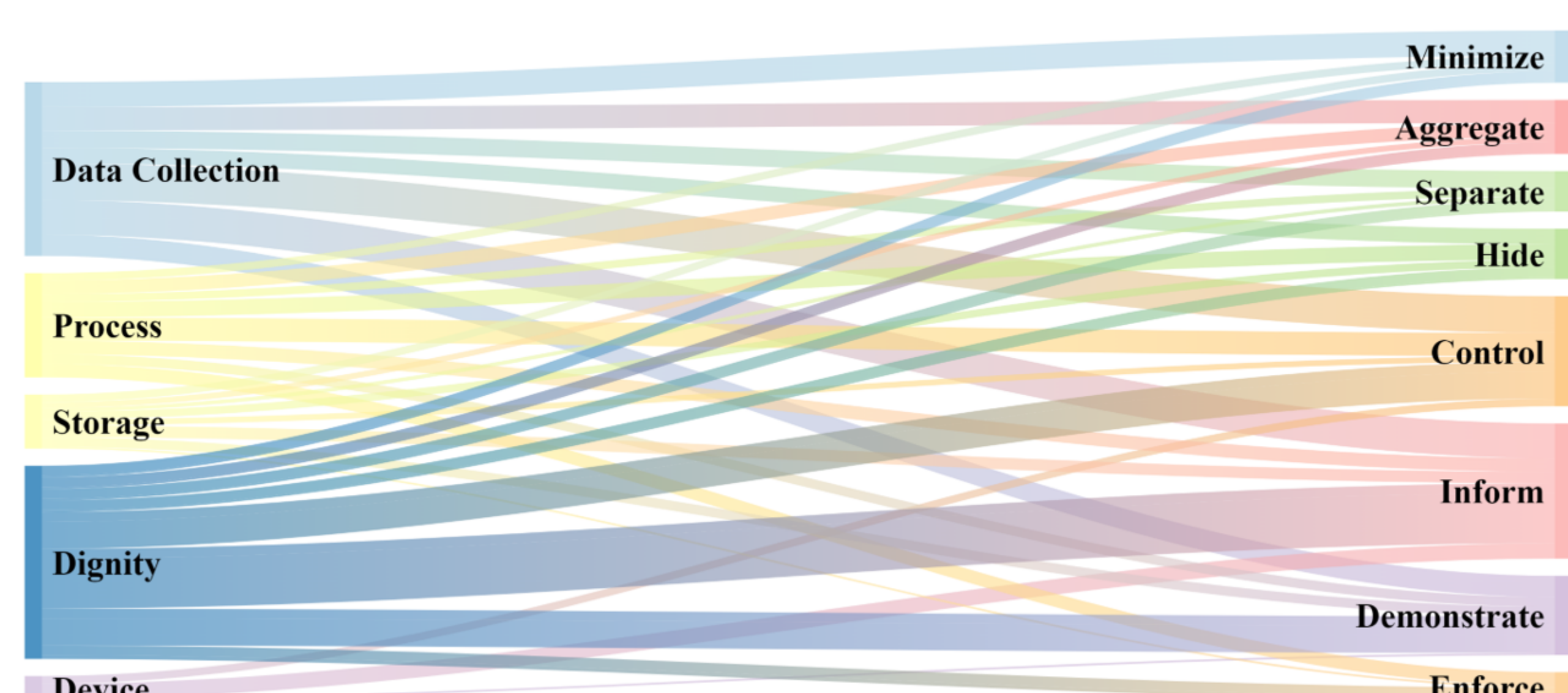
### Competency Questions Categories

The qualitative analysis of the competency questions showed different types and sub-types of based on the concerns raised in the questions.

Type	Sub-Type	Example
Data Collection	Location	What PbD patterns should I apply if my system stores a user's food intake information?
	Personal Information	
	Routine Photo	
Device	Mobile Phone	What are the standard measures for a microphone to protect the data subject's privacy?
	Camera	
	Microphone	
	Reading Sensor	
	Share	
Process	Access	Who should have access to the CCTV cameras?
	Third-Party	
	Route Profile	
Storage	Cloud	Can the information be saved in the cloud?
	Local	
Dignity	Advantage	Should the data subject turn it the functions on and off?
	Agreement	
	Notify Control	

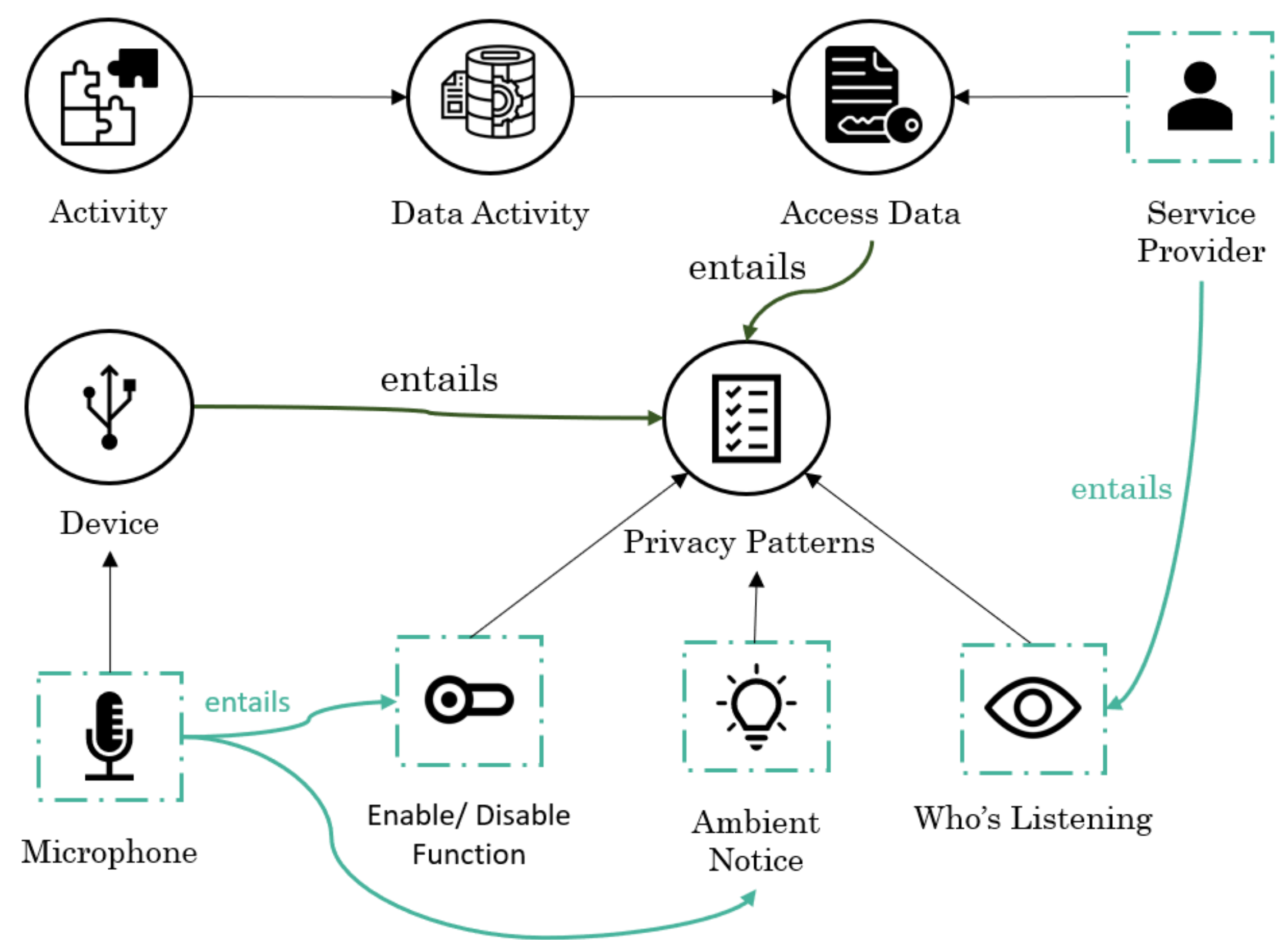
### Handling Privacy Issues

The Sankey diagram shows a symbol of how to deal with the privacy issues types.



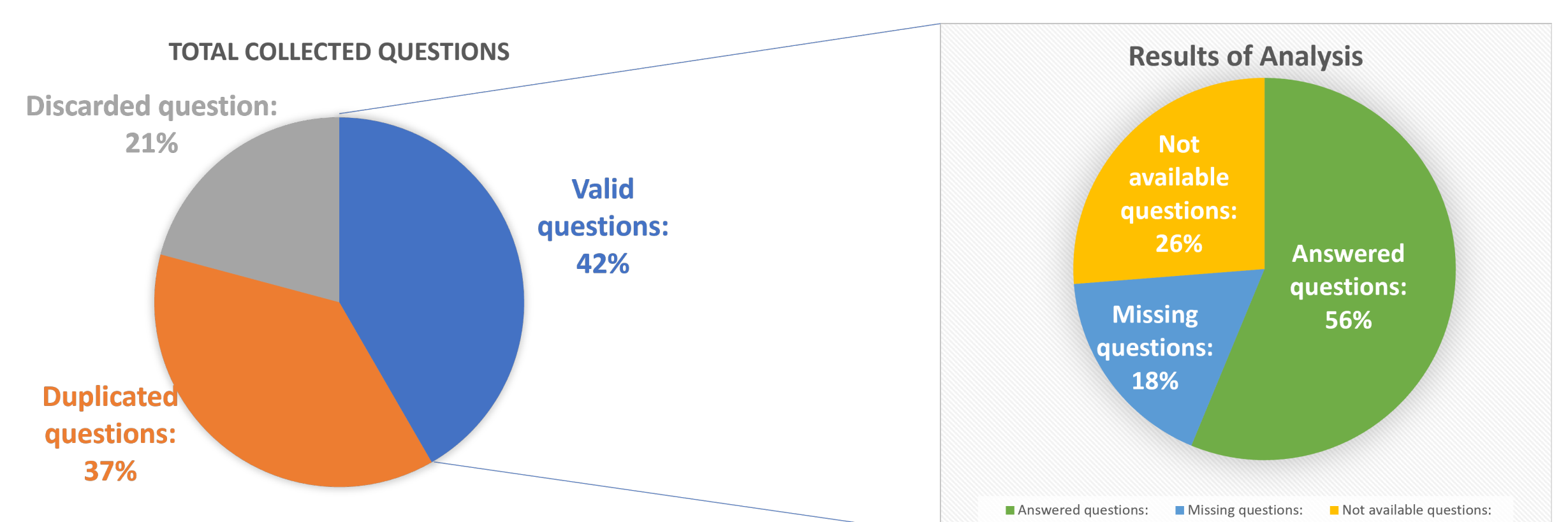
## PARROT Ontology

Examples of data modelled in the PARROT ontology.



## Evaluation Results

The ontology was assessed within a user study with software engineers.



## References

- [1] Lamya Alkhariji, Nada Alhirabi, Mansour Naser Alraja, Mahmoud Barhamgi, Omer Rana, and Charith Perera. Synthesising privacy by design knowledge towards explainable internet of things application designing in healthcare. arXiv, 2020.
- [2] Nils Dahlbäck, Arne Jönsson, and Lars Ahrenberg. Wizard of oz studies-why and how. International Conference on Intelligent User Interfaces, Proceedings IUI, Part F127502:193-200, 1993.
- [3] Claude E. Shannon. A mathematical theory of communication. The Bell System Technical Journal, 27(3):379-423, 1948.