A Hybrid Agent Architecture for Inquiry at the Dutch National Police

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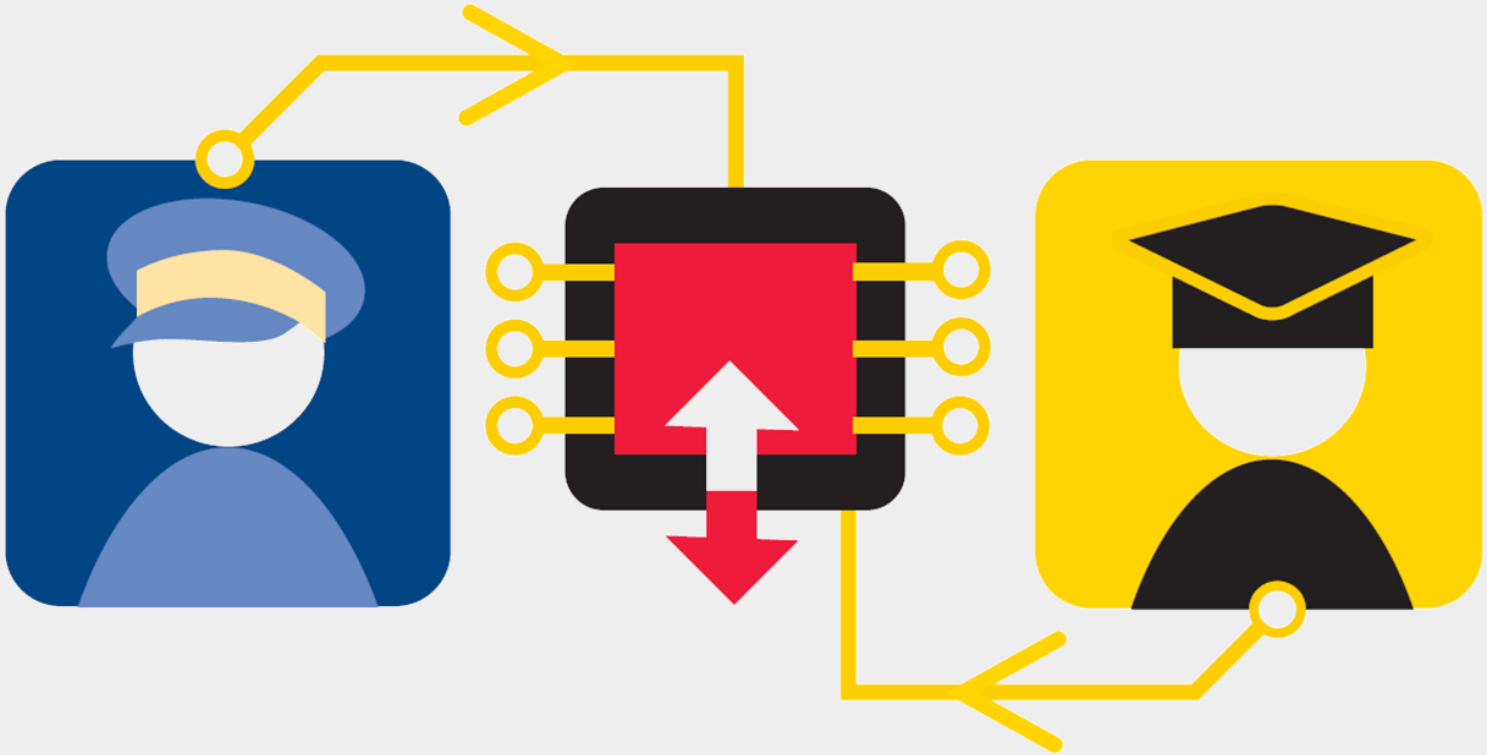


Dialogue Systems & Inquiry

- **Dialogue system**: communication between agents
- **Inquiry**: discussion in order to find the status of a claim *in collaboration with* other agent

Example Application

- Intake agent for **handling complaints**
- **Trade fraud**
  - Article 326 of Dutch Criminal Code
  - 40.000 complaints/year
  - Free-text in online form
- **Topic**: is the complainant a victim of trade fraud?
- Intake agent's tasks:
  - **Decide** on topic, based on complaint text
  - If not enough information: **ask questions**

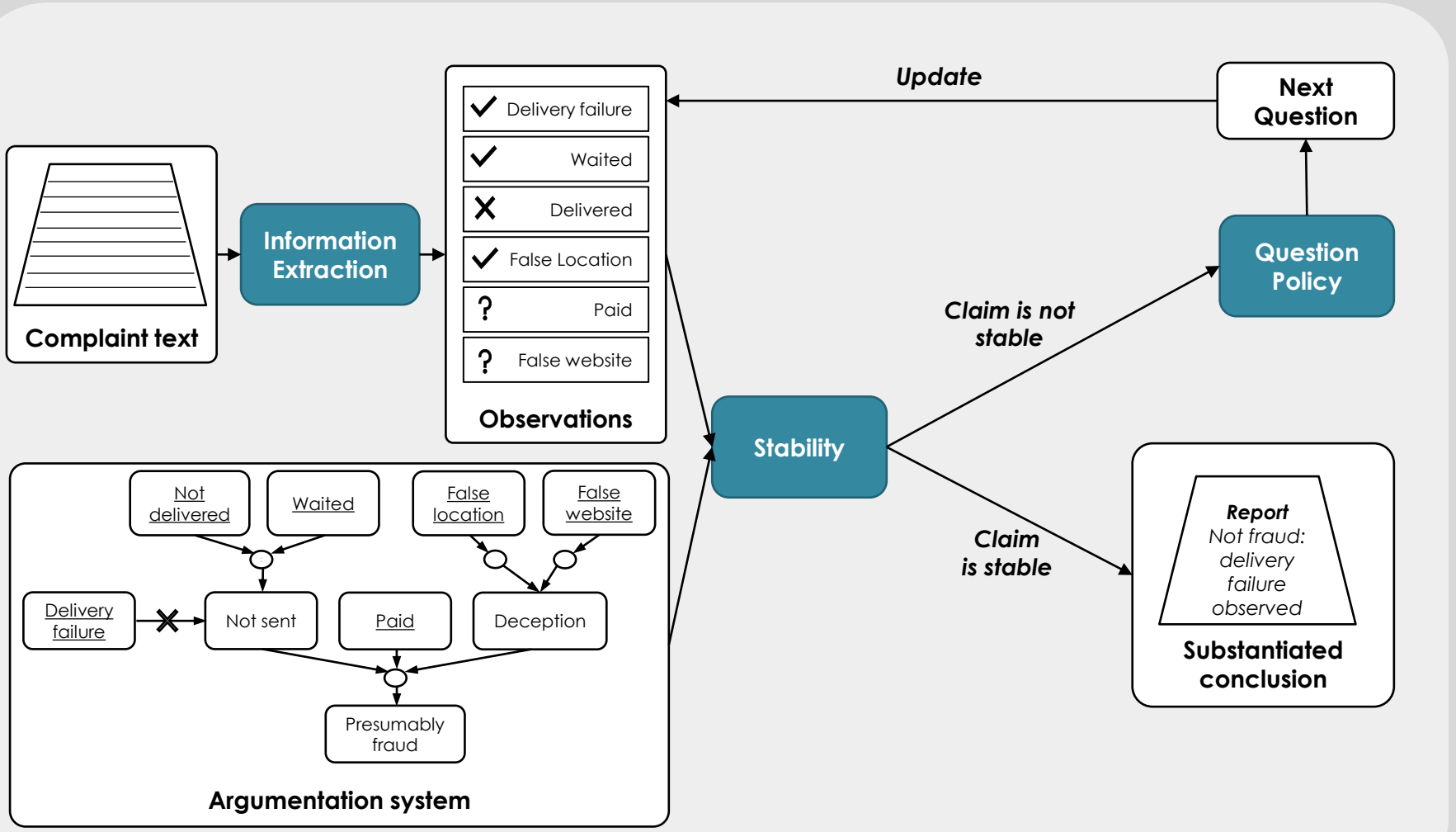
Requirements

- Handle natural language
- Efficiency
- Relevance
- Accuracy
- Transparency

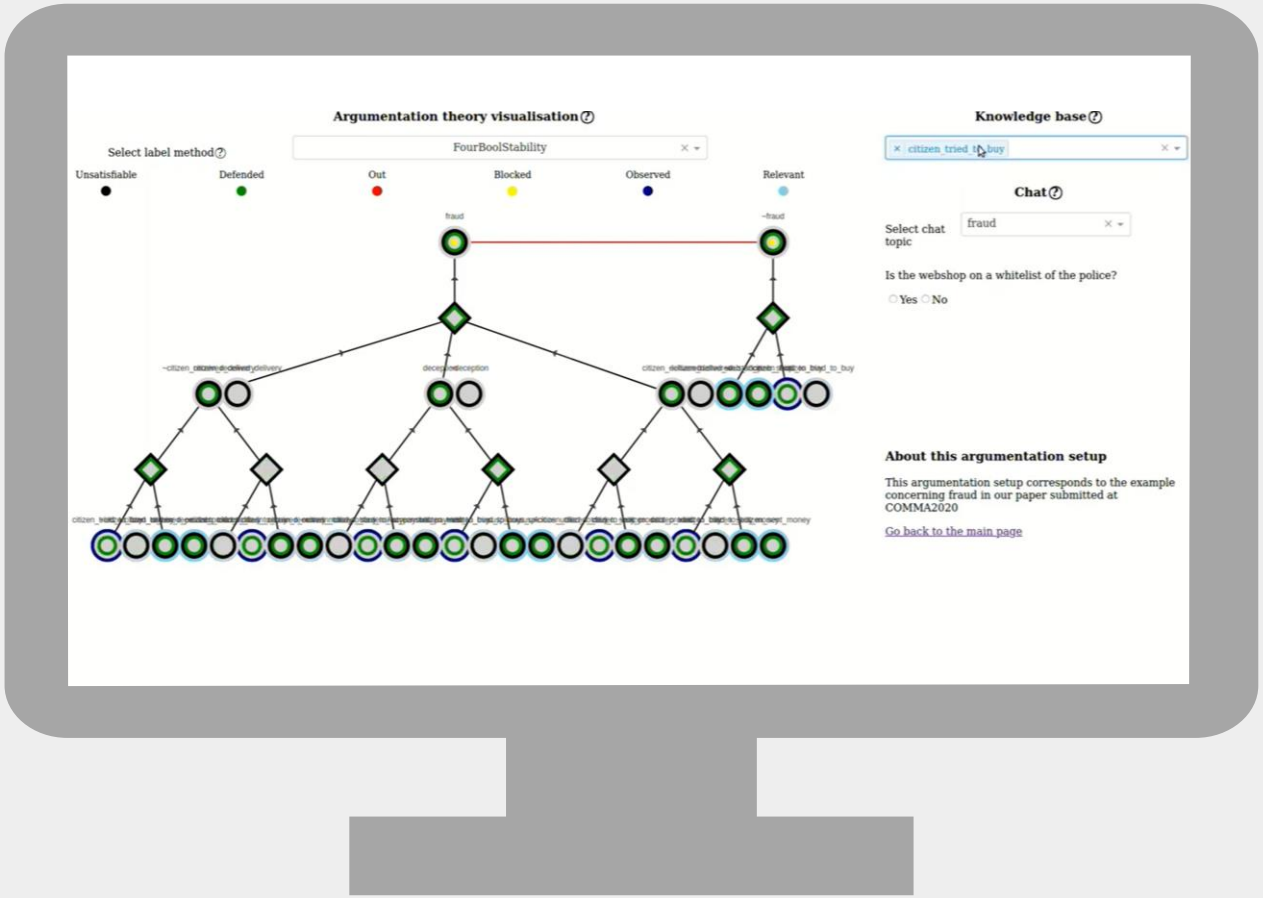
Related work

- Conversational AI for **Human-Computer Interaction**
  → QA agents / Task-oriented systems / Social chatbots
  - Scripted
  - Markov Decision Process & Reinforcement Learning
  - Sequence to sequence
- **Argumentation** dialogues

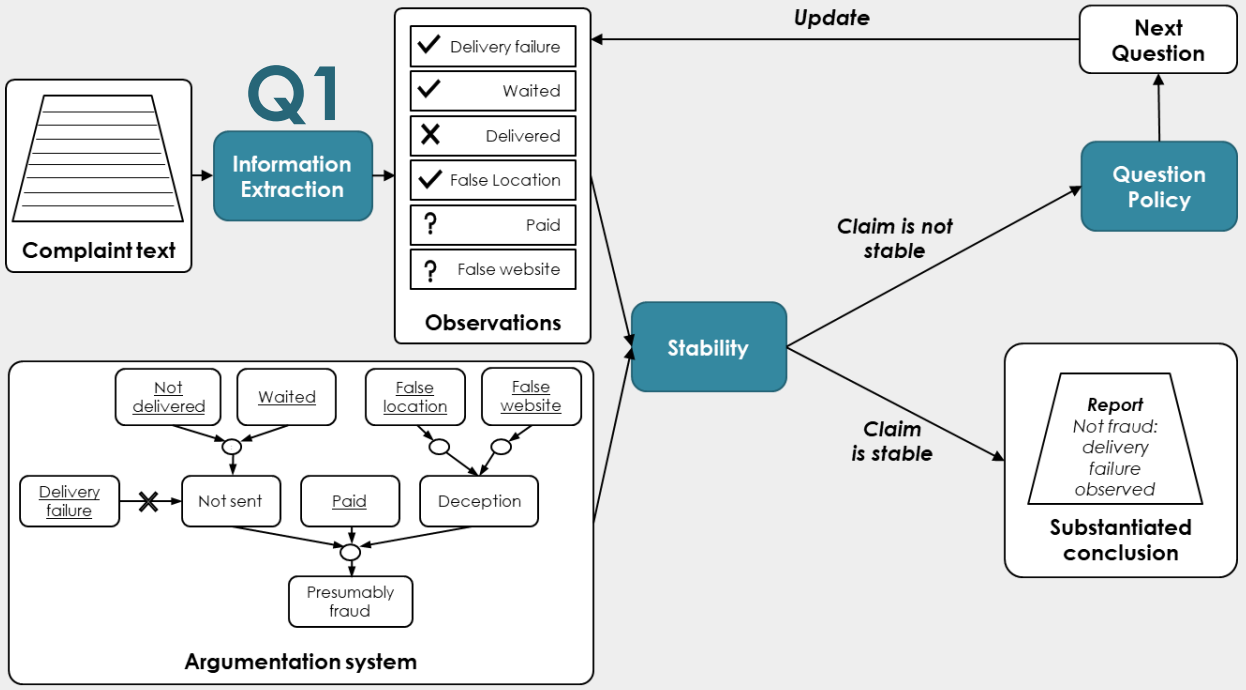
*How to combine **formal argumentation dialogues** and machine-learning-based **conversational systems** into **hybrid systems** for human-machine inquiry dialogue?*


Update
Next Question
Complaint text
Information Extraction
Delivery failure
Waited
Delivered
False Location
Paid
False website
Observations
Question Policy
Claim is not stable
Stability
Not delivered
Waited
False location
False website
Delivery failure
Not sent
Paid
Deception
Presumably fraud
Argumentation system
Claim is stable
Report
Not fraud: delivery failure observed
Substantiated conclusion

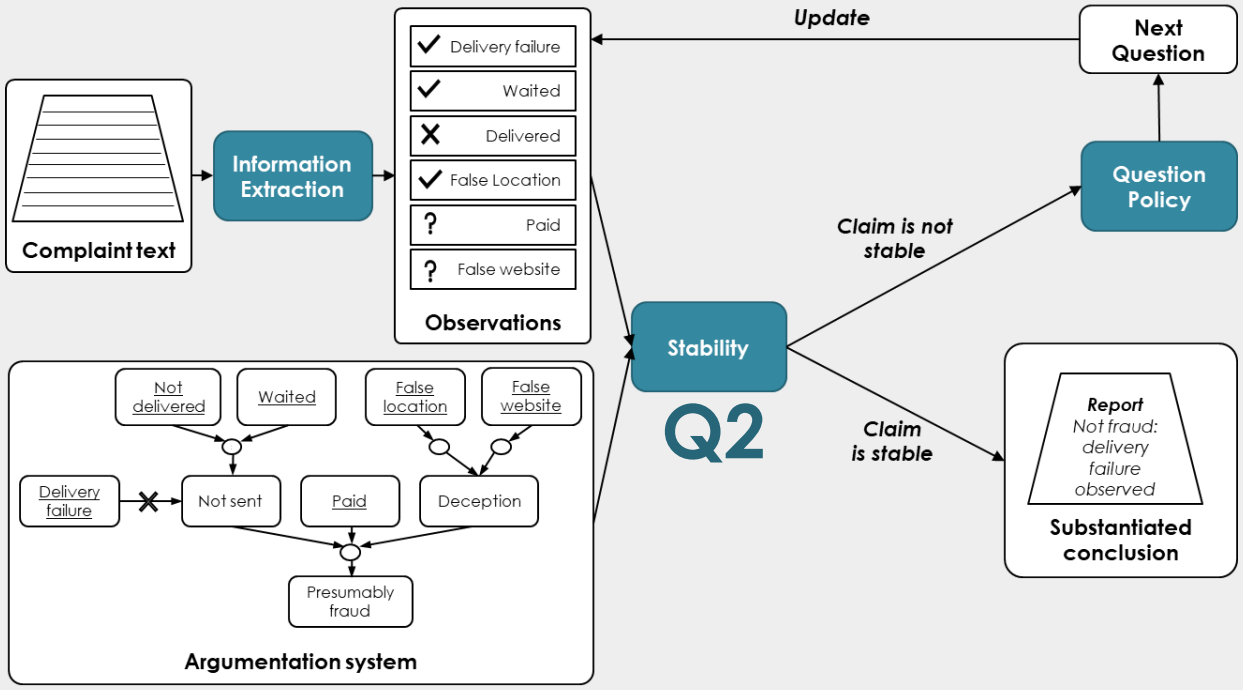
https://aangifte.politie.nl/iaai-preintake/#/



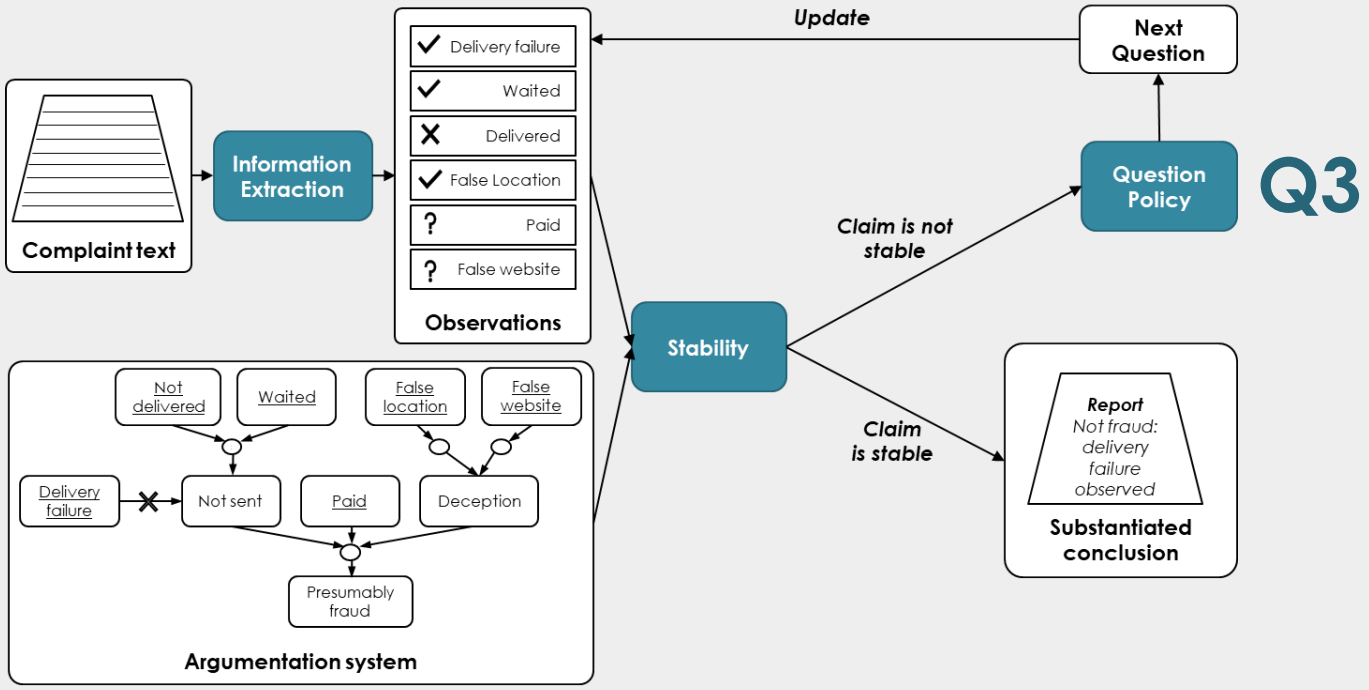
https://argumentapp.herokuapp.com/



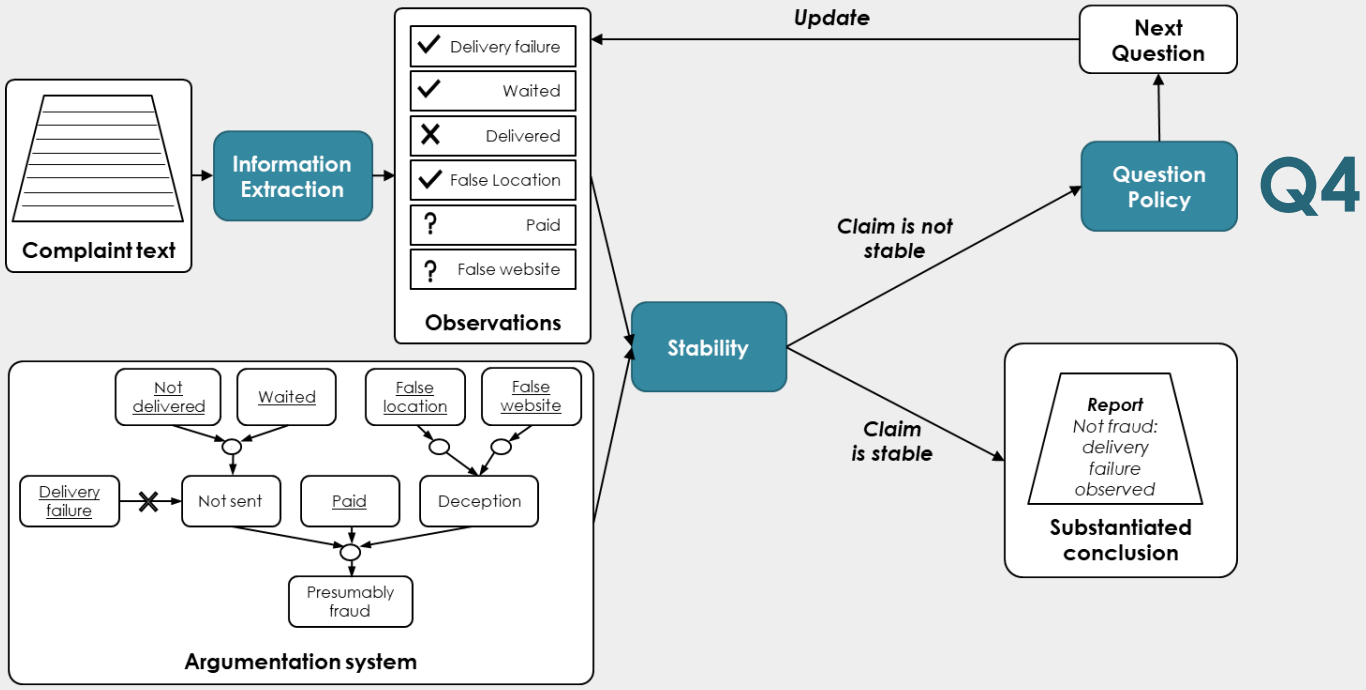
Q1 How to extract information from messages in an accurate and transparent way?



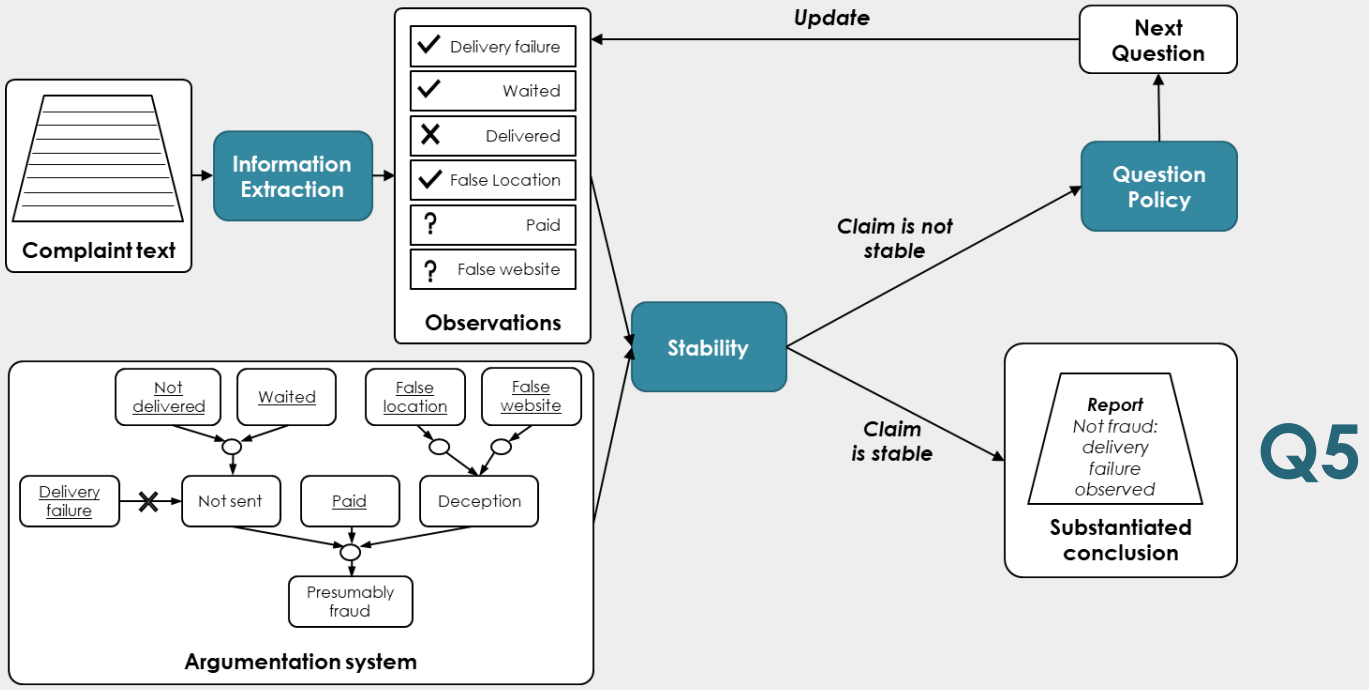
Q2 How to efficiently determine whether the dialogue should terminate?



Q3 How to efficiently select literals that are still relevant?



Q4 How to make sure that the dialogue is coherent, while still optimising efficiency?



Q5 How to explain the outcome of the dialogue?

What's next?

Priority according to use in application

Next project: Webshop checker

- Extending stability algorithm (e.g. rule preferences) – Q2
- Extending relevance listing algorithm – Q3