On-line Phase

1. Parameter Value Elicitation
   - Questions are presented to the user and their answers are recorded.
   - A knowledge-base maintains the information of all parameters and associated questions, which is prepared in the off-line phase.

2. Parameter Value Extraction
   - Two underlying subtasks:
     1. Understanding the semantics of the given parameter by reading its technical descriptions
     2. Extracting the value from a natural language conversation
   - Recruit non-expert crowd workers.

3. Response Generation
   - Convert the API response object, e.g., JSON or XML data, into natural language text.
   - Two underlying subtasks
     1. Understand the information.
     2. Describe the information in a natural language
   - Recruit non-expert crowd workers.

Off-line Phase

1. QA Collection
   - Collect the questions associated with the task.
   - “A friend wants to <TASK_DESCRIPTION> and is calling you for help. Please enter one question you would ask them to help accomplish their task.”

2. Parameter Filtering
   - Ask non-expert workers to select “unnatural” fields that are unlikely to occur in a conversation.

3. QA-Parameter Mapping
   - Show 1 QA pair and all parameters. Ask workers which parameters’ information is provided in the answer (with confidence scores).
   - Two Purposes:
     1. Find a good set of parameters
     2. Find good questions associated with each selected parameter