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| **STEP 1**  **Wake-Up Word Detection** | Also called 'keyword spotting', this component detects a spoken wake-up phrase such as 'OK Google', 'Hey Siri', or 'OK MindMeld'. It runs in low power mode locally on device. When a wake-up word is detected, resource intensive cloud-based speech recognition is activated. |
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| **STEP 2**  **Speech Recognition** | Also called 'speech-to-text' or ASR, this component converts spoken audio into a text transcript. Today, all major OS platforms provide built-in, speaker-independent ASR with near-human accuracy. They rely on hybrid local and cloud-based models and deliver results in real-time. |
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| **STEP 3**  **Domain Classification** | Domain classification is the first natural language processing, or NLP, step. It analyzes the ASR transcripts and categorizes each request into one of a set of pre-defined domains. Each domain typically reflects a unique knowledge area such as 'weather', 'sports', 'traffic', etc. |
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| **STEP 4**  **Intent Classification** | The second NLP step is intent classification. This step categorizes each request into one of a set of pre-defined intents. Each intent reflects what the user is trying to accomplish, and it prescribes a specific action or answer type which defines the desired outcome of each request. |
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| **STEP 5**  **Entity Recognition** | The third NLP step is entity recognition. This component is responsible for identifying important words and phrases in each request. For example, in the request 'play Vogue by Madonna', 'Vogue' is an entity identifying the song title and 'Madonna' is an entity identifying the artist. |
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| **STEP 6**  **Role Classification** | The fourth NLP step is role classification or role labeling. This component assigns pre-defined labels or categories to entities of a particular type. For example, for the request 'book a flight from SFO to JFK', the entity 'SFO' might be labeled 'origin' and 'JFK' might be labeled 'destination'. |
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| **STEP 7**  **Entity Resolution** | The fifth NLP step is entity resolution. This step matches each identified entity with a real-world, disambiguated canonical concept or object. For example, the entity 'Obama' could be resolved to 'President Barack Obama', and 'iPhone 6' could be resolved to a specific product SKU. |
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| **STEP 8**  **Language Parsing** | The last NLP step is language parsing. This step can involve both dependency parsing and semantic parsing. It is responsible for determining the relationships between the individual entities identified in each request. |
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| **STEP 9**  **Question Answering** | Question answering identifies the best answer candidates to satisfy each request. It relies on a knowledge graph, containing comprehensive catalog or product data for example, to check the validity of each candidate response and provide recommendations and suggestions. |
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| **STEP 10**  **Language Generation** | Language generation interprets the output of the NLP components and the question answerer in order to generate a human-language response for each request. This response is intended to resemble a real-world natural language interaction. |
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| **STEP 11**  **Dialogue Management** | Dialogue management formulates the response to return to the user for each stage in a conversational interaction. The response includes the natural language reply as well as other interactive elements. This component keeps track of context across multi-stage interactions. |
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| **STEP 12**  **Speech Synthesis** | Also called 'text-to-speech', speech synthesis converts text-based natural language responses into spoken audio which can be read aloud to the user. Most major OS platforms and devices provide built-in text-to-speech capabilities. |
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