



**Best Practices in Developing Conversational Systems**  
**Conversational Interaction Conference, 2020, San Jose**

Jyo Gadewadikar, [jgadewadikar@deloitte.com](mailto:jgadewadikar@deloitte.com)

Vatatmaja, [vatatmaja@deloitte.com](mailto:vatatmaja@deloitte.com)

# Key Takeaways –

- I. To create an **Engaging User Experience** for achieving a great degree of **Containment** in Voice Virtual Assistants with interaction that mimics a **Human Conversational Style**, remains a progressive area of research and currently a big challenge.
  
- II. In this document we present some of the critical **Actionable Leading Design Practices** for Complex Conversational Systems.

# How to make Virtual Assistants Conversational

Selected Design techniques and user experience practices for complex conversational systems



User Experience and Leading Design Practices extensively focus on **actionable methods/process, techniques and procedure** to make the conversation approach 'natural' style.

## Design Call Flow

- AI driven call listening and variation capture
- Stochastic call flow design

## Customize based on Context

- Utterance Collection =  $f$  (Machine Learning + Crowdsourcing)
- Customized Response =  $f$  (Sentiment + Intent + Preferences)

## Select Vendor/Technology

- Feature and Functionality Evaluation
- Non-Functional Evaluation

## Develop, and Train/Test/Tune Iteratively

- Continuously Improve

# Call Listening and Variation Capture

Methods to design product are critical initial steps

**1 Analyze Business Requirements**  
Conduct need analysis, identify requirements and project goals, map process flow

**3 Develop Sequential Mapping**  
Develop tabulation to connect nodes to intent, enabling improvements for Virtual Assistant

**7 Record Frequency of Utterances & Intents**  
Aggregate individual utterances and intents and record frequency of each

**8 Align Analysis with Product Design**  
Utilize node structure to inform Voice Virtual Agent product design and development

**2 Design Preliminary Conversation Structure**

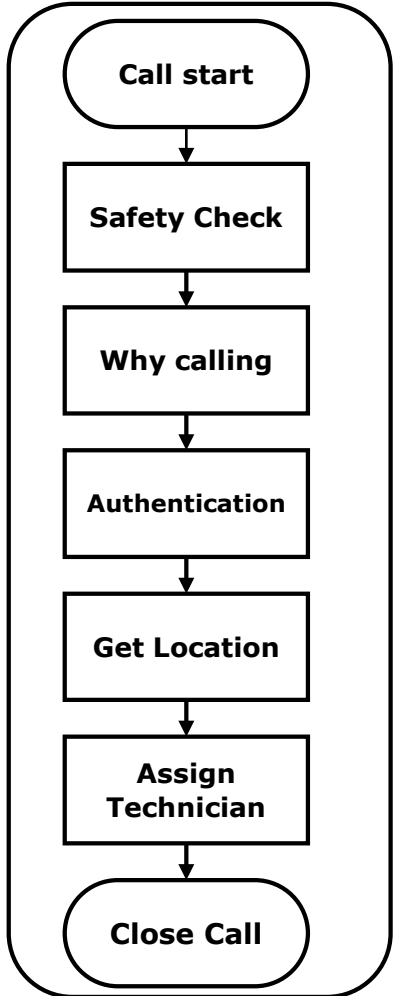
**4 Analysis & Call Transcription**  
Listen to calls, identify & discard irrelevancies, transcribe

**5 Structured Node Mapping**  
Map nodes to intent

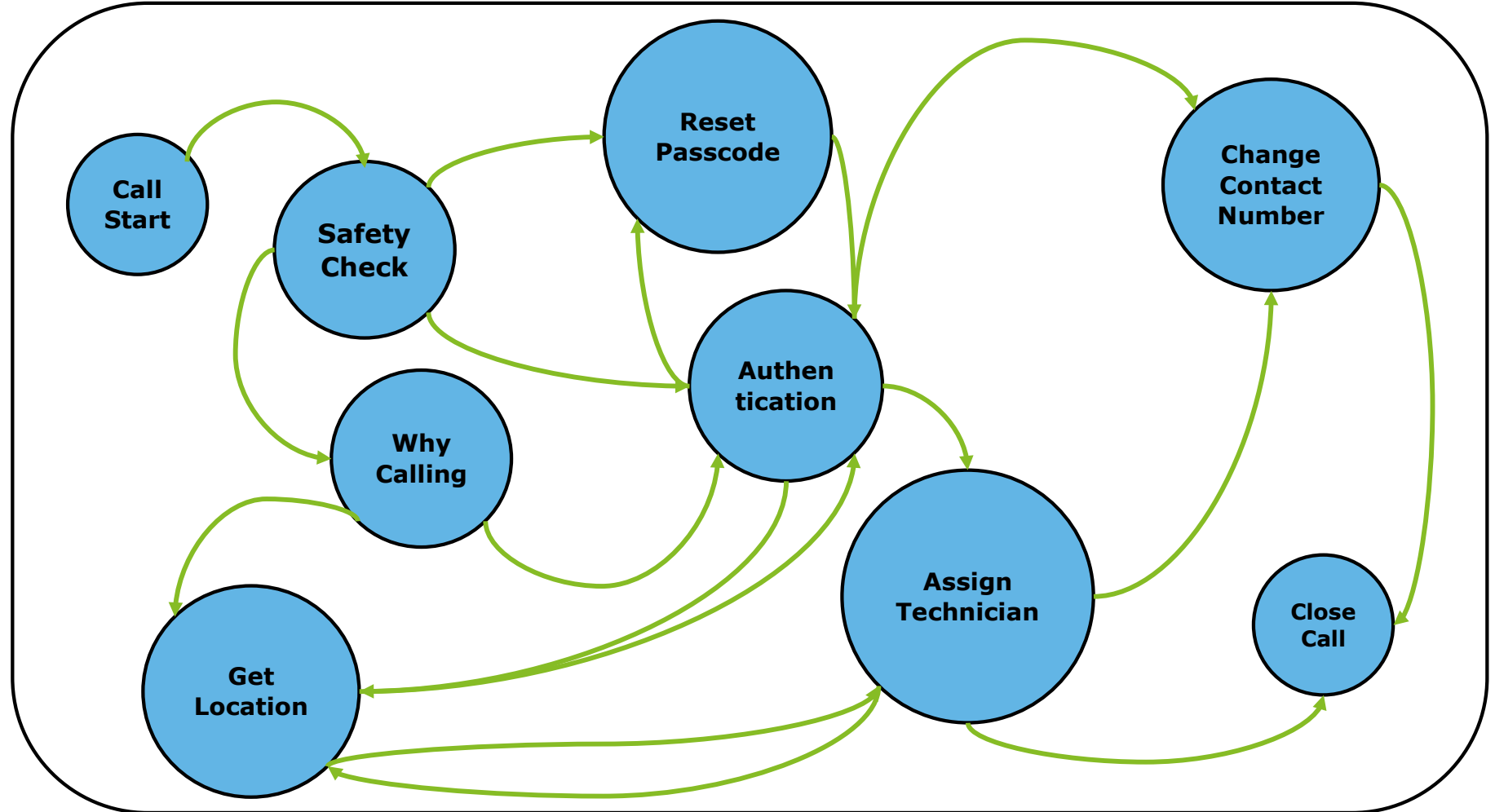
**6 Accommodate New Intents**  
Continuously identify and supplement new intents to node structure

# Stochastic Call Flow

True Human Conversations are varied hence designing a conversation shall not be straightforward or linear



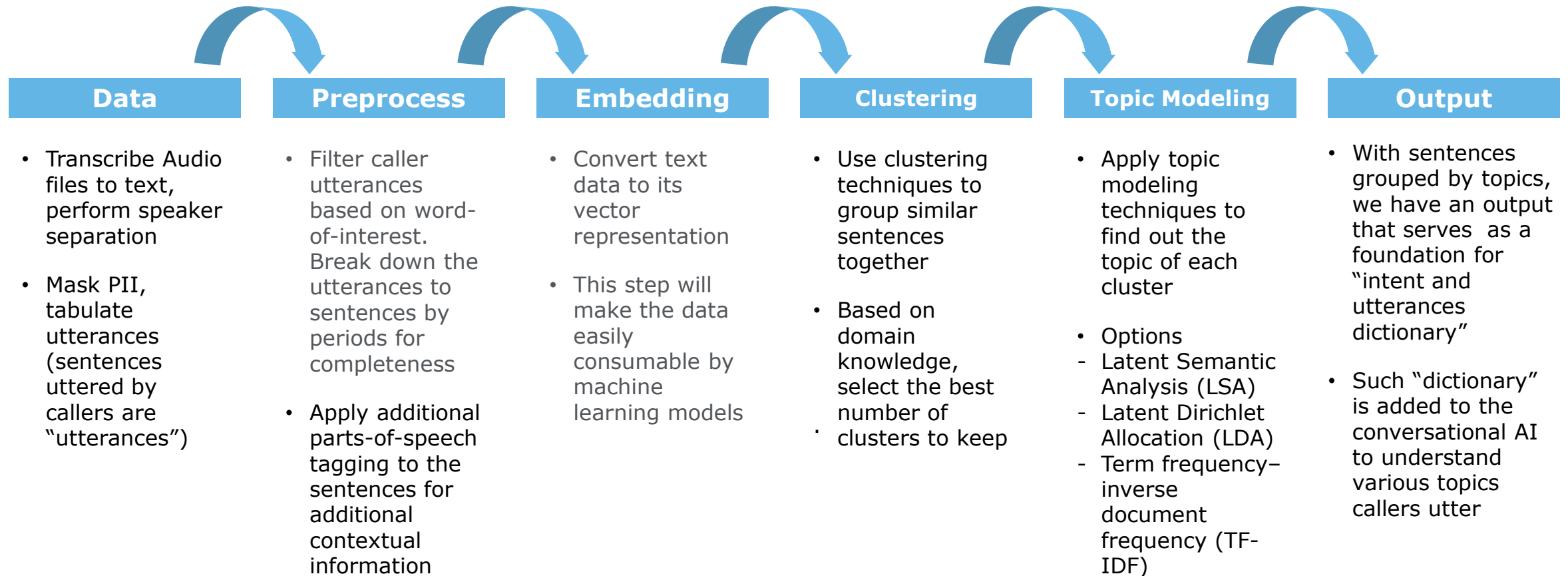
**Deterministic**



**Stochastic**

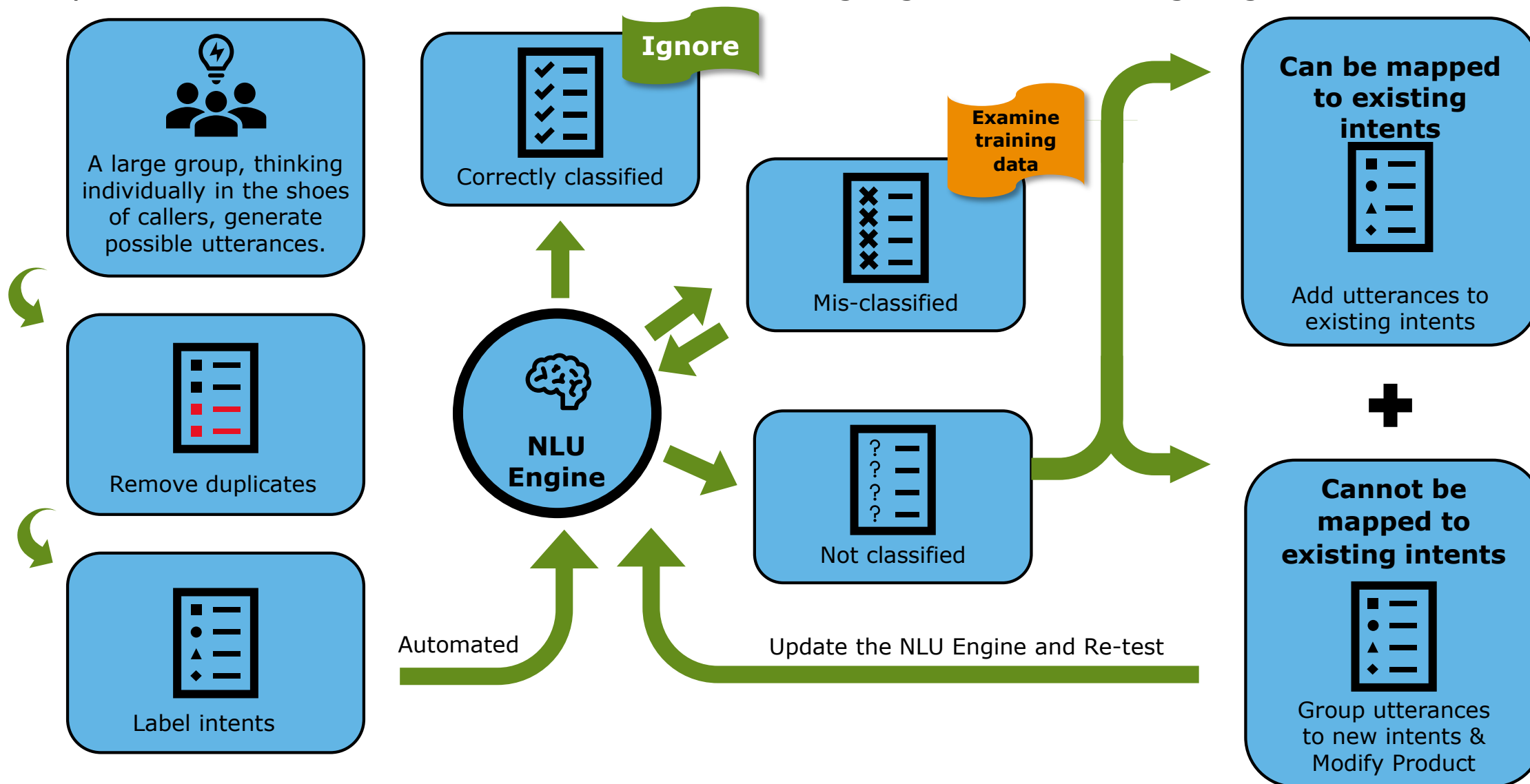
# Utterance Collection – Machine Learning

A representative set of training data is crucial in helping NLP engines understand



# Utterance Collection – Crowdsourcing

Populate utterances to enhance base natural language understanding engine



# Customize Responses – f(Sentiment + Intent + Preferences)

Ability to be empathetic is critical

“I would like to reschedule my flight.”



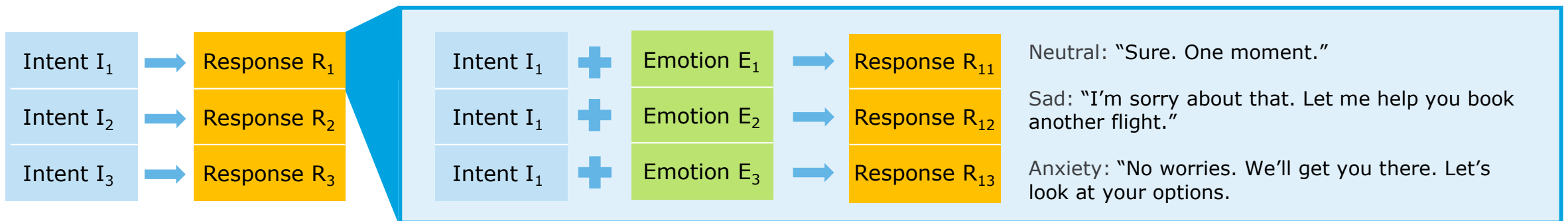
“I just broke up with my girlfriend.. I’m rebooking my flight to leave early.”



“My flight was canceled but I have an important meeting to get to.”



Caller’s Intent: Reschedule an airline ticket





# Select Vendor/Technology

## Features' Evaluation

Category	Feature	Vendor 1	Vendor 2	Vendor 3	Vendor 4
Channel	Telephonic Integration	Standard	Developing	Developing	Standard
	Omni-channel Experience	Standard	Standard	Standard	Standard
Voice	Speech-to-Text	Standard	Standard	Standard	Standard
	Text-to-Speech	Standard	Standard	Standard	Standard
	SSML	Differentiated	Standard	Standard	Differentiated
	Speaker Recognition	Developing	Developing	Developing	Developing
AI Engine	Intent Recognition and Mapping	Standard	Differentiated	Standard	Standard
	Entity Extraction	Standard	Differentiated	Standard	Standard
	Dialogue Management	Standard	Standard	Standard	Standard
	Context Management	Standard	Standard	Differentiated	Standard
	Agent Training	Standard	Differentiated	Differentiated	Standard
	Agent Testing	Standard	Differentiated	Differentiated	Standard
	Fallback Intent	Differentiated	Developing	Standard	Standard
	Sentiment Analysis	Standard	Differentiated	Standard	Standard
	Multilingual	Developing	Standard	Differentiated	Standard
	Pre-built Agents	Standard	Differentiated	Differentiated	Differentiated
	Small Talk	Developing	Developing	Standard	Developing
System Integration	Serverless Backend	Standard	Standard	Standard	Standard
	Knowledge Extension	Developing	Standard	Developing	Standard
Other	Security	Differentiated	Differentiated	Standard	Standard
	Monitoring & Reporting	Standard	Standard	Differentiated	Differentiated
	Hand-off to Human Agent	Differentiated	Standard	Standard	Standard

**Differentiated**

The feature is mature, distinctive from the standard functionality, and ready for production.

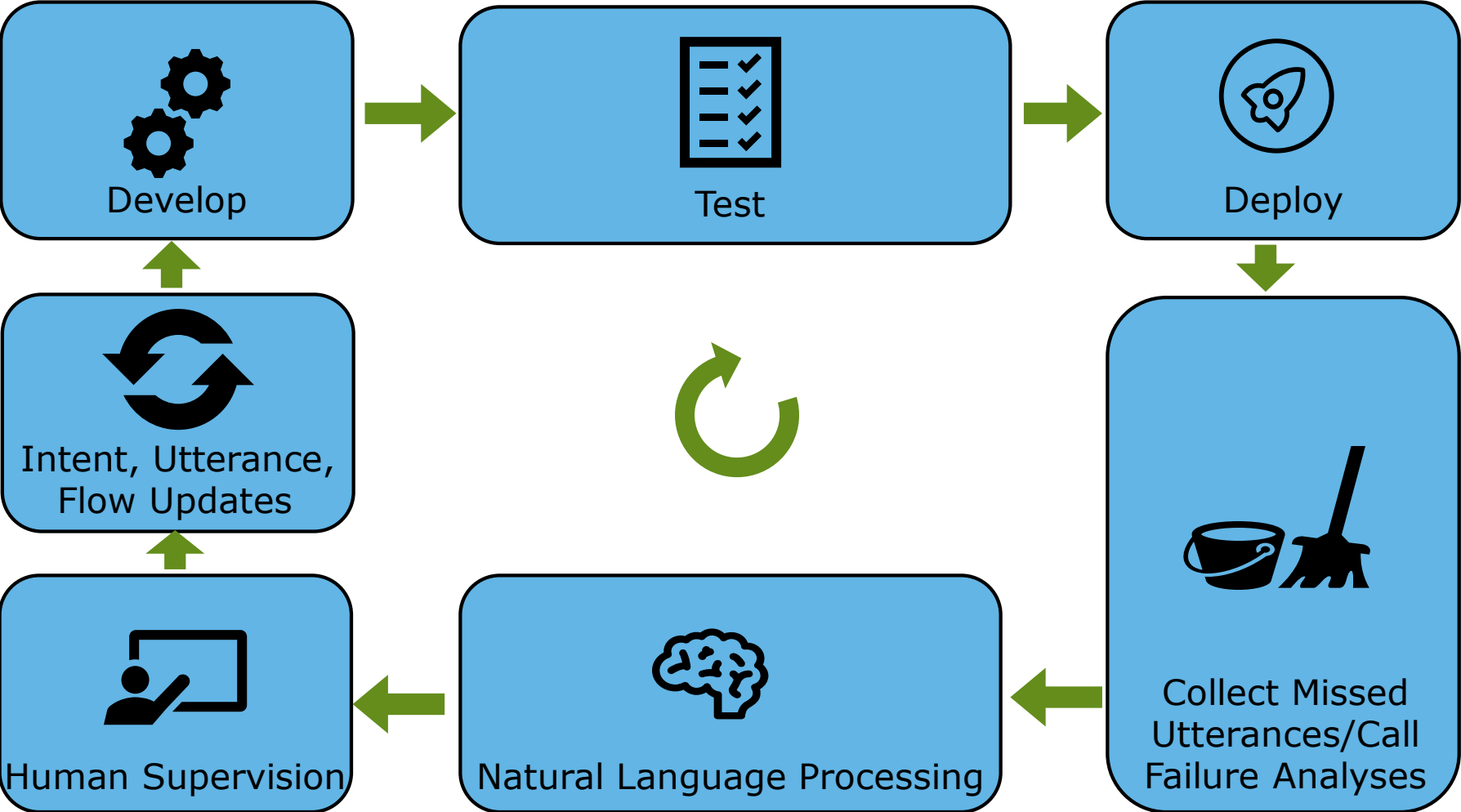
**Standard**

The feature has basic capability of fulfilling what is required and can be deployed as part of the Conversational AI system.

**Developing**

Capability not available or related feature is in preview/alpha/beta (Not covered by SLA or ready for production deployment).

# Continuous Improvement



# Questions

## Thank you!

Jyo Gadewadikar, PhD  
jgadewadikar@deloitte.com  
Chief Product Officer – Conversational AI  
Analytics and Cognitive – Applied AI  
Deloitte Consulting  
30 Rockefeller Plaza, New York, NY, 10112  
Mobile: +1 646 734 6510  
www.deloitte.com

Vatatmaja, PhD  
vatatmaja@deloitte.com  
Chief Technology Officer – Conversational AI  
Analytics and Cognitive – Applied AI  
Deloitte Consulting  
1100 Walnut Street, Kansas City, MO 64106  
USA  
Mobile: +1 913 653 9185  
www.deloitte.com