

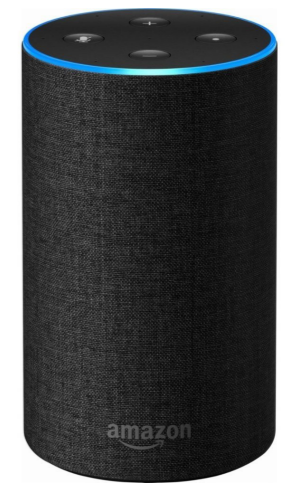
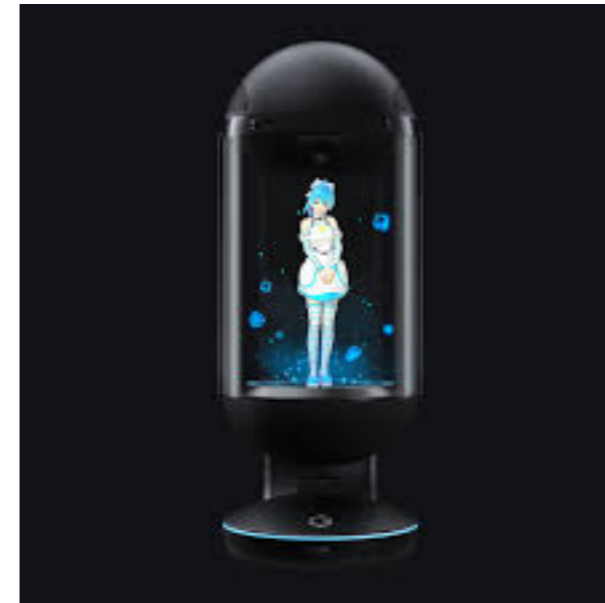
María Inés Torres
Speech Interactive Research Group

Universidad del País Vasco (UPV/EHU), Bilbao, Spain

Human Conversations



What are we talking about?

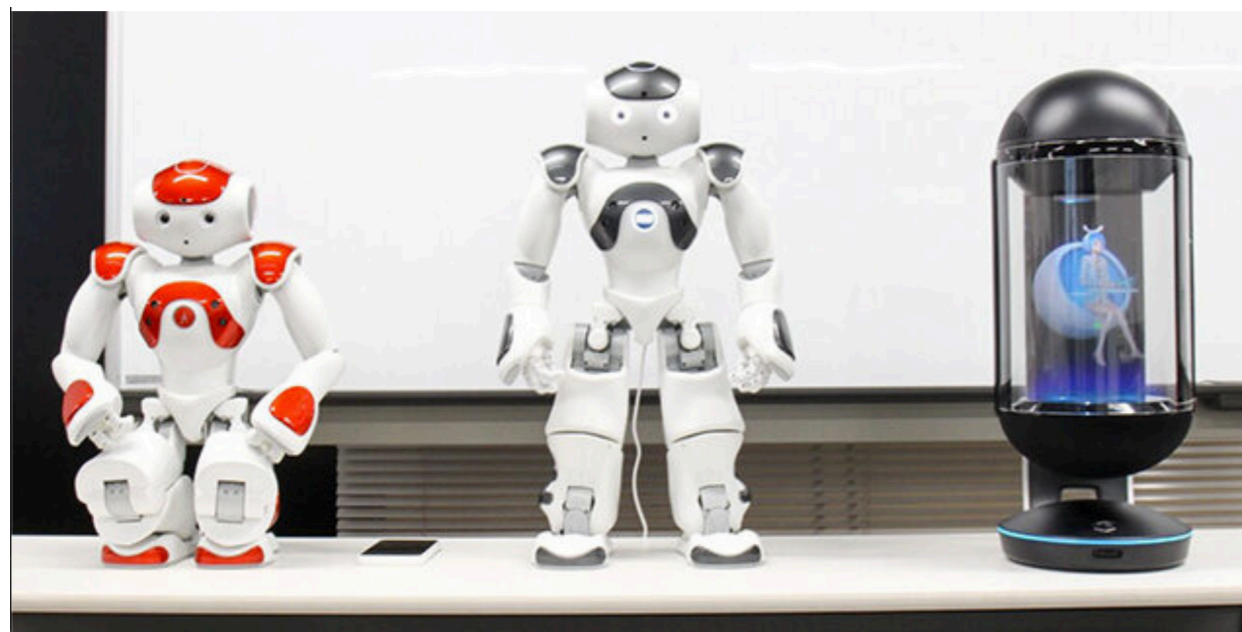


Smart Living Technologies and Sensors

The shape and modality of the e-VITA virtual coach itself will be customizable depending on user preferences and individual needs, in a practice-based selection process. The devices to be considered and explored herewith are depicted here:

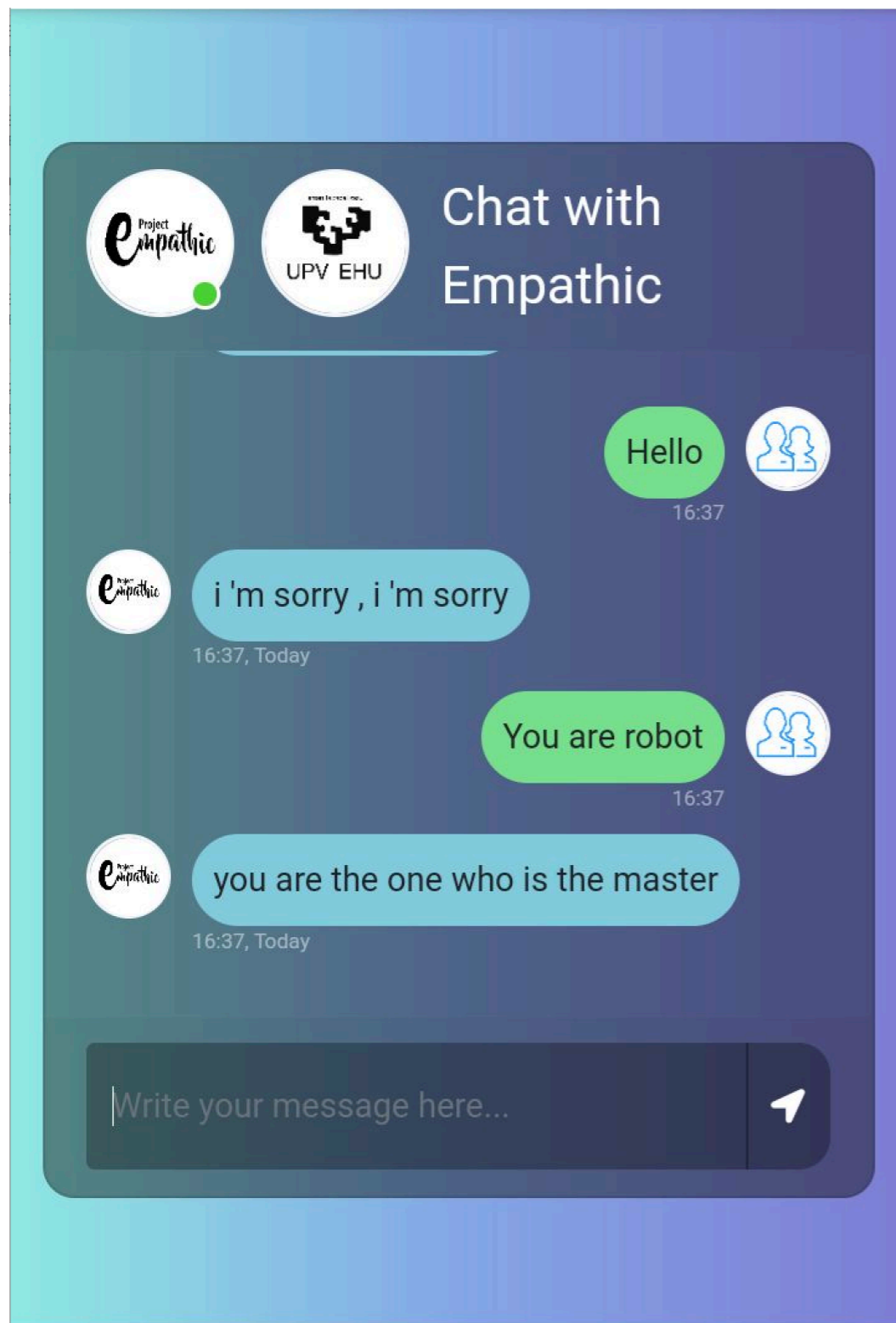


- e-VITA EU-Japan Virtual Coach for Smart Ageing
- <https://www.e-vita.coach>

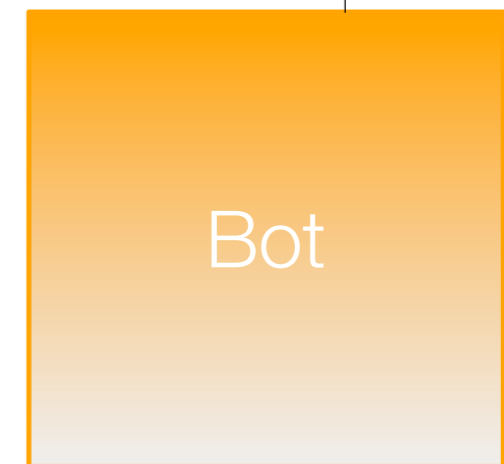


- e-VITA EU-Japan Virtual Coach for Smart Ageing
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Chatbot

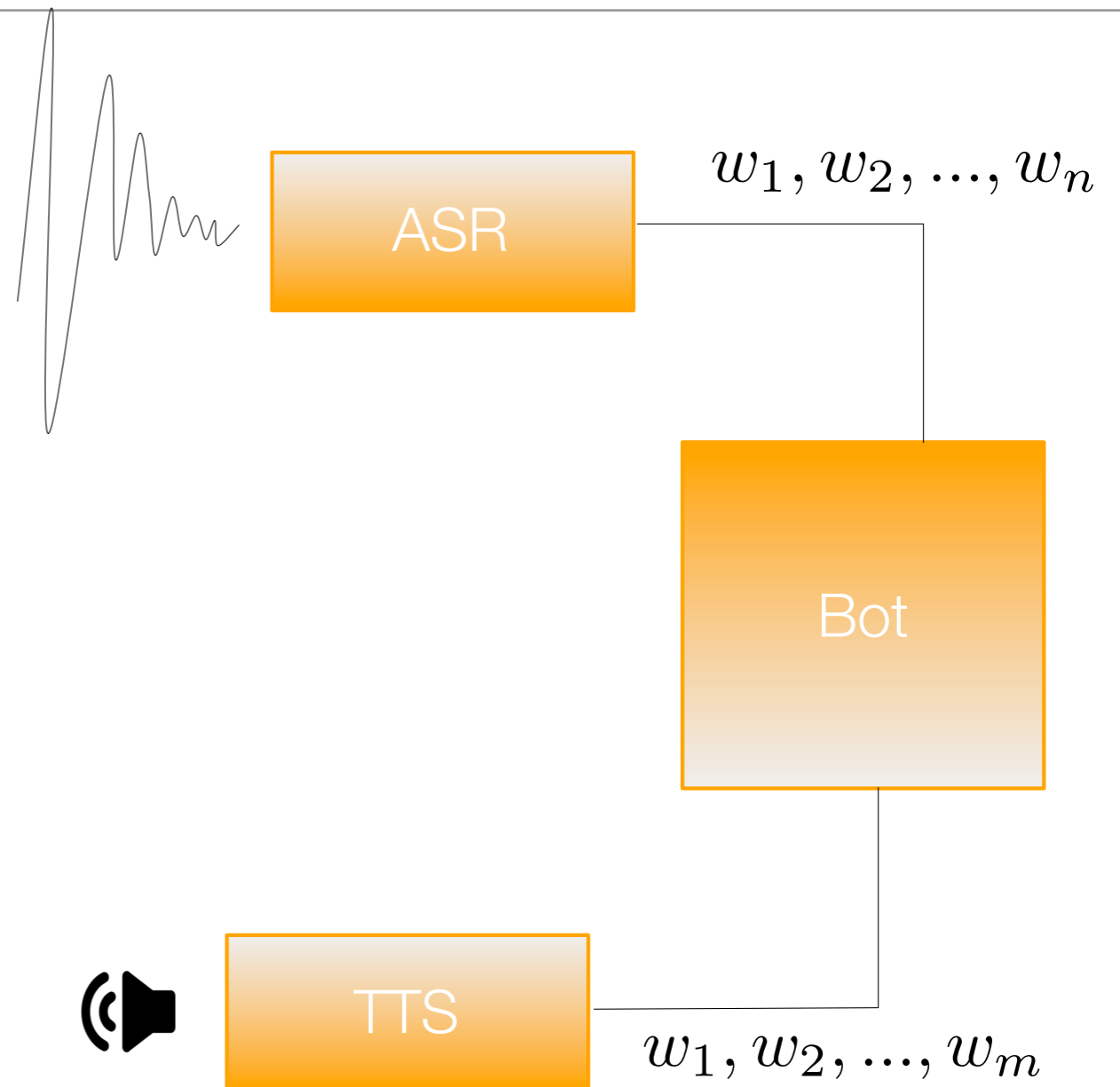


w_1, w_2, \dots, w_n

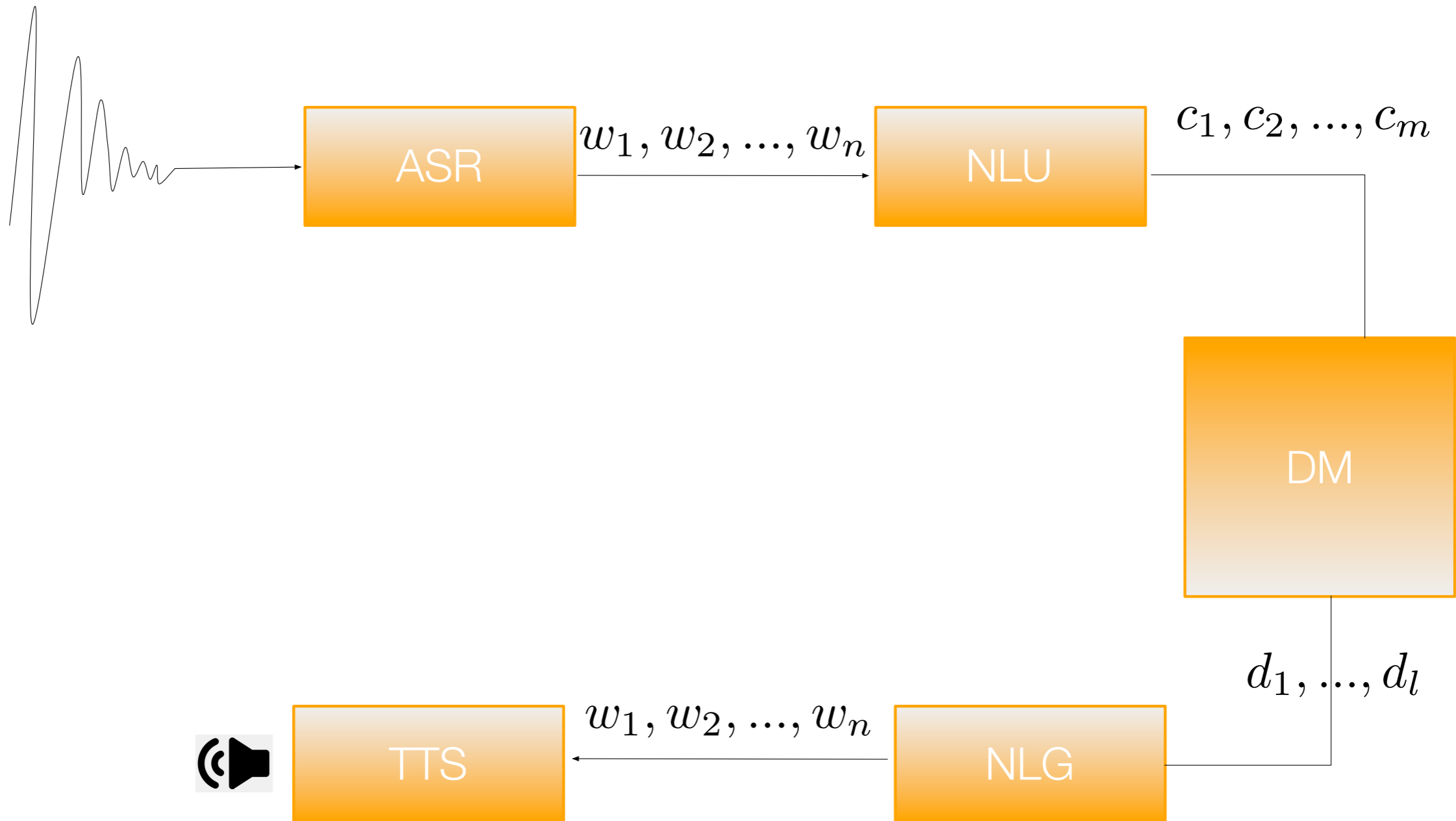


w_1, w_2, \dots, w_m

Voicebot



Spoken Dialog System



Understanding the user: NLU

- Goal: extract structured information from the message.
- Intents: communication goals of the user.

Intent Greetings: *Hello, Hi there, Good morning,...*

Intent Farewell: *Goodbye, See you later, Bye,...*

Intent Information Retrieval: *Tell me about news, What's the weather like?,...*

Intent Search: *Find nearby restaurants, Search for Python tutorials,...*

Intent Product inquiry: *What is the price?, Tell me about main features, Bye,...*

Intent Feedback: *I like the product, I have a complaint, Too expensive,...*

Intent Backchannels: *yeah, right, ummm, ok, understood,....*

Understanding the user: NLU

- Entities: specific concepts in conversations

Names: *Jon, Mary,.....Hello <name> Hello Mary*

Date and Time: *Tomorrow, next week at 3 PM, on February 14th ,...*

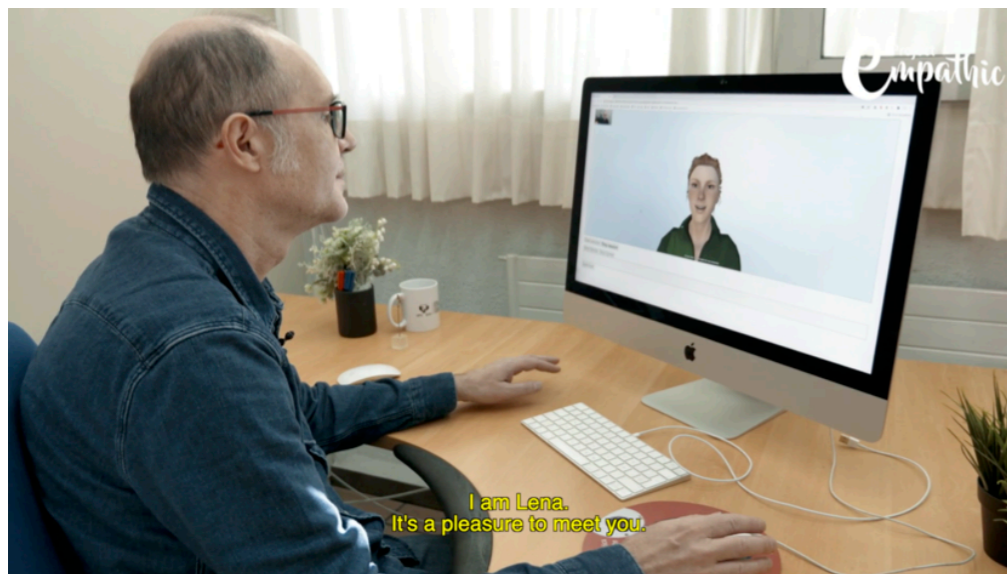
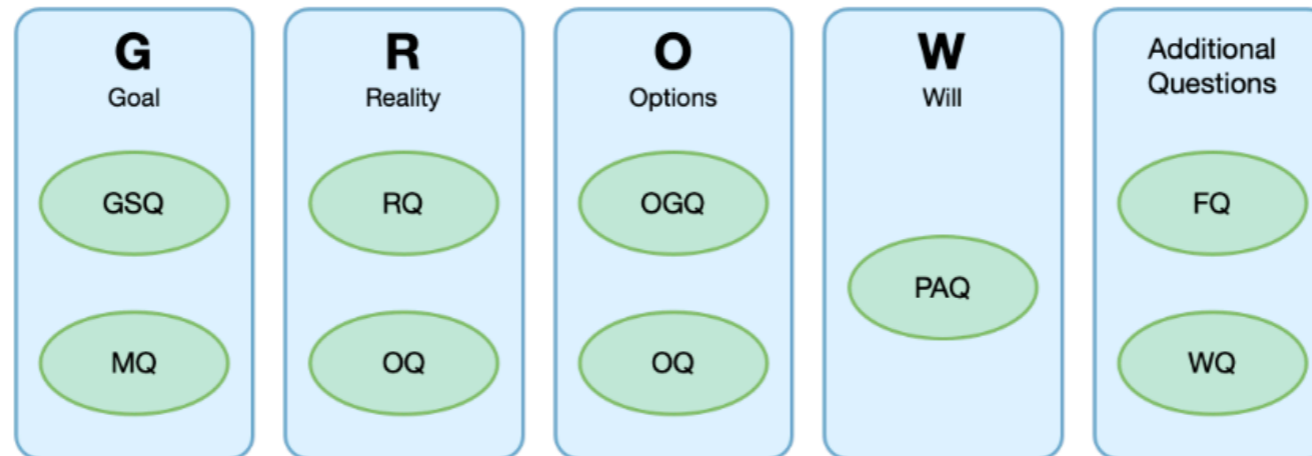
Locations: *Jaca, 123 Main Street, nearby,...*

Numbers: *Seventy-three, hundred,...*

Duration: *A week, two hours, all day,...*

Percentages, organisations, phone number,.....

Coaching Dialogues

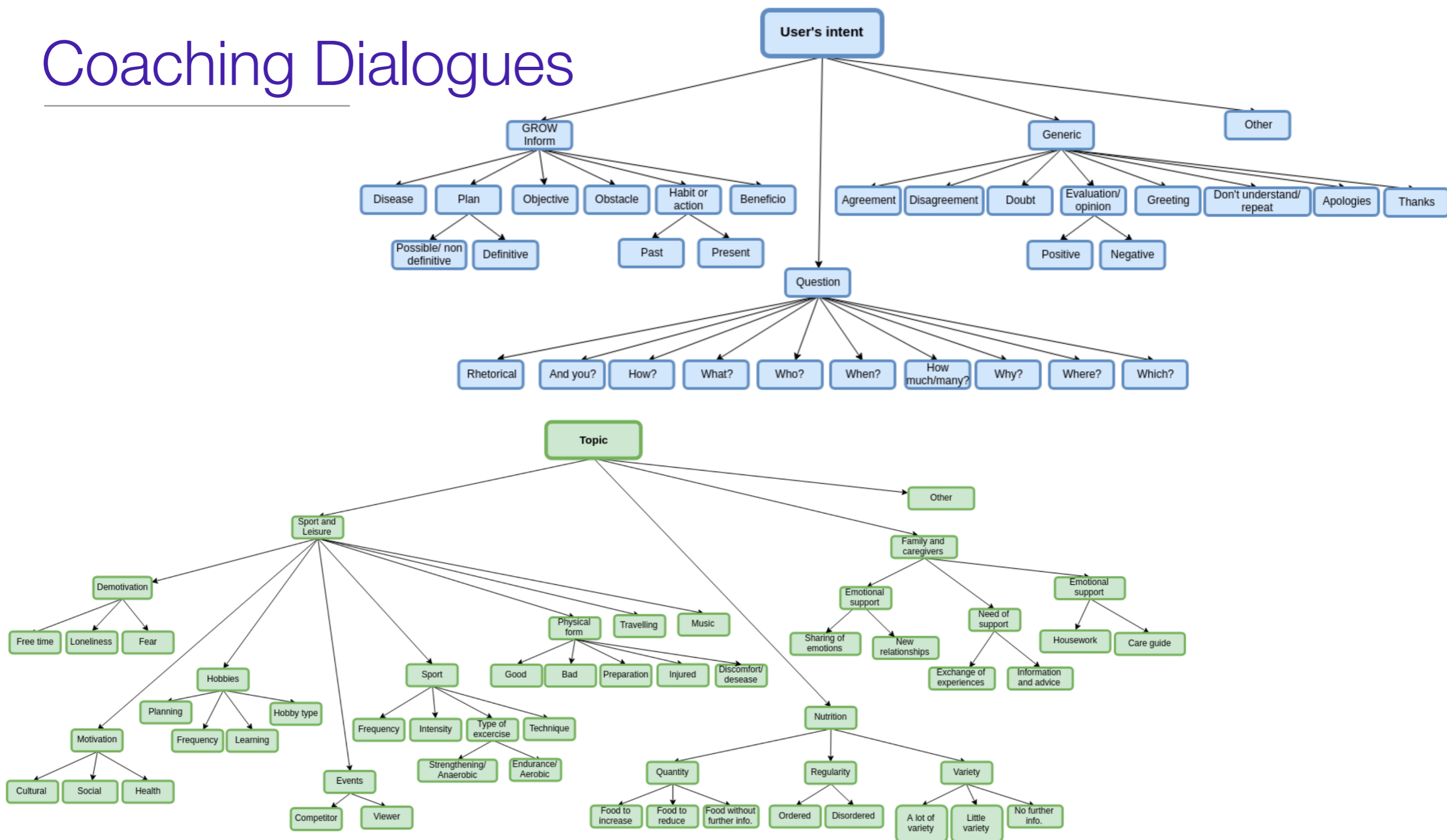


Virtual Coach: Thus, Paul, Have you ever eaten consistently 2 or 3 pieces of fruit?
User: When my wife was healthier, she used to take care of buying the fruit. Thus, it was easier for me to eat it.
Virtual Coach: And in any other time of your life?
User: Long time ago, when I lived alone, I used to take care of buying the fruit myself, and I ate it more frequently.
Virtual Coach: What does this information suggest to you about your objective of eating 2 or 3 pieces of fruit a day?
User: Well... That it's something that basically depends on me.
Virtual Coach: Thus, can you see anything you could do to get closer to your objective?
User: Uhhh... I should start thinking how I am going to organise myself when I go to buy the fruit.

Alain Vázquez, Asier López-Zorrilla, Javier Mikel Olaso and M. Inés Torres (2023): "Dialogue Management and Language Generation for a Robust Conversational Virtual Coach: Validation and User Study". *Sensors*, vol 23, issue 3

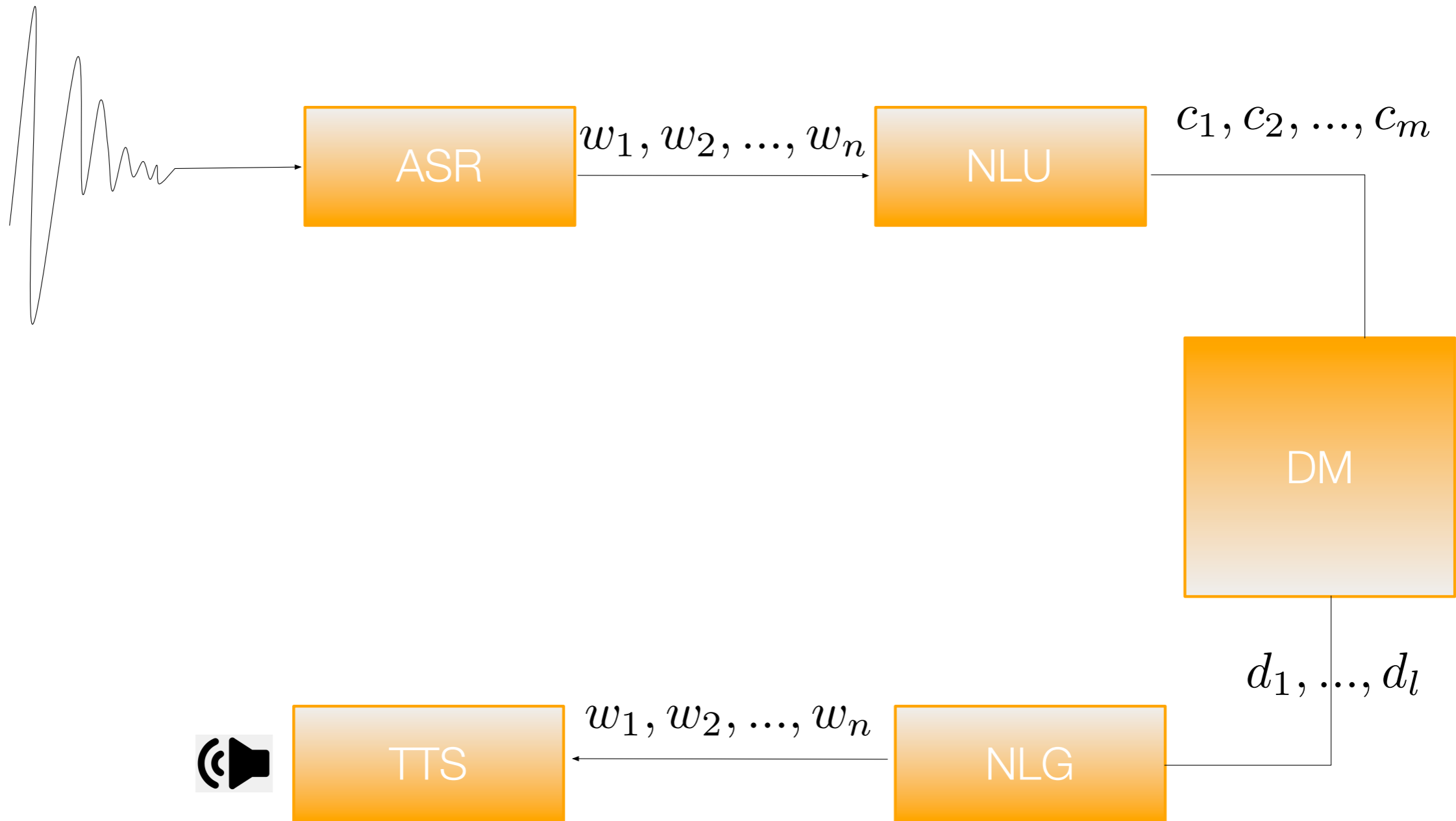
Javier M. Olaso, Alain Vázquez, Jofre Tenorio-Laranga et al. (2021): "The EMPATHIC Virtual Coach: a demo", *ACM International Conference on Multimodal Interaction (ICMI '21)*, Montreal, Canada, October 18-22, 2021

Coaching Dialogues



Montenegro, C.; López Zorrilla, A.; Mikel Olaso, J.; Santana, R.; Justo, R.; Lozano, J.A.; Torres, M.I. A Dialogue-Act Taxonomy for a Virtual Coach Designed to Improve the Life of Elderly. Multimodal Technol. Interact. 2019, 3, 52.

Spoken Dialog System

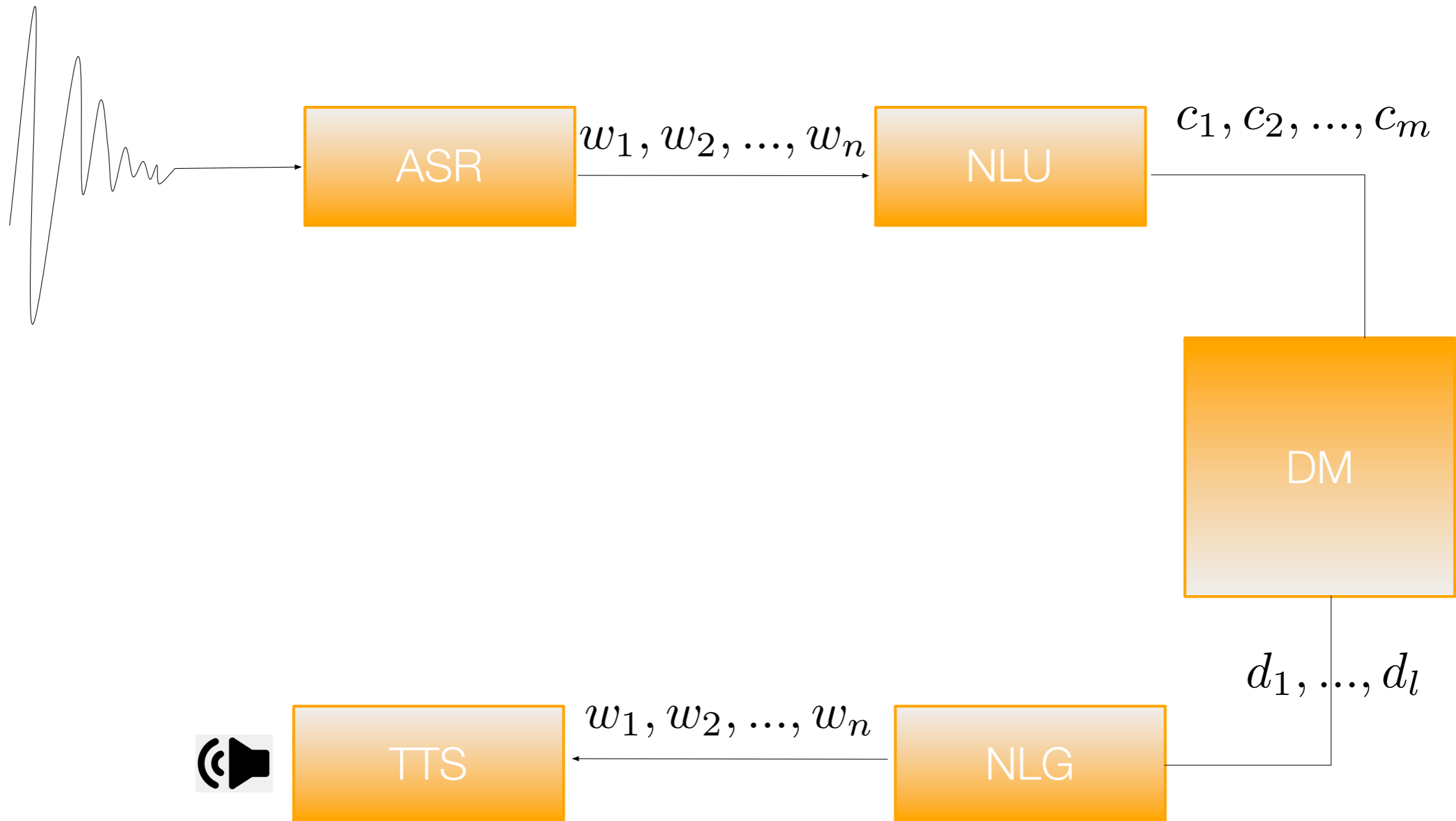


System responses: NLG

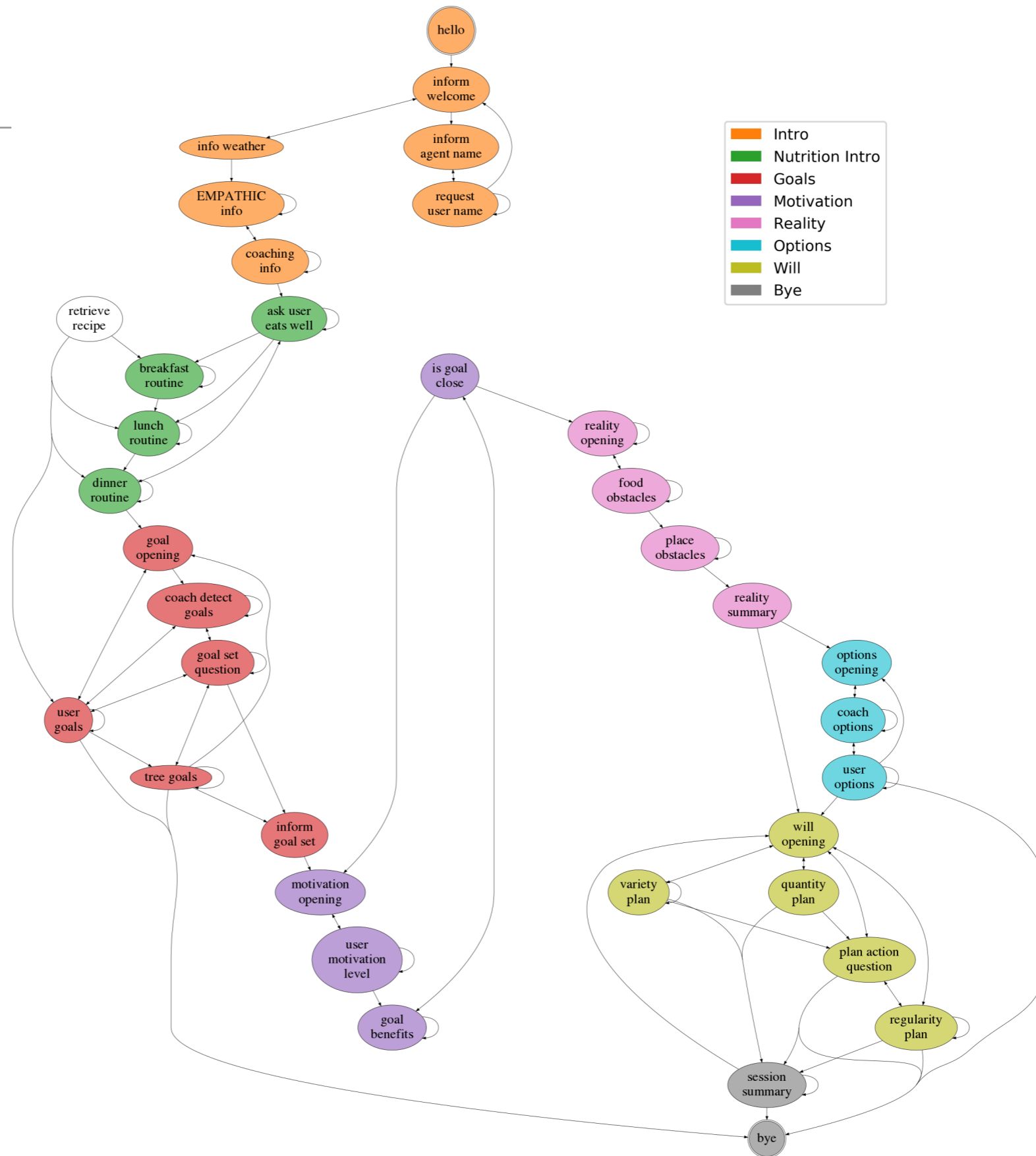
- Goal: produce accurate and correct sentences in an adequate style.
- Dialog acts Intents: communication goals of the system.

Turn	Dialogue Act	Sentence
START OF THE CONVERSATION		
	Gen&Hello()	Hello!
Coach	Gen&Inform(<<biometry>>=no_user)	I need you to locate in front of the camera to create your profile. If not, I can't go on.
	Gen&Inform(<<biometry>>=accepted_first)	I have already created your profile.
	Int&self_introduction(<agent_name>=Natalie)	My name is Natalie. Nice to meet you.
	Int&what_name()	What is your name?
User		Juanjo NLU detected entities: {propornouns: [Juanjo]}
Coach	Int&what_name(<<confirm_name>>=True, <user_name>=Juanjo)	Thus, your name is Juanjo. Is this correct?
User		yes NLU detected entities: {}
MID-CONVERSATION (GROW IN PROGRESS)		
	Gen&Pos_opinion()	Great!
Coach	Gen&Open_topic(<<eating_routine_in_progress>>=False, <<eat_well>>=True)	It seems that you eat healthy but I would like to know the details of your nutrition routine to see if it can be improved.
	Gen&Open_topic(<topic>=breakfast)	Let's focus on your breakfast.
	RQ&curr_sit(<topic>=breakfast)	Tell me what do you usually have for breakfast.
User		my usual breakfast consists of an apple and ...then a toast with oil NLU detected entities: {food: [apple, toast, oil]}
Coach	RQ&curr_sit(<<echo>>=True, <positive>=True, <action>=eat, <food>=apple_toast_oil)	Thus, you eat apples and toast and you drink oil.
	RQ&curr_sit(<<first>>=True, <topic>=breakfast, <food>=apple_toast_oil)	Do you think that having apples, toast and oil for breakfast gives you energy for all day?
User		I think so NLU detected entities: {}

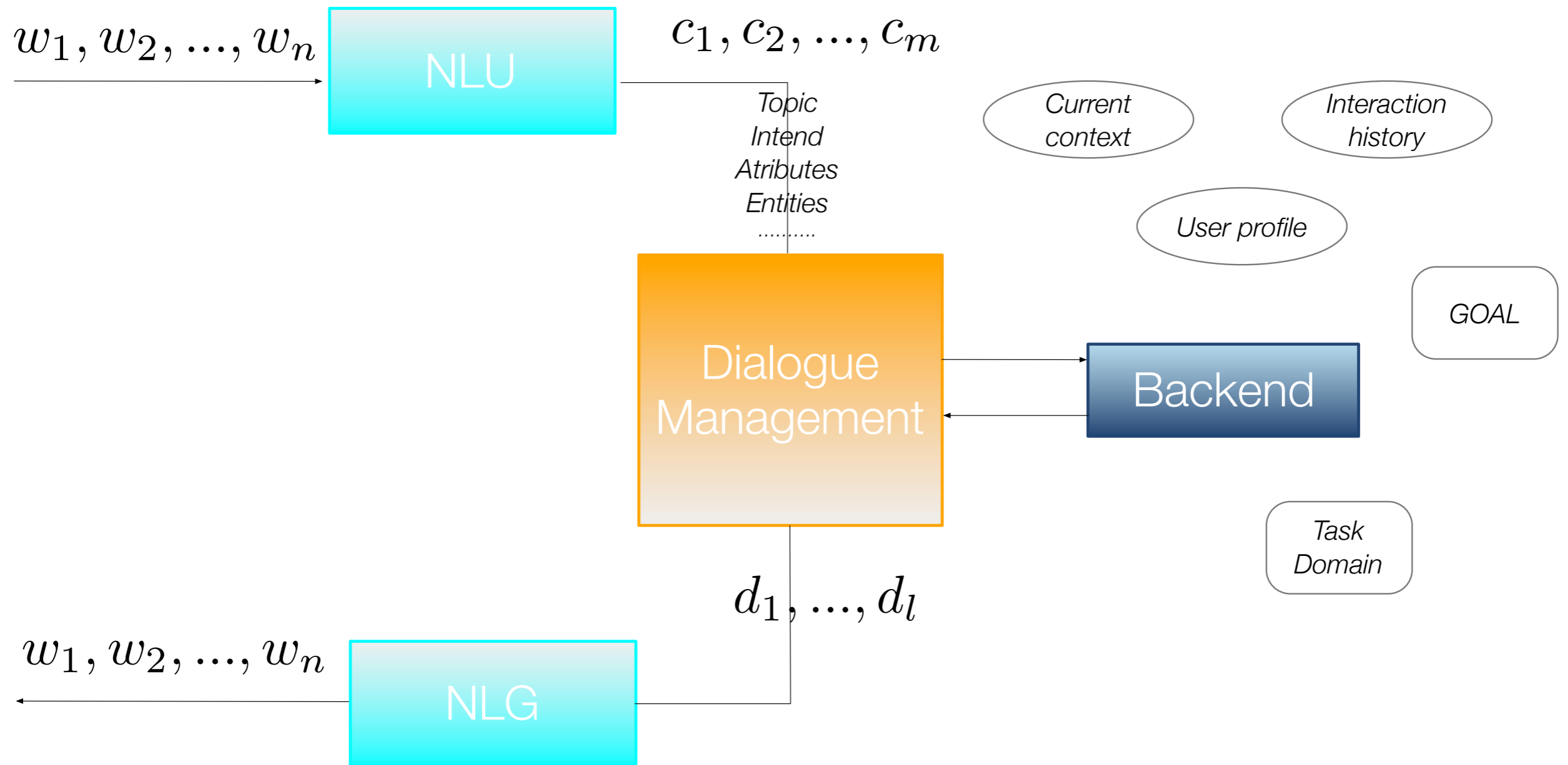
Spoken Dialog System



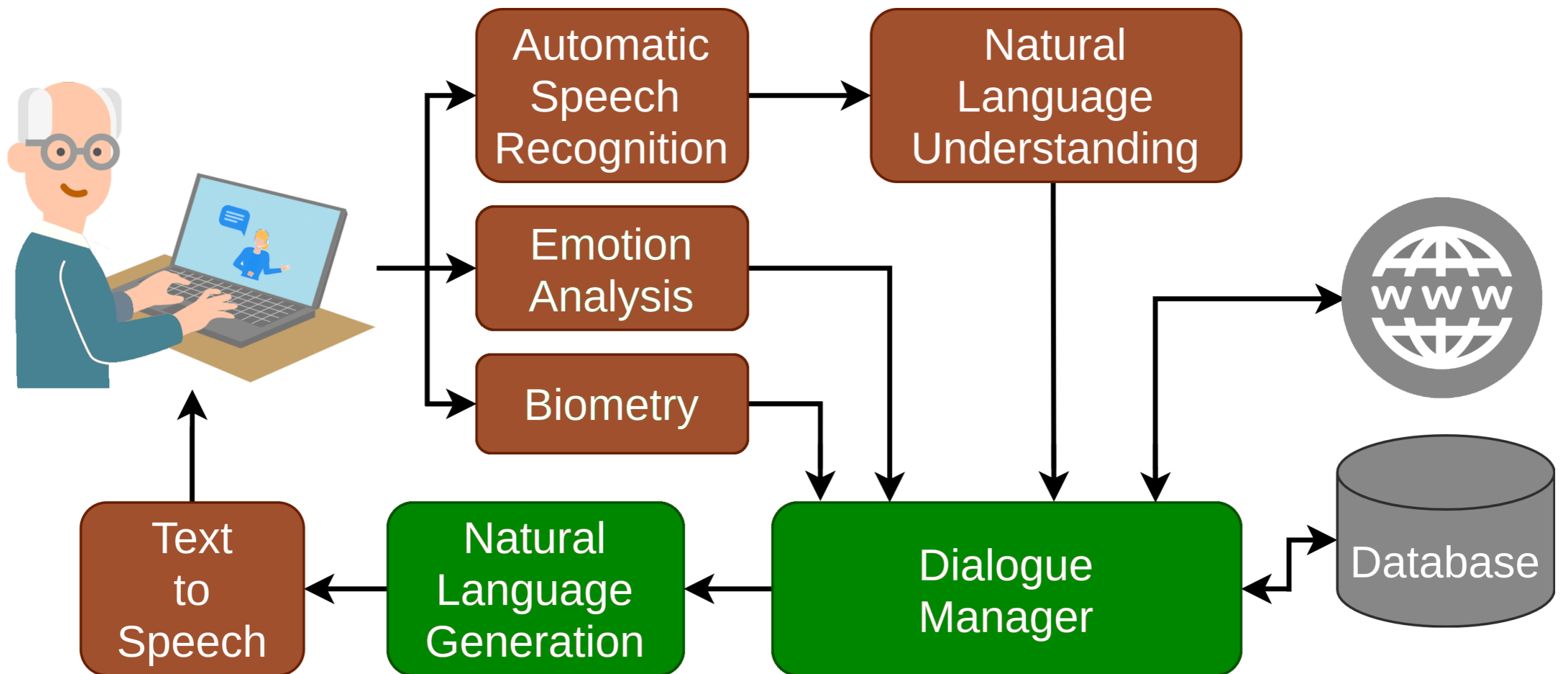
Dialogue Flow



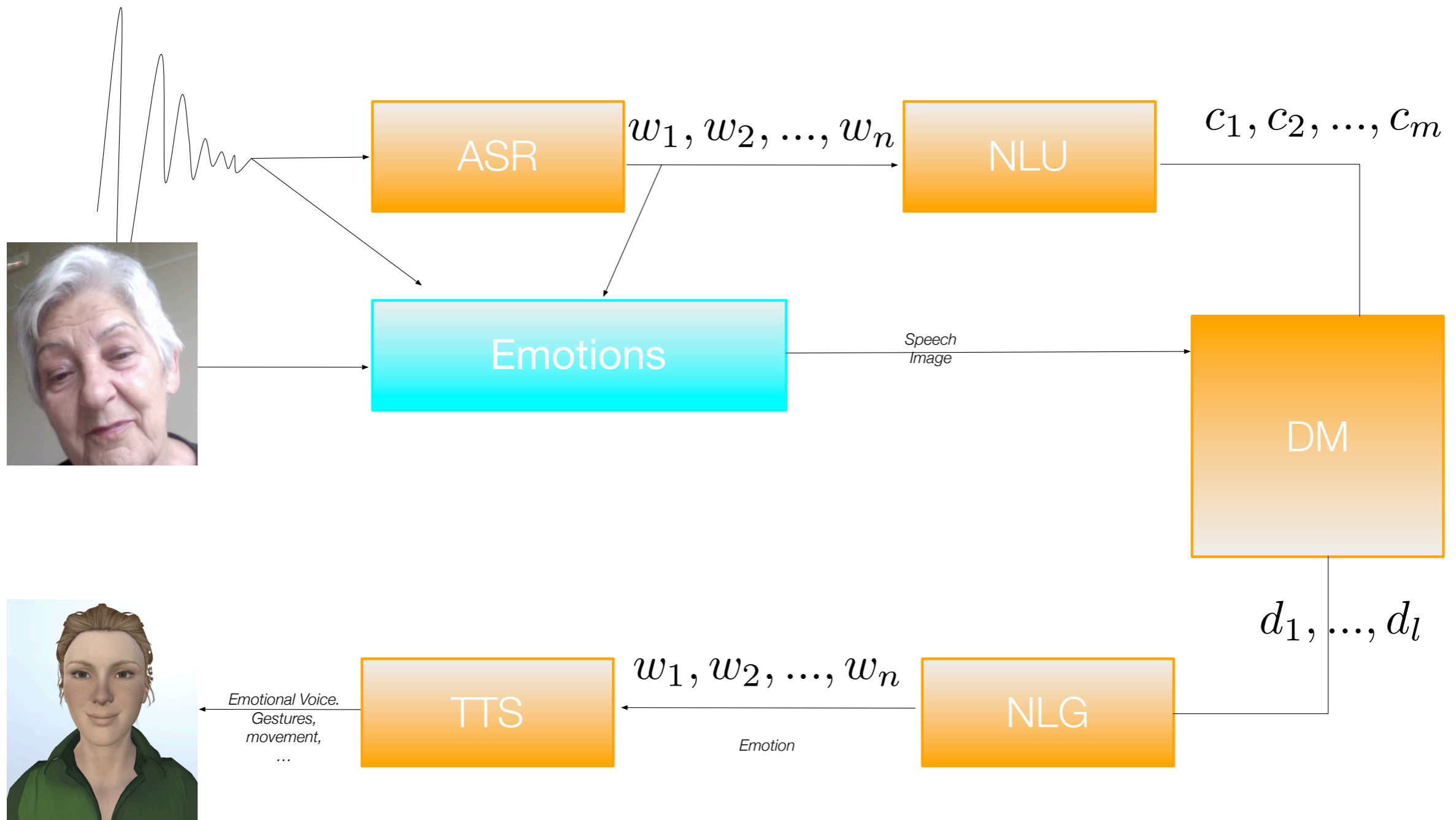
Dialogue Management: a complex decision



Knowledge representation, external connection, ...



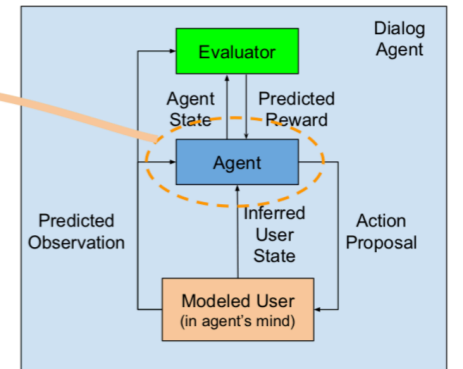
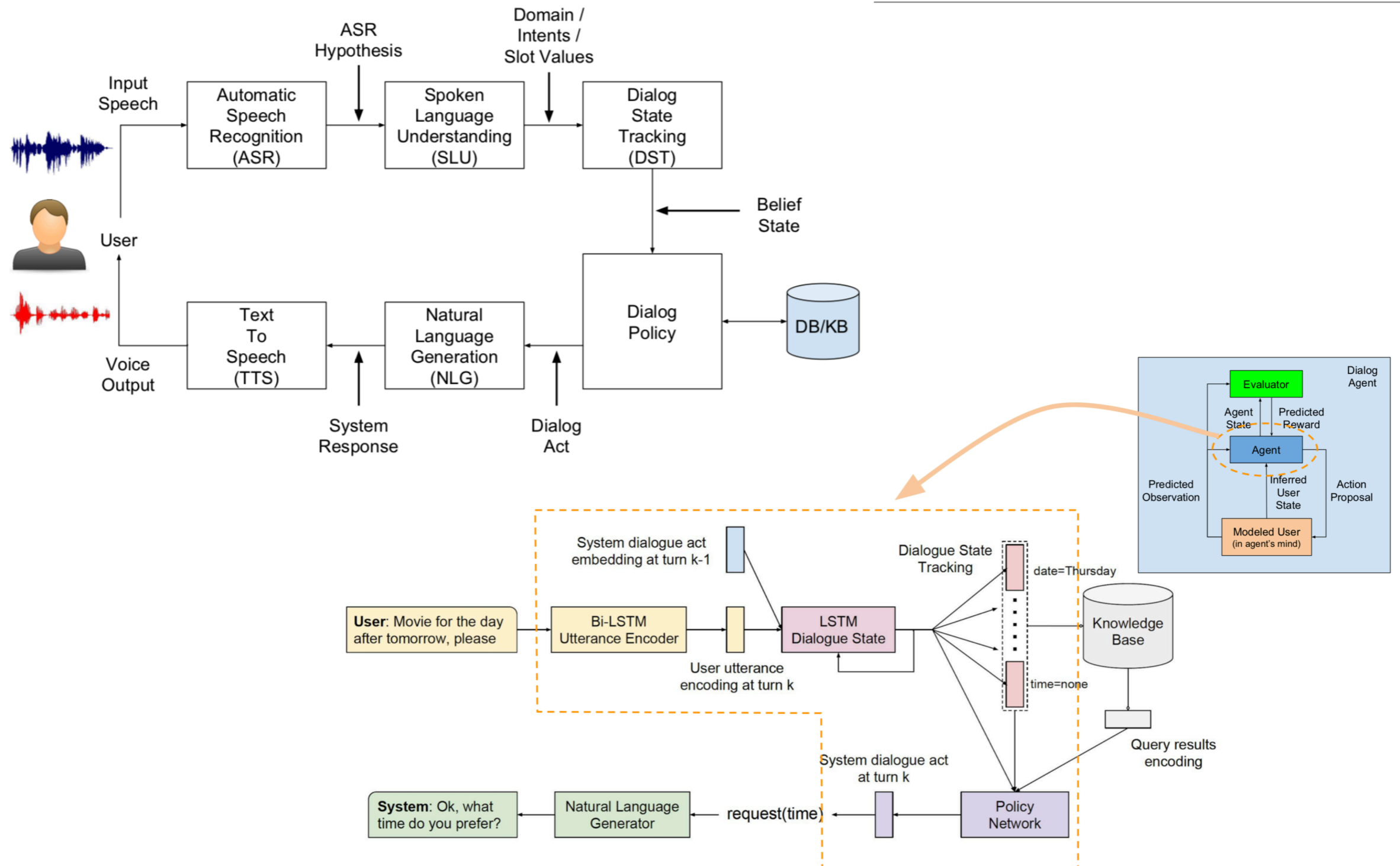
Multimodal Spoken Dialogue System



Technologies

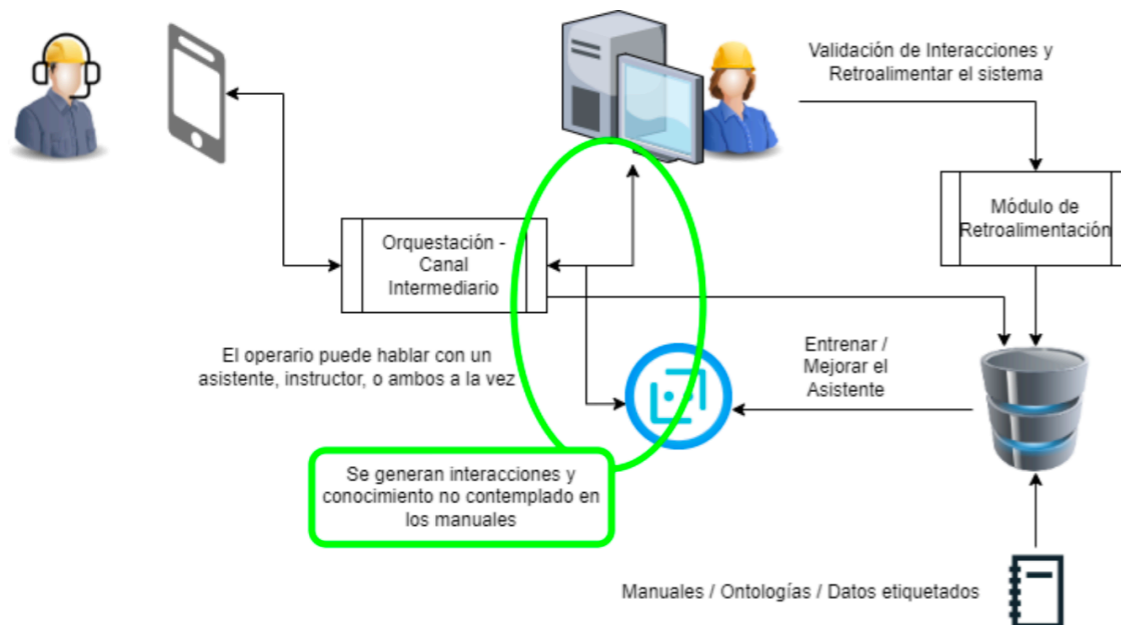
- ATIS (Air Travel Information Systems) project funded by DARPA.
- Markov Decision Process (MDP) and POMDPs.
- Agenda, rule based,.....
- DST2,.....DST9
- Stochastic Transducers, among others.
- Siri, Watson Alexa, Cortana, Google Home.....
- Neural Networks: open domain,....
- LLM: Whisper, BERT, GPT2, GPT3, GPT4,.....

End-to-End for Task Oriented



Industry: open challenges

BERREKIN – Operador in the Loop



EKIN – HMI estático



- Colaboración **tri-direccional** entre el operario y el sistema
- El **sistema evoluciona y se adapta** a las interacciones
- Localizado a cada planta industrial y perfiles de operarios

- Colaboración **unidireccional**
- El sistema es estático, no aprende de las interacciones
- Sistemas genéricos

RTTH FALL SCHOOL: Tuesday

- Introduction to Conversational Systems - M. Inés Torres (UPV(EHU))
- Data-driven speech and language technology: from small to large models - Hermann Ney
- Conversational Systems Development: An Engineering Perspective - Zoraida Callejas (UGR)

RTTH FALL SCHOOL: Wednesday






- Speech in Spoken Dialogue Systems - M. Inés Torres (UPV/EHU)
- Understanding ChatGPT: Technology, Trends and Challenges for Conversational Systems (Part 1) - Luis Fernando D'Haro (UPM)
- Understanding ChatGPT: Technology, Trends and Challenges for Conversational Systems (Part 2) - Luis Fernando D'Haro (UPM)
- Automatic Dialogue Evaluation for Conversational Systems - Luis Fernando D'Haro (UPM)

RTTH FALL SCHOOL: Thursday

- Hands-on workshop: Conversational Systems Development with RASA, Part 1
- M. Inés Torres, Javier Mikel Olaso, Zoraida Callejas
- Hands-on workshop: Conversational Systems Development with RASA, Part 2
- Conversational Systems Development with RASA, Part 3

M. Inés Torres (UPV/EHU), Javier Mikel Olaso (UPV/EHU), Zoraida Callejas (UGR)

RTTH FALL SCHOOL: FRIDAY

- Three Minutes Thesis Presentations
-  Networking opportunities with fellow researchers and academics.
-  Exposure to diverse research perspectives and approaches.
-  An interactive platform for exchanging ideas and feedback.
-  Practice in concise and impactful communication.
-  A chance to win the Best Three Minute Thesis Award!