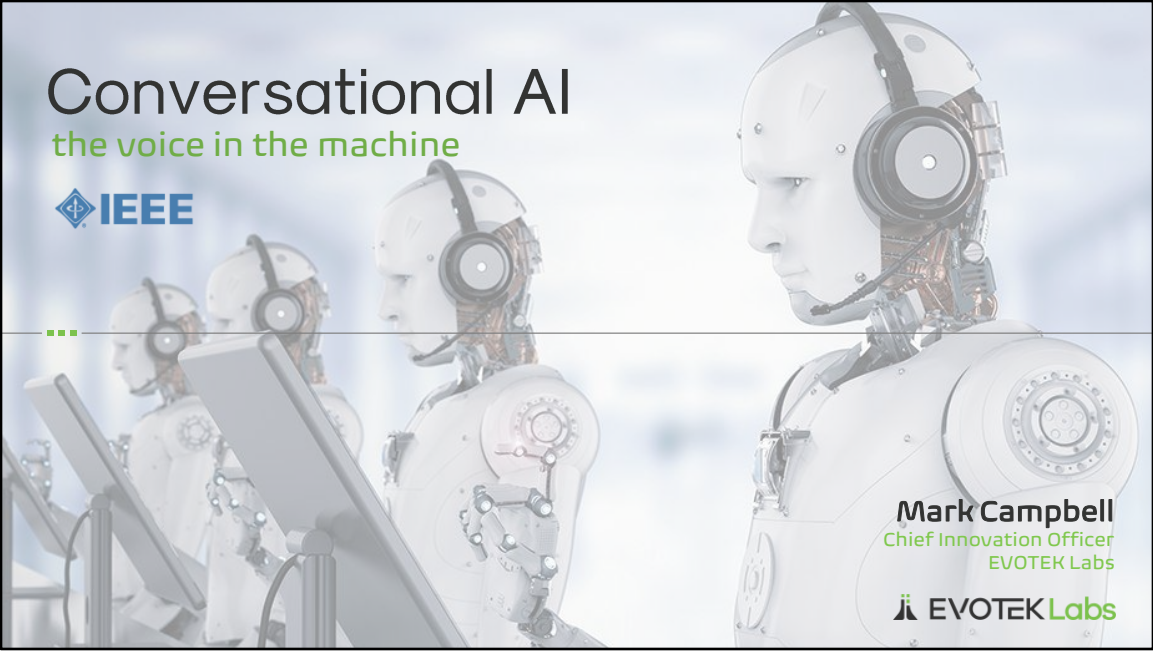


Conversational AI

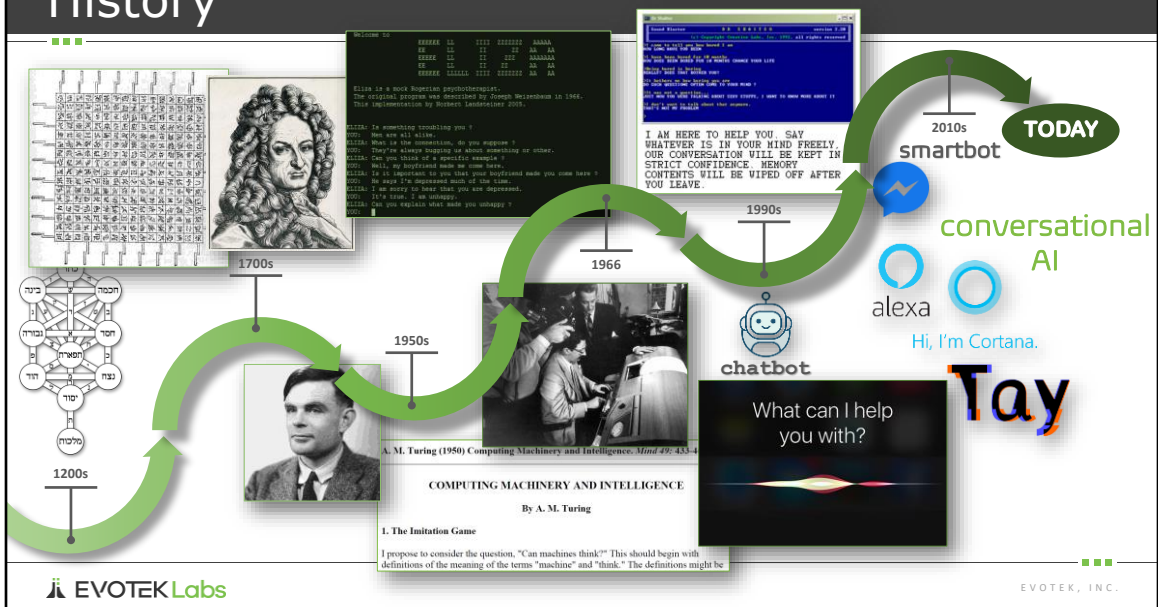
the voice in the machine



Mark Campbell
Chief Innovation Officer
EVOTEK Labs



History



1200s Kabbalistic scribes – combinatorics on Hebrew alphabet

1700s – Leibniz – system of language & cognition; Swift – Gulliver's Travels “the machine”

1950s – Turing – The Imitation Game (aka the Turing Test)

1966 – Weizenbaum – Eliza – natural language with a computer

- Users poured out their innermost issues

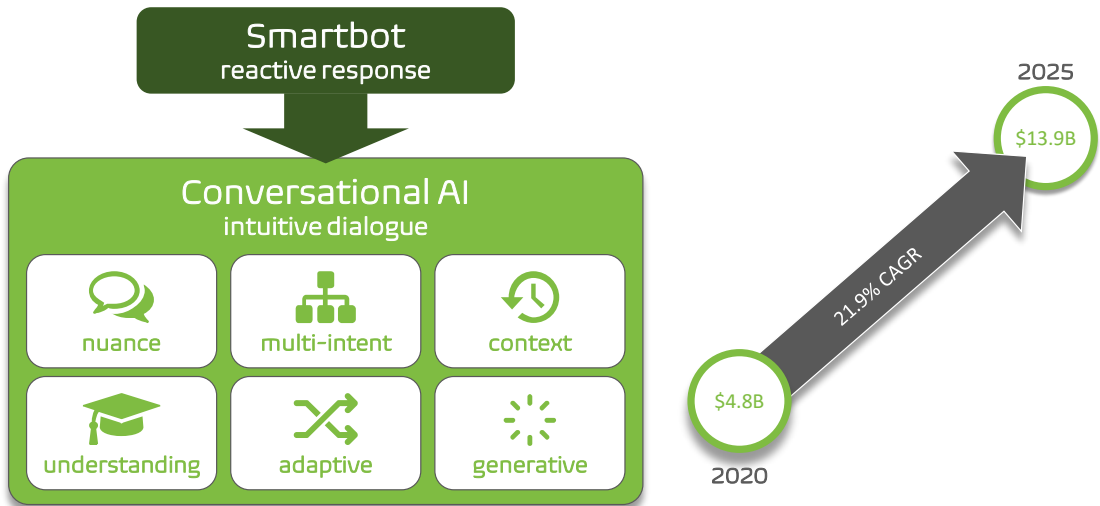
1990s – Chatbots – PARRY, Jabberwacky, Dr. Sbaitsso, ALICE, SmarterChild ... Siri (2010)

2010s – Smart Chatbots - Alexa, Cortana, Messenger, and Tay (plug pulled)

2020s – Conversational AI

- Google’s Meena – trained on 300 gigabytes of social media texts - can conduct discussions on any open-ended topic

What is Conversational AI?



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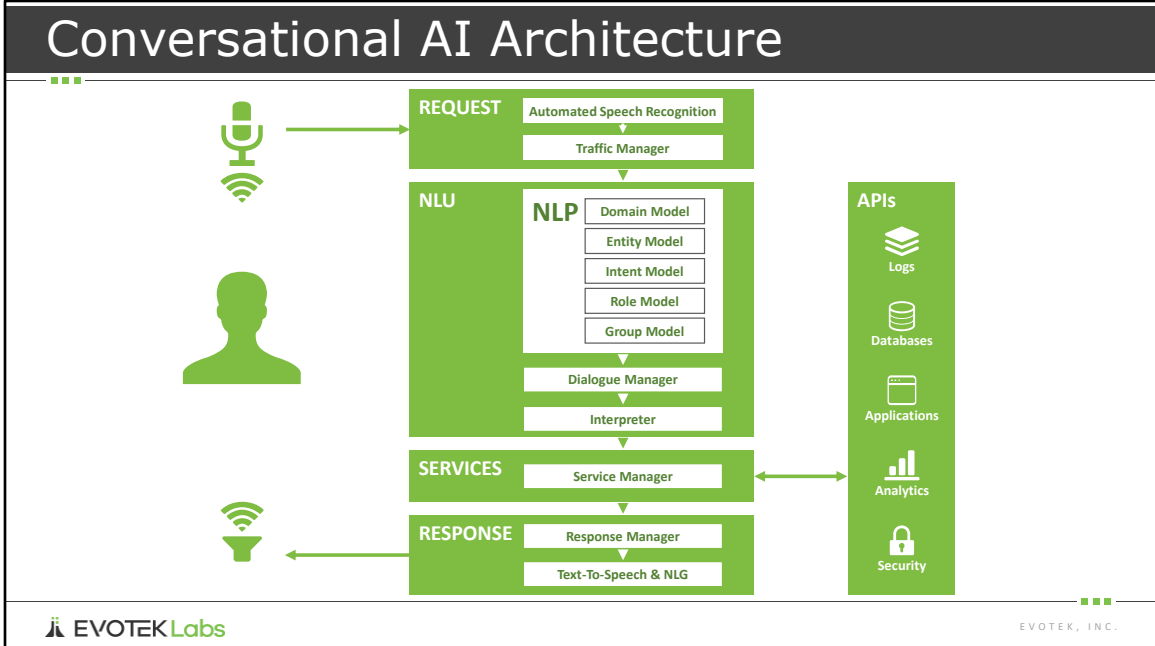
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- Nuanced Voice – Stutter, pauses, filler, fry/drag, accent - not just text, not just text to voice
- Multi-level intent – Dissect multiple intentions from dialogue
- Context – Retains conversational context across statements
- Understanding – Comprehends colloquialism, slang, jargon, abbreviations
- Adaptive – Changes style and content based on changing conversation (e.g., Sentiment)
- Generative – Generated the response type & response wording based on context not stock answer – answer to same question varies across requests

\$4.8B in 2020 to \$13.9B in 2025 - CAGR of 21.9%

reactive servant of user requests ->proactive and intuitive participant in user dialogue

Conversational AI Architecture



- **Request** – speech to text and a traffic manager to route conversation text to the correct processing instances.
- **Natural Language Understanding (NLU)** – construct a coherent response to the user.
 - **Natural Language Processing (NLP)** – take user input through a semantic grinder to extract key components.
 - Domain – classification of task groups to which the user is referring (e.g., book hotel and buy plane ticket)
 - Intent – relates to one of the domain’s supported actions (e.g., buy plane ticket)
 - Entity – relates to one of the domain’s supported objects (e.g., buy plane ticket)
 - Role - a secondary entity classification to distinguish its role from other similar entities (e.g., buy a one-way plane ticket versus buy the round-trip ticket)
 - Context – intent and entity correlation from past input (e.g., “I want to go to Cleveland” changes the entity to “Buy a plane ticket to Cleveland)
 - Grouping - a language parser to determine related entity groups (e.g., book hotel in Cleveland, buy round-trip plane ticket to Cleveland).
 - **Dialogue Manager & Interpreter** – gathers context, elicit user feedback, and

learn what actions most effectively satisfy user requests.

- Sentiment analysis - monitors the user's mood and emotional state. A rapid escalation in user emotions can cause the NLP to hand the conversation over to a human operator to calm the situation. Conversely, positive emotional interactions are fed forward to the response manager to reinforce "happy-path" interactions.
- **Services** – integrates with APIs for backend business applications, databases, security policies, audit logs, analytics, and visualization systems.
- **Response** – Generates response back to the user:
 - **Response Manager** –generates response candidates selects the best response. Two response manager models:
 - **Retrieval-Based Models** – select response candidates from a knowledge base of previously observed patterns. For example, "Which of these flights to Cleveland would you prefer?"
 - **Generative Models** – create response candidates from user input and previous conversations using an NLG model. For example, "Hey, the Browns have a playoff game while you're in Cleveland. Do you want tickets to the game?"
 - **Text-to-Speech and Natural Language Generation (NLG)** – produces the "voice" response back to the user - may be augmented with an NLG module or special models (e.g., vocal fry, vocal drag, stutter, filler).

Use Cases



Virtual Assistant



Proactive Help



Mobile Access



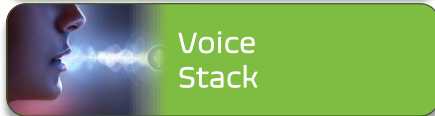
Conversational Commerce



Contact Center



Remote Training



Voice Stack



Outbound Campaigns

Virtual Assistant - Alexa, Cortana, Messenger, Bixby

Mobile Access – Voice MFA, Liveness tests

Call Center & Contact Center – smart textbots, virtual frontline call agents, real time sentiment analysis, real time agent scoring/tips. Voice was most expensive – now one of the cheapest

Voice Stack – Smart frontline, omnichannel, messaging, scheduling, web, voice as RPA front end (Ushur) - Small business gets a better voice stack than Citibank day 1

Proactive Help – In-app help that jumps in when the user has problems

Conversational Commerce - Complex Commerce – non-SKU sales

Remote Training - Employee on-boarding, e-School

Outbound Campaigns - Direct marketing campaigns, collections, donations, surveys, political campaigns - legislation prevents this now



Conversational
Commerce

 **INFINITUS**
AUTOMATING PHONE CALLS



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Contact
Center



Gridspace

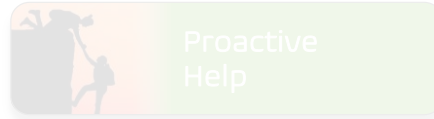
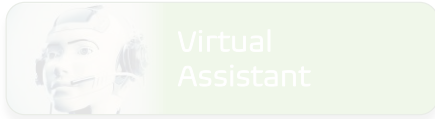


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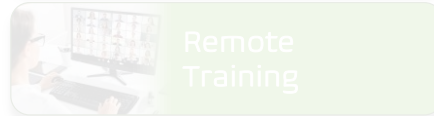


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Use Cases

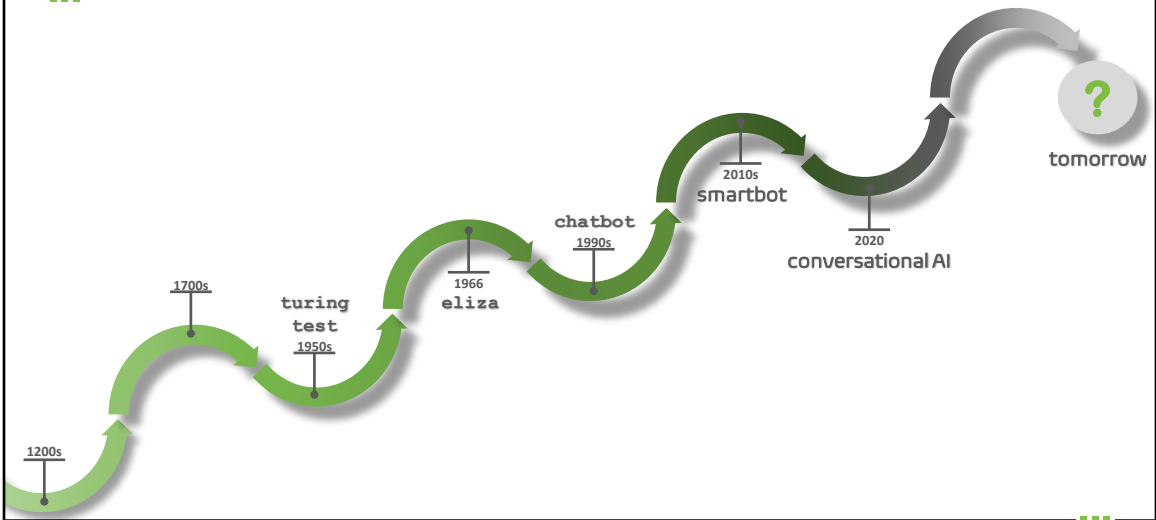


“In five years, we want to be agentless”

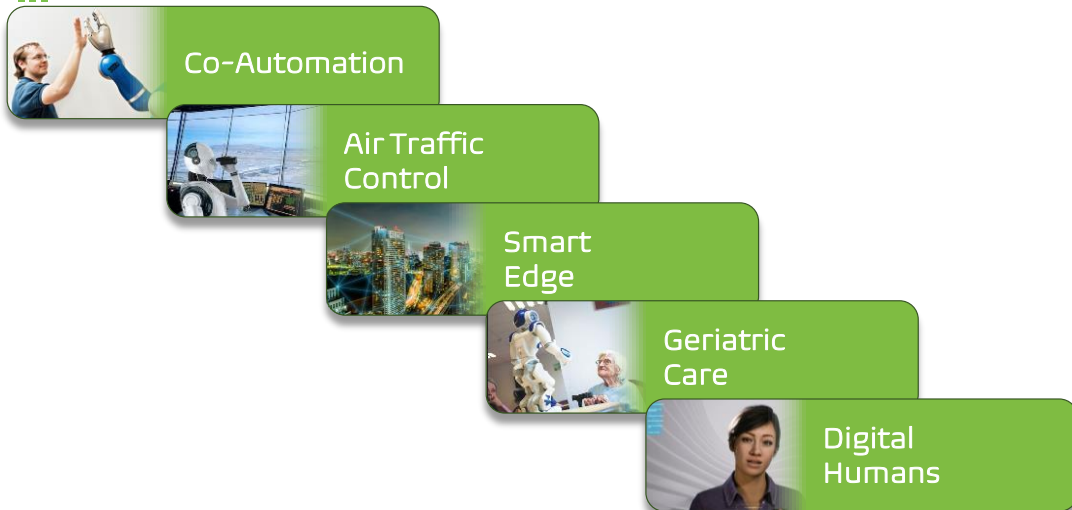


EVOTEK Customer – kept anonymous
Was viewed as impossible by team – but now seems doable.

Beyond



Beyond



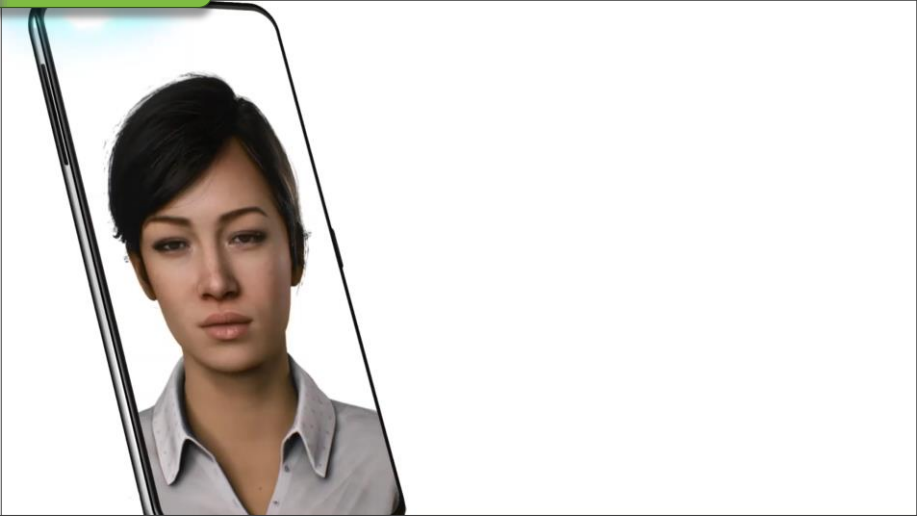
- **Co-Automation** – Conversational AI will act as the link between humans and automation systems in collaborative processes that take advantage of what people and machines each do best [14].
- **IoT** – As conversational AI systems are optimized, tuned, and miniaturized, they will be embedded into many smart edge devices such as vehicles, appliances, facilities, security, and sensors, giving them the ability to converse directly with operators.
- **Air Traffic Control** – Before you freak out, know that conversational AI is a natural fit for air traffic control where the interaction is verbal communication between a pilot and a controller. Regulatory hurdles aside, AI-controlled air traffic control conversations will be calmer, more accurate, and ultimately much safer than the current human-human system [15].
- **Geriatric Care** – Just imagine the myriad uses of a conversational companion for the growing elderly population: An ever-patient, smart assistant conversing on a variety of topics; reminding their friend of appointments and medications; alerting first-responders in case of an emergency and sharing pertinent healthcare information; or just virtually reminiscing over a meaningful song or

photo album.

- **Digital Humans** – Companies like Uneeq are coupling conversational AI with animated AI-generated faces to augment the virtual assistant persona. By combining facial gestures and body language to the conversation, these digital humans enhance the conversational experience while increasing communications accuracy and customer satisfaction [16].



Digital
Humans



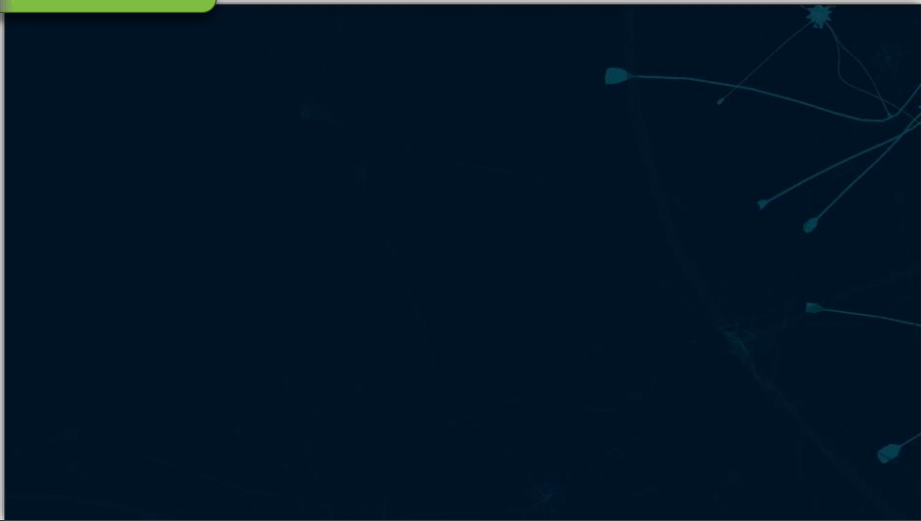
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Digital
Humans

soul
machines



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Other Resources



Beyond Conversational AI
December 2020



**Conversational AI
Changing Tomorrow's
Health Care Today**
August 2021



Conversational AI
4 Episodes

**Conversational AI
in Healthcare**
2 Episodes



Emerging Technology Summit
October 13

labs@evotek.com or EVOTEK Labs on [LinkedIn](https://www.linkedin.com/company/evotek)



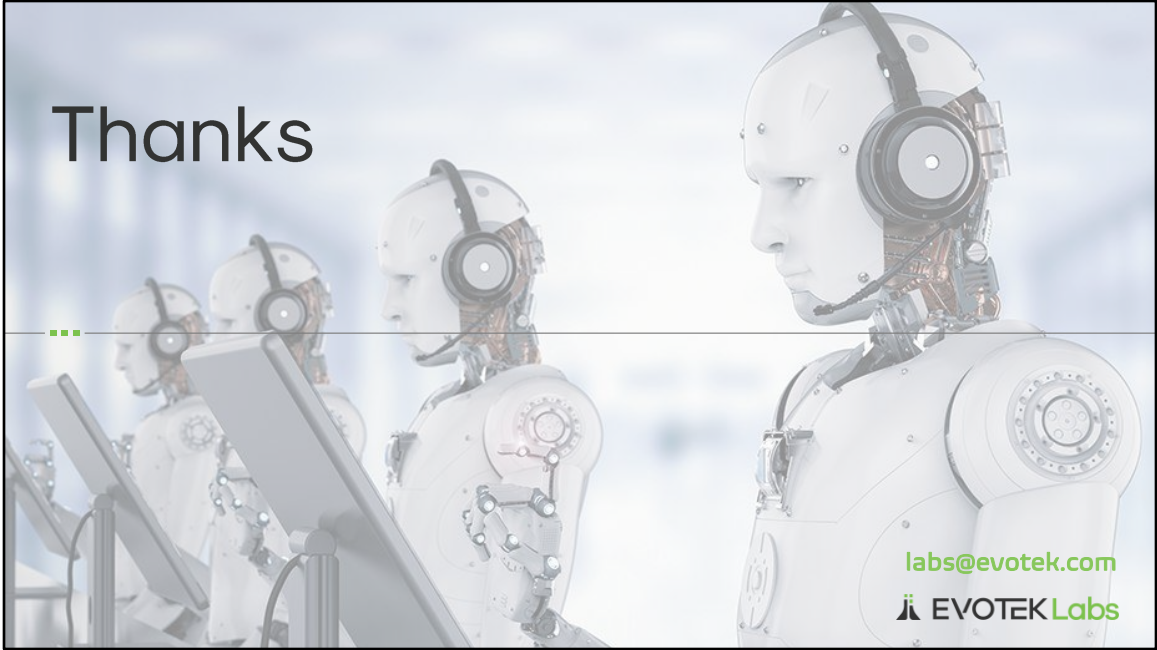
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YouTube - <https://www.youtube.com/playlist?list=PLZ3OD6iFiGzAJpQJtnz--wh5FEItIDuz3>

LinkedIn - <https://www.linkedin.com/showcase/teknically-speaking/>

MTEK - <https://hopin.com/events/mteksummit>

Thanks



labs@evotek.com

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Drop us a line – we'd love to hear from you