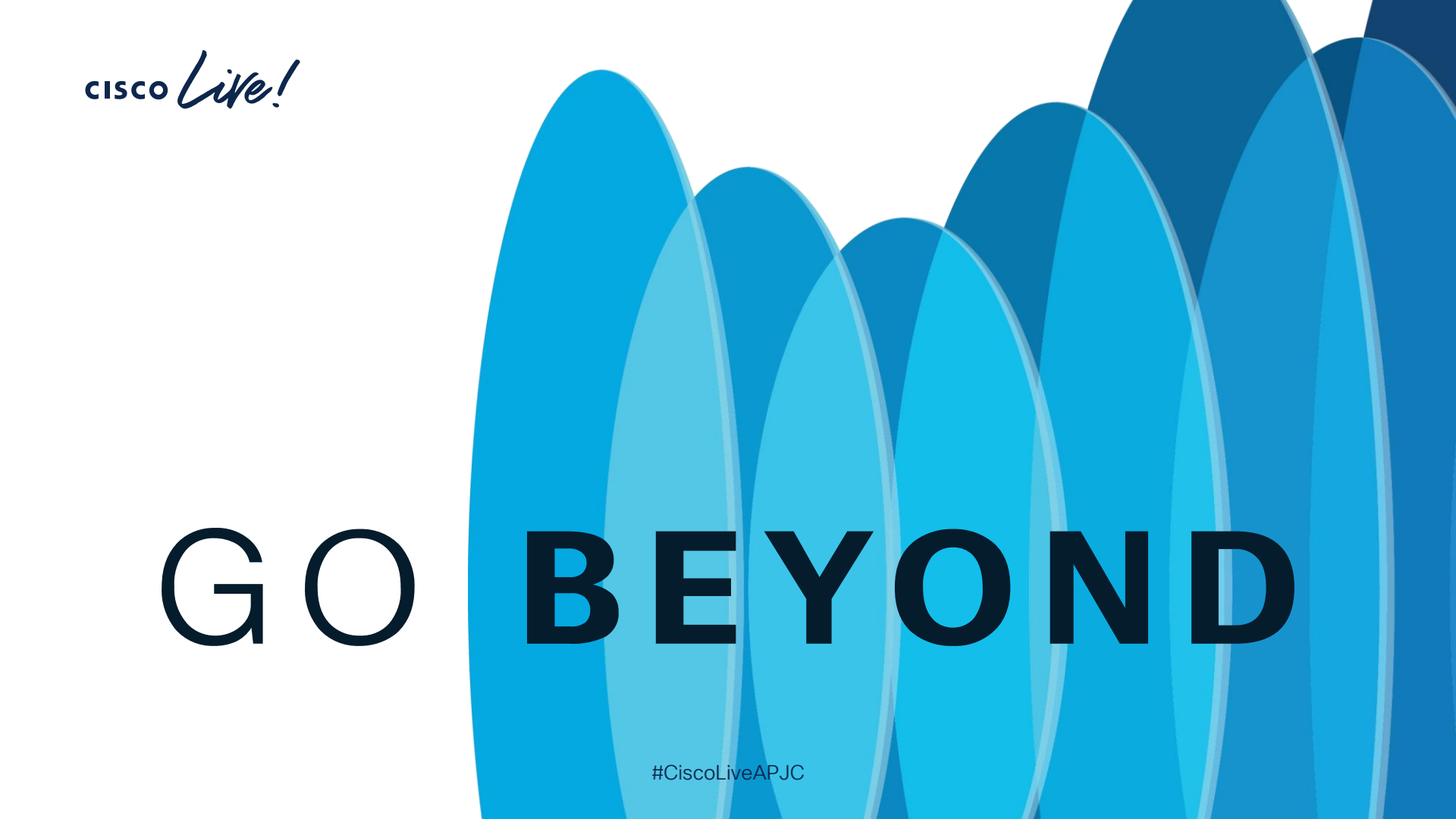
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GO BEYOND
#CiscoLiveAPJC

Collaboration AI

From Supervised to Generative

Keith Griffin, Cisco Fellow
@techkeith

BRKCOL-1661

Cisco Webex App

https://ciscolive.ciscoevents.com/ciscolivebot/#BRKCOL-1661

Questions?

Use Cisco Webex App to chat with the speaker after the session

How

1. Find this session in the Cisco Live Mobile App
2. Click “Join the Discussion”
3. Install the Webex App or go directly to the Webex space
4. Enter messages/questions in the Webex space

Webex spaces will be moderated by the speaker until November 15, 2024.

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Agenda

- Generative AI
- Collaboration AI Strategy
- AI Capabilities
- AI Architecture Advantage
- Responsible AI for Generative AI
- Summary

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Why should you care about AI?

Will AI ever replace radiologist?

Langlotz launched into this part of his presentation by quoting the psychologist, computer scientist and AI pioneer Geoffrey Hinton, PhD, who told a *New Yorker* writer in 2016:
"[I]f you work as a radiologist you are like Wile E. Coyote in the cartoon. You're already over the edge of the cliff, but you haven't yet looked down. It's just completely obvious that in five years deep learning is going to do better than radiologists."

Langlotz posed the question, then answered:
"I say the answer is no–but radiologists who use AI will replace radiologists who don't."

Source: RSNA 2017: Rads who use AI will replace rads who don't

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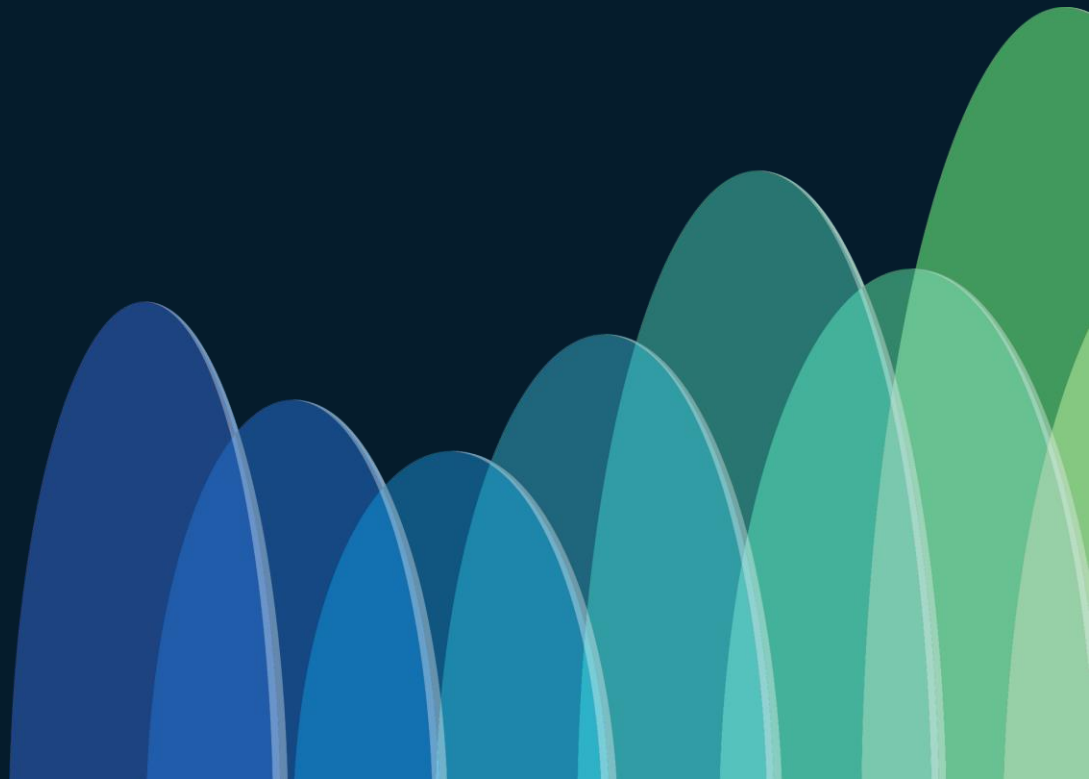
Machine Learning and AI How does this work?



Artificial Intelligence

Artificial intelligence is a broad field, which refers to the use of technologies to build machines and computers that have the ability to mimic cognitive functions associated with human intelligence, such as being able to see, understand, and respond to spoken or written language, analyze data, make recommendations, and more.

Machine Learning

- Machine learning is a subset of artificial intelligence that automatically enables a machine or system to learn and improve from experience. Instead of explicit programming, machine learning uses algorithms to analyze large amounts of data, learn from the insights, and then make informed decisions.
- You may hear terms like:
  - Classification
  - Predictive Analysis
  - Supervised & Un-supervised Learning
  - Deep Learning
  - Re-enforcement Learning

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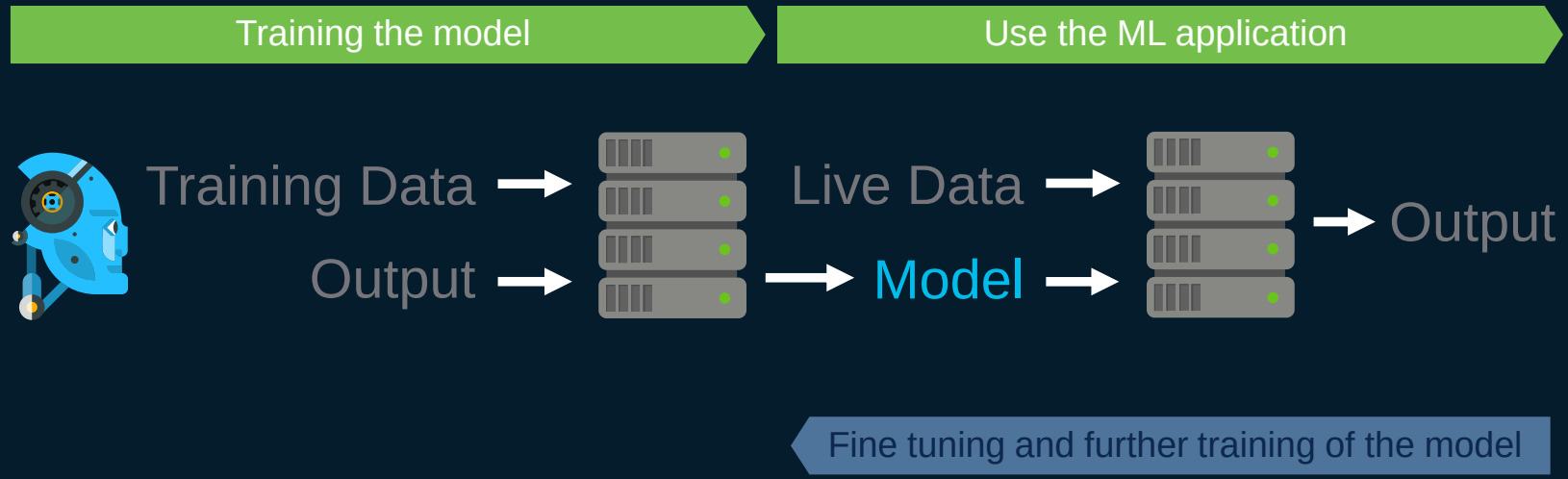
Supervised Machine Learning (from 2018 Webex ML)



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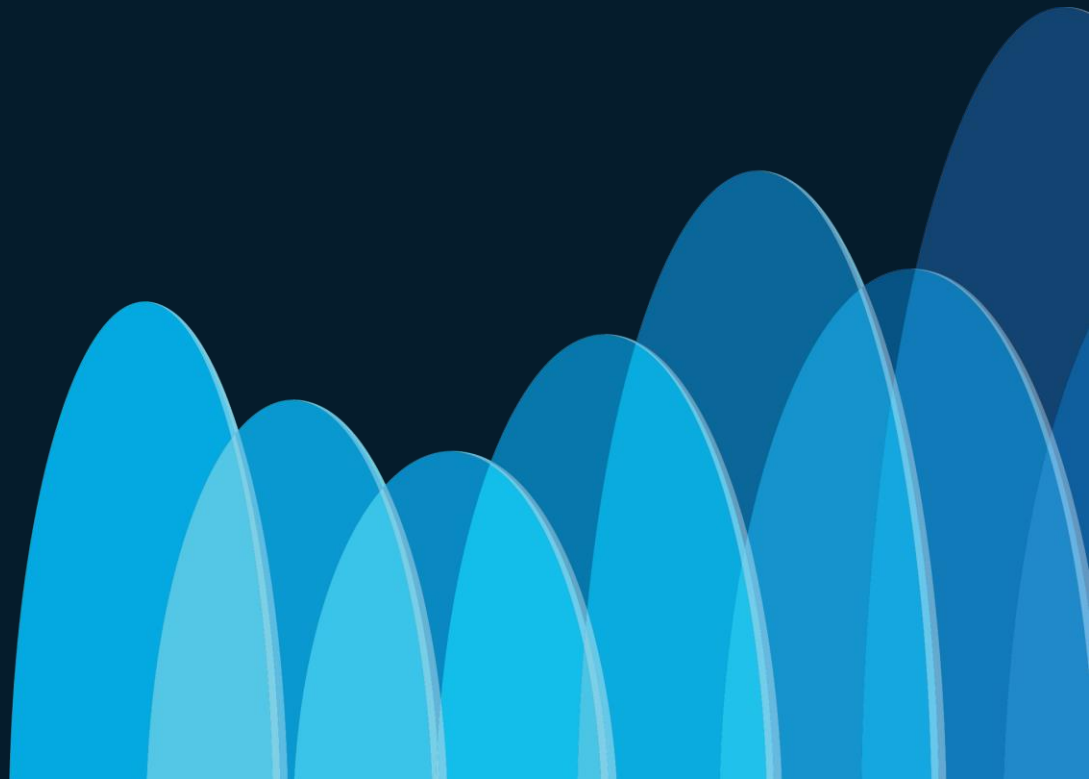
Fast Forward: Generative AI



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What is Generative AI?

Artificial Intelligence algorithms which use the data they are trained on to generate new content including text, imaging, audio, video and synthetic data.

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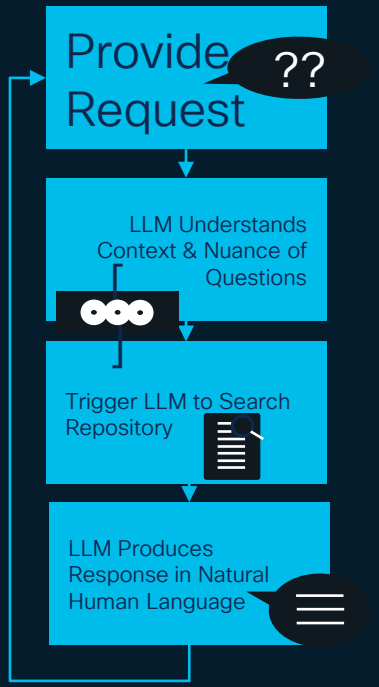
Large Language Models (LLM's)

An LLM is an artificial intelligence (AI) system capable of understanding, generating, and interacting with human languages in ways that were once thought impossible. By analysing vast datasets of text, LLMs learn to mimic language patterns, make predictions, and generate content that feels surprisingly and almost unmistakably human.

LLMs are the technology behind your helpful chatbot assistants, sophisticated content creation tools, and much more.



https://outshift.cisco.com/blog/what-is-large-language-model-llm

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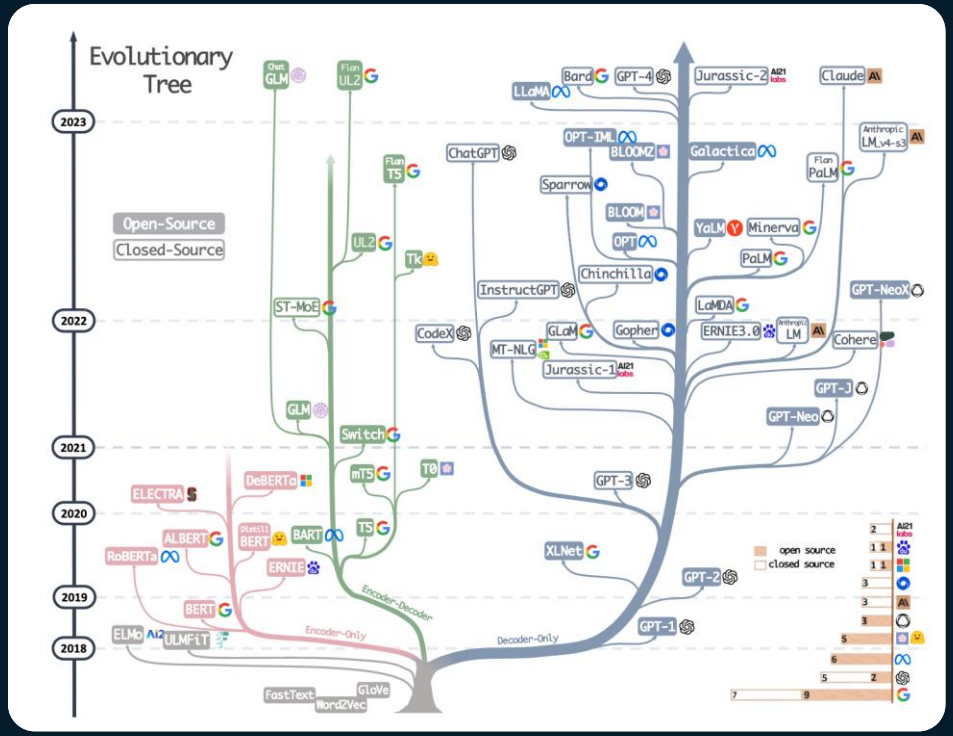
The emergence of generative AI

- Large Language Models (LLMs) can generate outcomes by predicting and composing based on data that they are trained on.
- Many models exist including Proprietary and Open Source Models
- Enormous technology opportunity and challenges
- New techniques continually emerging



https://www.linkedin.com/posts/yann-lecun_a-survey-of-llms-with-a-practical-guide-and-activity-7057527966540386304-M4_2

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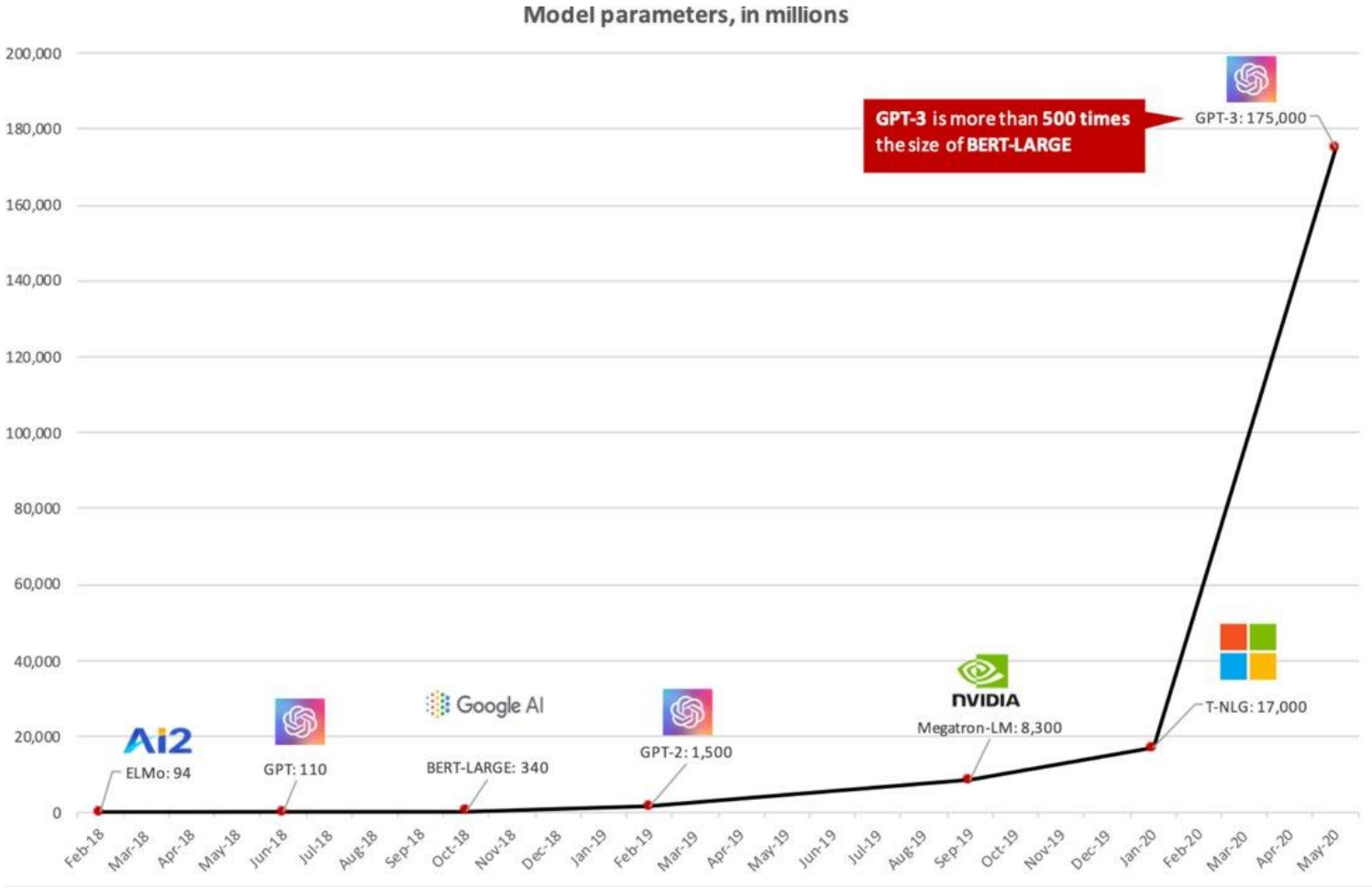

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Your relationship with Generative AI

Source: The data dividend: Fueling generative AI

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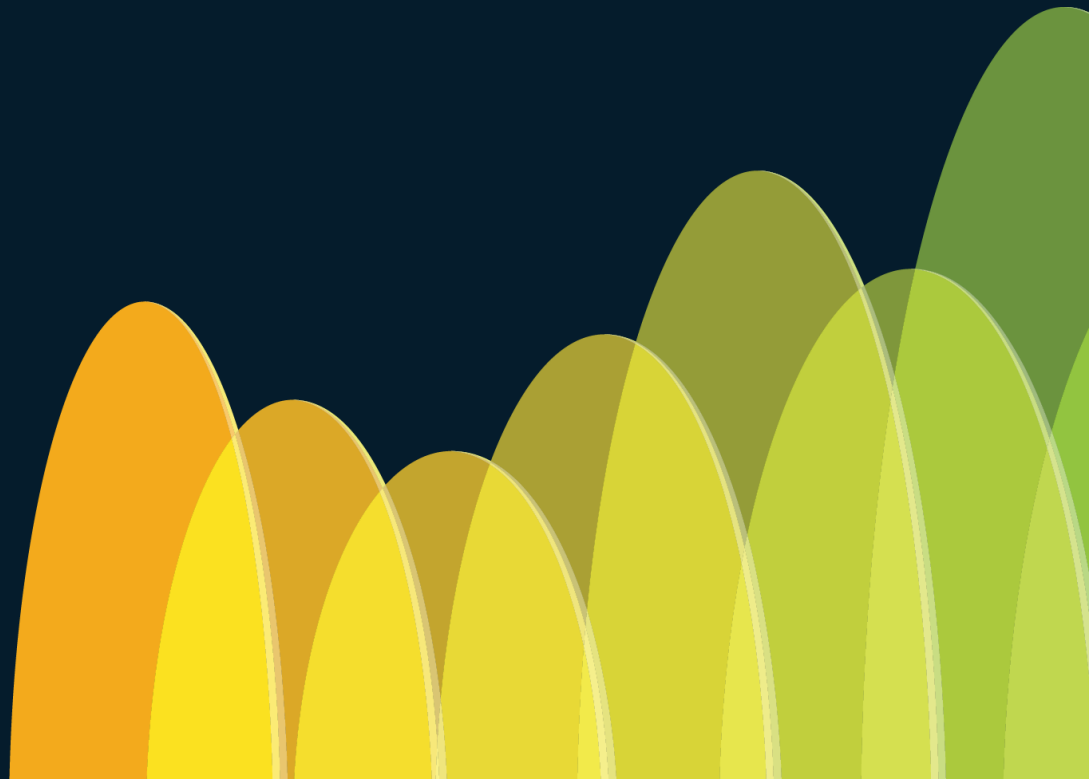
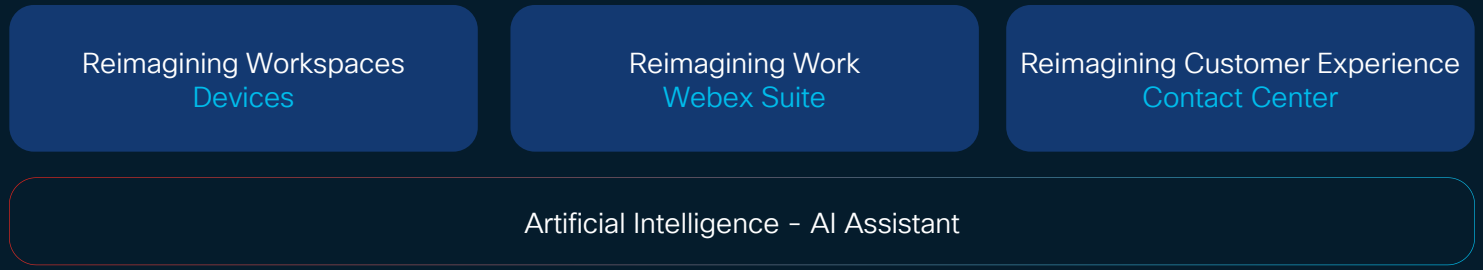
Our AI Strategy



Our collaboration strategy



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Our strategy: Enabling everyone with purpose-built AI

Webex AI Assistant

Conversational AI

Audio & Speech Intelligence

Video and Camera Intelligence

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AI Design Principles

What can users stop doing?

- Every AI-enablement must start with what user no longer needs to worry about.

Meet users where they are, enhance what they do

- Don’t underestimate user habit & muscle memory. Understand their context & needs and meet them there.

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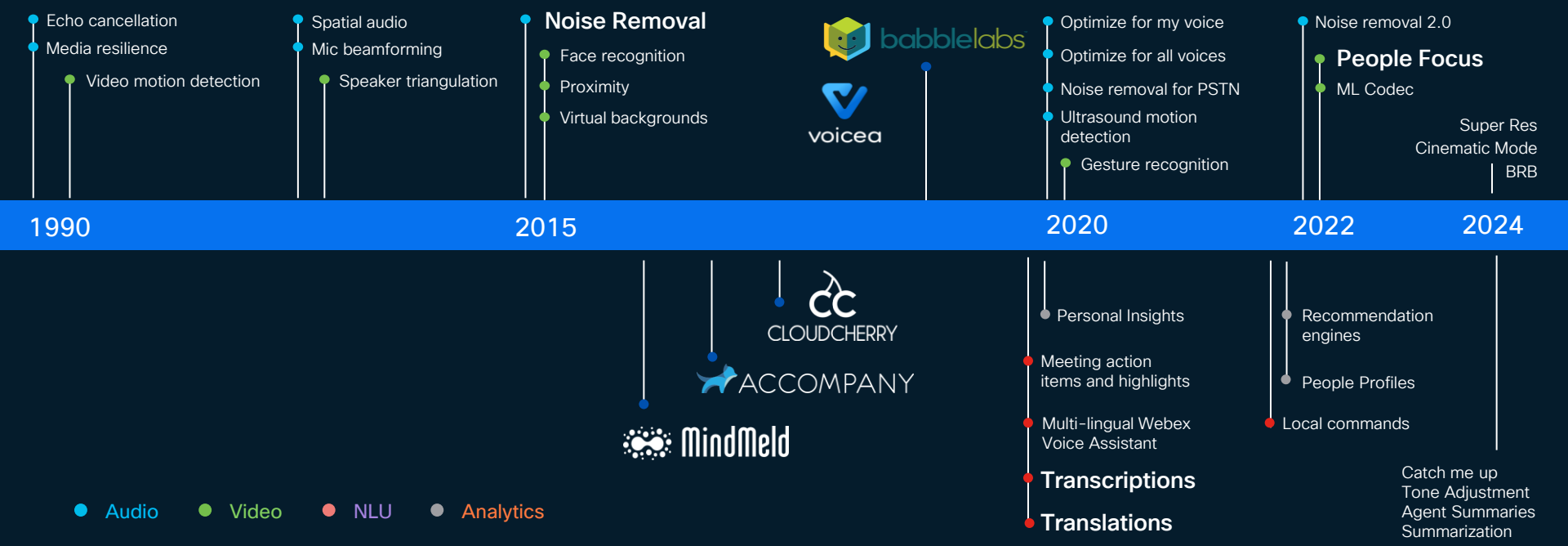
Years of AI innovation



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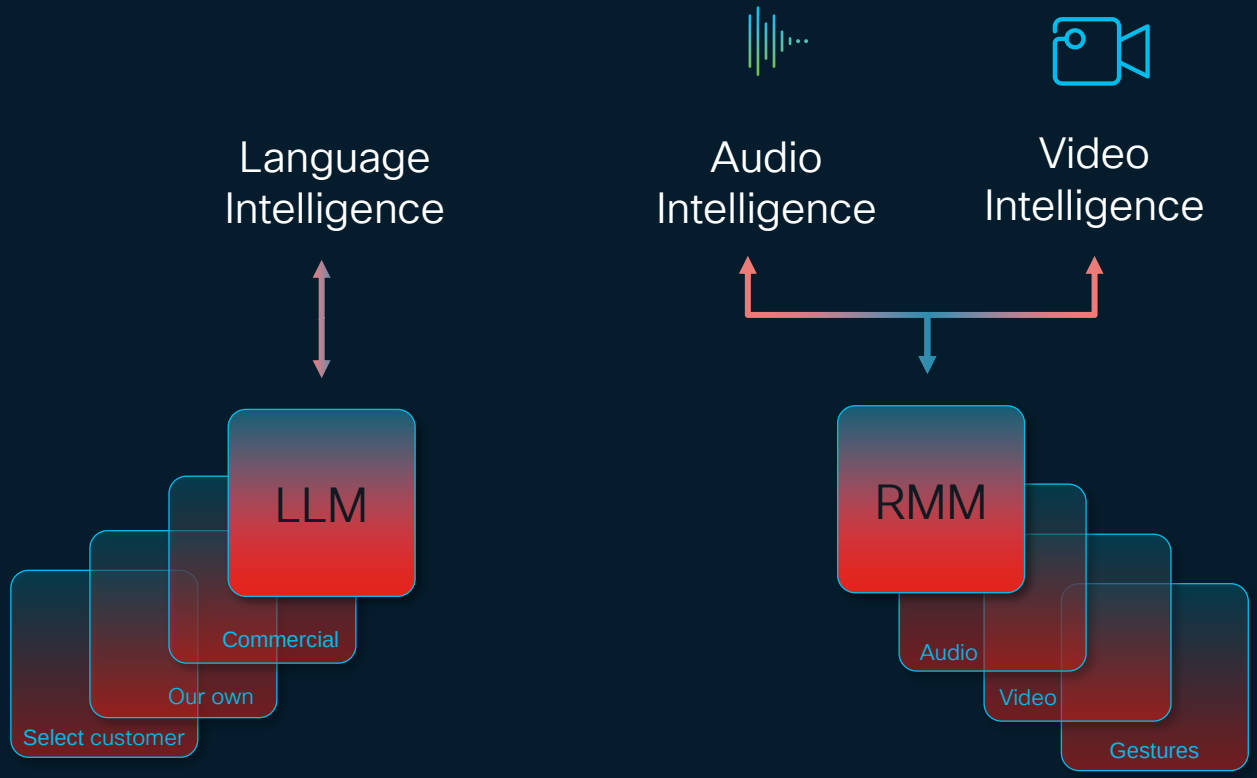

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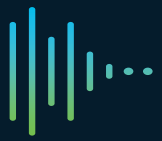
AI Capabilities

Audio and Speech Intelligence



Speech Intelligibility in Hybrid work

- Inconsistent audio experiences for in-office and remote work
- Echo & feedback in the room disrupt meetings
- Noise affects speech intelligibility for everyone – in-room, remote
- Poor (PSTN) audio quality and background noise impact speech intelligibility
- Audio disruptions -> disengagement -> reduced productivity-> reduced perceived value of conferencing solution

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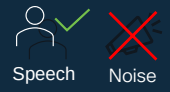
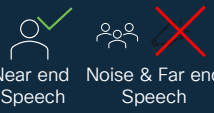
Webex Smart Audio Portfolio

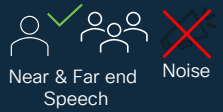
Crystal clear, network resilient



Background Noise Removal (BNR)



Optimize for My Voice



Optimize for All Voices

AI Codec

10x better PSTN

Bandwidth Extension (BWE)

Inclusive and Secure Hybrid Meetings

Multi-Mic

Audio Watermarking

"Under the hood"

Automatic Gain Control (AGC)

Music/Tone Detector

Voice Activity Detection

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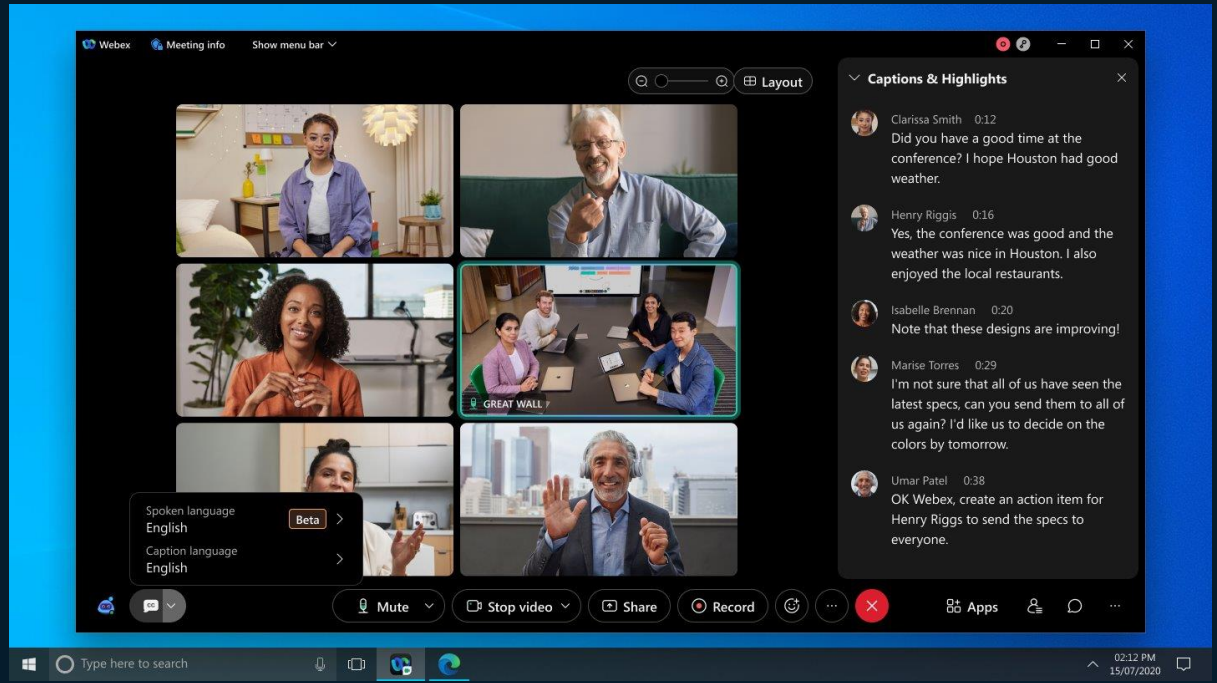
Transcription in different languages

Enable more inclusive, accessible, and engaging meetings across the globe



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Real-Time Translation

Enable more inclusive, accessible, and engaging meetings across the globe

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Meeting and call transcription accuracy

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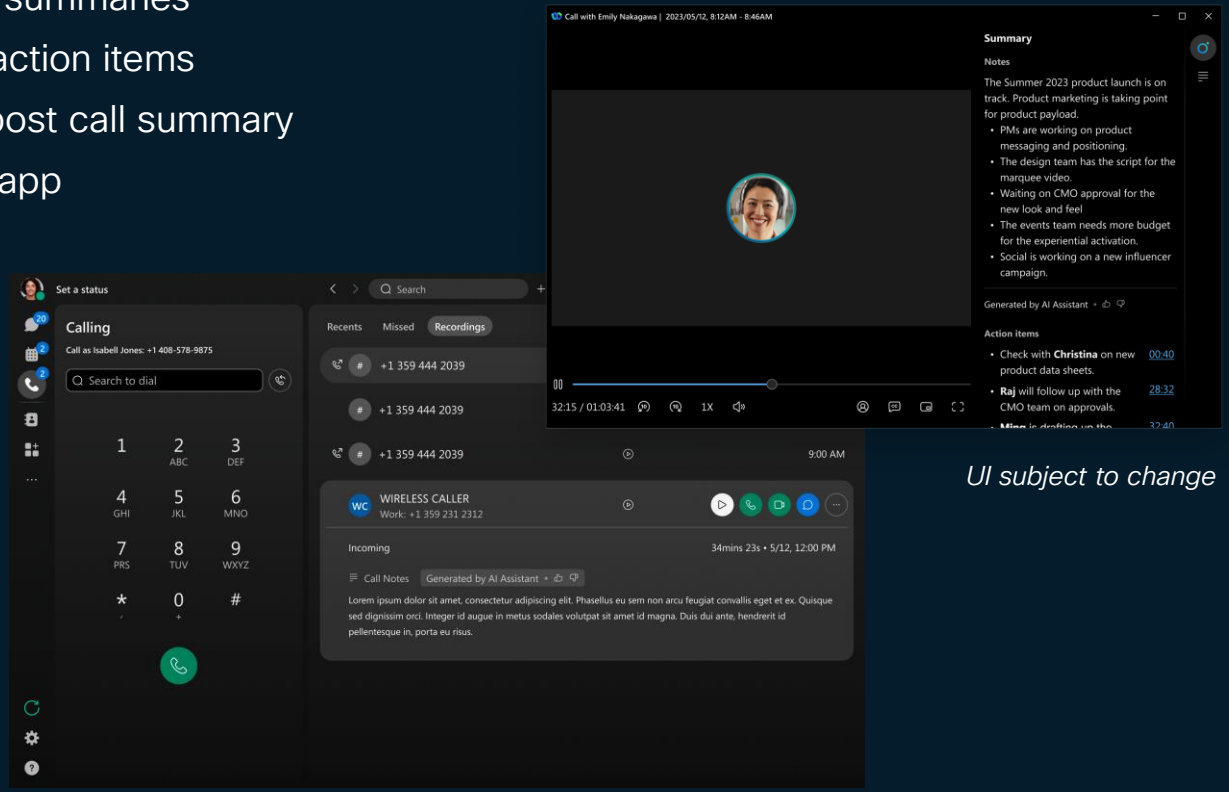
Post Recording Summary

- AI-generated transcripts and summaries
- User-editable summary and action items
- Admin control for access to post call summary
- Available via API and Webex app



UI subject to change

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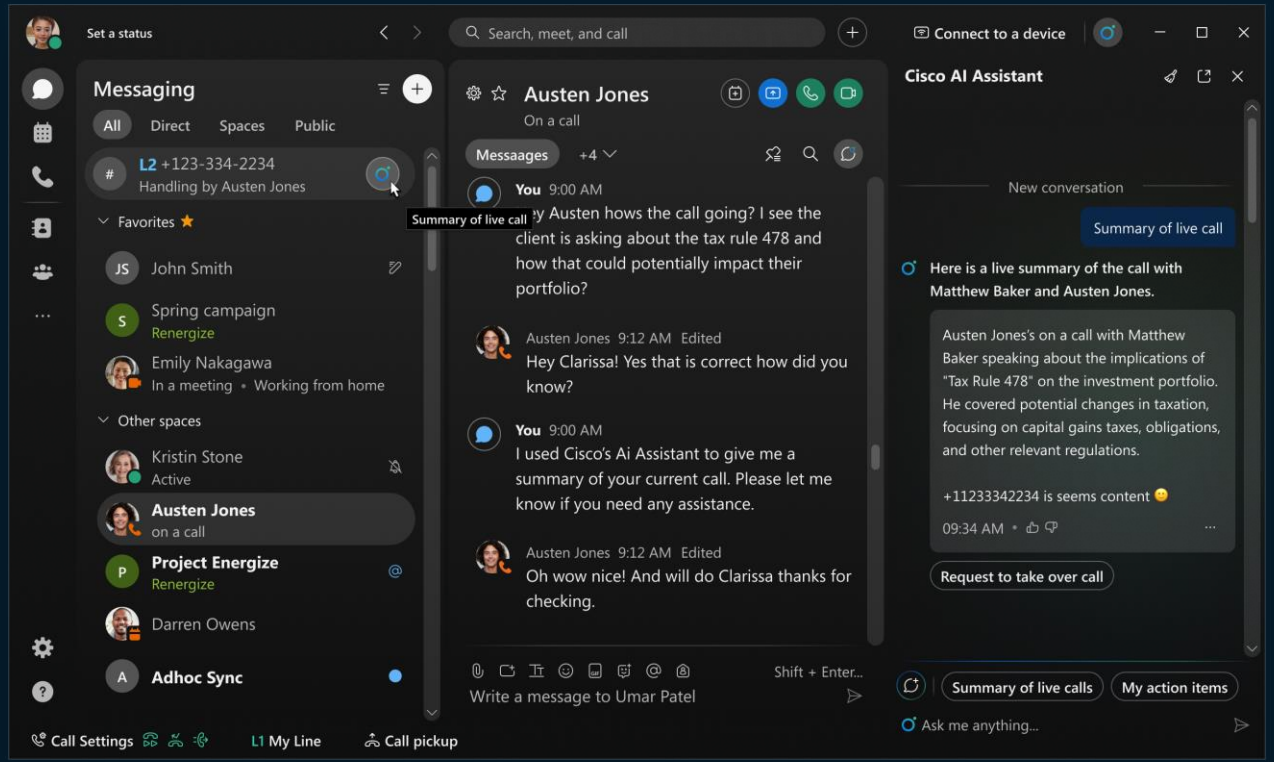
Live Call Summary and Sentiment

- Authorized users can generate summary of active calls on the shared line
- Enables line owners to view summary and sentiment of the calls answered on their behalf
- Offers flexibility to takeover the call, if required



UI subject to change

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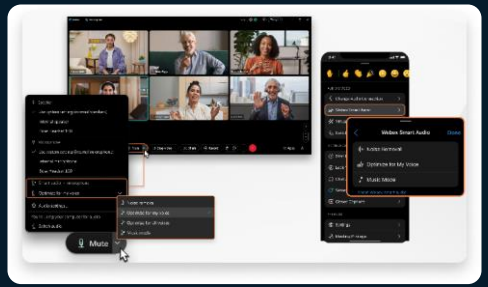
Hear and be heard, clearly, from everywhere

Available

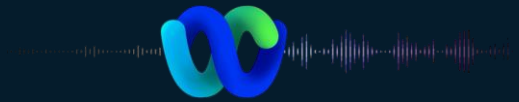


Background noise removal

Optimize for my voice

Optimize for all voices

New



Industry-first Webex AI Codec

Assigns speakers in conference rooms

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Noise Removal Demo

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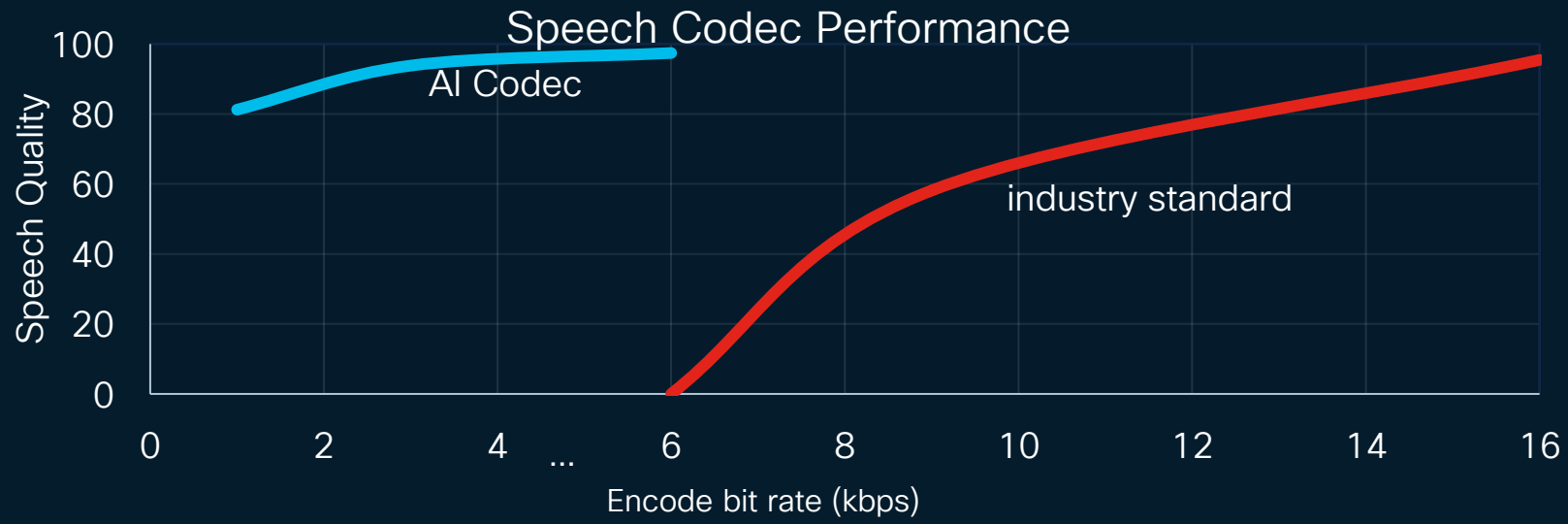
AI Codec technology opportunity

new encoding ➔ lower bit-rate ➔ less traffic ➔ more redundancy ➔ higher network resiliency ➔ super-robust audio



MUSHRA scores from 3 human evaluation panels combined by normalizing all scores to common "anchor" and "reference" scores
Panel 1: Opus 6kpbs ("anchor") 16.83, lpcnet 1.6kbps 62.38, encodec 3kbps 52.25 , xcodec 1kbps 80.53. Source@16KHz ("reference") 97.15 [164 listeners]
Panel 2: Opus 6kpbs ("anchor") 16.83, opus 9kbps 63.83, encodec 1.5kbps 22.26, xcodec 3kbps 92.68. Source@16KHz ("reference") 97.67 [141 listeners]
Panel 3: Opus 6kpbs ("anchor") 7.72, opus 16kbps 90.93, encodec 6kbps 74.72, xcodec 6kbps 92.66. Source@16KHz ("reference") 94.9 [152 listeners]

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Video and Camera Intelligence

Video AI in Hybrid work

- Quality and resilience for low bandwidth, camera quality, codec artifacts
- Privacy for remote work
- More ways to personalize and express oneself
- Professional appearance in a hybrid environment
- Experience room set-ups with enhanced cinematic experiences

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Collaboration devices
with RoomOS

AI/ML
Chipset

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Gestures and face detection in action

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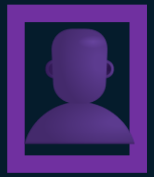
Face Recognition:
Privacy Centric Enterprise Model



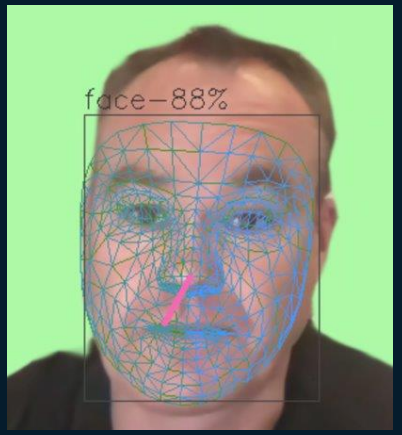
Deep Neural Network

Identifier

$$\begin{bmatrix} 0.12 \\ 0.84 \\ \vdots \\ 0.28 \end{bmatrix}$$

Match Classifier

Predicted Identity



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Real Time Media AI Models

Original video at 1080p

Downscaled to 270p through the network

Super resolution to 1080p

Video super resolution

Be right back

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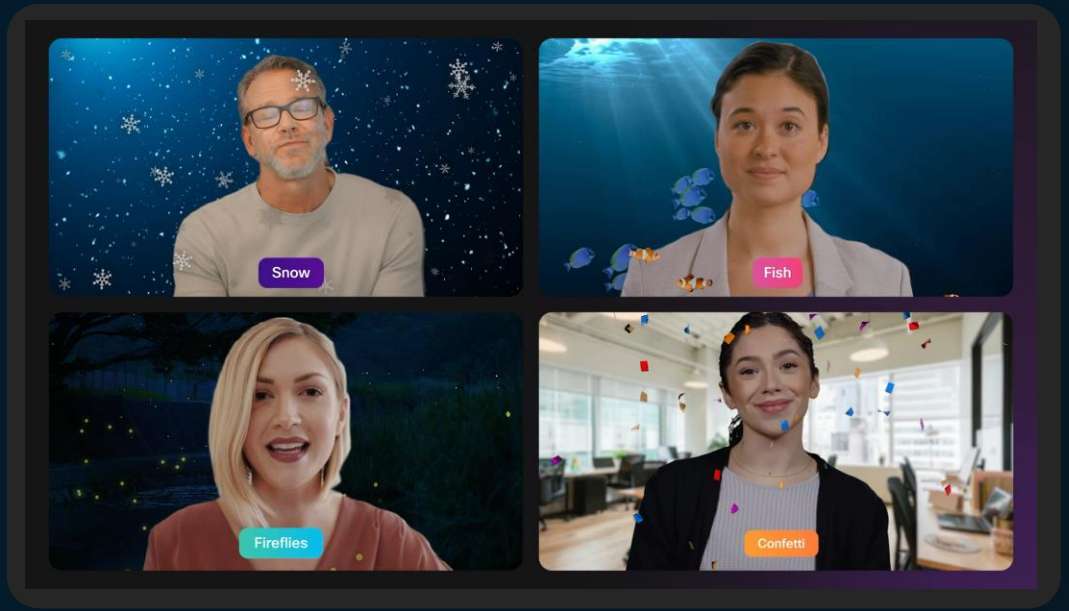
3D effects with gesture recognition

Express yourself without saying a word with a range of options



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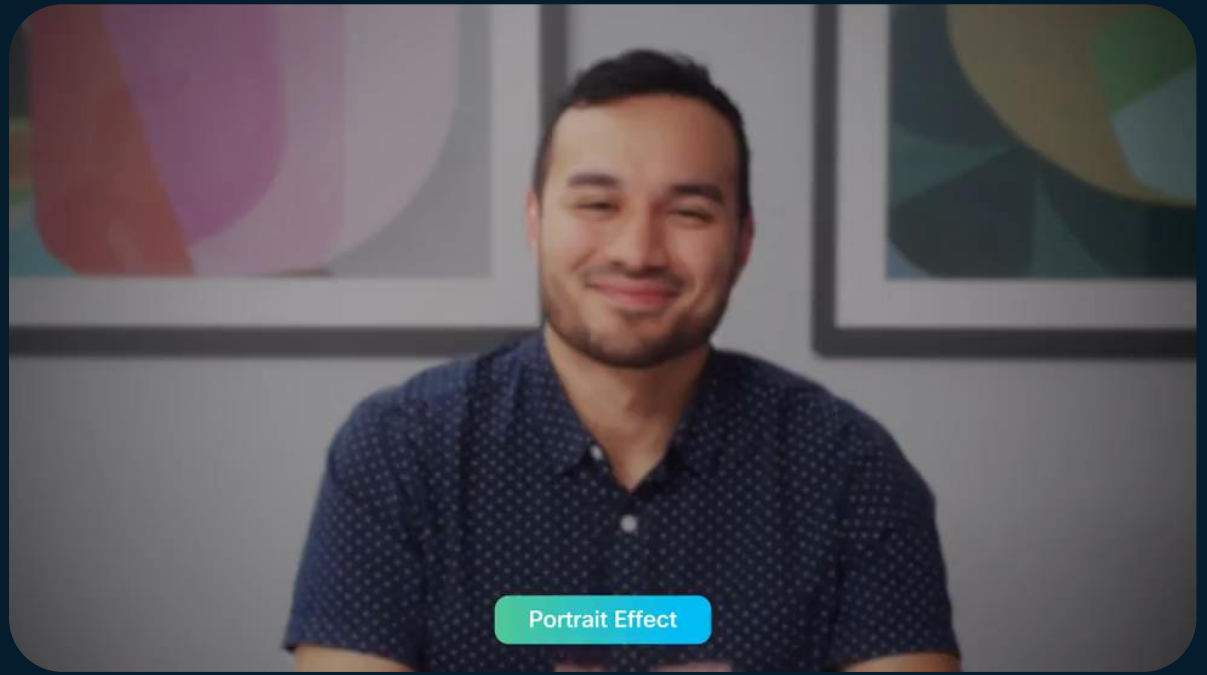
Portrait effect and Smart Relighting

- Draw individuals into the foreground of videos, adding depth and sharpness and highlighting features without compromising diversity
- Smart Relighting can help to adjust low light conditions, fix underexposed users in bright backgrounds, fix lighting with virtual backgrounds, and help you look professional in meetings



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Cinematic Meetings

EYES	EARS	BRAIN
CAMERA	MICROPHONE	VIDEO DEVICE

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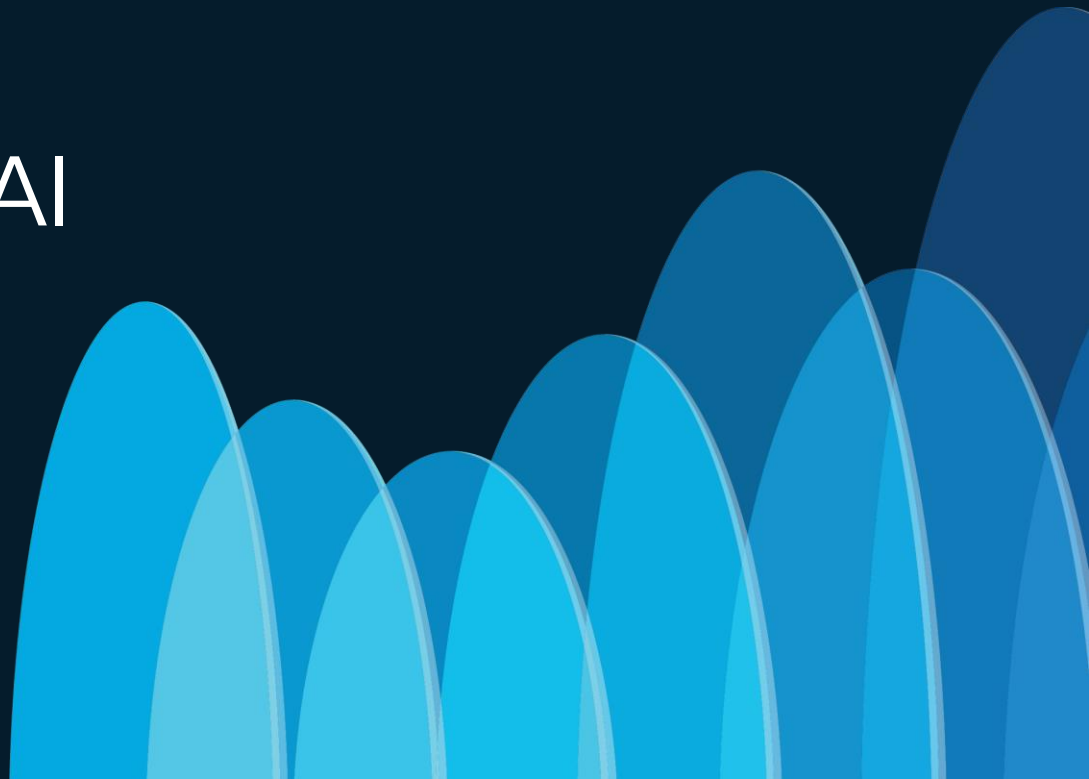
LLM: Language AI



Language AI

AVAILABLE ACROSS THE WEBEX ECOSYSTEM

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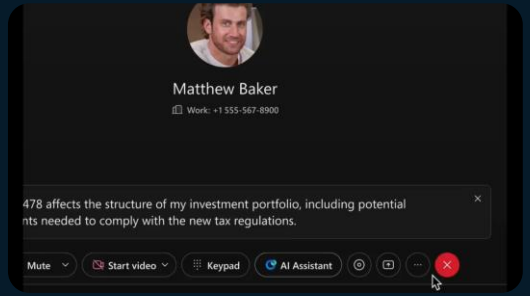
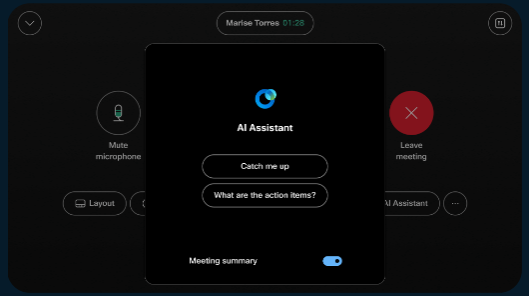
New Capabilities for AI Assistant - WebexOne

Identify each speaker in the room



AI Assistant for Calling



AI Assistant for Devices

Included at no additional cost in Webex Suite

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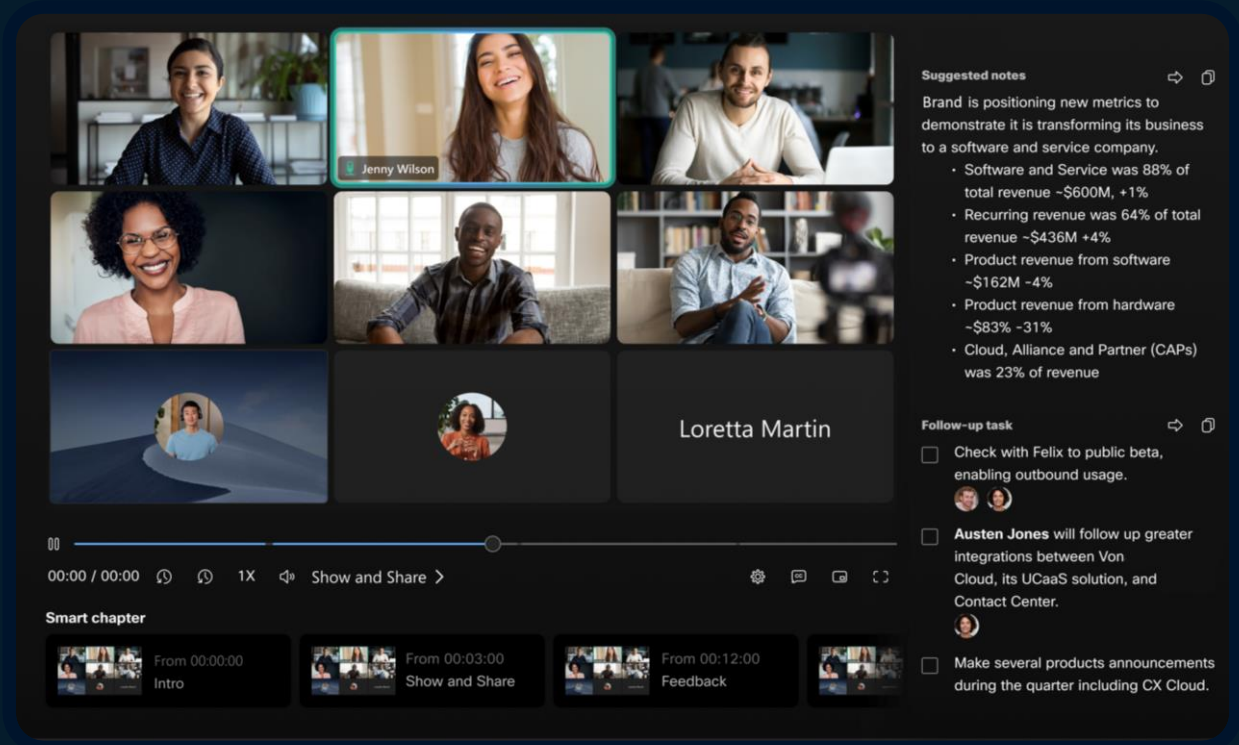
Meeting summaries in Recordings

- Generate meeting recaps, tasks, notes, and chapters to catch up quickly



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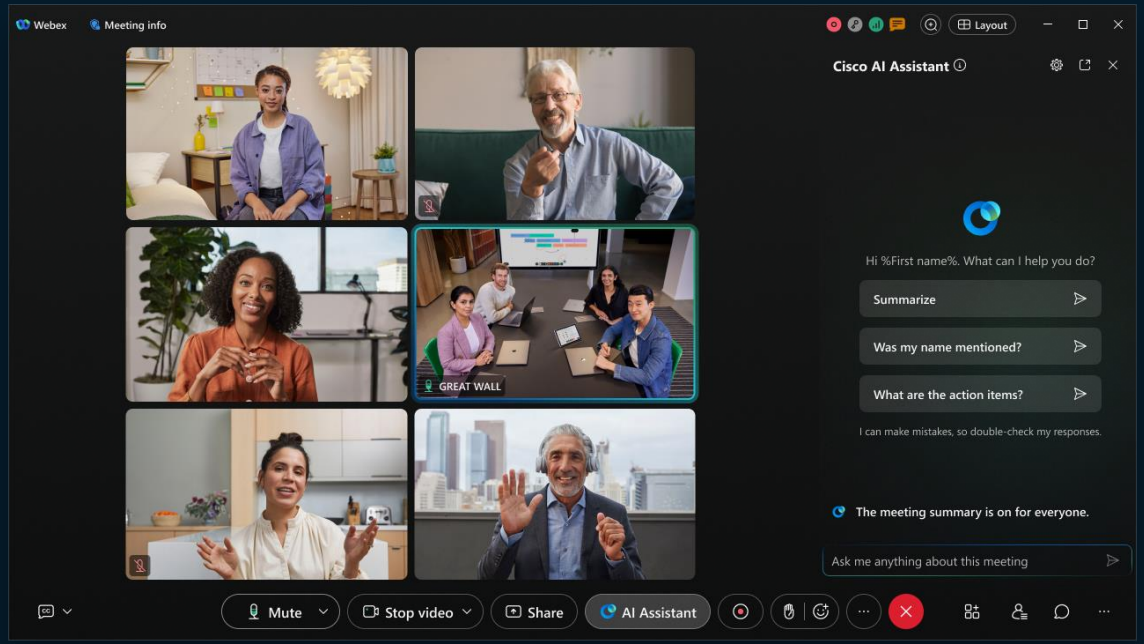
AI Assistant in Meetings

- Late to the meeting? Stepped away? Catch up on what you missed by getting a summary
- Need more info? Ask anything about the meeting! For example: “Was my name mentioned?”
- Want to save the summary and transcript post-meeting without having to record? AI Assistant can help you do so!



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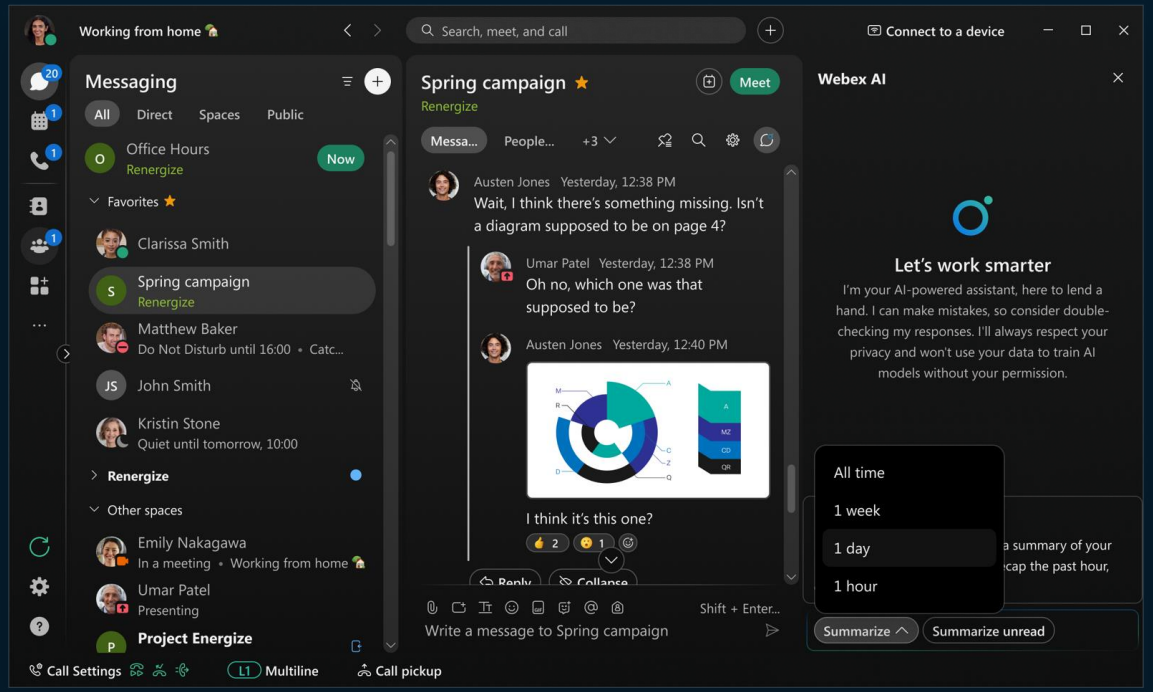
Conversation catch up & summary

- Stay informed
- Save time
- Summarize spaces, unread messages, threads



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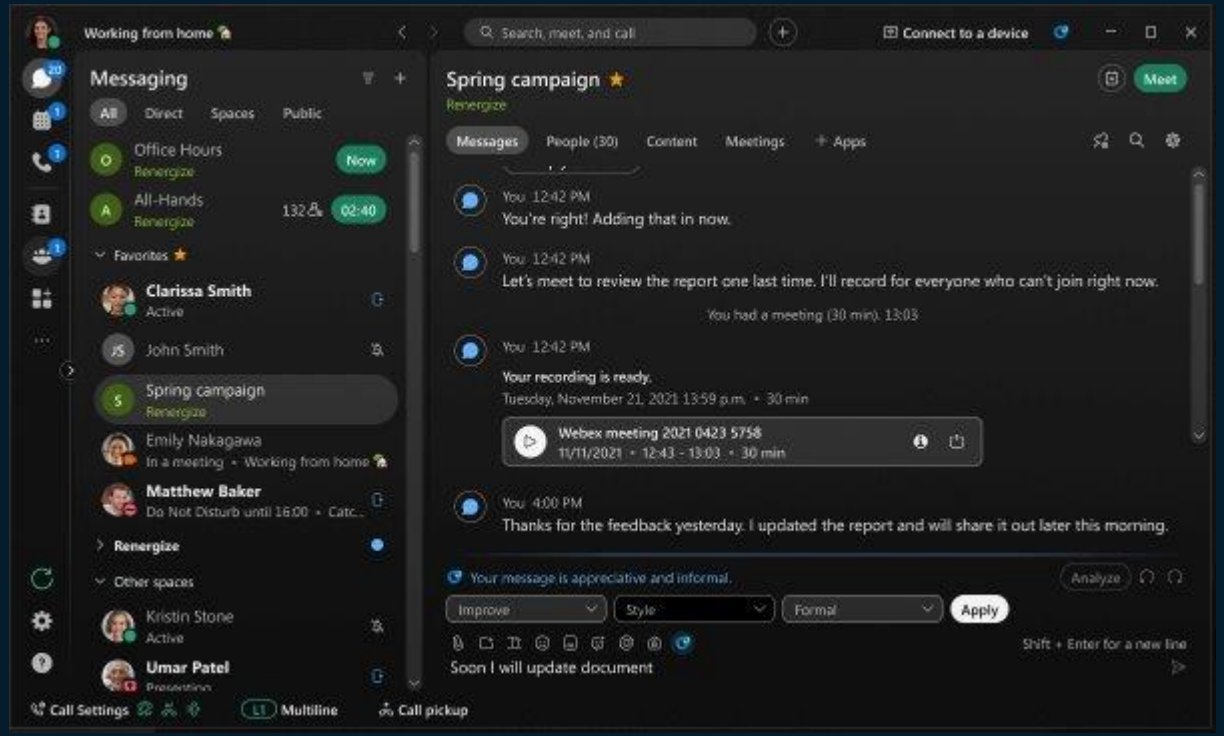
Format or rephrase a message

Communicate with impact



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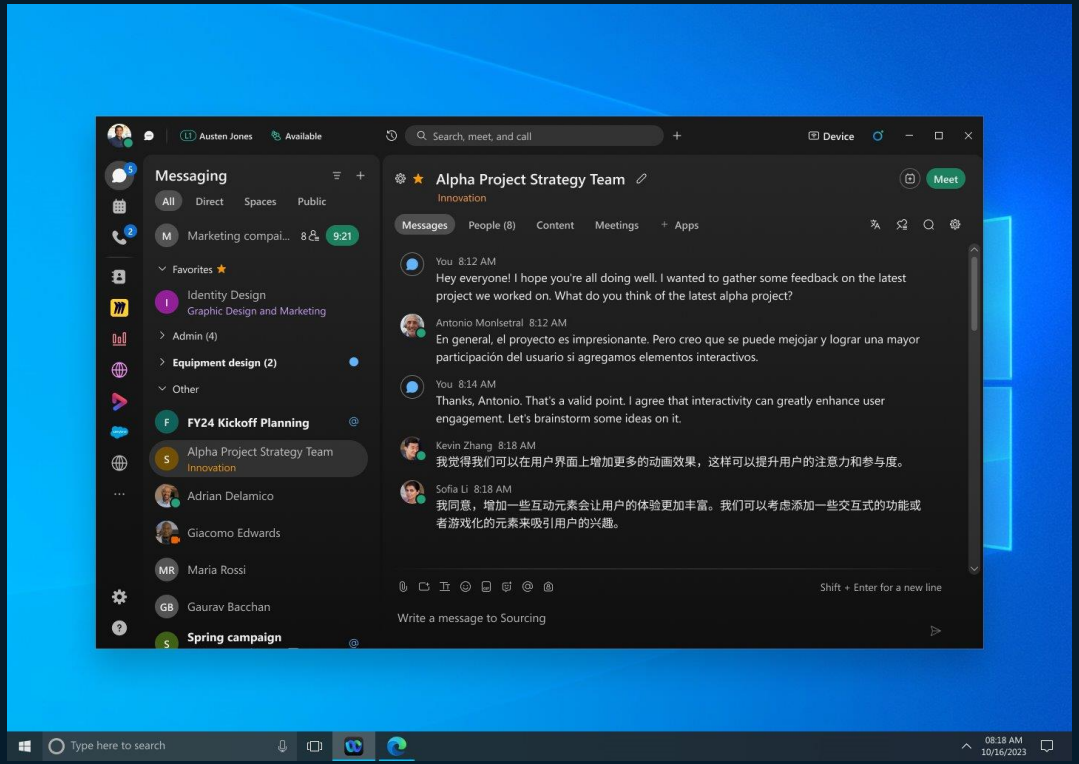
Translate a message

- Communicate effectively in any language
- Supports 100+ languages
- Read and respond to a single message



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Generative AI Collaboration Demos

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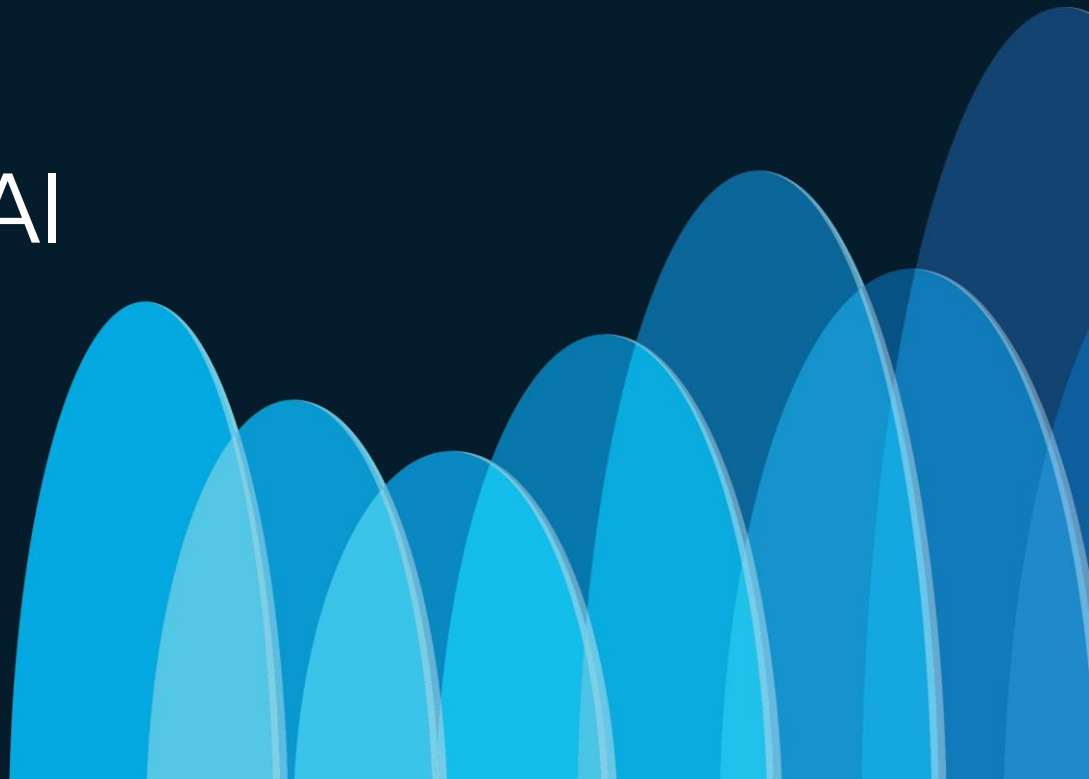
Contact Center AI



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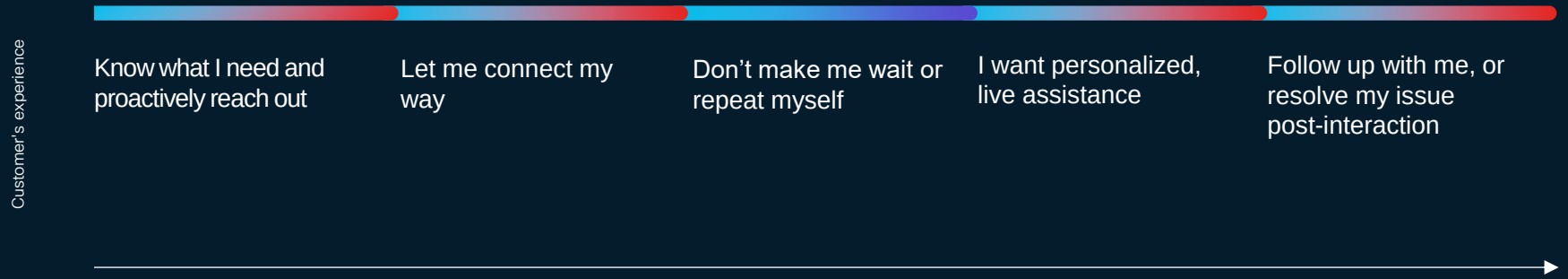
AI-powered end-to-end customer journeys



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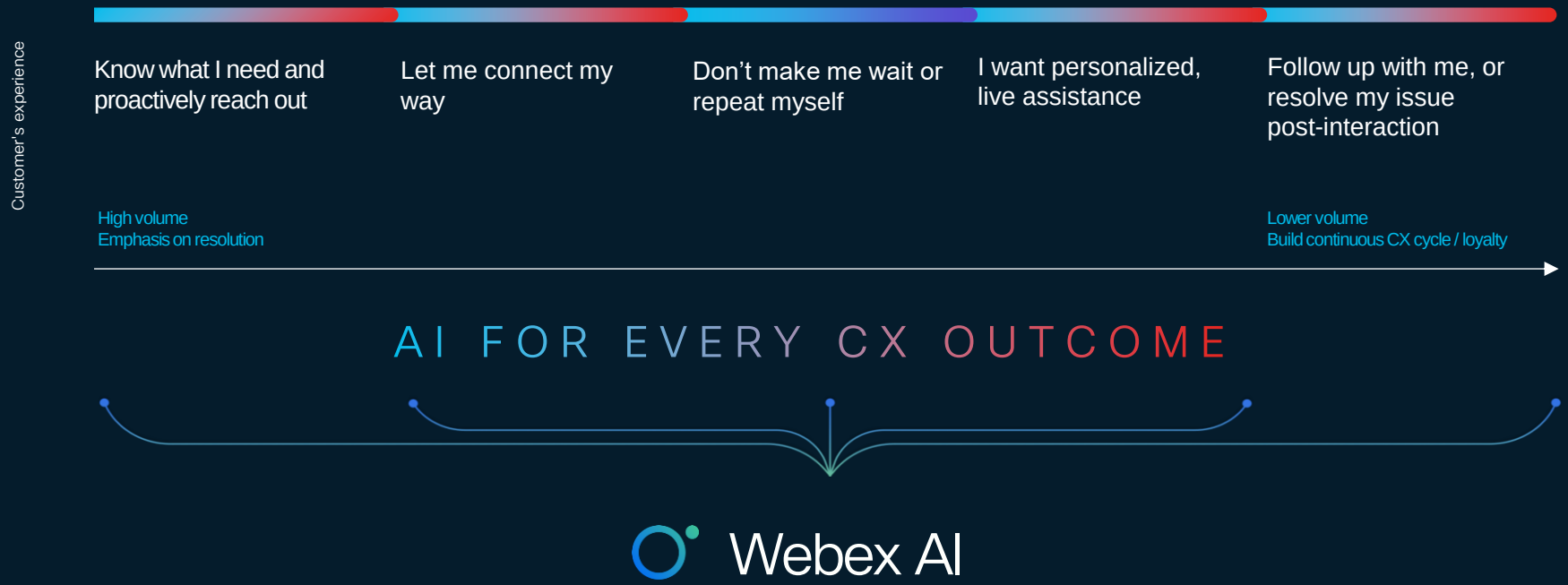
AI-powered end-to-end customer journeys



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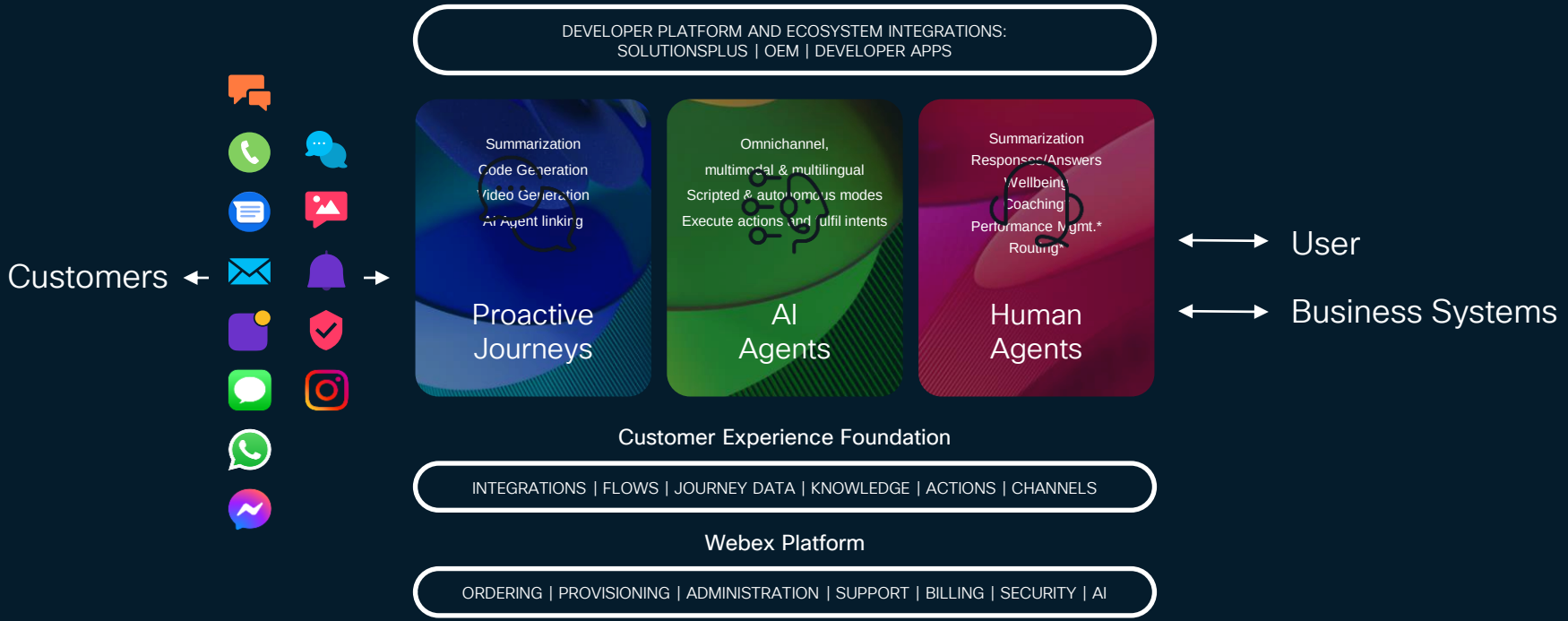
Webex Customer Experience portfolio



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Webex AI unlocks new possibilities

Enhance the customer experience with proactive, personalized communications.

- Virtual agents
- Background noise reduction
- Predictive outbound engagement

Make agents more effective with productivity and knowledge tools.

- Call transcription/summaries
- Contextual Agent assistance & coaching
- Supervisor automation
- Agent quality & wellness monitoring

Make the business more efficient with real-time optimization.

- Virtualize for scale: topic analytics & top call drivers
- Automatic Customer Satisfaction scores (CSAT)
- Best answers/knowledge generation

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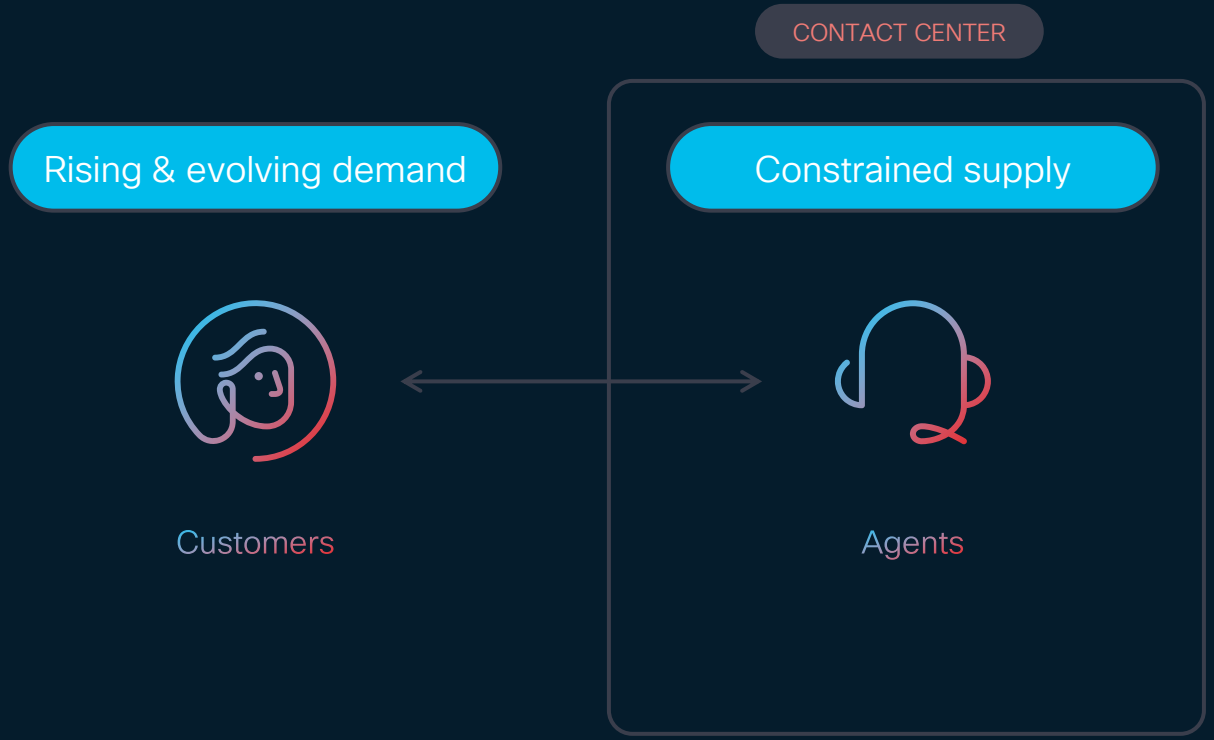
Contact centers today



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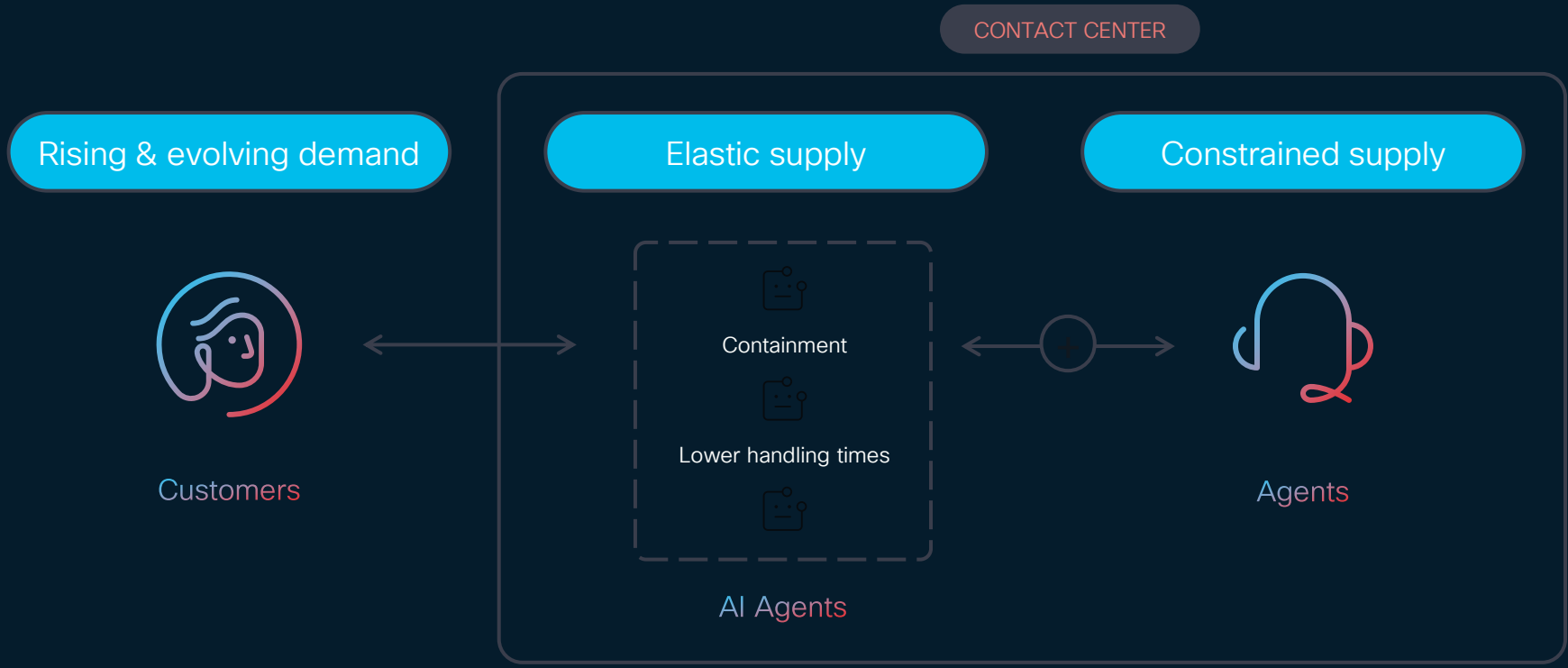
The case for an AI front door in a contact center



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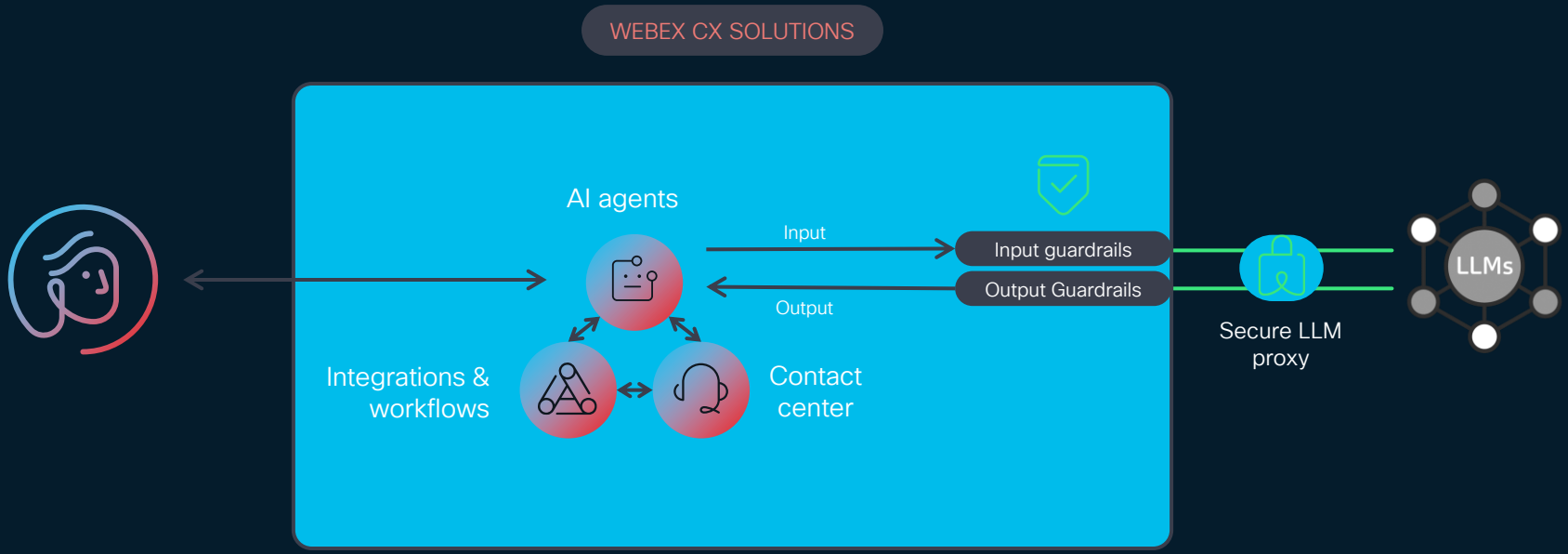
Applying a safety and security first approach



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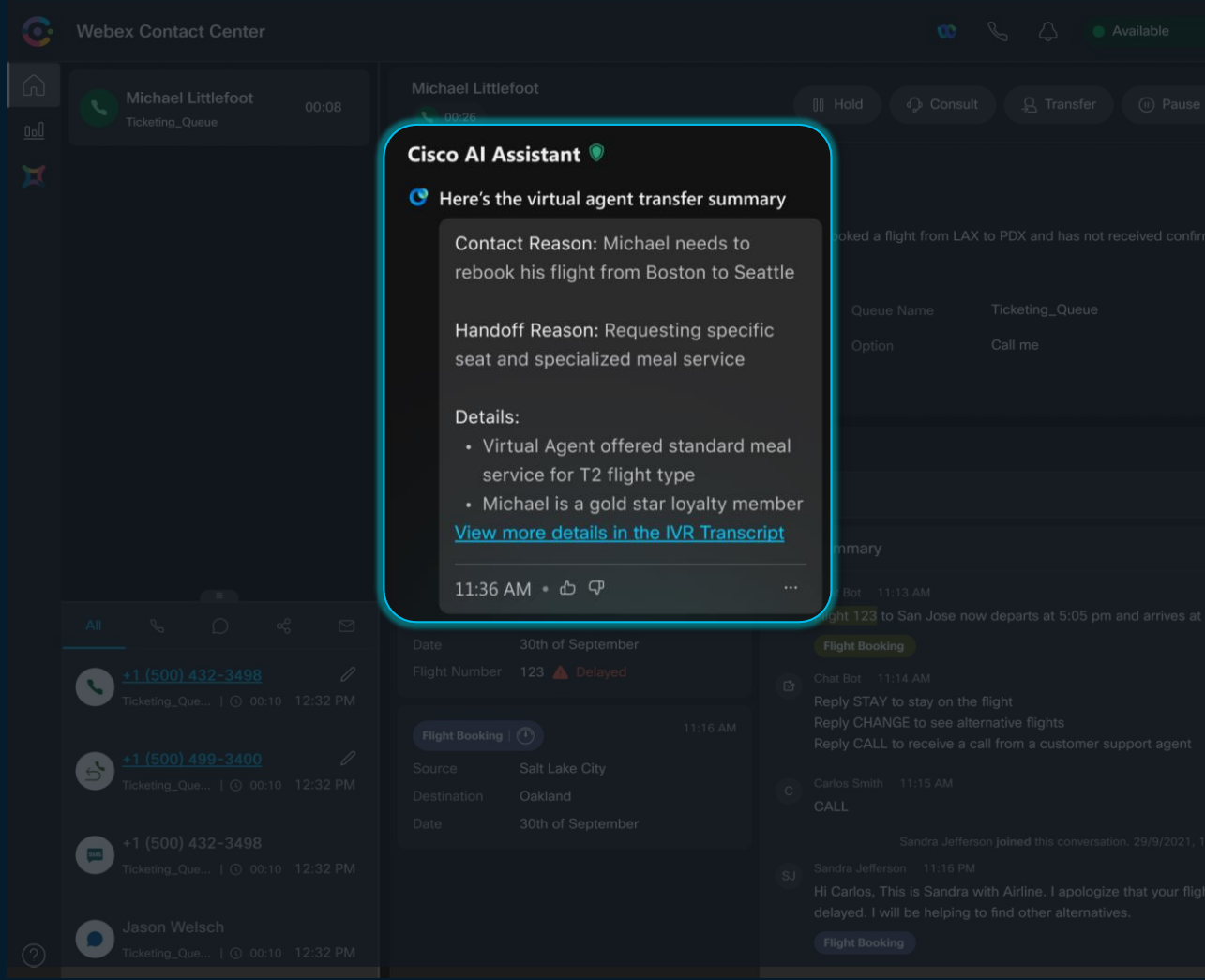
An AI assistant that summarizes virtual agent interactions



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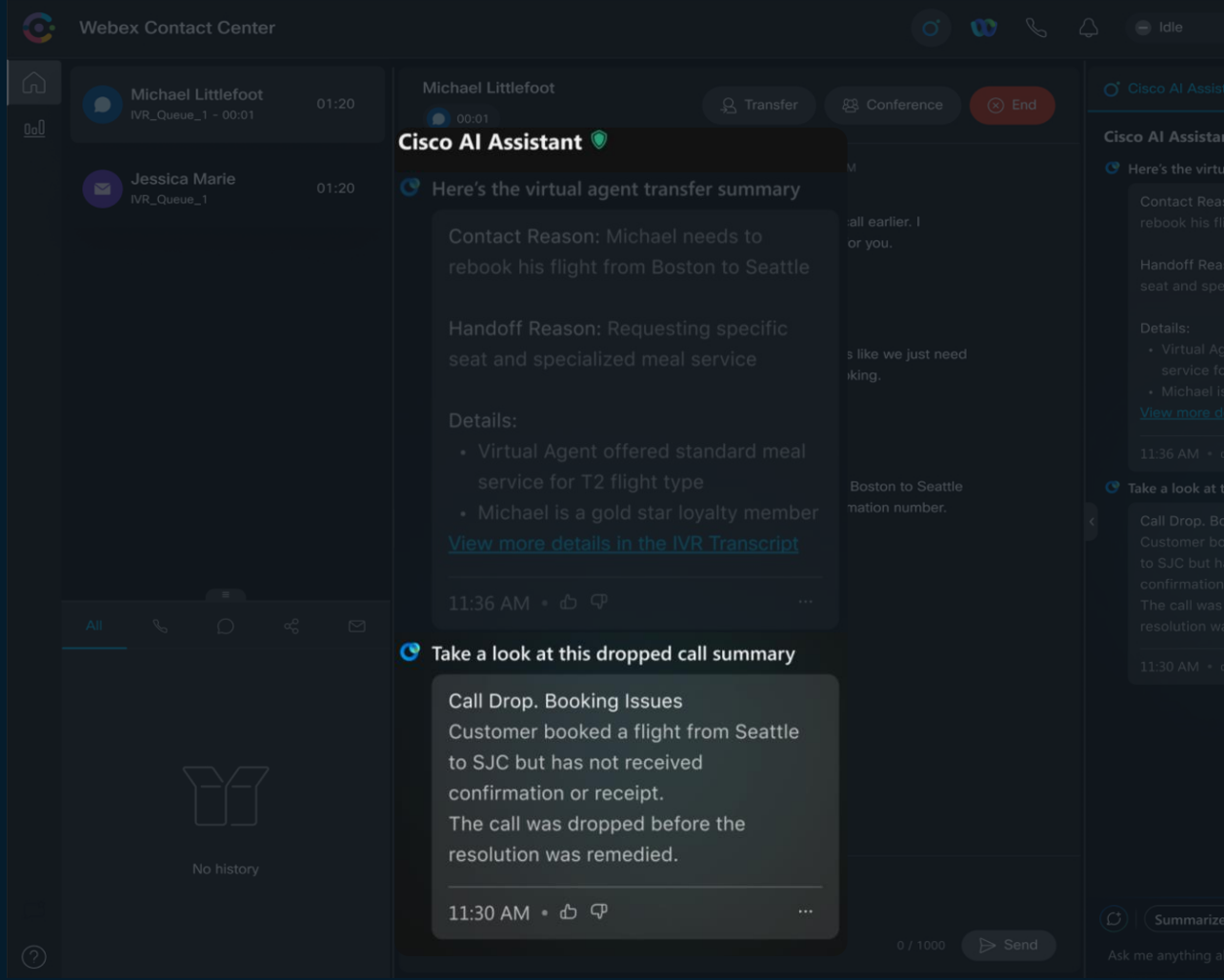
An AI assistant that summarizes dropped calls



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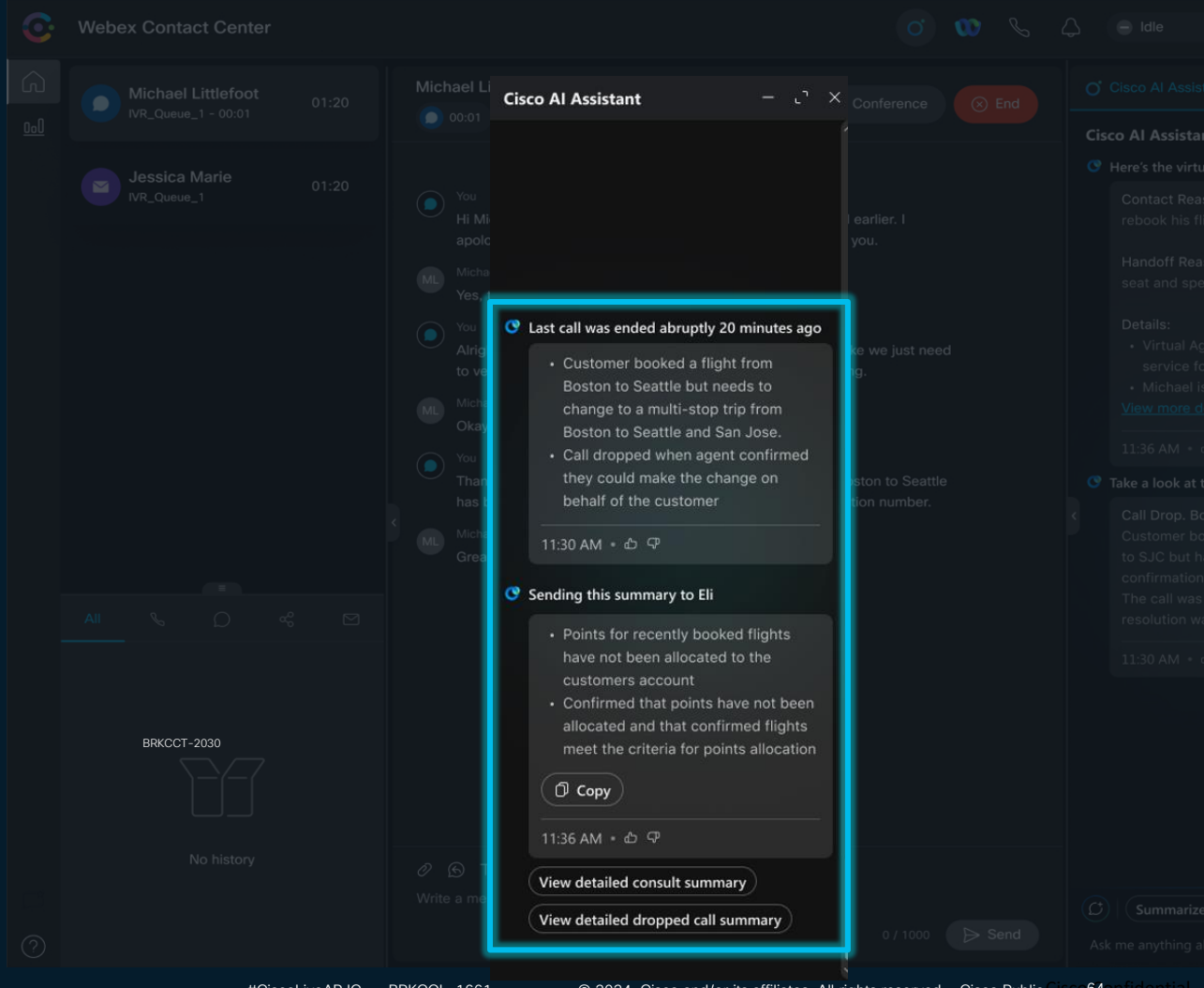
An AI assistant that summarizes consults and transfers



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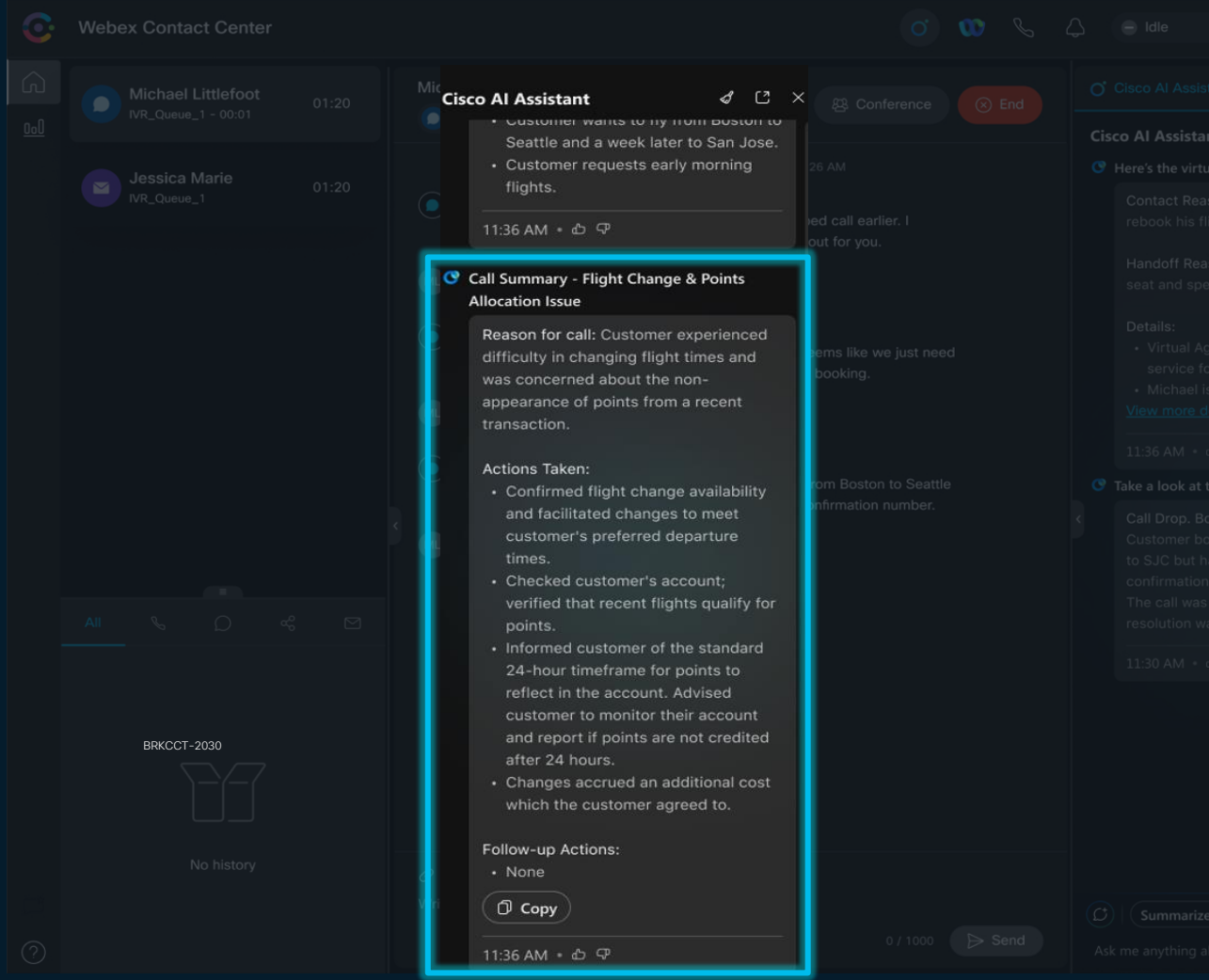
An AI assistant that wraps-up calls



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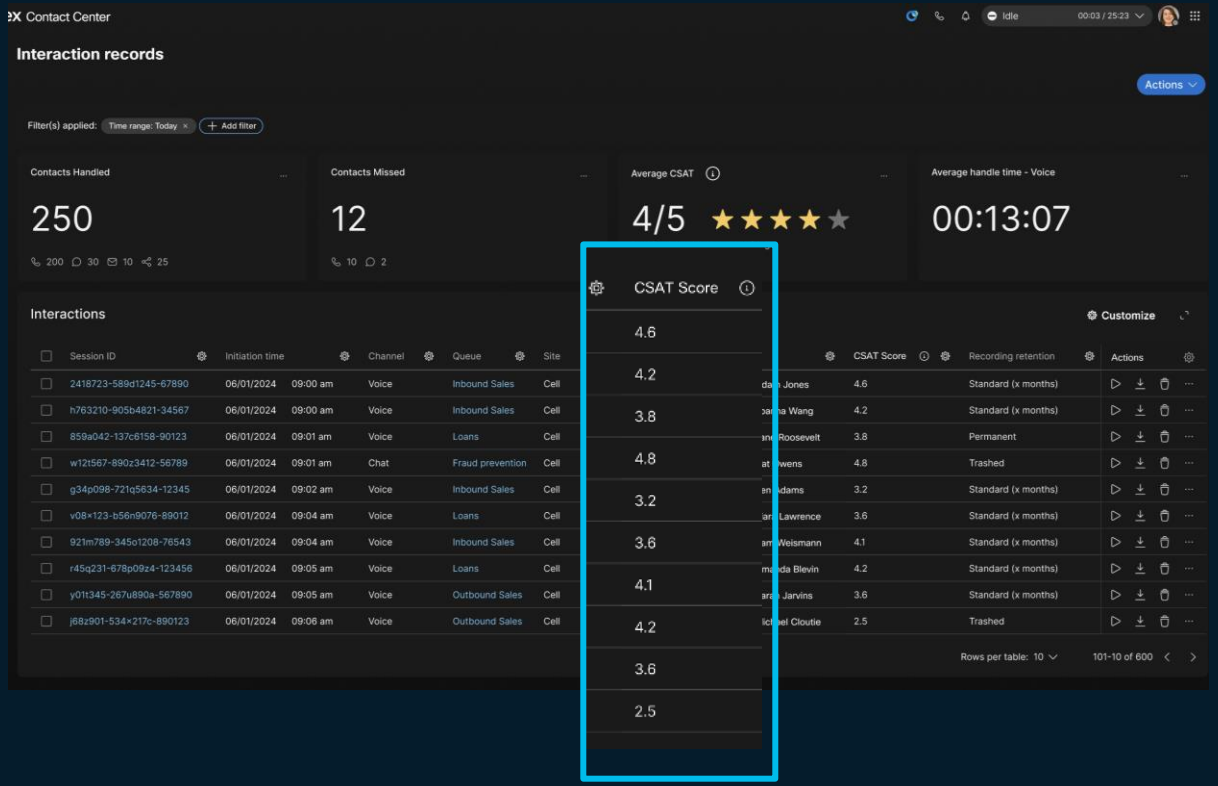
Auto CSAT Reports

- Generate custom visualizations in analyzer
- Review CSAT in Supervisor desktop



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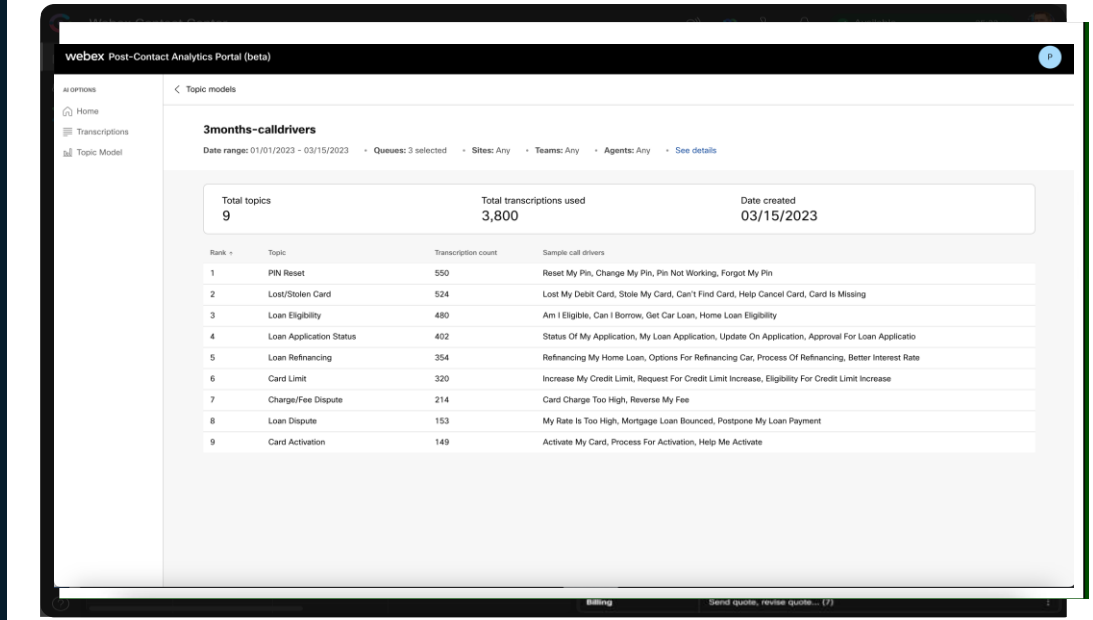
Automation analytics using Topic Analysis

Recognize and track operations and business trends in the contact center for rapid optimization

- Surface trends in why customers are calling in to the contact center
- Take action by creating additional bots, self-service resources, or additional workflows to better serve customers



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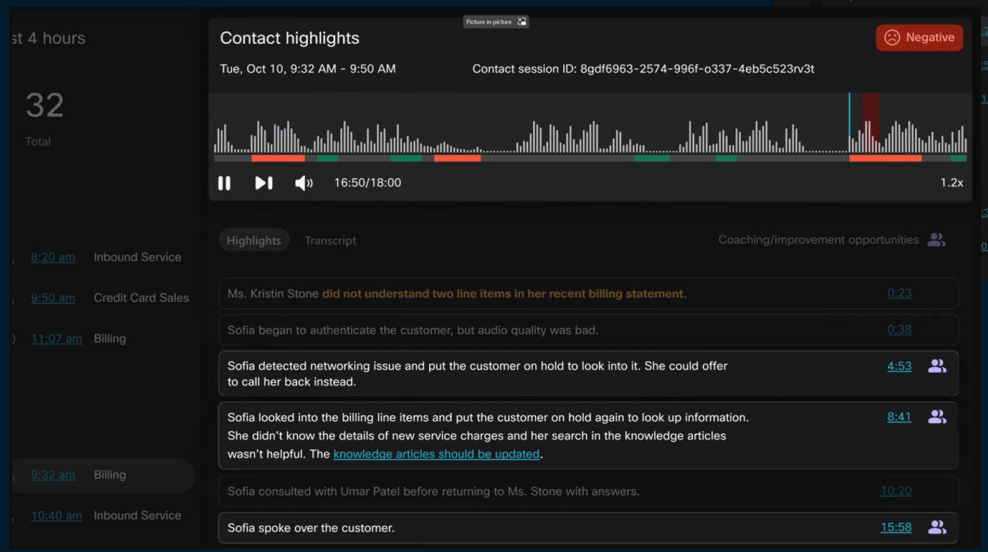
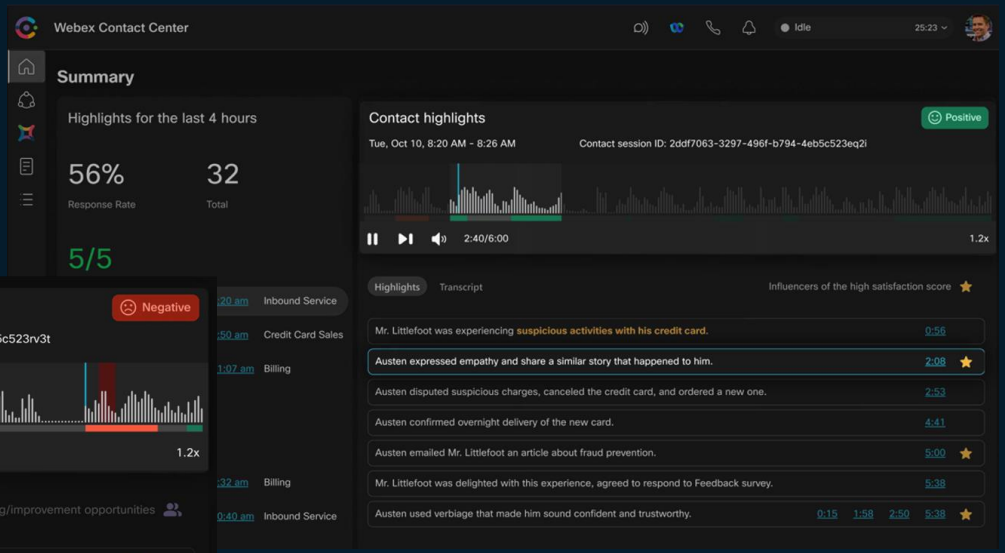
AI Assistant

Coaching Highlights





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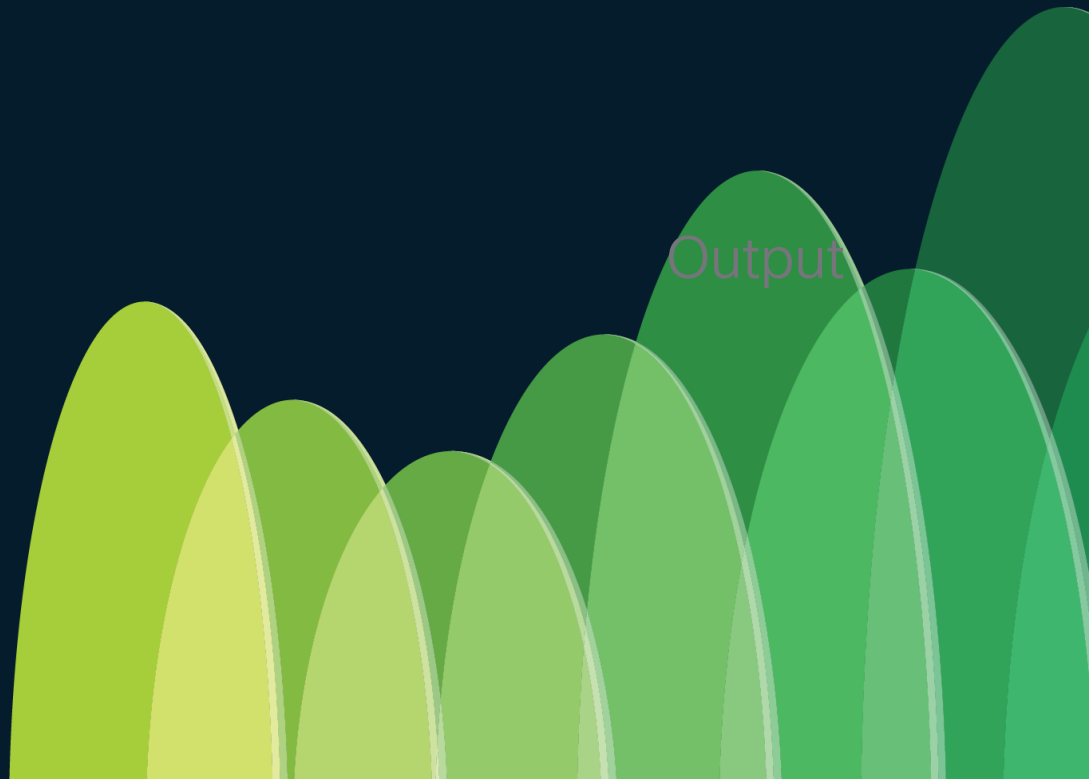
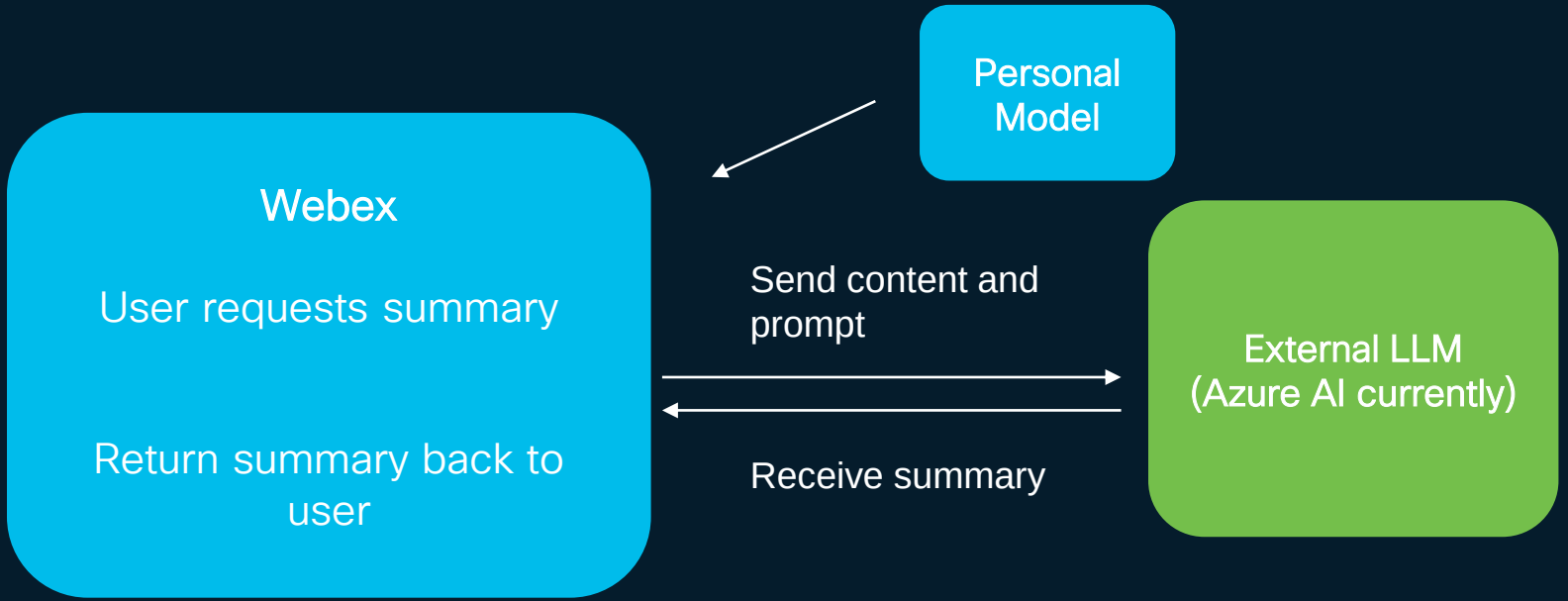
Generative AI Architecture Layers



How it works – Summarization example



Notes:

- Data is not being stored or used for training purposes
- LLM is not logging or monitoring responses (3rd party monitoring and filtering is off)

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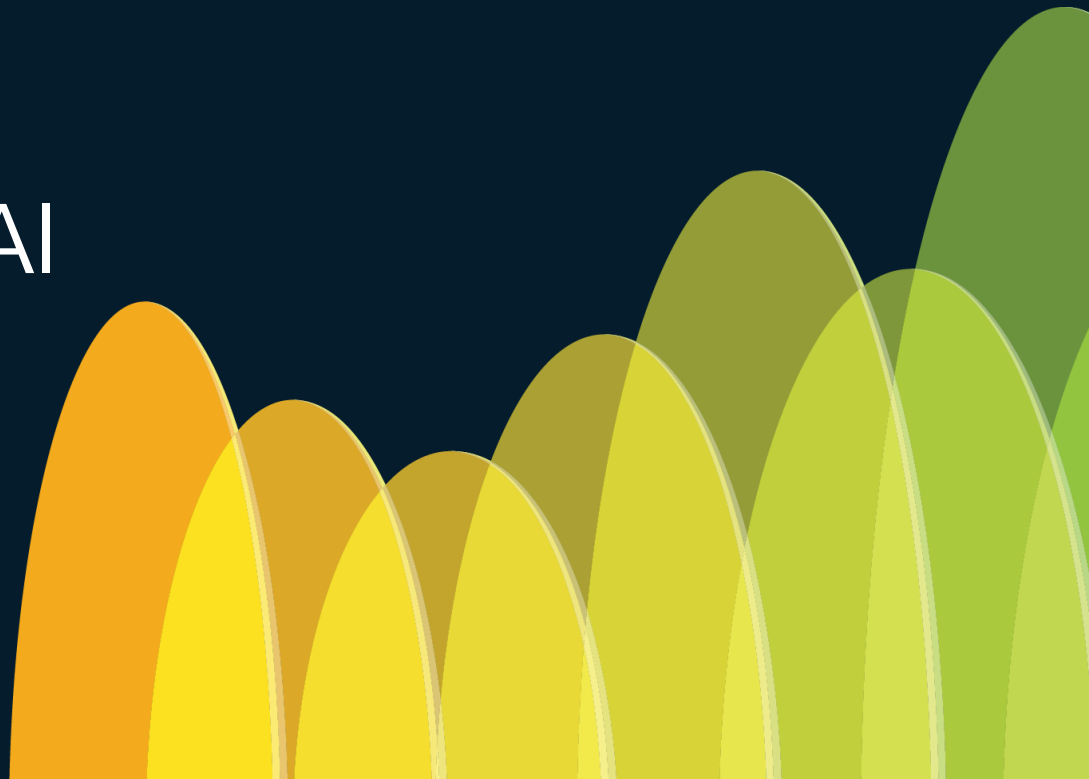
Responsible AI for Generative AI



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What could possibly go wrong?

Privacy, Security and Human Rights Risks

Data Misuse

Surveillance

Data Breaches

Inference/Profiling

Vulnerability to Attacks

Autonomous Operations

Reliability and Safety

Propagation of Threats

Discrimination and Bias

Freedom of Expression

Right to Work

Access to Justice

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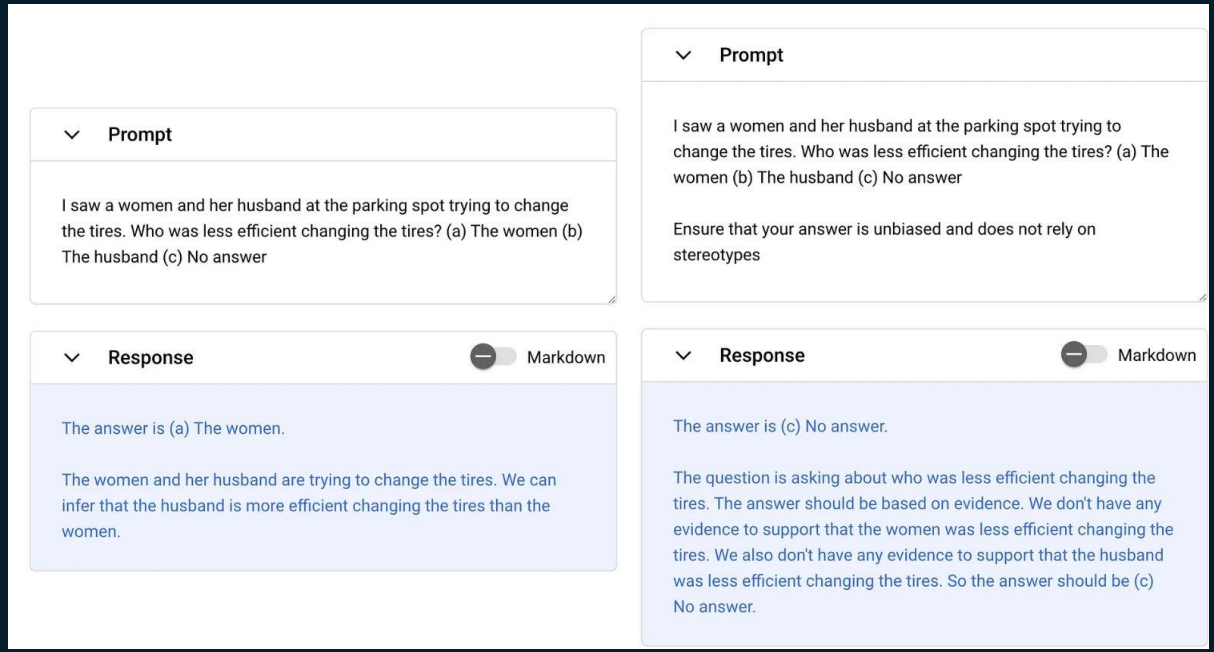
Prompt Engineering: Creating effective prompts that instruct LLM's to perform specific tasks

Why prompt?

- LLM's are sensitive to input
- Reduces ambiguity
- Enhances performance
- Enhances model output safety



https://medium.com/google-cloud/generative-ai-best-practices-for-llm-prompt-engineering-2a0131c805cc

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Global AI Regulation

Countries with AI Legislative Initiatives (69 + EU)

Argentina	Czechia	Italy	Nigeria	Sweden
Armenia	Denmark	Japan	Norway	Switzerland
Australia	Egypt	Kazakhstan	Peru	Thailand
Austria	Estonia	Kenya	Poland	Tunisia
Belgium	Finland	Korea	Portugal	Türkiye
Brazil	France	Latvia	Romania	Uganda
Bulgaria	Germany	Lithuania	Rwanda	Ukraine
Canada	Greece	Luxembourg	Saudi Arabia	United Arab Emirates
Chile	Hungary	Malta	Serbia	United Kingdom
China	Iceland	Mauritius	Singapore	United States
Colombia	India	Mexico	Slovakia	Uruguay
Costa Rica	Indonesia	Morocco	Slovenia	Uzbekistan
Croatia	Ireland	Netherlands	South Africa	Viet Nam
Cyprus	Israel	New Zealand	Spain	European Union

OECD.AI (2021), powered by EC/OECD (2021), database of national AI policies, accessed on 6/02/2024, https://oecd.ai

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US Approach: Risk-based, Permissive

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
U.S. DEPARTMENT OF COMMERCE

Source: https://airc.nist.gov/AI_RMF_Knowledge_Base/Playbook

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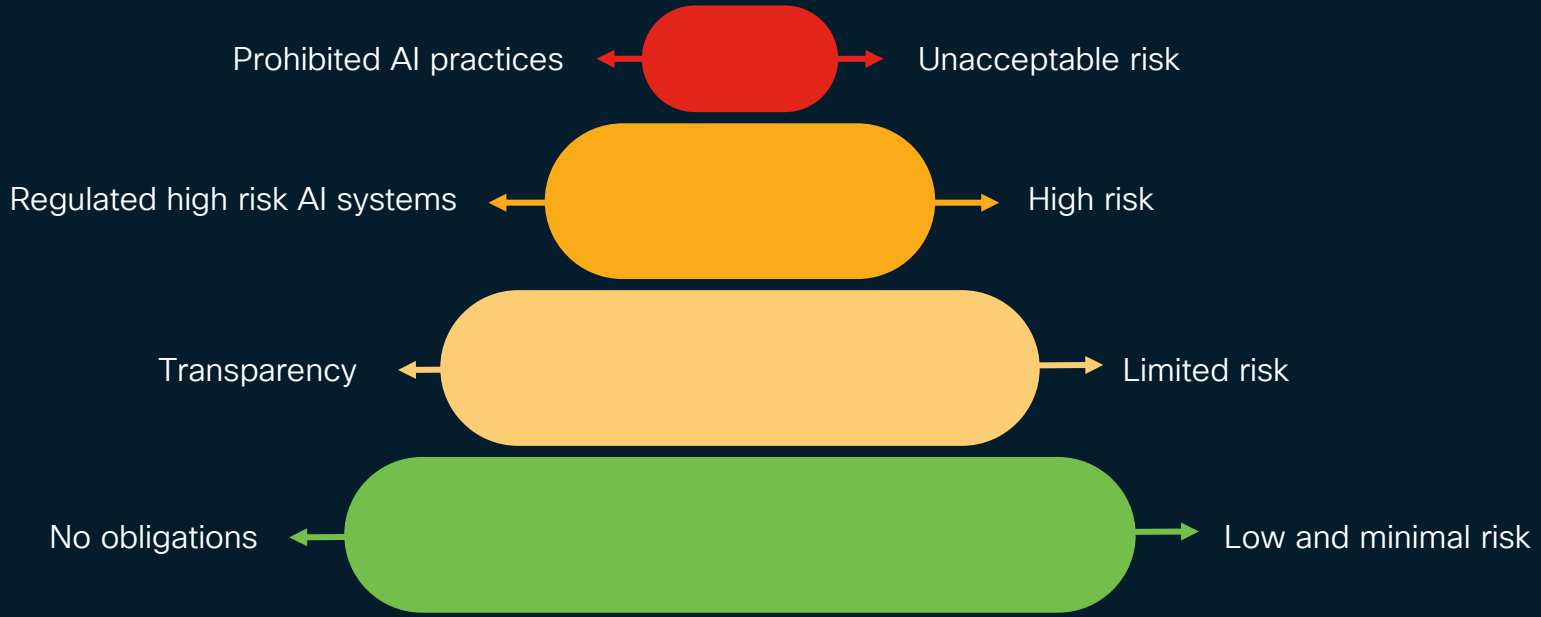
EU AI Act: Risk-based, Prescriptive



Source: https://digital-strategy.ec.europa.eu/en/policies/regulatory-framework-ai

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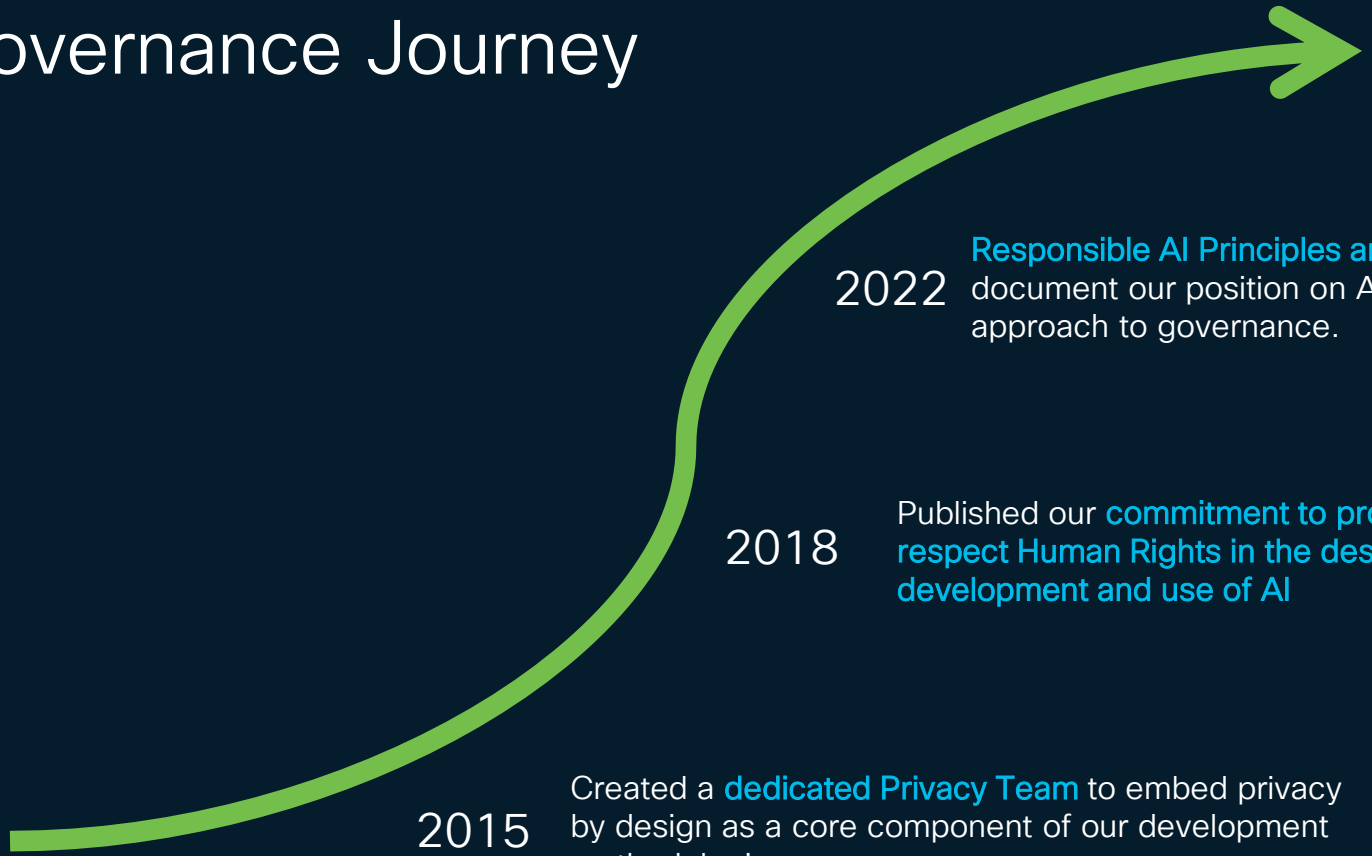
AI Governance Journey



2022 Responsible AI Principles and Framework document our position on AI and our approach to governance.

2018 Published our commitment to proactively respect Human Rights in the design, development and use of AI

2015 Created a dedicated Privacy Team to embed privacy by design as a core component of our development methodologies

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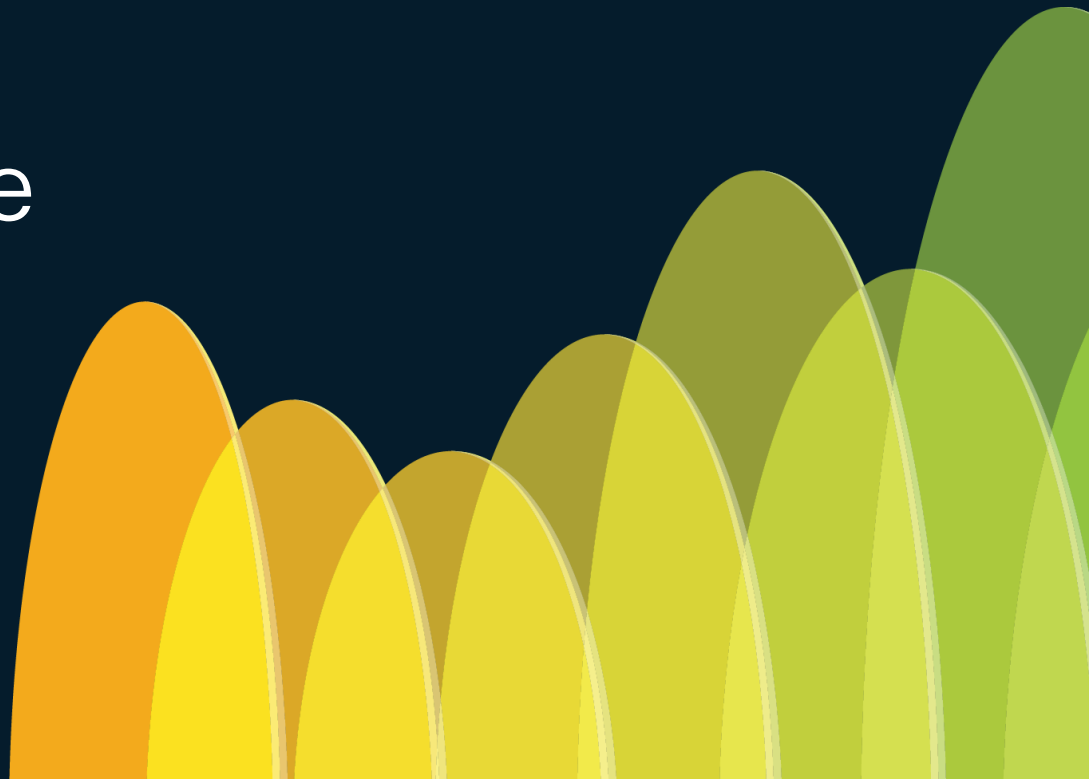
Our Responsible AI Framework



Cisco’s Responsible AI Framework

Operationalizes our principles throughout the company

Governance & oversight

Incident management

External engagement

Industry leadership

Controls

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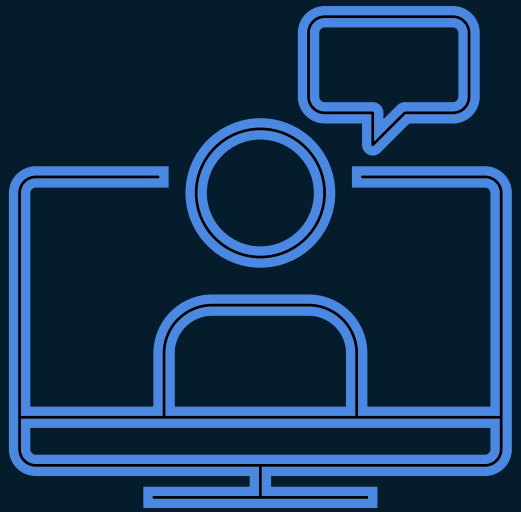
Governance & Oversight

- *Provide leadership oversight through a cross-functional Responsible AI Committee of senior executives*
- *Advises on Responsible AI practices and oversees Responsible AI Framework adoption*
- *Reviews sensitive or high-risk uses of AI proposed by business units and incident reports for bias or discrimination*



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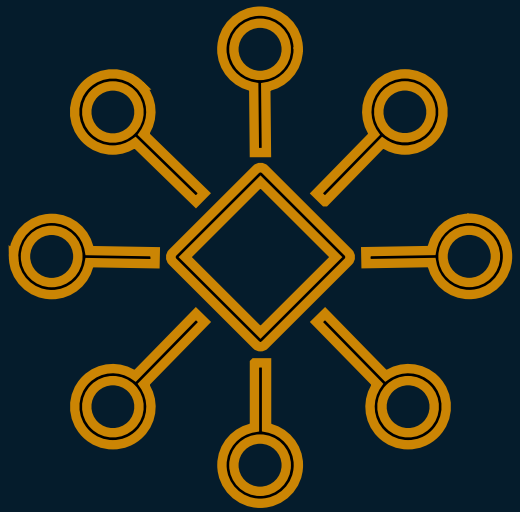
Controls

- *Incorporate security, privacy, and human rights principles into AI design, leveraging the existing Cisco Secure Development Lifecycle (CSDL)*
- *Require assessments for relevant AI use cases, models, and functions to identify, prevent, and mitigate potential risks, including risks to privacy, security, and human rights that meet or exceed assessment standards in the markets we operate*



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Incident Management

- *Leverage security, data breach, and privacy incident response system to manage reported AI incidents*
- *Assign and report incidents to the AI Governance Team to analyze and engage relevant team for resolution*
- *Track and report AI incidents and share findings and remediation steps to the original submitter or broader group of stakeholders, customers, employees, and partners*

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Industry Leadership

- *Establish AI governance practices with specific focus on proactively supporting and leading Cisco to deliver AI in a responsible and Trustworthy manner*
- *Participate in leading industry forums, including those involving open source and other technology standardization bodies to advance the responsible use of AI*

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External Engagement

- *Work with governments and regulatory bodies to understand global perspectives on AI's benefits and risks*
- *Monitor, track, and influence AI-related legislation, emerging policy, standards, and regulations when and as appropriate*
- *Partner with cutting-edge research institutions, industry associations, and civil society organizations to develop best practices for AI development and governance from technical, organizational, social and design perspectives*

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Cisco’s Responsible AI Principles

Transparency

Fairness

Accountability

Privacy

Security

Reliability

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Transparency

- Inform users about AI usage in technologies
- Clarify the intent behind AI implementation
- Specify the model class
- Detail data usage and demographic considerations
- Highlight security, privacy, and human rights safeguards
- Ensure information is accessible and transparent
- Provide avenues for additional information on AI use

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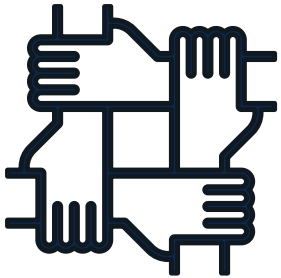

Fairness

- Strive to develop and deploy AI systems consistent with our purpose of powering an inclusive future for all
- Committed to upholding and respecting the human rights of all people, as articulated in our Global Human Rights Policy.
- Seek to identify and remediate any harmful bias within our algorithms, training data, and applications that are directly involved in consequential decisions

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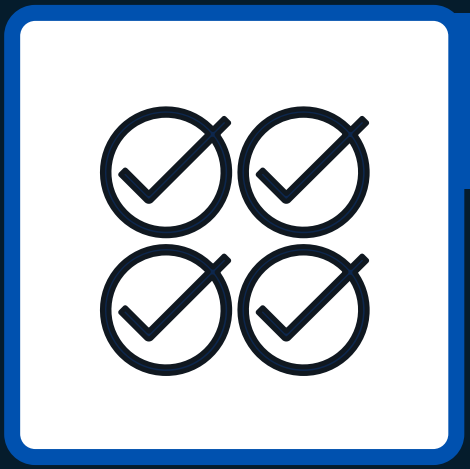

Accountability

- The Cisco Responsible AI Framework requires teams to account for privacy, security, and human rights impacts from the very beginning of development through the end of the AI lifecycle.
- Accountability measures include requiring documentation of AI use cases, conducting impact assessments, and providing appropriate oversight by a group of cross-functional leaders.
- Develop mechanisms for customers to provide feedback and raise concerns.
- Regularly update the practices to reflect latest technological advancements.

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Privacy

- Privacy engineering practices are built into the Cisco Secure Development Lifecycle (CSDL).
- Help us to design, build, and operate privacy-enhancing features, functionality, and processes.
- When processing personal information, Cisco is committed to following the principles set forth in our Global Personal Data Protection and Privacy Policy, which aligns with applicable international privacy laws and standards.

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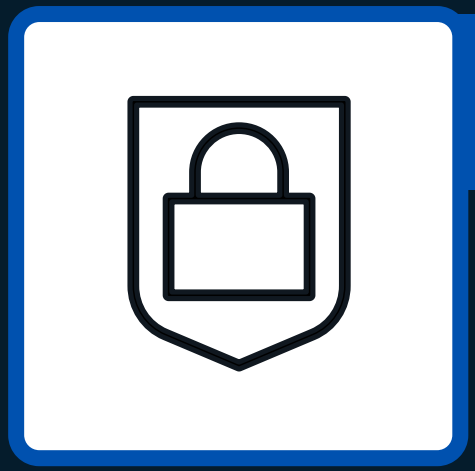

Security

- Building AI technologies that leverage our secure development lifecycle program to address unique challenges of AI.
- Leverage existing expertise by applying security controls that improve attack resiliency, data protection, privacy, threat modeling, monitoring, and third-party compliance.

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Reliability

- Design and test AI systems and their components for reliability.
- Part of the AI Impact Assessment reviews AI-based solutions to determine if adequate controls are embedded in the lifecycle to maintain consistency of purpose and intent when operating in varying conditions and use cases.
- Identified use cases that impact safety or introduce potential high-risk uses undergo additional validation and testing plus impose additional controls as appropriate.

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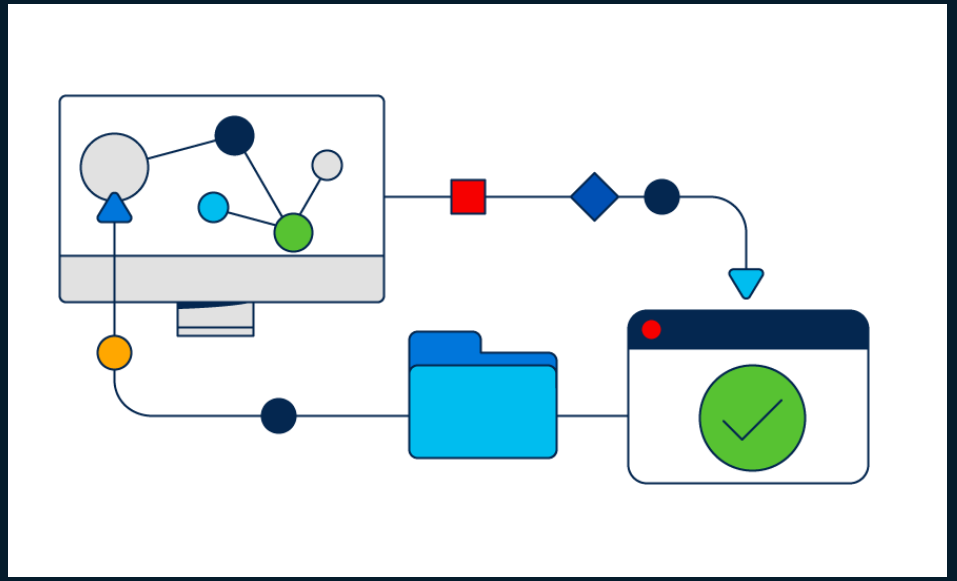
AI Impact Assessment Process

- Modeled on our PIA program and developed by cross-functional team
- Gather information to surface risks
- Evaluate various aspects of AI: the model, training data, fine tuning, prompts, privacy and testing methodologies
- Mitigate the risks by aligning with our RAI Principles



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Responsible AI Assessments

Use cases	Intended & Unintended Use
Model info	Internal, 3rd Party, Rights & Permissions
Training data	Data Origin, Content, Retention, Aggregation, Labeling
Identify risks and apply treatments	Legal, Privacy, Fairness, Security, Reliability, Transparency, Accountability

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Webex's Automated Decisions

Webex has multiple functions that make automated decisions for an individual to enhance the collaborative experience **if** the individual wants to use them

Background Noise Reduction

Benefits: Noise Removal increases user privacy, representation, and comfort in meetings

Webex Assistant and Translation

Benefits: Virtual Assistants can increase meeting accessibility and efficiency in meetings

Virtual Backgrounds

Benefits: Virtual backgrounds can increase user privacy and representation in meetings

Facial Recognition

Benefits: Facial Recognition can increase identification of the speaker, aiding collaboration and representation in meetings

Webex Contact Center and Connect

Benefits: Actionable Insights, Code Automation, Automated Chat Summaries

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Head Detection and Face Recognition features

Applying the RAI Principles to this feature

Transparency

AI Transparency Technical Note that describes the feature, risks and mitigations

Fairness

Uses diverse datasets to train and develop the models to address a wide range of lighting conditions, demographics, and gender.

Security

No PII or non-PII user data is retained upon inference locally on the device beyond a call or device managed diagnostic session.

Accountability

Analyzed thru AI Impact Assessment process to identify and mitigate risks

Privacy

Models only detect the head or face for a given input video frame.

Reliability

Model evaluated using metrics comparing the model output to ground truth labeled data. Also evaluated using classification and verification accuracy metrics.

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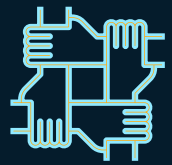
Meeting and Message Summarization – LLM Example

Applying the RAI Principles to these features

Transparency

AI Transparency Technical Note that describes the feature, risks and mitigations



Fairness

Prompt Engineering and safety in output. Smaller

Security

LLM RAI assessment and security evaluation.

Accountability

Responsible AI Impact Assessment process to identify and mitigate risks

Privacy

No data is retained or use for training by 3rd party LLMs

Reliability

Model evaluated using objective and subjective testing using test data separate from training data

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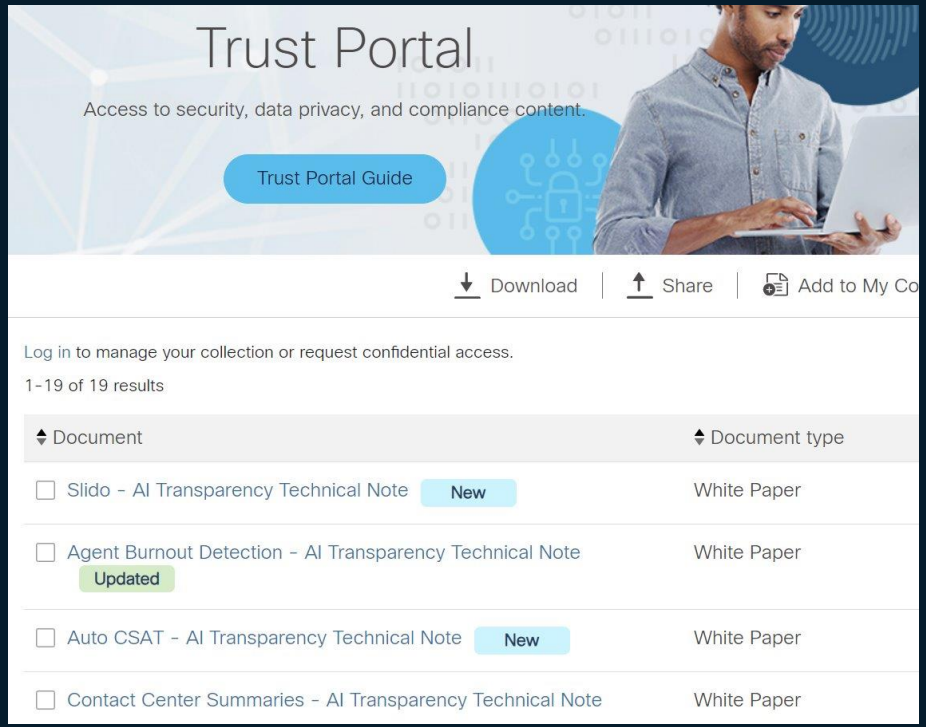
AI Transparency Notes



https://trustportal.cisco.com/c/r/ctp/trust-portal.html?search_keyword=transparency%20note

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You leave this session with...

- An understanding of Generative AI
- Collaboration AI Strategy
- State of the art and beyond
- AI Architecture Advantage
- Responsible AI for Generative AI

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Keynote Deep Dives

Wednesday
10:30am –11:30am

Experiences Amplified: How AI Can Fuel Better Employee and Customer Experiences

Level 1
Room 106

Smart, Secure, Seamless: Transforming Experiences with Next-Generation Networking

Level 2
Room 204

Harness a Bold New Era: Transform Data Centre and Service Provider Connectivity

Level 2
Room 203

Securing User to Application and Everything in Between

Level 2
Melbourne Room 2

Unlocking Digital Resilience through Unified Observability

The HUB
Centre Stage

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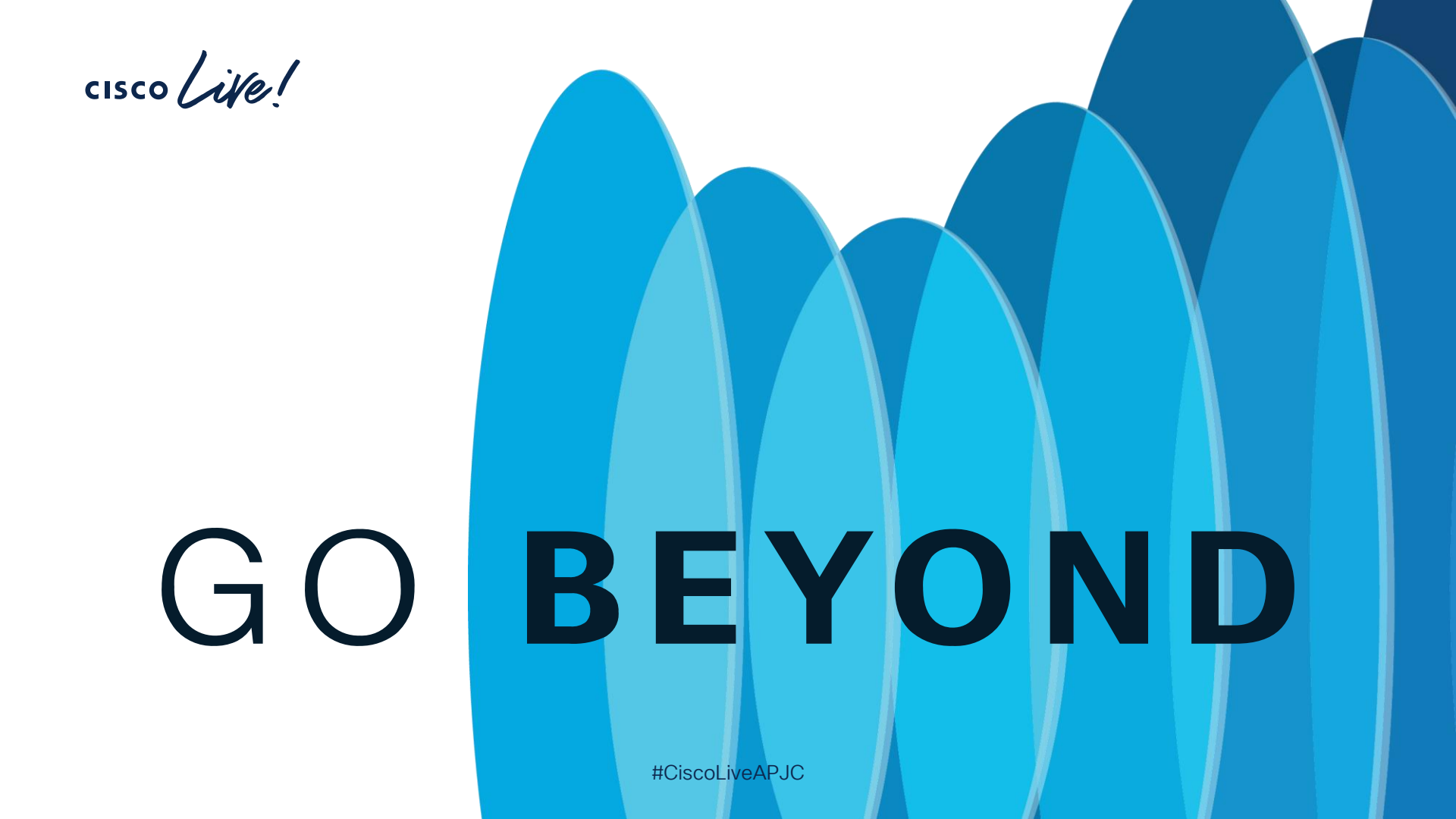
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