

Cognitive Collaboration Can Transform Business

Artificial intelligence (AI) is the new buzz across most technology sectors right now. There are plenty of good examples of how AI and related technologies will transform the way we interact, both with technology and with each other. There are also a lot of unrealistic expectations. Enterprise communications are no exception. Just about every vendor is now incorporating elements of AI into their solutions, but it's still early days.

To avoid the confusion surrounding "AI," Cisco introduced the term "Cognitive Collaboration" to shift the emphasis from the technology to the intended result. The goal of Cognitive Collaboration is to create more contextual, personalized, and predictive interactions and workflows. In this paper, we explore what Cisco likely intends with the term, and how it can benefit the customer experience.

Collaboration refers to two or more people working toward a specific outcome. The people's roles, the nature of their interactions, and the desired goal determine how the process proceeds to its conclusion. Technologies are often introduced to mimic yet improve the status quo. For example, the first use cases of the internet itself centered on existing services such as email (faster than physical mail) and shopping (larger catalogs). Then, after the internet evolved, it brought us services impossible to imagine in a pre-internet world, such as Facebook, Twitter, and business model shifts across a variety of industries such as transportation (Uber, Lyft), entertainment, video streaming services, and more.



The tools of collaboration have also evolved over the years. For decades, the goal has been to create a virtual meeting experience as good as in-person meetings. We have seen radical improvements in video quality and audio in terms of both sound pickup and noise suppression. Perhaps one of the most surprising elements of this evolution was

content-sharing, because the need for it coterminously evolved as the workplace has become more geographically dispersed and digital transformation initiatives moved physical work to displays.

We now collaborate in ways that were unfathomable just a few years ago. Cisco is applying Cognitive Collaboration across its entire collaboration portfolio that includes hardware, software, and services for telephony, meetings, messaging, and contact center solutions. The solution blurs communications, collaboration, and workflows by incorporating pre- and post-meeting-related activities.

Collaboration is changing, and so must the technologies that enable it. It's no longer about the Monday meeting down the hall. It's more likely to occur ad-hoc, with distributed colleagues — some of whom you have never met. Collaboration occurs in far more ways than most "collaboration" solutions address. These are the points at which people come together to create, inform, negotiate, or persuade each other in ways that advance the goals of their enterprise (see the sidebar "Collaboration").



KNOW YOUR AI

In computer science, the word "cognitive" refers to a collection of algorithmic capabilities that can augment employee performance, automate workloads, simulate thinking, and increase engagement. Some of the key terms in this domain include:

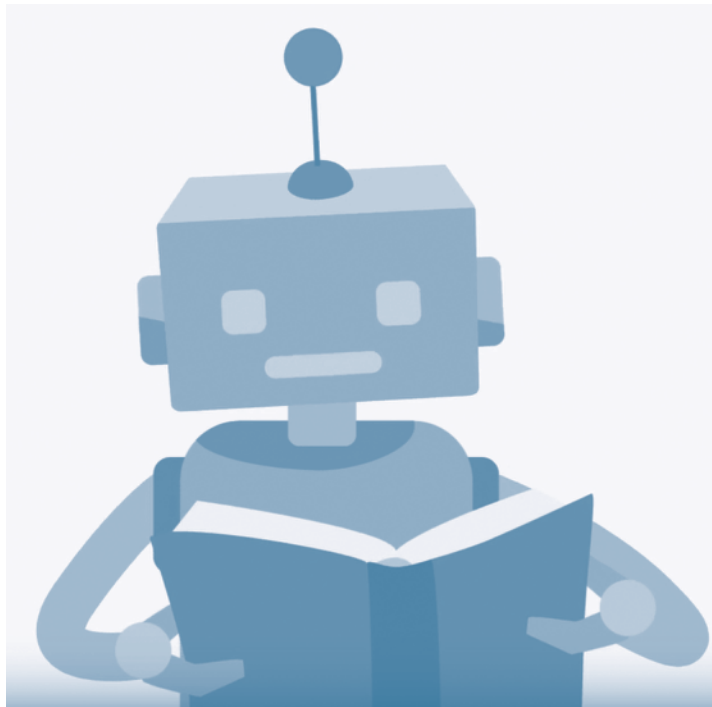
Artificial intelligence: Artificial intelligence is a branch of computer science that aims to create intelligent machines. The core problems of artificial intelligence include programming computers for certain traits such as knowledge, reasoning, problem-solving, perception, learning, and planning.

Chatbot: A program that simulates a human in conversational speech or text; often convincingly human.

Computer vision: Allows intelligent software to interpret its environment through room and personal device cameras. Resulting features include face, object, and gesture recognition. Combined with other technologies such as proximity pairing, computer vision provides powerful room interpretation to create better collaboration and meeting experiences for local and remote participants.

Cognitive: An umbrella term for various distinct yet related technologies and disciplines based on artificial intelligence, including machine learning, natural language processing, and deep learning to facilitate or improve experience and workflow.

Cognitive Collaboration: Describes a wide range of cognitive tools and experiences intended to facilitate collaboration with personalized contextual and predictive information and services that improve the effectiveness of collaboration across voice, messaging, video, and contact center solutions.



Artificial Intelligence Is Back

AI is not new. There have been many hype cycles, and the concept enjoys widespread awareness in popular culture thanks to science fiction. But while there have been many big promises, few compelling applications have emerged.

Today, AI is back in the spotlight. What changed? Everything: hardware, software, and the underlying intellectual models that define what we mean by reasoning, thinking, knowledge, awareness, and causality. AI applied to cloud computing has created a huge, scalable network capable of storing vast amounts of data, with a capacity to learn and improve on the go. The rise of increasingly parallel programming models allows for a new level of multivariate analysis, and complementary developments on the hardware side increase the speed and efficiency of executing these models.

Cognitive computing: The simulation of human thought processes that, broadly speaking, are based on the scientific disciplines of artificial intelligence and signal processing. These platforms encompass machine learning, reasoning, natural language processing, speech and object recognition, human-computer interaction, and dialog, among other technologies that mimic the way the human brain works.

Facial recognition: The ability to identify meeting participants by their faces alone, as soon as they appear on screen. Eliminates the need to enter metadata by hand and allows the system to track attendees as they move around the room.

Machine learning: Allows computers to learn from tagged data; decreases reliance on explicit programming commands.

Multimodal bots and assistants: Intelligent software agents that can carry out tasks to assist the user. They can be internal-facing for employees, and external-facing for cross-organizational teams or customer care. Bot interactions can be text or voice based.

Natural language processing: A branch of AI that analyzes, understands, and generates human written and spoken languages. The modern popularity of voice control (Siri, Alexa, etc.) arose from the success of NLP and its ability to interpret more natural syntax and expressions. The resulting conversational AI technology enables a user to interact with a system via speech.

Pattern recognition: The ability to process massive quantities of data and extract patterns for use in decision-making.

Speech recognition: The combined ability to recognize a speaker's identity by voice alone, interpret the content of speech, and convert it to text. Also called "voice recognition."

It's also important to note that computers now have more "senses" than ever before. Computers can see with cameras and other sensors, hear with microphones, interact conversationally, and much more. We can string these technologies together to ascertain intent and even sentiment. We can use these senses to create appropriate (contextual) and intelligent responses.

Conversational AI has been gradually improving for years. One of the most significant milestones, at least in terms of general awareness, was the 2010 introduction of Siri on the Apple iPhone 4S. The system used cloud processing to decipher and process naturally spoken requests. More recently, Amazon and Google have been even more successful with smart speakers. According to Canalys, the number of smart speakers in use will hit 225 million units by 2020, up from under 50 million at the end of 2017.

While interfaces to computing systems have been improving for decades, natural language as an interface is a crowning achievement. Humans naturally express abstract concepts and convey a variety of information with tone, word choice, pitch, and more. Bots can now interact like humans, and the competitive pressures in consumer personal assistants have made the technologies more accessible.

Today, conversational technologies are impressive and still improving. Last year, we even saw the reverse scenario with Google Duplex. Here, the chatbot called the human to complete a task (of scheduling an appointment), and in several cases, the human was unaware that they were speaking to a machine.

Cognitive Collaboration

Cognitive Collaboration is not a product or suite, but an evolution of integrated collaboration experiences that build intelligence and context aware-

ness into every aspect of the user experience. As a result, its features, capabilities, and technologies will evolve over time.

Cognitive Collaboration is now a persistent element across the entire collaboration portfolio: software, hardware, and services. With its implementation of Cognitive Collaboration experiences, Cisco is signaling a port-

folio-wide commitment to AI technologies that facilitate collaboration. Keep in mind that Cisco has the broadest collaboration portfolio on the market that includes:

- Meeting hardware, software, and services
- A global cloud of communications services
- Strong integrations into adjacent and popular ecosystems
- Contact center solutions





Cisco in 2019 introduced a framework of Cognitive Collaboration capabilities that includes:

Meetings, Teams, and Devices:

- People Insights
- Webex Assistant
- Bot framework
- Facial detection and recognition
- Noise detection and suppression
- Speaker tracking
- Auto framing
- Whiteboard de-skew
- Metadata (people count, etc.)

Contact Center:

- Customer Insights
- Customer Journey Analyzer
- Cisco Answers and Customer Virtual Assistant powered by Google

ANTICIPATING COGNITIVE COLLABORATION

While Cognitive Collaboration is a new category, its arrival was predicted years ago. Cognitive Collaboration wasn't simply created. Cisco has been building advances in AI and cognitive capabilities within its collaboration portfolio over several years. Consider these actions:

Conversational AI: In 2016, Cisco acquired MindMeld, a leader in the technology of chatbots, programs that simulate a human in conversational speech or text. MindMeld provides an AI-powered conversational interface that supports transcription, translation, and intelligent chatbots. Its open APIs and third-party modules let companies build or buy domain-specific or application-specific recognition modules for specialized vocabularies such as legal and medical.

Noise detection and suppression: In 2017, Cisco introduced noise detection for Webex Meetings. It was the first use of machine learning to improve the meeting experience. Cisco engineers trained a machine learning model to detect particular noise patterns, like a dog barking or keyboard typing. When that background noise was detected, Webex would alert the user and provide a suggestion to mute their line. This feature has also been introduced to Webex Devices, where the devices will automatically suppress the audio from a microphone when an offending noise is detected. If a user starts speaking, the audio is no longer suppressed.

Graphics processing hardware: As a leader in meetings, Cisco knew the power of information in a meeting, and predicted that specialized processing would be required. As a result, in 2017, it began to incorporate NVIDIA processors into its room systems. NVIDIA's high-end graphics enhance on-screen performance, improve content readability, and enable advanced visual effects such as metadata overlays (names of participants, etc.) to provide multiple layers of information to meeting attendees.

Relationship intelligence: With the acquisition of Accompany in 2018, Cisco introduced People Insights for Webex Meetings in 2019. Accompany was founded by internet pioneers with expertise in crawling the web at scale. With a database of over 250 million individual users and 25 million organizations, People Insights provides detailed people and company profiles within Webex Meetings.



It Starts With Meetings

Cisco's Cognitive Collaboration capabilities are first being implemented in Webex Meetings.

In a recent report, McKinsey suggested that today's emerging technologies could potentially automate 45% of all work activities. Machine learning enables 80% of that, and the learning curve is ramping up. The immediate opportunity for most organizations will be to focus on internal processes, and few activities are more universal than meetings.

Imagine going into a meeting with a colleague, customer, or prospect and being up-to-date regarding the account, person, and company. This information can now be served to

COLLABORATION BY CISCO

Webex has expanded from a single service to a cloud collaboration platform:

Webex Meetings: Previously known simply as Webex, Cisco Webex Meetings hosts more than 70 billion meeting minutes every year for a customer base that includes 95% of Fortune 500 companies. Webex Meetings was recognized as a Leader in the Gartner Magic Quadrant for Meeting Solutions 2018.

Webex Teams: Previously known as Cisco Spark, Webex Teams provides a messaging-centric platform for team collaboration. Users can stay connected between meetings to message, share content, and get work done. Webex Teams provides persistent team chat in virtual meeting rooms. It also offers screen and content sharing, co-editing/file sync, and whiteboarding.

Webex Calling: The newest member of Webex adds cloud-delivered, global telephony services, powered by the feature-rich Cisco BroadCloud.

Webex Devices: Webex Devices encompasses a broad catalog of Cisco devices for room systems, desktop meeting systems, and telephones.

Premises-based solutions: Cisco started in UC with premises-based solutions. The portfolio includes popular products such as Cisco Unified Communications Manager (CUCM) and Jabber messaging, which now has 45 million users. Premises-based solutions continue to be a major part of the company's future roadmap.

HCS: Cisco offers hosted collaboration solutions (HCS) to partners that use Cisco UC and contact center products to create powerful cloud solutions.

Customer Journey Solutions: Collaboration isn't just something within the four walls of an organization. Customer Journey Solutions provide cognitive and collaborative contact center solutions for the cloud, on-premises, or in a hybrid approach, and supports more than 3 million contact center agents globally. Appropriate for organizations looking for innovative, differentiating, and industry leading products that map to customer needs and support flexible deployments.

Cisco Collaboration supports over 300 million users in premises-based, hybrid, and cloud services. It is the world leader in meeting room solutions and offers the broadest portfolio of communications and collaboration hardware, software, and services. Cisco is not alone in embracing aspects of AI, but Cognitive Collaboration is very broad. It will facilitate group collaboration with cutting-edge technologies that provide contextual and intelligent assistance.

Cisco's expansive collaboration portfolio can extend further through its ecosystem of partners. Numerous pre-packaged integrations connect and extend Cisco's products and services to popular applications from Microsoft, Google, Apple, and more. Furthermore, Cisco exposes many APIs for custom integrations and offers software development kits (SDKs) for embedded collaboration use cases. For example, Webex Meetings or Teams can be launched and accessed from other applications.

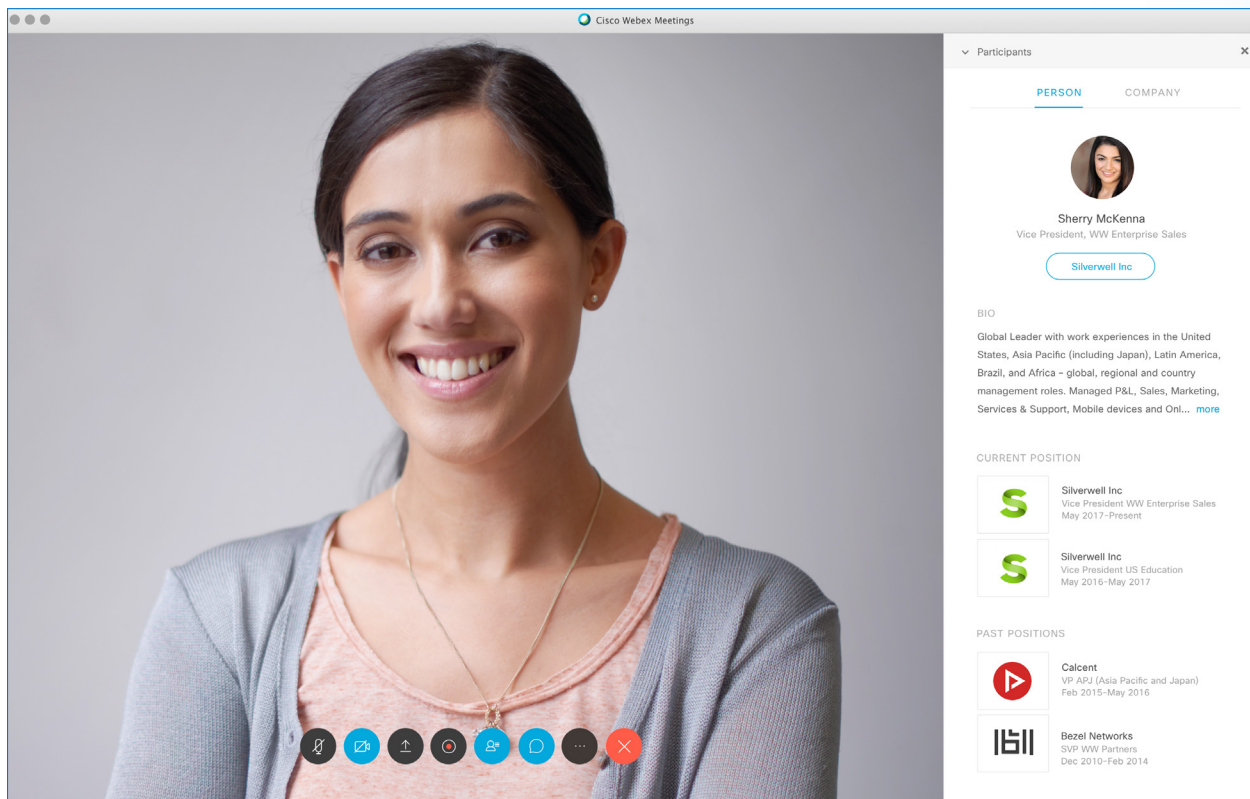
Webex users automatically based on the people in your Webex meeting. It's called People Insights, and as of March 2019, this information engine has been incorporated into Webex. It's an unprecedented platform for contact intelligence, now available to all Cisco Webex Meetings users.

People Insights brings intelligence and context into collaboration before it even begins. It changes the face of communication and brings AI/ML enriched context to the user — automatically and passively. This includes information on all meeting attendees — how often have you been in a meeting without knowing all the participants?

People Insights provides information about meeting participants, including their work history, recent blogs or news articles, details about the company

they work for, and links to social media accounts. If you're meeting with colleagues, People Insights also displays reporting structure and contact information. All of this information is available within Webex Meetings. The data comes from publicly available sources and the company directory, and users have control over what is shared. Individuals can edit or completely hide their profile. It is broader than LinkedIn data, which serves user-supplied data alone.

Knowing who is in the meeting is step one, recent and relevant biographical information is step two, and the final step is identifying who is who. Webex Room Series devices now include virtual nametags, provided through state-of-the-art facial recognition technology that leverages company databases to identify names.



The screenshot shows a Cisco Webex Meetings window. On the left is a large video feed of a smiling woman with dark hair. On the right is a 'Participants' sidebar. The sidebar has tabs for 'PERSON' and 'COMPANY'. Under the 'PERSON' tab, a profile for Sherry McKenna is displayed. Her profile includes a circular profile picture, her name, title 'Vice President, WW Enterprise Sales', and company 'Silverwell Inc'. Below this is a 'BIO' section with text about her global leadership experience. Underneath is a 'CURRENT POSITION' section with two entries for Silverwell Inc, detailing her roles as Vice President for WW Enterprise Sales and US Education. At the bottom is a 'PAST POSITIONS' section with two entries: Calcent (VP APJ) and Bezel Networks (SVP WW Partners).

Cisco Webex

Cisco believes Cognitive Collaboration will become the foundation to deliver massively personalized experiences and will transform how we work. This is not slideware; it's real, works today, and keeps getting better. The following improvements in Webex Meetings and Webex Teams were announced in March 2019:

- People Insights delivers a more effective meeting experience, with relevant, "just-in-time" information you need to better understand and relate to the people you're sitting down with.
- Facial Recognition identifies all of the individuals in a meeting — hello virtual nametags, so you actually know who is talking!



- Webex Assistant helps you join meetings through simple voice commands. It can call the right "Susan," share your content, or control the meeting, even adding the right colleagues for the project at hand.
- Webex Calling combines Webex Teams with enterprise-class PBX, powered by Cisco BroadCloud.



CISCO ROOM KIT MINI

Cisco launched the Room Kit Mini in response to the growing demand to video-enable small rooms. It has all the bells and whistles of its larger siblings with a few extra features to tout as its own. Beyond device features and specifications, a key advantage is a consistent collaborative experience in any size meeting room.

- Automatic screen/display integration through HDMI CEC
 - 120° field of view
 - Advanced video correction features — eliminates fisheye curves.
 - Advanced facial recognition
 - Automatic framing with digital pan/tilt/zoom settings for "best view" — can also follow moving subjects
 - Integrated microphones and speakers
 - Automatic noise suppression reduces meeting disruptions
 - Nametag support across entire portfolio
 - Advanced telemetry capture, such as people count, enabling analytics for resource planning
 - System "wake up" when someone walks into the room; recognizes them through their mobile device
 - Full compute for Webex meetings, but also usable as a USB peripheral with third-party conferencing applications
 - Whiteboard session participation through the Cisco Webex Teams app
 - Content sharing up to 4K resolution
- Launched November 2018, it quickly became Cisco's fastest-selling endpoint.

Cognitive Collaboration in the Contact Center

Cisco's Cognitive Collaboration commitment extends into the contact center portfolio. Cisco is a leading contact center vendor with more than 3 million agents supported globally (Synergy Research Group, 2018). The company offers and remains committed to premises-based, hybrid, and pure cloud solutions.

Customer Journey Analyzer

Cisco recently extended its cloud analytics solution, Customer Journey Analyzer, to be supported across all its contact center platforms. This brings the power of AI and the cloud to premises-based solutions. The Customer Journey Analyzer mines and consolidates data from multiple sources.

Cisco Customer Journey Analyzer brings data together from Automated Call Distributor (ACD), Interactive Voice Response (IVR), Workforce Optimization (WFO), outbound campaign, CRM, and other data sources. The data is consolidated in an analytics repository in the cloud where customers can analyze, understand, and manage the customer journey and automate customer interactions.

This makes it possible, or certainly easier, for a contact center to leverage all the data that is currently spread across the organization, gain valuable insights into customers' behaviors, and deliver

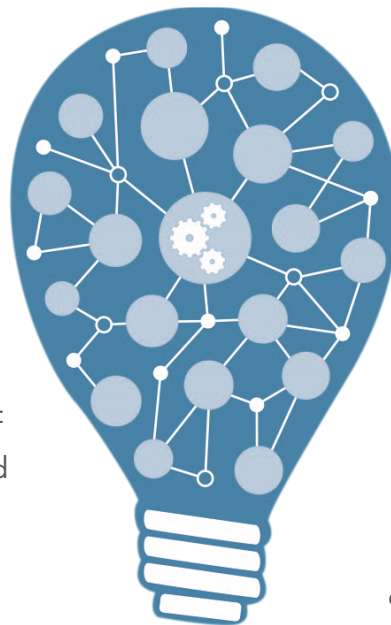
more personalized experiences. A single tool across the portfolio means a more concentrated effort from Cisco and a more seamless migration path for its customers.

Contact Center AI

Cisco also announced the integration of Google AI for Contact Centers to power Customer Virtual Assistant and Cisco Answers services.

Customer Virtual Assistant is an integrated BOT self-service capability to handle straightforward requests that don't always require a live agent. Virtual Assistant interacts directly with customers. It uses Google's [Dialogflow Enterprise Edition](#), a natural language understanding (NLU) platform supporting both voice recognition and text input. Connect the virtual agent to an enterprise knowledge base and back-end systems to automate tasks such as refund requests, returns, billing inquiries, etc.

If the virtual agent is unsuccessful at resolving the issue, it will transfer the customer to a human agent. However, the transfer includes the entire conversation, and the Virtual Assistant continues to guide the agent. **Cisco Answers** leverages AI to analyze real-time conversations and pulls from enterprise knowledge-bases to deliver contextual assistance such as pricing, membership benefits, and other information relevant to the conversation. Cisco Answers empowers agents with knowledge and information, enabling them to deliver faster and better service to your customers.



People Insights

In the future, Cisco intends to extend People Insights to the contact center with powerful intelligence about the customer or prospect. When this occurs, a contact center will be able to deliver more personalized experiences based on externally available contact information. More and more, customers are making their opinions and details public, and Cisco is well positioned to leverage it to grow customer lifetime value with a predictive capability.

For example, People Insights will be able to identify rising stars through a variety of cognitive capabilities within People Insights. This can include recognizing and celebrating customer or prospect achievements such as promotions and publicity. This capability will add to, not replace, existing contact center routing capabilities.

Cognitive Collaboration and the Future

As AI continues to evolve, expect Cisco to lead the way with Cognitive Collaboration. Cisco has the commitment, vision, and breadth in portfolio to make collaboration more seamless, contextual, and intelligent.



Hello, Future!

Cognitive Collaboration allows people to communicate better and more naturally, and it's needed.

A modern IP endpoint today is completely incompatible with older analog telephones. Yet most users don't know the difference. That's because so many of the technical updates in the past twenty years have been about the technology, not the user. We have wonderful gadgets, online calendars, and increased mobility, but along the way, we lost many travel agents, secretaries, and typing pools.

Modern workers don't want more technology; they want context and intelligence. It's time for technology to benefit the user experience, not just improve the bottom line. For the first time, the data and the capability to interpret is there.

AI resources will undoubtedly have a major impact on enterprise and customer communications, collaboration, and engagement. Not all initiatives will be equal, and it's still early in the transition. What makes Cisco's effort with Cognitive Collaboration stand out is the breadth of the initiative.

Cisco has the wherewithal, the installed base, the technology, the portfolio, and the data for a competitive advantage. The result is a comprehensive set of benefits for its customers and their customers. Improving the efficiency of a meeting has widespread and immediate impacts.

Enterprises can get more work done with less friction and delay brought about by interface mismatch, attention jitter, context switching, lack of resources, and missed opportunities to complete individual tasks in a way that drives the total process toward its intended goal. More awareness, availability, and engagement allow teams to maintain a strategic focus in the face of tactical distractions.

As a longtime industry leader, Cisco remains ahead of its competition and continues to lead in innovation — this time in AI. It has the broadest and most extensive portfolio of hardware, software, and intellectual resources to make AI a competitive advantage through efficiency, context, and prediction. Unlike other technical breakthroughs, these new capabilities don't require new equipment or user training. The most powerful ones will passively assist, like lights on a walkway.

It is likely that Cognitive Collaboration, not speeds and feeds, will be Cisco's key differentiator over the next few years. The Cognitive Collaboration umbrella will continue to expand and mature. The future will bring features and applications that we can't yet imagine.



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