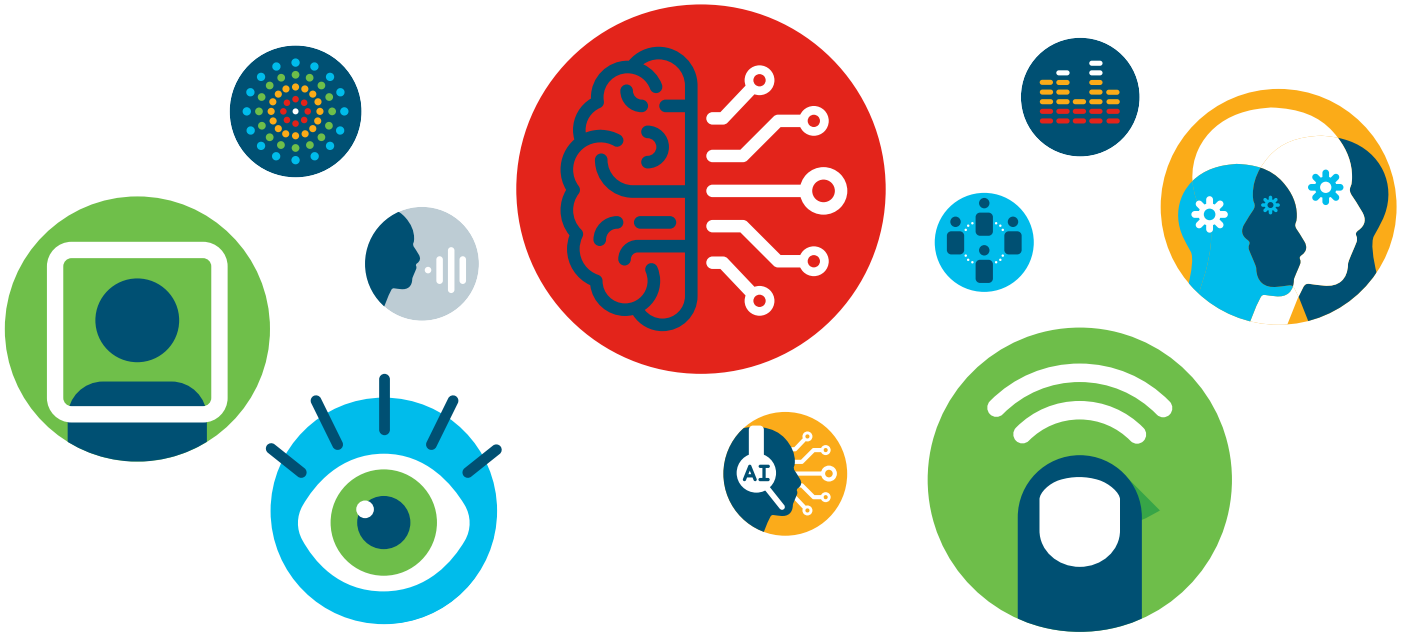
White Paper

Collaboration with the X Factor: How AI Is Transforming the Way We Work

By Keith Griffin, CTO of Intelligence and Analytics, Cisco Collaboration Group



The Most Common Problems Facing Teams Right Now

Even with all the technology currently available in the workplace, there is a fundamental problem in the way people communicate and collaborate. A recent Cisco® survey shows that the three most significant challenges for organizations today are people issues:

- Diminishing employee satisfaction (34 percent)
- Inability to retain top talent (32 percent)
- Slow decision making (32 percent)

We are entering a new era of work in which compartmentalized "productivity suite" technologies by themselves are no longer enough. We now need to bring intelligent technology across the way we work and integrate within workflows. We need to start making the entire process seamless, thereby giving a highly mobile, sophisticated workforce the opportunity to fully leverage its synergies and talents, to maintain satisfaction and engagement, and to speed up the process of getting things done.

This white paper identifies and describes a portfolio of tools and technologies collectively forming a new approach to work and productivity, called Cognitive Collaboration. It also seeks to illustrate how Cisco is tailoring leading-edge, but often misunderstood, approaches such as artificial intelligence (AI) and machine learning (ML) in specific, practical ways that make work life more engaging, productive, and profitable.

The Workplace

Professionals are working differently than they were even five years ago. Wireless technologies, high-bandwidth Internet, and the cloud are allowing work to happen in spaces other than traditional meeting rooms. Advances in memory and processing power mean greater levels of intelligence can be built into apps and devices.

A recent study conducted by Dimension Data shows that the number-one technology needed to drive workplace transformation consists of "communication and collaboration tools." According to the report, 53 percent of organizations say smart meeting rooms that provide workers with intuitive access to various types of conferencing technologies are central to significantly improving business processes.[1]

Figure 1. Cisco survey results on worker collaboration preferences[2]

Increased Speed Demands a New Solution

The situation of today's busy working professional—crowded schedules paired with mobile technologies and potential 24-hour daily availability—has resulted in a significant reduction in attention spans and tolerance for delay.

As just one parallel example, in the consumer space, e-commerce shopping cart abandonment is rampant. Much of this has to do with the fact that a slow-loading webpage (slow being more than two seconds) is enough for a consumer to move on without buying.

Consumer-oriented platforms like YouTube, Spotify, and Netflix, with their instant response paired with personalization bots and recommendation engines, further increase the speed and breadth of expectation. These high expectations get carried into the workplace. Consequently, collaboration, teamwork, self-directed work, and outbound customer care all need increased levels of proactive intelligence to keep pace.

This is further compounded by the threat of "shadow IT," in which people attempt to bring their consumer experience to the office by using unsanctioned and potentially insecure apps to help satisfy their need for fast action. But consumer-centric technology is often not enterprise-centric. This carries a very real danger when there is no central repository or protocol to ensure optimized use.

A recent Dimensional Research survey showed:

- Over 90 percent of respondents say having detailed participant information in their meeting would increase meeting effectiveness.
- Over half of people said they'd argue with their boss over which meeting solution their team should use.
- Eighty-nine percent of respondents would adopt a Cognitive Collaboration solution as soon as possible.

So together, these three forces—diminishing satisfaction and efficiency in the workplace, growing expectation of speed based on technological advancement in the consumer sector, and a stated need for intelligent assistance—demonstrate that the time is right for a new generation of communication and collaboration tools. Ones that are built to handle an ever-growing demand while moving the dial forward in terms of quality and efficiency. This is the basis of Cognitive Collaboration.

1. *The Digital Workplace Report: Transforming Your Business,* Dimension Data, 2017, https://www.dimensiondata.com/microsites/-/media/95C5923C59FD4437B870929D3396F891.ashx.
2. "Cisco Survey Indicates Adding a Virtual Assistant May Be the Key to Happiness at Work," Cisco, https://newsroom.cisco.com/press-release-content?type=webcontent&articleId=1895738.

Cognitive Collaboration Overview

Cognitive Collaboration Defined

When it comes to intelligent, contextual cooperation with people in the workforce, we feel the term Cognitive Collaboration presents a clear picture of the relationship and the outcome. This is because the technologies involved allow for a significant element of cognition to be introduced to the collaborative user experience. Cognition, in this case, means being capable of anticipating a user's needs, employing reasoning, remembering outcomes, and taking proactive actions.

Cognitive Collaboration brings together intelligence and context throughout all collaboration experiences. Bridging AI and ML capabilities with insight and the context of the meeting or customer interaction creates more meaningful experiences and outcomes. Cognitive Collaboration fosters human relationships, enhances customer interactions, and builds high-performance teams across boundaries, enabling smarter and faster decisions.

There are four pillars of technology that comprise the collaboration landscape:

- **Relationship intelligence** focuses on people's understanding of each other by providing relevant information about a meeting participant's job, background, and role in the project. It brings networking and relationship management to a more dynamic, up-to-date place.
- **Multimodal bots and assistants** are intelligent software agents that can carry out tasks to assist the user. They can be internal facing for employees, as well as external facing for customer care. Bot interactions can typically be text based or voice based.
- **Audio and speech technologies** work to improve the collaboration space. This includes conversational AI technology that enables a user to interact with the system via speech, as well as noise-detection technology that intelligently and automatically identifies and eliminates annoying background sounds such as keyboard typing and traffic.
- **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.

The Need for an AI/ML-Based Solution

Cognitive Collaboration needs an advanced form of computing intelligence to operate.

Cognitive Collaboration brings together intelligence and analytics to deliver contextually relevant interactions across workflows. Intelligence is a combination of data and powerful analytics to deliver greater context. Data may be obtained from many relevant sources, including sensors, bots, enterprise applications such as CRM, Internet of Things (IoT) sensors, people profiles, insights into enterprise calendars and meeting resources, and even social data. When combined with analytics that identify patterns and relational clusters for individuals, teams, organizations, and customer insights, we are able to present the right information, to the right team, at the right time and place. This powerful combination delivers Cognitive Collaboration integrated into workflows for connected, relevant, and human experiences.

This is what brings the activities of collaboration out of a static era and into a fully dynamic one. The answer to this call is to integrate the many abilities of artificial intelligence and machine learning in ways that will create a working environment that is:

- **Frictionless**, removing the complexity and manual steps involved in collaboration. Instead of searching for dial-in information or meeting passcodes, attendees could push a single button or join a meeting using only their voice.
- **Human**, leveraging technology to build deeper

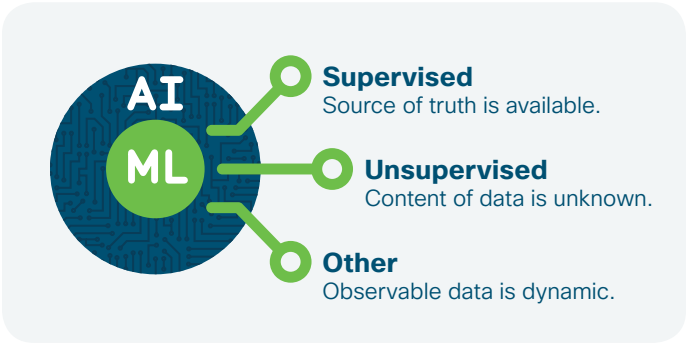
relationships. With intelligent identifiers like facial recognition and participant biographies, participants can quickly learn more about who they are meeting with and quickly develop more meaningful relationships.

- **Insightful**, delivering 360-degree insight for a range of collaborative situations, including meeting room dynamics and customer support in contact centers.
- **Secure**, building on Cisco's stringent enterprise-centric design principles.
- **Assisted**, helping users and teams focus on outcomes, not administration.

Cognitive Collaboration technologies offer solutions that could not have been achieved before with traditional techniques.

How AI and ML Support Cognitive Collaboration

AI and ML are becoming catch-all terms that cover a wide swath of computing capacity and potential, and they are sometimes incorrectly used as labels to describe other technological advances such as graphics processing unit (GPU) power. For the purposes of this white paper, we are applying the terminology and abilities of AI and ML to solve for specific collaboration-related scenarios.



Artificial intelligence is often used as an umbrella term to cover various applications of machine learning. It is commonly applied to describe intelligent agents that take inputs from their environment and attempt to achieve a cognitive outcome as a human would. This requires a certain level of programming, training, or applied problem-solving to become practical.

Machine learning allows computers to learn without specific programming. This is achieved primarily by learning from trained data models that are then used in conjunction with an algorithm to make predictions. Since ML uses sample inputs to predict an output, it is often referred to as supervised learning, given that the trained (supervised) model influences the output. Cognitive Collaboration fits within the supervised learning model.

Supervised learning generally starts with a large data set from which an algorithm is used to generate a prediction model (often called a trained model). The system identifies patterns in the data set that relate to different predictions. In the example of facial recognition, data set containing images of participants in a meeting as "known" (by name) or "unknown" can be used to predict the names of participants in future meetings.

For purposes of comparison and context within this paper, the two other models of machine learning are unsupervised and other variations.

- Unsupervised learning uses algorithms applied to a data set to identify groups or outcomes without knowing anything about these groups in advance. Unlike supervised learning that uses preexisting data, unsupervised learning can be used to build a knowledge base of its own through observation of activities like user or customer behavior, fraud, and anomaly detection.
- Other variations: Although there are many forms of learning that are currently corralled into this "other" category, the most predominant is reinforcement learning, which involves a decision-making policy that improves over time based on the outcomes of previous decisions. Reinforcement learning is often used in control systems such as autonomous vehicles, gaming, and mapping and route-planning systems. Examples of where reinforcement learning could be used in a collaboration environment include optimizing the framing of users in a video conference or anticipating a user's desire to start a meeting.

Machine learning software development is different from traditional software development techniques. Figure 2 shows in a supervised learning example how training data is used to create a trained model that is subsequently used with live data to predict an output.

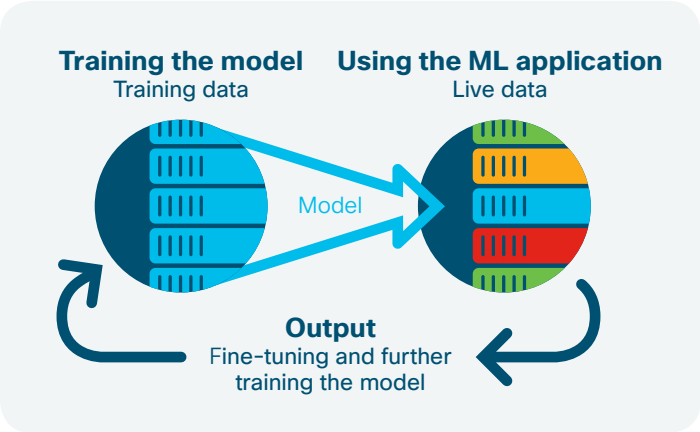


Figure 2. Supervised learning example on the use of training data to predict output

The Five Phases of Assisted AI

Artificial intelligence, as we define it, stands to solve the productivity and collaboration challenges of this new age. But to do so, it needs to collect and process a great deal of information about how people work, communicate, and think. We have defined five phases of assisted AI that we expect deployments to go through. They are:

Phase 1
Simple command and control. An example includes asking the system to join a meeting or add someone to a call.

Phase 2
Natural language understanding. Understand the intent of the user with more complex queries like, "Give this action item to Pat to prepare the slides for next week's meeting."

Phase 3
Understanding specific terminologies and making sense of complex statements. Examples might include a verbal discussion about a current news story that triggers an automatic search and retrieval of that news story, along with related documentation. Or, after a meeting, AI helps summarize the key meeting topics.

Phase 4
AI starts to behave like a member of the team, taking action items and summarizing decisions.

Phase 5
In the future (within the next decade), an AI device acts as a strategic team member, making recommendations based on its business intelligence. For example, it might analyze sales results and recommend an increase in sales headcount in a specific region to grow revenue.

To support all these phases, AI services need to collect and process business-related data and context. When it can do this, AI allows more time for employees to engage in high-value tasks, more creativity from participants, increased satisfaction with work (leading to higher retention levels and ROI on onboarding and training), and stronger team commitment, to name a few advantages.

In the context of Cisco Webex® Assistant, Cisco is currently between phases 2 and 3, although some user adoption rates might trail this. Getting to phases 4 and 5 will require more integration with customers' data. The earlier phases use supervised machine learning, which can be built using internal data—no customer data is required. Moving into these latter phases will be a highly significant transition, and the techniques used must always be designed with specific customers in mind.

Cisco's AI Pedigree

Cisco brings market-proven AI and ML capabilities to the collaboration platform. As Figure 3 demonstrates, we were an early innovator in this field, and we continue to build on our background in machine intelligence as we develop and acquire new solutions that together deliver a complete package.

- Cisco's acquisition of Accompany ensured market-leading insight and data on contact management. Accompany's success in consolidating and delivering up-to-date professional profiles on clients and contacts furthers the development and maintenance of relationships.
- MindMeld: The most vital part of successful collaboration is still voice and language. As such, Cisco Cognitive Collaboration uses powerful natural language processing (NLP) technologies based on MindMeld Workbench to deliver what we call conversational AI (described in more detail below). As a company, MindMeld was long recognized as an industry leader in NLP and conversational AI, using Python and open-source toolkits to build natural language understanding and learning capabilities. Its acquisition by Cisco in 2017 gives the Cisco Cognitive Collaboration team access to an industry-leading, in-house wealth of experience and intelligence to create and maintain this vital product line.

Together, this history of collaboration innovation and acquisition reduces dependencies on third-party services and allows for enterprise-centric designs of both cognitive services and endpoint devices that share a common DNA.

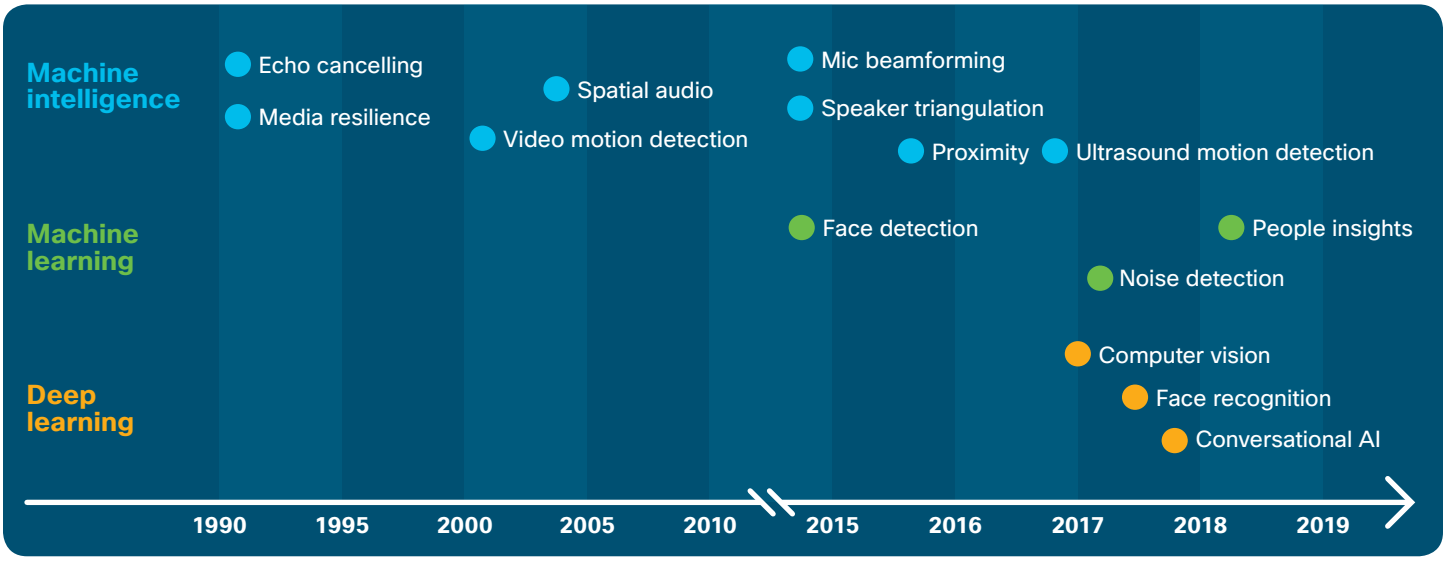


Figure 3. Cisco AI capabilities in collaboration

Looking more closely inside, Cisco's Cognitive Collaboration endpoint features are enabled by the NVIDIA platform—delivering the compute intelligence that works with extreme camera technology and machine learning for a variety of real-time situations. For context, using an outside (non-Cisco) example, in a car, a seamless 360-degree view is helpful for passing slower cars, changing lanes safely, and self-parking. It also incorporates machine learning capabilities for sensing and classifying objects. This same technology enables Cisco Cognitive Collaboration solutions with the compute power to:

- Detect and identify faces.
- Count the number of people in a meeting room.
- Identify who is speaking in the room.
- Use the meeting room camera(s) to best frame the speaking person for visual accuracy and comfort.
- Track active speakers as they move within the room.
- Optimize high-fidelity audio and wireless content sharing with up to 4K resolution.
- Determine that an assistant is invoked using a wake word like "OK Webex."

The Cisco engineering team has developed proprietary algorithms and processes that leverage the underlying GPU-based hardware to help ensure that the identification of faces and the understanding of speech remain accurate and secure. This is one of the ways that the process differs from other competing forms of signal analysis. Rather than simply cross-referencing data stored in the cloud, Cisco supports full security and privacy by incorporating and encrypting tokens that render data in transit worthless to bad actors.

> "Cisco has a complete solution when it comes to calling, meetings, teams, and contact center, as well as devices. Providing total solutions rather than point products will help the company compete against vendors that offer only a piece of the solution. ... Some of the cognitive capabilities can be a game changer, and it will be interesting to see how well Cisco can gain momentum in this area."[1]
>
> — Blair Pleasant, president and principal analyst, COMMfusion LLC, and a cofounder of BCStrategies

1. https://www.bcstrategies.com/content/bridges-and-clouds-cisco-collaboration-analyst-summit-2019

The Four Pillars of Cognitive Collaboration

Relationship Intelligence

The success of any meeting has much to do with inviting the right people and knowing who is in the room. Traditionally, this has been done with a roundtable introduction session, which can be time consuming, and which stands a good chance of losing the attention of participants.

People Insights

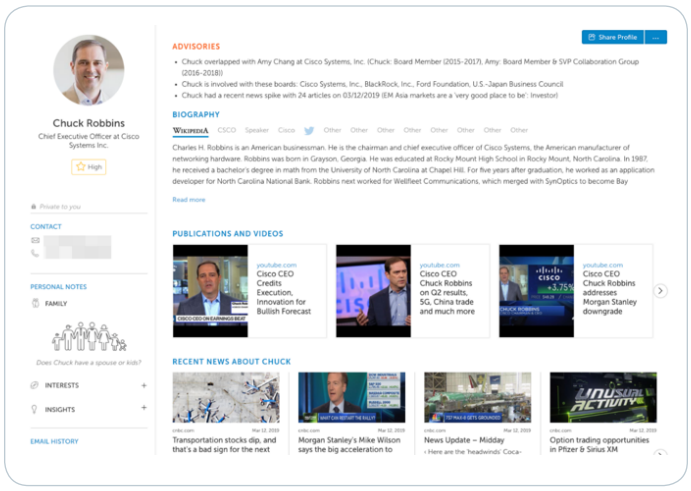
People Insights is a Webex feature that brings rich contextual attendee data into meetings by leveraging and integrating the capabilities of Accompany into Webex Meetings. Cisco acquired Accompany in May 2018, and this represents the first integration of its relationship intelligence platform into the Webex collaboration suite. When a Webex meeting starts up, participants will be able to see profiles populated with information gathered from publicly available sources to build a unique profile for each individual.

People Insights uses discernment logic, a proprietary approach to recognizing the difference between the Pat Smith currently on the roster for the meeting and the thousands of other "Pat Smiths" who have a public presence online. This ensures access to correct, contextual, and relevant information on each participant in the room.

The types of information presented on each attendee includes:

- Name and title
- Work history
- A listing of published documents and articles
- Subject matter expertise
- Employer and company information, including recent news and stock price and performance

Instant access to this type of material makes it easier to elevate the meeting experience.



Customer Journey

Outside of the world of internal meetings, there is the vital world of customer care. Historically, this has been the domain of telephone-based customer service representatives (CSRs) and interactive voice response (IVR) telephone systems.

The modern marketplace places far higher priority on positive experience as a chief attractor and retainer of customers. As such, customer care is now more than ever about automating, while still personalizing the customer digital journey so that everyone feels fully understood and cared for. Although bots and automation have been used for years, they have not employed substantive intelligence to accurately track and respond to a customer's specific needs of the moment. With Cisco Answers, an organization can provide data sheets, FAQs, and other data sources, which can be ingested and modeled by Google's contact center AI, resulting in real-time information being provided to agents based on the context of the callers' questions.

Multimodal Bots and Assistants

These include virtual and personal assistants and are essentially intelligent software agents that can carry out tasks that assist the end user in a collaboration use case. Virtual assistants can take many forms. For an enterprise they can be both internal facing, such as personal and employee assistants, and external facing, as in customer-care assistants. Bot interactions are typically text based, although interaction via voice is also an important use case.

Conversational AI

A critical component of any virtual assistant is the ability to understand the intent of the user. Therefore, Cisco employs powerful natural language processing technologies based on MindMeld Workbench to deliver a process called conversational AI. Conversational AI includes NLP, dialog management, and question-answering abilities.

Note: The initial implementation of Webex Assistant is more instructional in nature, due to the use cases that it solves for; however, conversational AI is a clear direction for Webex Assistant.

Here is an example of how conversational AI will work:

An individual speaks to a Cisco MindMeld Workbench–powered enterprise virtual assistant and says:

"Schedule a meeting with Janice from accounting from 11 a.m. to noon in the Acquerello Room." The virtual assistant replies, "Your meeting with Janice has been scheduled for 11 a.m. today in the Acquerello Room."

In the background, a complex parsing procedure seeks to understand the meaning of what was asked. It follows a sequence like this:

1. **Domain classification** classifies the meeting domain as the target based on the presence of meeting-centric language.
2. **Intent classification** identifies the specific intent of the user within the meeting domain concept, that being the act of scheduling. This is pulled from a collection of related intents such as schedule, cancel, check calendar, help, exit, or greet.
3. **Entity recognition** parses the unique factors (entities) of the meeting request: Janice (person), Accounting (department), 11 a.m. (time marker), noon (time marker), and Acquerello (room name).
4. **Role classification** assigns roles to specific outputs. For example, 11 a.m. is assigned as the start time and noon is assigned as the end time.
5. **Entity resolution** assigns specific identifiers to all the entities, such as Janice (Employee ID 82417), Corporate Accounting Department (Department ID 240817), and start time (Thursday, August 22, 2019, 11:00:00 PDT).
6. **Dialog management and question answering.** The entities are parsed, the order to book the meeting is processed and sent, and the contextually correct response is created and delivered: "Your meeting with Janice has been scheduled for 11 a.m. today in the Acquerello Room."

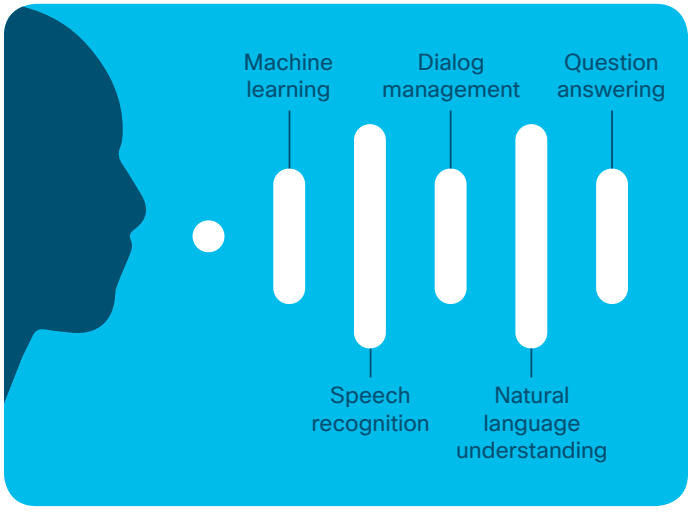


Figure 4. ML components of conversational AI functionality

This type of conversation appears simple to the outside viewer but requires significant computing power to parse and respond correctly and quickly. You can also see how, if any information was missing from the request, the dialog manager and question-answer module would request the required information from the user. For example, if the user did not specify an end time, the assistant would realize that it does not have the information to complete the request and could converse with the user to get the information it needs. It uses a combination of ML features to provide conversational AI functionality that can be exemplified in Figure 4 on the previous page.

Webex Assistant

The conversational AI model helps pave the way for a range of accurate and intelligent assistants for the workspace. It allows people to use their voice to accomplish meeting-related tasks such as starting a scheduled meeting, joining a Webex Personal Room (PR), or calling anyone in the company directory just by saying their name.

Webex Assistant is the keystone tool of Cisco's Cognitive Collaboration capability. It is activated by using the wake word "OK Webex," followed by one of many supported spoken instructions. Figure 5 is a screen shot of some functions Webex Assistant can perform.

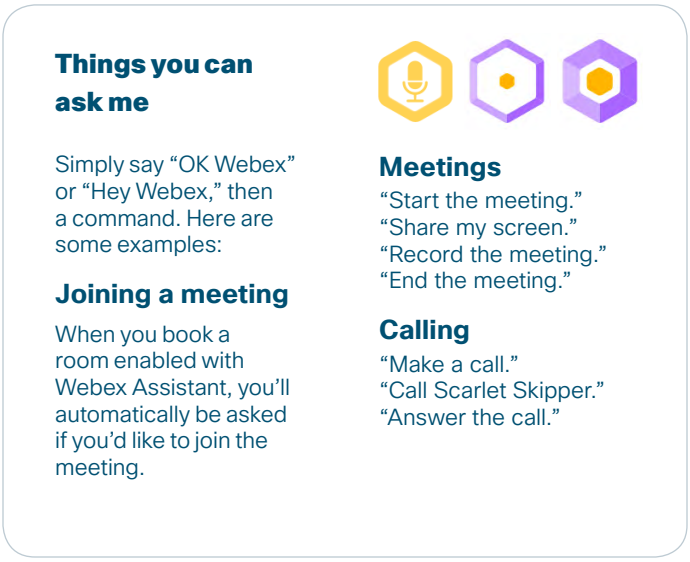


Figure 5. Webex Assistant interface

The interactions described in Figure 5 are just the start. A near-future scenario might sound something like this:

Webex Assistant:
Welcome Catherine, your next meeting is starting in five minutes. Would you like to know who accepted the invitation?

Catherine:
Yes, how many people?

Webex Assistant:
Three have accepted: Maria Rossi, Peter Hogan, and Sherry McKenna. Benjamin Vitali has not yet responded. Would you like to start the meeting now?

Catherine:
Yes, can you please share the latest deck from our space?

Webex Assistant:
Yes, your deck "Q1 Roadmap" has been shared.

Audio and Speech Technologies in Cognitive Collaboration

Collaboration and communication are still currently focused on speech and audio quality. Although the applicability of visual technology is growing quickly, as described in the next section, for the time being, most people are used to audio-related communication as central to their efforts. As such, a successful communication platform must be able to intelligently understand the role of speech and of other sounds in the workplace environment.

Noise Detection and Suppression

Webex provides machine-learning-based noise detection in Webex Meetings clients and Webex Room Series devices to intelligently and automatically identify and eliminate background sounds like keyboard typing, barking dogs at the home office, and traffic noise.

The suppression system follows a logical instruction set to:

- Detect and classify nonhuman noises.
- Provide an alert message: "Noise detected."
- Allow the user to ignore a certain type of noise from Webex.
- Suppress audio when a noise is detected, in the case of Cisco Room Series endpoints.

Transcription Recording

Future iterations of the Cognitive Collaboration suite will allow for accurate production of transcripts from meeting recordings. We are currently experimenting with this technology. This will offer the ability to search for meeting outcomes and identify follow-up work items.

Real-Time Meeting Analytics

Webex Meetings devices provide collaboration telemetry, which can inform utilization trends and help with troubleshooting for customers through Webex Control Hub. Providing this information to customers allows them to understand collaboration trends and manage the overall experience across the portfolio.

Computer Vision

After establishing a solid and reliable protocol for voice and language, the next most important feature is visuals. Humans take in a significant amount of comprehension through what they see. In a collaborative context, this includes inferring meaning and emotion through body language, and establishing relationships of trust through eye contact and face-to-face connection.

Meetings and collaboration are also served better when participants can see that their colleagues are engaged and focused, as well as when they are distracted, bored, or in disagreement. A quality visual connection allows for greater context, to help people understand who is involved in the meeting and read physical gestures and see physical objects (such as product prototypes or graphic charts) that are physically in the room.

Improved visual communication has only become possible in the last few years as network bandwidth and computing power have made web conferencing and video conferencing reliable and cost-efficient.

Rather than simply focusing on delivering a visual image, the Cisco Cognitive Collaboration solution offers intelligence, context, and proactivity by ensuring unimpeded understanding of the people and the topics involved. This is what we call computer vision. It primarily consists of:

- Face recognition
- Gesture recognition
- Object recognition and room interpretation

Face Recognition

Being able to accurately recognize faces, particularly as they move and speak, is an enormous achievement for a computer. Not only are there billions of possible identities to choose from for each human face, there are privacy and identity concerns and laws that dictate how a platform could even collect and store what it needs in order to identify and learn.

Facial recognition involves supervised learning as well as an ML subset called deep learning (DL), which allows for decisions and understanding to be done through a more thorough contextual understanding.

Typically, a face recognition system will use facial features in order to create a description of the face. Once a face is detected, the measurements between key points in the face image are used to create a description that can be returned in a variety of formats. This process recognizes that there is a face there but cannot yet identify it.

However, once the face description can be turned into a face identifier and pushed through a machine learning process using supervised learning or deep learning techniques, it then becomes possible to identify an end user with reasonable accuracy.

Cisco uses NVIDIA GPUs in endpoints to run algorithms to precalculate user descriptions for facial recognition.

Within the context of facial recognition, the deep learning model assigns a numerical identifier to each face it reads. It then works to figure out which known identity is a best match with the highest degree of confidence. Importantly, the user remains in control of their data for this feature to work. This is critical for enterprise deployments of face recognition systems.

Gesture Recognition

Gesture recognition also plays a role in Cognitive Collaboration. People often use the same physical gestures in a collaboration setting, and in future releases these will be recognized and interpreted by the system.

Object Recognition and Room Interpretation

These are two related concepts that focus on the ability to recognize objects within a collaboration environment. Take the example of a computer vision system that can count and identify the people in a meeting room, compare this to the names on the roster, and compare this to the available seating in the room. The system may be able to determine if the room is under- or oversubscribed and could possibly identify and reserve a better meeting location that is available nearby. The benefits of such a solution (to be made available in a future release) would help both the local and remote meeting participants, in addition to being good for meeting efficiency and building resource occupancy and utilization.

Proximity pairing calculates the distance of a specific person from the camera and microphone, which allows the software to tailor sound input volumes and gesture recognition without that person becoming lost in the background.

End-User Privacy Concerns

The platform delivers security, privacy, and reliability in every aspect of the product suite. For example:

- **Facial recognition technology:** On-screen and in-meeting, the output can be a basic name tag—or no display at all, if the user's identity is needed solely as input to another function. The data behind the facial recognition algorithms is tokenized, meaning no face image data is transmitted to and from the cloud. When an individual records his or her face, this is a process called enrollment. The individual enrolls by contributing images of their face. During facial recognition in a meeting, the platform generates a number, which is then matched against the closest known identifier. Cisco uses a GPU on the local device to calculate a descriptor to reduce the risk of thieves and outside agents. Given that features like this are based on users' identity, our design philosophy has been to reduce the risk of access of personal information at every step of the process.
- **Wake-word interaction:** When Webex Assistant is activated using its wake word, "OK Webex," it results in speech being streamed to the cloud-based speech engine. The wake-word service listens only for the wake-word pattern and does not stream until it is activated.
- **Data management:** When an organization opts out or a user leaves an organization, all related data, including machine learning models, is deleted.

The Future of Cognitive Collaboration

This white paper highlights some of the features available or soon to be available in the Cisco Collaboration portfolio. Like every facet of business communication, this is a continually evolving and improving area, and ongoing advancements in computing and mobile ability will only serve to make communication and collaboration even more streamlined and effective.

As more and more tedious or administrative activities get handed over to artificial intelligence, more time and resources are made available for people to leverage their intelligence, creativity, and relationships. Soon, when a meeting host physically walks into the room, everything should start to unfold: The host will be automatically logged into the meeting, the projection system will start up, and the room will coordinate with the other smart-building technologies to adjust the HVAC and lighting for a comfortable environment. The cues for this type of customization will come from more than one source. For example, if the host's phone was left behind, then some other data point will trigger the cognitive process.

What's Coming in Our Future Releases

The goal of this white paper is to illustrate the range of services and innovations available under the mantle of Cognitive Collaboration. Some of these are available currently, and others are still in development. We feel it is important to have presented both current and future offerings together to retain a logical flow and to keep the Cognitive Collaboration benefits in context.

For clarity, here is a summary of the Cognitive Collaboration technologies that are slated for future release:

- **Transcription recording:** accurate production of searchable transcripts from meeting recordings
- **Gesture recognition:** recognition and accurate interpretation of physical gestures
- **Room interpretation:** the ability to count the people in a meeting room, compare this to the names on the roster, and compare this to the available seating in the room to help local and remote meeting participants while also maximizing meeting efficiency and resource utilization

Conclusion

Cognitive Collaboration for Cisco Webex brings powerful artificial intelligence and machine learning to your collaboration experience to help foster relationships, enhance customer interactions, and build high-performance teams across boundaries. While Cognitive Collaboration presents many tangible benefits for Webex users today, Cisco is continuing to evolve these use cases with cross-platform capabilities, so whether you're collaborating on Cisco Webex Teams™, in a huddle space with a Webex device, or on your laptop in Webex Meetings, you'll have the power of AI driving your collaboration experience.