

The Role of the Audiovisual Industry in Unified Communications and Collaboration

An InfoComm International® White Paper

THE ROLE OF THE AV INDUSTRY IN UNIFIED COMMUNICATIONS AND COLLABORATION

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Executive Summary

Only a few years ago, the audiovisual (AV), information technology (IT) and telecommunications fields were distinct disciplines. Today, they have converged, which is not to say that one has consumed the others, but rather that large technology programs now incorporate elements of all three — interrelated and working together to achieve an enterprise goal.

With the advent of unified communications and collaboration (UCC) and the continued growth of AV system elements within the IT network, a shift toward commoditization — where products become indistinguishable and are chosen solely on price — is occurring in the AV marketplace. For example, it is possible to purchase a complete AV system from a single manufacturer in a pre-packaged system configuration. This is contrary to the AV industry's approach to systems integration, whereby custom-designed solutions are applied to the unique circumstances and requirements of each client.

For a number of years, videoconferencing solutions have been considered essential elements of UCC, frequently implemented in large group meeting spaces. More recently, in many markets, organizations' use of UCC has changed. There has been an overall trend toward smaller, less costly solutions that can be deployed across a broader range of staff, not just in executive and managerial suites. Endpoints — the systems people use to engage in UCC — have evolved to encompass desktop and mobile-device experiences, gaining currency over large-room collaborative events.

It is important to be aware that UCC is not something firms can just buy from anyone. UCC — when approached correctly — is an outcome. It happens when there is a coherent strategy, planning, and a blend of tools and infrastructure to support the multiple, unique needs of an organization.

With today's UCC, employees can locate the right people and knowledge to make decisions and carry out processes more quickly than ever before. And interest in improving efficiency through UCC is on the rise. According to Dimension Data, 86 percent of companies using UCC reported productivity gains, while more than 60 percent reported savings of three or more hours per week for each mobile worker [<http://tiny.cc/ucc1>]. A UCC environment can boost productivity by as much as 10 percent, according to various industry studies. Moreover, because virtually all aspects of communication fall under the UCC umbrella, such solutions can also streamline workflows and simplify processes that traditionally require human interaction and collaboration.

According to last year's IDC estimates, worldwide UCC revenue is forecast to increase to \$27.2 billion in 2020, from \$21.6 billion in 2014. A lot of that activity is in the enterprise space. Grandview Research said the “enterprise emerged as the largest application segment in 2013 and is expected to continue dominating the market over the next six years [<http://tiny.cc/ucc3>].”

In all types of enterprises, CIOs are assessing how UCC technologies can benefit their processes, functions, and cultures to determine the most dynamic impact. Such assessments

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typically include anticipating how UCC fits strategic goals and objectives, pinpointing which UCC solutions improve business processes, and finding value in equipping staff with UCC capabilities. **This paper outlines how to overcome business challenges and capitalize on UCC solutions by employing AV professionals who own the skillset to provide benefits, capabilities and support beyond out-of-the-box and limited implementations.**

For AV professionals and technology managers, a larger vision of UCC implementation — within and beyond the meeting space environment — presents a challenge, as some of those spaces are often remote and beyond their direct control. That said, the myriad potential UCC applications also offer a great opportunity for the integration of AV technology with new UCC functionality.

The AV professional may not have a say in an organization's selection of call-control or desktop collaboration software, but these systems inevitably connect to traditional meeting spaces. The performance of such spaces is a significant factor in the quality of the overall UCC experience. The environmental requirements of modern meeting spaces can, therefore, greatly affect the overall success or failure of UCC implementations. They have to be considered early in the UCC implementation process. Architects, with assistance from technology managers and AV professionals, establish proper room acoustics, lighting, mechanical systems, and physical space characteristics to best support the UCC solution. **This paper defines the UCC design characteristics taken into consideration by AV professionals to overcome user challenges and achieve a seamless, high-quality UCC solution.**

The overarching goal of this paper is to report on the impact that UCC is having on the AV industry and how the AV industry plays a significant role in UCC success.

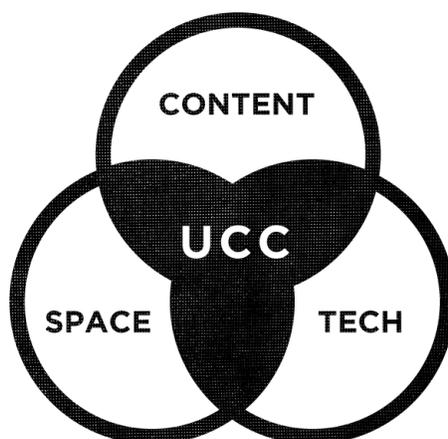
Introduction

Unified communications and collaboration (UCC) combines applications, devices, services, and infrastructure to enable a user experience in which participants can connect, meet, and exchange content. UCC can be deployed on premises, hosted or managed, or provided in the cloud. Applications and services may include audio and videoconferencing, instant messaging, and presence information (i.e., the users' availability), scheduling, content management, and media sharing delivered over desktop and mobile devices and in-room systems. The infrastructure, providing network, compute and storage capabilities, may be physical or virtualized. The most effective implementations provide an adaptive interface that maintains a consistent look and feel across many devices while managing a diverse suite of UCC capabilities.

To many enterprises, hosting and making available a UCC environment as an underlying collaborative platform has become paramount because the development of services and products involves not only the enterprises' internal functions, but also input from suppliers and customers in the quest for innovation, which becomes easier through UCC capabilities.

The solutions that form a complete UCC environment comprise a broad mix of platforms and supporting hardware that, in the best of cases, seamlessly supports the more agile way many enterprises operate today. A well-integrated UCC environment also bridges virtual and physical meeting spaces.

The primary goal of the AV industry is to create exceptional experiences that are greater than the sum of content, technology, and space. An exceptional UCC solution takes into account the need to remove the barriers between room AV and software platforms and calls for the AV solution provider to take a broader look at the various pieces of the UCC puzzle.



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The AV industry can help enterprises capitalize on their UCC investments by:

- Providing a seamless, high-quality user experience.
- Integrating the UCC solution into the physical meeting space
- Integrating video infrastructure into the datacenter for least-cost routing and to address bandwidth considerations
- Providing industry design and implementation standards and performance benchmarking specific to the business's needs for maximum consistency
- Providing managed support to ensure timely updates and troubleshooting
- Involving ANSI-approved, certified professionals in the UCC deployment, such as Certified Technology Specialists™ (CTS®), through a global industry of AV design and integration firms, including Audiovisual Provider of Excellence (APEX) companies

One of the ongoing challenges to enabling true UCC (and therefore maximizing the ROI from UCC systems) is the wide range of possible endpoints that might be brought into a common communication event. Everything ranging from desk telephones to immersive telepresence suites may be included in a UCC meeting/call/conference/collaboration. The following are key components of UCC solution design. In many of these areas, AV professionals provide substantial value and help overcome challenges through their systems integration experience.

Audio

With UCC platforms and soft clients (see below) entering enterprise meeting spaces, the role of audio systems has become even more important, as audio amplification is not only needed for speech reinforcement. Audio systems are now necessary even in small meeting spaces for audio pickup and amplification to and from remote participants. AV systems, such as digital signal processors (DSPs) with echo suppression and cancellation, are an increasingly important part of audio design to ensure high-quality audio when mobile devices are used as codecs for conference calls and video meetings. Furthermore, the need to use USB interfaces for audio connection to and from mobile devices is an important consideration for UCC design.

Codec-Based Videoconferencing

After years of technology development, videoconferencing systems (sometimes referred to as telepresence solutions, based on size and scope) represent an important piece of UCC. And although much has been made in consumer electronics about the webcam as a communication medium, traditional videoconferencing systems, which can connect meeting participants even if they use a webcam, are still important UCC endpoints. When implementing traditional hardware codec-based videoconferencing solutions, AV solution providers play a key role. A well-designed, dedicated videoconferencing room draws on all the skills unique to the AV industry, taking into account acoustics, lighting, audio, and the environmental aspects of the room.

UCC brings with it the need to link a codec-based conferencing platform to an enterprise UCC platform, ensuring a broader reach and bridging room-to-room setups and single, remote participants. As technology evolves, such bridging often entails implementing videoconferencing infrastructure and cloud conferencing platforms to bring people together online.

Video

Being able to communicate face-to-face with people not physically in the same location has become a core component of UCC. Specialists emphasize, for example, taking visual cues from meeting participants to better understand and communicate meaning. Therefore, it's important that such visual cues be seen clearly throughout a UCC environment. As new and different devices take on the role of videoconferencing codec and content-sharing platform for video meetings, the need for properly designed and integrated displays and room-grade cameras has grown. As is the case with audio solutions, even small spaces require a display-and-camera solution so that remote participants can show content and speak face to face with others. In addition, a UCC-supportive design accommodates wireless content sharing using a display and camera fit for a room environment.

Soft Clients

As an alternative to, or in conjunction with, a full UCC platform, a number of specialized soft clients (UCC software programs) support UCC functionality, from simple chat to specialized meeting applications. These soft clients can turn a desktop or notebook computer into a fully functional personal collaboration tool. However, when brought into a meeting space, soft clients require room AV to provide an adequate experience. With soft clients, the AV technology design focus is on the ability to connect to room microphones, cameras, and speakers.

With the use and adoption of an increasing number of UCC platforms, soft clients, and web-conferencing software, there is a growing need to extend the basic functionality of laptop PCs, tablets, and smartphones to support conferencing beyond the one-to-one desktop call. Hardware components include basic USB-based webcams and speakerphones to support small meetings of two to four participants, as well as permanently-equipped huddle spaces and small meeting rooms with cameras, speakers, and microphones that can be easily connected to the mobile device of choice.

Content Management/Sharing Platforms

Content management systems are quickly becoming an integral part of a UCC environment, supporting the need to easily find, share, and redraw documents in a more collaborative way. Although an AV solution provider may not be directly involved in the design and acquisition of a content management solution, the solution's output depends on AV capabilities.

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The need to see and interact with such content, even when connecting smaller spaces, such as huddle rooms, to the larger UCC environment is increasing. This creates the need for nimble display, touch-display, and wireless content-sharing solutions that are core AV specialties.

Wireless content sharing, in particular, is a rapidly evolving product category. The uptake in sharing content on the fly with remote participants creates a need to swiftly connect and share from multiple devices in a room. Knowledge of IP networks and wireless technologies is essential to guiding customers in the right direction when choosing among solutions.

UCC Platforms

Underlying and supporting an ever-increasing number of enterprises, a full-fledged UCC platform is based on a single user interface that incorporates and unites functionality, such as presence, voice, messaging, mail, and video. The need for adapting corporate meeting spaces to support the UCC platform of choice is becoming increasingly important. As more and more spaces are expected to support scheduled or ad-hoc meetings involving remote participants, the interfacing of room AV to support a participant's personal device becomes a crucial part of a UCC strategy.

The mixing of UCC platforms, soft clients, and codec-based videoconferencing has opened a new category of offering, namely that of the cloud conferencing platforms. To the AV solution provider, these platforms provide an effective tool in bridging the gap between codec-based videoconferencing and various UCC platforms. Their functionality varies from merely a cloud-based interface to additional UCC capabilities of their own.

A significant technology path for UCC is the implementation of UC-as-a-Service (UCaaS) — a model of UCC that charges on a per-use basis, with little or no capital costs. The ability to provide presence, chat, voice, and video services from a cloud-based solution continues to gain momentum in the industry. This concept, like other applications migrating to cloud services, allows organizations to deploy highly capable and reliable UCC even when budgets are tight. Additionally, UCaaS allows the user base to take advantage of technological developments in conferencing services without the time and cost required to execute a capital equipment replacement program every three to five years.

That said, even with UCaaS, UCC endpoint and clients should still be refreshed regularly to support the best possible UCC experience. The important point is to keep user requirements and interoperability in mind.

To help clients decide whether to choose an on-premise or cloud-based UCC solution, Wainhouse Research recommends taking into account the following 10 considerations [<http://tiny.cc/ucc6j>]:

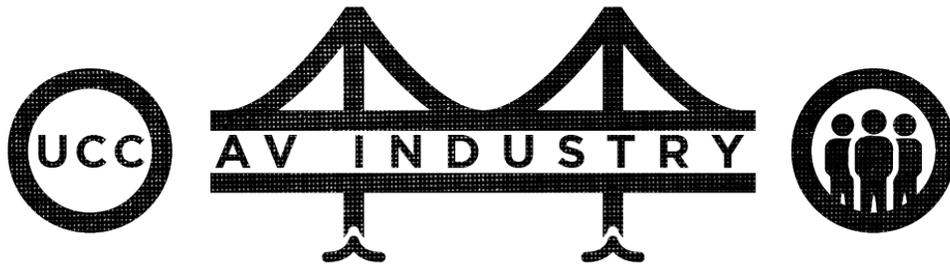
1. Total cost of ownership
2. CAPEX vs. OPEX
3. Business continuity and redundancy
4. Obsolescence and maintenance
5. Immediate expansion
6. Tighter vendor relationships
7. Feature/customization restrictions
8. Control
9. Call quality
10. Security

Who are the clients? Many organizations have shifted the responsibility for purchasing and supporting AV systems to the IT department, as modern solutions have become AV/IT codependent. This shift has resulted in new generations of owners' representatives who are trained in IT and solution providers who continue to adapt their products and services to the IT buyer.

But when it comes to UCC environments especially, AV experts address a distinct set of requirements that make UCC work optimally for the users who depend on it.

AV is the Bridge Between UCC and Users

Throughout their development, AV and IT have traditionally evolved along separate paths, with little intersection. In recent years, however, the two quickly merged, particularly from a technology standpoint. AV professionals still must ensure that clients have a full understanding of the needs and performance of designed systems, not only during the implementation stage, but also for support and possible future options. Frameworks, such as the ANSI/InfoComm 10 standard, *Audiovisual Systems Performance Verification*, provide a common language and point of reference for the evaluation of both AV/IT- and room-based outcomes for UCC solutions.



AV providers need to be able to translate the language of AV for IT buyers in a way that helps clients make the best decisions. In doing so, they help clients understand that UCC is an audiovisual experience, marrying technology and people to help organizations perform better. It can be difficult, but necessary, to describe the causes of unforeseen or less-than-optimal UCC outcomes that could hinder UCC adoption, such as:

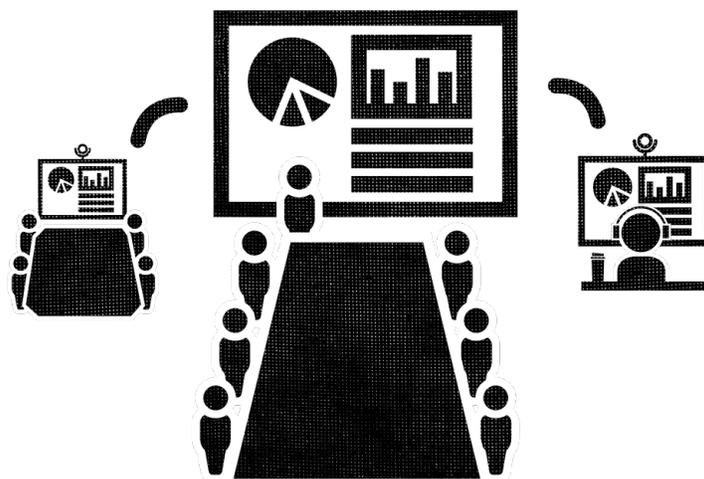
- Microphone placement in rooms that have unknown acoustical characteristics may affect the UCC solution's performance.
- Control systems and codecs residing on the client's network could affect performance due to increased data traffic.
- Information-sensitive UCC meetings traversing systems managed by IT staff may require additional security measures.

The ability to demonstrate issues through mock-ups and alternative-option studies is recommended for minimizing risk in projects and building trust and rapport.

Although UCC is commonly associated with IT, major components of it are, quite literally, an audiovisual experience. This paper will explain how the AV industry can provide an exceptional UCC experience and help respond to UCC business challenges.

How the AV Industry Helps to Address UCC Business Challenges

Capitalizing on the business case for effective UCC requires technology budgeting and planning, but it also requires attention to various nontechnical considerations. Building a UCC environment involves taking into account three key organizational components: people (the corporate culture), spaces (the physical work environment), and technology (the tools to support a seamless UCC experience). In doing so, CIOs and other client stakeholders often must address three main business challenges to UCC implementation: making a business case, addressing deployment issues, and overcoming organizational hurdles. Let's look at each in more detail.



Making a Business Case

Effective business cases clearly state the problem, analyze the solution, provide a cost analysis, and recommend solution options. The business case for an enterprise UCC solution should also include associated costs, adoption drivers, and benefits.

Costs

Capital costs that should be considered include the cost of the UCC platform, licensing and associated servers, and user hardware (endpoints). Beyond the cost of equipment, some organizations may need to budget for room and/or workplace improvements — the changes needed to make the environment and infrastructure suitable for UCC.

Operational costs include telecommunications carrier, licensing and support costs.

Adoption Drivers

What will help ensure a UCC solution is used to the best of its abilities? Drivers of UCC adoption include metrics, motivation, and training. **Metrics** include setting a framework to measure the soft benefits of UCC, as well as some of the harder information, such as the amount of employee travel (completed and/or avoided), specific collaboration activities, and the overall number of meetings before, during, and after key seasonal periods.

Motivation describes incentives the business will use to drive UCC adoption, such as rewarding teams for reducing their travel-related expenses.

User segmentation is also a critical factor for driving adoption and utilization. Not every UCC tool is right for every user. Identifying the correct user groups (e.g., executives, recruiters, sales individuals, technologists) and understanding their unique needs is a necessary step to take before purchasing any hardware or software. Some UCC solutions should only be used when they are a perfect match for the users' needs. The right answer is inevitably a blended set of solutions.

And, of course, proper **training** on UCC platforms ensures productivity goes up and not down with the new technology deployment.

Benefits

Operational benefits are measureable benefits used in advance of deployment to support the business case and cost justification, such as the reduced cost of converged networks, IT management, and travel.

Productivity benefits include those that generate value through UCC, such as delivering products faster or more efficiently, increasing customer satisfaction, and reducing sales cycles.

Strategic benefits come from the top. UCC projects with a strategic impact are usually sponsored by senior executives. Goals may be to improve internal collaboration and innovation, increase first-call resolution rates and/or customer satisfaction in call centers, attract more millennial workers, and other objectives with secondary financial results. Executive sponsorship helps drive the necessary budget, but it can also spur any reengineering required to achieve strategic benefits.

Addressing Deployment Issues

Desktop- and room-based UCC face similar deployment issues, which can impede their usefulness. For example, a video call from a desktop webcam may enhance face-to-face collaboration, but if one of the participants is poorly lit, it can hinder communication and on-screen sharing. Organizations should anticipate issues that might limit UCC usefulness in order to realize the full potential of selected technologies.

Desktop-Based UCC Issues

The following are issues and possible solutions related to the deployment of laptops and PCs equipped with a UCC platform:

- **Audio** — It's important to select an appropriate headset type (i.e., wired, wireless, fully enclosed, or over the ear) and integrate it with the PCs, telephone handsets, and/or mobile devices so that all three can utilize the headset.
- **Acoustical privacy** — Depending on where users access UCC services, they may require a quiet or, at least, private place to communicate. Obtain input from an acoustical engineer or AV professional to determine ways to support desktop users' privacy needs.
- **Video** — Implement the optimal laptop or PC camera specification to ensure the best-possible image quality given the environment and network characteristics.
- **Lighting** — Consider employing task lighting at desktops for better image quality.

Room-Based UCC Issues

Room-based UCC entails rooms that are either equipped with an entire UCC platform (i.e. a videoconferencing or telepresence room) or equipped to enable staff to bring their laptop or mobile devices and connect to the room's infrastructure to launch UCC sessions. The following are deployment issues and possible solutions that organizations may encounter in UCC rooms:

- **Audio** — Select room-based, tabletop and/or ceiling microphones to minimize the critical distance to users' voices. Position microphones away from noise sources (e.g., air-conditioning). Choose a networked audio platform that can integrate multichannel audio via IP or USB to the UCC platform or laptop used within the room. (Note: It's important to test the platform before deploying it at full scale.)
- **Acoustical privacy** — As with desktop-based systems, room systems should allow for quiet conversation. Obtain input from the acoustical engineer or AV professional
- **Video** — Select a wide-angle, pan-tilt-zoom (PTZ) room-based camera with high resolution that can interface with the UCC platform or laptop used in the room.
- **Lighting** — Choose lighting designed to enable the best image in accordance with videoconference lighting guidelines (refer to the upcoming standard [IES/InfoComm RP-38-1X, Videoconferencing Lighting](#)).

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- **Conferencing** — Consider whether the UCC platform will be the primary conference tool or if separate videoconferencing, telepresence and/or audioconferencing systems will co-exist. Such solutions may be tiered across the meeting room environment and should be thoroughly examined for the best productivity mix.
- **Bridging services** — One fundamental UCC deployment challenge that can have a large impact on budget is the provision of bridging services, which combine several different UCC participants into a single meeting. A UCC solution's successful implementation of bridging — and how easy it is to use — depends on whether it uses meeting-room infrastructure, a data center, or a hosted service, as well as whether it can integrate with existing audio and videoconferencing facilities or must be remade around the UCC platform entirely. AV professionals can carry out a detailed least-cost routing assessment of typical collaboration and meeting profiles and advise on compatibility.
- **Interactive sharing** — Select technologies to enable a room participant to share content from multiple devices (i.e., laptops and portable devices).

For more information on specific ways the AV industry addresses user challenges, see the related [section](#) in “How the AV Industry Creates an Exceptional UCC Experience.”

Overcoming Organizational Hurdles

Organizations are a complex mix of experiences, strategies and goals, which leaves room for disagreement and resistance to progressive technology programs. Organizational challenges to UCC implementation include:

- **Finance** — The number one conversation related to establishing service and technology is the level of financial investment an organization is willing to commit to a UCC solution.
- **Infrastructure support** — Aligning infrastructure owners with the needs of UCC initiatives is crucial to implementation success.
- **Brand or vendor loyalty** — New technologies promoting new ideas and solutions might need a new vendor and strategic partner to best succeed. But certain conditions, such as vendor complacency and stretching the useful life of legacy products and services to adapt to progressive business requirements, can cause confusion during implementation and customer handover.
- **Legacy processes** — End users and clients drive the solution, but it is not uncommon to maintain the same methodologies and processes in spite of technical deficiencies and lower productivity. New technologies can mean new, better ways of doing things.
- **Misunderstanding technology** — There are two significant reasons that parties involved with UCC may misunderstand collaborative solutions. Manufacturers, engineering teams, and integrators may have limited experience and direction when tasked with creating UCC solutions. End users, on the other hand, usually are unaware of weaknesses in their current technologies.

Finance

Regardless of business size, decision-makers have to take into account the cost of not just the UCC components, but also the cost of changes in the supporting infrastructure and implementation staffing.

Smaller operations may be easier to fund; therefore, the success of a small-scale implementation does not solely depend on finance. For example, a national chain of hospitals and patient care centers might call for a modest network with reasonable redundancy and control for simple communication events on a day-to-day basis. The communication dynamics are simpler with a smaller scale of endpoints and desktop users. In such cases, the financial commitment is more manageable than a multinational financial institution with global reach and large-scale communication events that require sophisticated logistics and dedicated event management.

Although UCC implementations in large enterprises may be as easy to fund as they would be in small business environments, the chance of their going underfunded due to poor awareness of user requirements for performance and quality is much larger. Such a challenge occurs when there is a disconnect between technology management and business needs. (This is especially true when organizations believe incorrectly that a single purchased solution is all it needs, regardless of use-case diversity.) Furthermore, there may be a gap between the expectations and the resources necessary to achieve the goal in a given timeline. This particular challenge is caused by limited understanding of what the service needs to look like and how it needs to be implemented.

To combat these challenges, AV/IT professionals should create cost estimates that respond to the customer's unique budget, functional requirements, and expectations and design solutions with well-defined performance-measurement baselines.

Infrastructure Support

Significant modification of a network to accommodate UCC might create a sense of risk for network infrastructure managers. Identifying and working with stakeholders on the network/IT side can assist in driving innovation, developing justification, and influencing the appropriate parties.

A number of infrastructure-related problems *can* occur, and it's important to understand that in preparation for a UCC deployment. For example, if providers of disparate UCC platforms, which enable users in separate organizations to interact and communicate with each other, do not coordinate their work, their router configuration templates may not be functional for a certain UCC implementation. Moreover, existing infrastructure that already represents a large investment may not play well with the new UCC solution and, therefore, may not provide the promised functionality to the end user.

It is essential that AV integrators approach every possible installation with an awareness of their clients' existing environments. Knowing what solutions will be compatible, or when to recommend that the existing infrastructure be changed, is critical to the perceived success of an implementation.

Brand or Vendor Loyalty

Decision makers choose solutions they believe will be beneficial both functionally and financially. They leverage relationships to save time and improve the organization's standing. They may depend on familiar, long-standing vendor and consultant relationships to install and maintain collaborative or video tools and audioconferencing products or services. However, new technologies may signal a new approach to ensure ROI.

Existing providers may be able to deliver the necessary products, if they've been keeping up with technology and trends. But sometimes, conditions such as vendor complacency and legacy products and services can cause challenges. For example, network infrastructure managers may leverage component vendors or network infrastructure consultants to establish collaborative or video tools — and possibly even install audioconferencing products or services — that just don't fit the enterprise. The offering may look good in presentation, but it does not always have enough support, leaving the technology manager an inordinate level of work to ensure the solution is successful.

In the long term, such a situation can result in a significant change of direction that is ultimately much more expensive than starting in the right place, with the right product and services. An integral part of the AV solution sales process is strategic vendor selection.

Legacy Processes

Change can be difficult to drive in any environment. The same is true for a UCC implementation. Users may be used to their existing tools (e.g., telephone and email) and question the need for something new. They may oppose the change—vocally. It is important to be prepared to answer their questions quickly and provide logical reasons for the UCC system so that users embrace and support the transition.

Here are some specific challenges to transitioning a user group to a UCC environment:

- **Self-managed vs. managed** — Today's team members are expected to create and manage virtual meeting opportunities. Legacy users and white-glove service clientele will continue to expect a managed experience of pre-scheduling audio and video connections and in-room support, relying on costly services.
- **Users may want to communicate the old way** — The telephone remains the most powerful business tool, but technology managers are moving users to integrated solutions that match voice with other services to increase productivity and contain costs through the elimination of expensive external services and better operational efficiency. For example, experts can join an online conference, with audio, video, and built-in bridging, through an electronic invite from WebEx or other integrated UCC solution. Such a solution does not require users to stop the action, prepare an invite, schedule a service, or even request onsite support. This new agile workflow must be clearly communicated to users.

- **Legacy AV support vs. IT support** — Traditional support models consist of staff trained solely on AV technologies. Existing IT support staff is usually unaware of AV applications, how they're supposed to work, where they fit in the enterprise, and how their clients need to use them. AV and IT managers should work together to develop functional awareness for all of their support staff to meet this new challenge. For example, traditional desktop support agents may struggle to understand audio gain structures and levels of AV quality. In addition, they may not understand the time-sensitive nature of an affected meeting in progress (i.e., when filling out a trouble ticket should take a back seat to urgent troubleshooting). Meanwhile, AV support techs may not grasp concepts related to how AV functions in an enterprise deployment and more network-related issues, such as roaming user profiles. To avoid confusion, organizations should reinvent their support of UCC solution *before* deployment in order to anticipate new challenges and to satisfy user expectations.
- **Users may not be open to obtaining additional training for new processes and features** — Change takes time, especially if the old way worked and users don't feel like leaving their comfort zone. Old habits will be difficult to break if there are users at various seniority levels who want to push back. This sentiment needs to be recognized and the UCC solution, which should consist of high-usability products with reliable service and functions, needs to be presented in a way that is inclusive of all user levels. Otherwise, even the best programs risk failure.

Misunderstanding the Technology

Misunderstandings about UCC solutions come from technology providers and program managers on the one hand, and end users on the other. Such misunderstandings need to be addressed in order to minimize confusion and improve the chances of a successful UCC business case.

Technology Providers and Program Managers

UCC solutions carry a unique set of implementation challenges. Technology providers and program managers, though perhaps well versed in the technology, may contribute to its misunderstandings through poor judgment and missteps by not foreseeing those unique circumstances. Here are some of the possible causes:

- **Faulty needs assessment** — Often performed at the upper organizational tiers instead of a cross-section including all user levels.
- **Poor coordination** — Insufficient technology awareness, ownership, and accountability across project stakeholders including technology, infrastructure, and real estate teams.
- **Solutions oversold by management and stakeholders and misunderstood operationally by engineering** — A coordination challenge that requires adequate education and clear communication.

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To help neutralize unrealistic expectations for UCC, technology providers and technology managers should proactively address both of the following:

- **Ease of use** — Physical connections should be readily available and reliable. System controls should be positioned in an optimum place for users and support personnel. Power-user control settings can be established and hidden for support-technician use, while a set of simple and easy-to-use controls for primary functions can be made available upfront for a self-service meeting. The scheduling facility should have a reasonable self-service control and meeting scheduling option and simple reservation process. Finally, a help desk offering remote and (if possible) onsite assistance to resolve customer concerns and assist new users is beneficial.
- **Quality** — End users anticipate and expect clear communication with as little interruption as possible. The closer a program manager gets to achieving a seamless service, the more successful collaborative meetings will be.

End Users

End users often misunderstand the promise of collaborative technology. Among the common misconceptions are:

- **I'll never have to travel for business again** — A videoconferencing experience can't fully replace in-person meetings. Videoconferences can certainly help clarify communication across distances, enabling the exchange of ideas in real time, which can be critical to ensuring that a message is received. However, face-to-face meetings allow for a clearer exchange of nonverbal signals and cues, which is a very important part of business communication.
- **I'll be able to collaborate with anyone anywhere and at any time of day** — Conferencing technologies are not time machines. Teams still need to establish schedules to accommodate time zones. This affects logistics and support management.
- **I can collaborate with anyone inside or outside my organization regardless of the systems/networks they use** — A richer set of cloud services and network tools that allow for ubiquitous connections is on the verge of existence. There is a great opportunity to leverage new tools, but educating the end users, setting expectations and managing external connections are all part of that challenge. Partnerships across the network infrastructure group help to have the entire community aligned and working toward this common goal.
- **I (don't) need to be an expert** — A good training program builds confidence in the user base, especially for a self-service model.

Assessing Technology for the Agile World

When designing UCC solutions, it is important not only to look at current requirements and the UCC options that can address those requirements, but also to consider future trends in peripheral technologies and anticipate expansion needs. As technology helps organizations communicate more effectively, it's important that they harness technological advances for competitive advantage. AV integrators are in a position to deliver on this advantage by offering up-to-date solutions and integrating flexible infrastructure environments for both short- and long-term projects.

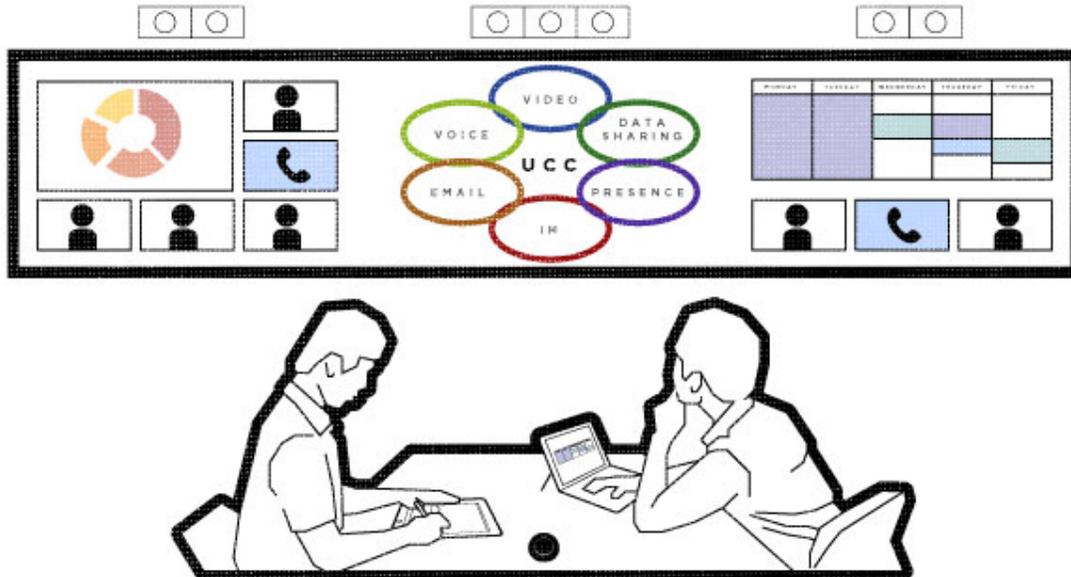
Designers and integrators must invest in two key operational areas:

- Growing the company knowledge base via ongoing training and social networking to create an open work environment where new technology trends can be understood and assessed.
- Developing partnerships with manufacturers and services providers. The primary benefit of this mutual relationship would be built on anticipating and developing new technologies specific to users' needs.

UCC is an agile solution for the agile world. To implement a solution that can grow and change as processes and needs evolve, the AV industry must:

- Understand the client's strategies and workflows, and how the organization can benefit from UCC technologies
- Educate clients on the various options and limitations of UCC offerings
- Discuss current and future infrastructure requirements, as well as possible budget consideration for expansion and support options

How the AV Industry Creates an Exceptional UCC Experience



As a potentially AV-heavy application traversing a predominantly IT infrastructure, UCC has increased the need for the AV industry to work closely with the IT industry. Such coordination between AV and IT is especially important during UCC deployment. It's crucial for manufacturers and integrators to walk users through the process to ensure a successful integration, as well as secure and reliable infrastructure.

For some time now, videoconferencing, telepresence, and video streaming technologies have made the IT industry more aware of the impact of AV solutions on the network. With the UCC evolution, it is no longer an option for IT managers to simply separate network traffic. Successfully deployed UCC requires a thoughtful approach to AV/IT infrastructure and careful coordination with the participating industries from the beginning.

Traditionally, the success of an AV system deployment has been contingent on creating a system that works within the room environment. This has been the focus of integrated AV systems for years. Such environments can mean the difference between an investment in UCC that works just okay, and an investment in UCC that creates a truly collaborative setting that users want to engage in and enhances productivity. With their cross-section of skills in room systems and in UCC devices and software, AV professionals can leverage both AV and IT technologies to their and their clients' advantage.

Using the knowledge and skills developed through AV training and experience, the AV professionals can provide a design solution that enhances the use of technology and content in a space. Over the lifecycle of a UCC project, an AV professional:

- Identifies the requirements
- Designs the UCC solution
- Provides an exceptional UCC environment
- Ensures interoperability
- Secures systems and users
- Provides exceptional service and support

Understanding each of these parts of a UCC project can help AV professionals explain their role to clients, and help clients and IT departments understand some of the requirements for an exceptional UCC experience that fosters the collaboration envisioned by the system's business case.

Identifying the Requirements

The most critical phase of solution design and implementation is collecting and defining requirements with the end users. Many end users do not have the expertise and experience to qualify the most significant elements that make up the function of the solution. A project initiative succeeds or fails based on the availability and accuracy of customer requirements.

The functional requirements are developed and finalized through an iterative process with the customer. A number of meetings may be required to get the requirements into their final state and adequately documented so everyone involved on the project can understand the design intent and function.

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AV professionals develop a functional requirements specification document for review and approval by all customer stakeholders. These requirements may include:

- Choice of one-to-many vs. peer-to-peer meeting styles
- Special applications (e.g., concierge-managed endpoints or some other vertical requirement)
- Cost
- Audio details (e.g., quality and scale)
- Video details (e.g., quality, size, and scale)
- Audio and video endpoint features
- Level of interactivity or collaboration
- Messaging needs
- Ease of use
- Remote access and desktop virtualization
- Frequency and volume of usage vs. reliability
- Necessity to record, manage and remotely deliver content
- Workspace design and layout

Throughout the process of collecting requirements, such as those noted above, AV professionals typically:

- **Begin at the end** — They determine what the outcome of the application will be. Is the purpose to create a fabric of tightly aligned collaboration tools on a desktop to create a shared work environment? What level of quality will be necessary based on the audience and purpose?
- **Review the requirements for simplicity** — Is the solution understandable to a novice user? Can any user readily understand how to make the system function and achieve the desired outcome?

After the requirements are finalized, the next step is to begin the design process.

Designing the UCC Solution

A variety of new technology, products, components, and capabilities influence the overall design of a UCC solution. For example, a solution design may be based on whether an application needs to stream video; the types of systems the solution needs to interoperate with; and all the different endpoints the UCC service might need to reach, from regular PCs, to room systems, to tablets, to so-called thin clients based on a virtual desktop infrastructure (i.e. even the computer operating environment is streamed to a screen over the network).

When considering design options, it is important to understand that a UCC user is usually influenced by an array of consumer applications. Several audio and video software endpoints

are free to use across Internet connections and provide “good enough” quality. But such quality is not generally acceptable in most enterprise environments.

The challenge for AV professionals is to provide a solution that offers exceptional quality, but not at an exceptionally high cost. And there are many reasons that challenge exists. Consider the rapid rise of bring-your-own-device (BYOD) initiatives and their effect on UCC environments. With BYOD, users can experience UCC from anywhere, with anyone, and largely on their own terms. From an IT management perspective, BYOD poses support, security, and other challenges. From an AV perspective, the challenge comes in ensuring the best possible UCC experience on endpoints that are often unknowable, uncontrolled, and randomly connected to the UCC environment. Such UCC experiences *are* achievable while still supporting BYOD programs; but they require close collaboration between AV and IT professionals.

Related to BYOD, the explosion of mobile devices means UCC designs must account for wireless connectivity in all forms. The wireless transmission of content and collaboration environments to workspace displays presents a potentially radical change in the design and configuration of AV systems. New technology developments point toward a UCC system that operates without specialized wiring, cable-length limitations, connectors, and matching devices. Many solutions have emerged based on 802.11 Wi-Fi signal formats, from embedded wireless capabilities within computer chip sets to proprietary wireless solutions from a variety of manufacturers. This is a rapidly developing area of AV, but it is hard to imagine a UCC design that does not include provisions for wireless connections through special infrastructure.

But here is the key: Users expect all of these disparate technologies to work in harmony, providing seamless transitions from any communication medium or device to another. AV professionals are used to developing solutions from a wide range of requirements, and that includes many disparate components, such as control systems and audio- and video-distribution networks.

Providing an Exceptional UCC Environment

As collaboration spaces have evolved from fully-enclosed meeting and videoconferencing rooms to huddle spaces and open office environments, so has the need to provide similar treatments to these spaces to help ensure the best possible UCC experience.

An AV professional tends to focus on an all-inclusive approach to the room environment, rather than focusing on devices. Enabling and enhancing human interaction are central goals of AV solutions. To an AV professional, UCC is a feature that complements the whole-room AV approach — it’s a subset of the whole-room design.

When integrating UCC technology and content into a space, AV professionals consider a host of elements in the proposed room environment and provide solutions to address user challenges. The following are some of the issues that could hinder an exceptional UCC experience, and ways AV professionals might address them.

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UCC User Challenge	AV Solution
Audio privacy	<p>In a quiet, non-reverberant environment, conversations can be overheard unintentionally, invading privacy. Moreover, mechanical or man-made noise can disrupt collaboration. AV professionals solve such issues through:</p> <p>Design, testing and coordination — Anticipating possible sources of signal crosstalk (mixed or disparate platforms) in the design phase, performing thorough and comprehensive testing to limit noise, and coordinating with other industries to correct the problem.</p> <p>Managed services — Providing continued oversight of controls to prevent and manage audio privacy issues.</p> <p>Sound masking — Introducing artificial noise to a space to mask HVAC and conversational noise. However, it can interfere with acoustic echo cancellation (AEC).</p> <p>Fully enclosed headsets—Providing users with a mobile headset solution they can take anywhere. While the over-the-ear solutions can be popular, fully enclosed stereo headsets (covering the full-ear or in-ear plugs) provide an unparalleled sense of privacy on conference calls.</p>
Video privacy	Depending on where the video collaboration takes place, the solution may be to install a high partition, movable partition, motorized privacy screen, or switchable privacy glass behind the user.
Vibration	Vibration is structure-borne noise that can impede the function of document and videoconferencing cameras. AV professionals work with the project's acoustical consultant or other member of the design team to control vibration.
Reverberation	When a room has hard, reflective surfaces, sound bouncing around can adversely affect UCC sessions. AV professionals work with an acoustical consultant, who should understand how a space will be utilized, and make recommendations about the space's size, shape, finishes, and materials to help control reverberation.
Poor image clarity caused by endpoints and infrastructure	AV professionals work with the IT staff to define the problem and ensure that the right protocol exchange is occurring and the best available compression algorithms being implemented based on the UCC hardware and software. With a proper understanding of the client's network infrastructure, AV professionals help identify limiting factors, such as network congestion or high latency.
Format and multisite issues	The number of sites to be combined into a session/call, the number of participants at each of these sites, and the call setup method need to be factored into creating an exceptional experience. AV professionals use audio and video technologies that provide a seamless experience by automatically switching to the users who are talking, while keeping the shared content clearly viewable on main screens, tablets, and other devices. Currently available technology enables video-based detection (i.e., not just audio or gating) to determine who is speaking, such as with dual camera systems. Telepresence systems are now interoperable with mid-tier and software based solutions. Automated presence technology is suitable for single user end-points, but is still considered a work in progress for defining who is in a meeting room in most current platforms.
Interruptions from public-address/paging systems	A common, though often overlooked issue. UCC designers may implement a messaging application, leaving the PA system to be used only for emergency announcements.
Connection interruption	The more UCC participants are mobile and untethered, the more they risk cutting out of a UCC session when their devices' batteries run down. Designers should provide outlets at different workplaces for laptop recharging and battery recharging stations.
Poor lighting for mobile user environments	Provide key light to assist in visual presentation (e.g., desk lamps that provide a soft vertical luminance onto the participant's face).
Webcam video for video's sake	All too often, inexperienced users believe that a webcam — either integrated into a notebook or sold separately — is all they need to achieve effective visual collaboration. These fixed-focal-length webcams are usually good when used about eighteen inches from the subject. However, when positioned at the end of a conference room of any size, the results are poor. Although they produce video images of varying quality — all the way up to HD — these webcams can't resolve facial expressions or body language at distances past two feet. What good is it to have video for video's sake, but achieve none of goals of remote visual collaboration? There are a number of products on the market that claim to be room systems, but in reality just utilize webcams. An AV professional needs to explain the difference between camera systems that can convey appropriate body language and emotion and those that can't.

Ensuring Interoperability

One of the major challenges in designing UCC systems is ensuring interoperability among products and services from various vendors. True UCC means welcoming the widest possible range of endpoints into a common communication event. Everything ranging from desk telephones to the immersive telepresence suite might be included. How can these vastly differing applications be blended into one communication environment? Through UCC protocols that work across all devices.

Often, UCC providers say their products are “standards-compliant,” yet they’ve created extensions to the standard to differentiate their value and actually prevent interoperability with other manufacturers’ solutions. For example, the Session Initiation Protocol (SIP) standard, which is used for call control in a UCC environment, is not fully defined, so SIP has been modified by several providers so that their solutions can still be considered to meet the SIP standard [<http://tiny.cc/ucc2>]. The result is that some endpoints need a third-party gateway in order to communicate.

In the world of AV, network appliance devices are not necessarily compatible with other AV equipment. For example, a collaboration product may be compatible with iOS and no other platforms. Although the ability to mix AV components from various manufacturers is a desired capability, it remains a major challenge.

Open standards are critical to enabling direct interoperability. And direct interoperability is just that: one UCC client directly communicating with another UCC client and not via a gateway (see “Gateways: Good or Evil?”). Adhering to open standards ensures that UCC users can communicate within and outside their enterprises, and, generally, that they can communicate using all the UCC client’s features.

Gateways: Good or Evil?

One of the limiting factors for an effective UCC environment is the lack of compatibility between the various components and endpoints. In some situations, such a problem can be alleviated by providing gateway solutions, which can bridge the gap between the disparate elements. That means going outside of the defined solution to provide a level of interaction and connection that users expect.

The use of a gateway generally disables many UCC features. For example, users may not be able to escalate a chat session to a voice or video call. Also, directory services may not be available. Additionally, the gateway reduces the scalability of the overall UCC solution because it can only support a finite number of user sessions.

In case a gateway must be deployed, users should not have to use a prefixed dial before hitting the gateway and making a UCC call — the solution should just work. AV and IT must coordinate to deliver such a capability.

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Non-standard protocols and gateways add a degree of complexity to necessary UCC events, such as firewall traversal (allowing UCC traffic to pass through network security systems), and can result in an inability to communicate. In consultation with UCC designers, information security personnel can implement firewalls as UCC-aware devices on the network, using standards that establish easier, known paths through those firewalls. The H.460 family of firewall traversal standards is one example that provides a means for UCC network packets to traverse firewalls without opening network ports specifically for UCC data. This satisfies all interested parties by ensuring a secure network infrastructure and a fully operational UCC environment.

The following helps explain further how vastly differing UCC applications can be blended into a single, interoperable communication environment.

The IP-ification of Components

The impact of the TCP/IP network protocol was first felt in the IT industry. Traditional proprietary network protocols, such as IBM's System Network Architecture (SNA), eventually were overcome by the flexibility and interoperability that TCP/IP provided enterprises. The AV industry is now in the midst of this revolution. Adopting the Internet Protocol (IP) for AV traffic transport, historically handled by a dedicated wiring infrastructure, promises ease of use, the ability to leverage the existing network infrastructure, and resulting economies of scale. Migration to the IP network for transport is essential for traditional AV components to participate in the UCC realm.

It is essential that AV designers and implementers be prepared to present manufacturer specifications and IP communication protocols for every device that needs to reside on a client's network. Information security personnel will often require this detailed information before allowing the connection. Additionally, peripheral devices that wouldn't necessarily raise a red flag might utilize technologies that would prevent their acceptance on an enterprise network unless disabled, such as Digital Living Network Alliance (DLNA) functionality in displays.

Transparent Connectivity

It should not matter to the user whether an application initiates a voice, video, or data/graphics transaction. But such integration is not usually built into various UCC endpoints and must be implemented in the core of the UCC platform or as part of the networked environment.

Network arbitration engines (i.e., gateways) and communication transcoders (i.e., multipoint control units or MCUs) may be required as part of the overall system architecture. For example, gateways are often required when content (i.e., graphics, data, and annotation) is included in the UCC environment. Ensuring that devices and architecture are appropriate for the required communication connections is critical to success. And keep in mind: Compatibility may not mean the same thing to manufacturers and systems integrators.

Consistent User Interfaces

Ensuring a consistent user interface (UI) gives the users a sense of familiarity, in spite of the inherent differences among UCC systems. System designers count on a carefully considered and created UI to disguise the intricacies of the underlying connections and other operational aspects. Simplified interface screens with clean transitions go a long way toward enhancing that feeling of true unification.

UCTopia: BYOD and Ad-Hoc Integration in the Traditional/Telepresence Paradigm

Ultimately, UCC is the perfect marriage of AV and IT—AV experiences and IP-enabled interoperability. What does the perfectly integrated UCC solution look like? We call it *UCTopia*. Here's what life in UCTopia is like:

- **Starting a UCC solution initiates the automatic acquisition of applications and contacts already present.**

In a web-enabled/HTML5-based UCC environment, a user clicks on a hyperlink and the collaboration tools are immediately available. Either no software is required or it is preloaded on a workstation and no plug-in is necessary. Some users have hardware or software-based UCC platforms, but a web-enabled feature opens UCC to anyone with a specific browser version/release. UCC platforms based on open standards for hardware, software, and web platforms are critical. This feature has been around for some time, but without the rich feature set of a true client loaded on a workstation. The current trend is to support rich features such as directory services and presence in a web-enabled UCC environment. The more this environment closely resembles a true client device, the more widespread the adoption will be.

- **Individual presence in a meeting environment is based on the UCC devices that participants use.**

A meeting organizer can launch an ad-hoc meeting using the presence available for all of the individuals required to attend. Users can connect via video, audio, or a web browser, depending on their availability and location.

A browser-based application downloads a plug-in that allows users to dial into a conference or to another endpoint in a point-to-point call. This capability does not require pre-installed software, only that the user has a camera and the appropriate browser (for example, older versions of Internet Explorer [IE] would not work well). Presence is a feature that can be added to this capability, but, for now, the capability only includes video and audio and not IM and presence. This feature does not rely on an endpoint or on a specific architecture. Users just need to have a browser and be connected to the same network.

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- **Unified identification of individuals in a global directory creates a seamless collaborative environment.**

Directory services are important to establishing a ubiquitous UCC environment. In order to collaborate, users must be able to dial other users within and outside of their UCC enterprise.

- **The web allows ad-hoc additions from multiple platforms.**

Web-enabled UCC is key to allowing ad-hoc additions from multiple platforms. The web-enabled UCC user does not depend on the platform, but rather on the browser type. So a user can choose a browser based on the UCC web-enabled client's requirements. This is true for many applications beyond UCC. Users have gotten accustomed to choosing a browser based on the application because some applications simply work more efficiently and effectively on specific web browsers.

- **Interaction through seamless integration can be achieved without gateways.**

The goal is an architecture without gateways that limit scalability and can result in network congestion (i.e., all users being directed to pass through the gateway). The key is to support an open-standards environment for all UCC.

- **UCC capabilities are transferrable to wherever the user is working.**

Extension mobility is a useful UCC feature available now. Users can log into a UCC endpoint in their local area and receive voice and video calls, check voice mail, receive IMs, and indicate presence in the space where they are currently working — regardless of where it is physically.

- **Meeting rooms are virtual.**

Increasingly, systems are moving away from complicated dial plans and toward the same kind of “meet me” call initiation that audioconferencing has used for years. Sending all meeting participants a link that enables them to connect from whatever device or room they wish to use is quickly becoming the industry standard.

Ultimately, UCTopia would provide users with a UCC environment that is as seamlessly enabled as a standard phone call, but with the added advantages of a comprehensive, online directory and presence information. This gives users the ability to easily collaborate at a time that is convenient. This environment, combined with UC-as-a-Service features in the cloud, empower UCC developers to establish an architecture that is interoperable across different networks and endpoints.

Ensuring Security of Systems and Users

UCC has revolutionized the world of IT and is now impacting the world of AV technology. Historically, the AV world used dedicated infrastructure and cabling, effectively isolating components from outside threats of attacks. Now, by leveraging a common IP infrastructure, UCC exposes AV components to security threats traditionally experienced by IT services.

In UCC environments, some of the security concerns are unauthorized interception or eavesdropping, toll fraud, phishing, platform compromise, and denial of service (DoS).

UCC-enabled AV components have to be properly configured and rigorously tested, with security measures applied as part of a comprehensive multilevel strategy. When developing the requirements and design solutions, an AV professional considers security at the very origins of a project.

To combat security flaws and threats, AV professionals either coordinate their implementation with security professionals or hire contractual or permanent IT staff with expertise in network security. To ensure security of UCC solutions, AV professionals must understand security standards and vulnerabilities that can arise from endpoints, servers and infrastructure.

Network security is an integral part of the InfoComm CTS training and *Networked AV Systems* content.

Providing Exceptional Service and Support

In addition to systems designs and deployments, the AV industry also needs to provide services to ensure integrated systems are monitored and managed to ensure reliability, quality, and a seamless solution. Many UCC solution providers offer long-term support to allow companies to embrace the technology. It is important for support options to be customizable to fit system designs and users' requirements. Proper support ensures that users have the most effective and economical solutions with uninterrupted system utilization.

A support team that understands the application and is able to communicate that understanding to the end user is crucial to the success of a UCC solution. Developing and retaining a talent pool is one of the most reliable ways to combat organizational resistance, produce a real effort to ensure success in technical operations, and maintain sustainability of service offerings. Talent is not normally created but rather identified and then developed into a powerful resource.

Conclusion

The ability to allow people to connect anywhere through a variety of devices is the foundation of creating a flexible and productive environment. The AV industry strives to understand the users' needs, the technological capabilities and ways to fuse them to create easy-to-use, reliable, and secure means of communication.

The traditional silos of communication such as audioconferencing, videoconferencing, communications via mobile devices, emails and instant messaging, have merged. UCC exploits the opportunities enabled by mobile devices and overcomes the challenges of distances and disparate communication methods, creating an interconnected environment for communication. The AV industry creates exceptional experiences through its mastery of matching user requirements to content, spaces, and technology. The AV industry has an opportunity to combine the need for customized room solutions for AV integrated with UCC devices and software that complement the AV system.