

INTRODUCTION TO TELEPRESENCE

Abstract

- *There is a niche known as telepresence within the sphere of conferencing or remote meeting technology.*
- *It is based upon a fundamentally different class of technology and associated underlying standards.*
- *While still small/specialized, it is a legitimate departure from traditional (legacy) videoconferencing, delivering a more realistic, “being there” experience.*
- *Within the niche there are several players, some of which do a better job of meeting (adhering) to key telepresence requirements than others.*
- *Customers who have bought these systems are realizing tremendous value.*
- *The market is stable and mature enough to mean purchases of telepresence systems are no longer a high risk.*

Introduction

Now more than ever, organizations are faced with difficult choices regarding how to leverage their global talent in a timely manner without undue risk. While worldwide travel will continue to persist, organizations are becoming much more selective in its role and frequency. In today’s marketplace, dynamics such as competition, global enterprises, and new technologies mean that organizations are increasingly using virtual workforces to get things done. This means putting the right people together, regardless of their geographic locations, to get a job done. So how does one make up for lost time and put scattered workforces together to work efficiently?

While some would tell you that videoconferencing is the answer, the fact that in almost four decades, (since the advent of the first Picture Phone by the Bell System at the 1964 World’s Fair), videoconferencing remains a niche market used primarily by Fortune 1000 companies and some vertical markets (government, education, telemedicine) indicates that many feel traditional videoconferencing has too many limitations. The technology has been over promised and under delivered -- works like your telephone and looks like a television – a statement frequently made, but not achieved. For several years vendors have focused on product differentiation, which can be futile if users do not see meaningful applications in a user friendly environment.

And yet, there still remains a need to communicate at a distance, in a timely manner, without the need to travel. Productivity is an issue, sharing scarce talent in different locations is a concern, and the need to be increasingly competitive remains. An alternative may exist in a new space labeled telepresence.

Telepresence – What Is It?

Several firms have stepped into the arena to attempt to achieve what traditional videoconferencing has failed to do before – emulate true face-to-face meetings without the need to compensate for audio delay, the inability to see others clearly, and be able to share any document at a distance.

Many people are confused as to what is important in a video conference and when evaluating an IT based technology like videoconferencing, certain criteria are more important than others to ensure a successful meeting. In addition to audio and video quality these include document sharing, control systems, diagnostics, room environment, and transport.

Telepresence can be defined as the ability to share audio, data, and video with a distant site or sites as though the person were truly in the same room, across the conference table from you. In other words, the ability to have a meeting that is as good as being there.

Technology Factors

What makes telepresence different from traditional videoconferencing relates to how the audio, video, document sharing, control systems, room environment, and transport are handled. A brief review of each of these factors is warranted to better understand their differentiation from traditional videoconferencing. Three factors: audio quality, video quality, and latency are all governed by standards associated with the class of codec used (i.e. H.323, H.320, Mpeg, etc.).

- **Audio Quality**

To ensure the highest quality audio, attention must be given to microphone placement, echo cancellation, audio balancing, tone adjustment, and audio pre and post processing. Proper audio quality ensures that audio delivery is below the maximum tolerances detectable by the human ear in order to allow meeting participants to “talk over” each other, as they might during an in-person meeting. Careful attention to microphone placement and audio processing also allows simultaneous “side conversations”.

To go beyond audio associated with traditional videoconferencing the audio quality needs to allow for users all talking at the same time with no clipping, lack of echo, the ability to reproduce low and high volume levels and not reproduce others (i.e. a whisper), and the ability to reproduce left and right conversations in order to identify which user is speaking.

- **Video Quality**

With conventional videoconferencing participants typically convene in rooms configured to include elongated or u-shaped tables. The on-screen result is that some people appear close while others are barely visible, so the camera must be continuously adjusted to capture images as people speak. When this happens, the

technology becomes intrusive and distracts attention away from the communications at hand. Even those traditional videoconferences, where participants are seated around a boat or banana shaped table so they are equidistant from the screen, still lack the clarity of a telepresence system because the images and audio are not as crisp and clear and the technology has not been designed to be completely user friendly. Other factors that play a role in having excellent video quality include latency and camera positioning, sometimes referred to as vectoring.

-- Latency

Latency is a fancy word for waiting time. Real-time interactive applications, like videoconferencing, are sensitive to accumulated delay, which is referred to as latency. Latency results from everything that sits between the origination of the sound and the ear of the person listening to it. The human brain wants to feel that interaction is real. Telephone networks are engineered to provide less than 400 milliseconds (ms) round-trip latency. The lower the number, the less the delay. There is a point where latency becomes imperceptible, usually under 250 ms. Achieving imperceptible latency is a critical requirement of a true telepresence solution. Latency should be measured looking at both the codec and the network.

-- Camera Placement or Vectoring

Camera placement is critical to create a more realistic orientation and interface among users. This includes the ability to consistently maintain eye contact, allowing the maximum number of individuals to appear on each screen, never sending the same image to more than one site, and proper camera placement to ensure that sight lines for all users are maintained. The fundamental issue is how to scale from a point-to-point call to a multi-site call. For effective meetings there should be no difference. To accomplish the feeling of “being there” requires multiple cameras and encoders to capture different perspectives of the table or strategic placement of those cameras.

• Document Sharing

During the course of any meeting users often wish to exchange information using various forms of collateral including: pre-printed documents, handwritten notes, drawings, computer generated images, PowerPoint presentations, web-based collaborative tools, pre-recorded audio and video, document cameras, etc. Attendees should be able to present information to the local room and remote locations using whatever tools are most comfortable. The goal should be to provide total and equal access to information for everyone, ensure ease of use (“plug and play”), deliver a high level of quality for viewing/reviewing materials, and create a sense of “sameness” regarding the user experience (e.g. putting a screen on the side of a room so that when participants in a multi-point meeting are looking at materials it appears as if everyone is turning their heads in the same direction to view it). While document sharing has improved, in traditional videoconferences there are still users who find it difficult to easily share documents with others. Part of the problem is lack of training, but another issue for many is ease of use. Some document sharing systems are software based while others are hardware based

systems. One of the issues with collaboration based software is the need to load software on ones laptop and then know how to use that software.

- **Control Systems**

Control systems for videoconferencing products have traditionally been action-specific (user-directed instructions “pushed” to individual parts of the system) and not function-oriented (an integrated solution querying users regarding their needs in a “pull” scenario). All users want to do is have a flawless meeting and not have to deal with the technology by pushing buttons or accessing menu screens. With telepresence technologies users are better able to meet without having to control anything. While minimal control is also possible with traditional videoconferencing systems, it is not the norm. More often someone needs to take control of the meeting technology or the meeting tools available to the participants are not frequently used.

- **Diagnostics**

To ensure successful meetings it is important to be able to fully test the systems. This includes not only testing the components of the system, but also the actual functioning of the system (i.e. Is audio passing from site A to B to C and are all screens displaying the video?). With traditional videoconferencing systems the components are tested, but not the actual functioning of the system.

- **Room Environment**

Unfortunately, many organizations do not put enough emphasis on the room environment in which videoconferencing technology is placed. This often results in distant sites being unable to clearly see or hear the other end. The lighting is not optimized for video, resulting in shadows on faces, and the room is not properly treated for sound absorption, resulting in poor audio. Organizations who pay close attention to the room environment, whether in a traditional videoconference or an telepresence meeting, have a better meeting. Environmental issues needing to be addressed include: room dimensions, furniture and equipment placement, table shape, room acoustic treatments, fabric selection, colors, lighting design/placement, number of participants per room, and intent of usage (multi-purpose or dedicated).

- **Transport**

Transport relates to the network used to get the information from point A to point B to point C, etc. Issues involved in transporting information include speed, consistency of speed, amount of bandwidth, resiliency/redundancy, and network options. Video is a specialized type of data stream with very tight quality of service requirements.

Transmission speed relates to how quickly the data packets are transmitted from point A to point B to point C, etc. Consistency of speed means the transmission rate must be constant without a significant amount of deviation. A sophisticated use of bandwidth is required to deliver high-resolution images and video that emulates a face-to-face meeting. When transporting video and audio, the transport

must provide sequenced packets at a constant bandwidth rate with no errors. Systems for video transmission should be designed with a varying degree of resiliency and the level of redundancy and fault tolerance should be designed to match the levels of criticality of the application (e.g. more bandwidth is needed for surgery than for a talking head).

The transport facility chosen is entirely independent of the video solution. The transport selection should be based on reliability, availability, service quality, vendor guarantees, and cost. A variety of transport options may be chosen including: T1/E1 lines, ISDN, DS3 circuits, ATM, broadband fiber optics, satellite, and IP based transports. Today, doing quality video over the Internet is often still difficult as the quality of bandwidth is not always guaranteed. Any data network design must take into account other transport needs of the customer, including voice and data. Video will only be a part of the overall communications strategy employed by the customers.

Is It Time To Consider Buying This Technology?

As users assess the pros and cons of adopting telepresence systems they need to be asking themselves if now is the right time to deploy these technologies or will waiting be advantageous? The answer to these questions is the same as the answer given twenty years ago about traditional videoconferencing: if one has the application and need to deploy telepresence, one should do so now. While telepresence is a new space that can be more expensive than traditional videoconferencing, the firms using it find it has greater value than traditional videoconferencing and find it easy to justify the cost for both domestic and international meetings.

Future Trends & The Impact of Telepresence

Given that very large organizations have opted to install telepresence systems, and their senior management is using them, indicates the need for better technology and integration of technologies than is currently available with videoconferencing. As such, as more organizations realize there is an alternative to traditional videoconferencing, telepresence will be better utilized and demanded by more.

The advent of telepresence should be a wake up call to technology firms in the videoconferencing space. It should also be a welcome signal to users that an alternative exists.

The future will see more firms offering high speed video access, companies realizing there is more to virtual meeting success than quality audio and video, and a drop in the price to install and conduct virtual meetings.

Additionally, convergence of telecommunications and information technology are making it easier and less costly to deploy networks that are more robust

and meet a variety of needs.

In the future, audio conferencing will become more reliable over the web, there will be more movement of videoconferencing to the desktop, and there will also be a desire for telepresence systems that truly emulate being there.

It is assuring and refreshing to realize that there are firms reacting to the need to communicate at a distance and that these firms are seeking a better way to meet that is easy for the users and works without effort. In other words, the ability to have a meeting without having to be there.

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