

# *Emerging Technologies for Teleconferencing and Telepresence*



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**Wainhouse Research  
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## Introduction

This white paper focuses on a relatively new wave of enhanced conferencing and collaboration tools and solutions that present users with an enhanced or non-traditional teleconferencing experience. Some of these solutions focus on a specific element of a teleconference. In other cases, they provide an immersive meeting environment that approaches a “true” telepresence experience.

This paper was sponsored by the following companies; Be Here Corporation, Codian, Destiny Conferencing, Digital Video Enterprises (DVE), LifeSize Communications, PangeAir, Sony, and Teliris.

### *It's a Matter of Connectedness*

The key to a successful and effective visual collaboration experience is achieving a level of “connectedness” between the remotely located participants. The chart below shows the levels of “connectedness” provided by various types of communication and collaboration.



**Figure 1: Level of "Connectedness"**

As shown above, non-real-time communication methods, including “snail mail,” faxes, and email, provide a relatively limited degree of connectedness or interactivity. The next group of applications: instant messaging, audio conferencing, and web conferencing, enable real-time interaction between participants, and represent the next level of connectedness.

Traditional videoconferencing, which most commonly involves a videoconferencing system / camera sitting on top of a monitor, provides a significantly higher degree of interaction than the prior group of real-time solutions due to the addition of the visual component to the session. Enhanced visual collaboration affords an even superior level of connectedness by further immersing the participants in a meeting experience that is more natural and conducive to collaboration. Finally, as one might expect, face-to-face, in-person sessions provide the highest level of interactivity and connectedness.

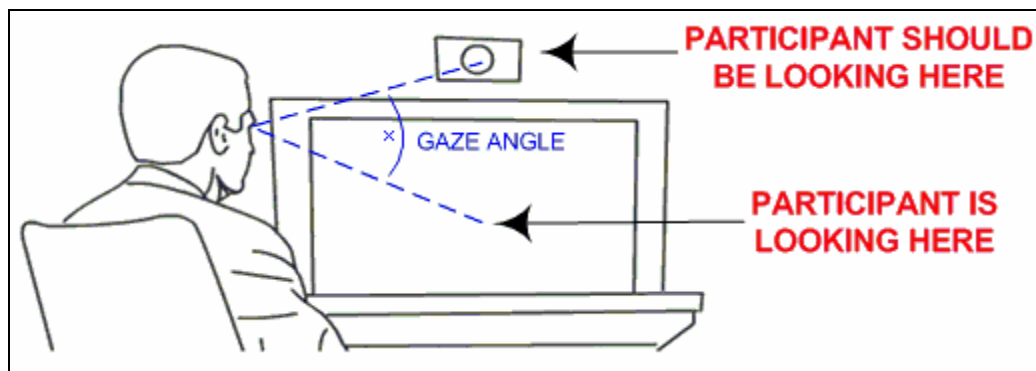
## Enhanced Collaboration Concepts

Those seeking to enhance their visual collaboration sessions should pay careful attention to the ergonomic and human factors of the virtual meeting experience.

### ***“True” Eye Contact***

Eye contact is one of the most important aspects of face-to-face communication. It instills trust and fosters an environment of cooperation and partnership. On the other hand, a lack of eye contact between meeting participants can generate feelings of negativity, discomfort, and sometimes even distrust.

Providing natural feeling eye contact during a videoconference requires that the participants look directly into the camera. Unfortunately, as shown in the DVE provided image below, traditional videoconferencing often fails in this regard because participants tend to look at the video display and not at the camera (see the gaze angle highlighted in fig. 2 below).



**Figure 2: Traditional Videoconferencing May Not Provide “True” Eye Contact**

The pictures below show one of the solutions offered by Digital Video Enterprises. As highlighted by the image on the left, the camera is physically positioned behind the display, which means that when the local participants look at the display showing remote participants, they are also looking directly into the camera and providing true eye contact (with zero gaze angle) to the far end sites.



**Figure 3: DVE's True Eye Contact Solution**

Another vendor, Teleportec, uses a similar method with their Teleporter offering, to physically position the camera behind the screen to provide true eye contact.

In some situations, such as a conference room with pre-existing rear projection screens, it may not be practical (or cost-effective) to place the camera directly behind the screen and provide a zero gaze angle, true eye contact experience. If the gaze angle is limited to perhaps five degrees (or less), the result is an experience that provides the feeling of face-to-face interaction (i.e. “face contact”), but not necessarily true eye contact with the far-end participants. In other words, a zero gaze angle experience provides “true eye contact,” while a low gaze angle experience provides what Wainhouse Research calls “face contact.”

Several studies have shown that the human brain can compensate for limited gaze angles and that meeting participants in such an environment would still experience an acceptable level of interaction. Note, however, that as the gaze angle increases, an increasing percentage of far-end participants will find even face contact to be lacking.<sup>1</sup>

When designing a videoconferencing room to provide far-end eye contact, integrators must consider the position of the camera, the position and size of the screen, and the participant’s distance from the camera. The take-away here is that a videoconferencing experience can be improved by providing eye contact (through the use of a zero gaze angle method as described above) or by designing the conference room to minimize the gaze angle. Destiny Conferencing and Teliris both claim to have designed their solutions to minimize the gaze angle.

DVE and Teleportec have also released versions of their solutions in which, through the use of beam-splitter technology, the far end participants seem to float in thin air in front of the system. This effect serves to hide the conferencing technology from the meeting participants, and according to some, enhances the meeting dynamic. Others, however, consider this to be more of a visual effect, and question the degree to which it improves the typical meeting. DVE was issued a patent on this technology in March 2004.

### ***Audio Quality***

An in-person meeting offers participants the best possible audio and video quality, and anything less than in-person represents some degree of compromise. The key to an effective teleconference experience is to provide a level of audio and video quality that still feels “natural” to the meeting participants. While this sounds simple enough, there are technological and environmental factors working against us.

A good conferencing experience requires good audio quality. In fact, studies have shown that poor audio quality measurably increases the stress level of meeting participants.<sup>2</sup> Depending upon the equipment and

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<sup>1</sup> Sources : <http://www.ehealthinnovation.org/node/89>, [http://graphics.stanford.edu/papers/eye\\_contact/paper.pdf](http://graphics.stanford.edu/papers/eye_contact/paper.pdf)

<sup>2</sup> Source: <http://www.cs.ucl.ac.uk/staff/A.Sasse/aisb.pdf>

protocols utilized and the integration within the room, videoconferencing solutions provide levels of audio quality ranging from “poor” to “exceptional.”

There are four significant factors that contribute to the perceived audio quality during a conference; the clarity / quality / consistency of the sound, the latency or lag time, the synchronization between the sound and the images, and the “apparent” location of the sound source.

Audio clarity / quality - For the most part, and given a reasonable data connection rate, most current videoconferencing solutions can provide an acceptable (or even exceptional) level of audio clarity and quality. Some companies, including Be Here, LifeSize, Polycom, Sony, and TANDBERG offer wide-band audio solutions that provide greater fidelity and a richer sound than traditional video systems.

Lip sync – To provide participants with a natural virtual meeting experience, lips and words need to be in sync. Similarly, when a pencil is dropped, it needs to make a sound when it hits the table (and not ½ a second later). When proper lip sync is in place, the technology is somewhat transparent. Conversely, when significant lip sync problems occur, the video element can become more of a distraction than an added benefit.

Latency – Sometimes called lag or delay, in the conferencing world one-way latency is defined as the time between when something is said and something is heard. Latency below 50 ms is barely perceptible, while at 200 – 250 ms and above, latency can become annoying. As latency increases beyond this threshold, interactivity suffers and eventually a two-way dialogue becomes virtually impossible.

Lip sync and latency in teleconferencing are primarily dependent upon two items; the technology used to capture, compress, and decompress the audio and video (including video bridges and gateways), and the network used to transmit the signals. While most videoconferencing solutions in use today utilize the H.323 or H.320 protocols and are optimized to provide video using limited bandwidth (typically 1.5 Mbps or less), MPEG-based videoconferencing solutions (such as those offered by Haivision, Teliris, and VBrick) are designed to utilize additional bandwidth to improve performance and decrease compression / decompression related latency. In addition, some videoconferencing service providers, including Destiny Conferencing, GlowPoint, IVCi, Network-I, PangeAir, Telanetix, Teliris, Virtela, and WireOne Communications (formerly V-Span) utilize high-performance IP networks to provide low-latency transmission of videoconferencing data.

Apparent location of sound (spatial orientation) – A natural meeting experience requires that a person’s voice appear to be coming from his mouth. While this may seem obvious, many conference rooms utilize ceiling mounted speakers for conference audio, which makes the far-end speaker’s audio seem to be coming from above and behind the meeting participants. To avoid this problem, the speakers providing the far-end audio should be right next to the displays showing the far-end participants, as is the case with the integrated solutions from Destiny Conferencing (offering the TeleSuite System solution), PangeAir and Teliris (and a standard television for that matter).



Full duplex – The ability for meeting participants in different locations to speak simultaneously without clipping or loss of audio is another important part of a natural virtual meeting experience. In Wainhouse Research’s experience, traditional videoconferencing solutions typically offer solid full duplex performance during point-to-point meetings. In multipoint meetings, however, full duplex is often lacking. To bypass the duplex problem, some vendors (including Destiny Conferencing and Teliris) organize multipoint meetings by placing multiple video calls (or delivering multiple video streams) simultaneously and locally mixing the audio signals; a method that works best for smaller meetings (i.e. less than 10 simultaneous locations).

## ***Video Quality***

Videoconferencing system designers and integrators are faced with a difficult challenge; to provide participants with “life-like” audio and video connections to other locations in a cost-effective manner. Hence, designers are forced to balance three inter-dependent variables; video resolution, frame rate, and bandwidth (which impacts the monthly cost of ownership).

Video Resolution – Video resolution is the amount of information captured and displayed on the screen and it is usually measured in the number of horizontal or vertical picture elements (or pixels). For the most part, and up to a certain threshold, higher resolution yields a more “natural” feeling for meeting participants because higher resolution yields images of higher clarity.

Frame Rate – Measured in frames / second (or fps), frame rate is simply the number of frames (or complete video images) displayed per second. Depending upon the standard followed, television signals provide either 30 (NTSC) or 25 (PAL) frames per second.

Bandwidth – The network bandwidth required to transmit a video signal depends upon the amount of information provided (which is a factor of video resolution and frame rate) and the degree of compression in use. Note that higher bandwidth requirements typically equates to higher operating costs.

Ideally, videoconferencing systems would provide the best possible video quality by maximizing both video resolution and frame rate. In reality, things are more complicated. For example, there is a limit to the processing power of today’s “typical” videoconferencing systems, which forces one to decide between optimizing frame rate (which provide a feeling of smooth, fluid motion) and optimizing resolution (which provides appealing, clear images). Furthermore, using compression to minimize bandwidth requirements can result in signal degradation and additional latency. Note that the use of compression is an important part of videoconferencing (without compression one would need almost 160 Mbps of bandwidth, or 103 T1 lines, to transmit a single NTSC signal), but excessive signal compression can cause video quality to fall below acceptable “business quality” levels.

The way in which vendors juggle and balance video resolution, frame rate, and bandwidth consumption, depends upon the problems they are trying to solve or the markets they are addressing.

### Increasing Bandwidth

Some vendors, including Destiny Conferencing, PangeAir, and Teliris, utilize higher bandwidth connections (1.5 – 5 Mbps for Destiny Conferencing, 1.5 – 3 Mbps for PangeAir, and 5 – 10 Mbps for Teliris) for each video call, which allows them to decrease compression related artifacts and latency. While this does increase the monthly cost of these solutions, the result is often superior video quality.

Note that the video quality enhancements afforded by increasing the call connection rate / bandwidth are not linear. For example, for an H.323 video call, the perceived performance boost resulting from a rate increase from 256 kbps to 512 kbps will usually be more apparent than the boost resulting from a rate increase from 1 Mbps to 2 Mbps. In addition, most videoconferencing codecs (coder / decoder systems) have a bandwidth sweet spot where the codec is “tuned” to perform, and connection rates above that sweet spot may not yield significant performance improvements.

### Increasing Resolution

Recognizing that even the quality of standard TV video signals pale in comparison to an in-person experience, several companies have announced plans to release High Definition (HD) video systems. By leveraging high-power compression hardware and efficient encoding / decoding standards (such as the ITU H.264 standard), these companies seek to increase “video realism” by providing up to 10 times the resolution of standard videoconferencing images.

***HD videoconferencing systems should provide a more natural video experience, but video quality is but one of the requirements for an effective visual collaboration experience.***

The primary benefit afforded by HD resolution relates to visual acuity, or “the eye’s ability to distinguish shapes and objects at certain distances.”<sup>3</sup> At the optimal visual acuity viewing distance for a specific image size, the image resolution matches that of the human eye. The closer you are to an image, the more pixels per inch you need in order for an image to appear “natural.” If there are not enough pixels per inch in the image, the human eye will see the individual pixels, resulting in a pixilated image. This is why at a given viewing distance a CIF image looks better when it is smaller since by making the image smaller we are increasing the pixels per inch (CIF is fixed at 352 x 288 pixels). Alternatively, a CIF image of a given size will appear smoother as a viewer moves farther away from the screen (until the point that the viewing distance equals the optimal visual acuity viewing distance).

Based on the eye’s visual acuity, the optimal viewing distance for a 50” plasma display is 35.5 feet for a CIF (352 x 288) resolution image. Since at this distance from the display the far-end participants would appear too small for effective face-to-face communication, participants tend to sit much closer to the display and accept the associated image pixilation. On the other hand, at HD resolution (1280 x 720), the optimal viewing distance for a 50” plasma display is only 9.8 feet. Similarly, for a 17” video display

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<sup>3</sup> Source: About.com, <http://vision.about.com/od/glossary/g/visualacuity.htm>

(such as used on some personal desktop systems), the optimal viewing distances for CIF and HD resolution are 12.1 feet and 3.3 feet respectively.<sup>4</sup>

This is the true benefit of higher resolution for videoconferencing; it allows users to enjoy a clear, non-pixelated image while sitting a reasonable distance from the screen.



**Figure 4: Debut HD Products from LifeSize Communications**

The figure above shows two of the recently announced HD videoconferencing solutions from LifeSize, an industry newcomer and the first company to officially announce and publicly demonstrate a line of HD video solutions. Recently several other players within the videoconferencing space, including Digital Video Enterprises, Polycom, Sony, TANDBERG, and Teliris, announced plans to release HD video solutions in the near future.

In order to enjoy HD resolution in multipoint meetings, either an HD-capable video bridge (internal or external) or multiple codecs and connections must be used. As of this writing, only two video bridges, LifeSize's embedded bridge and a beta version of Codian's external video bridge, support HD resolution.

It is also worth noting that HD is not the only way to improve video resolution. For example, some vendors are currently using or plan to utilize D1 resolution (720 x 480) as a way to enhance image quality in videoconferences. Although the specification for D1 resolution is much lower than the specification for HD, it does offer more than 3 times the resolution of standard CIF images.

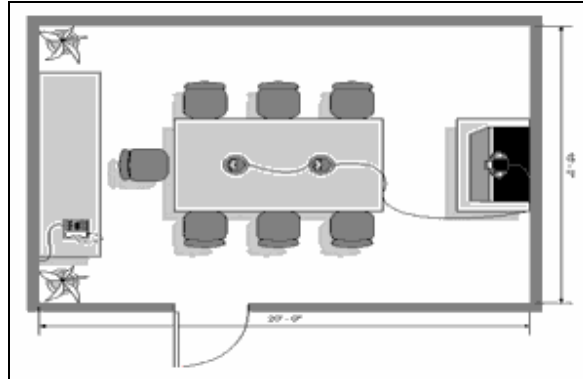
Once available, these solutions should provide a superior video experience compared to the current crop of standard CIF offerings. The above notwithstanding, surveys of current videoconferencing users show that end users consider video quality to be less important than other factors including audio quality, reliability, and ease of use.

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<sup>4</sup> Source: Home Theater Projector, Screen, and Room Design Calculator developed by Carlton Bale, [http://www.carltonbale.com/ht/calculator/theater\\_calculator\\_v2.5.xls](http://www.carltonbale.com/ht/calculator/theater_calculator_v2.5.xls)

## ***Meeting Room Format***

As shown in the drawing below<sup>5</sup>, most videoconferencing rooms are designed such that the video system and monitor / display are positioned at one end of the room. This effectively means that the remote participants (those attending via videoconferencing) are “virtually sitting” away from the table and out of the flow of the meeting; a situation that places far end locations at a distinct disadvantage in terms of their ability to contribute and participate in the discussion. While this could, perhaps, provide a degree of face to face interaction with the far-end participants (if the camera and display are properly positioned), this creates an unnatural meeting experience.



**Figure 5: Typical VC Room Layout**

Conferencing vendors and integrators have attempted to resolve this problem by integrating the cameras, displays, and other technologies into the meeting room environment. For example, Teliris' GlobalTable installations typically include wall mounted flat-screen displays, integrated table microphones, and multiple strategically positioned cameras to facilitate “position appropriate” face to face interaction (described later in this document) as shown in the picture below. Similarly, Digital Video Enterprises and Telanetix offer turnkey, fully-integrated conferencing environments in which all audio-visual components are discretely placed to avoid distracting the meeting participants.

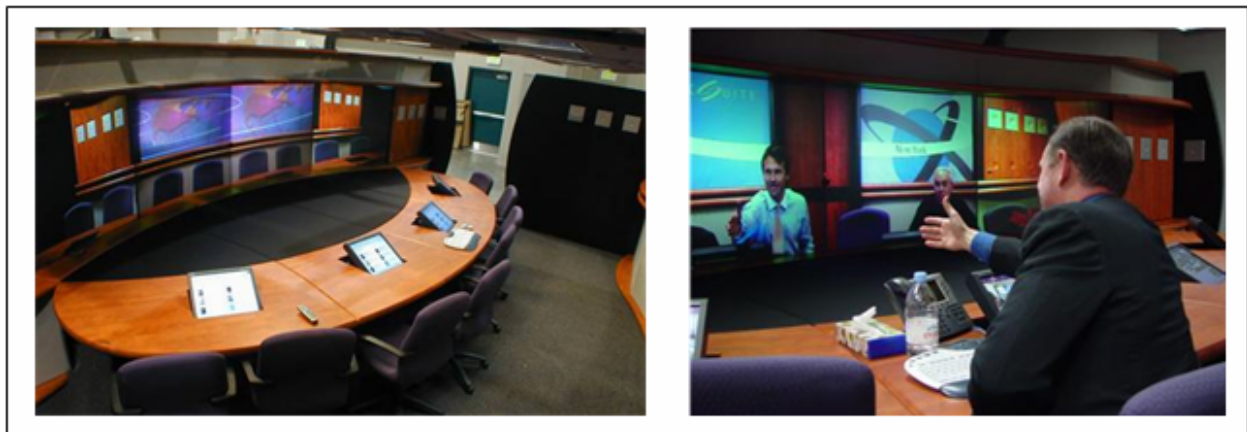
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<sup>5</sup> Source: <http://www.videosystem.us/vc-design.html>



**Figure 6: Teliris' GlobalTable Solution**

Another telepresence vendor, Destiny Conferencing (whose TeleSuite System solutions are also available on an hourly or daily rental basis from PangeAir), has attacked this problem by effectively splitting the meeting room into two parts: the local half and the remote “virtual” half. As highlighted below, the curved panel displays showing the remote attendees are situated in the space normally occupied by participants across the table.



**Figure 7: Destiny Conferencing's TeleSuite Room Environment**

The TeleSuite System design gives meeting participants the distinct feeling that they are sitting across the table from the remote attendees. The DVE Immersive Meeting Room solution (rendering shown below) provides a similar “in the same room” feeling and utilizes concealed cameras positioned behind the display screens. According to DVE, this solution is already in use by end-user organizations, but customer privacy prevents them from providing actual pictures of the installations.



**Figure 8: Rendering of DVE's Immersive Meeting Room Solution**

Other companies offer solutions that challenge the typical meeting layout paradigm. For example, Be Here Corporation's TotalView is a combination wide-band audio (VoIP) speakerphone and videoconferencing system (SIP and H.323) with an integrated 360 degree camera system that allows the remote participants to enjoy a panoramic view of the entire local meeting room (as shown below). In addition, as an alternative or supplement to wall mounted displays, local attendees can use notebook PCs to display and control their own independent views of the far-end locations (not shown in the Be Here provided image below). Unlike traditional video systems, TotalView was designed to sit in the center of the meeting room, producing the panoramic image shown in the figure below.



**Figure 9: 360 Degree View Provided by Be Here's TotalView Solution**

This concept affords two meeting format advantages; first, since the TotalView's 360 degree camera is in the middle of the table, the remote participants are effectively "sitting" (in terms of camera position at least) in the middle of the discussion. In addition, local participants are not forced to turn unnaturally to the far end of the room to interact with remote sites.

Based on our understanding of this concept, it seems that depending upon the local viewing method used, positioning the camera in the middle of the conference room table can have either a positive or negative impact on far-end eye / face-contact. For example, if each of the local attendees uses his own notebook PC to view the far-end, positioning the camera in the middle of the table could enhance the face-to-face interaction between the local and far-end participants. Alternatively, using this device in a traditional meeting format (including a single display device positioned at one end of the room as shown in figure 5), the camera position could prove detrimental.



Readers should note that while the concept is very novel and apparently will be priced below traditional set-top video systems, the Be Here solution is not yet available on the market. Finally, although Be Here reports that the TotalView paradigm has been validated by independent focus groups, this solution must ultimately prove itself in demos and in the market.

Another company, C360, has a working prototype of an omni-directional display system that enables 360 degree viewing of video or PC images. As shown below, when placed in the middle of a conference room table, this device allows all participants around the table to view the remote participants without having to re-direct their attention away from the other local attendees. In effect, this “virtually” positions the remote participants in the middle of the meeting.



**Figure 10: C360’s Center of Table 360-Degree Display System**

For now, the C360 device is more of a proof of concept than a true offering, but it does illustrate how new technology may impact the format of future conferences and meetings.

### ***Life Sized Images***

Thanks to the massive proliferation of television, most people are accustomed to watching smaller than life-size images of people on monitors and displays. With TV sizes ranging from 1.5” (used for wrist watch TVs) to more than 10 feet (using video projectors), it appears that TV viewers have a wide tolerance for varying image sizes. For a virtual meeting, however, it seems unnatural to interact with people whose faces are not life sized.

Various companies, including many described in this report, have designed their solutions to provide life sized far end images. For example, integrated solutions from Destiny Conferencing, Digital Video Enterprises (DVE,) and Teliris, and the Exec system from LifeSize (not yet available on the market) provide life sized (or close to life sized) images of the far end participants.

Readers should note that increasing the image size may highlight the resolution limitations of the far-end images (see discussion on visual acuity earlier in this document). This highlights one of the major benefits of HD; the ability to provide life sized images that can be viewed at reasonable viewing distances without perceived image pixilation or degradation.

### ***Multi-Location / Multi-Point Meetings***

Traditional multi-location (three-or-more-site) video meetings force participants to choose between seeing all locations at all times and having sufficient image size / quality. To display all sites simultaneously, the screen is divided using a feature called “continuous presence” (or CP). Unfortunately, due to screen real-estate limits, in CP meetings each individual site’s image is usually small and of one-quarter the resolution of a full site view. Alternatively, users can see a full-screen image of the last site to speak, but this means that some meeting participants are off-camera for much of the meeting, which effectively eliminates the primary benefit of videoconferencing. Those off-camera participants tend to remain uninvolved unless actively invited to participate.



**Figure 11: A 16-Site Continuous Presence Layout<sup>6</sup>**

In an effort to provide a more natural feeling multi-site video experience, two videoconferencing vendors, Polycom and Sony, have systems capable of distributing the images from multiple remote locations to multiple displays. The result is that each far-end location (up to five) can be displayed on its own monitor in CIF resolution, which effectively resolves the screen real-estate issue described above.

The figure below shows the multiple display mode of Sony’s G-70 video system with the largest display showing six remote sites in continuous presence mode on the main monitor (bottom right) and each of five other monitors displaying a full screen image of one remote site. While not the first system to offer this multi-monitor capability (Polycom released this feature several years earlier in its recently discontinued ViewStation FX system), the G-70 supports a combined total multipoint bandwidth of 4 Mbps, and allows users to choose between numerous continuous presence modes for the “main” monitor. Note that this functionality is only available at the site hosting the multipoint meeting.

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<sup>6</sup> Source: RADVISION – <http://www.radvision.com>

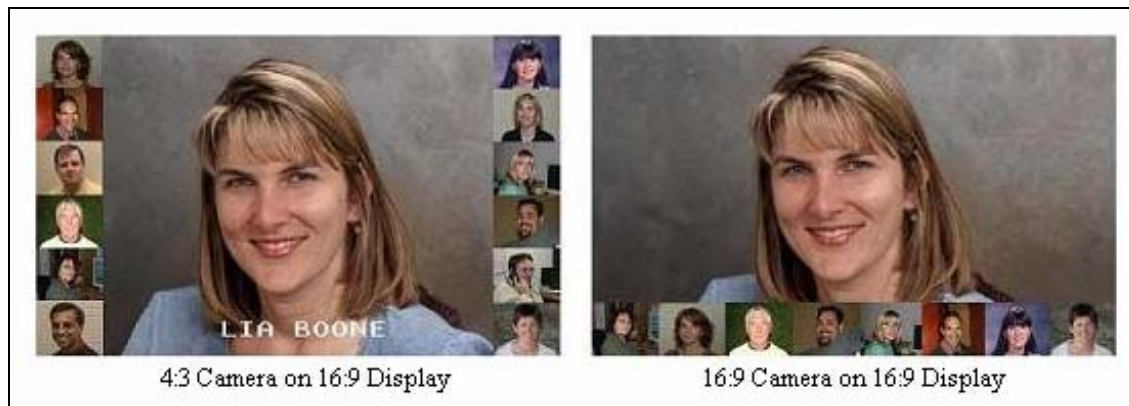




**Figure 12: Sony's G-70 Multi-Display Mode**

Another visual collaboration vendor, Telanetix, uses a SIP-based, IP-multicast capable, high bandwidth codec in customers' conference rooms to provide multipoint functionality without the need for an external video bridge. The result is decreased latency and higher resolution than traditional multipoint meetings.

To improve upon the typical multi-site meeting experience, Codian has added a variety of combined voice-activated switching (VAS) and continuous presence (CP) layouts to its MCU product line. In this hybrid VAS / CP layout, the largest window (i.e., the "speaker window") always shows the current speaker, and all other participants are continuously displayed in smaller "thumbnail" windows. While not the first or only vendor to support hybrid layouts, Codian's MCU allows each participating location to select its own preferred layout (from a choice of 40+ different screen configurations), and has released a number of layouts that specifically leverage 16:9 displays as shown below.



**Figure 13: Two Hybrid VAS / CP Layouts on the Codian MCU**

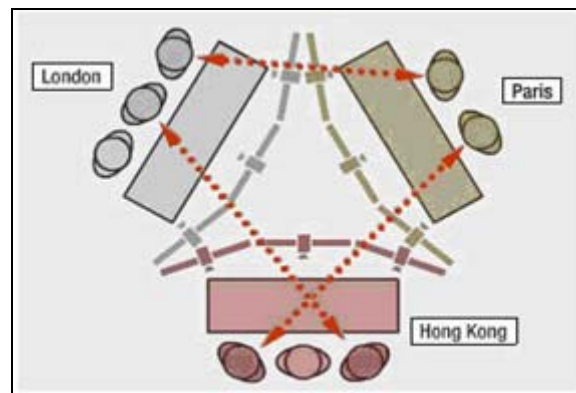
The images above highlight Codian's effective use of 16:9 screen real-estate in hybrid VAS / CP meetings. As shown in the left image, instead of distorting (stretching) the 4:3 camera image to fill the entire 16:9 display, Codian uses the extra space to display thumbnail images of the other meeting

participants. In the right image, the speaker window is filled with a 16:9 camera image, and the other participants are displayed in thumbnails along the bottom of the screen.

Teliris' GlobalTable incorporates a concept called "Virtual Vectoring" to create a more realistic orientation between participants in multi-site video meetings. The idea behind Virtual Vectoring is that participants in an "in-person" meeting do not see each other from the same physical perspective.

To understand Virtual Vectoring, imagine that three people are sitting at a round conference table and one person starts speaking to a second person. This naturally prompts those two people to turn and face each other. While the other two people are interacting (and facing each other), the third person will lose eye contact and see a side view of the other two people.

In order to simulate this meeting dynamic, Teliris dedicates a camera, speaker, and display to each remote location in a multi-site meeting. The resulting effect is that participants in each location either maintain or lose their face to face interaction with the participants in each other location as appropriate (based on whom is speaking to whom) during the meeting.



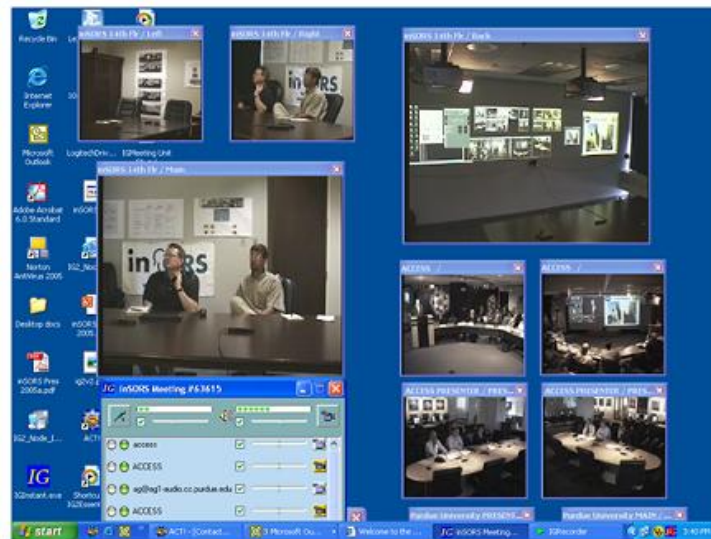
**Figure 14: Teliris' Virtual Vectoring Concept**

To provide the Virtual Vectoring effect, each GlobalTable site must receive a "position-appropriate" camera view of each other site in the meeting (which requires placing a video call between each pair of participating locations). The result is a multi-site meeting experience that more closely resembles an in-person experience, although the need for multiple simultaneous connections increases both the system cost and bandwidth requirements. Note that Virtual Vectoring works only between GlobalTable locations, and that standard GlobalTable installations support a maximum of five sites per meeting.

Two additional vendors, AGT and InSors, challenge the traditional paradigms by enhancing both point-to-point and multipoint video meetings. AGT's Video Presenter is a presentation platform and multipoint bridging service that provides several unique presentation features. The solution supports various collaboration endpoints including PCs, IP and ISDN video endpoints, and even audio devices (such as cell phones). Furthermore, the system allows standard video and high resolution PC content to be included in meetings without the need for dual-stream (H.239, People+Content, DuoVideo, etc.) support. This is accomplished through a dual-screen emulation mode that shows PC content on the display and the

video in a PIP window. In other words, single-monitor installations and even legacy video systems can enjoy dual-screen like functionality via Video Presenter.

The InSors solution enhances multipoint (and point-to-point) meetings by providing multiple simultaneous views and full-duplex audio from each location to all other participating sites. This allows participants to enjoy close-up views of meeting participants and switch their focus from one view of each meeting room to the next. The screen shot below of the InSors user interface highlights the company's multi-view capability by including three views of one conference room and five views of another on a single display. Users can adjust the size of each image to suit their viewing requirements.



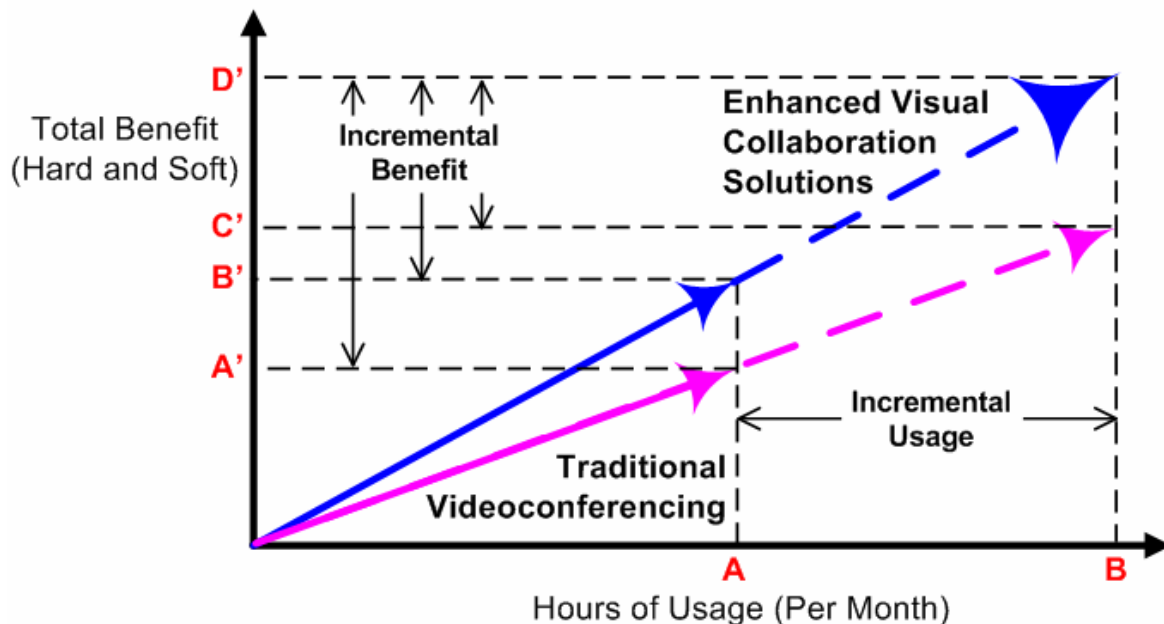
**Figure 15: InSors' "Multi-View" User Interface**

According to InSors, this multi-view capability reduces participant fatigue and greatly increases the effectiveness and richness of the meeting experience.

## The Business Case for Enhanced Visual Collaboration

The benefits of videoconferencing have been documented in many forums and include hard benefits (cost savings mostly related to travel avoidance) and soft benefits such as time savings, enhanced productivity, improved communication and decreased stress. For a detailed discussion of the soft and hard benefits and justification for videoconferencing, please reference the Wainhouse Research white paper “[The Business Case for Videoconferencing 2005](#).”

Vendors offering emerging teleconference and telepresence solutions seek to increase the total benefit afforded by conferencing by improving or enhancing the end-user meeting experience.



**Figure 16: Total Benefit vs. Productivity and Usage**

As shown in the diagram above, there are two ways that the total benefit of conferencing can be increased within an organization; by increasing the benefit provided by the current usage level of conferencing, and by fostering additional conferencing usage.

### Concept 1: Increased Benefit at Current Usage Level

To illustrate the above, assume that an organization improves one or more aspects (perhaps eye contact, audio quality, video quality, etc.) of its conferencing. Although we have yet to see this proven or documented, these efforts should improve the user experience and foster an enhanced level of communication, productivity, and teamwork between participants. As a result, the benefit afforded by the conferencing technology should increase, causing a shift from the lower (pink) to the upper (blue) usage vs. total benefit line. In other words, based on this premise, at the same usage level (point A), the total benefit would increase from A' to B'.

## Concept 2: Increased Usage at Same Productivity Level

Another example would be a firm that improves the comfort level of its meeting environment (perhaps through technology integration or improved furnishings), which prompts the usage of conferencing to increase from point A to point B. Assuming the meeting productivity has remained unchanged, we remain on the pink usage vs. total benefit line, and therefore the increased usage causes the total benefit to increase from point A' to point C'.

## Concept 3: Increased Productivity and Increased Usage

The ideal situation would be that improving meeting factors would yield both increased meeting productivity and additional monthly usage. This would cause a shift from the pink to the blue usage vs. benefit line, which at a usage level of B results in a total benefit of D'.

### Important Note:

While it seems reasonable that improving the conferencing experience could improve meeting productivity and foster additional usage, WR has yet to see any quantitative or qualitative data supporting this premise. That said, telepresence vendors Destiny Conferencing and Teliris have reported that their integrated telepresence systems are used an average of 60 hours per month (figures that contrast sharply to Wainhouse Research surveys showing that typical videoconferencing systems are used an average 10-15 hours per month). But, the question is what portion of that incremental usage stems from the culture and demands of the organizations purchasing these telepresence solutions and how much is a direct result of the solutions in question. The soft nature of these benefits makes this a difficult, if not impossible question to answer beyond a reasonable doubt.

## Conclusion

Traditional videoconferencing, often called “hang and bang video” by industry insiders, involves the use of a set-top video system, one or two monitors / flat panels, a tabletop microphone, and some form of ISDN or IP network. Although these solutions provide significant “connectedness,” they often fail to provide a natural and comfortable meeting experience for the meeting participants.

This document has highlighted a number of emerging teleconferencing and visual collaboration solutions that address various meeting factors in order to provide a superior visual collaboration experience. These factors include meeting eye contact, audio / video quality, meeting format, image size, and multi-site meeting effectiveness. Vendors promoting enhanced solutions hope that improving the meeting experience will increase productivity and foster additional conferencing usage (and increase the ROI of conferencing investments). Although hard data supporting this premise is lacking, this assumption is not unreasonable.

The rate of adoption of videoconferencing within the average enterprise remains a disappointment. In fact, some organizations have reported decreased usage of visual collaboration tools in recent months. The real question is to what extent these innovative solutions will motivate organizations to embrace (and invest in) visual collaboration.

The above notwithstanding, there are many reasons to be optimistic about the future of visual collaboration in the enterprise. Specifically, the videoconferencing endpoint market continues to grow each year.<sup>7</sup> In addition, the reliability and performance of both video systems and IP networks continues to improve, and many handheld devices (PDAs, cell phones, etc.) are now video-capable. Finally, the emergence of centralized management systems and managed service provider offerings has given enterprises much-needed options for managing their global conferencing environments. In short, while videoconferencing has yet to become an everyday core business tool in all enterprises, both technology and business drivers indicate a reasonably promising future for visual collaboration solutions.

For end-user organizations seeking to increase the benefits afforded by conferencing, the types of solutions described within this document are at least worthy of consideration, especially considering that many are likely to become mainstream in the future. While enhanced visual collaboration and telepresence solutions will probably cost more initially (and perhaps on a recurring basis), the enhanced user experience (and potential increased productivity and usage) may more than justify the incremental spend.

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<sup>7</sup> Source: Wainhouse Research – 2004 Q4 Videoconferencing SpotCheck Report

## Appendix A - Vendors Mentioned in this Report

AMX Corporation	<a href="http://www.amx.com">www.amx.com</a>
Applied Global Technologies (AGT)	<a href="http://www.appliedglobal.com">www.appliedglobal.com</a>
Be Here Corporation	<a href="http://www.behere.com">www.behere.com</a>
C360	<a href="http://www.c360inc.com">www.c360inc.com</a>
Codian	<a href="http://www.codian.com">www.codian.com</a>
Crestron Electronics	<a href="http://www.crestron.com">www.crestron.com</a>
Destiny Conferencing	<a href="http://www.telesuite.com">www.telesuite.com</a>
Digital Video Enterprises (DVE)	<a href="http://www.dvetelepresence.com">www.dvetelepresence.com</a>
GlowPoint	<a href="http://www.glowpoint.com">www.glowpoint.com</a>
Haivision	<a href="http://www.haivision.com">www.haivision.com</a>
InSors	<a href="http://www.insors.com">www.insors.com</a>
IVCi	<a href="http://www.ivci.com">www.ivci.com</a>
LifeSize Communications	<a href="http://www.lifesize.com">www.lifesize.com</a>
Network-I	<a href="http://www.network-i.net">www.network-i.net</a>
PangeAir	<a href="http://www.pangeair.com">www.pangeair.com</a>
Polycom	<a href="http://www.polycom.com">www.polycom.com</a>
Simtrol	<a href="http://www.simtrol.com">www.simtrol.com</a>
Sony Corporation	<a href="http://www.sony.com">www.sony.com</a>
TANDBERG	<a href="http://www.tandberg.net">www.tandberg.net</a>
Telnetix	<a href="http://www.telnetix.com">www.telnetix.com</a>
Teleportec	<a href="http://www.teleportec.com">www.teleportec.com</a>
Teliris	<a href="http://www.teliris.com">www.teliris.com</a>
VBrick	<a href="http://www.vbrick.com">www.vbrick.com</a>
Virtela	<a href="http://www.virtela.com">www.virtela.com</a>
WireOne Communications (formerly V-Span)	<a href="http://www.wireone.com">www.wireone.com</a>

## Appendix B - Sponsoring Vendor Information

**Company:** *Be Here Corporation*

**Website:** [www.behere.com](http://www.behere.com)

**Founded:** 1996

**Employees:** Approx. 20

**Type:** Privately held

**Revenue:** Not disclosed

**Funding:** From partners and venture capitalists

**Headquarters:** Fremont, CA

**Other Offices:** None

	Presence Environment
•	Camera / Image Capture Device
	Display Technology
•	Codec Technology
•	Peripherals and Add-Ons
	Other

Founded in 1996 and holding 48 patents (with 29 more pending) in optics, image processing, and view navigation, Be Here Corporation approaches the enhanced visual collaboration / telepresence space from a rather unique perspective. While most videoconferencing companies focus on providing the ultimate in high quality video and some form of direct eye contact capability, BeHere has taken a different tack. The company does not pretend to provide maximum-quality video, nor does it focus on simulating an in-person meeting experience. Instead, BeHere focuses on providing solid performance and extreme cost-effectiveness for what it calls “the working man’s conference room.”

BeHere’s TotalView solution consists of a stand-alone device that sits in the center of the conference table and incorporates the following:

- A high performance, wide-band, VoIP speakerphone
- A standards-compliant (SIP and H.323) videoconferencing system
- A 360 degree “panoramic” camera
- The ability for each participant to customize his personalized view of the far-end locations
- A 4” integrated video screen for easy previewing of far-end video images
- An XGA video output (allows display of far-end locations on external monitor or projector)
- Document sharing capabilities
- Telephone-like ease of use

Be Here plans to ship the TotalView product in early 2006.

### Analysis:

Be Here’s TotalView challenges several longstanding traditional paradigms. First, in typical videoconferencing rooms, the video camera and display are on one side of the meeting room, effectively placing the far end participants physically outside the meeting dynamic. Like a speakerphone, Be Here’s



TotalView device sits in the middle of the table, which effectively places the remote attendees (at least in terms of their camera view) right in the middle of the action.

The second interesting item is that TotalView incorporates a 360-degree camera with no moving parts that provides the far-end location with a panoramic and seamless view of the entire local meeting room. Since no part of the local room is hidden from camera sight at any time (which is different from a normal in-person experience because human beings do not have 360 degree vision), remote participants feel more immersed in the local meeting. In addition, the remote site participants can digitally pan and zoom each of the view slices independently; a feature that allows for close-ups of individual local meeting participants and currently available (as far as WR knows) from only Be Here and InSors.

Finally, although BeHere has yet to finalize the TotalView pricing, the company expects its end-user pricing to be much lower than competitive videoconferencing products. Considering the device includes a wide-band VoIP speakerphone, an H.323 / SIP video system with embedded support for Cisco and Nortel IP PBXs, and data collaboration capabilities, a low price should make the offer quite compelling.

On a critical note, Wainhouse Research is unsure about the experience that will be provided by Be Here's center of table concept. While true that the system can also drive a large screen display or projector, the most interesting features (including the ability to customize the view of the far-end participants) require that local participants use their laptops as the display device. Unfortunately, if the local participants are looking down at their laptops to see the far end participants, they cannot also be looking directly at the camera. As a result, eye contact will most likely suffer. Be Here assures us that this meeting paradigm has been validated by independent focus groups, but for now WR remains a bit skeptical..

Based on specifications alone (the unit has just become available for testing and evaluation), Be Here's TotalView solution sounds promising from a price and capability point of view. The true test, however, will be in the final delivery of a well performing integrated conferencing device.

**Company:** **Codian**

Website: [www.codian.com](http://www.codian.com)

Founded: 2003

Employees: 36

Type: Privately held

Revenue: Not disclosed

Funding: Self funded by company founders

Headquarters: United Kingdom

Other Offices: San Jose, CA, Chicago, Hong Kong

	Integrated Presence Environment
	Camera / Image Capture Device
	Display Technology
	Codec Technology
●	Peripherals and Add-Ons
	Other

Codian, with offices in London, Hong Kong, Chicago and San Jose, is a privately held, self-funded company founded in 2003 by ex-Cisco personnel. The company's goal is to provide multipoint video bridges (MCUs) and related components with industry-leading features and performance, at price points significantly below competing offerings. Unlike most start-up organizations, Codian is not under extreme pressure from investors to generate immediate sales, profit, and market share. Instead, this team is intent on achieving slow and steady growth over the next few years.

Codian's product offerings include the 1 RU MCU 4200 IP-only video bridge (intended for enterprises), the modular, IP/ISDN capable MSE 8000 video bridge (intended for enterprises, service providers, and carriers and due out in early 2006), a line of ISDN gateways, and an IP VCR for recording and streaming video conferences. The company is currently working on an HD-capable version of the 4200 for release near the end of 2005.

The company's debut and only shipping video bridge, the MCU 4200, offers the following features:

- Standards-based (H.323) IP-only video and audio bridging
- Port capacities ranging from 12 to 40 video and audio ports
- Support for H.264 video compression
- Voice activated switching (VAS) and continuous presence (CP) modes
- User-selectable personalized layout (VAS or choice from 50 CP layouts)
- High resolution (from CIF through to XGA) and high bandwidth (up to 4 Mbps) per endpoint
- Integrated video, audio, and resolution transcoding
- Video auto attendant / meeting lobby with integrated IVR provides easy access to scheduled and on-demand conferences

The 8000 series, based on a modular design, is both IP and ISDN capable, supports larger port volumes, and supports H.323, H.320, and SIP connections.

Features and performance aside, Codian has distinguished itself in the marketplace by offering "fully functional, high-performance" video ports at extremely low price points (the 4200 lists for \$39K and \$80K respectively for the 20 and 40 port versions).

## **Analysis:**

With only 36 full time employees, Codian is notably outmatched (in terms of resources at least) as it battles to compete with industry heavyweights Polycom, RADVISION, and TANDBERG for MCU market share. This has not, however, kept the company from releasing an impressive debut offering, rolling out consistent performance and feature enhancements, establishing a strong and growing reseller channel, and enjoying respectable and quickly growing sales revenue.

Codian has attracted much attention by offering performance that matches, and in some ways exceeds, that offered by competitors – at much lower price points. The company offers the same “connect to any endpoint” capability touted by other leading MCU vendors, but has taken this to a new level by including innovative features like the automated video attendant and the ability for each user / location to select its own personalized meeting layout. Also noteworthy is that the Codian MCU maintains its port count regardless of the connection speed, video protocol, or image resolution of each connected endpoint.

Wainhouse Research remains impressed with the power of the Codian MCU, and the company’s demonstrated ability to remain ahead of the curve in terms of adding new functionality. For example, Codian was among the first external MCU vendor to release H.264 and H.239 support, and was the first to publicly demonstrate an HD multipoint meeting.

The power and price of the Codian offering has injected new life into the MCU marketplace, and is clearly exerting both performance and price pressure on other MCU vendors. The question remains, however, whether Codian can maintain this level of innovation, responsiveness, and growth as it matures and supports a base of customers using both current and legacy products.

Finally, Codian’s limited funding / debt and strong sales growth may make it an attractive acquisition target for vendors seeking to break existing dependencies on other MCU vendors.

**Company:** *Destiny Conferencing*

Website: [www.telesuite.com](http://www.telesuite.com)

Founded: 2005

Employees: 30

Type: Privately held

Revenue: Not disclosed

Funding: Private from company founders

Headquarters: Englewood, OH

Other Offices: None

•	Integrated Presence Environment
•	Camera / Image Capture Device
	Display Technology
	Codec Technology
•	Peripherals and Add-Ons
	Other

Hotel developers David Allen and Herold Williams founded TeleSuite in 1993 as a means to keep guests from leaving their Caribbean resort early for business meetings. The company focused its efforts on research and development for the first few years, and shipped its first product in 1997. Recent years have seen several rounds of funding, including one that shifted management away from the founders. In early 2005, the company and all assets were “re-acquired” by David Allen (Herold has left the company) under the corporate entity Destiny Conferencing, but continues to design and offer the TeleSuite System solution.

Destiny Conferencing produces modular telepresence environments for installation in corporate and educational environments. The solution is delivered in kit form to the customer’s facility, and includes furniture, a nearly seamless video wall (sizes up to 16 x 4 ft), a videoconferencing system, and the company’s proprietary multi-camera image capture system. All technology components are integrated to create an upscale, comfortable meeting room environment. The key to this solution is that the cameras, displays, and physical environment have been designed and configured to give participants the feeling that they are sitting physically across a meeting room table from the remote meeting attendees. According to Destiny Conferencing, just under 50 TeleSuite systems are in use today, and the company has orders in hand for another 25 systems to be installed in the next six months.

In addition to the TeleSuite product, Destiny Conferencing has two other lines of business; custom conference room design, manufacturing, and implementation services, and a managed service offering including network services, meeting scheduling, and meeting management / coordination.

#### **Analysis:**

Having attended several TeleSuite System meetings, Wainhouse Research can confirm that Destiny Conferencing’s solution performs as advertised. Participants enjoy high quality audio and video (thanks to the high speed connections), accurate flesh-tones (thanks to the integrated lighting), and a solid telepresence experience. Unfortunately for Destiny Conferencing, this is a solution whose value isn’t

truly understood until one experiences it for himself. This is one of its challenges: getting potential customers to experience a TeleSuite System meeting.

The true value of this solution, however, is not in the telepresence experience alone, but in the increased usage reported by many TeleSuite users (an average of roughly 50 – 70 hours for TeleSuite systems, contrasted with an average of 10 – 15 hours per standard videoconferencing system). Because additional usage results in additional savings and benefits, this increased usage is the real reason to install a TeleSuite System to replace or complement a traditional videoconferencing solution.

The wrinkle in this offering is the buy-in price (more than \$100,000 per suite) and the \$2,000 - \$8,000 monthly fee for system management and help desk (network / data lines not included). Wainhouse Research believes that this high buy-in price has made many enterprises (i.e. potential customers) question the justification for an investment in a TeleSuite system. Although not recommended, enterprises with their own “video-ready” network lines and installed management solutions can buy the room kits independent of the bundled managed services. While this may decrease the monthly cost, it totally absolves Destiny Capital of the accountability for ensuring successful calls.

It is also worth noting that although the TeleSuite Systems can connect to any other standards-based videoconferencing system, the “TeleSuite telepresence effect” requires all participating sites to be TeleSuite sites. Thus, the effective minimum purchase is two TeleSuite Systems. While true that the potential savings (both hard and soft) may provide a strong payback on such an investment, sticker shock has kept many firms from taking the plunge.

**Company:** *Digital Video Enterprises (DVE)*

**Website:** [www.dvetelepresence.com](http://www.dvetelepresence.com)

**Founded:** 1999

**Employees:** 2

**Type:** Privately held

**Revenue:** Not disclosed

**Funding:** Private from company founders

**Headquarters:** Irvine, CA

**Other Offices:** None

	Integrated Presence Environment
●	Camera / Image Capture Device
●	Display Technology
	Codec Technology
●	Peripherals and Add-Ons
	Other

California based Digital Video Enterprises (DVE) is a privately held corporation founded in 1999 by Dr. Steve McNelley, a psychologist whose doctoral research focused on the importance of eye contact in visual communications, and Jeff Machtig, an inventor and visual effects wizard. Since the early 1990's this duo has been conducting extensive research and development in the field of "true eye contact" videoconferencing, resulting in 11 patents (with several others still patent pending).

DVE's claim to fame is the ability to provide true eye contact during videoconferences. This is achieved by incorporating beam-splitter technology into the display device (the beam splitter optic is mounted on a forward tilted angle, reflecting the image from a flat screen monitor below). The video camera is then positioned directly behind the display. The result is that when local attendees look directly at the display showing the remote participants during a conference, they also are looking directly into the camera, thus providing true eye contact (with zero gaze angle) to those at the far end sites.

DVE's current product line includes various implementations of beam-splitter technology, holographic displays, and transparent display technologies in various form factors including:

- Large immersive group systems
- Group roll-about systems
- Personal conferencing systems
- Virtual presence add-ons (retrofit to legacy video systems)

The features of the DVE solutions vary by model, but include:

- True eye contact (with zero gaze angle)
- Proper far-end participant sizing
- High resolution video images

### **Analysis:**

DVE's strength lies in its technical expertise. Having witnessed the effect first hand, Wainhouse Research can confirm that the company's solutions provide the feeling that one is looking directly into the far-end person's eyes during a meeting. In an effort to address other telepresence issues, including life-

sized remote images and an issue the company calls cultural proximics (the distance the far end person seems to be from the viewer), DVE has added additional products with new form factors to its product line.

Considering the importance of eye contact in visual communications, the obvious question to ask is: why isn't everyone using DVE's technology in their videoconference rooms? The answer to this question is three fold: DVE's technology is not inexpensive (the telepresence display systems, not including the codec(s), camera(s), and other options, start at US \$8,900 for the personal systems and US \$27,900 for the group systems). Second, until recently DVE had offered its solution in only a credenza-based form factor, which limited its target audience. Finally, while technologically strong, DVE lacked capitalization and internal resources for marketing its offerings. The combination of these three factors has made the company something of an industry insider secret, with only a few hundred units currently out in the field. That said, we are aware of several partnerships and distribution deals currently in the works which may help DVE reach the enterprise meeting room market.

Technology aside, DVE's solutions are notable because they can immediately improve end user satisfaction, which in turn results in increased usage and a stronger ROI on an existing or next generation traditional videoconferencing deployment.

**Company:** *LifeSize Communications*

**Website:** [www.lifesize.com](http://www.lifesize.com)

**Founded:** 2003

**Employees:** 70

**Type:** Privately held

**Revenue:** Not disclosed

**Funding:** Venture capital (various investors)

**Headquarters:** Austin, TX

**Other Offices:** United Kingdom, Hong Kong

	Integrated Presence Environment
●	Camera / Image Capture Device
	Display Technology
●	Codec Technology
●	Peripherals and Add-Ons
	Other

Texas-based LifeSize Communications is a privately held company founded in 2003 by Craig Malloy and Michael Kenoyer, the original creators of the ViewStation set-top product. Funding for LifeSize has been provided in part by Norwest Venture Partners, a venture capital firm that has considerable experience in the video market, having previously funded Accord (now owned by Polycom), Ezenia, Polycom and Virtela. LifeSize offers four video products: a room system (expected release in fall 2005), an executive system (expected release in winter 2005), an IP-ISDN gateway, and a management system designed for multi-vendor configurations. LifeSize also offers a high definition audio conference phone.

LifeSize's stated goal, which is largely similar to most of the companies covered in this document, is to create a life-like experience for video users. The company contends that the main reason videoconferencing has not been widely adopted within the enterprise is the deficient image quality provided by current videoconferencing systems. In addition, the company believes that producing a satisfying video experience requires that the displayed video images be of sufficient size and resolution to create the illusion of an in-person experience.

The company's debut videoconferencing solution, the LifeSize Room solution, has a list price of \$11,999, and incorporates a video system, camera, speakerphone, and remote. The specific capabilities of the LifeSize Room solution include:

- H.323 / SIP video system with IP support at connection rates from 64 Kbps to 5 Mbps
- HD video resolution (up to 1280 x720 at 30 frames / second at 1 Mbps )
- Widescreen (16:9) and normal (4:3) video modes
- A LifeSize-designed HD PTZ camera with integrated optical zoom capabilities
- Speakerphone that serves as the microphone array for the videoconferencing system (providing super wide-band 22 kHz audio) and as an IP conference room phone
- Support for / interoperability with H.264, H.263, and H.261 video systems
- Spatial audio capabilities (using microphones on the base of the camera)
- Embedded 8-way multipoint video bridge with 4-site continuous presence capability
- Dual streaming support
- ISDN, and V.35 connectivity via the LifeSize Networker gateway



The key differentiator of the LifeSize solution is the HD video resolution support which provides up to 10 times the resolution of standard FCIF video images. With this dramatic improvement in resolution, LifeSize believes that users will be more likely to embrace video communications as a core business tool.

### **Analysis:**

The demos and specifications of the debut offerings from LifeSize are certainly impressive. While the LifeSize systems promise HD video and support wide-band, the systems are priced competitively with less capable, standard-definition video systems. At least from a performance to price point of view, LifeSize's offering seems quite compelling.

On a critical note, Wainhouse Research questions the importance of image quality and resolution within the videoconferencing industry. According to a recent LifeSize survey of 638 end users of traditional videoconferencing, video quality was listed as one of the top impediments to continued investments in video. This directly conflicts with the results of numerous Wainhouse Research surveys indicating that video quality IS NOT one of the top five concerns of group videoconferencing users. This is not to say that the increased resolution will not be welcomed by both new and long-term video users, but it begs to question whether LifeSize's offering is solving a problem that the users either don't have or don't yet know they have.

Another area of concern is the fact that displaying HD video requires the use of HD-capable video displays, which further increases the price of upgrading an existing video room to support HD video. Although the adoption of HDTV in the US and Japan has been significant in the last 12 months, HD has yet to become the norm in most households or organizations. Furthermore, LifeSize may cause a short term slow down in the videoconferencing industry as buyers delay purchases until they can evaluate and experience HD videoconferencing.

Offering aside, LifeSize has really stirred the pot in the relatively stagnant group videoconferencing industry that has long been dominated by market leaders Polycom and TANDBERG. While true that LifeSize's HD support is a significant differentiator today, over time other vendors will undoubtedly provide this same capability (several have already announced plans to release HD video in the next few quarters). The question is whether the "LifeSize effect" will ultimately grow the videoconferencing market and increase the adoption of video within the enterprise, or simply cause a short-term increase in demand in an otherwise slow (but consistently) growing industry.

Overall, WR expects the company will enjoy a certain level of success (at least to a degree that LifeSize would consider reasonable), especially in niche markets and applications that demand the highest possible image clarity. For now, however, the company has yet to ship its first communications system, so the LifeSize offering remains just a pending promise.

**Company:** *PangeAir*

Website: [www.pangeair.com](http://www.pangeair.com)

Founded: 2004

Employees: 3

Type: Privately held

Revenue: Not disclosed

Funding: Private from company founders

Headquarters: Indianapolis, IN

Other Offices: None

•	Integrated Presence Environment
•	Camera / Image Capture Device
	Display Technology
	Codec Technology
•	Peripherals and Add-Ons
	Other

PangeAir offers more of a business model than a telepresence or technology solution. PangeAir has taken Destiny Conferencing's TeleSuite System (with minor modifications) and turned it into an international franchise, offering public access to the telepresence-enabled environment for an hourly (or daily) fee.

According to President and COO Bob Briggs, PangeAir offers "a high quality, high end, and C-level-ready replacement for business travel." Under the terms of the franchise, PangeAir is selling area developer licenses that allow the licensees to sell franchise rights within their territory (usually a state). The current model divides North America into 65 areas and calls for one PangeAir suite to be deployed per 500,000 people.

The PangeAir flavor of the TeleSuite system seats up to 18 people, includes a 4 ft x 8 ft video wall, and all necessary furniture and A/V equipment. It utilizes a PangeAir-managed, quality of service (QoS) data network hosted by several carriers. Although pricing may vary, the company's suggested hourly rental rate is \$595 per room. To date it reports having sold 15 area developer licenses that have resulted in commitments to deploy 30 locations in 2005.

#### **Analysis:**

There are many compelling aspects of this business model / offering. First of all, while other telepresence players are dividing their efforts between product development and sales / business development, PangeAir is focusing solely on its business model. By purchasing a COTS (commercial off the shelf) TeleSuite solution from Destiny Conferencing, the company has effectively outsourced its development and can focus on developing territories and franchise sales.

The market for public videoconferencing room rentals includes Regus (which recently acquired HQ Global Workplaces) and Affinity; two companies that have demonstrated the ability to successfully manage a global network of "for hire" meeting rooms. PangeAir, however, is offering a videoconferencing suite with telepresence capabilities for a similar hourly fee. Although PangeAir rooms can connect to Regus and Affinity rooms (and vice versa), Regus and Affinity offer customers the choice (and convenience) of hundreds of video rooms around the world. This is a significant challenge that

PangeAir faces (and a textbook example of Metcalfe's law): to make its offering more compelling, it needs to reach the tipping point of globally deployed rooms.

While Wainhouse Research appreciates PangeAir's inventive, all-business approach to seeding the world with telepresence suites, the question is whether PangeAir can attract enough franchisees, and whether those franchisees in turn can generate enough revenue to pay the bills? Yet for end users seeking to conduct telepresence-enabled video meetings on an hourly or daily rental basis, PangeAir's offering is an attractive and unique choice.

**Company:** *Sony Corporation*

**Website:** [www.sony.com](http://www.sony.com)

**Founded:** 1946

**Employees:** 162,000 (as of March 31, 2004)

**Type:** Publicly Held

**Revenue:** \$67.74B

**Funding:** N/A

**Headquarters:** Tokyo, Japan

**Other Offices:** Worldwide

	Integrated Presence Environment
●	Camera / Image Capture Device
●	Display Technology
●	Codec Technology
●	Peripherals and Add-Ons
●	Other

One would be hard pressed to find a better known brand in consumer electronics than Sony. With more than 150,000 employees worldwide and products ranging from televisions to video projectors to audio amplifiers and personal MP3 devices, Sony is truly an 800-pound gorilla in the technology solution marketplace.

Sony has been wading knee deep in the conferencing and collaboration space for several years, and to date has released several generations of mildly successful videoconferencing products. Its current top-level video system, the G-70, sports a wealth of strong features including support for 4 mbps connections on IP, H.264 support (in both point-to-point and multipoint calls), and an optional integrated 6-site embedded multipoint video bridge.

While many of these features are available from competing products, the G-70 stands out because of its support for up to five additional monitors - each of which can display one of the far-end sites in a multipoint meeting. Although Sony was not the first to release this capability, its implementation includes:

- High IP bandwidth support (4 mbps shared between all remote sites)
- H.264 support in multipoint meetings and multiple display mode

The result is a multipoint meeting experience that is superior to the typical continuous presence or voice-activated switching (VAS) meeting, and includes full-screen views of each far-end location (for up to five remote sites).

In addition, as recently as March 2005, Sony publicly declared its intention to release a new set of products, under its IPELA product line, with features for the telepresence market including:

- HD image quality
- True eye contact
- Proper far-end participant sizing

Sony's existing product range includes the HDCX300 HD camera (\$22K list) and the Qualia line of HD plasma displays (\$30K list), so the only missing item is the HD videoconferencing codec.

**Analysis:**

Sony is well positioned to excel within the enhanced visual collaboration space. Its G-70 product provides solid performance, and the multiple monitor capability improves on the typical multi-site experience. That said, the G-70 does not currently address some of the most common requests of users seeking telepresence capabilities (true eye contact and life-size far-end participants), although Sony promises to deliver telepresence features in upcoming product releases.

Wainhouse Research does not question Sony's ability to release top-notch electronic products – including high performance videoconferencing solutions. The question is whether Sony will choose to invest in this relatively small potential market and dedicate the necessary resources to make things happen. On the one hand, Sony recently announced plans to launch a \$10M IPELA ad campaign, and at the 2005 Infocomm show dedicated a full 50% of its extremely large booth to visual collaboration. Unfortunately, the company's marginally successful history in videoconferencing, and the string of recent managerial shifts and structural changes suggest that Sony's long-term future in conferencing remains to be seen.

**Company:** *Teliris*

Website: [www.teliris.com](http://www.teliris.com)

Founded: 2001

Employees: Approx. 20

Type: Privately held

Revenue: Not disclosed

Funding: Private from company founder

Headquarters: NYC

Other Offices: Massachusetts, USA  
UK

•	Integrated Presence Environment
•	Camera / Image Capture Device
	Display Technology
	Codec Technology
•	Peripherals and Add-Ons
	Other

Teliris is one of a handful of companies offering users an enhanced video conferencing experience. According to the company's founder, the company focused its energies on creating a "no-compromise" virtual meeting experience that incorporates the following:

- Very high quality video
- Low latency (delay) audio (with directionality)
- Carrier grade reliability (99+ %)
- Enhanced multi-site meetings (with full-screen, high-quality view of each site)
- Proactive remote management and monitoring of audio-visual devices within the conference room
- Fully managed service including 24/7 system diagnostics and customer support

To provide these attributes, the company utilizes proprietary cameras and high bandwidth MPEG-2 video connections riding on a high-QoS network under Teliris's management. Also noteworthy is Teliris' "vectoring" technology (described in detail earlier within this white paper) that provides an additional level of reality and accurate sight-lines during multipoint meetings.

The above capabilities are packaged in a turnkey service called the GlobalTable, which costs roughly \$5,000 per month plus network costs ranging from \$2,500 to \$8,000 per month.

As one might expect from these prices, Teliris (wisely) positions its solution to Fortune X companies seeking to enhance internal productivity and save busy executives' time. The company's argument is that if utilizing their system can save a few hours (or days) for upper-level resources or decrease product development time by a few weeks, the cost of the Teliris solution is well spent. With 50+ systems already installed and under management, and a \$15M backlog of pending orders and long-term contracts, Teliris appears to be the current commercial leader in this market space.

## **Analysis:**

Teliris' position is that traditional "talking head" videoconferencing does not provide a natural meeting experience. Based on this belief, the company has created GlobalTable, an offering that combines high-bandwidth, high-quality video connections (using an MPEG codec), and a turnkey, high-touch support model that fits well with the demands of many Fortune X organizations. In addition, the company's Virtual Vectoring concept, which provides participants in multiple locations with the same face contact (or lack of face contact) that they would have if they were in the same room, adds an additional layer of realism to multipoint meetings. Wainhouse Research questions, however, whether conference participants would actually want to lose face contact with other locations at any time – even if this more closely simulates an in-person meeting.

Features, functionality, and value aside, the question is what incremental value (in dollars) does the company's enhanced meeting experience command versus traditional videoconferencing solutions?

According to Teliris, the fact that the typical GlobalTable system is utilized more frequently than most traditional video systems indicates that end-users prefer Teliris video meetings. While not an unreasonable conclusion, it is also possible that the typical Teliris customer has a greater need for videoconferencing than the typical organization. Although difficult (if not impossible) to prove, Wainhouse Research believes that both the Teliris offering itself and the corporate culture of Teliris' customers contribute to this incremental usage.

Also noteworthy is Teliris' monitoring of audio-visual devices within the conference room. In some circumstances, such as a room with a defective microphone or flat screen, this capability may allow Teliris to adjust the meeting / room settings to compensate for the equipment failure, or give the end-user organization ample notice to fix the problem before impacting the user community. While some audio-visual control system vendors, such as AMX, Crestron, and Simtrol, offer similar device monitoring capabilities, this is not typically available from videoconferencing or telepresence vendors.

Considering Teliris' solid recurring revenue and impressive customer backlog, it seems the company has struck a chord with enterprises seeking high-impact, turnkey conferencing. In addition, the company's ability to integrate its solutions into existing conference rooms makes it more flexible – and cost effective – than some competing telepresence solutions.

## Appendix C - Sponsoring Vendor Promotional Information

This section includes promotional materials from the following participating vendors:

Be Here Corporation	<a href="http://www.behere.com">www.behere.com</a>	
Digital Video Enterprises	<a href="http://www.dvetelepresence.com">www.dvetelepresence.com</a>	
LifeSize Communications	<a href="http://www.lifesize.com">www.lifesize.com</a>	
Teliris	<a href="http://www.teliris.com">www.teliris.com</a>	

Readers should note that the material in this section has been provided by these vendors directly, and as a result Wainhouse Research cannot guarantee the accuracy or completeness of these marketing and promotional documents.

For additional information about these offerings, please contact these vendors directly.





**Be Here Corporation**  
**39300 Civic Center Drive, Suite 180**  
**Fremont, CA 94538**  
**Phone: 510.505.7900**  
**Fax: 510.505.7901**  
**information@behere.com**  
**www.behere.com**

### **About Be Here Corporation**

Be Here® provides VoIP products that restore “natural communication” to multimedia business meetings. Only Be Here’s TotalView 360° videoconferencing center-of-the-table solution gives users the power to control multiple video views of participants and data from any source, at any moment. TotalView delivers maximum scope of vision for participants, with a compact table-top appliance. The 3-in-1 communications device integrates with existing IT, VoIP networking and telephony environments, and works with legacy video conferencing systems. It is easy to use and as affordable as a business speaker phone. TotalView gives each attendee and caller choice of what they see and share – maximizing their confidence to engage effectively and to control the outcome.

### **Maximum “Connectedness” with TotalView 360° Video Conferencing**

Using the power of the existing IP network, TotalView changes the way people communicate over a distance. Eye contact among participants at the local and remote locations is “natural” because the microphones with wide-band speaker and camera are converged together into a single appliance in the center of the meeting room table. In contrast to other products with a corner of the room, contrived video camera view, Be Here has developed the solution that returns the central focus of the room and the individual’s perspective to the natural focal point of the meeting interaction. TotalView captures all participants around the table equally, using a distortion-free, always in focus 360° single lens camera that has no moving parts. From that full panoramic view, participants at all ends can independently select and display multiple portraits of participants or groups in split-screen mode on their attached laptops in TV News broadcast fashion. This customizable, zoom-able, and full motion viewing experience can be seen in multiple ways – via their laptop PC, an overhead projector, a 4” screen on the phone itself, or combined with an LCD flat panel. No other solution delivers this level of flexibility for individual control where each person can select and display exactly what they want and need to see.

### **TotalView Device Familiarity for Quick User Acceptance**

Be Here recognizes that the productivity gains and business cost savings of teleconferencing and telepresence are directly related to user acceptance of the technology. TotalView uniquely delivers a VoIP converged plug-and-play video conferencing solution that -- although rich in capabilities, sound, and video quality -- is instantly familiar to users who have long experienced the benefits of a traditional speaker phone as a core business tool. With its telephone dial-pad, console experience, real-time availability, and integration with other virtual meeting applications, TotalView enables anyone in the workplace to quickly harness the power of video, audio and data sharing in their day-to-day communications, phone calls and meetings.

Have you  
ever seen an  
**invisible**  
camera?



## Introducing True Telepresence...

Intuitively, people know something is just not right with old time videoconferencing cameras and displays. Trying to have a productive conversation with **6-inch tall remote participants who appear to be staring at your stomach** is no way to start a business relationship.

True eye contact, invisible cameras, and life-size images shift the experience from observant and artificial to Immersive and Natural. Non-verbal cues become visible and communication is dramatically improved.

**Usage, productivity, and ROI on your existing videoconferencing investment soar.**

### What is Telepresence?

[Click here to read DVE's White Paper](#)

For over a decade, DVE has been helping Wall Street, Hollywood, and the Fortune 2000 **to get rid of the intrusive, misplaced camera and the TV on a dessert cart** and get down to business.

Next time you are in Southern California please stop by and see us. True Telepresence is just one of those things you have to experience for yourself.

Accelerating  
human capital  
to the speed of light.



## A Better Way to Group Conference.

**Are delayed flights delaying your business? Are canceled flights canceling your business?**

Is your most valuable commodity: Stuck in traffic? Cooling their heels in the airport? Stuck on the runway?

The **DVE Telepresence 50** is a fully integrated group telepresence environment, affordable enough for every conference room. Connect outlying offices virtually to your worldwide organization. Leverage your staff and subject matter experts around the world at the speed of light.

### Only True Eye Contact Adds Value

[Click here to read the eye contact study](#)

Don't just meet with clients, prospects, and analysts... Connect with them...with true eye contact, an invisible camera, and superior image resolution.

Experience True Telepresence for yourself. Contact us to arrange a meeting at our Tour of Telepresence Showroom in Southern California.

# Connect

with personal telepresence.



## True Telepresence Throughout Your Enterprise.

Imagine trying to have a productive conversation with a business associate who appears to be looking away and avoiding you. This is exactly the experience you get with both entry level and executive videophones.

Traditional videoconferencing displays and camera placement can't come close to re-creating the warm, engaging connection that true eye contact delivers and that the human brain expects. True eye contact has been shown to dramatically improve non-verbal communication. Conversely, studies show that people who do not engage in eye contact are perceived to be: *Less Honest, Less Intelligent, and Less Attractive.*

### What is Telepresence?

[Click here to read DVE's White Paper](#)

Don't let your videophones and personal videoconferencing systems make you seem like someone you are not.

Experience True Telepresence for yourself. Contact us to arrange a meeting at our Tour of Telepresence Showroom in Southern California.



# True telepresence. is true ROI.



**DVE Telepresence 50**



**DVE Telepresence 32**

The ugly little secret of traditional videoconferencing is that it doesn't get used very often. What is the return on investment if it doesn't get used?

When it does get used it is almost always internal, never with customers or prospects, and often, as a last resort. When it is used, the experience is less than satisfying and even awkward. The videoconferencing industry assured us that usage would improve with IP...then with H.264...now their story is Higher Definition. Don't believe the hype! Higher Definition will only make an awkward, unnatural experience clearly more awkward and unnatural.

DVE True Telepresence will dramatically improve the end-user satisfaction and usage of your existing videoconferencing investment. DVE can also help you customize a state-of-the-art bundled solution that people will actually use and enjoy. **For more information see our Buyers Guide.**

## **Only True Eye Contact Adds Value**

[Click here to read the eye contact study](#)

Experience True Telepresence for yourself. At our Tour of Telepresence Showroom in Southern California you will see the entire DVE line from telepresence podiums to group systems to executive personal solutions.

## **High Definition – The Way Video Communications Was Meant to Be**

### *Critical Success Factors for Technology Decision Makers*

The following is an excerpt from a white paper published by LifeSize™.

For a complete copy of the white paper, visit: <http://www.lifesize.com/registration>.

If seeing is believing, then the video conferencing experience of the past has always been something less than believable. Despite boastful claims that the video was “just as good as being there” and would allow us to “extend the conference room table 10,000 miles,” the truth was always something short of expectations.

The quality of video conferencing was limited. Viewed in low resolution, participants always have appeared blurred and murky. While organizations have gone to great lengths to modify rooms and lighting to create the best possible quality, they have done so with limited success and at great expense.

Now, the opportunity to make video communications deeply compelling and true-to life is about to be seized. This promises to be a consequential leap in technological innovation, but it also represents an important advance in terms of productivity in an era of global collaboration and communication.

### **Why High Definition (HD) is Important**

Why are advances in video communications technology important? Such innovations matter because the productive value of interactive video is inextricably bound to the technology itself. After all, no one would watch television if it was difficult to turn on and had a low quality picture. Similarly, the reluctance to actively use video communications is linked to poor image resolution, unimpressive sound quality, and user complexity. As interactive video becomes a vivid, high definition experience, it will also become an actively used and highly productive form of communication.

Advances in video communications technology represent immediate savings to the bottom line as travel time and costs are reduced. But video communications and other rich media collaboration solutions also “provide better ways to communicate and work,” according to a report by Wainhouse Research. “New tools provide ways for knowledge workers not just to exchange information, but to interact productively.”

New technology promises resolution that offers three times (3X) the resolution of standard television (NTSC) resolution and ten times (10X) the resolution of the conventional video conferencing systems (FCIF) available over the past 15-20 years. With the introduction high definition video, powerful new camera designs, spatial audio, and new user interface approaches, video communications is poised for dramatic advances from a technical perspective.

## Critical Success Factors when Assessing High Definition Video Communications and Traditional FCIF Systems

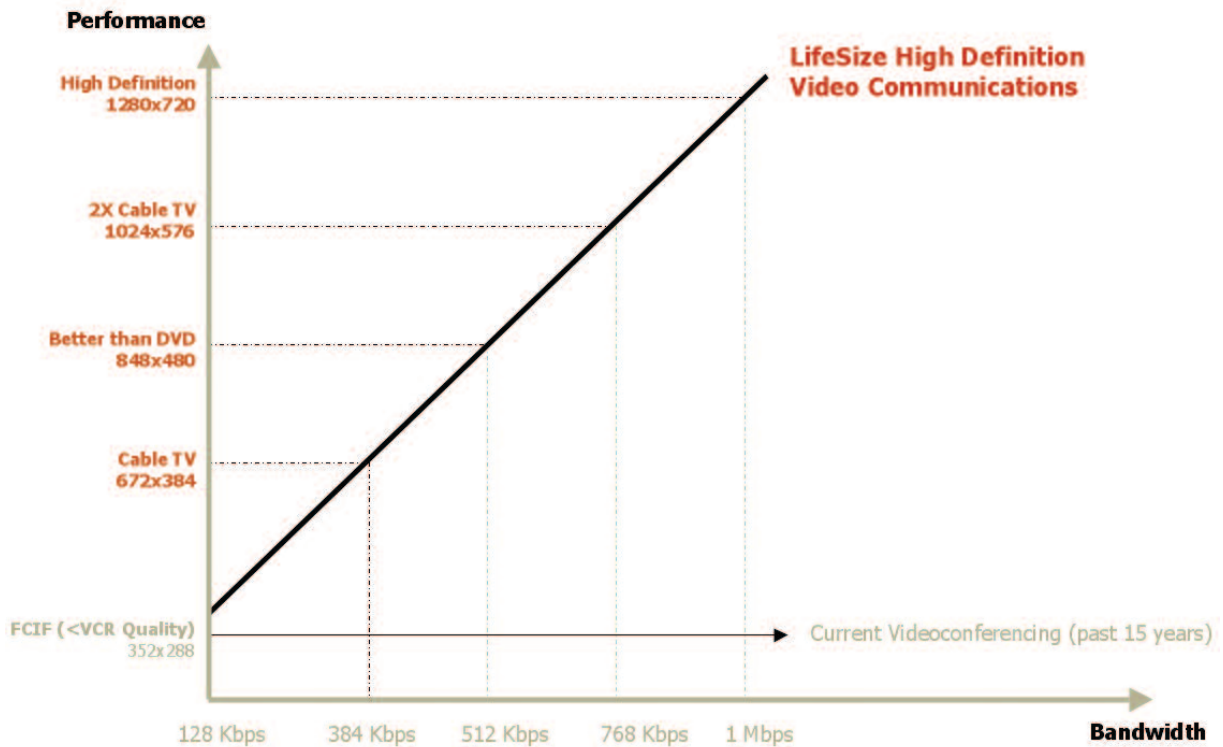
Several key criteria for assessing video conferencing technology are explored in this paper. While the standard criteria discussed here certainly relate to “quality” from a technical standpoint, they also are linked to the “productivity” of video calls as a means of conducting effective communication.

Herein, we recognize the technical strength from the perspective of producing a realistic experience (one that is vivid and true-to-life) and an intuitive experience (one that emphasizes simplicity and ease of use). Among the key assessment criteria discussed here are: visual realism; acoustic realism; and usage simplicity.

**VISUAL REALISM.** Video communications technology has reached levels that simply weren’t possible a few years ago. Today, it’s possible to provide a high definition visual experience in a cost-effective way. Reaching that objective, however, requires us to consider how compelling, high definition video communications are both generated (video resolution) and perceived (visual acuity).

**Video Resolution.** In order to provide video resolution that generates a compelling, true-to-life experience, it is necessary for high definition video solutions to incorporate and encompass several recent advancements in the video communications field:

- **Architecture.** As suggested in Moore’s Law, there are advances in processing power that continue to double every 18 months. Today’s video conferencing systems are limited to providing FCIF (352 x 288) resolution video at 15-30FPS due to computing limitations or MIPS available in the architecture of these systems. Video communications is a processor intensive application. New advances in processor technology enable new compression/decompression (CODEC) architectures that provide high definition video communications at a resolution of 1,280 x 720, 30 FPS which is 10X FCIF quality.
- **Bandwidth.** In order to achieve higher resolution video communications, some early adopters have gone to great lengths to provide uncompressed high definition video using MPEG devices and cobbled together components. The limitation of these efforts is that they require significant amounts of bandwidth -- upwards of 2-5Gbps, according to USC’s Integrated Media Systems Center (<http://imsc.usc.edu/research/>). There are very exciting applications available for this level of video communications but the bandwidth required and unsupported and unreliable configurations would severely limit usage by mainstream users. While many of today’s video conferencing networks operate at bandwidths of 384Kbps to 768Kbps, this has been primarily due to diminishing returns of quality associated with applying additional bandwidth. In fact, most organizations have chosen to use this bandwidth for data applications due to the lack of benefit linked to using more bandwidth with a FCIF system. With LifeSize, users will experience improved quality at all bandwidths but will achieve full high definition resolution (10X FCIF) by utilizing 1Mbps+ of bandwidth. In recent years, cost effective bandwidth and network convergence have become widely accessible in the enterprise and other organizations such as universities and government institutions.



- Standards.** When exploring investments in video communications, it is also important to consider the linkage between a particular solution and industry standards. Adherence to industry standards protects an investment by ensuring compatibility with existing systems. Meanwhile, breakthrough standards – such as the newly released H.264 standard – make it possible to take high definition video communications to new levels. H.264 is a culmination of 10 years of work in the industry to create the very best video compression algorithm, extended to include high definition resolutions. This standard is 2-3X better than compression algorithms that the industry has previously used. Importantly, it is also backward compatible. As a standard, it is crucial to provide interoperability for systems to expand the growth and communication of multi-vendor systems. In its new video communication systems, LifeSize has embraced this standard and has fully leveraged its capabilities.
- Cameras.** High definition cameras have primarily been available for the broadcast market or for digital camcorders. In the case of broadcast equipment, the cameras are not cost effective for mainstream video communications. On the other hand, digital camcorders do not provide the quality needed for interactive video conferencing systems. One factor making high definition interactive video possible is the availability of reasonably priced image sensors that are driven by the digital camera market. LifeSize has internally developed a cost effective high definition camera using commercially available image sensors and has developed software to make the camera appropriate for the challenges of video communications. Such developments make it possible to cost-effectively address exposure and backlight compensation challenges (see sidebar) to generate a vivid and compelling picture.



**Visual Acuity.** The human eye has a certain well known and measurable level of visual acuity. If you look at an object, you can resolve the detail only to certain limits – like the numbers on an eye chart. In the viewing of a video image, what is important is producing as much resolution as the eye can resolve. This is the standard to measure against: visual acuity. Added resolution is unnecessary because the eye cannot see it. If the video resolution is below the eye's, the image will appear to be filled with pixels. In other words, there's a certain optimal resolution in relation to visual acuity.

LifeSize achieves that optimal resolution and provides a "large window" view of the participants on the far end of the conference call. With a 50 inch, plasma screen (1280 x 720 pixels), the optimal viewing distance based on the human visual system is about 10 feet. The screen image looks as good as if someone is standing in the room. The eye can't tell the difference from a resolution standpoint. People appear to be true-to-life, which is an important factor in making the experience as credible and compelling as possible.

But consider the "optimal" viewing distance for a FCIF (352 x 280 pixels) image. It is 32 feet away. That's the distance at which the visual acuity of the eye matches the resolution of the image. Rather than provide a full-screen view, video conferencing must shrink the image to avoid projecting a blurry image with a standard room.

By projecting a high definition image onto a large window, LifeSize enables the video conference participant to clearly see the participants on the far-end without moving a camera around. Not only is the "window" matched to the eye's resolution limit, the person you are seeing is true-to-life. If you have enough of a view, then you just move your eye to look at whoever you want to see. The larger the participants on the screen, the more "real" the experience seems.

For video conference calls within an executive office, LifeSize has designed an integrated system for a 17-inch screen with a 16:9 format. The optimal viewing distance at which the image matches the eye's visual acuity is 3.3 feet. Contrast that with conventional systems on the market, which use the FCIF standard and therefore, would require the participant to be 10 feet away from the monitor to obtain optimal resolution.

For a complete copy of this white paper, visit: <http://www.lifesize.com/registration>.

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All other trademarks are property of their respective owners.



# The New Way to Manage the Global Enterprise

Increasingly, senior executives at major international companies are forgoing business travel and instead relying on Teliris – the number one provider of interactive telepresence solutions in the world – to share knowledge, leverage human resources and operate more efficiently. GlobalTable by Teliris is a life-like videoconferencing system that replicates the human dynamics of a live meeting with extraordinary realism, freeing executives to collaborate unhampered by international time zones and geographic distances.

---

*"Face-to-face meetings used to require executives to fly the Atlantic... Now we're holding international meetings at a moment's notice by just walking into a room and pressing two buttons," explains a media company executive.*

---

*"It is the first time we have seen the creation of a real 'meeting environment' in which people many thousands of miles apart can have conversations that are completely normal in every sense," adds a senior executive of a publishing company.*

---

*"The technology simulates in-person meeting environments so realistically that people in different cities – and in our case, often in different continents – all but forget they're not physically present with each other. Scientists around the world can now work with each other on drug research as if they're side-by-side," marvels the research director of a pharmaceutical company.*

---

## Real-time Synchronicity

To replicate a real-time experience, lips and sounds must be in synch, must be seen and heard when they actually occur and must be fully audible even when people in different locations are speaking at the same time. If the sights and sounds of a meeting are low quality or delayed, participants will act differently than they would during an in-person situation, distorting the meeting's effectiveness and results.

Scientific studies have actually determined a threshold of 1/4 of a second, beyond which a delay is noticeable and uncomfortable to people. GlobalTable meetings are so realistic because their latency factor falls below the 1/4 second threshold, whereas competitors' solutions exceed this level creating a perceivable gap between when something is said and when it is heard.

# Informed by Research

To convince senior executives that a videoconferencing solution could truly simulate a live meeting experience, Teliris carefully researched the issues and assumptions underlying person-to-person conversations. Formal academic studies investigated the psychological factors associated with interpersonal communications as well as users' disappointing experiences with traditional videoconferencing systems.



Teliris also examined and tested a wide range of supporting technologies, including existing products and components. The outcome is a service that enables participants to experience life-size, high quality images and no-delay, synchronized audio over Teliris' highly secure and reliable InfiNET global network.

## Life-Like Videoconferencing Threshold Test

To recreate a life-like, "being there" experience, **ALL** of the following factors must be met:



Real-time synchronicity	Latency must be below 1/4 second.	<input checked="" type="checkbox"/>
Picture quality	Participants must be able to see detailed eye/face reactions, sweat etc.	<input checked="" type="checkbox"/>
Reliability	System must be guaranteed to work 99+% of the time.	<input checked="" type="checkbox"/>
True duplex sound	Participants at 2,3,4+ locations can be heard without distortion at all times.	<input checked="" type="checkbox"/>
Whisper sound	Participants must be able to hear whispers at other locations just as they would at an in-person meeting.	<input checked="" type="checkbox"/>
Vectoring	Orientation of eyes and sound must be directionally appropriate.	<input checked="" type="checkbox"/>

If you can't look into the whites of their eyes and hear their words exactly as they are said, it is not the same as being there. GlobalTable delivers all of these factors for every meeting.

## High Definition Vectoring

During an in-person meeting, people turn to look at the individual who is talking. To simulate this orientation, the GlobalTable system employs High Definition Vectoring (HDv) to replicate the body language and directional cues that occur during face-to-face interactions.

By using High Definition technology, HDv enables each participant to see where others are looking. Are they focused on the person speaking, on the reactions of others to the speaker or on a presentation screen at the end of the room? Importantly, individuals can observe precise human reactions just as they would in a live meeting. Such is not the case with traditional video conferencing solutions that employ a "Hollywood Squares" approach, where multiple people are displayed grid-like on a single screen, randomly looking in different directions with too little resolution to judge expressions.

Further contributing to the life-like meeting experience, Teliris pioneered Virtual Vectoring, a proprietary approach to room configuration that maximizes the locations of cameras, microphones, speakers and screens as well as manages the electronic placement of images and their associated sound. Virtual Vectoring creates a realistic perception of body language and visual orientation. In effect, the technology disappears, and people from multiple sites interact – eye-to-eye – as if they were in the same room.

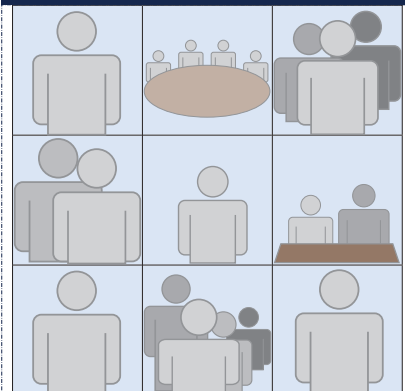


Equally important, Teliris removed the uncertainty associated with traditional video-conferencing by designing

GlobalTable as a fully managed service – one that assures customers 99+ percent reliability. Simple screen commands or a single telephone call enable users to book and experience the meeting they need, supported 24/7 by the Teliris Video Network Operating Center. This resource provides comprehensive customer assistance, including room booking and call set-up, system diagnostics, standby help, complete break/fix service and online reporting/data management.

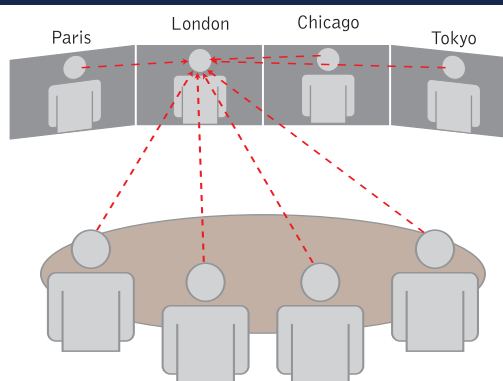
It is the combination of all these dimensions – life-size, high quality images, no-delay audio, the InfinET global network, multi-point Virtual Vectoring and a highly reliable managed service – that enables GlobalTable to deliver a high quality, life-like meeting experience around the world.

### Conventional Multi-Point Videoconferencing



Conventional multi-point videoconferencing is less than life-size and often splits a single screen into small, difficult-to-view windows.

### Virtual Vectoring



With Virtual Vectoring, when someone in one location (e.g. London) talks, everyone else appears to be looking at that person and hearing the words and sounds from that direction.



## Networking

Life-like videoconferences require a higher quality video-capable network than those deployed for data transmission or traditional videoconferencing. While any network can carry video information, a special configuration is needed to deliver real-time interaction.



For example, an inferior network creates problems such as time-delay, loss of video and audio data and introduction of picture or sound noise. Teliris overcomes these issues with its high-performance InfiNET network, backed by the company's 24/7 Video Network Operating Center.

## Extraordinary Business Impact

With GlobalTable, organizations not only save time and reduce real costs associated with long-distance meetings, but they begin to change fundamental work processes – leveraging talent better, increasing collaboration, making decisions faster and operating far more productively.

GlobalTable customers say they utilize the system far more than they ever imagined:

- CEOs use it for weekly update meetings with their senior management team.
- Regional executives use it to get closer to far-flung country operations.
- Researchers use it to engage in scientific discussions that shape product development efforts.
- Partnerships use it to leverage the time of their most economically productive senior people.

Most importantly, using the GlobalTable system becomes a vitally important, culturally ingrained behavior within the organization. It truly creates the ability to walk down the hall and meet with anyone else in the company no matter where he or she is located.

Teliris has a large installed base of GlobalTable videoconferencing systems throughout North America, Europe and Asia. Users consistently praise their benefits and real-world value.

Teliris clients include leading corporations in a wide variety of industry sectors.



For more information on Global Table,  
visit [www.teliris.com](http://www.teliris.com) or call:  
NY: 212.490.1065 or London: +44.207.481.1600



## About Wainhouse Research

Wainhouse Research (<http://www.wainhouse.com>) is an independent market research firm that focuses on critical issues in rich media communications, videoconferencing, teleconferencing, and streaming media. The company conducts multi-client and custom research studies, consults with end users on key implementation issues, publishes white papers and market statistics, and delivers public and private seminars as well as speaker presentations at industry group meetings. Wainhouse Research publishes *Conferencing Markets & Strategies*, a three-volume study that details the current market trends and major vendor strategies in the multimedia networking infrastructure, endpoints, and services markets, as well as a variety of segment reports, the free newsletter, *The Wainhouse Research Bulletin*, and the PLATINUM ([www.wrplatinum.com](http://www.wrplatinum.com)) content website.

### *About the Authors*

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**Howard S. Lichtman**, a contributing author to this white paper, is a business-focused technologist and consultant with specialties in telepresence, visual collaboration, and productivity in the enterprise. Mr. Lichtman is the Chief Productivity Officer at the Human Productivity Lab, his telepresence and productivity consultancy. Mr. Lichtman was the former Vice President of Business Development at TeleSuite Corporation, the first commercially successful telepresence provider and an innovator in visual collaboration. Prior to TeleSuite, Mr. Lichtman was the President at Powwow Networks, a visual collaboration start up, and the head of the financial vertical sales organization at Savvis Communications. He can be reached at [hsl@humanproductivitylab.com](mailto:hsl@humanproductivitylab.com).