

Telepresence on a Videoconferencing Budget



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sensorytechnologies™
A MARKEY'S VIDEO IMAGES COMPANY

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Executive Summary

Although announcements and product releases by industry heavyweights Cisco, HP, Polycom, and Tandberg have brought telepresence into the spotlight in the recent years, telepresence is not a new concept. In fact, telepresence offerings amazingly similar to those available today have been on the market since the 1990s from companies including TeleSuite (which became Destiny Conferencing and was eventually acquired by Polycom) and Teliris.

Despite vendor claims to the contrary, telepresence is a form of videoconferencing. The difference is that videoconferencing is a virtual collaboration technology, while telepresence is a virtual collaboration experience. In other words, videoconferencing focuses on making a technical connection, while telepresence focuses on providing a virtual, in-person meeting experience.

The need to meet (or exceed) the expectations of various organizations with a single offering has led telepresence system designers to maximize every element of the user experience. This, of course, results in a relatively high sticker price for these systems.

End-user demand for a superior visual collaboration experience at a non-telepresence price has given rise to a new breed of offerings that provide near-telepresence performance at a videoconferencing price point. These solutions include the core elements of a telepresence solution (life size images, proper positioning / proximity), and compromised versions of the other visual collaboration user experience elements. For example, instead of including three cameras / displays, customized furniture, and ultra-high resolution video signals, these solutions include two cameras / displays / codecs, off-the-shelf furniture and standard HD resolution. The two-camera, two-display solution offered by the sponsor of this white paper, Sensory Technologies, is an example of a “telepresence on a videoconferencing budget” system.

The key takeaway of this paper is that enterprises can enjoy an enhanced videoconferencing experience for a reasonable price by implementing some, but not all, of the design and technology elements found in today’s leading telepresence offerings.

Understanding Telepresence

Wainhouse Research (WR) defines a telepresence (TP) session as “A videoconferencing experience that simulates an in-person meeting with life-like images and sound.” This definition highlights two fundamental items:

1) Telepresence (TP) is a Form of Videoconferencing (VC)

For a variety of reasons (the majority of which no longer apply), videoconferencing has suffered from a poor reputation within many enterprises. In hopes of avoiding this stigma, telepresence vendors have worked hard to differentiate telepresence from videoconferencing. Marketing hype aside, this does not change the fact that telepresence, in WR’s opinion, is a form of videoconferencing.

2) Technology vs. Experience

While videoconferencing is a visual collaboration technology, telepresence is a visual collaboration experience.

Telepresence Concepts

Understanding telepresence requires an understanding of several key points:

1) Telepresence is a Recipe

Although productized by many vendors, telepresence itself is not an exact science. Instead, it is more like a recipe in which the end result depends upon the choice of ingredients (type, size, quality, etc.), the mixture (relative quantity of each ingredient), and the method of preparation.

While videoconferencing is a virtual collaboration technology, telepresence is a virtual collaboration experience.

The diagram below highlights the top-level ingredients in the telepresence recipe. When properly integrated and delivered, these elements contribute to what WR calls the “telepresence effect”; an illusion designed to make meeting participants feel like they are in the same physical location, despite the physical distances between them. This is a good example of how 1 + 1 can actually equal 3 (at least in terms of the overall user experience).

As with any recipe, the chef (or in this case the system designer and/or integrator) can alter the recipe in order to favor specific tastes. For example, in an environment with exceptionally demanding users, one might choose to add an additional level of managed services to the telepresence recipe.

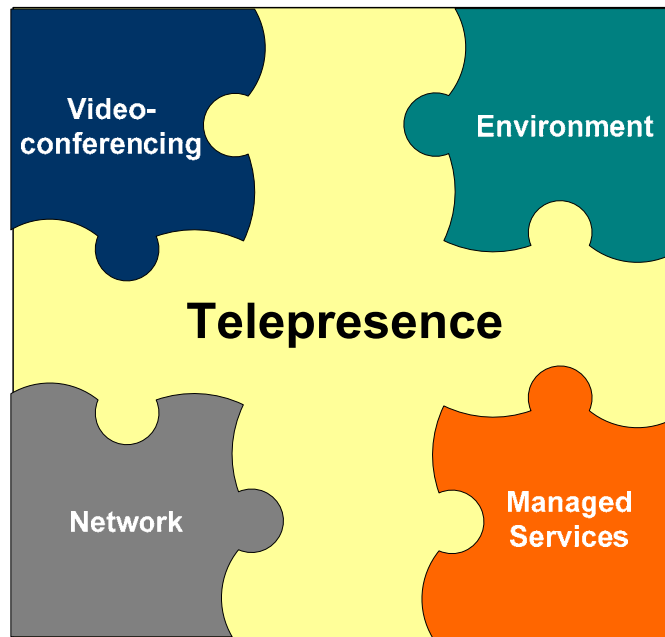


Figure 1: Elements of a Typical Telepresence Offering

2) Telepresence is Subjective

What one person calls a telepresence experience, another may call a high quality videoconference. This stems from the different expectations, priorities, and tolerance levels of the various meeting participants. The need to meet the expectations of various users with a single product (or product line) is one of the greatest challenges facing telepresence system designers.

3) Telepresence Favors Consistency over Flexibility

In general, telepresence solutions provide a superior experience and level of consistency compared to videoconferencing offerings. However, this consistently high level of performance can not be achieved without some degree of sacrifice, most notably in terms of flexibility.

Videoconferencing provides an exceptional degree of flexibility. Users can decide who they want to call, the call speed / bandwidth (which determines the quality of the session), the number of participants to capture on camera, the look and feel of the conference room, and much more. However, this high degree of flexibility results in an inconsistent user experience. For example, during one meeting the camera might be zoomed in on one or two people, while during another it might be zoomed out to capture 15 people sitting around a board-room table.

A telepresence session, on the other hand, provides a consistent, very high quality user experience ... but almost all aspects of the meeting experience are locked down. The chart below highlights the consistency vs. flexibility compromise associated with telepresence.

Capability	Videoconferencing	Telepresence
Call Any Systems	Flexible	Limited *
Call Speed (Quality Level)	Flexible	Locked Down
Number of Participants	Flexible	Locked Down
Screen Layouts	Flexible	Locked Down
Network (ISDN or IP)	Flexible	Locked Down
Room Footprint	Flexible	Locked Down
Camera Angle / Zoom Setting	Flexible	Locked Down **

* Limit may be related to reachable systems or loss of the telepresence “effect”

** Indicates that camera angles / zoom settings are set by the system based on the operating mode (point-to-point or multipoint) and cannot be adjusted by the users directly.

Figure 2: The Flexibility vs. Consistency Trade-Off

Providing a Telepresence Experience

This section describes some of the key elements that contribute to the quality of a visual collaboration or telepresence experience, two of which (life size images and proper positioning / proximity) WR considers to be required elements of any telepresence session. The pictures in this section are courtesy of Apple, Cisco, Polycom, and Telanetix.

Life size images of people on screen – In the ideal world, the far end participants would appear life size (or very close to life size) on the local displays. Images of people that are much smaller or much larger than real life destroy the telepresence effect.

Proper positioning / proximity (across the table feel) – Giving participants the feeling that they are present within the same physical space is an important part of a telepresence experience. In a traditional meeting situation, this means giving the feeling that all participants are sitting around the same table. Note that providing this feeling does not necessarily increase the cost of the system. Instead, it requires paying careful attention to the layout of the room, and specifically the location of the tables and displays, and tight control of camera angles. Note that this does NOT mean that all meeting rooms must be identical in size or décor.

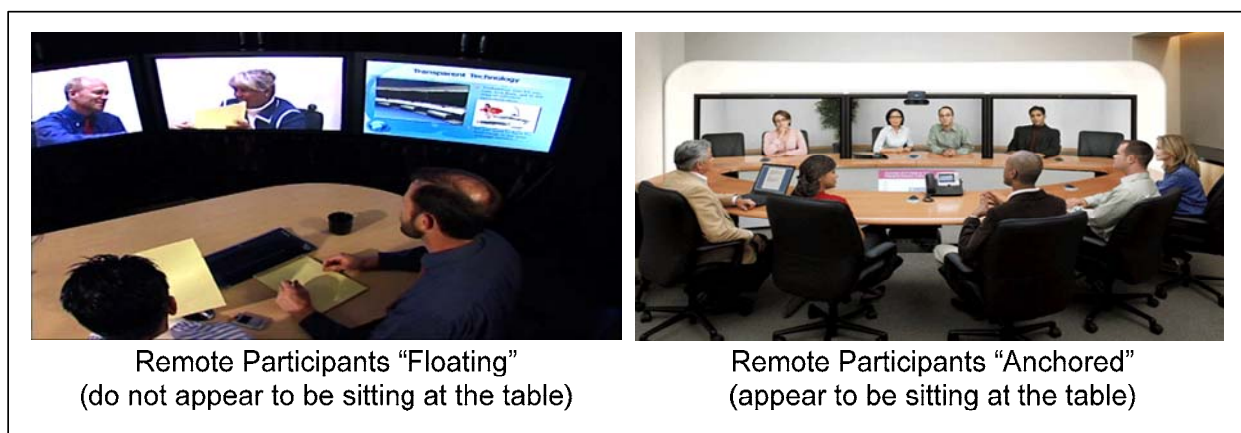


Figure 3: Proper Positioning and Proximity / The "Sitting Across the Table" Feel

Video quality – In the visual collaboration world, video quality depends upon the video resolution, color rendition, motion handling, frame rate, and more. A successful telepresence experience requires video images of sufficient quality to provide a natural reproduction of the remote participants. It is worth noting that telepresence sessions do not necessarily require high definition, although we would expect systems using standard-definition to move to HD in the near future.

Audio quality – Audio quality is a key part of a natural, comfortable visual collaboration session and involves a variety of items including audio clarity, fidelity, noise cancellation, echo cancellation, lip sync, and support for advanced features like wide-band audio, virtual positioning, and stereo microphone audio. As with video quality, the audio quality must be sufficient to provide a natural meeting experience.

Ease of use – Telepresence system users tend to include upper-level executives who have neither the time nor the interest in dealing with technology issues. For this reason, the systems should be extremely easy to use. In most cases, telepresence systems include either a very simple user interface (for example, Cisco uses a standard telephone and Polycom uses a color touch panel) or a turnkey managed service in which all calls are launched and managed by the service provider.



Figure 4: Wide vs. Narrow View of Remote Locations

Panoramic view of the remote room(s) – Providing meeting participants with a wide view of the remote meeting room significantly enhances the user experience. Although this may change in the future, most telepresence offerings available today use multiple cameras and displays to provide the panoramic view.

Meeting room comfort – The degree of comfort the users have while sitting in the meeting room can have a significant impact on the meeting experience. Providing a comfortable meeting environment requires the use of proper furniture (table, chairs, and credenzas), appropriate lighting, proper integration of the conferencing technology, and an acceptable level of room cleanliness and upkeep.

System reliability and consistency – In order to gain the acceptance of the user community, telepresence solutions should provide a reliable and consistent user experience. This requires the use of highly reliable equipment, proper and professional system integration, and a reliable network able to successfully host real-time video traffic.

Support services – Providing the users with a stress-free, automated meeting environment, including proactive monitoring and support, can significantly enhance the user experience. The majority of telepresence offerings on the market today include some form of support service offering ranging from a 24 / 7 concierge service to same-day / next-day break fix support.

The above list, which is by no means all-inclusive, is intended to highlight some of the key items that may enhance (or detract from) the overall user experience during a visual collaboration session.

Telepresence on a Budget

Telepresence solutions on the market today address most – if not all – of the telepresence elements described in the prior section. However, to ensure the best possible experience for all session participants (and ensure that nobody questions the righteousness of the investment), telepresence solution vendors tend to include the best of everything in their offerings – whether absolutely necessary or not. Typical “no-compromise” elements include near-broadcast quality cameras, very large displays, extremely high video resolution, outstanding network services, custom designed and manufactured furniture, and amazingly advanced, all encompassing support services

The secret to enjoying “telepresence-like” performance on a budget is making informed decisions and choices that consider both your organization’s priorities and requirements AND the desire to control cost. In most cases, this will involve some degree of performance or service compromise. However, if the decisions are made properly, the cost reduction benefit enjoyed by deploying a “telepresence-like” integrated video suite will far outweigh the impact on the user experience.

Compromise Example 1 – Room Furniture

When outfitting a conference room, one can either use custom or off-the-shelf furniture (tables, chairs, credenzas, etc.). Choosing custom furniture allows one to exactly match the décor of the environment and the exact requirements for the application (size, shape, etc.). Alternatively, one could find off-the-shelf furniture, with approximately the same specifications, at a MUCH lower cost. This is an example of a reasonable cost-cutting compromise that will not significantly impact the user experience.

Compromise Example 2 – Video Hardware

Current video codecs are able to support resolutions ranging from CIF (352 x 240) to 1080p (1920 x 1080 progressive). In the ideal world, one would use the highest possible video resolution in order to provide the best possible end user experience. However, this requires the use of high resolution cameras, codecs, and displays. Assuming the majority of meetings will be “talking head” sessions, an enterprise could decrease hardware cost and bandwidth requirements by using lower resolution video, smaller / fewer screens, and less bandwidth for its telepresence sessions.

The takeaway here is not that the leading telepresence offerings are not well designed. It is just that in order to provide the highest possible level of performance, telepresence vendors could not afford to make significant compromises.

Design and Deployment Considerations

As a part of the planning process, organizations should identify their thresholds of acceptability for each element of the telepresence / visual collaboration user experience. As shown below, when seeking telepresence on a budget, the goal is to invest the funds required to reach the threshold. Spending more than the required amount is typically unnecessary – even if it does yield additional performance in that particular area. In many cases the law of diminishing returns will apply.

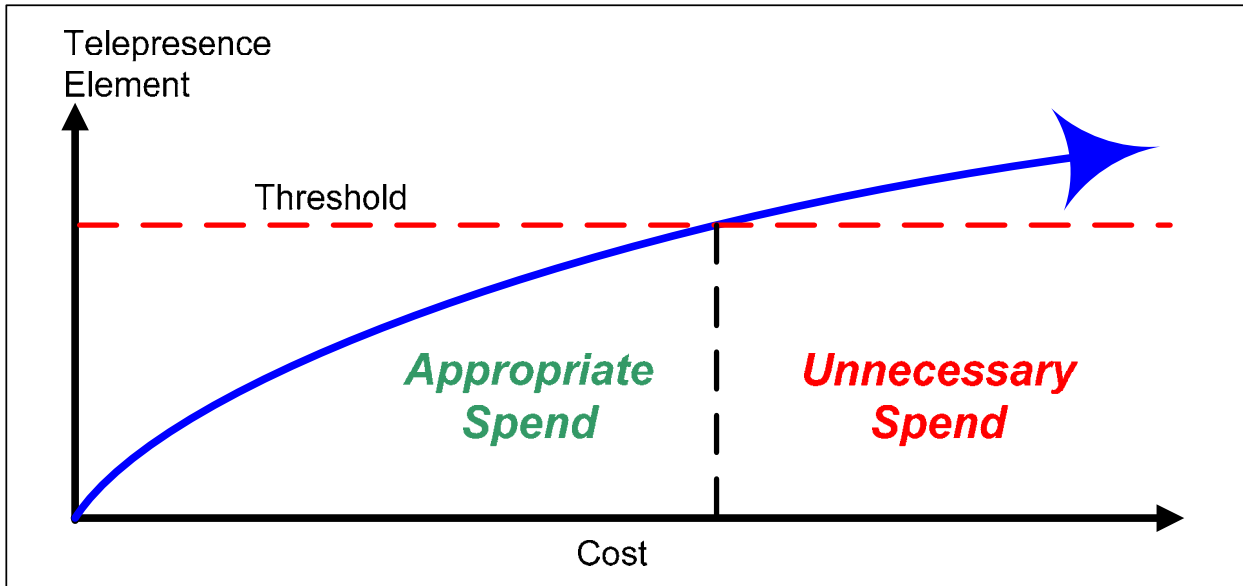


Figure 5: Defining Thresholds of Acceptability

Applying the threshold concept to the various visual collaboration / telepresence elements yields a chart like the one below. The blue columns represent how close an existing (or proposed) solution comes to the defined acceptable threshold (red dashed line) for each individual element. The threshold lines below are for illustration purposes only and may not be applicable within your environment.

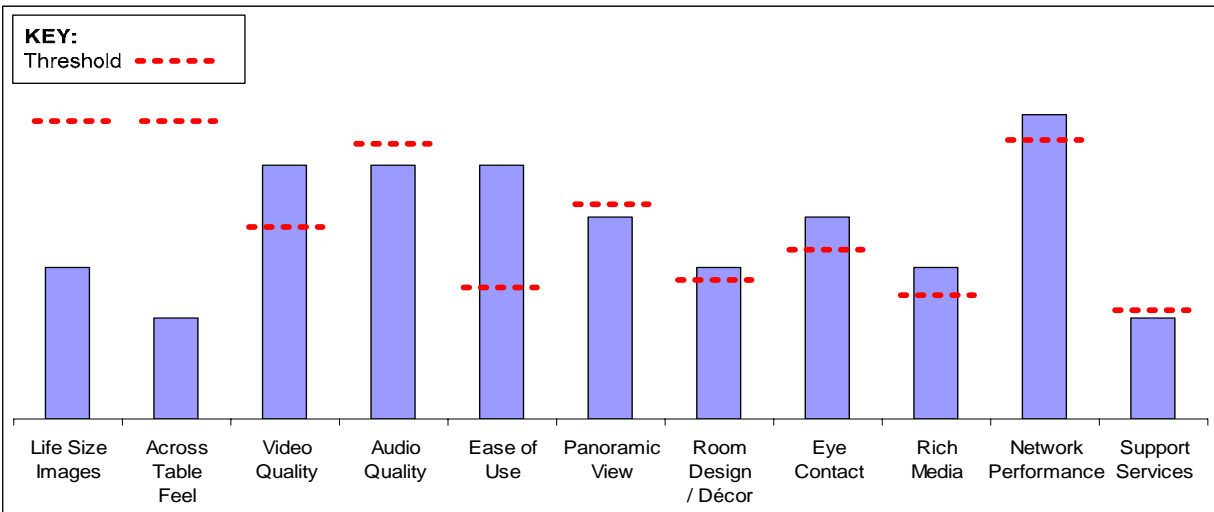


Figure 6: Sample Visual Collaboration Elements Threshold Chart

A chart like the one above allows an organization to perform a gap analysis on its existing (or proposed) videoconferencing suites to ensure that all available funds are invested wisely. The chart below provides insight into some of the areas enterprises should look to find acceptable cost-cutting compromises.

Telepresence / Visual Collaboration Element	Compromise Opportunity?	Comment
Life size images of people on screen	No	Ideally, one would provide full life size images of the remote participants. However, <u>almost</u> life size images are typically acceptable (and can yield significant savings).
Proper positioning / proximity (across the table feel)	No	Telepresence systems should give participants the feeling that they are in the same physical space and sitting at the same table. This requires careful planning in terms of room layout and positioning of furniture and displays. This does NOT mean that all meeting rooms must be identical in size or décor.
Video quality	Yes	High quality images (video resolution, color rendition, motion handling, frame rate, etc.) is a requirement, but ultra-high resolution is not necessarily required.
Audio quality	Yes	High quality audio (clarity, fidelity, echo cancellation, lip sync, etc.) is a critical component, but one does not need the best sound system available in order to enjoy a solid experience.
Ease of use	Yes	Ease of use is absolutely critical, but this does not always require expensive onsite staff or a 24 / 7 concierge. A well-designed and implemented touch panel / GUI will often suffice.
Panoramic view of the remote room(s)	Yes	Providing a wide view of the remote room is an excellent way to enhance the user experience. Possible compromises include using two cameras / displays instead of three or more.
Room design / décor / comfort	Yes	Although the meeting room should be clean, comfortable, and nicely appointed, the use of custom furniture / expensive design elements are not required.
Eye contact	Yes	Perfect eye contact is ideal, but in WR's opinion not required. An "acceptable" degree of eye contact can be provided through careful positioning of the system cameras and displays.
Rich media capabilities	Yes	Many telepresence offerings include expensive rich media options (doc cams, DVD players, white boards, etc.). End users should only invest in the items they need and ensure that the system allows for the addition of other items later.
Network performance	Yes	System performance depends upon a strong network, but a network offering with excellent performance (perhaps 99.99% availability, low latency, and < 0.01% packet loss) is likely to meet typical enterprise requirements at a much lower price than a dedicated telepresence network.
Warranty / repair services	Yes	One must decide how vital it is for every system to be up and running at all times. Selecting a next-day repair option instead of same-day could yield significant cost savings.

Figure 7: Potential Areas of Compromise

A Sample “Telepresence on a Videoconferencing Budget” Offering

This section provides information about the “telepresence-like” solution available from the sponsor of this white paper, Sensory Technologies.



Figure 8: Sensory Technology's Telepresence-Like Solution

Sensory’s Telepresence Solution includes two cameras, two 65” LCD displays, and integrated table microphones. As shown above, this configuration allows the system to provide near-life sized images of four remote participants – either from a single location or divided between two locations. The primary user interface for the system is the custom-programmed AMX touch panel.

This solution leverages off-the-shelf, standards-based video codecs to provide HD720p video resolution and 30 frames per second. Additional features include H.460 firewall traversal (to allow inter-enterprise IP video calls), AES encryption, and an integrated DVD player.

This particular solution supports two operating modes:

- 1) Telepresence mode – both of the 65” LCD screens are used to display far-end participants (see above) and content (e.g. PPT) is displayed on the touch panel.
- 2) Videoconference mode – one of the 65” LCD screens displays the far-end participants (from a single site) and the other displays the content.

Sensory offers the above two-screen solution for \$72,000 including all necessary hardware (cameras, displays, codecs, microphones, table, chairs, etc.), system installation, and one year of support (break / fix, remote system monitoring and management) and unlimited telephone access to Sensory’s help desk.

Additional options include the installation of a 42” content monitor above the 65” LCD screens, hosted video bridging services, network services, and system / room design (lighting, furniture, acoustical treatments, window treatments, etc.).

This system is an excellent example of how to provide an exceptional user experience, including many of the same elements used in the leading telepresence offerings, at a non-telepresence price.

Conclusion

Few would argue that today's leading telepresence offerings provide an exceptional, "almost in-person" meeting experience. However, the high cost of these immersive solutions makes them difficult to justify for mass deployments. With a bit of thought, sound judgment, and a willingness to compromise, enterprises today can add telepresence-like functionality to their existing videoconferencing systems, or purchase a new telepresence-like videoconferencing solution without breaking the bank.

About Wainhouse Research

Wainhouse Research (www.wainhouse.com) is an independent market research firm that focuses on critical issues in rich media communications and conferencing. 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) content website.

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About Sensory Technologies

Sensory Technologies is a leading audio-visual, videoconference, telepresence, and collaboration solutions provider. Our customized solutions help to increase productivity and communication effectiveness for corporations, educational institutions, healthcare organizations and government agencies nationwide. We achieve this by providing our customers with a fully integrated solution consisting of system design and engineering, equipment procurement and project management, system installation and integration, on-site service and Help-Desk management and support services.

Sensory Technologies incorporates products from leading industry manufacturers including AMX, Polycom, Tandberg, Liberty Wire and Cable, and others to ensure the most intuitive, high quality experience possible. Sensory Technologies' projects are most visible in boardrooms, conference rooms, training centers, universities, control centers, museums, hospitals, stadiums, and many other specialized venues.

To learn more about Sensory Technologies, visit www.sensorytechnologies.com or email info@sensorytechnologies.com.