Telepresence vs. Videoconferencing

Resolving the Cost/Benefit Conundrum

Wainhouse Research

Telepresence vs. Videoconferencing

Resolving the Cost/Benefit Conundrum

Data from multiple users of telepresence and videoconferencing systems leads us to believe that the actual cost per hour for these two types of systems may not be all that different. This paper describes our findings and how we came to these conclusions.

January 28, 2008
Revision 9

Introduction

More than a decade after the first telepresence solution was introduced to the public, telepresence hit the limelight towards the end of calendar year 2006. With high technology giants gaining the attention of C-level customers, many conferencing and collaboration managers are beginning to look at this new class of enterprise communications system more closely and to examine their assumptions and perceptions around the concept of telepresence.

Differentiating Telepresence from Videoconferencing

Many in the end user community are very familiar with videoconferencing, a solution set that has been around for over twenty years. Videoconferencing provides two-way, interactive audio and video communications between two or more end points. In the past decade, videoconferencing technology and products have advanced along multiple fronts – including the move to IP networks that provide higher bandwidth, lower costs, and vastly improved connection reliability; the evolution from low resolution to high resolution images and now to high definition (720p and 1080i) video; and equally important - the advances from tinny, low bandwidth (3 kHz) AM-quality audio to 7, 14, and even 22 kHz wideband, stereo, spatial audio that is equivalent to CD quality, greatly improving speech intelligibility while vastly reducing "meeting fatigue."

Many people are confused by the concept of telepresence. For some, the mere mention of telepresence conjures up images of traveling to remote galaxies without leaving the comfort of one's living room sofa, or to remote business locations without leaving one's own conference room. This fantasy is exactly what the telepresence suppliers are starting to deliver.

The most common videoconferencing-centric question Wainhouse Research is asked today is: "what is the difference between telepresence and videoconferencing"? To answer this question and to help define different market segments, we offer the following definition of telepresence:

> Telepresence solutions use video and audio conferencing components as well as other "arts and sciences" to create a two-way immersive communications experience that simulates an in-person, interactive encounter.

In fact, many elements embedded in "traditional" videoconferencing systems (self-view, moving cameras, etc.) are intentionally left out of telepresence systems since they would break the "immersive" experience or shatter the "sitting across the same table" illusion.

Telepresence: Creating the "Same Room" Experience

To create the same-room illusion, telepresence solutions use a combination of technology elements and environmental design and are often accompanied by high levels of service and support. The telepresence "value-add" comes from a combination of four elements

➢ High-quality audio and video: If the experience is to emulate a meeting with participants directly in the room, then the audio must be clear, without noise, intelligible, echo-free, and of sufficient volume. Multi-channel audio (sometimes known as "spatial audio") can also provide directional cues as to who is speaking if multiple people are in the room, much as sounds from people sitting around a table come from different directions. Likewise, video images should be clear, life size, and noise-free, while providing sufficient resolution and detail. These constraints on the video require careful control of the screen size as well as the distances between screens, cameras, and chairs. The audio and video signals must also be synchronized and suffer from no noticeable delay, delay being one of the most visible deterrents to having a natural-feeling meeting

➢ Simplicity: One of the two major complaints with traditional videoconferencing is that video calls are too complex to set up and operate. Cisco, for example, has addressed this issue by making connections as simple as pressing a single button. Others require pressing no buttons at all (a managed services support person or scheduling system places the call on your behalf). In addition, telepresence solutions typically include no user-configurable settings (call speed, camera pan-tilt-zoom) or intimidating hand-held remotes to confuse customers.

➢ High reliability: A second major complaint with traditional videoconferencing is that connections are unreliable. Either the calls do not go through or the connections provide poor quality audio or video, despite the fact that the same connection made 24 hours (or even 5 minutes) earlier was perfectly fine. Telepresence suppliers have taken many steps to ensure that their systems deliver a consistent experience time after time. These include network assessments to ensure the network traffic is properly engineered to avoid congestion issues, extensive system monitoring and management services, high performance managed network services, and call launching / meeting management services.

➢ Environmental excellence: A successful telepresence experience requires more than just a successful video connection. The environment must create a reasonable illusion that the remote participants are in the same room. Hence, the telepresence deployment must control the furniture (particularly the conference room table), lighting, fixtures, and even the wall paint colors and material to make all sites involved in the call identical (or symmetrical). Some systems employ a table that is designed to "merge" into the display, giving the distinct impression that the remote table is actually connected to the local table, i.e…. the impression that the two tables are really one. Many telepresence systems strive to make the technology invisible to the user: microphones, speakers, cameras, etc. are hidden to the extent possible following the belief that these items are not present in an in-person meeting and should therefore not be present in a telepresence meeting. Of course, an important part of the meeting environment is created by careful attention to room lighting and acoustics. For example, reverberation caused by the room echo that occurs between the talker and the microphone can be minimized by room geometry, microphone placement, and wall coverings, etc.

All of these factors are important contributors to conference quality and the telepresence experience. But they come at a cost. Telepresence systems are expensive to buy. With high end compression engines, high quality cameras, large flat panel displays, and carefully designed and integrated furniture and room elements, telepresence systems

cost much more than standard "vanilla" videoconferencing solutions. Most telepresence systems currently fall in the range of $200-400K each, with $300K list price perhaps representing the average for a 6-seat room. In contrast, videoconferencing systems range from $10K to $65K, with perhaps $25K representing a good industry average.   In addition, because they strive for the highest quality images and use multiple displays, telepresence systems require more bandwidth. Many vendors today are recommending 10-15 Mbps connections for each telepresence room[1], while high end standard definition conference room videoconferencing systems typically operate at 384kbps – 1.5 Mbps; high definition videoconferencing systems typically operate at 2 Mbps. Finally, many users of telepresence suites find it advantageous to use a managed service to operate the systems. These services range from network and monitoring services to full "concierge" services that handle everything from call launching to ordering the coffee and doughnuts.

Comparing Videoconferencing and Telepresence Usage

In early 2007, Wainhouse Research asked a number of companies using videoconferencing solutions if they could provide detailed usage information on a per-system basis. Cisco Systems also gave us actual usage data for its own telepresence systems deployed internally to date. These data are presented below[2].

Videoconferencing Usage

The data presented in figure 1 below is from five pharmaceutical companies (P1 – P5). Our research shows that the pharmaceutical industry is one of the leaders in videoconferencing adoption and deployment, driven largely by the dispersed global teams used in drug discovery and by the great value derived from collaboration between multiple scientific disciplines and project/product managers.

|	PI	P2	P3	P4	P5	Composite Average
Mean hours per month	34.25	27.14	6.39	7.39	10.09	10.65
Median hours per month	33.25	6.17	3.60	3.38	1.00	2.00
Std Deviation (hours/month)	32.36	32.69	8.45	9.84	18.9	18.77
# of Systems	1-20	21-100	21-100	100-500	>500	924
# of Months of data	>10	3	1	>10	>10	

Figure 1: Summary statistics for five pharmaceuticals' use of room video systems

The data in the figure above shows that for the three largest deployments (P3, P4, and P5), the average usage per system is between 6.4 and 10.1 hours per month. In the last column, we have combined the data from all five pharmaceutical companies to create a collective view of the "industry." The composite data is obviously heavily influenced by P5 which had the largest number of systems. This company also had the highest

---

[1] This much bandwidth will be required only if attendees wear brightly colored clothing with wild patterns (like Hawaiian shirts). Normal bandwidth is typically between 5 and 8 Mbps.
[2] One may argue that presenting data from a telepresence manufacturer invalidates the videoconferencing-telepresence comparison. We simply point out that Cisco's management edict to reduce travel budgets by 20% is certainly repeatable and that other companies could emulate what Cisco is doing and are likely achieve similar results by deploying telepresence ubiquitously.

percentage of systems with extremely low usage. As can be seen in the table, for the "industry", the average usage is just over 10.6 hours per month per system.

Average Hours Per Month - P1-P5
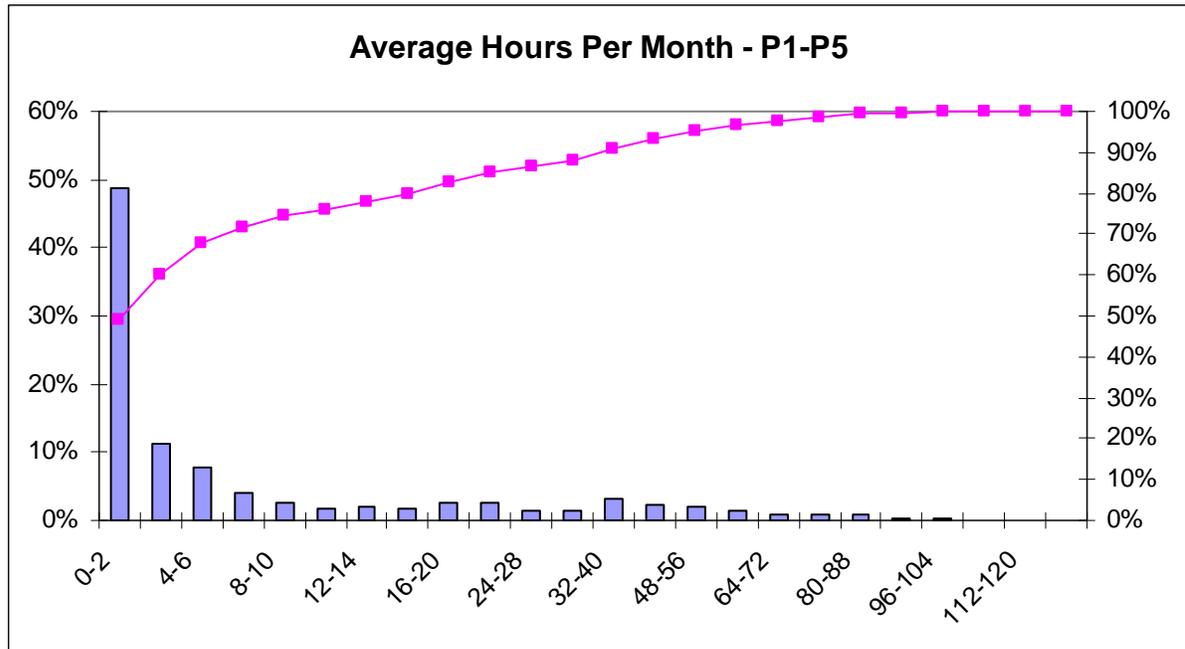
Figure 2: Videoconferencing system usage histogram for five pharmaceutical companies.

The summary statistics can mask usage patterns that become more evident when the data is viewed as a histogram. As shown in the graph, while the average is just over 10 hours per month (representing a utilization rate of under 5% given 10 hour days and 22 working days/year), nearly 50% of the systems deployed are used less than 2 hours per month.

Based on interviews with many end users and videoconferencing managers, we believe that there are significant factors that contribute to the low utilization rate of most videoconferencing systems and the large percentage of infrequently used systems, including:

➢ People who use videoconferencing infrequently find the systems hard to use, non-intuitive, and generally intimidating.
➢ Managers who have had meetings delayed or interrupted by connection difficulties, dropped calls, or poor audio quality are reluctant to use videoconferencing again.
➢ When more than three people are in a conference room on a video system, the images displayed on the far end are such that the faces are too small. Hence, the ability to check body language and sometimes even to perceive who is speaking is totally missing. The video sometimes detracts rather than adds to the meeting experience.
➢ Many video systems are installed in general purpose meeting rooms. When these rooms are being used for other meetings, the video systems are not available to others. Hence the actual available hours per month are less than the theoretical.
➢ The deployment of personal systems (also known as executive systems) such as the Polycom VSX 3000 and Tandberg 1000 can skew the data. While these can be classified as either personal or small conference rooms systems, they are relatively

expensive and are typically managed and monitored much like large conference room systems. However, they are often deployed in individual offices where they are not shared and usage can be expected to be low.

Telepresence System Usage

Interviews with companies using telepresence systems indicate that the usage pattern is quite different from that of videoconferencing. First of all, most telepresence customers have between two and ten systems deployed, and most customers have less than two years telepresence operating experience. Second, all of the telepresence systems deployed to date are capable of communicating only with like systems from the same vendor. Nevertheless, a clear pattern of usage has emerged – system usage increases over time and as the number of systems increases. Companies typically start with two to four telepresence rooms and then expand slowly, although some companies have ordered 10 – 20, and a few even more. In a company with two telepresence rooms, usage typically starts at a few hours per day and increases regularly until it stabilizes at a rate which is often location dependent. To some extent, usage also increases as the number of systems increase – a classic illustration of what is known as Metcalfe's law: the value of a network is proportional to the square of the number of endpoints; or the value of an endpoint is proportional to the square of the number of endpoints to which it can connect.

To illustrate the usage companies can expect when deploying telepresence systems, Wainhouse Research asked Cisco Systems to provide us with usage data from all of the telepresence systems the company has deployed worldwide. At the time this data was collected at the end of October, 2007, 102 six-person systems were deployed in 65 locations (an additional 49 two-person systems were deployed, but data was not collected from them).
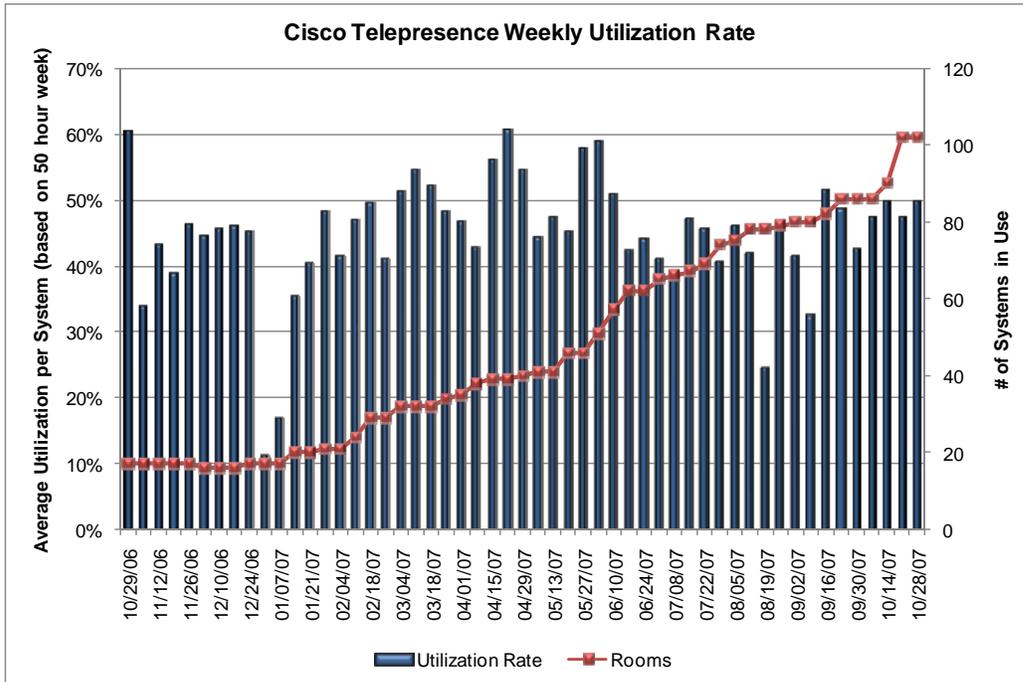

Figure 3: Cisco's weekly telepresence utilization rate.

The data in figure 3 shows the average utilization rate per week across all Cisco telepresence systems. The first usage bar, from October 2006, is an average over 17 systems that were deployed at that time; the last usage data point, from October 2007, is an average over 102 systems, some of which were deployed during that week. (The chart also includes the low utilization weeks of Christmas and New Years which could be factored out in a thorough analysis.) Drawing too many conclusions about telepresence system usage from an environment like Cisco's where deployment numbers are growing so rapidly may be dangerous. But it appears that a long term, steady-state usage of 40% -50% (20-25 hours) per week is a reasonable prediction.

Cisco is reporting that once room utilization rates reach approximately 50%, employees are having serious difficulty scheduling the rooms for times when all participants at all locations can be available. Hence, the company continues to build out additional rooms, and at the time this paper was released, Cisco reported 162 total telepresence suites in use (combines the total number of six- and the two-person suites).
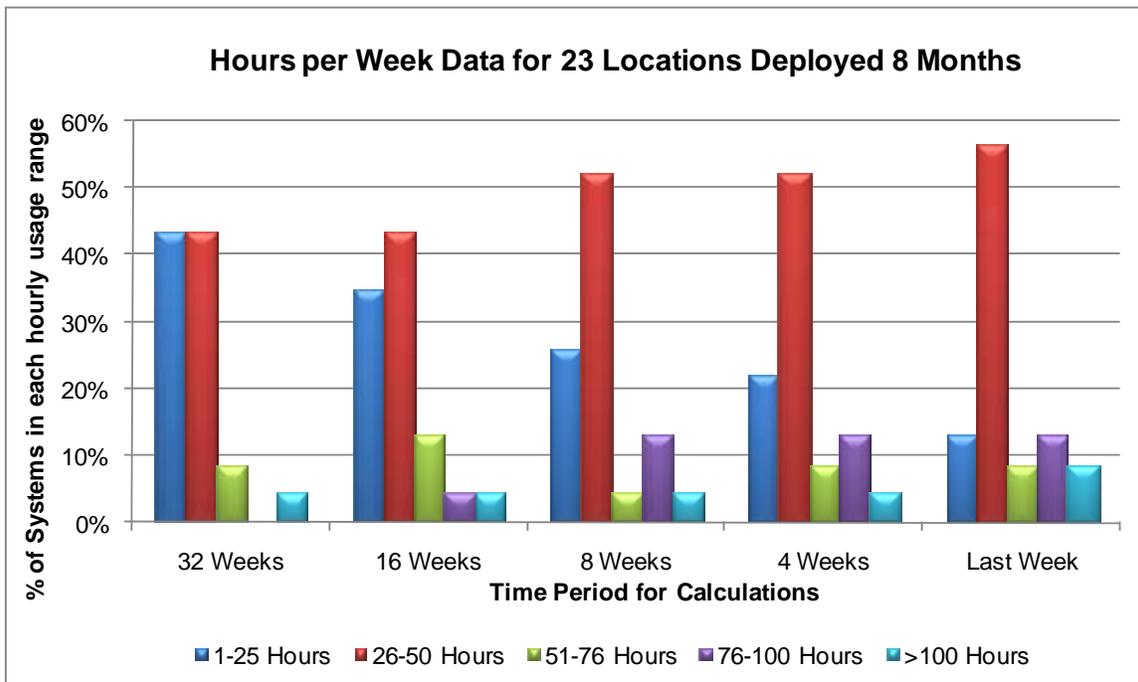
Figure 4: Hourly telepresence usage per week for 23 Cisco locations

Figure 4 is designed to show how average hourly usage per system changes with time. To create this figure, we selected 23 locations[3] for which we had 32 full weeks of operating data usage data (ending in October 2007). We calculated the average usage of each system over periods of 32 weeks, 16 weeks, 8 weeks, the last four weeks, and the last week for which we had data and created a histogram as shown in figure 4. What this chart shows is that as telepresence systems are deployed, their average weekly hourly usage rate rapidly stabilizes to between 26 and 50 hours per week. We note the following:

---

[3] We were given data on 102 telepresence systems; however, not all rooms have been deployed for an equivalent length of time. Cisco is rolling new systems on a weekly basis; hence, we took data for 23 systems for which we had at least 32 continuous weeks of operating data.

- The % of systems used less than 25 hours/week decreases. In the past week, 12% of the systems fell into this category, while the 32 week average was over 40%
- For these systems that have been deployed by Cisco for 32 weeks, approximately 9% were used greater than 100 hours per week over the most recent week, while only 4% hit this utilization rate on a long term basis. Similarly, the % of systems falling into the 76-100 hour band increases as well.
- The figure shows that many systems gravitate to the 26-50 hour usage band almost immediately and tend to remain there.

A Different Look at Economics

Telepresence systems are expensive to buy and expensive to operate. But are they more expensive to own than a videoconferencing system? Many justifications for electronic meeting systems, videoconferencing, and telepresence deployments have been written based on reduced travel expenses, shortened time-to-market, improved quality-of-life, and reduced executive down time. There is no doubt that these new communication tools have benefits, the question remains, how does videoconferencing compare to telepresence on an economic basis. A quick look at some typical figures leads to the following table.

	Room Videoconferencing System	Telepresence Suite
Initial acquisition cost	$40K	$300K
Monthly network services and maintenance fee	$1K	$8K
Total out of pocket costs over 36 month operation	$76K	$588K
Average Usage rate for system	10 hours/month (2.5 hours/week)	77.4 hours/month (19.4 hours/week)
Cost per hour of usage over 36 month cycle	$211	$211

Figure 5 Operating cost per hour of usage

Obviously, there are many variables in the above table of figures, but those used in the calculations are indeed typical of what many enterprises are currently experiencing. Keeping all figures constant and varying only the hours/month of usage leads an interesting cost comparison graph.
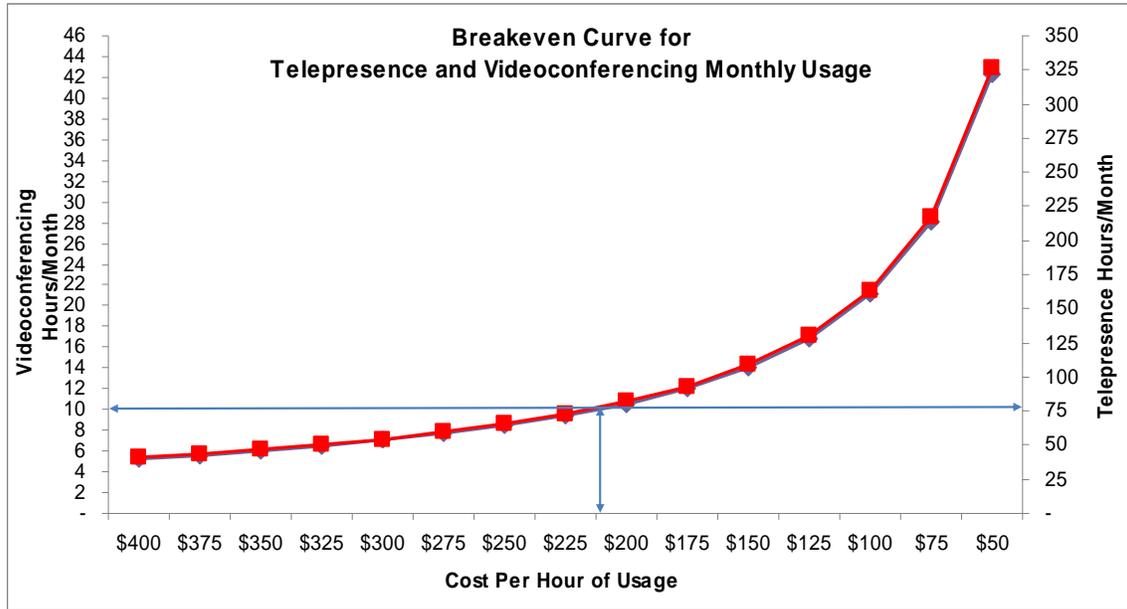
Figure 6. Breakeven curve for Telepresence vs. Videoconferencing Average Monthly Usage over a 36-month period.

The vast discrepancy in the usage patterns of the two systems in many cases can make the more expensive system actually less costly on an hourly basis. Figure 6 shows a graph of the monthly cost for both telepresence systems and videoconferencing systems per hour used during the month. The graph was calculated using the data in figure 5. As an example of using the graph, draw a line from 10 hours of video conferencing straight across to the telepresence axis, where it intersects at approximately 77 hours of telepresence. Then draw a line straight down from where your line crosses the red curve. It intersects cost axis at $211. Thus, a videoconferencing room used on average 10 hours per month (2.5 hours per week) will cost approximately the same as a telepresence room used on average 77 hours per month (~19 hours per week), and the approximate cost for either over the 36 month period will be $211/hour.

Cisco's Results: More Than Travel Savings

Cisco is well known for its focus on performance measurements, and measuring telepresence usage rates and financial benefits is no exception. As of late October 2007, Cisco had booked 31,381 telepresence meetings worldwide. Of these, 6,643 meetings were held in lieu of traveling, yielding an estimated travel savings among participants of $52.03 million.
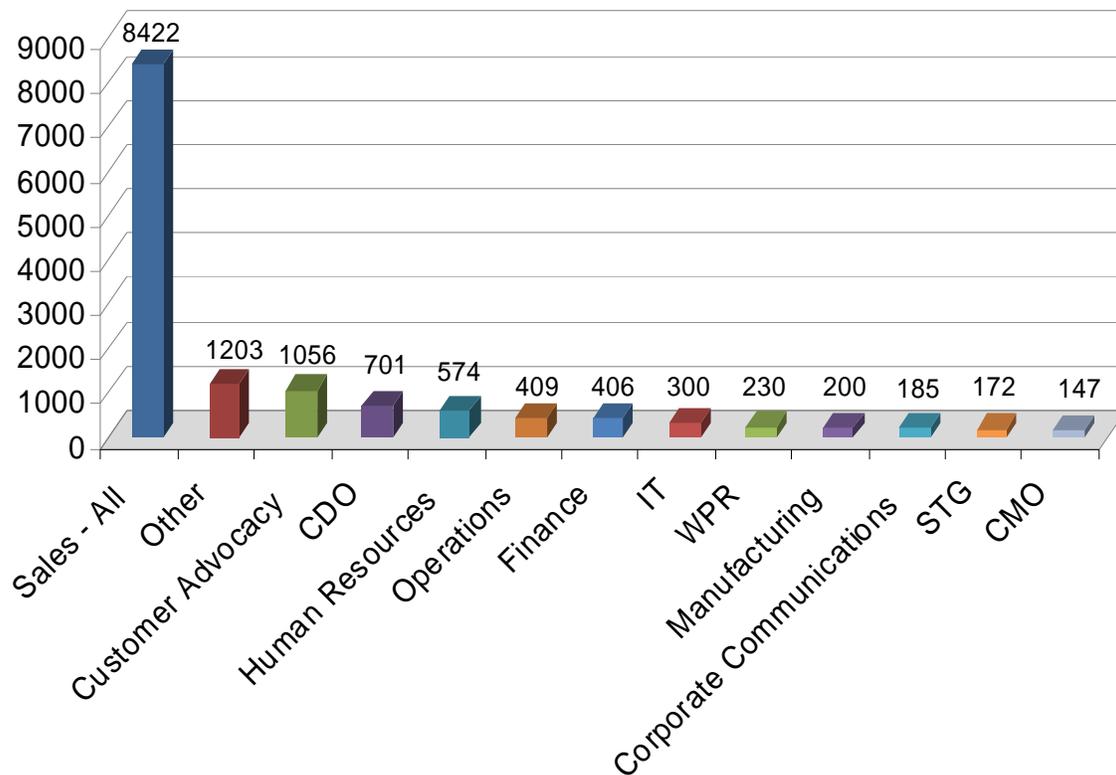
Figure 7: Cisco telepresence suite meetings by business function.

While the travel savings are significant, they pale in comparison to the other business benefits Cisco is realizing and documenting through its measurements. For each telepresence meeting held, the meeting organizer must specify the purpose for the meeting and the meeting's results. This has yielded the following benefits thus far:

➢ Sales success rates have increased by 2%. Net benefit: $127 million.
➢ Sales cycle time has increased by 2%. Net benefit: $68 million.
➢ Employees and executives are more productive. Their estimated net benefit: $42 million.
➢ Cost avoidance in services. Net benefit: $21 million.
➢ CO_2 emission decrease: 15,561 tons (equals 7,921,741 cubic meters or the equivalent of 3,364 cars off the road)

Cisco's first telepresence system came online in October 2006. Since October, the company has documented $240 million in net benefit. We estimate the costs of the 161 telepresence suites currently operating, including networking costs to date, at approximately $50 million. The net benefits are significant, and Cisco has the measurements to prove that they are real. Of course, the benefits other companies may achieve will vary, but if they emulate Cisco's determination to cut costs and improve business efficiency, they will likely be of the same magnitude.

Why Telepresence Works

Clearly, telepresence systems are delivering the remote meeting experience, including audio-video quality, ease-of-use, and realistic face-to-face environment that executives, product planners, and business managers want. Whether used in business negotiations, candidate job interviews, sales calls, or plain team meetings, telepresence systems are providing business professionals the ability to reduce travel while attending more meetings at the same time. The proof lies in the fact that companies who have deployed telepresence solutions find their systems are used more heavily than is the case for typical videoconferencing room systems. Although costly at first, telepresence systems have successfully addressed the limitations of typical videoconferencing designs.

Analysis & Conclusion

The success exhibited by today's deployments of telepresence solutions is a demonstration of the utility of these systems – the power to satisfy people's needs despite the high purchase price and monthly operating costs of the typical telepresence system. A careful consideration of the economics of telepresence and videoconferencing will take into account not only the costs of these solutions, but also the reality of their use. Many videoconferencing systems deployed today are not delivering the benefits that were anticipated for a variety of technical and human factor reasons – but the end result is that the systems are not delivering benefits because they are not being used. Hence, despite their relatively low costs, the return on investment for most videoconferencing systems is limited. Telepresence systems, on the other hand, typically experience higher demand and higher usage, and through this usage deliver the benefits anticipated when the purchase decision was made.

About Wainhouse Research

Wainhouse Research (www.wainhouse.com) is an independent market research firm that focuses on critical issues in unified communications, videoconferencing, rich media conferencing and collaboration, as well as 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 and presentations. Wainhouse Research also publishes a variety of market segment reports, product overviews, and a free newsletter, The Wainhouse Research Bulletin, and hosts the PLATINUM (www.wrplatinum.com) content website.

About the Authors

Andrew W. Davis, the Managing Partner at Wainhouse Research, has more than 15 years experience as a successful technology consultant and industry analyst. Prior to founding Wainhouse Research, Andrew held senior marketing positions with several large and small high-technology companies. He has published over 250 trade journal articles and opinion columns on multimedia communications, image and signal processing, videoconferencing, and corporate strategies. Andrew has authored numerous market research reports and is the principal editor of the conferencing industry's leading newsletter, *The Wainhouse Research Bulletin*. Andrew specializes in videoconferencing, rich media communications, strategy consulting, and new business development. A well-known industry guest speaker, Mr. Davis holds B.S. and M.S. degrees in engineering from Cornell University and a Masters of Business Administration from Harvard University.

E. Brent Kelly is a Senior Analyst & Partner at Wainhouse Research with over 17 years experience in developing and marketing highly technical products. Prior to joining Wainhouse Research, Brent held senior management, marketing, and technical positions in both large and small communications, manufacturing, semiconductor testing, and petroleum companies. He has authored reports and articles on migrating to IP communications, integrated conferencing environments, IP video network providers, and the conferencing reseller channel. He has developed a highly successful seminar on implementing IP-based Rich Media Conferencing. Brent specializes in unified communications, IP communications infrastructure, and strategic consulting. Brent holds a Ph.D. in engineering from Texas A&M and a B.S. in engineering from Brigham Young University.

About Cisco Systems

Cisco, (NASDAQ: CSCO), is the worldwide leader in networking that transforms how people connect, communicate and collaborate. Information about Cisco can be found at http://www.cisco.com.