Understanding High Definition Video Conferencing

By: S. Ann Earon, Ph.D.
President, Telemanagement Resources International Inc. (TRI)

In the past year there has been a lot of press about high definition video conferencing. While I applaud the vendors who have entered this space, (initially LifeSize and HP, followed by Tandberg and Polycom) I find users confused. They don't understand why they should bother with HD, they don't understand what HD is all about, and they are confused with HD, versus traditional videoconferencing. It has taken me months to start to figure all of this out and I especially thank Richard Line of VC Insight for his diligence in trying to explain all aspects of HD to me. I thought it was time to boil it down for the average user.

The original impetus for High definition television (HDTV) came from wide-screen movies. Film producers discovered that individuals seated in the first few rows of a wide-screen cinema enjoyed a level of participation in the action not possible with conventional (4 x 3 format) movies. Having the screen occupy a greater field of view (especially horizontally) significantly increases the sense of "being there". That is why the proponents of high definition TV decided early on that the aspect ratio should be 16 x 9. This means that with more definition for the eye to absorb, a person must sit closer to a 16 x 9 screen than a 4 x 3 screen; and if the picture is high definition TV or a monitor, closer still.

I have been working with a number of clients who are redoing board rooms and presentations rooms and the aspect ratio has become a big issue. The following chart is helpful to understand the distance issue.

Screen Size Diagonal	Optimum Viewing Distance for HDTV content 780 active lines	Optimum Viewing Distance for NTSC content 480 active lines
32" standard (4:3)	3.5 to 6 feet	8 to 13 feet
26" wide (16 x 9)	3 to 5 feet	5 to 8 feet
42" wide	5 to 8.5 feet	9 to 14 feet
60" wide	7 to 12 feet	12 to 20 feet

The lenses and chips used can also have a factor on this.

To compare high definition videoconferencing to traditional videoconferencing you need to understand the differences in resolution, display systems, bandwidth, audio quality, and camera designs.

Resolution
Standard video conferencing systems are limited to providing 352 x 288 lines of video resolution at 15 – 30 frames per second, due to computing limitations of the systems. Newer advances in processor technology enable new compression/decompression architectures that provide high definition video at a resolution of 1,280 x 720 lines of video resolution at 30 frames per second, which is 10 times better than the standard video quality achieved today.

Display Systems
A videoconferencing system needs a display. Initially, videoconferences were displayed on a TV set or a computer monitor. Today there are many more choices and often two displays are used for videoconferencing: one for data and one for video.

When standards for high definition television were initially discussed, the aim was to double the horizontal and vertical resolution and increase the viewing angle from 10 degrees to 30 degrees horizontally and 20 degrees vertically by going for a 16 x 9 wide screen, instead of a traditional 4 x 3 screen. The viewer experiences an increased sense of reality, and 3-dimensional depth in the picture, as soon as the viewing angle exceeds 20 degrees.

Bandwidth
Many of the standard videoconferencing systems used today operate at bandwidths ranging from 128 Kbps to 768 Kbps. These ranges have often been selected to minimize cost and because additional bandwidth was not always available. High definition videoconferencing systems use a minimum of 1 Mbps of bandwidth to operate effectively, with bandwidth at 2 Mbps or better recommended to achieve premium audio quality and allow the use of additional content sharing devices like PCs, DVDs, or high-resolution document cameras. In recent years, cost effective and plentiful bandwidth has become accessible to enterprises, educational institutions and the government.

Audio Quality
While often overlooked, high quality audio is critical to the success of any video conference for without good quality audio, the image appears to suffer; and with no audio at all we are left with silent pictures! To ensure the highest quality audio, attention must be given to microphone placement, echo cancellation, audio balancing, tone adjustment, and audio pre and post processing. Proper audio quality ensures that audio delivery is below the maximum tolerances detectable by the human ear in order to allow meeting participants to “talk over” each other, as they might during an in-person meeting. Careful attention to microphone placement and audio processing also allows simultaneous “side conversations”.

Camera Designs

In the past, high definition cameras have only been available for digital camcorders or the broadcast television market. Now that high definition is being used for videoconferencing, firms are starting to develop software and technology to make high resolution cameras for high definition videoconferencing. These cameras help ensure that optimal lighting in the room matches the individuals and the environment.

The use of high definition video offers an improved experience that allows users to feel more comfortable meeting at a distance. Remarkable audio and video quality, coupled with user friendly interfaces makes users feel they are truly at the distant site. The high definition experience causes users to come back for more as they realize how life-like communicating and participating from a distance can be.

S. Ann Earon has been a researcher and consultant in multimedia communications for 25 years. She holds a Masters in instructional technology and educational administration from Northeastern University, and a Ph.D. from Boston College in business, speech & communications, and education. Dr. Earon is the Chairperson Emeritus of the Interactive Multimedia & Collaborative Communications Alliance (IMCCA), the non-profit industry association for conferencing & collaborative communications. She can be reached at AnnEaron@aol.com.