Draft Discussion Paper on Audio Visual Equipment for use in Small to Medium Hybrid Meetings

How to reach your audience clearly and easily in the COVID age

Abstract
Remote learning and general communications are now not just an option but critical

Chris Charalambous
tpm@u3avictoria.com.au

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Table 1 - Changes

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Background

With peoples' movement curtailed by government mandated restrictions owing to the current COVID-19 pandemic there is an increasing use and dependency on video conferencing (VC) communications, and consequently there is a growing demand for sophisticated and simple to use VC systems; with excellent audio and visual characteristics. U3As have embraced the use of VC software systems such a Zoom, which U3A Network Victoria has promoted throughout the Victorian U3A movement. This has been a success with most U3As in Victoria now using Zoom to run classes and hold meetings.

Zoom, like its competitors in the marketplace such as Microsoft Teams, Cisco Webex, and BlueJeans, work reasonably well enabling interconnection and video conferencing over the Internet using the built in microphone and video camera of the connected PC or Laptop. Reasonable though this is, there are limitations. The limitations are with the quality of the audio and visual (AV) systems, particularly with several people within one room as the Laptop or PC video camera, speaker, and microphone are not adequate.

Note that Zoom will be discussed in this document, but other VC software systems may equally be applicable.

There are technical options available to improve the AV component. They are effectively systems with high quality microphones, video cameras, speakers, and interfaces to external devices such as display screens, and interfaces to advanced software functions of the VC systems such as Zoom.

This document discusses technical options that could meet the VC requirements of the U3As in Victoria and presumes that most usage will be in meetings of about twenty or less people in any one room a VC meeting. Therefore, this paper will not discuss high end AV systems that cater for greater than twenty people in a room.

General Requirements

It is assumed that there will be hybrid meetings, and in U3A's environment, based on the Zoom product. A hybrid meeting is defined as a video conferencing or web conferencing meeting where some of the participants are located together in one or more rooms, and some participants are located individually remotely.

For remote and individual participants, their video and audio experience are dependent on their own computer system and its components. For most modern laptops, PCs, tables, tablets, and even phones running Zoom, or equivalent, the quality is reasonable and can be enhanced if required with external devices, such as a high definition camera, and possibly headsets for the audio component.

The focus for this paper is for systems based in meeting rooms, and not specifically individual participants.

The room(s)

In a meeting room, where a hybrid meeting is being held, there are some participants in the room; and there may be a presenter in the room, but not necessarily; the presenter or speaker may be connected to the meeting remotely. There may be several presenters and or speakers either in the room or remote.
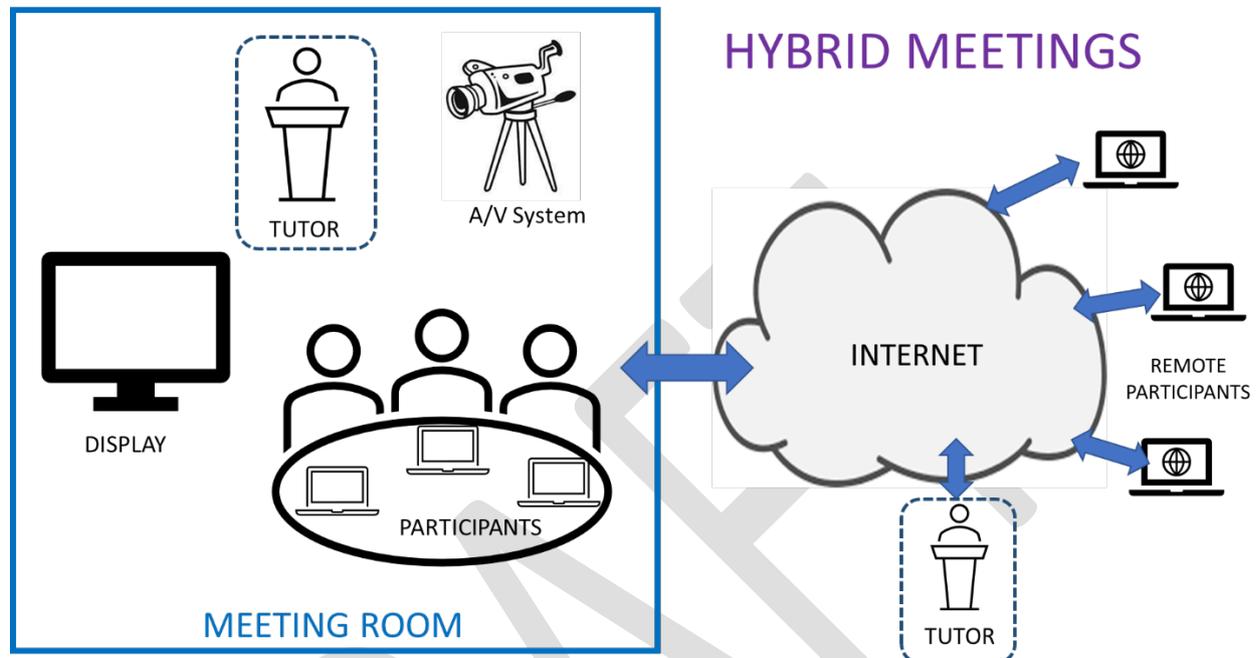

Figure 1 – Hybrid meeting

In Figure 1, a hybrid meeting room has participants possibly with their own laptop connected to the VC, there may be a presenter, there is an A/V system, and possibly a display, either a projector or a large screen TV connected to the A/V system.

It is also required that there is an internet connection to the A/V system to enable connectivity to Zoom.

Room requirements

The configuration and features of the room itself is important and will affect the quality of the meeting experience and these factors should be taken into consideration along with the technical aspects of the A/V system:

- Sufficient floor space
- A high enough ceiling
- Air conditioning and heating
- Windows and blinds
- Presentation facilities and network connectivity
- Open space, clear line of sight to presenter, screen, and so on
- Power sockets
- Light, clear walls

Size of room – with COVID-19 restrictions

It is generally recommended that there is normally about 2 to 2.5 m^2 per person in the meeting room. So, a meeting of four to five people requires about 8 to 12 m^2, and a 20-person meeting will require a 40 to 50m^2 room.

With COVID-19 accommodation restrictions, the factor is approximately one person per 4 m^2, so in the above examples, four to five people require 16 to 20m^2, and a 20-person meeting requires a 80m^2 room.

The size of the room affects the sound quality, for both the microphone pick-up, and the quality and volume from the loudspeakers.

More than one room?

It is possible and expected that there will be groups of participants in more than one room connected to the same meeting. Once again, the same requirements pertain to each room; and each room may require its own independent A/V system. The A/V system in each do not have to be identical, nor do they need to be of the same quality.

The computer system

The computer system used, such as a laptop, Mac, Android tablet, iPad, and so on, is integral to Zoom Video Conferencing for both the quality of the experience and for the control of the session. Some A/V systems connect directly to a laptop, with the laptop providing control and network connectivity, as well as connectivity to an external display. Other A/V systems can run independently, and some even can run Zoom.

In any case, it is advisable that the devices in the video conference, especially the presenter's system should be up to date, running the latest operating systems and software, for example Windows 10, MacOS 10.14, Android 9.0, Zoom 5.0. The computer should have ample memory and CPU. Zoom recommends a minimum of 1 GHz processor and minimum RAM of 4GB. The processing power and storage capacity of the computers running Zoom make a considerable difference to the audio and video quality, independently of the quality of the inbuilt camera, microphone, and speaker of the computer itself.

The network

The quality and bandwidth capacity of the network is critical to the video conferencing experience. This is applicable to the LAN (Local Area Network), the network within the meeting room; and also applicable to the WAN (Wide Area Network), the network connection to the Internet.

Zoom recommends for Internet bandwidth:

- For 1:1 video calling
    - Between 600kbps for High-Quality to 1.8Mbps for 1080HD video quality
- For group video calling:
    - Between 800kbps to 3.0 Mbps for High-Quality to 1080HD.

The greater the bandwidth available the better the A/V experience.

The audio-visual system

The A/V system may connect to a device, such as a laptop or PC, within the room. This makes that device the master Zoom control for the meeting room. The device may also be connected to a large shared external monitor or TV in the room.

Some A/V systems, especially higher-end products can support Zoom directly, and do not need to be connected to a laptop. The A/V system itself can connect to the Internet and to external monitors. Some A/V system may even include their own large display or displays.

Note that most A/V systems large or small come with a remote control to manage the features such as volume, brightness, mute, and some Zoom interface instructions.

Fixed, cart, or portable systems

For most U3As it is expected that a cost-effective portable system is sufficient. This allows for the system to be physically moved and set-up from location to location, from room to room when required.

A **portable** system is usually comprised of a camera, microphone(s), and speakers, sometimes in one complete physical unit that just needs power and connectivity to a device with Zoom; or may need the components such as microphone need to be set-up within the room.

The limitation with such a system is that it caters for small to medium sized meetings with two to 20 people in a room: excluding COVID-19 spacing. The benefits are its portability, and overall price.

There are **cart-based** systems available that have the A/V system on a wheeled cart, which provides some level of portability from room to room but are quite bulking to transport from location to location. Benefits are they are higher-end systems that can support meetings of greater than 20 people, with high-quality audio-visual systems, and usually have one and sometimes two screens affixed to the cart. They contain all the devices to need for the audio and visual components.

Fixed systems are rooms whereby they have the necessary microphones, speakers, cameras, and display screens installed as fixtures within the room. Many of these systems can support the connection of a device with Zoom to the internet to enable hybrid meetings without much effort to be run.

Many sites in council premises, and so on. already have meeting and presentation rooms are available, and they may be worth seeking out for rental, rather than the high cost of setting up a fixed A/V system.

Video

The video components are the camera and its capabilities, and the display and its viewing quality.

Camera

A modern video camera has a number of features and functions that need to be considered, such as its:

- Resolution
- Clarity of image captured and transmitted
- Ability to focus on the intended subject
- Ability to zoom in and out
- Ability to pan - move the view left or right, up or down
- Auto-tracking - the ability to automatically stay focused on a moving target such as a presenter
- Ability to switch focus between current talkers

The camera can either be connected to a device running Zoom directly, or is integrated with the A/V system, and the A/V system is connected to the device. For some smaller meeting rooms, a simple high-end web camera, webcam, with built in microphone may be sufficient, connected to a device, and possibly with additional external speakers.

Display

Providing a large display provides better viewing experience for the attendees within the room. The size of the TV, monitor, or projector display will depend on the size of the room, and the viewing experienced required. For example, a 32 inch screen is best viewed from about 1.5 metres, a 50 inch screen, about 2 metres; and 71 inch screen can be comfortably viewed from 3 metres.

The quality of the display is dependent on the resolution, but most new devices such as large screen TVs provide adequate high definition resolution (HD) viewing for a small to medium sized room.

Connection to the display is usually with an HDMI cable from the device or A/V system, or by a wireless device such a Chromecast or Apple TV. Some newer smart TVs have Wi-Fi and / or ethernet network capabilities built in.

With the use of Zoom, it is also possible for individuals within the meeting room to have the hybrid meeting displayed on their own devices.

Audio

This comprises the recording and the playback of the sound. Many of the newer A/V systems have sophisticated features on both the microphones and speakers.

Microphone

Depending on the size of the room, who will be talking, and where people will be sitting; there may be a requirement for more than one microphone. Most A/V systems have advanced microphones with features such as high gain, echo cancellation, noise reduction and directional pick-up. Advanced systems support acoustic fencing by blocking out sounds from without a particular area, which requires two or more microphones.

The quality of the A/V system microphones, especially in larger rooms easily surpasses the capabilities of most laptop microphones.

If there will be multiple people talking in a large room, then locating microphones at the further reaches of the room may be appropriate. Many of the A/V system can support additional microphones, though usually with additional costs for the additional microphones.

For a small to medium room, with the presenter being the main talker, then additional microphones will not usually be required.

Speakers

Most modern speaker systems are quite sophisticated and physically small devices can provide reasonable sound quality in a small to medium room. For larger rooms it is possible to include additional speakers, though this is not usual.

Support and operations

There may be a requirement to provide installation, training, and ongoing support services for these devices. Therefore, if large number of devices are procured it may be possible and cost effective to investigate professional services that could be associated with the devices, such as on-going support.

Chris Charalambous
Technology Project Manager
U3A Network Victoria
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APPENDIX

List of devices

The following is a small list of portable Audio-Visual devices that can integrate with Zoom to enable Hybrid meetings. Note that this is not an exhaustive list and is not an endorsement for any particular product at this stage.

Polycom

Polycom have been in the marketplace for a number of years specialising in audio-visual and video conferencing systems. They produce a range of high-quality systems; the list below is on the lower end of their price range.

https://www.poly.com/au/en/products/video-conferencing/studio

Poly Studio Soundbar	$1,366
Poly Studio X30	$2,275
Poly Studio X50	$3,425

Logitech

Logitech have also been in the marketplace for many years and have generally focused on the consumer end of the market, with well know webcams and speaker systems.

https://store.logicaltech.com.au/products/logitech-bcc950-conferencecam-1002424
$350

https://store.logicaltech.com.au/products/logitech-conferencecam-connect-3840240
$572

https://store.logicaltech.com.au/products/logitech-meetup-4k-conferencecam-3091165
$1,440

Meeting Owl

https://www.owllabs.com/meeting-owl
$1,800

AVer

https://www.averusa.com/products/conference-camera/vc520pro
$2,530

Zoom approved hardware

Note that this is an interactive page and you enter whether you want audio, video, small room, and so on.

https://zoom.us/hardware

What should be a reasonable budget?

Presuming that we are targeting a small to medium room with 10 to 20 participants with a portable A/V system connected to a decently powered laptop, which is connected to a screen in the room and also connected to any number of remote Zoom participants over the Internet.

A budget of $2,000 to $2,500 would be reasonable for a cost-effective system that includes the purchase of the A/V kit and a 50 inch TV.

Reasonable A/V systems are around $1,500 – for example, the PolyStudio Soundbar is within this price range.

At U3A Network Victoria we have the Logitech ConferenceCam Connect Video Conferencing Camera $572 listed above which operates quite reasonably in small venues, but higher priced systems do provide better sound and visual quality.