## SECTION 18: AUDIO VISUAL DESIGN STANDARDS 2020

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18.1. EXECUTIVE SUMMARY

18.1.1. INTRODUCTION

This section provides details of minimum requirements for the design, installation and operation of audio-visual services. These design standards supersede 'The University of Melbourne Audio-Visual Design Standards (2019) and shall be read in conjunction with other sections of 'The University of Melbourne Design Standards'.

Both project management and design standards apply to all learning spaces, professional spaces and digital signage. The critical role of learning spaces for the University and the specialised nature of learning space design means that particularly rigorous standards of design and construction are required which are reflected in the standards.

The Designer is expected to produce their own specification incorporating the elements of the following information and submit all designs to the University for review prior to any works commencing on site. This design standard sets out the University’s minimum requirements and shall be considered an adjunct to all relevant statutory regulations.

18.1.2. OBJECTIVES

Teaching spaces throughout the University are places of social and personal interaction, where learning takes place and where creative thinking is encouraged. The primary objective of this design standard is to provide a consistent arrangement of all audio-visual systems on campus such that operation, maintenance and management are simplified.

Professional meeting spaces are spread across the campus and must be designed to provide a consistent experience for all users and allow for collaboration between University colleagues and external parties.

This document aims to prescribe a list of recommendations and considerations that should be included in designing audio visual systems for teaching, learning and professional spaces. It is recommended that all spaces are specifically designed to meet the user group’s requirements and be coordinated by Collaboration Endpoints.
18.1.3. COLLABORATION ENDPOINTS

Collaboration Endpoints is the team responsible for maintaining the University's teaching, learning and professional space standards. Collaboration Endpoints sits within the Digital Workplace Team in Client Services. Collaboration Endpoints are responsible for approving designs for and acceptance of new audio-visual installations in these spaces prior to handover to ensure that works are completed satisfactorily and meet the standards herein.

Where an AV Consultant is involved in a project, they are required to work in conjunction with a representative of Collaboration Endpoints. This can involve attending meetings with the end users when issues relevant to audio visual equipment are discussed and coordination with the Collaboration Endpoints representative prior to completion of the design.

Any variation from the selection of audio-visual equipment currently being used must be authorised by the Collaboration Endpoints representative in writing.

Collaboration Endpoints contact details are as follows:

The University of Melbourne – Collaboration Endpoints
Level 1, 11 Barry St Carlton, VIC
Email: dwt-collaborationendpoints@lists.unimelb.edu.au
18.2. PROJECT IMPLEMENTATION

18.2.1. PROJECT RESPONSIBILITIES

Each project team shall include a representative of the User Group to provide user input. However, the project team shall take account of the fact that some of the University's learning spaces are common learning spaces and may be used by other departments. It is the responsibility of the AV Consultant to ensure adherence to the standards herein, and to liaise with the User Group, Collaboration Endpoints staff and the University appointed Project Manager/ Project Services representative.

18.2.2. PROJECT STAKEHOLDERS

The following stakeholders will generally be involved in University projects:

**Architect**
External consultant engaged to design the overall teaching space and coordinate all services. On occasion acts as superintendent.

**AV Consultant**
External consultant engaged to design and coordinate the installation of the audio-visual system. The AV Consultant shall liaise with all other stakeholders listed below. On projects where no external AV Consultant is present, the role of designer will be undertaken by a Collaboration Endpoints Engineer.

**AV Contractor**
External contractor engaged to perform audio visual works

**Collaboration Endpoints**
University representatives who are responsible for the maintenance of audio-visual standards within the University.

**Project Services**
Typically assigned as Project Managers for projects.

**Services Consultant**
External consultant engaged to design and coordinate installation/modification of engineering services for teaching and professional spaces.

**Field Services**
Responsible for maintenance and management of audio-visual systems once installed.

**User Group**
University representative selected to outline specific requirements for the teaching space.
18.2.3. PROJECT PROCESS

AV Projects follow a similar format to standard construction project management processes and include the following phases:

**Design**
Workshops are conducted, and AV system requirements are established, including specific functional and technical requirements. Preliminary design options are produced by AV Consultant with preliminary cost estimates for AV services. Options are developed and presented with Collaboration Endpoints and stakeholders for consideration.

**Contract Documentation**
Preferred design option is developed further. System design schematics, AV drawings and technical specification are produced for tender by a UoM preferred AV Consultant. All AV services are coordinated with architectural and engineering services. A detailed, pre-tender cost estimate is produced.

**Tender**
AV documentation is issued for tender to a Collaboration Endpoints endorsed list of specialist AV Contractors. Tender submissions are evaluated for their technical and commercial merit and tender recommendation is provided by AV Consultant. Project Manager engages AV Contractor for the project. A pre-award meeting should be held to discuss items related to the AV installation – see the AV Project Pre-award Agenda Sample (appendix I) for typical agenda items.

**Construction**
AV Contractor installs, programs and commissions AV systems as specified. AV Contractor coordinates works with the Head Contractor and other trades as necessary. Any issues, questions or clarifications are issued to Project Manager as an RFI. AV Consultant responds to RFIs formally as a Consultant’s Advice Notice (CAN).

**Handover**
Handover occurs once systems have been installed and tested. Complete written test results are submitted to AV Consultant and Collaboration Endpoints. AV Consultant conducts an independent inspection of AV systems in conjunction with Collaboration Endpoints to verify AV test results. All defects identified are issued to AV Contractor as a CAN to rectify. Practical completion is awarded by Project Manager once all items noted in Section 18.2.9 have been addressed.
18.2.5. RESPONSIBILITY MATRIX

The following table outlines the project team’s typical responsibilities.

- R - Member of the project team who is responsible for documentation of the task
- C - Requires coordination with this member of the project team
- I - Must inform this member of the project team
- N - Not involved with the nominated task

<table>
<thead>
<tr>
<th>Task</th>
<th>Architect</th>
<th>AV Consultant</th>
<th>Collaboration Endpoints</th>
<th>Project Services PM</th>
<th>Services Consultant</th>
<th>User Group</th>
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</thead>
<tbody>
<tr>
<td>Attend project workshops/meetings</td>
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<td>R</td>
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<tr>
<td>Learning &amp; Professional spaces design</td>
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<td>Furniture and joinery</td>
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<td>C</td>
<td>C</td>
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<tr>
<td>AV system design</td>
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<td>R</td>
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<td>I</td>
<td>I</td>
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<tr>
<td>Electrical/Data Services</td>
<td>C</td>
<td>C</td>
<td>I</td>
<td>C</td>
<td>R</td>
<td>I</td>
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<tr>
<td>Mechanical / Fire Services</td>
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<td>C</td>
<td>I</td>
<td>C</td>
<td>R</td>
<td>I</td>
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<tr>
<td>Network access, switches and Wireless Access Points</td>
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<td>I</td>
<td>I</td>
<td>R</td>
<td>C</td>
<td>I</td>
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<td>Computers, monitors, keyboards etc</td>
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<td>C</td>
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<td>Telephones</td>
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<td>Lecture Capture</td>
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<td>I</td>
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<td>Web Conferencing (Zoom / Teams Room)</td>
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<td>C</td>
<td>C</td>
<td>R</td>
<td>I</td>
<td>I</td>
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<td>IP addresses (general)</td>
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<td>C</td>
<td>R</td>
<td>C</td>
<td>I</td>
<td>I</td>
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<tr>
<td>AV Remote Management</td>
<td>I</td>
<td>C</td>
<td>R</td>
<td>I</td>
<td>I</td>
<td>I</td>
</tr>
<tr>
<td>AV User Interface</td>
<td>I</td>
<td>C</td>
<td>R</td>
<td>C</td>
<td>I</td>
<td>C</td>
</tr>
<tr>
<td>Lighting pre-sets and configurations</td>
<td>I</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>R</td>
<td>C</td>
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<tr>
<td>MATV Services</td>
<td>I</td>
<td>C</td>
<td>C</td>
<td>R</td>
<td>C</td>
<td>I</td>
</tr>
<tr>
<td>Locks for AV equipment</td>
<td>I</td>
<td>C</td>
<td>C</td>
<td>R</td>
<td>I</td>
<td>I</td>
</tr>
<tr>
<td>Room Booking</td>
<td>I</td>
<td>C</td>
<td>C</td>
<td>R</td>
<td>I</td>
<td>I</td>
</tr>
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</table>
18.2.6. AV CONSULTANT

The audio-visual consultant will be engaged by Project Services and/or Collaboration Endpoints. In the case of minor works Collaboration Endpoints may perform the role of AV Consultant. The AV Consultant must be selected from the University’s approved AV Consultant panel.

The AV Consultant will be responsible for the design and the coordination of the delivery of all AV services. The Consultant must be strictly versed on the University design standards and must ensure that all systems strictly comply with University standards and best practice.

As a minimum AV Consultant must have the following qualifications:

<table>
<thead>
<tr>
<th>Qualification</th>
<th>Mandatory</th>
<th>Preferable</th>
</tr>
</thead>
<tbody>
<tr>
<td>AVIXA/Infocomm Certified Technology Specialist (CTS)</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>AVIXA/Infocomm Certified Technology Specialist – Design (CTS-D)</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Extron XTP Systems Engineer Certification</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Minimum 4 years Industry Experience</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Biamp Tesira Certification</td>
<td>✓</td>
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</tbody>
</table>

As a minimum, the AV Consultant must be responsible for the following works:

• Attend design workshops and document AV services requirements as nominated by Stakeholders. All functional requirements must be captured formally as part of meeting minutes and/or Return Brief for formal acceptance from user group and Collaboration Endpoints.

• Produce AV systems design to be issued for approval by Collaboration Endpoints. System design shall include:
  o Video system schematic
  o Audio system schematic
  o Control system schematic
  o Cable schedules
  o AV equipment rack layout.

• Produce AV drawings for coordination with Architect and Services Engineer. Drawings shall include:
  o Floor plan indicating locations of AV equipment
  o Elevations
  o Reflected ceiling plans.

• Produce technical specification for tender. Technical specifications shall include:
  o AV scope of works
  o Functional and technical description of each system
  o Technical specifications
  o Installation requirements
Details of coordination with other trades
- Specific access requirements and working conditions
- Details of defects liability and warranty
- Returnable Schedule, Bill of Materials to allow for consistent tender responses
- Contact equipment suppliers to forecast and secure stock for the project.

- Project coordination during installation including:
  - Review shop drawings produced by AV Contractor
  - Respond to RFIs issued by AV Contractor
  - Provide design advice as requested by Project Manager
  - Coordinate integration with other services
  - Coordinate commissioning and testing of AV systems.
- Conduct independent inspection of AV systems to ensure it meets Stakeholder requirements
- Review training material and coordinate training
- Review as-built documentation and operational manuals.

The AV Consultant must consult with Collaboration Endpoints regarding all of the above items throughout the project.

18.2.7. AV CONTRACTOR

The audio-visual Contractor must be enlisted with Project Services and Collaboration Endpoints. The Contractor must be on the University approved AV Contractor panel as a specialist AV Contractor, in order to be appointed to undertake any AV works at the University of Melbourne. Organisations that are not on the University AV Contractor panel are not permitted to undertake any AV works for the University.

AV Contractors carrying out works must have appropriate experience and qualifications required of their trade. As a minimum AV Contractors must have the following certifications:

<table>
<thead>
<tr>
<th>Qualification</th>
<th>Mandatory</th>
<th>Preferable</th>
</tr>
</thead>
<tbody>
<tr>
<td>AVIXA / Infocomm Certified Technology Specialist (CTS)</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>AVIXA / Infocomm Certified Technology Specialist: Design (CTS-D)</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>AVIXA / Infocomm Certified Technology Specialist: Installation (CTS-I)</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Extron XTP Systems Engineer and Technician Certification</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Extron Control Specialist Certification (ECS)</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Extron Control Professional Certification (ECP)</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Biamp, Tesira Certification</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Crestron Technician, Engineer, Programmer</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>
The AV Contractor must appoint an installation manager who will act as a single point of contact throughout the delivery of the project, who has enough experience to be able to ascertain if the works carried out are fit for purpose. The installation manager must be nominated during a tender submission.

AV Contractors must undergo induction of the University site procedures prior to commencing work. AV Contractors must adhere to and observe all safety, security and administrative rules and regulations by the University as well as local, state and federal regulations.

18.2.8. VARIATION FROM THE DESIGN GUIDELINES AND CUSTOM DESIGNS

Variation and changes to the AV Design Guidelines may be considered for a project for a number of reasons, including unique user requirements, building environment, change in equipment supply etc.

All requests for changes to the requirements of the Design Standards must be made on the Modification Request Form. This form is available on the UoM Design Standards web page. No design work is to proceed on the basis of the proposed modification until the modification request has been approved in writing.

18.2.9. HANDOVER & DEFECT MANAGEMENT

Practical completion will be granted when the following minimum requirements have been fulfilled by the AV Contractor:

- Completed Project Asset and IP schedule has been submitted to Collaboration Endpoints, with all serial numbers included
- System has been tested and commissioned
- System has been inspected by Collaboration Endpoints and the AV Consultant and has been deemed to be operational and practically complete
- All documentation has been approved by the AV Consultant and submitted to Collaboration Endpoints
- All control system source codes, DSP and switcher and other device configuration files have been handed over to Collaboration Endpoints and become the intellectual property of the University
- Interface testing to the Extron GVE system has been successfully completed with correct GVE IDs used
- All training has been completed
- All accessories, software, fly-leads and remote controls have been handed over to Collaboration Endpoints. All packages of information handed over to Collaboration Endpoints shall be scheduled in a transmittal, copied to the Project Services project manager and AV Consultant
- Any decommissioned equipment needs to be documented via the Asset and IP schedule and sent to Collaboration Endpoints Team for instruction. Items will need to be delivered to either Field Services or the e-waste office.
- Notice of Practical Completion issued by AV Consultant or Collaboration Endpoints.

The issuance of a Notice of Practical Completion by the AV Consultant is contingent upon the rectification of any installation defects by the AV Contractor.
Defects should be tracked via an online spreadsheet. Installation defects are classified as follows:

<table>
<thead>
<tr>
<th>Severity</th>
<th>Characteristics</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Critical</td>
<td>Space is unable to be used, no workaround exists</td>
<td>Network not active for computers, Displays not working, User interface not working, OHS related issues</td>
</tr>
<tr>
<td>Major</td>
<td>Functionality is limited or contains significant performance issues. A workaround can be temporarily implemented to allow use of space.</td>
<td>Some sources not working, Lighting pre-sets not finalized, No source audio present, Some components not supplied, Performance issue may include poor audio quality, distorted video signal</td>
</tr>
<tr>
<td>Minor</td>
<td>Space is usable though some known errors are present, and some functionality may be limited. Some aspects of space may not conform to specification and applicable standards.</td>
<td>Fly-lead missing / adapters not supplied, Equipment not secured, such as touch panel, Hook for fly leads not present, EDID not set correctly, Display not aligned, AV equipment is not on network for monitoring and remote support</td>
</tr>
<tr>
<td>Trivial</td>
<td>Issues that do not impact on useability of space</td>
<td>Grammatical errors on user interface, Errors in document submissions such as user guides and as-built drawings</td>
</tr>
</tbody>
</table>

The priority of these installation defects is further categorised as follows:

<table>
<thead>
<tr>
<th>Priority</th>
<th>Characteristics</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Immediate</td>
<td>Defect to be resolved asap to be able to proceed with delivery of space</td>
<td>OHS Issues, Critical Defects</td>
</tr>
<tr>
<td>Urgent</td>
<td>Defects to be resolved prior to high, normal and low defects</td>
<td>Major Defects</td>
</tr>
<tr>
<td>High</td>
<td>Should be fixed as soon as possible</td>
<td>Major and Minor Defects</td>
</tr>
<tr>
<td>Normal</td>
<td>To be resolved once higher priority defects have been attended to</td>
<td>Minor Defects</td>
</tr>
<tr>
<td>Low</td>
<td>Fixing may be deferred until a later period</td>
<td>Trivial Defects</td>
</tr>
</tbody>
</table>
18.2.10. DOCUMENTATION AND SUBMISSIONS

As a minimum the following documentation shall be submitted to Collaboration Endpoints:

- Operational manual with clear and concise description on how to technically operate, service and maintain the AV system. To be submitted as both a PDF and Word document.
- Quick reference guide (QRG). A summary for end-users, briefly describing the basic operation of the AV system for each room using a UoM template provided upon request. To be submitted as both a PDF and editable Word document.
- Details of equipment manufacturers and distributors, and warranty information.
- As-built drawings including the following:
  - Audio schematic
  - Video schematic
  - Control system schematic
  - Floor plans, elevations and sections of teaching space indicating equipment locations, mounting heights and installation detail, including hearing loop layout if present.
  - Cabling schedule
  - Serial numbers and MAC addresses of all equipment provided via Project Asset and IP schedule once approved by Collaboration Endpoints
  - Commissioning test results (See Appendix C for template).

Contractors must provide an electronic copy of all documentation in PDF format within two weeks (10 business days) of practical completion of the project, via email or shared via cloud-based platform. Each PDF should only contain the documentation of a single room / AV system. A copy of each as-built drawing must be left in a plastic sleeve in the lectern or AV Rack of each space.

18.2.11. TRAINING

Contractors shall allow for a minimum of two training sessions for each AV system. An operator training course and a technical training course shall be provided.

The operator training course shall include but not be limited to training of the following systems:

- Basic operator principles of the system
- Operating principles of video, audio and control system equipment and functions
- Practical training in the operation of each function of the control system
- Equipment locations and operation
- How to seek assistance and report faults

The technical training course shall include, but not be limited to, training of the following systems:

- Overall principles of operation of the AV System with specific emphasis on the installed system
- Basic operator principles of the system
• Operating principles of video, audio and control system equipment
• Practical training in the operation of each function of the control system
• Equipment locations and operation
• Maintenance and fault-finding procedures
• How to seek report faults, including warranty and support procedures
• Fault simulation for practical training in fault finding procedures.

Training is to be formally structured. Training shall be provided prior to the issue of final certificate of the works.

Additional training courses may be requested by Collaboration Endpoints or the User Group.

18.2.12. AV LIFECYCLE REPLACEMENT

Audio Visual systems at the University of Melbourne run on a 7-year lifecycle replacement, at which time all components of an AV system should be replaced to ensure that they continue to provide a positive experience for end users and can be maintained and supported by the University support teams.
18.3. ROOM DESCRIPTIONS

The following sections describe the various types of spaces with audio-visual systems at the University of Melbourne, their minimum audio-visual functional requirements and recommended equipment.

Each type of space with an audio-visual system as outlined below, has differing design considerations according to their intended use. The design of each space shall be coordinated closely with architectural, faculty and services requirements.

18.3.1. COLLABORATIVE LEARNING SPACES

18.3.1.1. DESCRIPTION

Collaborative learning spaces are flat-floored or tiered teaching & learning spaces designed to facilitate collaborative learning in small teams with flexible furniture configuration & student access to shared desktop computer or BYOD connectivity.

There are typically two types of Collaborative Learning Spaces.

• Collaborative Learning Space Type 1 (CLS1)
  o Presenter can push content to flat panel displays located at student areas.
  o Students can work in group mode, by connecting their own device or local PC to a flat panel display located in their area.
  o AV and content distribution is controlled by the presenter using ‘Presenter Mode’ when presenting to the class, or ‘Group Mode’ to allow students to connect a device to the flat panel display located in their area.
  o Presenter Mode content is distributed to student areas via a Distribution Amplifier.
  o Each student area will have an AV Control Keypad, that will allow the student display to be used independently when the room AV system is in group mode or switched off. When the room AV system is activated, the local keypad control will be disabled.
  o Volume is controlled at student area displays via user’s own device.

• Collaborative Learning Space Type 2 (CLS2)
  o Presenter can push content to flat panel displays located in student areas.
  o Students can work in group mode, by connecting their own device or local PC to a flat panel display located in their area.
  o Students can present to the class by distributing content from their area to all other displays/ areas in the space.
  o AV and content distribution is controlled by the presenter using ‘Presenter Mode’ when presenting to the class, or ‘Group Mode’ to allow students to connect a device in their area. Routing of content from student areas is controlled by the presenter via the AV touch panel.
  o Each student area will have an AV Control Keypad, that will allow the student display to be used independently when the room AV system is in group mode or switched off. When the room AV system is activated, the local keypad control will be disabled.
  o Content is distributed to and from student pods via a matrix switcher.
As a minimum, collaborative learning spaces types 1 & 2 shall be provided with the following audio-visual system functionality:

- Distributed audio system for source and mic audio.
- The control system processor and touch panel, as a minimum, shall interface with the following equipment:
  - Video matrix switch
  - Digital Audio processor
  - Video Displays
  - Microphones
  - Motion sensor/s
  - Equipment rack power controller
  - Room lighting dimmers
  - Extron GVE network (via the LAN).

All audio-visual switching and processing equipment shall be housed in a dedicated audio-visual equipment rack located within the lectern, or a separate cupboard/joinery if required, locked with a University standard ‘TEC lock’.

18.3.1.2. AV EQUIPMENT

Equipment manufacturer and technology must be consistent with University standards and quality to ensure that it can be readily supported by University staff.

- Teaching Point
  - University standard lectern
  - AV Touch panel
  - University supplied computer
  - Laptop input connection plate(s) - HDMI
  - Wireless AV presentation device
  - Document camera(s)
  - Provision to integrate lecture capture system
  - 1 x Wireless lapel microphone system
  - 1 x Wireless handheld microphone system
  - Microphone charging dock.

- Student Area
  - University supplied computer if required
  - Laptop input connection plate
  - Flat panel display
  - Push Button Keypad Controls.

- General Space
  - Central display; projector or large flat panel display
  - Hearing Augmentation System
  - PTZ HDMI Camera if required
• Room Booking Panel.
  • AV Equipment Rack (in lectern by default)
    o Video matrix switch
    o Video Distribution Amplifier (CLS1 only)
    o Digital audio processor
    o Audio amplifiers
    o Control system processor
    o USB AV Bridge if camera present
    o Managed AV network switch if required.
18.3.2. MAJOR LECTURE THEATRE (MLT)

18.3.2.1. DESCRIPTION

Major Lecture Theatres are single function spaces with a stepped floor or tiered lecture theatre used for general timetabled teaching with a capacity equal to or greater than 450 seats. Each seat should have a clear unobstructed view to the lecturer and to all boards and screens located on the presentation wall. These spaces are generally well equipped for audio visual equipment including projection systems, dedicated sound reinforcement system, touch panel control system and playback equipment installed within a dedicated lectern. The AV system including theatre lighting must be operatable via an integrated touch panel control system.

18.3.2.2. AV SYSTEM FUNCTIONALITY

As a minimum, Major Lecture Theatres shall be provided with the following audio-visual system functionality:

- Left, right and central data projection to display the following sources:
  - University supplied computer
  - Laptop connection(s)
  - Document camera(s).
- Local preview of all sources on lectern monitor(s)
- All source audio shall be replayed via front of house loudspeakers
- All microphone audio shall be reinforced via ceiling-mounted loudspeakers
- The hearing augmentation system shall provide 80% coverage of the entire space with low spill to adjacent spaces
  - Shall take a combined feed of source and microphone audio.
- Audio output plate on lectern and nominated location for recording/ media feed
  - Shall take a combined feed of source and microphone audio.
- Dedicated audio output (XLR connection at lectern) from audio DSP for web-conferencing applications (Teams, Zoom etc.)
- Provision to integrate lecture capture system
- PTZ Camera to display feed from space to overflow facilities and web conferencing via installed presenter computer
- The control system processor and touch panel, as a minimum, shall interface with the following equipment:
  - Video matrix switch
  - Digital audio processor
  - Video/data projectors
  - Motorised screen(s) (as required)
  - Motorised projector lift(s) (as required)
  - Motion sensor(s)
  - Equipment rack power controller
  - Room lighting dimmers
  - Extron GVE network (via the LAN).
PTZ Camera
Lecture Capture device

- A fixed lectern installed at the front of the theatre to house the following AV equipment:
  - University supplied computer
  - Laptop input connection plate (mounted above the lectern)
  - Touch panel
  - Boundary microphones
  - Document cameras.
- All audio-visual switching and processing equipment shall be housed in a dedicated audio-visual equipment rack located within the lectern, or a separate cupboard/joinery if required, locked with a University standard ‘TEC lock’.

### 18.3.2.3. AV EQUIPMENT

As a minimum, a Major Lecture Theatre shall be provided with the following audio-visual equipment:

- 3 x Video/data projectors
- University supplied computer
- Laptop input connection(s)
- 2 x Document cameras
- Front of house loudspeakers
- Ceiling-mounted loudspeakers
- Wired boundary microphones
- 2 x Wireless lapel microphone system and receivers
- 2 x Wireless handheld microphone system and receivers
- 1 x 4-bay charging dock for wireless microphones
- 4 x additional wireless microphone receivers
- Hearing augmentation system
- Video matrix switch
- Digital audio processor
- Audio power amplifiers as required
- Touch panel
- Control system processor
- Dedicated local managed AV network switch if required
- Lecture Capture System
- Dedicated AV equipment rack
- Motorised projection screen(s) (as required)
- Motorised projector lift(s) (as required)
- University Standard Lectern
- PTZ HDMI Camera
- USB AV Bridge
- Set-top Box where antenna feed is present
- Room Booking Panel.
18.3.3. LECTURE THEATRE (LT)

18.3.3.1. DESCRIPTION

A stepped floor or tiered lecture theatre used for general timetabled teaching with a capacity of 101 to 249 seats. The AV system, input devices and theatre lighting shall be controlled via a dedicated wired touch panel installed on the University standard lectern. The lectern, as a minimum, shall house one University supplied computer, document camera, laptop connection plate, and touch panel. All audio-visual switching and processing equipment shall be housed in a dedicated audio-visual equipment rack located within the lectern, or a separate cupboard/joinery if required.

Voice reinforcement shall include wired and wireless microphones along with ceiling loudspeakers and a hearing augmentation system.

18.3.3.2. AV SYSTEM FUNCTIONALITY

As a minimum, Lecture Theatres shall be provided with the following audio-visual system functionality:

- Video/data projection to display the following sources:
  - University supplied computer
  - Laptop connection(s)
  - Document camera.
- Local preview of computer on lectern monitor(s)
- All source audio shall be replayed via front of house loudspeakers
- All microphone audio shall be reinforced via ceiling-mounted loudspeakers
- The hearing augmentation system shall provide 80% coverage of the entire space with low spill to adjacent spaces
  - Shall take a combined feed of source and microphone audio.
- Dedicated audio output (XLR connection at Lectern) from audio DSP for web-conferencing applications (Teams, Zoom etc.)
- PTZ Camera for web conferencing via installed presenter computer
- The control system processor and touch panel, as a minimum, shall interface with the following equipment:
  - AV media presentation switch
  - Digital audio processor
  - Video/data projector
  - Motion sensor
  - Equipment rack power controller
  - Extron GVE network (via the LAN).
  - Lecture capture device
  - PTZ Camera
- A fixed lectern installed at the front of the theatre to house the following AV equipment:
  - University supplied computer
- Laptop connection plate(s)
- Touch panel
- Document camera.

- All other AV equipment shall be securely installed in a dedicated AV equipment rack. The rack shall be securely locked in a dedicated cupboard locked with a University standard ‘TEC lock’
- The AV system including theatre lighting must be operatable via an integrated touch panel control system.

18.3.3.3. AV EQUIPMENT

As a minimum the Lecture Theatre shall be provided with the following audio-visual equipment:

- Data projector(s)
- University supplied computer
- Laptop input connection(s) - HDMI
- Document camera
- Front of house loudspeakers
- Ceiling-mounted loudspeakers
- 2 x Wired boundary microphones
- 1 x Wireless lapel microphone system
- 1 x Wireless handheld microphone system
- Wireless microphone charging dock
- Hearing augmentation system
- AV media presentation switch
- Digital audio processor (if required)
- Audio power amplifiers as required
- Touch panel
- Control system processor
- Dedicated local AV network switch if required
- Lecture Capture System
- University Standard Lectern
- Dedicated AV equipment rack if required
- PTZ Camera
- USB AV Bridge
- Room Booking Panel.
18.3.4. FLEXIBLE LEARNING SPACE (FLS1, FLS2, FLS3)

18.3.4.1. DESCRIPTION
There are three types of Flexible Learning Spaces:

- Flat-floored teaching & learning space with flexible furniture configuration & capacity for 70 or more student seats (FLS1)
- Flat-floored teaching & learning space with flexible furniture configuration & capacity for 31-69 student seats (FLS2)
- Flat-floored teaching & learning space with flexible furniture configuration & capacity for up to 30 student seats (FLS3).

The AV system shall typically comprise of a projection system or large-format FPD (depending on the size of the space), and front of house sound reinforcement. All systems shall be controlled via a dedicated push-button keypad or touch panel. The AV control system shall interfaced to all AV equipment.

18.3.4.2. AV SYSTEM FUNCTIONALITY
As a minimum, an FLS shall be provided with the following audio-visual system functionality:

- Video/data projector or FPD to display the following sources:
  - University supplied computer
  - Laptop connection(s)
  - Document camera
  - Wireless Presenter.
- All source audio shall be replayed via front of house loudspeakers
- All microphone audio shall be reinforced via ceiling-mounted loudspeakers in FLS 1 & 2 type spaces
- The control system processor, as a minimum, shall interface with the following equipment:
  - AV media presentation switch
  - Digital audio processor (if present)
  - Video/data projector / FPD
  - Motion sensor
  - Equipment rack power controller
  - Extron GVE network (via the LAN).
- A UoM standard lectern installed at the front of the room to house the following AV equipment:
  - University supplied computer
  - Laptop connection - HDMI
  - Document Camera
  - Push button keypad / touch panel.
- All other AV equipment shall be securely installed in a dedicated AV equipment rack. The rack shall be securely locked in a dedicated cupboard/joinery locked with a University standard ‘TEC lock’.
18.3.4.3. AV EQUIPMENT

As a minimum the FLS rooms shall be provided with the following audio-visual equipment:

- Video/data projector
  - Or FPD (optional)
- University supplied computer
- Laptop connection - HDMI
- Wireless Presenter
- Document camera
- Front of house loudspeakers
- AV media presentation switch
- Digital audio processor (when required)
- Wired boundary microphones (FLS1 & 2)
- Wireless lapel microphone system and charging dock (FLS1 & 2)
- Wireless handheld microphone system (FLS1 & 2)
- Hearing augmentation system
- Audio power amplifier
- Push button keypad (FLS3)
- Touch panel (FLS1 & 2)
- Control system processor
- Motion Sensor
- Dedicated local AV network switch if required
- Dedicated AV equipment rack
- UoM Standard Lectern
- Room Booking Panel.
18.3.5. PROFESSIONAL SPACES

18.3.5.1. DESCRIPTION

Professional spaces are designed for academic, professional staff and the student body. Room types may include:

- Small Meeting Rooms up to 4-5 people (SMR)
- Medium Meeting Rooms from 6-9 people (MMR)
- Large Meeting Rooms from 10-12 people (LMR)
- Boardrooms and Multipurpose spaces for 12-25 people (BR)
- Project Rooms, stand-up spaces, student presentation spaces and spaces less than 4 people (PR).

18.3.5.2. STAFF MEETING SPACES COLLABORATION TECHNOLOGY

AV in staff meeting spaces will be based around the Crestron Flex System to enable users to present content locally and also participate in software-based video conferencing. Appendix G should be used as a guide when designing a staff meeting space, noting that adjustments may be required depending on the size of the space to meet industry guidelines for viewing sightlines, microphone coverage and audio reinforcement. This will apply especially for Large Meeting Spaces and Boardrooms. Boardrooms may require additional integration with building services, such as control for lighting and blinds where necessary, as well as hearing augmentation.

For Small Meeting Rooms, the user interface and laptop connection point will be installed on the wall where the display is located. For Medium and Large Meeting Rooms, as well as Boardrooms, the preference is to install the user interface and laptop connection point on the table.

Audio-visual racks and joinery should not be required for spaces other than Boardrooms, as all equipment should be installed behind the display in each space.

The University will provide instruction as to whether the rooms will run an MS Teams or Zoom interface. Rooms will be monitored via Crestron XiO and Fusion. The spaces will be designed, programmed, configured and maintained under an SLA by the University’s contracted supplier Citadel Technology Solutions, although they may be installed by a UoM-preferred AV integrator in some cases. System commissioning is the responsibility of the installing integrator for small, medium and large pattern rooms. Citadel will provide instructions to the installing integrator on the steps required to prepare the spaces and installed equipment for final commissioning and handover. The steps may include uploading code and configuration files provided by Citadel, applying IP addresses and making test calls.

Users of these spaces will be required to bring their own device (BYOD) to present in the space, via a supplied cable or wirelessly via the web conferencing system (e.g. wireless sharing via Zoom). No fixed computers will be installed in these spaces for user presentations unless required for specific use cases. No separate phones shall be supplied in rooms other than in Small Meeting Rooms.

Screens may be interactive touch screens if required for specific use cases.

A room booking and scheduling display will be installed outside each space to allow users to view upcoming bookings and make ad-hoc bookings if the space is available.

Refer to section 18.4.7 for design considerations for spaces with Video Conferencing.
18.3.5.3. **AV SYSTEM FUNCTIONALITY**

As a minimum, Professional spaces shall be provided with the following audio-visual system functionality:

- FPD to display the following sources:
  - UC Engine (Dedicated NUC PC running UC software)
  - Wired Laptop connection(s) via HDMI to USB converter attached to UC Engine
  - Wireless presentation via UC Software.
- All source audio shall be replayed via front of house or ceiling mounted loudspeakers
- The control system processor and touch panel, as a minimum, shall interface with the following equipment:
  - Video Display
  - Motion sensor
  - Equipment rack power controller if present
  - Crestron Fusion and XiO.
  - UC Engine
- Zoom / Teams certified microphone
- Zoom / Teams certified camera
- Room Booking Panel
- Teleconferencing via UC Engine with phone integration
- Prescheduled and ad-hoc web conferencing meeting capability
- One-touch start for conferencing meetings.

18.3.5.4. **AV EQUIPMENT**

Refer to Appendix G to view the AV equipment required for each room type.

18.3.5.5. **PROJECT ROOMS & STUDENT SPACES**

Rooms primarily used by students, often referred to as Project Rooms such as those found in libraries and student lounges, will be used for basic presentations. In these spaces, users can present by connecting their own device to the room display via a cable. An optional camera and speakerphone may be supplied for specific use cases, for web conferencing via a student’s own device.
18.4. AUDIO VISUAL TECHNICAL REQUIREMENTS

The following sections detail the minimum technical requirements for audio visual equipment specified in The University of Melbourne’s teaching spaces.

The make and models of all audio-visual equipment nominated for The University of Melbourne teaching spaces shall be verified by Collaboration Endpoints prior to installation. A list of AV equipment manufacturers currently supported by Collaboration Endpoints is included in Appendix B.

18.4.1. PROJECTION SYSTEMS

Projection systems play a primary role at the University and are present in the majority of learning spaces across the campus. It is imperative that the projection system for these spaces meet the technical and functional requirements of the space.

Engineers shall confirm make, model and specifications of projector with a Collaboration Endpoints representative prior to finalising system configuration.

As a minimum, projection systems at the University of Melbourne shall comply with the following:

18.4.1.1. PROJECTOR REQUIREMENTS

As a minimum, nominated video/data projectors shall adhere to the following standards:

- Minimum of 4000 ANSI lumens
  - The specific brightness of the projector shall depend on the application and the particular space
- Minimum contrast ratio 2000:1
  - The specific contrast of the projector shall depend on the application and the particular space
- Capacity to support 16:9 aspect ratios
- Native 1920 x 1080 resolution (or 1920 x 1200 running in 1080 mode)
- As a minimum, projectors shall include the following video inputs:
  - HDMI
  - HDBaseT
- RS232 / Ethernet controllable
- Ethernet interface (for management)
- Lamp-less technology (e.g. laser)
- Low noise
- Ceiling-mountable.

18.4.1.2. LINES OF SIGHT

Optical calculations shall be performed to determine suitable projection parameters for each space; however, the following standards shall be applied:

- Furthest Viewer – no viewer shall be further than six times the image height from the projection surface
- Closest Viewer – no viewer shall be closer than twice the screen height from the projection surface
• Horizontal Viewing Angle – audience shall be positioned within an arc of 45 degrees from either side of the centre line of projection
• Vertical Viewing Angle - audience shall be limited to 30 degrees maximum head tilt above horizontal, in relation to the centre of the projection image
• Image position – The base of the projected image should be at least 1200AFFL for seated viewers
  o In spaces where the audience will primarily be standing, the minimum height will be 1700 AFFL
• Element Height – EH refers to the smallest height of an element or character shown on a display under normal viewing conditions and is expressed as a percentage of the total image height (%EH). When using 6x image height to calculate the furthest viewer, the minimum element height should be 3%.

Whilst the horizontal viewing angle and closest viewer rules are slightly flexible, the furthest viewer rule is essential.
The size and the height of the image shall take into account environmental considerations such as ceiling height, ceiling mounted equipment, furniture, audience seating position etc.

18.4.1.3. PROJECTION SCREEN / SURFACE
The projection image shall be located in the centre of the front of house, or in the case of two images (which may include writing space) each shall be situated on either side of the centre. Where possible the projection system shall be able to be used simultaneously with writing boards.

Projection walls shall be a non-reflective surface painted matte white. Projection shall be above or behind the writing board area, which may be lowered to expose the projection surface.

If required, fixed and motorised projection screens shall be provided. The projection screen shall be sized to suit the space and a 16:9 aspect ratio.

Motorised projection screens shall be quiet and robust and when recessed and shall be flush mounted within the ceiling cavity where possible. Projectors should be programmed to project an image once the screen has fully deployed. Screens shall be individually controlled via the touch panel control system.

18.4.1.4. PROJECTOR CONFIGURATION
The projector must be configured for optimal image reproduction. The projector must be configured with the following settings:
• Colour matching: for side-by-side projectors
• Panel alignment: adjust if necessary, to fine tune colour and improve image sharpness
• Eco mode: switch off Auto Dim feature.

18.4.1.5. PROJECTOR INSTALLATION
Video/data projectors shall be securely installed on either a ceiling bracket or within a dedicated bio-box depending on the requirements of space. Motorised projector lifts can be used when the projector cannot be easily serviced from a ladder.

The following considerations shall be taken into account when positioning the video/data projector:
- Presentation position: The projector shall be installed such that the projected image is not obstructed by the lectern or the presenter
  - Consideration shall also be taken to ensure that the presenter is not affected by the glare from the projection angle.
- Projection image size: Each projector manufacturer recommends an optimal installation distance for a given projected image
  - Engineers shall ensure that a suitable lens is provided for the desired position.
- Ease of maintenance: Consideration shall be taken to ensure that the projector is accessible for maintenance purposes
  - It is preferred that projectors are not installed above stairs or un-sturdy surfaces where ladders cannot be placed.
- Other ceiling-mounted services and equipment: Projection image should not be obstructed by other ceiling mounted services such as security cameras, light fittings, air-conditioning ducts etc.
- Security: Projector shall be installed in a location where it is not easily accessible and prone to damage or theft.

18.4.1.6. FIXED PROJECTOR MOUNT

Each projector shall be fitted on a University approved mounting bracket/mounting plate with University standard security screws and high tensile steel padlocks. The mounting bracket shall be fitted to a compatible dropper which is then fixed directly to the ceiling slab or structure. The projector shall be installed such that the projector aligns horizontally with the top of the projected image and electronic image correction or adjustment shall not be required.

Electronic image correction or keystone adjustments shall only be used if prior approval is provided in writing by Collaboration Endpoints.

University preferred mounting bracket is an 'Ultralift Spyder (Uni-Melb) bracket' make and model.

18.4.1.7. MOTORISED PROJECTOR LIFT

Where possible, video projectors shall not be mounted higher than 2700AFFL. If projectors cannot be mounted within 2700AFFL on a fixed bracket, then a University approved custom built mechanical lift shall be fitted.

The projector shall be fitted within the lift cage with University approved security screws and high tensile steel padlocks. The cage shall be manufactured to suit the projector. The cage should allow for removal and servicing of projector, filters and lenses without having to remove the projector from the cage (often the underside of the cage is cut out to allow access).

The lift shall be cabled back to the AV control system and controlled by the touch panel. Furthermore, IR bud and remote control shall be provided as a failsafe.

The projector lift shall be installed securely on ceiling slab and configured for single stage drop, for service only. When projector is retracted to home position, it must be in show mode. Service height shall be approximately 1500AFFL. In cases where a projector lift is required to have a show position in addition to the up and down position, 3-stage lifters must be procured.

Each new lift must be fitted with a fall arrester. Spaces undergoing an upgrade with an existing lift where no fall arrester is present must have a fall arrester added.
CAT6A cabling must be used for all audio, video and control signals. Cabling must be terminated on a connection plate within the ceiling adjacent the lift with braided cable down to the receiver/projector.

Electronic image correction and keystone adjustments shall only be used if approved in writing by Collaboration Endpoints.

University preferred projector lift is an Ultralift Unilift 2, custom manufactured to suit the specific projector model.

18.4.1.8. DUAL PROJECTION

Dual projection systems shall have two images projected side-by-side ensuring that they do not overlap. Each projected image shall be of the same size, brightness and contrast. It is recommended the same projectors are used in dual projection rooms.

The AV control system shall be flexible enough to allow the user to select any input source, to be displayed on either or both of the projection systems concurrently. Lecture Capture Systems shall be configured to capture left projections by default. The touch panel interface should be designed to indicate which projected source is being sent to the Lecture Capture System.

18.4.1.9. TRIPLE PROJECTION

Triple projection systems shall have three images projected side-by-side ensuring that they do not overlap. Each projected image shall be same brightness and contrast. It is recommended the same projectors are used in triple projection rooms.

The AV control system shall be flexible enough to allow the user to select any input source, to be displayed on any one, two or all of the projection systems concurrently. Lecture Capture Systems shall be configured to capture the left or centre projections (selectable via the control system). The touch panel interface should be designed to indicate which projected source is being sent to the Lecture Capture system.

18.4.2. FLAT PANEL DISPLAY (FPD)

The University of Melbourne deploys commercial FPD within various AV systems. The following table lists the recommend panel size for the furthest viewer:

<table>
<thead>
<tr>
<th>Flat panel display size (diagonal)</th>
<th>Recommended Furthest viewer</th>
<th>Recommended Closest viewer</th>
</tr>
</thead>
<tbody>
<tr>
<td>43”</td>
<td>3.4m</td>
<td>1.1m</td>
</tr>
<tr>
<td>49”</td>
<td>3.8m</td>
<td>1.2m</td>
</tr>
<tr>
<td>55”</td>
<td>4.2m</td>
<td>1.4m</td>
</tr>
<tr>
<td>65”</td>
<td>5.0m</td>
<td>1.6m</td>
</tr>
<tr>
<td>75”</td>
<td>5.8m</td>
<td>1.9m</td>
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<tr>
<td>85”</td>
<td>6.5m</td>
<td>2.2m</td>
</tr>
<tr>
<td>98”</td>
<td>7.5m</td>
<td>2.5m</td>
</tr>
</tbody>
</table>

18.4.2.1. FPD REQUIREMENTS

As a minimum, the nominated FPD shall adhere to the following requirements:

- Minimum 4K UHD resolution
- 16:9 aspect ratio
- High brightness – 500 nit
• Standard sizes (as nominated in the table above) to meet room requirements
• NTSC / PAL Colour system
• RS232 / Ethernet controllable
• VESA compliant, wall-mountable
• As a minimum, the panel shall include the following inputs:
  o HDMI x 2
• Must be able to be mounted vertically for digital signage applications

Optional features to meet project requirements:
• Optional input slots for twisted pair receivers
  o TV tuners, HDBaseT, card readers etc.
• Optional loudspeakers.

18.4.2.2. INSTALLATION REQUIREMENTS

FPDs shall be fitted with University approved mounting brackets with capacity for high tensile University padlocks and security mechanisms to be fitted to prevent theft or malicious damage. Any mounting solution or modifications to the installation bracket or security mechanisms shall be approved by Collaboration Endpoints.

Final height of FPDs shall be coordinated with architectural drawings and optimal viewing angles. Ceiling-mounted FPDs and panels mounted at high levels shall be angled down to ensure image integrity. Where a FPD has equipment installed behind or if panel is recessed, an articulated bracket must be installed to allow for technician servicing.

Interactive whiteboards or FPDs with touch overlays shall be installed ensuring the top of the board is no higher than 2000AFFL. Refer to section 18.4.1.2. LINES OF SIGHT for viewing angle requirements.

18.4.2.3. PANEL ENCLOSURE

FPDs installed in public and unsecured areas shall be fitted within a custom-built enclosure. As a minimum, the enclosure shall have the following:
• Fully sealed (glass front)
• Lockable with keys or security screws (locks to be provided by UoM)
• Suitable for all temperatures
• Integrated air movement
• Mounting options: Wall mount, ceiling mount, stand-alone pedestal etc.
• Accommodate LCD screen and loudspeakers within the enclosure
• To suit nominated FPD
• VESA mounting compatible or ability to mount VESA compatible bracketry.
• IP54 rated – dust and splash-proof design
• Screen shall be accessible for servicing and maintenance.
18.4.2.4. **INTERACTIVE FLAT PANEL DISPLAYS**

Interactive FPDs and Interactive Whiteboards shall be minimum 55” diagonal, 16:9 aspect ratio and from a reputable manufacturer approved by Collaboration Endpoints.

Interactive FPDs must be installed on walls and shall be mounted ensuring the top of the board is no higher than 2000AFFL.

18.4.3. **VIDEO SWITCHING**

The University transmits and switches the following video signals:

<table>
<thead>
<tr>
<th>Type</th>
<th>Video Signal</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>HD Video</td>
<td>HD1080 (1920 x 1080p)</td>
<td>Standard Resolution</td>
</tr>
<tr>
<td>Digital Video</td>
<td>HDMI / (EDID enabled)</td>
<td>Fixed computer, laptop input, document cameras, DVD, Blu-Ray, PTZ cameras etc.</td>
</tr>
</tbody>
</table>

All video signals shall be switched, scaled, transmitted and displayed in full HD resolution (1920x1080 pixels).

All new AV systems must be provided with provisions to support digital video equipment (e.g. HDMI). All digital AV switching equipment must support EDID, CEC and HDCP protocols.

Video switching equipment must be provided with the ability to disable HDCP from any input, including HDMI computer sources, HDMI laptops and HDMI document cameras.

All source devices that provide HDCP content must also provide sufficient HDCP (KSV) keys to allow all display devices to display content.

18.4.3.1. **DSP AND AV SWITCHER CONFIGURATION**

All inputs & outputs must be labelled for all DSP and AV switcher devices.

Within DSPs, all matrix blocks and other processing blocks must be labelled appropriately.

All DSP and AV Switcher configuration files must be provided at handover for the space to be accepted as completed.

A standard device configuration for some switchers can be found in appendix H.

18.4.4. **SOUND REINFORCEMENT**

Despite the growth in the use of visual and computer means of communication, verbal communication remains the single most important method of teaching and learning. Irrespective of the size of the space, maximum attention must be paid to optimising the acoustic properties of the space.

Amplification is required for all lecture theatres and should be considered for other presentation spaces of 30 seats or more.

Wherever amplification is installed, whether for presenter's voice or for electronic sound, provision for hearing augmentation systems and Lecture Capture should be considered.

Auxiliary inputs for sound presentation (audio-cassette, CD, iPod and computer audio), are always required for language teaching, and for all Major Lecture Theatres.
Typically, source audio shall be reproduced via dedicated front of house loudspeakers and microphone audio shall be via ceiling-mounted loudspeakers. The hearing augmentation system and Lecture Capture system shall have combined mix of both source and microphone audio inputs.

18.4.4.1. MICROPHONES

Wired and wireless microphones shall be used as required. Wired microphones shall be condenser boundary-type microphones with a low profile and semi-cardioid pattern.

UoM are currently deploying Digital Wireless Microphones with automatic frequency management. Other wireless microphones using digital modulation shall operate on Band A 520-558MHz frequency range. Commissioning of wireless microphone systems shall be coordinated with the existing range of frequencies in use in nearby spaces to ensure there is no interference. Alternative configurations to wireless microphones require approval from Collaboration Endpoints staff. Appropriate amplification shall be installed when a sound reinforcement system is required.

Wherever microphone systems are installed, hearing augmentation systems must be installed.

18.4.5. HEARING AUGMENTATION SYSTEMS

The AV Contractor must provide Hearing Augmentation systems where there is an inbuilt amplification system, other than one used solely for emergency warnings, as per BCA requirements.

The type of Hearing Augmentation system must be determined with due consideration of the building environment, restrictions, interference and user requirements.

IR hearing augmentation systems require approval from Collaboration Endpoints staff. Hearing induction loops are the preferred option for all projects.

A complete set of written test results must be provided with each system including a certificate of compliance as per AS1428.5-2010.

All hearing augmentation systems must be provided with a constant audio feed, that cannot be muted, from the AV system consisting of a mix of both source and microphone audio.

18.4.5.1. HEARING INDUCTION LOOP

Where an induction loop system is required, the AV Contractor shall coordinate with the builder to install copper foil tape below the floor covering. Chasing of floor will not be feasible.

The hearing augmentation system shall provide 80% coverage of the space as per BCA, with low spill to outside areas unless otherwise specified.

As a minimum, the assistive hearing loop must meet the following minimum criteria:

- Field strength inside the area of use must be equal to 400mA/m plus/minus 3dB (tested with 125ms RMS measurement with 1kHz Sine wave)
- Total variation in signal across the frequency band 100Hz to 5kHz at 1kHz must be within 3dB anywhere in the loop area
- Background noise must be less than or equal to -32dB relative to 400mA/m.

Contractors shall specify an appropriate loop layout from the list below for rooms over 100m2.
• Counter Loop: Typically used for counters and benches where one-to-one interaction is required.
• Perimeter Loop: Typically used in spaces where there are no spill issues and minimal metal loss.
• Single Array Loop: Typically used in fixed seating arrangements where it is known that users will not pass through the "null" zones during use.
• Cancellation Loop: Typically used for rooms located back-to-back where loop spill is reduced in one direction.
• Low Loss Phased Array: Typically used in spaces where metal loss occurs and there is a requirement to reduce spill into adjacent rooms.
• Ultra-low Spill Phased Array: Typically used in spaces where metal loss occurs and there is a requirement to reduce spill for confidentiality purposes.

The installer must seek specialist design advice from the manufacturer regarding the specific design of the system.

The Contractor must coordinate on site to determine the presence of existing adjacent hearing loop systems within the building.

The Contractor must conduct a site survey to undertake field strength measurements prior to designing the new hearing loop, to determine whether background interference is greater than, or equal to, -32bB relative to 400mA/m. The field strength measurements must be taken whilst adjacent hearing loop systems are in operation.

If an interfering system is discovered, the Contractor must advise the Project Manager and the Consultant and then proceed with the design of the hearing loop system.

The Contractor must submit results of background field strength measurements included with a manufacturer endorsed hearing loop technical design proposal. The measurement results and loop design proposal must be submitted to the Project Manager for approval prior to installation.

Where the manufacturer endorsed design includes the installation of copper foil tape below floor coverings (where chasing of floor is not be feasible), detailed technical drawings must be submitted for approval by Project Manager prior to installation.

The Contractor must engage the manufacturer of the hearing augmentation system to provide specialist design advice, site testing, technical data and design documentation from the system manufacturer for each space.

The manufacturer of the loop system, or their approved Australian distributor, must undertake the final system testing and provide the manufacturer certificate of compliance.

18.4.5.2. INFRA-RED SYSTEM

Infra-Red Hearing Augmentation systems must include IR transmitters, antennas and IR receivers. Signs alerting users to the presence of the IR system must be installed at the room entrance and inside the room.

As a minimum, the IR Hearing Augmentation system must meet the following criteria:
• IR Hearing Augmentation must provide 95% coverage of the room as per the BCA
• Multiple transmitters may be required to ensure correct operation for all room configurations
• Transmitters must not be installed outside or in direct sunlight
• The number of receivers must correspond to the number of people the space accommodates to meet BCA regulations
• Recharger and rechargeable batteries must be provided for each receiver supplied.
Contractor must conduct a site survey and review line of sight restrictions and ambient light, prior to submitting a detailed design submission.

18.4.6. CONTROL SYSTEM

All teaching spaces provided with an audio-visual system shall include a dedicated Extron control system fully programmed to control all audio-visual devices. As a minimum each room shall be provided with a dedicated control system processor (Extron IP Link Control Processor or Integrated IP Link Processor) and fixed control interface (touch panel or keypad). For control in professional spaces, please refer to the devices listed in Appendix G.

18.4.6.1. USER INTERFACE

The University typically uses the following control interfaces:

<table>
<thead>
<tr>
<th>Device</th>
<th>Model</th>
<th>Typical application</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wired Touch Panel</td>
<td>Extron TLP 1025</td>
<td>Lecture Theatres, Collaborative Spaces and some Flexible Learning Spaces</td>
</tr>
<tr>
<td>Wired Touch Panel</td>
<td>Crestron TSW 1060</td>
<td>Professional Spaces with Crestron Flex Systems</td>
</tr>
<tr>
<td>Wireless touch panel</td>
<td>Requires approval from Collaboration Endpoints</td>
<td>Should only be installed in addition to a hard-wired interface.</td>
</tr>
<tr>
<td>Push button keypad</td>
<td>Extron MLC Plus Series</td>
<td>Collaborative Spaces and some Flexible Learning Spaces</td>
</tr>
<tr>
<td></td>
<td>Extron eBus Series</td>
<td></td>
</tr>
</tbody>
</table>

18.4.6.2. DEVICE INTEGRATION

Typically, the following audio-visual equipment shall be interfaced with the control system processor as follows:

<table>
<thead>
<tr>
<th>Device</th>
<th>Control Interface</th>
</tr>
</thead>
<tbody>
<tr>
<td>Video switch</td>
<td>RS232 or Ethernet</td>
</tr>
<tr>
<td>Audio DSP / Digital audio processor</td>
<td>RS232 or Ethernet</td>
</tr>
<tr>
<td>Audio amplifier</td>
<td>Consult with Collaboration Endpoints as required</td>
</tr>
<tr>
<td>Video/data projector / FPD</td>
<td>RS232 or Ethernet</td>
</tr>
<tr>
<td>Lighting dimmers</td>
<td>RS232 or RS485, Ethernet Interfaces to be provided by lighting contractor</td>
</tr>
<tr>
<td>Playback equipment</td>
<td>RS232 or Ethernet</td>
</tr>
<tr>
<td>Document camera</td>
<td>RS232 or Ethernet</td>
</tr>
</tbody>
</table>
Alternative configurations shall be approved in writing by Collaboration Endpoints.

18.4.6.3. PROGRAMMING & DEVICE CONFIGURATION

Programming of control systems shall be coordinated with Collaboration Endpoints. The Control System programming shall be consistent with that of other teaching and professional spaces at The University of Melbourne where possible.

The Contractor shall organise workshops and submit samples of the touch panel and keypad layout to a Collaboration Endpoints representative to verify the layouts are correct prior to commissioning. A range of configurations and automation shall be available from the touch panel. Selecting a function from the touch panel shall operate all required equipment to perform that function e.g. selecting a source on the user interface will switch the projector on, switch the AV switch to correct input and select the required lighting pre-set.

Typical touch panel and keypad layouts are attached in Appendix A. Final touch panel layouts shall be developed on a project-by-project basis in conjunction with Collaboration Endpoints and User Groups.

The Contractor shall supply the fully working control system source codes to the University on completion of the project. Software provided by the Contractor shall be procured and transferred in full compliance with the publisher’s copyright, licensing and other requirements of ownership and use. License agreements shall be registered in the Principal’s name.

The University shall retain full rights to all custom software and programming developed by the Contractor as part of the Project. This shall include, but not be limited to the right to use, reproduce and modify the software as reasonably required to operate the systems and to support their ongoing maintenance and development.

All IPCP Pro Series controllers shall be programmed in Global Scripter. Any deviation will require formal approval from Collaboration Endpoints.

18.4.6.4. SHUT DOWN / MOTION SENSOR

Ceiling-mounted motion sensors shall be provided for all spaces equipped with a control system. The control system shall be configured to automatically turn off all equipment when the motion sensor has not detected any movement for three hours, and the control interface has not been active within this period. The motion sensor on a user interface (e.g. touch panel) must also be used if available.

Additionally, the control system shall be programmed to check status of the motion sensor at 11pm every night. If no motion has been detected, the AV system shall shut down all equipment. If motion has been detected, the system will repeat check every 2 hours.
18.4.6.5. REMOTE MANAGEMENT

All devices attached to an Extron control system with feed-back control (RS232, RS422, RS485 and TCP-IP) shall be able to be monitored and managed via the University of Melbourne’s Remote Management platform, Extron GVE, via the University LAN. All AV control systems provided for the University must be enabled for remote management by Extron GVE. Contractors must coordinate with Collaboration Endpoints staff to integrate control systems for all spaces.

The GVE Server location is: 172.22.8.31

Existing spaces with AMX control systems must be upgraded to Extron control systems and integrated to the Extron GVE.

The table below lists common devices, associated standard GVE IDs and required monitors.

<table>
<thead>
<tr>
<th>Device Type</th>
<th>Use For</th>
<th>GVE IDs</th>
<th>Monitors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Touch Display</td>
<td>Touchlink Panels iPads</td>
<td>TouchLinkPanel iPad eBus</td>
<td>Connection status</td>
</tr>
<tr>
<td>Matrix Switcher</td>
<td>DTP Crosspoints and other matrix switchers</td>
<td>DTPCrosspoint84 DTPCrosspoint108 XTP1600 XTP3200</td>
<td>Connection status</td>
</tr>
<tr>
<td>Switcher</td>
<td>IN1804 / IN1808</td>
<td>IN1804 IN1808</td>
<td>Connection status</td>
</tr>
<tr>
<td>Signal Processor</td>
<td>Lecture Capture</td>
<td>Echo360</td>
<td>Connection status</td>
</tr>
<tr>
<td>Audio Processor</td>
<td>Wireless Mics</td>
<td>LapelMic1 HandHeldMic1</td>
<td>Connection status</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Mic Battery Level via Device Status 100%, 70% = ‘Normal 30% = ‘Warning’ 0% = ‘Error’</td>
</tr>
<tr>
<td>Camera</td>
<td>PTZ Cameras</td>
<td>PtzCam</td>
<td>Connection status</td>
</tr>
<tr>
<td>Document Camera</td>
<td>Document Camera</td>
<td>DocCam1</td>
<td>Connection status</td>
</tr>
<tr>
<td>Video Projector</td>
<td>Projectors</td>
<td>Projector1 Projector2</td>
<td>Connection status</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Lamp Hours</td>
</tr>
<tr>
<td>Display</td>
<td>Flat Panel Displays</td>
<td>LCD1 LCD2</td>
<td>Connection status</td>
</tr>
<tr>
<td>Audio Processor</td>
<td>DSPs</td>
<td>DSP</td>
<td>Connection Status</td>
</tr>
<tr>
<td>Collaboration Device</td>
<td>Sharelink</td>
<td>Sharelink</td>
<td>Connection Status</td>
</tr>
</tbody>
</table>
For spaces programmed in Global Configurator, a Global View Location must be created, and provided with a name in the following format:

- Building Name – Room Number
  - Example: Eng Block D Room 312.

Global Viewer Settings must be enabled in the Project Properties.

Ensure that source inputs are updated to reflect the actual project. Ensure that source inputs are monitored using 'Report GVE Input' function.

Ensure that all system devices are added to the Global Viewer Location such as displays, DSPs, switchers and Sharelink.

- As a minimum the remote management platform shall allow for real-time monitoring and problem notifications
- Source usage shall have the following labels:
  - DocCam1, DocCam2
  - Laptop
  - MAC
  - PC
  - TV
  - Room Link
  - Sharelink
  - Group Mode.
- Equipment/system status and hot list of equipment errors
- Flexible, intuitive interface that lets the user select how and what is monitored
- Professional help desk and monitoring
- Capacity to create the following web-based and/or log data reports:
  - Help requests
  - Room usage
  - Lamp / Operational hours
  - Source usage
  - System & device usage.
- Monthly reports on all maintenance requirements.

Consultants and Contractors shall confirm final requirements with Collaboration Endpoints on a project-by-project basis.

18.4.6.6. **REMOTE POWER MANAGEMENT**

A networked power distribution unit (PDU) must be provided to all AV equipment racks to enable remote monitoring and management of devices. As a minimum the PDU must allow for the following functionality via a web-based interface:

- Current meter per outlet
- Individual outlet power consumption
- Remote ON/OFF and reboot switching
• User defined group control (switched and un-switched devices)
• PDU must have minimum 8 ports, each rated at 10A at 240V AC.

18.4.6.7. NETWORK REQUIREMENTS FOR AV

All devices connected to the network must be listed on the UOM Project Asset and IP Address Schedule and handed over to Collaboration Endpoints for IP addressing. The schedule will be shared by the Collaboration Endpoints team via SharePoint. MAC addresses must be provided by AV contractor prior to IP addresses being allocated.

The requirement or use of a dedicated AV Network Switch in any project shall be discussed and approved with the Collaborations Endpoints Team prior to inclusion and where required the University’s Network Operations Team. In cases where a network switch is not being used in an AV system, each device requiring a LAN connection shall have its own dedicated network point.

There are UoM Network configuration classifications for AV Projects at the University that are used in any given AV project:

<table>
<thead>
<tr>
<th>VLAN Description</th>
<th>Devices</th>
</tr>
</thead>
<tbody>
<tr>
<td>LS - 1300</td>
<td>AV Switchers, Control Systems, DSPs, User Interfaces, Microphone Receivers</td>
</tr>
<tr>
<td>MITS - 1400</td>
<td>Digital Signage, Concierge Booking Panel, Extron Sharelink, Crestron Flex Meeting Spaces</td>
</tr>
<tr>
<td>Staff Mobility - 1100</td>
<td>Fixed IT Computing</td>
</tr>
<tr>
<td>PVS – 1200</td>
<td>Computer Labs</td>
</tr>
<tr>
<td>Voip</td>
<td>In Room Resource Phone</td>
</tr>
<tr>
<td>Trunk Port</td>
<td>Used to connect managed Cisco switches in AV Racks to building switch</td>
</tr>
</tbody>
</table>

• *ports are configured for PoE (802.3)

18.4.7. VIDEOCONFERENCE SYSTEM

The University currently deploys videoconferencing systems to selected teaching, research and professional spaces. Each teaching space shall be designed in consultation with Collaboration Endpoints to meet the User Group requirements. The AV Consultant shall consider and coordinate the following aspects of the room:

• Lighting
  o Lighting in a space with video conferencing should be well balanced. A four-point lighting system is recommended.
  o Avoid lighting that causes glare, both directly into the camera and also indirectly via other surfaces in the room.
  o Dimmable lighting control is recommended
• Furniture selection
  o Tables: 20 to 60 percent reflectance. Neutral colour finishes including grey, buff, taupe. Modesty panels should be considered.
  o Chairs: As per recommendation for wall finishes.
• Interior Design
  o Walls: 40 to 60 percent reflectance with no small patterns or stripes. Recommended colours include grey, blue and mauve. Black, orange, yellow, green and red are not recommended.
Floors: less than 60 percent reflectance
Ceiling: 70 to 90 percent reflectance
Windows: Interior colours of window shades follow the recommended wall colours. Blackout shades should be installed for all windows.

- Acoustics
  - Carpet is recommended in conferencing spaces.
  - Wall and ceiling acoustic treatment should be considered.

- Wireless network coverage
- Wired network bandwidth and capacity (to be coordinated with Information Technology Services).

### 18.4.7.1. CODEC BASED SYSTEMS
Codec based systems are no longer deployed. Liaise with Collaboration Endpoints staff to confirm requirements.

### 18.4.7.2. WEB-CONFERENCING
Meeting rooms, huddle spaces and selected teaching spaces may be provided with a web-conferencing system that is configured to operate via software. Web-conferencing systems provided to the University must comply with the following:
- Web-conferencing software must be Zoom or MS Teams cloud-based application linked to the University’s existing account/subscription.
- IP-enabled and configured to operate over the University LAN
- H.323/SIP compliant with provision to connect to multiple endpoints
- Support H.264, H.239, H.235, and G.722 protocols
- Capacity to support content collaboration for concurrent video and content streams.
- Full control via GUI software
- USB camera and microphone(s).

For teaching spaces enabled with web-conferencing, all microphone audio, camera and video sources shall be routed to the presenter computer via a USB AV bridge.

### 18.4.8. LECTURE CAPTURE
The University of Melbourne Lecture Capture System is a central recording system that records and distributes audio and visual content from lecture theatres and other teaching spaces. The audio-visual content is captured, encoded and stored on a cloud server and delivered over the University network via a dedicated portal and a network connection to a dedicated VLAN.

The Lecture Capture System requires a dedicated video input from the theatre video switch and a dedicated audio feed from the theatre digital audio processor connected to the balanced audio inputs.

The audio feed shall be a combined mix of both microphone and source audio inputs terminated into the stereo phoenix connectors. PA / program audio touch panel controls shall not affect the level sent to the capture appliance. It will have a constant audio feed.

The video input to the Lecture Capture is HDMI and is split from the primary display (left projector in a dual projection room), however in some spaces a HDMI video output is also provided from a camera installed within the theatre. Video feed must be 1080p.
The touch panel control system installed within the theatre shall include a dedicated page for Lecture Capture Systems to monitor, pause and stop recordings (see appendix A). The audio feed to the capture device will be a set level and will bypass any volume or mute controls on the AV user interface. The source being captured must be labelled on the AV user interface to provide a constant and consistent feed for recording. E.g. Left Projector / Lecture Capture.

Lecture Capture appliances are UoM supplied items, to be collected and installed by the AV Contractor.

The Lecture Capture System must be installed securely within the AV equipment rack.

18.4.9. DIGITAL SIGNAGE

Digital signage systems provided within the University shall be network-enabled and be integrated with the centrally managed digital signage platform.

Each project will be required to determine the following:
- Number and type of displays and player hardware
- Number of content administrators / authors
- Content management policy.

Design and deployment of all digital signage systems must be coordinated with Collaboration Endpoints.

Digital Signage commissioning checklist is to be completed on the Project Asset and IP spreadsheet per project.

18.4.10. OVERFLOW & ROOM LINKING

Selected theatres shall be provided with overflow displays (FPDs / projection systems) in the foyer area outside and/or surrounding spaces. Overflow displays are used in special circumstances when the theatre does not have enough seating capacity within the venue.

Nominated theatres must be provided with PTZ camera(s) within the theatre that can capture and display the presenter to the overflow displays. Additionally, a dedicated feed from the video matrix switch must also be provided so that the overflow display can replicate the same content shown on the primary projection system within the theatre. The feed to the overflow screen will be selectable via the AV user interface within the space.

The size of the overflow display and installation locations shall be confirmed with Collaboration Endpoints. The flat panel display used for overflow will also be used as a digital signage display via the University’s approved digital signage platform.

An appropriate audio system will also be required for overflow, providing playback of both microphone and source audio from within the theatre.

In cases where two adjoining rooms may be linked, one room will become the master and send video and audio content to the adjoining space, which will be the slave. Microphones from both the master and slave room will be available for use when rooms are linked. A room link must be enabled from the user interface in the master room and accepted via the user interface in the slave room. The interface in the slave room will become locked until the link is broken via the user interface in the master room.

18.4.11. MEDIALINKS

Selected theatres shall be provided with media outlets to allow external parties, such as news services, to connect for recording purposes. Additionally, audio visual links shall
also be provided to adjacent theatres to allow media and other external parties to view lectures.

The specific number of connections and the number of links required shall be confirmed with Collaboration Endpoints.

18.4.11.1. AV LINKS

The following links, if available, must be transmitted to adjacent theatres:
- HDMI video content from primary projector
- Video from PTZ camera
- Combined audio from digital audio processor.
  - Audio shall be a mix of source and microphone.

18.4.11.2. MEDIA CONNECTION

As a minimum, media outlets shall consist of the following connections:
- 4 x Male XLR connections for microphones
- Female XLR connections for microphones
- BNC (SDI) and HDMI connections for video if required.

18.4.12. LIGHTING

18.4.12.1. LIGHTING LEVELS

Lighting levels within teachings spaces must comply with the minimum requirements as nominated in the UoM Design standards.

18.4.12.2. INTEGRATION

AV Contractor shall coordinate with electrical contractors to integrate lighting systems with the AV control system. The electrical contractor shall be responsible for providing and installing lighting dimmers along with an RS232/RS485 interface.

Care must be taken to minimize light spilling onto projection surfaces. Any lights surrounding projection surfaces must be controllable and on a different circuit to other lights within any given spaces, such as audience / seating lights.

As a minimum the AV contractor shall provide the following lighting pre-sets for teaching spaces:

<table>
<thead>
<tr>
<th>Pre-set</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFF</td>
<td>All lights turned off (excluding lectern light, emergency lights and aisle lighting)</td>
</tr>
<tr>
<td>ON</td>
<td>All lights on</td>
</tr>
<tr>
<td>AV</td>
<td>Stage lighting directed at the front of the theatre is turned off to reduce any glare on the projection surface. Theatre lighting reduced to 40%</td>
</tr>
<tr>
<td>LEC (Presentation)</td>
<td>Stage light turned on to allow usage of white boards. Theatre lights reduced to 40%</td>
</tr>
</tbody>
</table>
By default, these pre-sets will be automatically selected according to the projection status in the spaces. Users will have the option to turn automation off if required. Ramping of individual lighting channels will not be available via the AV user interface.

Additional lighting controls for bespoke requirements must be located within the ‘Room’ page on the AV user interface.

The requirement for integration of lighting to the AV system should be determined in the design stage. Final lighting requirements and configurations shall be coordinated with Collaboration Endpoints and User Groups.

Professional and Collaboration displays may have specific requirements that will differ from the standard teaching space configuration.

Philips Dynalite is the lighting control system nominated in the UoM Design Standards.
18.5. AUDIO VISUAL PHYSICAL REQUIREMENTS

18.5.1. CABLELING

The Contractor shall ensure that all cabling is installed to avoid sources of electromagnetic interference. Cabling shall be run concealed in ceilings, floor ducts or in wall cavities, and shall be labelled to indicate source, destination and function. Surface ducts or conduits are not a preferred method of installation and shall only be used in cases where no alternative is possible.

Velcro ties are to be used for cable management. No plastic cable ties or “zip ties” shall be accepted.

The cables installed shall be as listed below:

<table>
<thead>
<tr>
<th>Cable Type</th>
<th>Cable Description</th>
<th>Approved Manufacturer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Video Projector Control</td>
<td>Low capacitance, 72 pF/m. 4 x stranded inner pairs with overall foil and drain screening only. Pair colours as per CAT5.</td>
<td>Belden / Turnbull</td>
</tr>
<tr>
<td>(RS-232)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Video Coaxial Cable</td>
<td>Coax, 1 coax, 20 AWG, stranded (26x34) TC - tinned copper conductors, EPDM - ethylene propylene diene monomer rubber insulation, conductive textile wrap, tinned copper Spiral Serve Shield, 72% shield coverage, neoprene jacket.</td>
<td>Belden / Turnbull</td>
</tr>
<tr>
<td>Computer Video Cable</td>
<td>Digital video coax 5-way snake, miniature RG59/U, 23AWG, solid, soft PVC, 95% braiding, black.</td>
<td>Belden / Turnbull</td>
</tr>
<tr>
<td>Digital Video Cable</td>
<td>Pre-moulded HDMI cable, conforming to Premium High Speed HDMI cable performance standards. For continuous runs no longer than 10m.</td>
<td>Extron Ultra Series for all spaces other than Crestron Flex meeting rooms. Kramer HDMI for Crestron Flex meeting spaces only. Kramer PICO cables are to be used in racks or behind displays. They are not to be run through walls/ceilings or used for user device connections. Kramer MHM/MHM cables to be used for user device connections and are to be no longer than 3m.</td>
</tr>
<tr>
<td>Cable Type</td>
<td>Cable Description</td>
<td>Approved Manufacturer</td>
</tr>
<tr>
<td>------------------</td>
<td>------------------------------------------------------------------------------------</td>
<td>-----------------------</td>
</tr>
<tr>
<td>Audio Cable</td>
<td>1 pair, 22 AWG (7/0.32) tinned copper, polyethylene insulation, twisted beldfoil shielded pair, 22 AWG stranded tinned copper drain wire, PVC jacket.</td>
<td>Belden / Turnbull</td>
</tr>
<tr>
<td>Speaker Cable</td>
<td>2 core speaker cable 14 AWG, stranded, 75 degree insulated, PVC jacket.</td>
<td>Belden / Turnbull</td>
</tr>
<tr>
<td>Twisted pair</td>
<td>Category 6A shielded twisted pair for AV signal distribution. Data twist / media twist. Purple colour PVC jacket for AV services. CAT6 may be used for LAN connections.</td>
<td>Siemon</td>
</tr>
<tr>
<td>Twisted pair - Braided</td>
<td>For CAT6A shielded runs located at projector lifts.</td>
<td>ALOGIC Purple 10G Shielded CAT6A LSZH Network Cable</td>
</tr>
<tr>
<td>Fibre</td>
<td>50/125 µm multi-mode fibre, OM3</td>
<td>Extron</td>
</tr>
</tbody>
</table>

Shielded twisted pair cabling installed for AV services must be fitted off on RJ45 blocks within the lectern and RJ45 connection plates at the device location. Each location must be clearly labelled. Braided Cat6 leads must be used between connection plate/block and equipment.

Cabling that is to be routed within a motorised projector lift must be fitted off to a connection plate within the ceiling space at the mounting location. Shielded twisted pair cabling installed within a motorised projector lift must be a pre-terminated Alogic purple shielded Cat6a patch cable.

All other Cat6 leads must be terminated on R&M RJ45, IP67, FM45, rated jacks suited for industrial environments. Alternatives will not be accepted.

Shielded Cat6a cabling must be installed with a minimum bend radius of 50mm.

**18.5.2. CONNECTION PLATES AND FLY-LEADS**

Cabling points and engraved connection plates shall be installed as nominated on drawings. All connection plates shall be engraved to indicate the function for each nominated outlet. Labels shall be confirmed by Collaboration Endpoints.

The style and finish of all connection plates shall be consistent and match the décor of the space.

Typically, all audio-visual connections shall be terminated on Clipsal 2000 series connection plates.

For spaces with moveable lecterns or displays, CAT6a connectors for AV devices in floor boxes and wall plates should be securable with a latch lock system to prevent damage. They should also be colour-coded and labelled to allow for easy removal and reconnection by UoM staff.

The following table details University standard connections:
<table>
<thead>
<tr>
<th>Type</th>
<th>Video</th>
<th>Audio</th>
<th>Typical Installation location</th>
</tr>
</thead>
<tbody>
<tr>
<td>University supplied computer input</td>
<td>HDMI</td>
<td>3.5mm mini stereo jack for audio</td>
<td>Installed below lectern in dedicated shelf for computer</td>
</tr>
<tr>
<td>Document Camera input</td>
<td>HDMI</td>
<td>Phoenix connector for audio (combined microphone and source outputs from digital audio processor)</td>
<td>Installed in AV equipment rack</td>
</tr>
<tr>
<td>Laptop input</td>
<td>HDMI</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lecture Capture System</td>
<td>HDMI</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Microphone</td>
<td></td>
<td>3-pin XLR Female</td>
<td>Installed on lecterns, media link, bio-boxes and floor boxes</td>
</tr>
</tbody>
</table>

Contractors shall submit connection plate samples for approval by Collaboration Endpoints.

Video adapters (mini DP, DP, USB–C etc.) must be approved by Collaboration Endpoints for suitability. Video adapters must be from the Liberty DigitaLinx range or parts specified in appendix B and securely tethered to AV fly-leads using a Liberty DL-CL adapter ring clamp.

Contractors must provide all necessary fly-leads for all devices. Laptop fly-leads (HDMI) must comply with the following: alternatives will not be accepted.

<table>
<thead>
<tr>
<th>Fly-Lead Type</th>
<th>Description</th>
<th>Model</th>
<th>Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>HDMI</td>
<td>Designed to transmit HDMI digital video and audio signals, including 4K and UHD resolutions</td>
<td>Extron Ultra series</td>
<td>To suit application, e.g. to reach middle of table.</td>
</tr>
</tbody>
</table>

Wall-mounted connection plates must be provided with suitably sized fly-leads. Leads must be neatly coiled within joinery or on hooks where joinery is not available. Contractor must ensure that fly-leads and cables do not pose any OH&S risk.

18.5.3. POWER AND DATA REQUIREMENTS

The following table details the typical electrical and data requirements to support AV systems. The final requirements shall be coordinated on a project-by-project basis with the Services Engineer to match the system design. In cases where a dedicated AV network switch is not being used in an AV system, each device requiring a LAN connection shall have its own dedicated network point.
## Location

<table>
<thead>
<tr>
<th>Location</th>
<th>Electrical Requirements</th>
<th>Data Requirements</th>
<th>Typical AV Equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standalone AV equipment racks</td>
<td>1 x 15 Amp captive outlet on dedicated circuit 1 x DGPO</td>
<td>One outlet per networked device</td>
<td>AV switching/processing equipment, Echo360, AV control system.</td>
</tr>
<tr>
<td>Lectern / Presenter Location</td>
<td>4 x DGPO for AV equipment 1 x GPO accessible for networked device</td>
<td>One outlet per networked device</td>
<td>Teacher’s computer, local AV switch, AV touch panel, IP Phone, document camera, laptop etc.</td>
</tr>
<tr>
<td>FPD, video/data projector location (standard installation)</td>
<td>1 x DGPO</td>
<td>1 x Data</td>
<td>Projector/ FPD</td>
</tr>
<tr>
<td>Digital Signage FPD</td>
<td>1 x DGPO</td>
<td>1 x Data</td>
<td>Digital Signage</td>
</tr>
<tr>
<td>FPD, video/data projector location (motorised lift/mount)</td>
<td>2 x DGPO</td>
<td>2 x Data</td>
<td>Motorised lift, projector/ FPD</td>
</tr>
<tr>
<td>Motorised projection screen</td>
<td>1 x GPO</td>
<td>1 x data</td>
<td>Motorised projection screen</td>
</tr>
</tbody>
</table>

### 18.5.4. LECTERNS & TEACHER TOUCHDOWN POINTS

University standard lecterns must be used in all lecture theatres and teaching spaces. Performance venues and research environments such as labs may require bespoke solutions, which must be approved by the Collaboration Endpoints team.

The standard lectern design can be modified by the manufacturer to match the aesthetics to a limited extent. However, changes to the design must not change the structural frame of the lectern and must be approved by Collaboration Endpoints staff prior to installation.

The standard lecterns provide an area atop the bench for the presenter’s notes/laptop, microphone(s), touch panel, presenter PC, IP phone, document camera(s), wireless microphone charger(s) and input connections. It also includes rack space below the bench for AV switching equipment and other system components. The Contractor must ensure that lecterns can be raised and lowered unimpaired.

A floor duct or trench is required to carry electrical and AV wiring to the lectern. The duct must be compartmented to provide separation between services. Services must be terminated in floor boxes for mobile lecterns.

Moveable lecterns should only be used in special use cases and must be approved by Collaboration Endpoints. For spaces with moveable lecterns or displays, CAT6a connectors for AV devices in floor boxes and wall plates should be securable with a latch lock system to prevent damage. They should also be colour coded and labelled to allow for easy removal and reconnection by UoM staff.

Ventilation provided within the lectern must not be obstructed or covered. Where a separate AV rack is required, cupboard doors and access panels shall be secured with University standard TEC key.
Final joinery details and equipment layout shall be coordinated and approved by Collaboration Endpoints. UOM standard lectern designs and equipment layouts are included in Appendix E.

<table>
<thead>
<tr>
<th>Lectern Model</th>
<th>Typical Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>UOM-1000</td>
<td>Flexible Learning Spaces with no Document Camera</td>
</tr>
<tr>
<td>UOM-1500</td>
<td>Flexible Learning Spaces with fixed lectern</td>
</tr>
<tr>
<td>UOM-1500B</td>
<td>Flexible Learning Spaces with moveable lectern, requires approval from C.E.</td>
</tr>
<tr>
<td>UOM-1900</td>
<td>Lecture Theatres with Dual Document camera</td>
</tr>
<tr>
<td>UOM-POD-X</td>
<td>Mobile Lectern for Event Spaces</td>
</tr>
<tr>
<td>UOM-TDP</td>
<td>Flexible Learning Spaces &amp; Collaborative Spaces</td>
</tr>
</tbody>
</table>

18.5.5. AUDIO VISUAL EQUIPMENT STORAGE

The following AV equipment storage is required:

- AV equipment cupboard for ready access by presenters using the “LEC key”, recessed completely into a wall at the front of the theatre, and utilising the international 19” rack mounting standard and readily accessible to service staff.
- AV systems and AV equipment racks shall be separately keyed under the “TEC key” for access by maintenance and technical staff.
- A dimmer cupboard usually adjacent to the switchboard outside the theatre, and never physically adjacent to the AV systems rack.

18.5.5.1. VENTILATION

Ventilation shall be provided to maintain the temperature of all AV equipment within the manufacturer’s specifications. Ventilation requirements shall be determined by the Services consultant. Ventilation methods may include:

- Air inlets at low level and air outlets at high level must be provided to provide airflow through the rack, lectern, joinery or other relevant enclosure requiring ventilation
- Ventilation slots or grilles shall be selected following consultation with the Architect
- Natural convection or fan-driven ventilation shall be provided to accommodate the heat load of the AV equipment requiring ventilation.

18.5.5.2. POWER SUPPLY

240V mains power on dedicated AV circuits are required for AV equipment, generally as follows:

- 15 Amp captive outlets for AV racks fitted with internal power rails
- 10 Amp single or double GPOs for AV equipment.

Specific requirements for each project are to be determined by the Services Consultant.
18.5.5.3. **DIMENSIONS OF EQUIPMENT CUPBOARDS**

The internal cupboard enclosure usually provides a mounting surface for audio visual cable looms and ducts, power distribution conduits etc.

Adequate clearance must be provided for these services plus the actual metal rack frame. At least 150mm clear space is required behind the equipment rack frame, inside the cupboard.

Minimum internal dimensions for an equipment rack cupboard are 750mm x 650mm (depth x width).

Cupboard height varies with the size of the rack installation; however, two common formats do occur:

- Typically, the height is around 2100mm, allowing for installation of a full height (45RU) equipment rack
- In the second case, the cupboard is much lower, usually no more than one meter high. In some cases, the cupboard needs to be twice as wide, to allow for installation of two half-height rack frames.

18.5.5.4. **ACCESS TO EQUIPMENT**

The rack shall be mounted on wheels to allow rack removal for service. The lecture theatre floor and the rack cupboard floor must be continuous. If the equipment is housed in two racks, there must be enough length of cable connection between the two racks to allow one of the two racks to be brought out alone.

All rack cupboard doors are fitted with the TEC key lock for technician access to remove/repair equipment and LEC key lock for user access to operate equipment.

Equipment mounted in any location, including AV racks, behind flat panel displays or beneath tables, must be mounted with an approved mounting bracket. Double-sided tape or Velcro is not acceptable.

The device should be removable from the rack independently without the need to move other equipment and never used as a shelf.

18.5.5.5. **CANTILEVERED CUPBOARDS AND BIO-BOXES**

Projector cabinets and such shall not be cantilevered out from walls. This creates a safety hazard regarding people knocking their heads or hanging on them. All cabinet work shall be taken down to the floor, not supported from walls.

18.5.5.6. **LIGHTING INSIDE CUPBOARDS**

All equipment racks, AV cupboards and Bio Boxes require adequate internal lighting for technical staff.

18.5.5.7. **DIMENSIONS AND LOCATION OF PROJECTION ROOM**

Sufficient height is required to clear audience heads and sufficient room is required for a bench for video/data projectors.

18.5.5.8. **ACOUSTIC ISOLATION**

The Dimmer cupboard, projection room and AV cupboard must be acoustically insulated to prevent dimmer or projector noise from disturbing lectures.
18.5.5.9. **DOORS**

The front door of a recessed cupboard has conventional hinges and with the door closed, the cupboard door face is flush with the wall.

18.5.5.10. **AV EQUIPMENT RACK**

The AV Equipment Rack shall house all AV switching and processing equipment and thus be appropriately sized. The 19” AV equipment racks shall meet the following specifications:

- 540mm wide x 540mm deep
- Sized to accommodate equipment plus 20% spare capacity in AV cupboards
- Complete with 19” patch panels for termination of AV cabling
- Vertical and horizontal cable management
- 1 x 8-way vertical power strip fitted with captive plug tops
- 1 x 8-way vertical power strip for switched power, connected to an output of the power controller
- Power surge protection
- 2 x 100mm cable trays fitted to the inside of the equipment rack
- Allow for security panels as shown on the drawings
- Lockable doors and side panels
- Heavy duty castors to allow rack to be pulled out of cupboard for servicing.

The color finish and labelling of the cabinets shall be approved by Collaboration Endpoints.

Detailed shop drawings shall be submitted for approval prior to manufacture, indicating the layout and labelling of the patch panels.
18.6. APPENDICES

18.6.1. APPENDIX A: STANDARD TOUCH PANEL AND KEYPAD LAYOUTS

Start Up

Main Page
Computer

Document Camera
Lecture Capture Source

Lecture Recording
Lecture Recording stop

Press 'Shutdown' to switch off equipment

System Shutdown
Password for technical page access
Room Offline Notification

It looks like this touchpanel has lost connection with the controller.

Please call x40777 immediately for assistance.
*Button labels will differ on a project by project basis. Contractors must confirm labels with Consultant prior to commissioning.*
## 18.6.2. APPENDIX B: APPROVED AV EQUIPMENT MANUFACTURERS

<table>
<thead>
<tr>
<th>EQUIPMENT / DEVICE</th>
<th>MANUFACTURER</th>
<th>MODEL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Projector</td>
<td>Sony</td>
<td>VPLFHZ70</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sony PHZ11 (Approval by C.E required per project)</td>
</tr>
<tr>
<td>Large Venue Projector</td>
<td>Sony</td>
<td>VPL-FHZ90L</td>
</tr>
<tr>
<td></td>
<td>Panasonic</td>
<td>(to meet project requirements)</td>
</tr>
<tr>
<td>Interactive Short Throw Projector</td>
<td></td>
<td>Consult with Collaboration Endpoints</td>
</tr>
<tr>
<td>Interactive Flat Panel Display</td>
<td>Samsung Flip</td>
<td>(Approval by C.E required per project)</td>
</tr>
<tr>
<td>Flat Panel Displays</td>
<td>Samsung</td>
<td>(Approval by C.E required per project)</td>
</tr>
<tr>
<td></td>
<td>NEC</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Panasonic</td>
<td></td>
</tr>
<tr>
<td>FOH Speaker</td>
<td>Large/Specialist</td>
<td>(Approval by C.E required)</td>
</tr>
<tr>
<td></td>
<td>JBL</td>
<td>Control Series to Suit Space</td>
</tr>
<tr>
<td>Ceiling Speaker</td>
<td>JBL</td>
<td>Control 24CT, Control 26CT</td>
</tr>
<tr>
<td>Pendant Speaker</td>
<td>JBL</td>
<td>Control 60, Control 67, Control 65</td>
</tr>
<tr>
<td>Sound Bar</td>
<td>Crestron</td>
<td>Saros SB-200-P-B</td>
</tr>
<tr>
<td></td>
<td>JBL</td>
<td>Pro SoundBar PSB-1</td>
</tr>
<tr>
<td>PTZ HDMI Camera</td>
<td>Sony</td>
<td>SRG300</td>
</tr>
<tr>
<td></td>
<td>Panasonic</td>
<td>(To suit project requirements)</td>
</tr>
<tr>
<td>Document Camera</td>
<td>Wolf Vision</td>
<td>VZ8L4, VZ-3Neo</td>
</tr>
<tr>
<td></td>
<td>Elmo</td>
<td>L-12iD</td>
</tr>
<tr>
<td>Wireless Presentation System</td>
<td>Extron</td>
<td>Sharelink 250 (No WAP)</td>
</tr>
<tr>
<td>Boundary Microphone</td>
<td>Beyerdynamic</td>
<td>BM42B</td>
</tr>
<tr>
<td>Wireless Handheld Microphone</td>
<td>Sennheiser</td>
<td>SL Handheld Set DW-3-AU R</td>
</tr>
<tr>
<td>Wireless Lapel Microphone</td>
<td>Sennheiser</td>
<td>SL Lavaliel Set DW-3-AU R</td>
</tr>
<tr>
<td>Wireless Microphone Charging Bay</td>
<td>Sennheiser</td>
<td>CHG 2 or CHG 4N</td>
</tr>
<tr>
<td>Ceiling Microphone</td>
<td>Shure</td>
<td>MXA910</td>
</tr>
<tr>
<td>EQUIPMENT / DEVICE</td>
<td>MANUFACTURER</td>
<td>MODEL</td>
</tr>
<tr>
<td>---------------------------------</td>
<td>---------------</td>
<td>----------------------------------------------------------------------</td>
</tr>
<tr>
<td>AV Switch</td>
<td>Extron</td>
<td>DTP CrossPoint 84 4K IPCP SA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>DTP CrossPoint 86 4K IPCP SA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>DTP CrossPoint 108 4K IPCP SA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>IN1808 IPCP SA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>IN1804 Series (to meet project requirements)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>XTP II Series (to meet project requirements)</td>
</tr>
<tr>
<td>Twisted Pair Extenders</td>
<td>Extron</td>
<td>(to meet project requirements)</td>
</tr>
<tr>
<td>AV Control System Processor</td>
<td>Extron</td>
<td>(to meet project requirements)</td>
</tr>
<tr>
<td>Touch Panel</td>
<td>Extron</td>
<td>TLP Pro 1025T</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TLP Pro 1025M</td>
</tr>
<tr>
<td>Wireless Touch Panel</td>
<td></td>
<td>Consult with Collaboration Endpoints</td>
</tr>
<tr>
<td>Keypad</td>
<td>Extron</td>
<td>MLC Plus Series (50,100,200)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>eBus Series (EBP 50,100,200)</td>
</tr>
<tr>
<td>Digital Audio Processing</td>
<td>Biamp</td>
<td>Tesira</td>
</tr>
<tr>
<td></td>
<td>Extron</td>
<td>DMP Series</td>
</tr>
<tr>
<td>Audio Amplifier</td>
<td>Extron</td>
<td>XPA Series (to meet project requirements)</td>
</tr>
<tr>
<td></td>
<td>Large/Specialist Venue</td>
<td>(to meet project requirements)</td>
</tr>
<tr>
<td>Hearing Induction Loop</td>
<td>Ampetronic</td>
<td>(to meet project requirements)</td>
</tr>
<tr>
<td>IR Hearing Systems</td>
<td>Sennheiser</td>
<td>Transmitter: SZI 1015-T</td>
</tr>
<tr>
<td></td>
<td>Large/Specialist Venue</td>
<td>Receiver: EKI 830 with EZT 3011 neck loop</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Charger: L 300 10-10</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sennheiser (to meet project requirements)</td>
</tr>
<tr>
<td>AV Network Switch</td>
<td>Cisco</td>
<td>(Consult with Collaboration Endpoints)</td>
</tr>
<tr>
<td>Projector Mounts</td>
<td>Ultralift</td>
<td>Spyder UoM Custom</td>
</tr>
<tr>
<td>LCD Mounts</td>
<td>Ultralift</td>
<td>(to meet project &amp; serviceability requirements)</td>
</tr>
<tr>
<td></td>
<td>Chief</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Vogels</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Atdec</td>
<td></td>
</tr>
<tr>
<td>EQUIPMENT / DEVICE</td>
<td>MANUFACTURER</td>
<td>MODEL</td>
</tr>
<tr>
<td>--------------------------</td>
<td>--------------------</td>
<td>----------------------------------------------------------------------</td>
</tr>
<tr>
<td>Projector Lift</td>
<td>Ultralift</td>
<td>UoM Custom Unilift 2 (to meet project requirements)</td>
</tr>
<tr>
<td>Projection Screen</td>
<td>Screen Technics</td>
<td>(to meet project requirements)</td>
</tr>
<tr>
<td>Power Control</td>
<td>Server Edge</td>
<td>SEDG-8PSW-C13 8 Port Switched PDU: (8) IEC C13 Output &amp; (1) IEC C14 Input, 10A, 240V</td>
</tr>
<tr>
<td>Racks (Frame)</td>
<td>Elgee</td>
<td>(to meet project requirements)</td>
</tr>
<tr>
<td>Racks (Cabinet)</td>
<td>MFB</td>
<td>2005 Series</td>
</tr>
<tr>
<td>USB Cameras</td>
<td>Logitech</td>
<td>Pro PTZ 2, Rally</td>
</tr>
<tr>
<td></td>
<td>Crestron</td>
<td>UC-SB1-CAM</td>
</tr>
<tr>
<td>USB Microphone</td>
<td>Crestron</td>
<td>UC-SB1-CAM</td>
</tr>
<tr>
<td>USB Scaling Bridge</td>
<td>Extron</td>
<td>MediaPort 200</td>
</tr>
<tr>
<td></td>
<td>Shure</td>
<td>X2U</td>
</tr>
<tr>
<td>Lectern</td>
<td>Podion</td>
<td>UOM Custom, refer to Appendix E</td>
</tr>
<tr>
<td>Room Booking Panel</td>
<td>Concierge</td>
<td>ACMG10 – 10” inch booking panel</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ACMGMP – Media Player</td>
</tr>
<tr>
<td>HDMI Adapters</td>
<td>Liberty</td>
<td>Base security clamp, cable and hardware for DL-AR system DL-CL</td>
</tr>
<tr>
<td>*subject to change,</td>
<td></td>
<td>4K Mini DisplayPort to HDMI Cable Adapter 5 inches long AR-MDP4K-HDF</td>
</tr>
<tr>
<td>consult with</td>
<td></td>
<td>4K DisplayPort to HDMI Cable Adapter 5 inches long AR-DP4K-HDF</td>
</tr>
<tr>
<td>Collaboration</td>
<td></td>
<td>ALOGIC Ultra 15cm USB-C (Male) to HDMI (Female) Adapter - 4K 60Hz ULUCHD-ADP</td>
</tr>
<tr>
<td>Endpoints</td>
<td></td>
<td>With Security clamp to attach Apple Adapters to DL-AR system DL-AP</td>
</tr>
</tbody>
</table>
18.6.3. APPENDIX C: AV COMMISSIONING SHEET TEMPLATE

University of Melbourne / Collaboration Endpoints
AV Commissioning Template

Project Details
UOM Project BR Reference:

| Project Name: |  |
| Building Address: |  |
| Room No./Space: |  |
| AV Contractor: |  |
| AV Contractor’s Project Manager: |  |
| AV Contractor’s Commissioning Manager: |  |
| Date of Commissioning: |  |

Input Devices

<table>
<thead>
<tr>
<th>Item</th>
<th>Tested</th>
<th>Comments / Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Installed PC / iMac</td>
<td>Audio</td>
<td>·</td>
</tr>
<tr>
<td></td>
<td>Video</td>
<td>·</td>
</tr>
<tr>
<td>Laptop Connection Plate</td>
<td>Audio</td>
<td>·</td>
</tr>
<tr>
<td></td>
<td>Video</td>
<td>·</td>
</tr>
<tr>
<td>Document Camera</td>
<td>Video</td>
<td>·</td>
</tr>
<tr>
<td>Web Conferencing System</td>
<td>Video</td>
<td>·</td>
</tr>
<tr>
<td></td>
<td>Audio</td>
<td>·</td>
</tr>
<tr>
<td></td>
<td>AEC</td>
<td>·</td>
</tr>
<tr>
<td></td>
<td>Content Sharing</td>
<td>·</td>
</tr>
<tr>
<td>Boundary Microphone</td>
<td>Audio</td>
<td>·</td>
</tr>
<tr>
<td>Wireless handheld Mic</td>
<td>Audio</td>
<td>·</td>
</tr>
<tr>
<td>Wireless Lapel Mic</td>
<td>Audio</td>
<td>·</td>
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### Output Devices

<table>
<thead>
<tr>
<th>Item</th>
<th>Tested</th>
<th>Comments / Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Video/Data Projector</td>
<td>Video</td>
<td></td>
</tr>
<tr>
<td>LCD Panel</td>
<td>Audio</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Video</td>
<td></td>
</tr>
<tr>
<td>Lecture Capture System</td>
<td>Audio</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Video</td>
<td></td>
</tr>
<tr>
<td>Front of House Speaker</td>
<td>Audio</td>
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<tr>
<td>Ceiling Speakers</td>
<td>Audio</td>
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</tr>
<tr>
<td>Hearing Augmentation Sys.</td>
<td>Audio</td>
<td></td>
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</tbody>
</table>

Hearing induction loop system compliance certificate provided as per AS1428.5-2010  Yes/No

### Control System

<table>
<thead>
<tr>
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<tr>
<td>AV Switching</td>
<td>Audio</td>
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</tr>
<tr>
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<td>Video</td>
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<tr>
<td>Audio DSP</td>
<td>Levels</td>
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<tr>
<td>Projector Lift</td>
<td>Up/Down</td>
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<tr>
<td>Podion Lectern</td>
<td>Up/Down</td>
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<tr>
<td>Lighting</td>
<td>ON</td>
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<td>Helpdesk</td>
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<td></td>
<td>GVE</td>
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<td>Touch Panel</td>
<td>Layout</td>
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<td>Icons</td>
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<td>Labels</td>
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Other

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<th>Item</th>
<th>Tested</th>
<th>Comments / Notes</th>
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<tbody>
<tr>
<td>Cable Management</td>
<td>•</td>
<td></td>
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<tr>
<td>All devices on network</td>
<td>•</td>
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<tr>
<td>(Contractor to specify)</td>
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18.6.4. APPENDIX D: UOM PROJECT ASSET AND IP SCHEDULE TEMPLATE

### Room Booking Information

<table>
<thead>
<tr>
<th>Building Number</th>
<th>Building Name</th>
<th>Room Number</th>
<th>Room Name/Type</th>
<th>AV Integrator</th>
<th>Project Name / Number</th>
<th>Integrator Job Number</th>
<th>Fire Isolation</th>
<th>Room Booking Start</th>
<th>Room Booking Finish</th>
<th>Faculty</th>
<th>Status</th>
<th>Contact</th>
<th>Handover Date</th>
<th>Notes</th>
</tr>
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<tbody>
<tr>
<td>266</td>
<td>266</td>
<td>1-105</td>
<td>Small Meeting</td>
<td>Meeting</td>
<td>Room/Pilot Space</td>
<td>Requested</td>
<td>1/01/2022</td>
<td>2/02/2022</td>
<td>Uni Services</td>
<td>Design</td>
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<td>2/03/2022</td>
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<td>256</td>
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### IP and Asset Details

<table>
<thead>
<tr>
<th>Building Number</th>
<th>Building Name</th>
<th>Room Num</th>
<th>Room Name/Type</th>
<th>AV Integrator</th>
<th>Project Name</th>
<th>Handover Date</th>
<th>Device (Category)</th>
<th>Manufacturer</th>
<th>Model Name</th>
<th>Part Number</th>
<th>Manufacturer Warranty</th>
<th>Serial Number</th>
<th>VLAN</th>
<th>MAC Address</th>
<th>Outlet/Port Number</th>
<th>Switch/Port Number</th>
<th>Comments</th>
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<tbody>
<tr>
<td>104</td>
<td>OLD ENGINEERING</td>
<td>104</td>
<td>Small Meeting</td>
<td>Meeting</td>
<td>Room/Pilot Space</td>
<td>Requested</td>
<td>Small Meeting</td>
<td>Pioneer</td>
<td>Model</td>
<td>Part Number</td>
<td>Manufacturer Warranty</td>
<td>Serial Number</td>
<td>VLAN</td>
<td>MAC Address</td>
<td>Outlet/Port Number</td>
<td>Switch/Port Number</td>
<td>Comments</td>
</tr>
<tr>
<td>266</td>
<td>266</td>
<td>1-105</td>
<td>Small Meeting</td>
<td>Meeting</td>
<td>Room/Pilot Space</td>
<td>Requested</td>
<td>Small Meeting</td>
<td>Pioneer</td>
<td>Model</td>
<td>Part Number</td>
<td>Manufacturer Warranty</td>
<td>Serial Number</td>
<td>VLAN</td>
<td>MAC Address</td>
<td>Outlet/Port Number</td>
<td>Switch/Port Number</td>
<td>Comments</td>
</tr>
</tbody>
</table>
18.6.5. APPENDIX E: UOM STANDARD LECTERN DESIGN
- Height adjustable lectern for University of Melbourne.
- 1500mm wide benchtop.
- Fully wheelchair accessible.
- 300mm of height adjustment.
- Melbourne metropolitan delivery included to the room if requested.
- University of Melbourne logo panel included as part of lectern.

- 2X 5RU slide out racks behind hinged logo panel.

- Locked using UoM standard combination lock located on benchtop.
Supplied Benchtop Items
- Extron Cable Cubby 202
- LED Reading Light and Switch
- Cable Entry Hole and Cover
- 2x 3RU slide out rack on presenters side of lectern.
- Can be locked in with UoM standard combination lock.
- Other access panels all locked with UoM standard combination lock.
- Hinged base cover to give access to floor box and column.
- Covers are held up with torsion hinges.
- Height adjustable lectern for University of Melbourne.
- 1000mm wide benchtop.
- Fully wheelchair accessible.
- 300mm of height adjustment.
- Melbourne metropolitan delivery included to the room if requested.
- University of Melbourne logo panel included as part of lectern.

- 5RU slide out rack behind hinged logo panel.

- Locked using UoM standard combination lock located on benchtop.
Supplied Benchtop Items
- Extron Cable Cubby 202
- LED Reading Light and Switch
- Cable Entry Hole and Cover
- 3RU slide out rack on presenters side of lectern.
- Can be locked in with UoM standard combination lock.
- Other access panels all locked with UoM standard combination lock.
- Hinged base covers to give access to floorbox and column.
- Covers are held up with torsion hinges.
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- Height adjustable lectern for University of Melbourne.
- 1500mm wide benchtop.
- Reduced benchtop and base depth.
- 300mm of height adjustment.
- Melbourne metropolitan delivery included to the room if requested.
- University of Melbourne logo panel included as part of lectern.

- 2X 5RU slide out rack behind hinged logo panel.

- Locked using UoM standard combination lock located on benchtop.
INDICATIVE LAYOUT ONLY
CONSULT WITH UoM

Supplied Benchtop Items
- Extron Cable Cubby 202
- LED Reading Light and Switch
- Cable Entry Hole and Cover
- Hinged access panels to rear of 5RU slide out rack.

- Can be locked in with UoM standard combination lock.

- Other access panels all locked with UoM standard combination lock.
- Hinged base cover to give access to floor box and column.

- Covers are held up with torsion hinges.
- Height adjustable lectern for University of Melbourne.
- 1900mm wide benchtop.
- Fully wheelchair accessible.
- 300mm of height adjustment.
- Melbourne metropolitan delivery included to the room if requested.
- University of Melbourne logo panel included as part of lectern.

- 2X 5RU slide out racks behind hinged logo panel.

- Locked using UoM standard combination lock located on benchtop.
Supplied Benchtop Items
- Extron Cable Cubby 202
- LED Reading Light and Switch
- Cable Entry Holes and Covers
- 2x 3RU slide out rack on presenters side of lectern.
- Can be locked in with UoM standard combination lock.
- Other access panels all locked with UoM standard combination lock.
- Hinged base cover to give access to floor box and column.
- Covers are held up with torsion hinges.
- Base must be

NOTE: LECTERN MUST BE BOLTED TO THE FLOOR WHEN INSTALLED FOR STABILITY
REMOVABLE LOGO PANEL
UNIVERSITY OF MELBOURNE LOGO WHITE ON BLUE
PROVIDED AS STANDARD
OTHER PRINTS CAN BE SPECIFIED

NOTE: LOGO PANEL IS CURVED
PRINT DIMENSIONS ARE 278X350
2X XLR SHOCK MOUNTS

BOOK STOP STRIP
CABLE ENTRY HOLE IN BASE PLATE

140.00

40.00
UOM-TDP SPEC SHEET
- Height adjustable lectern for University of Melbourne.
- 1125mm wide benchtop.
- Wheelchair accessible.
- 300mm of height adjustment.
- Melbourne metropolitan delivery included to the room if requested.
Supplied Benchtop Items
- Extron Cable Cubby 202
- LED Reading Light and Switch
- Cable Entry Hole and Cover
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The information contained in this drawing is the sole property of Podion Global PTY LTD. Any reproduction in part or as a whole without the written permission of Podion Global PTY LTD is prohibited. Specification subject to change without notice. Dimensions, weights, materials, etc. are shown for illustration purposes only and are not necessarily actual.

3RU SLIDE OUT RACK BEHIND HINGED FRONT PANEL

1RU RACK STRIPS RUNNING SIDEWAYS

COMBINATION LOCK

162.80

234.48
- Castor wheels on lectern base plate.
- Increases overall lectern height by 70mm minimum and maximum
- Lockable castors at presenters side of lectern
- Security plate for 3RU rack on Orion range lecterns.
- Mounts to rack cage nuts (included).
- Solid steel with satin powdercoat finish.
- Slide out pencil drawer.

- Mounts underneath benchtop.
- Flo montior arm.
- Camps onto lectern benchtop.
- 341mm verticle adjustment.
- 3-9 KG screen weight range.
18.6.6.  APPENDIX F: DIGITAL SIGNAGE COMMISSIONING SHEET

**SAMSUNG MAGIC INFOR - DIGITAL SIGNAGE SETUP**

**Ensure that WIRED MAC address is provided on IP and Asset Sheet**

1. Press the MENU button on the remote control.
2. Select Support
3. Select Contact Samsung
4. Enter Wired MAC address on IP and Asset Spreadsheet

**Turn on Wired Network Connectivity**

1. Press the MENU button on the remote control.
2. Select Network - Open Network Settings.
3. Select Wired. – The network test screen appears and then the verification process starts.
4. When the connection has been verified, select OK

**Activate Network Standby**

1. Press the MENU button on the remote control.
2. Select System - Open System Settings.
3. Select Power Control
4. Select Network Standby – ensure this is ON

**Connect to Magic Info Server**

1. Press the MENU button on the remote control.
2. Select Network - Open Network Settings.
3. Select Server Network Settings
4. Select Connect to Server, Enter : 172.24.80.81
5. Advise Collaboration Endpoints once above steps are completed so that the screen can be approved on server

**UOM Unified License Key for Magic Infor Server (for Digital Signage) : 01014A-YNOYUD-UNM2TA-UW65**

**UOM RM License Key for Magic Infor Server (for FLIP Screens) : 01064A-HSE4KC-WETTV6-I6Q5**
### APPENDIX G: PROFESSIONAL MEETING SPACES AV EQUIPMENT

<table>
<thead>
<tr>
<th>Space Type</th>
<th>Description</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Small Meeting Rooms (4-5 Persons) SMR</strong></td>
<td>Crestron Flex running Zoom or Teams, including UC Engine, User Interface, Sound Bar &amp; Camera</td>
<td>UC-B160-Z</td>
</tr>
<tr>
<td></td>
<td>Samsung LCD Screen</td>
<td>To suit room size, approx. 55”</td>
</tr>
<tr>
<td></td>
<td>Screen Wall Mount</td>
<td>Chief MTM1U</td>
</tr>
<tr>
<td></td>
<td>HDMI Cable with adaptors for user laptops installed near screen on hook</td>
<td>Crestron HD-TX-101-C-E</td>
</tr>
<tr>
<td></td>
<td>HDMI Transmitter &amp; Receiver</td>
<td>Crestron HD-RX-101-C-E</td>
</tr>
<tr>
<td></td>
<td>Motion Sensor</td>
<td>Crestron GLS-ODT-C-CN</td>
</tr>
<tr>
<td></td>
<td>Control System</td>
<td>Crestron RMC3 for motion sensor &amp; equipment monitoring</td>
</tr>
<tr>
<td></td>
<td>Room Monitoring</td>
<td>XIO Cloud &amp; Fusion</td>
</tr>
<tr>
<td></td>
<td>Room Booking Display</td>
<td>Concierge &amp; appropriate wall mount</td>
</tr>
<tr>
<td><strong>Medium Meeting Rooms (6-9 Persons) MMR</strong></td>
<td>Crestron Flex running Zoom or Teams, including UC Engine, User Interface, Sound Bar &amp; Camera</td>
<td>UC-B160-Z</td>
</tr>
<tr>
<td></td>
<td>Samsung LCD Screen</td>
<td>To suit room size, approx. 65”</td>
</tr>
<tr>
<td></td>
<td>Screen Wall Mount</td>
<td>Chief MTM1U</td>
</tr>
<tr>
<td></td>
<td>HDMI Cable with adaptors for user laptops installed in cable cubby</td>
<td>Crestron GLS-ODT-C-CN</td>
</tr>
<tr>
<td></td>
<td>Motion Sensor</td>
<td>Extron Cable Cubby 1202 Brushed Aluminium &amp; Series/2 AC Module, Australia</td>
</tr>
<tr>
<td></td>
<td>Cable Cubby</td>
<td>Crestron HD-TX-101-C-E</td>
</tr>
<tr>
<td></td>
<td>HDMI Extenders</td>
<td>Crestron HD-RX-101-C-E</td>
</tr>
<tr>
<td></td>
<td>Control System</td>
<td>Crestron RMC3 for motion sensor &amp; equipment monitoring</td>
</tr>
<tr>
<td></td>
<td>Room Monitoring</td>
<td>XIO Cloud &amp; Fusion</td>
</tr>
<tr>
<td></td>
<td>Room Booking Display</td>
<td>Concierge 10.1” &amp; appropriate wall mount</td>
</tr>
<tr>
<td></td>
<td>ECD floor track system with transition kit (where no floor box is present)</td>
<td>FloorTrack</td>
</tr>
<tr>
<td></td>
<td>Power under desk mounting kit c/w quad power module (soft wired) (where no floor box is present)</td>
<td>ECD PMK4P with CL1000BK, SSPBK</td>
</tr>
<tr>
<td>Space Type</td>
<td>Description</td>
<td>Model</td>
</tr>
<tr>
<td>-----------------------------------------</td>
<td>------------------------------------------------------------------------------</td>
<td>--------------------------------------------</td>
</tr>
<tr>
<td>Large Meeting Rooms (10-12 Persons) LMR</td>
<td>Crestron Flex running Zoom or Teams, including UC Engine, User Interface, Sound Bar &amp; Camera*</td>
<td>UC-B160-Z or UC-C160-Z* *Depending on Room Size</td>
</tr>
<tr>
<td>Samsung LCD Screen</td>
<td>To suit room size, approx. 75”</td>
<td>Chief LTM1U</td>
</tr>
<tr>
<td>Motion Sensor</td>
<td>Crestron GLS-ODT-C-CN</td>
<td></td>
</tr>
<tr>
<td>Cable Cubby</td>
<td>Extron Cable Cubby 1202 Brushed Aluminium &amp; Series/2 AC Module, Australia</td>
<td></td>
</tr>
<tr>
<td>HDMI Extenders</td>
<td>Crestron HD-TX-101-C-E</td>
<td>Crestron HD-RX-101-C-E</td>
</tr>
<tr>
<td>Control System</td>
<td>Crestron RMC3 for motion sensor &amp; equipment monitoring</td>
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<tr>
<td>Room Monitoring</td>
<td>XIO Cloud &amp; Fusion</td>
<td>XIO Registration Licence SW-XIOC-P-1</td>
</tr>
<tr>
<td>Room Booking Display</td>
<td>Concierge 10.1” &amp; appropriate wall mount</td>
<td></td>
</tr>
<tr>
<td>ECD floor track system with transition kit (where no floor box is present)</td>
<td>FloorTrack</td>
<td></td>
</tr>
<tr>
<td>Power under desk mounting kit c/w quad power module (soft wired) (where no floor box is present)</td>
<td>ECD PMK4P with CL1000BK, SSPBK</td>
<td></td>
</tr>
<tr>
<td>Space Type</td>
<td>Description</td>
<td>Model</td>
</tr>
<tr>
<td>Board Rooms (12+ persons) BR</td>
<td>Crestron Flex running Zoom or Teams, including UC Engine, User Interface</td>
<td>UC-C160-Z</td>
</tr>
<tr>
<td>Samsung LCD Screen or Projector to suit room size</td>
<td>To suit room size</td>
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</tr>
<tr>
<td>HDMI Cable with adaptors for user laptops</td>
<td>Crestron GLS-ODT-C-CN</td>
<td></td>
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<tr>
<td>Motion Sensor</td>
<td>Extron Cable Cubby 1202 Brushed Aluminium &amp; Series/2 AC Module, Australia</td>
<td></td>
</tr>
<tr>
<td>HDMI Extenders</td>
<td>Crestron HD-TX-101-C-E</td>
<td>Crestron HD-RX-101-C-E</td>
</tr>
<tr>
<td>Camera</td>
<td>Logitech Rally</td>
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<td>Ceiling Speakers for Audio Reinforcement</td>
<td>JBL Control 24CT</td>
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<tr>
<td>Amplifier</td>
<td>To suit room system</td>
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<tr>
<td>Microphone</td>
<td>Shure MXA 910</td>
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</tr>
<tr>
<td>DSP</td>
<td>Biamp Tesira with Dante</td>
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<tr>
<td>Integration with lights and blind as necessary</td>
<td>As per project requirements</td>
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### Project Rooms PR

<table>
<thead>
<tr>
<th>Control System</th>
<th>Crestron to suit project requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Room Monitoring</td>
<td>XIO Cloud &amp; Fusion</td>
</tr>
<tr>
<td></td>
<td>XIO Registration Licence SW-XIOC-P-1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Room Monitoring Display</th>
<th>Concierge 10.1” &amp; appropriate wall mount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Samsung LCD Screen</td>
<td>To suit room size</td>
</tr>
<tr>
<td>HDMI Cable with adaptors for user laptops</td>
<td></td>
</tr>
<tr>
<td>Keypad for control</td>
<td>Extron MLC PLUS100</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Motion Sensor</th>
<th>To suit room size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Room Monitoring</td>
<td>Extron GVE</td>
</tr>
<tr>
<td>Optional Camera and Soundbar for conferencing</td>
<td>Crestron Flex Soundbar with Camera, dependant on room size</td>
</tr>
<tr>
<td>Room Booking Display</td>
<td>Concierge 10.1” &amp; appropriate wall mount</td>
</tr>
</tbody>
</table>

### Table: Space Type and Requirements

<table>
<thead>
<tr>
<th>Space Type</th>
<th>Power Required</th>
<th>Data Required</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Small</strong></td>
<td>3 x DGPO Behind Screen</td>
<td>4 x Data Behind Screen</td>
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<tr>
<td></td>
<td>1 x DGPO for user devices</td>
<td>1 x Data for Booking Panel</td>
</tr>
<tr>
<td><strong>Medium</strong></td>
<td>3 x DGPO Behind Screen</td>
<td>3 x Data Behind Screen</td>
</tr>
<tr>
<td></td>
<td>1 x DGPO beneath table</td>
<td>1 x Data beneath table</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1 x Data for Booking Panel</td>
</tr>
<tr>
<td><strong>Large</strong></td>
<td>3 x DGPO Behind Screen</td>
<td>3 x Data Behind Screen</td>
</tr>
<tr>
<td></td>
<td>1 x DGPO beneath table</td>
<td>1 x Data beneath table</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1 x Data for Booking Panel</td>
</tr>
<tr>
<td><strong>Boardrooms</strong></td>
<td>As required by design</td>
<td>As required by design</td>
</tr>
<tr>
<td><strong>Project Rooms</strong></td>
<td>2 x DGPO Behind Screen</td>
<td>3 x Data Behind Screen</td>
</tr>
<tr>
<td></td>
<td>1 x DGPO for user devices</td>
<td>1 x Data for Booking Panel if present</td>
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### Extron DTP Crosspoint 84

<table>
<thead>
<tr>
<th>Inputs</th>
<th>Source</th>
<th>Outputs</th>
<th>Source</th>
<th>Control</th>
<th>Device</th>
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<tbody>
<tr>
<td>VIDEO</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HDMI 1</td>
<td>iMac/PC</td>
<td>VIDEO 1</td>
<td>Lecture Capture</td>
<td>Com 1</td>
<td>Lights</td>
</tr>
<tr>
<td>HDMI 2</td>
<td>Laptop</td>
<td>HDMI 2</td>
<td>Media Port</td>
<td>Com 2</td>
<td>PTZ Camera</td>
</tr>
<tr>
<td>HDMI 3</td>
<td>Sharelink</td>
<td>DTP 3</td>
<td>Display 1</td>
<td>Com 3</td>
<td>Motion Sensor1</td>
</tr>
<tr>
<td>HDMI 4</td>
<td>Doc Camera1</td>
<td>DTP 4</td>
<td>Display 2</td>
<td>Digital I/O 1</td>
<td>Motion Sensor2</td>
</tr>
<tr>
<td>HDMI 5</td>
<td>Doc Camera2</td>
<td></td>
<td></td>
<td>Digital I/O 2</td>
<td>Motion Sensor3</td>
</tr>
<tr>
<td>HDMI 6</td>
<td>Spare</td>
<td></td>
<td></td>
<td>Digital I/O 3</td>
<td></td>
</tr>
<tr>
<td>DTP 7</td>
<td>Remote Input 1</td>
<td></td>
<td></td>
<td>Digital I/O 4</td>
<td></td>
</tr>
<tr>
<td>DTP 8</td>
<td>Remote Input 2</td>
<td></td>
<td></td>
<td>IR/Serial</td>
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### Extron INI808

<table>
<thead>
<tr>
<th>Inputs</th>
<th>Source</th>
<th>Outputs</th>
<th>Source</th>
<th>Control</th>
<th>Device</th>
</tr>
</thead>
<tbody>
<tr>
<td>VIDEO</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DisplayPort 1</td>
<td>blank</td>
<td>HDMI 1</td>
<td>Lecture Capture</td>
<td>Com 1</td>
<td>Lights</td>
</tr>
<tr>
<td>HDMI 2</td>
<td>iMac/PC</td>
<td>HDMI 2</td>
<td>Media Port</td>
<td>Com 2</td>
<td>PTZ Camera</td>
</tr>
<tr>
<td>HDMI 3</td>
<td>Laptop</td>
<td>DTP 2</td>
<td>Display</td>
<td>Com 3</td>
<td>Motion Sensor1</td>
</tr>
<tr>
<td>HDMI 4</td>
<td>Sharelink</td>
<td></td>
<td></td>
<td>Digital I/O 1</td>
<td>Motion Sensor2</td>
</tr>
<tr>
<td>HDMI 5</td>
<td>Doc Camera1</td>
<td></td>
<td></td>
<td>Digital I/O 2</td>
<td>Motion Sensor3</td>
</tr>
<tr>
<td>HDMI 6</td>
<td>Doc Camera2</td>
<td></td>
<td></td>
<td>Digital I/O 3</td>
<td></td>
</tr>
<tr>
<td>DTP 7</td>
<td>Remote 1</td>
<td></td>
<td></td>
<td>Digital I/O 4</td>
<td></td>
</tr>
<tr>
<td>DTP 8</td>
<td>Remote 2 (PTZ Camera)</td>
<td></td>
<td></td>
<td>JR/Serial</td>
<td></td>
</tr>
</tbody>
</table>

### Appendix H: Device Configuration

#### Extron DTP Crosspoint 84

- **Inputs:**
  - HDMI 1: iMac/PC
  - HDMI 2: Laptop
  - HDMI 3: Sharelink
  - HDMI 4: Doc Camera1
  - HDMI 5: Doc Camera2
  - HDMI 6: Spare
  - DTP 7: Remote Input 1
  - DTP 8: Remote Input 2 (PTZ Camera)

- **Outputs:**
  - HDMI 1: Lecture Capture
  - HDMI 2: Media Port
  - DTP 3: Display 1
  - DTP 4: Display 2

- **Control:**
  - Com 1: Lights
  - Com 2: PTZ Camera
  - Com 3: Motion Sensor1
  - Digital I/O 1: Motion Sensor2
  - Digital I/O 2: Motion Sensor3
  - Digital I/O 3: Motion Sensor4
  - Digital I/O 4: Motion Sensor5

- **Device:**
  - Option 1
  - Option 2 (PTZ Camera)

#### Extron INI808

- **Inputs:**
  - DisplayPort 1: blank
  - HDMI 2: iMac/PC
  - HDMI 3: Laptop
  - HDMI 4: Sharelink
  - HDMI 5: Doc Camera1
  - HDMI 6: Doc Camera2
  - DTP 7: Remote 1
  - DTP 8: Remote 2 (PTZ Camera)

- **Outputs:**
  - HDMI 1: Lecture Capture
  - HDMI 2: Media Port
  - HDMI 3: Loop Out
  - HDMI 4: Loop Feed Mono

- **Control:**
  - Com 1: Lights
  - Com 2: PTZ Camera
  - Com 3: Motion Sensor1
  - Digital I/O 1: Motion Sensor2
  - Digital I/O 2: Motion Sensor3
  - Digital I/O 3: Motion Sensor4
  - Digital I/O 4: Motion Sensor5

- **Device:**
  - Option 1
  - Option 2 (PTZ Camera)
### CISCO 3560-cx Managed Switch

#### Teaching Spaces Configuration

<table>
<thead>
<tr>
<th>Port</th>
<th>VLAN</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>UoM Mobility</td>
<td>Phone</td>
</tr>
<tr>
<td>2</td>
<td>UoM Mobility</td>
<td>Presenter PC</td>
</tr>
<tr>
<td>3</td>
<td>MITS</td>
<td>Sharelink</td>
</tr>
<tr>
<td>4</td>
<td>LS</td>
<td>Mic Rx1</td>
</tr>
<tr>
<td>5</td>
<td>LS</td>
<td>Mic Rx2</td>
</tr>
<tr>
<td>6</td>
<td>LS</td>
<td>MediaPort</td>
</tr>
<tr>
<td>7</td>
<td>LS</td>
<td>AVVLAN - DTPCrosspoint</td>
</tr>
<tr>
<td>8</td>
<td>LS</td>
<td>IPCP LAN - DTP Crosspoint</td>
</tr>
<tr>
<td>9</td>
<td>LS</td>
<td>Touchlink Panel / Keypad</td>
</tr>
<tr>
<td>10</td>
<td>LS</td>
<td>Projector</td>
</tr>
<tr>
<td>11</td>
<td>LS</td>
<td>PDU</td>
</tr>
<tr>
<td>12</td>
<td>LS</td>
<td>DSP</td>
</tr>
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<td>13</td>
<td>Uplink</td>
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#### Meeting Spaces Configuration

<table>
<thead>
<tr>
<th>Port</th>
<th>VLAN</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>MITS</td>
<td>UC Engine</td>
</tr>
<tr>
<td>2</td>
<td>MITS</td>
<td>FPD</td>
</tr>
<tr>
<td>3</td>
<td>MITS</td>
<td>Touchpanel</td>
</tr>
<tr>
<td>4</td>
<td>MITS</td>
<td>Microphone</td>
</tr>
<tr>
<td>5</td>
<td>MITS</td>
<td>DSP Control</td>
</tr>
<tr>
<td>6</td>
<td>MITS</td>
<td>DSP Dante</td>
</tr>
<tr>
<td>7</td>
<td>MITS</td>
<td>Video Switcher / Extender</td>
</tr>
<tr>
<td>8</td>
<td>MITS</td>
<td>Booking Panel</td>
</tr>
<tr>
<td>9</td>
<td>MITS</td>
<td>Control System</td>
</tr>
<tr>
<td>10</td>
<td>MITS</td>
<td>Ceiling Mic Control</td>
</tr>
<tr>
<td>11</td>
<td>MITS</td>
<td>Ceiling Mic Dante</td>
</tr>
<tr>
<td>12</td>
<td>MITS</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Uplink</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Uplink</td>
<td></td>
</tr>
</tbody>
</table>
## Appendix I: AV Project Preaward Agenda Sample

<table>
<thead>
<tr>
<th>Agenda Item</th>
<th>To be discussed</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Schedule</strong></td>
<td>Confirm installation schedule and room bookings once equipment ETAs are known</td>
</tr>
<tr>
<td></td>
<td>C.E to provide access to project Asset and IP schedule - AV Contractor to confirm staff that will need access</td>
</tr>
<tr>
<td></td>
<td>Handover to occur minimum 2 days prior to room booking ending</td>
</tr>
<tr>
<td></td>
<td>Submission of User Guides &amp; As-built Drawings</td>
</tr>
<tr>
<td><strong>Site Survey</strong></td>
<td>Site-survey prior to installation commencing, with PM, AV contractor &amp; Builder</td>
</tr>
<tr>
<td></td>
<td>Testing of any equipment to be re-used in new system by AV Contractor</td>
</tr>
<tr>
<td><strong>Coordination</strong></td>
<td>Delivery of any Lecterns</td>
</tr>
<tr>
<td></td>
<td>Final positioning of equipment on lectern to be confirmed on site by C.E</td>
</tr>
<tr>
<td></td>
<td>IT, Phones and Lecture Capture</td>
</tr>
<tr>
<td></td>
<td>Confirm roles and responsibilities, and communication plan</td>
</tr>
<tr>
<td></td>
<td>Submit any RFIs to the project manager and C.E for response, and AV consultant if engaged</td>
</tr>
<tr>
<td></td>
<td>GVE Programming Guide and expectations for room monitoring</td>
</tr>
<tr>
<td><strong>Access</strong></td>
<td>Keys for AV cupboards and equipment can be checked out from the C.E office at 11 Barry St Level 1</td>
</tr>
<tr>
<td></td>
<td>Building keys can be checked out from security - staff must complete UoM induction</td>
</tr>
<tr>
<td><strong>Asset Management</strong></td>
<td>Decommissioned equipment process. Spreadsheet to be populated for C.E to be able to advise what will be returned to C.E and what will be sent to e-waste. A minimum of 24 hours notice is required for UoM to provide advice on decommissioned equipment.</td>
</tr>
<tr>
<td></td>
<td>All new asset details to be recorded in the Asset and IP spreadsheet</td>
</tr>
<tr>
<td><strong>Submissions</strong></td>
<td>Submission of shop drawings prior to installation</td>
</tr>
<tr>
<td><strong>Networks</strong></td>
<td>If any new data points are required, please treat these as high priorities to give networks enough time to configure - 10 working days required.</td>
</tr>
<tr>
<td></td>
<td>If re-using network points, label the port per what equipment is connected prior to decommissioning so that they can easily be reused with the new system.</td>
</tr>
<tr>
<td></td>
<td>Use the C.E IP address template to record all MAC addresses and network point information. Once MAC addresses have been submitted to C.E, IP addresses will be supplied. A minimum of 24 hours notice is required for C.E to provide IP addresses once all MAC addresses have been supplied.</td>
</tr>
<tr>
<td></td>
<td>When managed Cisco switches are being provided by UoM, these are to be picked up at 11 Barry St by AV Contractor</td>
</tr>
<tr>
<td><strong>Client Supplied Items</strong></td>
<td>UoM Supplied items such as IP Phones, computers, Cisco Switches require a minimum 24 hours notice from AV contractor prior to pickup.</td>
</tr>
<tr>
<td></td>
<td>For any items that need to be unlocked in spaces, such as computers and phones, a minimum of 24 hours notice is required so that Field Services may attend the site.</td>
</tr>
<tr>
<td><strong>Check-point Reports</strong></td>
<td>Weekly Checkpoint Reports are to be submitted to the project manager and C.E each Wednesday. Template is available from the project manager if required.</td>
</tr>
<tr>
<td><strong>Handover</strong></td>
<td>Commissioning reports can be submitted to C.E and/or AV Consultant prior to handover, which will be staged as per the room booking schedule</td>
</tr>
<tr>
<td></td>
<td>Defects to be tracked via Project Asset and IP Schedule spreadsheet</td>
</tr>
<tr>
<td></td>
<td>Handover should occur a minimum of 2 days prior to room booking ending to allow support teams such as LSS &amp; Lecture Capture to transition these spaces into operations</td>
</tr>
<tr>
<td></td>
<td>As-built drawings, completed asset and IP schedule, user guides as per guidelines will need to be submitted after room handover</td>
</tr>
<tr>
<td><strong>Risks and Constraints</strong></td>
<td>Any risks identified by UoM staff or awarded contractors that will need to be addressed to ensure that project can be delivered as specified</td>
</tr>
</tbody>
</table>
### Programming & Commissioning Checklist

The GVE Server ID location is: **172.22.8.31**

#### Global Scripter

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>☐ Standard GVE IDs used</td>
<td></td>
</tr>
<tr>
<td>☐ All devices being controlled are being monitored and have GVE IDs allocated</td>
<td></td>
</tr>
<tr>
<td>☐ Firmware has been updated</td>
<td></td>
</tr>
<tr>
<td>☐ File provided to Collaboration Endpoints</td>
<td></td>
</tr>
</tbody>
</table>

#### Global Configurator

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>☐ GVE Enabled</td>
<td></td>
</tr>
<tr>
<td>☐ Global Viewer Location Created with Standard Room Name Used</td>
<td></td>
</tr>
<tr>
<td>☐ ‘Report GVE Input’ function applied to all input sources.</td>
<td></td>
</tr>
<tr>
<td>☐ All system devices are added to GVE location</td>
<td></td>
</tr>
<tr>
<td>☐ Firmware has been updated</td>
<td></td>
</tr>
<tr>
<td>☐ File provided to Collaboration Endpoints</td>
<td></td>
</tr>
</tbody>
</table>

#### DSPs

<table>
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<tr>
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<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>☐ Inputs and Outputs labelled</td>
<td></td>
</tr>
<tr>
<td>☐ All mixer blocks are labelled</td>
<td></td>
</tr>
<tr>
<td>☐ Firmware has been updated</td>
<td></td>
</tr>
<tr>
<td>☐ File provided to Collaboration Endpoints</td>
<td></td>
</tr>
</tbody>
</table>

#### AV Switchers

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>☐ Inputs and Outputs labelled</td>
<td></td>
</tr>
<tr>
<td>☐ Firmware has been updated</td>
<td></td>
</tr>
<tr>
<td>☐ File provided to Collaboration Endpoints</td>
<td></td>
</tr>
</tbody>
</table>