



VISUAL DISPLAYS

TEAMS ROOMS 2022

Microsoft's refreshed Hive campus. What we can deliver today from these visions of tomorrow.

22 July 2022
Greg Jeffreys

DISPLAYS, LIGHT & ENVIRONMENTAL EXPERTISE
PRODUCTS, SERVICES, SPECIALIST CONSULTANCY

Presenter – Greg Jeffreys



VISUAL DISPLAYS



- ▶ Managing Director of Visual Displays (formerly Paradigm AV)
- ▶ Specialist consultant in standards, displays, light & lighting, VC lighting, teaching space & meeting room design
 - ▶ Not an AV consultant!
- ▶ Current chair, AVIXA Standards Steering Committee
- ▶ Lead writer, PISCR image contrast standard – and new ISCR standard task group
- ▶ Task group chair ANSI/AVIXA DISCAS standard – image size, resolution, viewing positions/angles, content size guidance
- ▶ Task group working on AVIXA's new UX for AV Design standard
- ▶ President of InfoComm/AVIXA 2012, board member 2008-13
- ▶ Writer and teacher
- ▶ 2020 Outstanding Contribution Award – AV Technology Awards
- ▶ Proud associate of LTSMG & AV User Group

These views are mine – not Microsoft's!

- ▶ This presentation is based on:
 - ▶ The Hive – video of refreshed facility on Microsoft's Redmond Campus
 - ▶ New White Paper I wrote for Microsoft to discuss and expand on their published MTR- related collateral
 - ▶ <https://visualdisplaysltd.com/resources/resources/Microsoft-Teams-Rooms-Displays-Projection-and-the-bigger-picture>

Microsoft Teams
Rooms – Displays,
Projection and the
bigger picture

A White Paper by Greg Jeffreys, Visual Displays Ltd

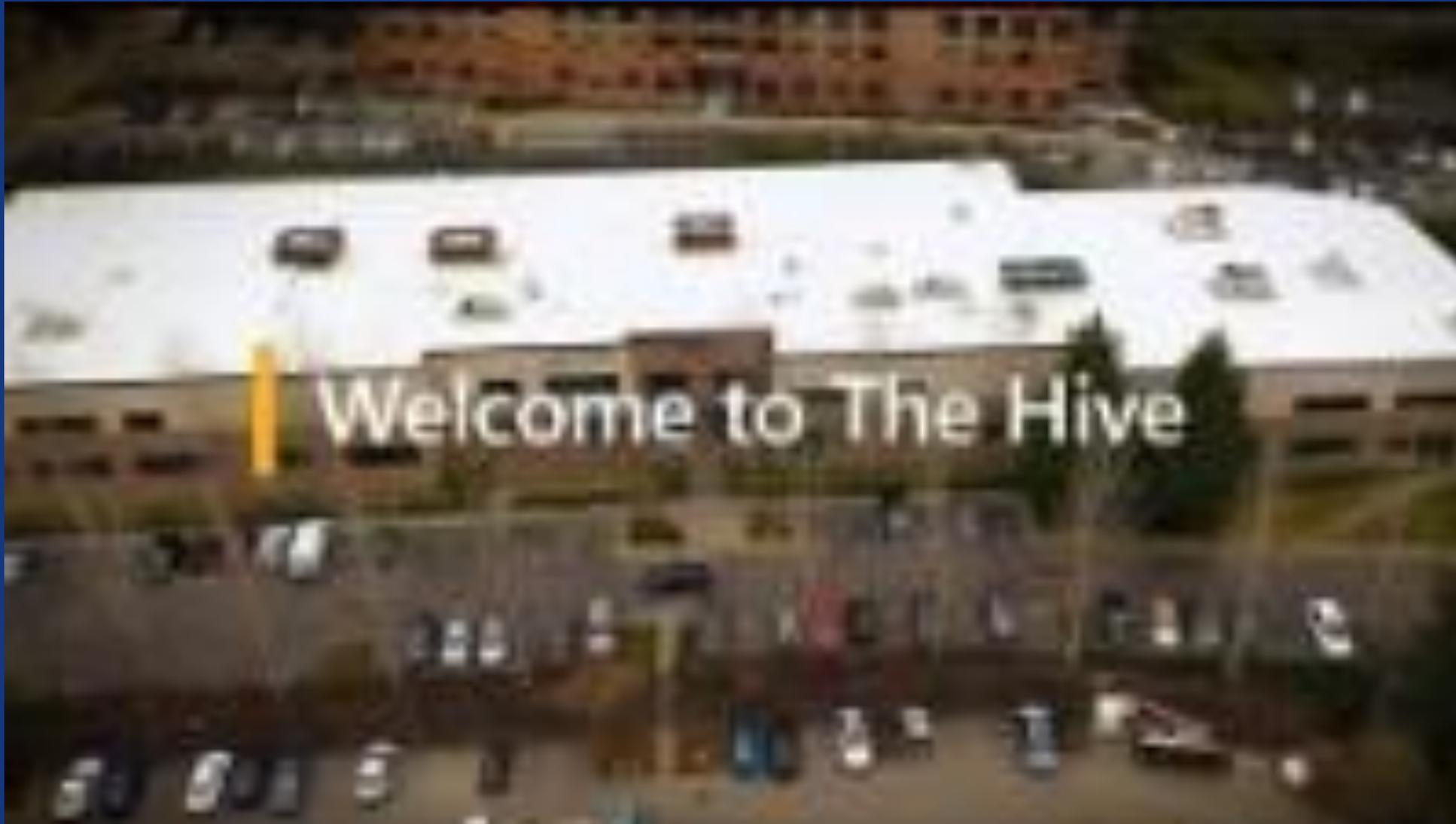


A White Paper concerned at high level with the design and deployment of Microsoft Teams Rooms (MTRs) into physical three-dimensional workspaces.

The Hive new video – 22 May 2022



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YouTube link:

<https://youtu.be/eS3efXIKjpA>

What are focus items from video?

- ▶ One completely modernised space
- ▶ One refurbished space
- ▶ Interesting talk about standards...
 - ▶ Display
 - ▶ Lighting
 - ▶ Camera position
 - ▶ Room finishes
 - ▶ Room layout and sightlines
 - ▶ Standards
 - ▶ Training and certification
 - ▶ Visual Displays products and services
 - ▶ Greg's consultancy

We've come a long way in a short time...

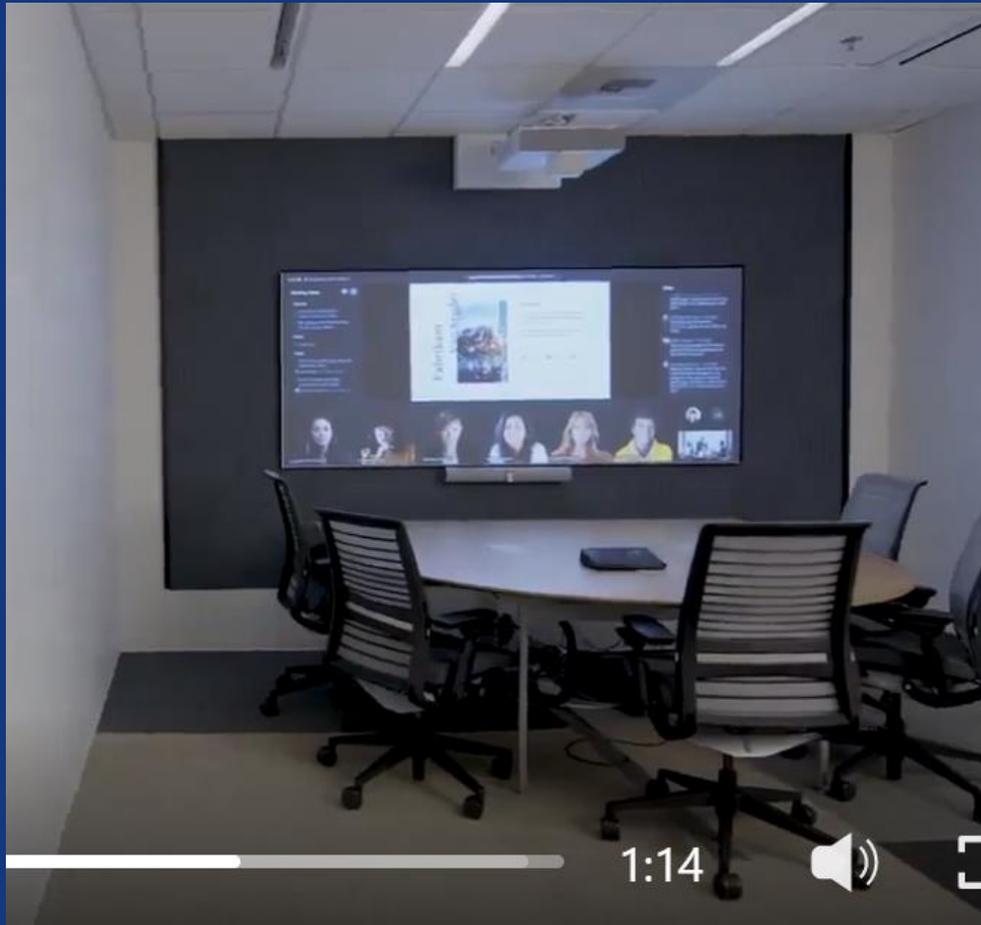
From this...



...to this (main space, created from new)



Self-described refitted space U-shaped table

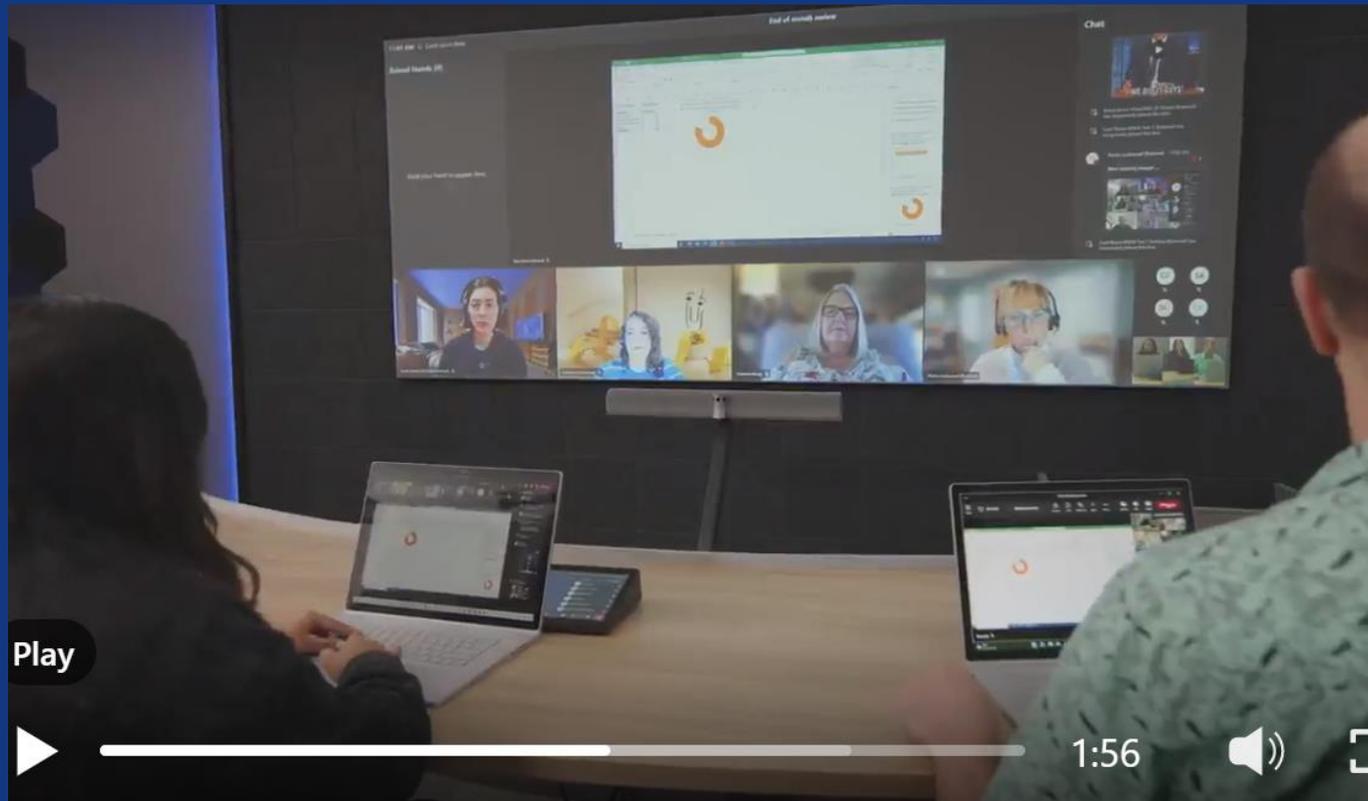


- ▶ Demonstrates 21:9 will work in conventional rectangular 'bowling alley' rooms?

Display size 101



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- ▶ Look at size of Excel sheet in main content window



Apply DISCAS to main content window height – not image height

- ▶ DISCAS %ElementHeight (%EH) default = 3%
- ▶ $3\%EH = 6 : 1$
 - ▶ (Farthest viewer no more than 6 x image height)
- ▶ If content window = 60% of image height
- ▶ Then ratio becomes 3.6 : 1
 - ▶ $(0.6 \times 6 = 3.6)$

- ✓ Use AVIXA DISCAS standard
- ✓ Use it critically
- ✓ Adapt it to your use case – it's not a law!
- ✓ Show your workings – get user buy in

Content window
e.g. 60% of
image
height



Full
image
height

How to create these systems in normal room lighting

- ▶ Normal room lighting = 300-500 lux on working plane (e.g. table. Desk)



Two photos of the same space – notice the difference in contrast?

Display Quality 101 – contrast, contrast, contrast



- Both images are projected, shot with mobile phone – unretouched (no Photoshop!)
- Which one do we need for MTRs?
- What do we need for MTRs?

- ✓ AVIXA ISCR standard!
- ✓ Focus on black levels

Projection contrast tools



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Projector Brightness | **Image Contrast**

The Projector Brightness Calculator below is used to calculate how bright a projector you need according to a given screen and a specific desire for quality. The calculator enables you to compare two different setups - e.g. different size, different image quality, different light scenario etc.

All grey fields must have a numeric value.

[Change to US unit](#)

Copy information from scenario 1 to 2

Image brightness needed based on best estimates:		Scenario 1	Scenario 2
Ambient brightness level in the room	ALR	0 LUX	500 LUX
Ambient brightness level on the screen surface	ALS	200 LUX	150 LUX
Screen reflectance factor	SRF	8.0 %	8.0 %
Contrast level needed in final image	ICR	0.0 :1	15.0 :1
Projector checkerboard contrast	C	0 :1	120 :1
Ambient light reflected back to the audience	R	16.0 NIT	12.0 NIT
Image brightness needed based on best estimates	B	0.0 NIT	192.0 NIT
Maximum brightness allowed to be "eye-gonomical"	Bmax	0.0 NIT	477.5 NIT

Projector brightness needed for the actual screen size:		Scenario 1	Scenario 2
Image height	<input type="text" value="Set size"/>	2,000 mm	1,975 mm
Image width		3,556 mm	3,511 mm
Image area		7.11 m ²	6.93 m ²
Peak gain		0.80	0.80
Gain efficiency for horizontal viewing position		0 %	89 %
Gain efficiency for vertical viewing position		0 %	90 %
Effective gain in viewing position		0.00	0.64
Effective (net) projector brightness needed	PBN	0 lum	6,527 lum

Dimensioning the projector(s):		Scenario 1	Scenario 2
Loss for start-up adjustment of colours		10 %	10 %
Number of projectors		1	1
Blending zone		100 %	100 %
Lamp efficiency		90 %	90 %
Brightness need adjusted for start-up adjustment of colours		0 lum	7,252 lum
Brightness need adjusted for loss for edgeblending		0 lum	7,252 lum
Brightness need adjusted for loss due to lamp decay		0 lum	8,058 lum
Specified (gross) projector brightness needed	PBG	0 lum	8,058 lum

Projector Brightness | **Image Contrast**

The Image Contrast Calculator below is the "basic formula" for calculating the image quality (contrast ratio) of a given setup. Used in cases where you want to determine the contrast ratio of a certain picture and you have information about the screen, projector and the environment.

$$\text{Image contrast ratio} = \frac{B + R}{C + R}$$

B = Image brightness (Determined from the projector Lumens and the screen gain and size)
 R = The amount of ambient light reflected in the front surface of the screen
 C = The projector checkerboard contrast measured according to the ANSI/ISO standard

[Change to US unit](#)

Effective gain in viewing position (EG):

Effective projector brightness (PBN): lum

Image height (IH): mm

Image width (IW): mm

Image area = m²

Screen Reflectance Factor (SRF): %

Ambient light level on screen (ALS): lux

$$\text{Image Brightness (B)} = \frac{\text{gain} * \text{lumens}}{\text{screen area} * \pi} = \frac{0.00 * 0}{0.00 * 3.14} = 0.0 \text{ nit}$$

$$\text{Reflected ambient light (R)} = \text{SRF} * \text{ambient light} = 0.000 * 0 = 0.0 \text{ nit}$$

Measured brightness (B + R) =

Projector checkerboard contrast (C): :1

$$\text{ICR} = \frac{0.0 + 0.0}{0.0 + 0.0} = 0.0 :1$$

<http://pdf.dnp.dk/html/contrast.php>

<https://visualdisplaysltd.com/resources/tools/useful-calculator-tools>

<https://visualdisplaysltd.com/resources/tools/useful-calculator-tools/projected-brightness-calculator>
<https://visualdisplaysltd.com/resources/tools/useful-calculator-tools>

Projector lumens calculation tools

Image width (mm)	<input type="text" value="2000"/>	mm
Image height (mm)	<input type="text" value="1125"/>	mm
Screen area (m ²)	2.25	m ²
Image brightness required	<input type="text" value="382"/>	cd/m ² [nit]
Screen gain	<input type="text" value="1"/>	
LUMENS (lm) =	2699	These are the 'real' lumens required from the projector, once you have applied some kind of 'reality check' factor to the brochure lumens

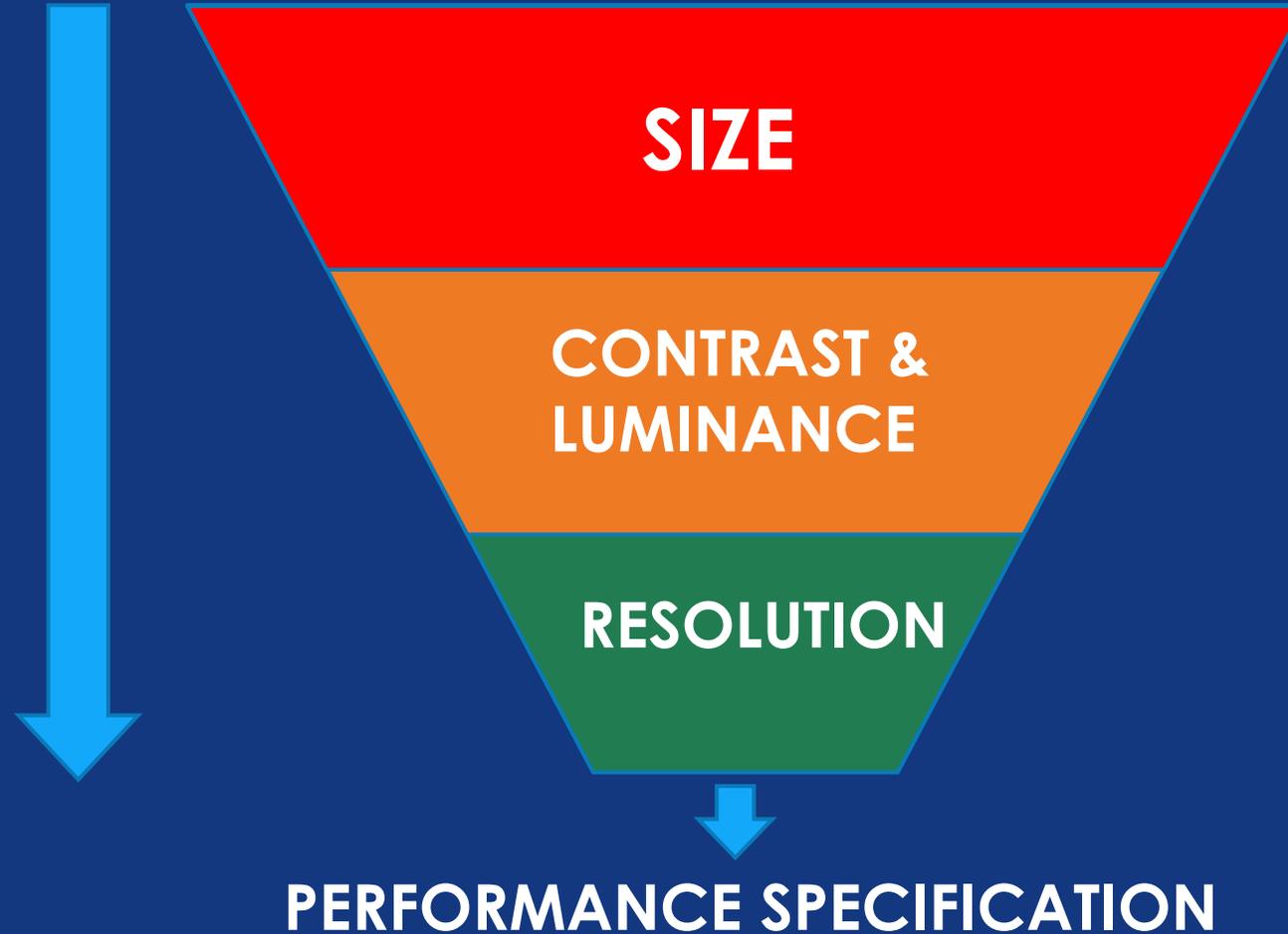
Image width (mm)	<input type="text" value="2400"/>	mm
Image height (mm)	<input type="text" value="1500"/>	mm
Screen area (m ²)	3.6	m ²
Projector lumens	<input type="text" value="4000"/>	
Screen gain	<input type="text" value="1"/>	
NIT (cd/m ²) =	354	This is the theoretical luminance ('brightness') of your projected image

Specification funnel

What needs delivering?

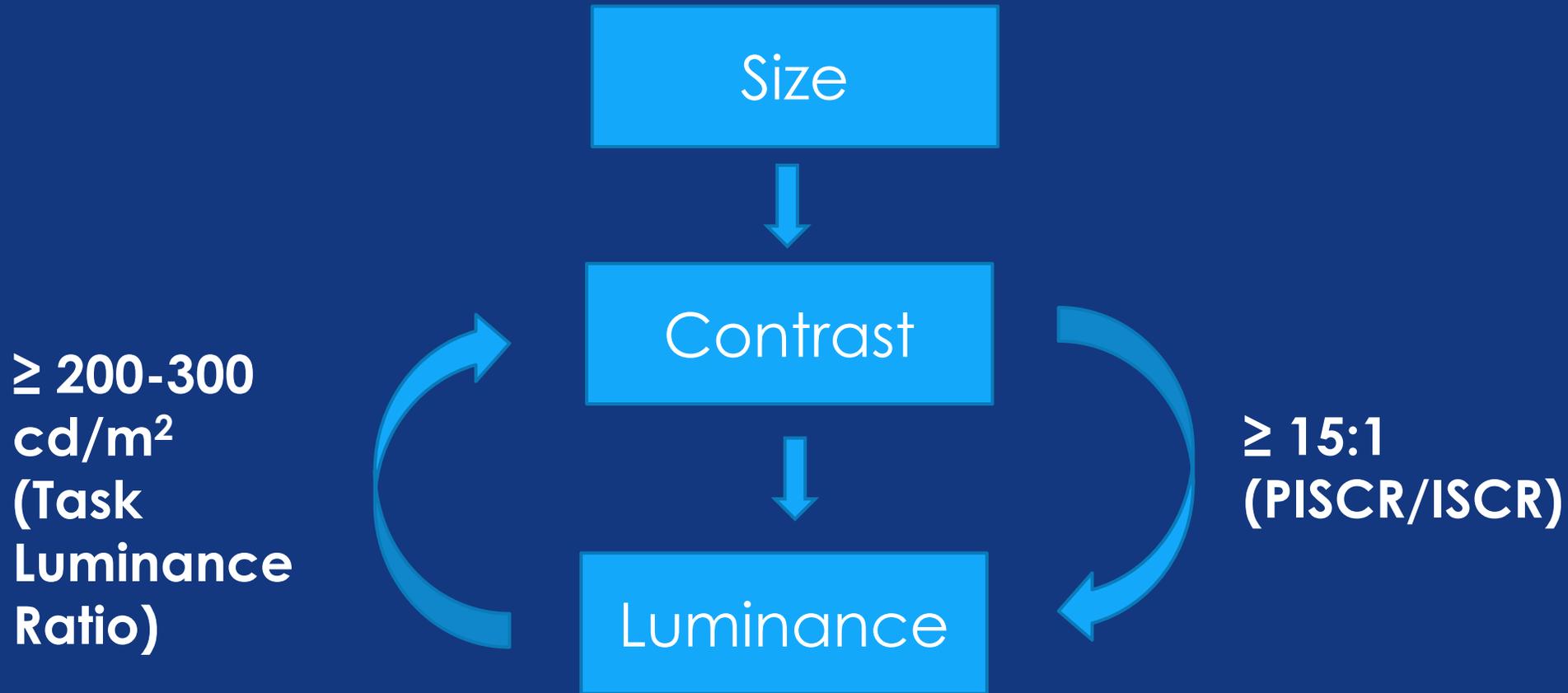


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PERFORMANCE SPECIFICATION

Projection specification process



✓ ALWAYS SPECIFY SCREEN BEFORE PROJECTOR!!

Three types of projection screen



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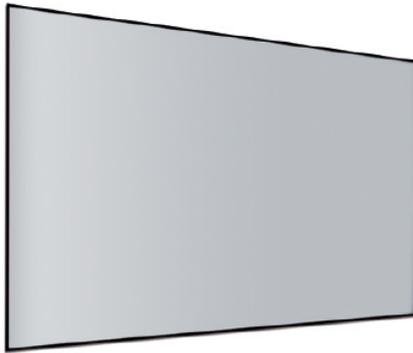
- ▶ Standard matt white – some small variants
- ▶ Contrast enhancing
 - ▶ Coated materials
 - ▶ May have combination of reflective & tinted materials
 - ▶ Low gain versions used to help acute-angled UST projection results
- ▶ Optical ALR (ambient light rejecting)
 - ▶ Lensed micro-engineered technology
 - ▶ Absorbs light from specific directions
 - ▶ Redistributes projected light to viewing locations
 - ▶ Versions for UST and standard lensed projectors

dnp Supernova – UST lens version



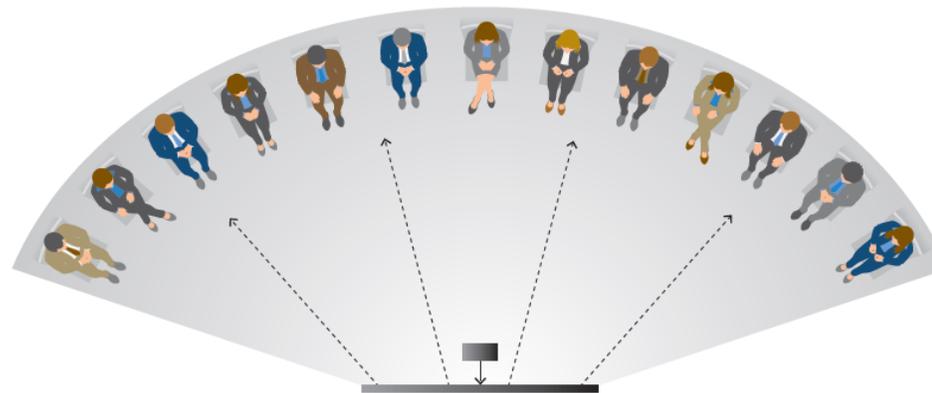
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- ▶ Used in VDL Digital Canvas



dnp Supernova™ STW

- Black/White Lenticular Technology
- For wider seating arrangements
- Unrivalled image contrast for UST front projection
- Projector to be mounted below the screen



dnp Supernova

Direct throw lenses (> 1.5:1) throw ratio



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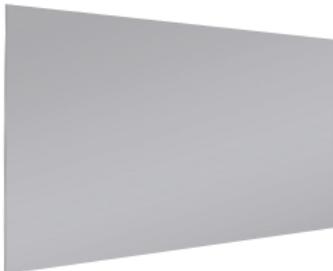
▶ Used in VDL Digital Canvas



dnp Supernova™ One

- Frames available in black and aluminium
- Floor stand available
- Easy to install on wall or ceiling

Screen material: Supernova 08-85* or Supernova 23-23



dnp Supernova™ Blade

- Frameless, space-saving design
- Minimal screen thickness - only 3mm
- Easy to install on wall or ceiling

Screen material: Supernova 08-85* or Supernova 23-23

dnp Supernova Infinity

Direct throw lenses (> 1.5:1) throw ratio

UST lensed projectors

LARGE SCREENS - 120" 16:9 (2.7 x 1.5m) – TO ANY SIZE



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dnp Supernova™ Infinity

- Unlimited screen size
- Seamless viewing experience
- Soft-edge blending possible

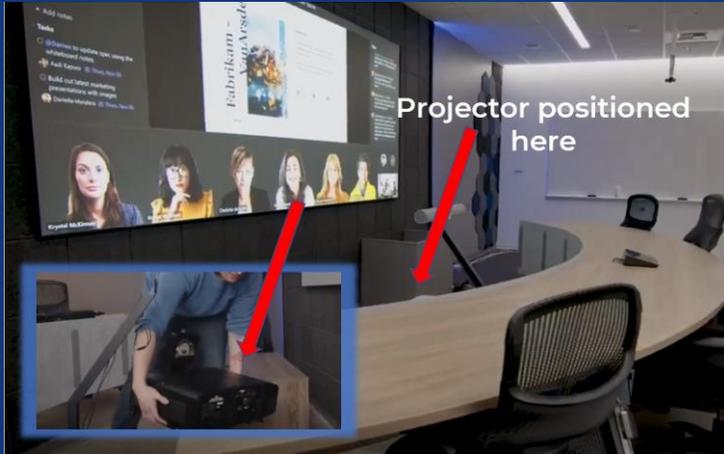
Screen sizes: Any – customised screen sizes

- ▶ Any size, any aspect ratio
- ▶ UST & standard lenses

21:9 – the practical specification call today

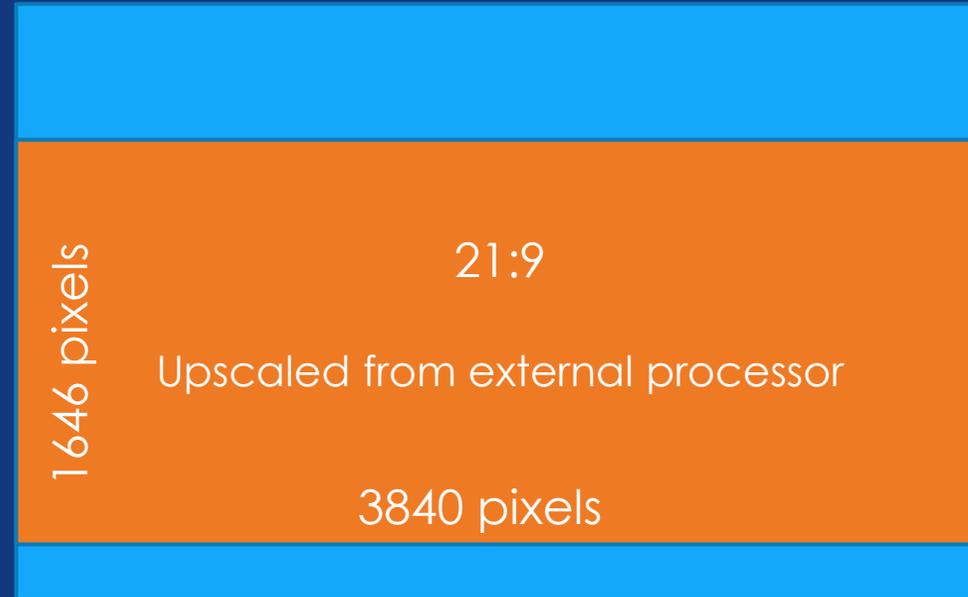


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Aspect ratio 16:9 with 1920 x 1080 resolution or
21:9 with 2560x1080 resolution

2160 pixels



Using 16:9 at width of 21:9

- You can have Front Row and all other screen layouts
- Front Row strip can be positioned vertically
- Background strips to match wall/background

SOURCE(S)



External processor



Single 4K UHD (pixel shifted) projector

Epson EB-PU range now offers EDID to present 21:9 to MTR PC

Camera position & baseline



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Using UST projection on special ALR surface allows camera placement behind small aperture

Moving to larger 'digital canvas' allows placement of small form factor VC cameras to be placed in front of screen

Allows optimising vertical positioning of image – and remote participants

Lighting



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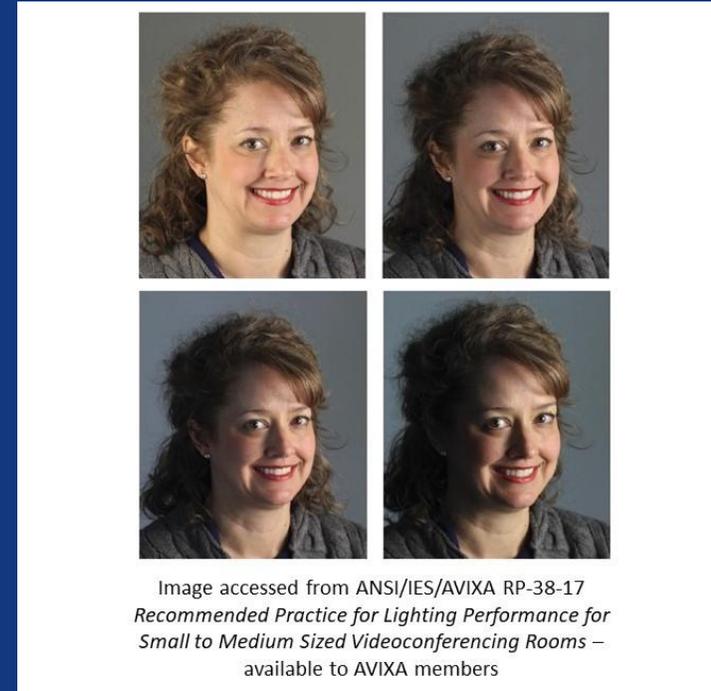
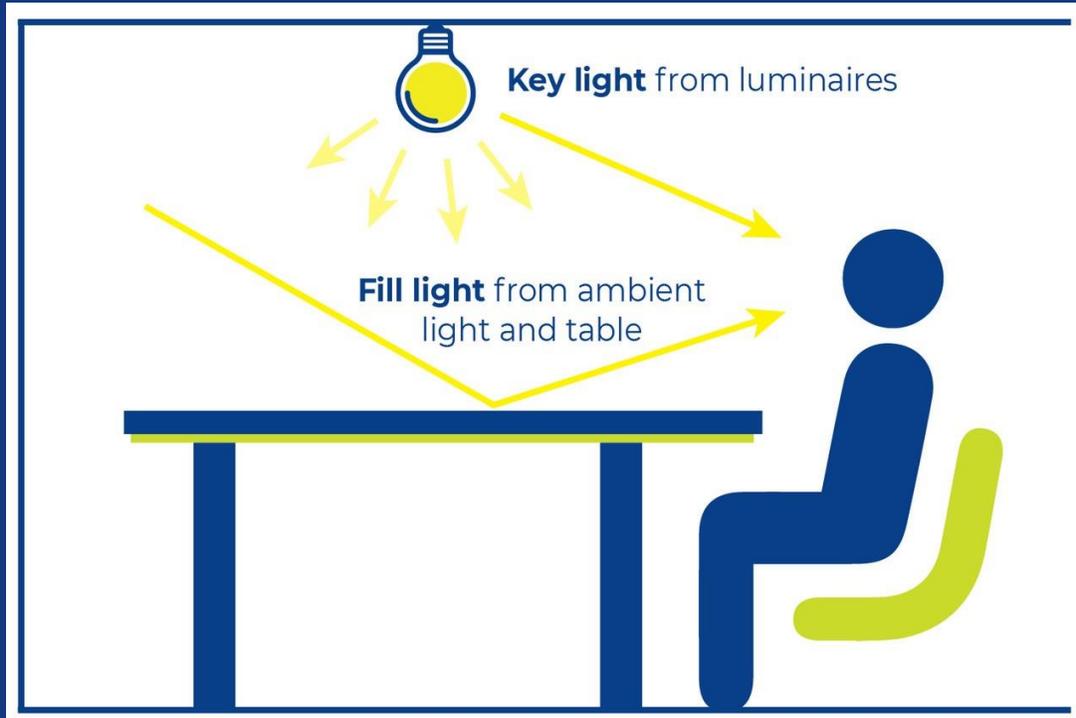


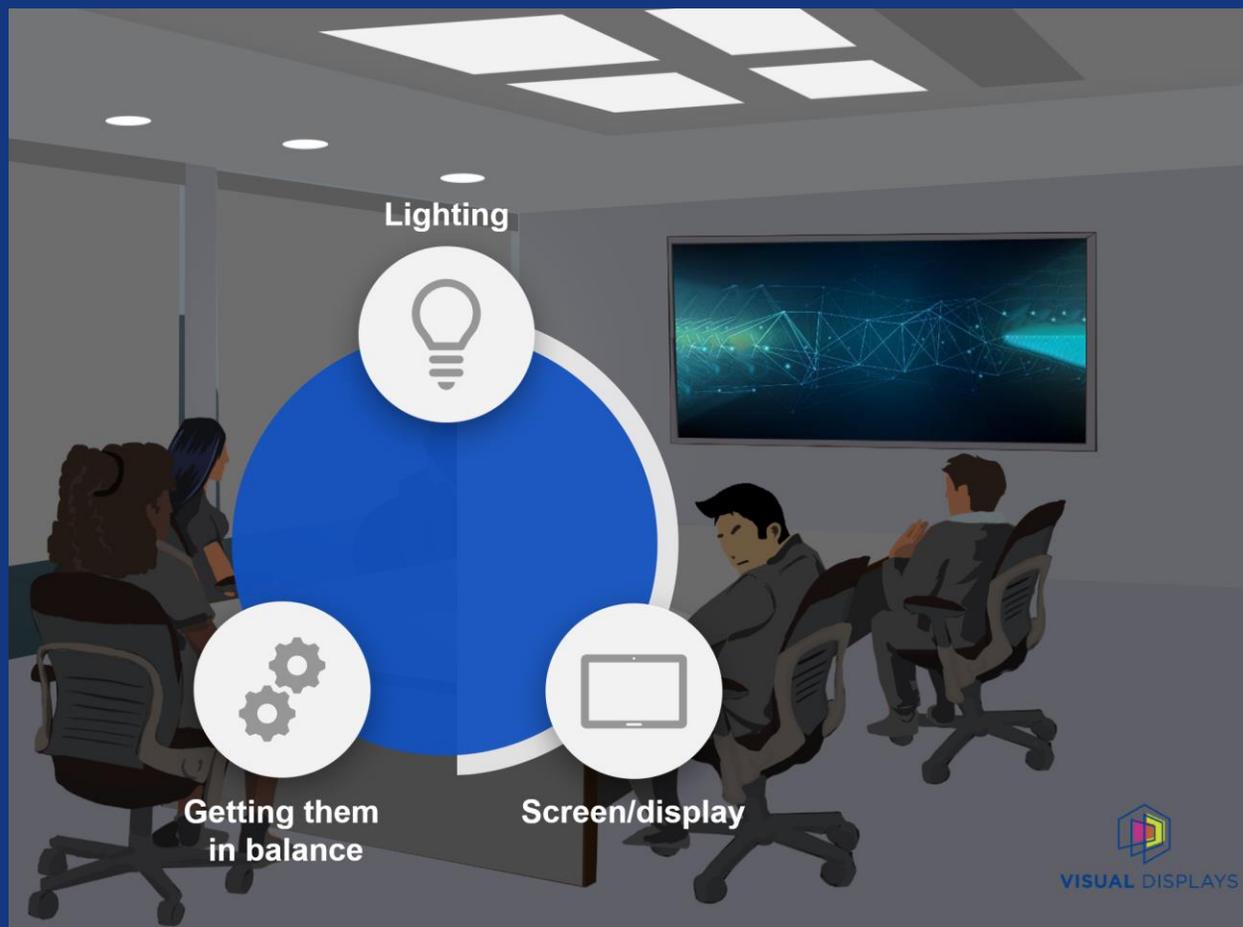
Image accessed from ANSI/IES/AVIXA RP-38-17
*Recommended Practice for Lighting Performance for
Small to Medium Sized Videoconferencing Rooms* –
available to AVIXA members

- ✓ The VC camera is the VIP presence in the room
- ✓ Be respectful of your VIP with proper room lighting!
- ✓ Understand the critical differences between direct and indirect lighting
- ✓ Use AVIXA standards!

Balancing lighting & display



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Room lighting				
Reference standard	SLL Lighting Handbook (CIBSE)			
	CIBSE LG 1			
Objective				
	Core area illuminance	300 - 500		lux
	Colour temperature	3000 - 5000		CCT
	Discomfort glare	< 19		UGR
	Colour rendering (ex VC)	> 85		CRI
	General illuminance ratio	10 : 1		
	Core area illuminance ratio	< 5 : 1		
	Task illuminance uniformity	> 0.7		(esp work surfaces)
	Task luminance ratio (TLR)	< 3 : 1		(sets max display luminance)
Display				
Reference standard	PISCR			
	ISCR			
	Information Display Measurements Standard			
	DISCAS			
Objective				
	Max luminance (from TLR)	300 - 450		cd/m ² [nit]
	ISCR contrast ratio	> 15 : 1		
	Max black level	20 - 30		cd/m ² [nit]
	Size (DISCAS, height)	1400		mm
	Resolution (vertical pixel)	1080		pixel
	%Element height	2.5		%
	Max viewing distance ratio	6.3 : 1		farthest viewer : image height

Standards



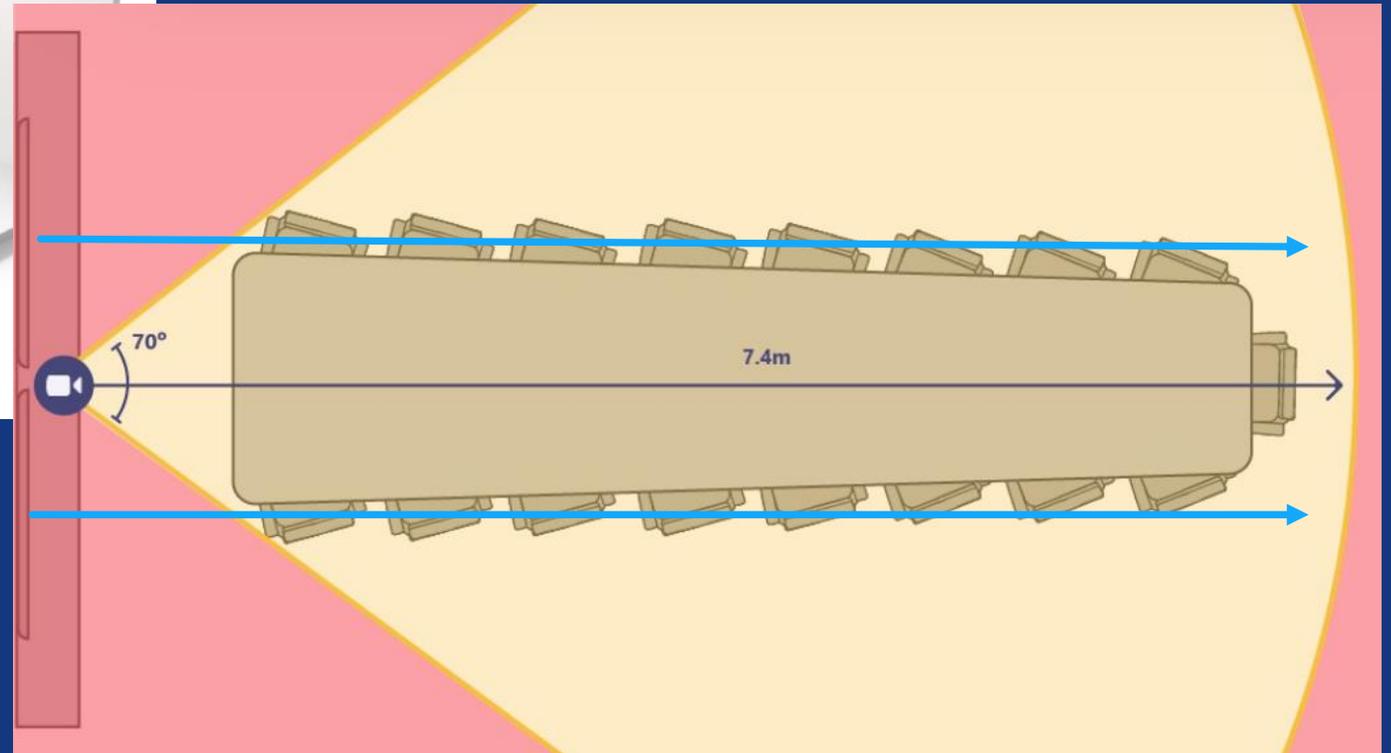
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Is it a Standard, a Best Practice or just a BOM (Bill of Materials)

The word 'standard' itself starts with two meanings:

1. Relating to a level of quality;
 2. Relating to a norm or a model, in this context meaning, for example, a room specification that can be replicated globally. In this second category, this is often reduced to the minimum viable content, a Bill of Materials (BOM).
- ▶ In AVIXA we focus on 'performance standards' – describing good outcomes and user experiences in measurable (and repeatable) metrics
 - ▶ Use related environmental standards too.

Twin displays – not for Front Row!!



Key points



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- ▶ A holistic approach is essential – the entire hybrid space (room, furniture, technology etc) is an inter-dependent system
 - ▶ Understand the individual components and strategise for each
- ▶ Use AV standards – critically and adapt to your needs
 - ▶ Use hard performance metrics
- ▶ Futureproof your spaces as your needs and workflows develop
- ▶ Get the image size right – a step change increase
- ▶ Understand what creates an authentic and natural experience – for in-person and remote users
- ▶ Get the technology right
- ▶ Avoid the pitfalls e.g. eye strain, reflective screen surfaces etc
- ▶ Use specialist assistance where needed!

Visual Displays Ltd supplies these displays



Part of the VDL Digital Canvas range

Full packages can include:

1. Lab meter & laser survey of spaces (if needed)
2. Standards-curated system specification for each space
3. 3D CAD design and full installation instructions
4. ALR (ambient light rejecting screen)
5. Projector mount, framework & camera mount
6. You can buy the specified projector from us or locally

▶ We ship globally

Specialist consultancy



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- ▶ Greg provides specialist consultancy in short duration packages or on retainer:
 - ▶ Space design
 - ▶ Lighting and VC lighting design
 - ▶ Displays design
 - ▶ AV Standards
 - ▶ Environmental standards (including lighting)
- ▶ Available through AV consultants and major AV integrators
- ▶ (This is NOT AV consultancy or design – it's a complementary services and disciplines)

Do you have an evaluation space?



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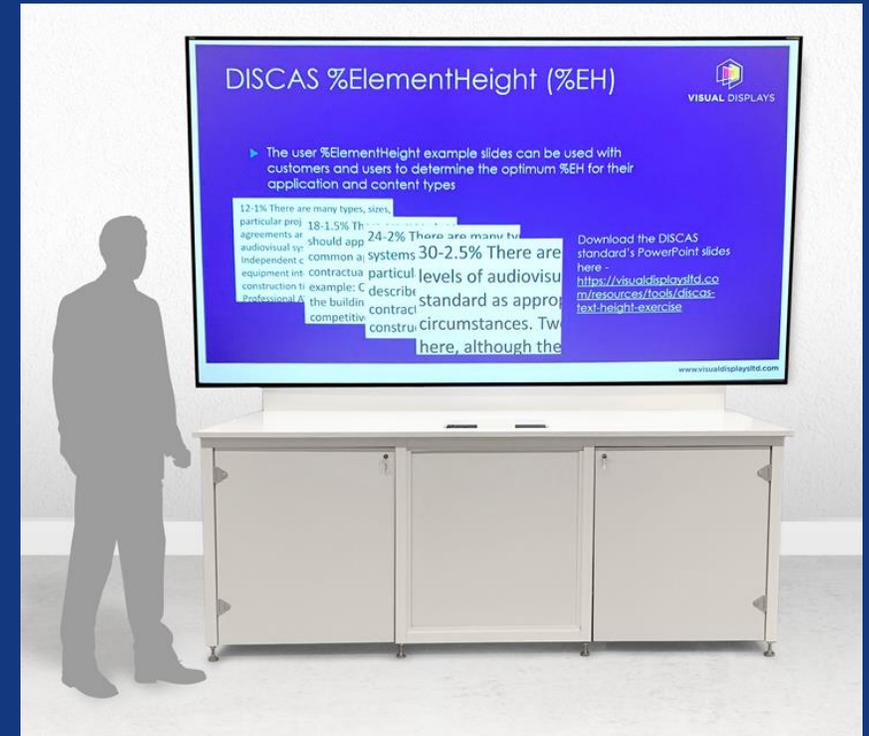
- ▶ Speed of change and development very rapid
- ▶ Workflows = work in progress
- ▶ Display layouts – how many new versions in 2022?!
 - ▶ User-created layouts
 - ▶ Multiple sessions/codecs for multi-point sessions with display running at high resolution?

Let us help you design and build your test spaces.

VDL Digital Canvas – 120", 140" & bespoke sizes



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Find out more visit:

www.visualdisplaysltd.com/meeting-board-room-screens/teams-rooms

Curved screen VDL Digital Canvas

- ▶ Reciprocity – remote & in-person are more equal
- ▶ Organic, human-friendly configuration
- ▶ UST vs standard lens
 - ▶ Impact on camera position
- ▶ Wide range of aspect ratios and resolutions
- ▶ IP and tools based on our simulation & immersive display modelling tools
- ▶ Part of our design consultancy



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VDL Digital Canvas – Freestanding, complete, UST projection



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Find out more visit:

www.visualdisplaysltd.com/meeting-board-room-screens/teams-rooms

VDL Digital Canvas Core

Standards-curated ALR screen, projector & mount bundles – direct throw lenses



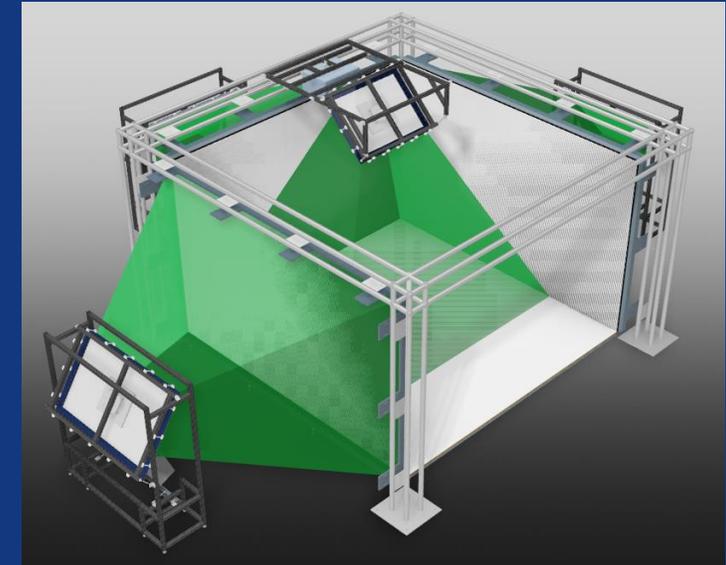
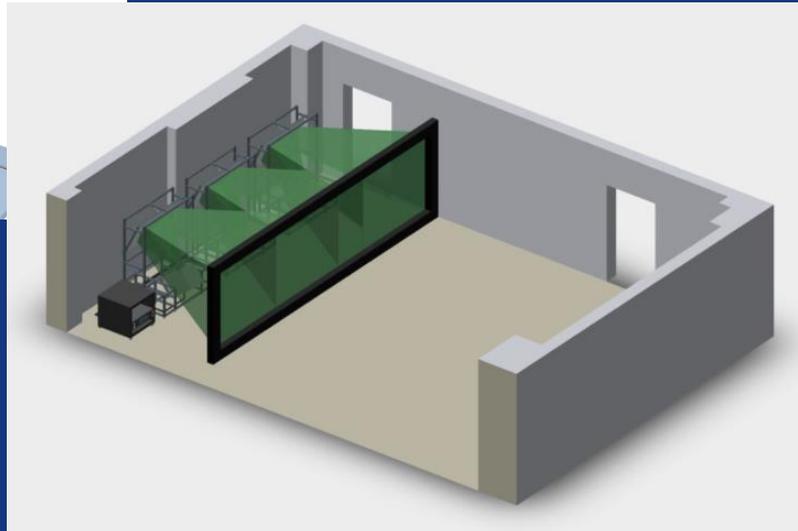
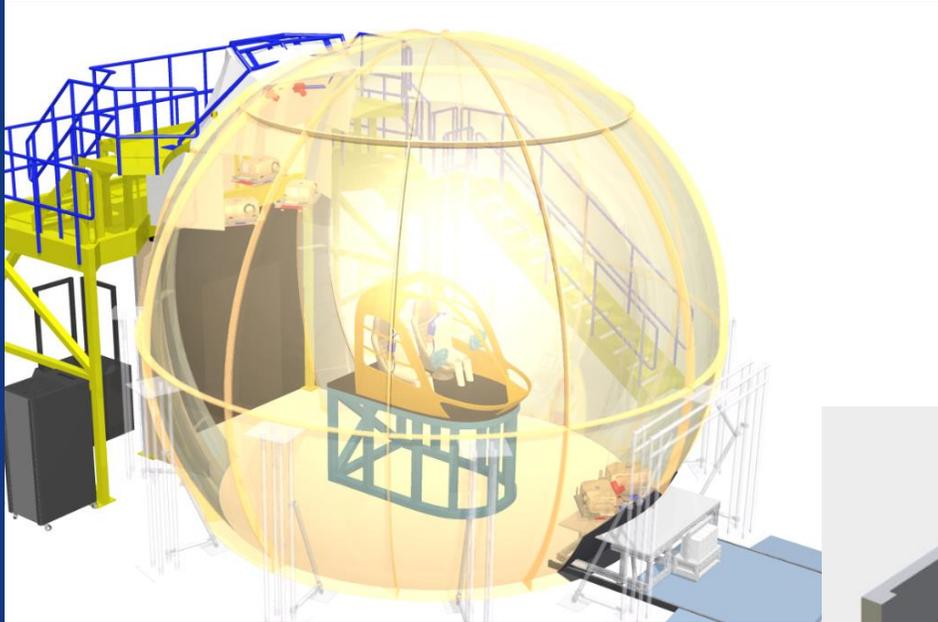
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Our background in immersive brought us here



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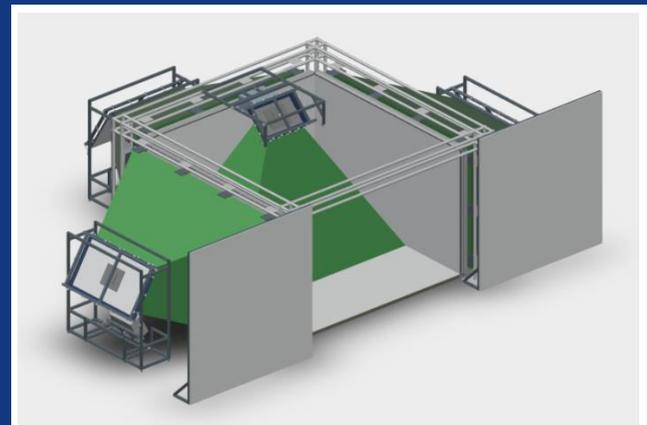
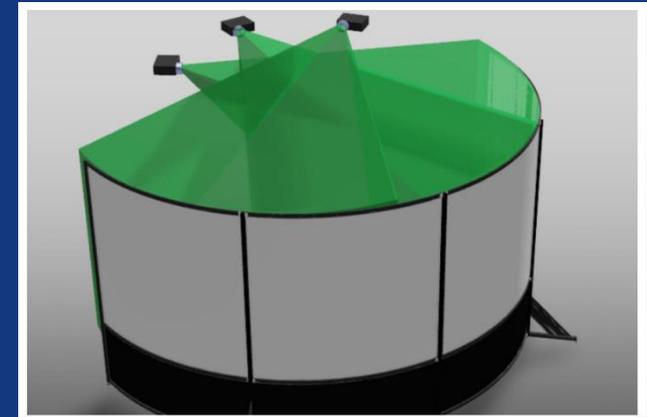


Simulation & immersive displays



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- ▶ Breaking the Fourth Wall
- ▶ Thinking in 'cues'



AV User Group



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▶ <https://www.avusergroup.com/>



LTSMG – Learning and Teaching Spaces Management Group



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HE & FE campus technology managers association



<https://ltsmg.co.uk/>



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What we can do for you

Use any or all of our services

- ▶ Specialist consultancy
 - ▶ (not AV consultancy!!)
- ▶ Design
- ▶ Manufacture
- ▶ Solutions & technology
 - ▶ VDL Digital Canvas Displays
 - ▶ Projection screens of all types
 - ▶ Immersive displays
- ▶ Proof of concept, product development, system troubleshooting
- ▶ Advanced laser tools
- ▶ We work actively with all parts of the channel - from end user through to reseller
- ▶ All hardware and solutions supplied through reseller/integrator channel



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