

# DESIGNING WITH THE MIND IN MIND

to reach higher and better performance levels

intellectually spatially technically materially

without losing non-linear beauty

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IAN RITCHIE ARCHITECTS



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**inventive, speculative, romantic, with the mind of a chartered accountant**

**Sainsbury Wellcome Centre for Neural Networks  
and Behaviour  
at University College, London**

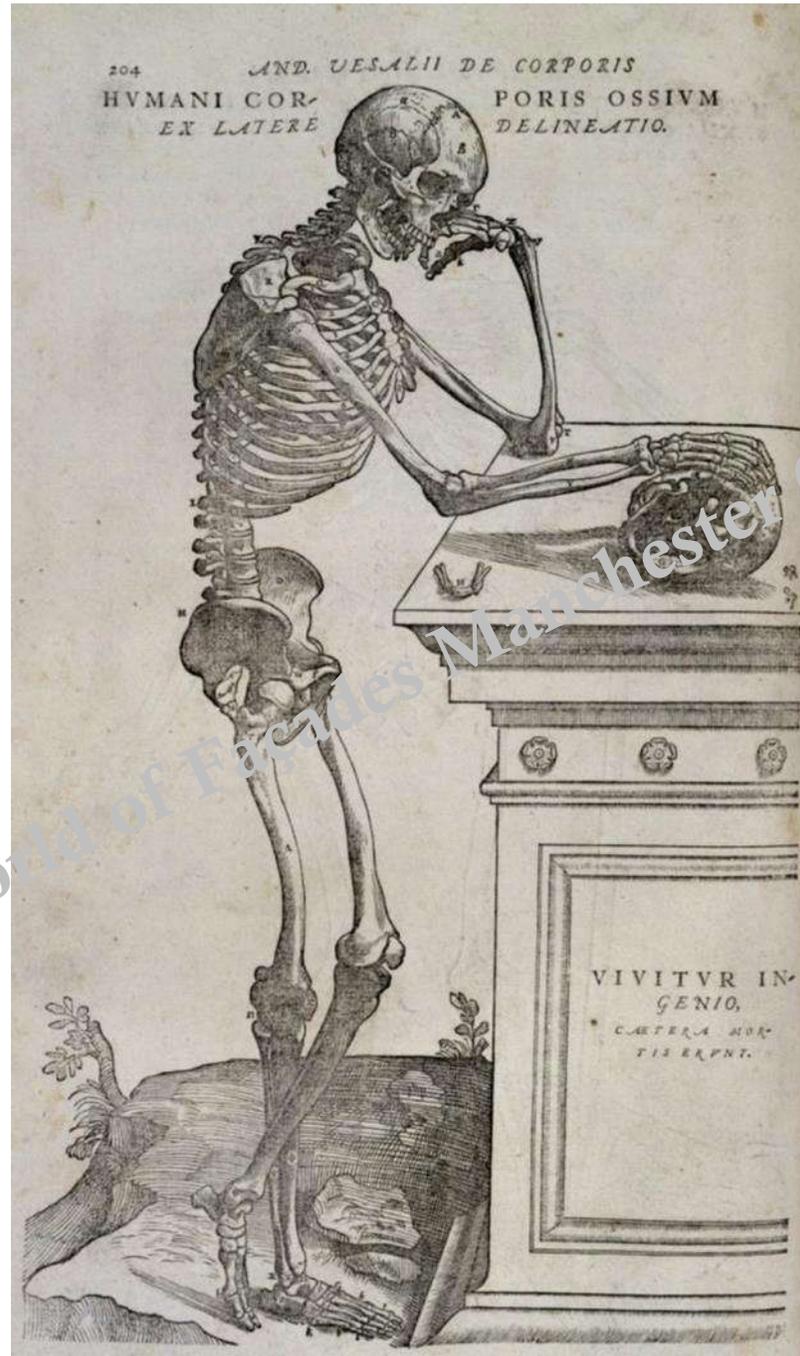
**science meets art meets architectural space**

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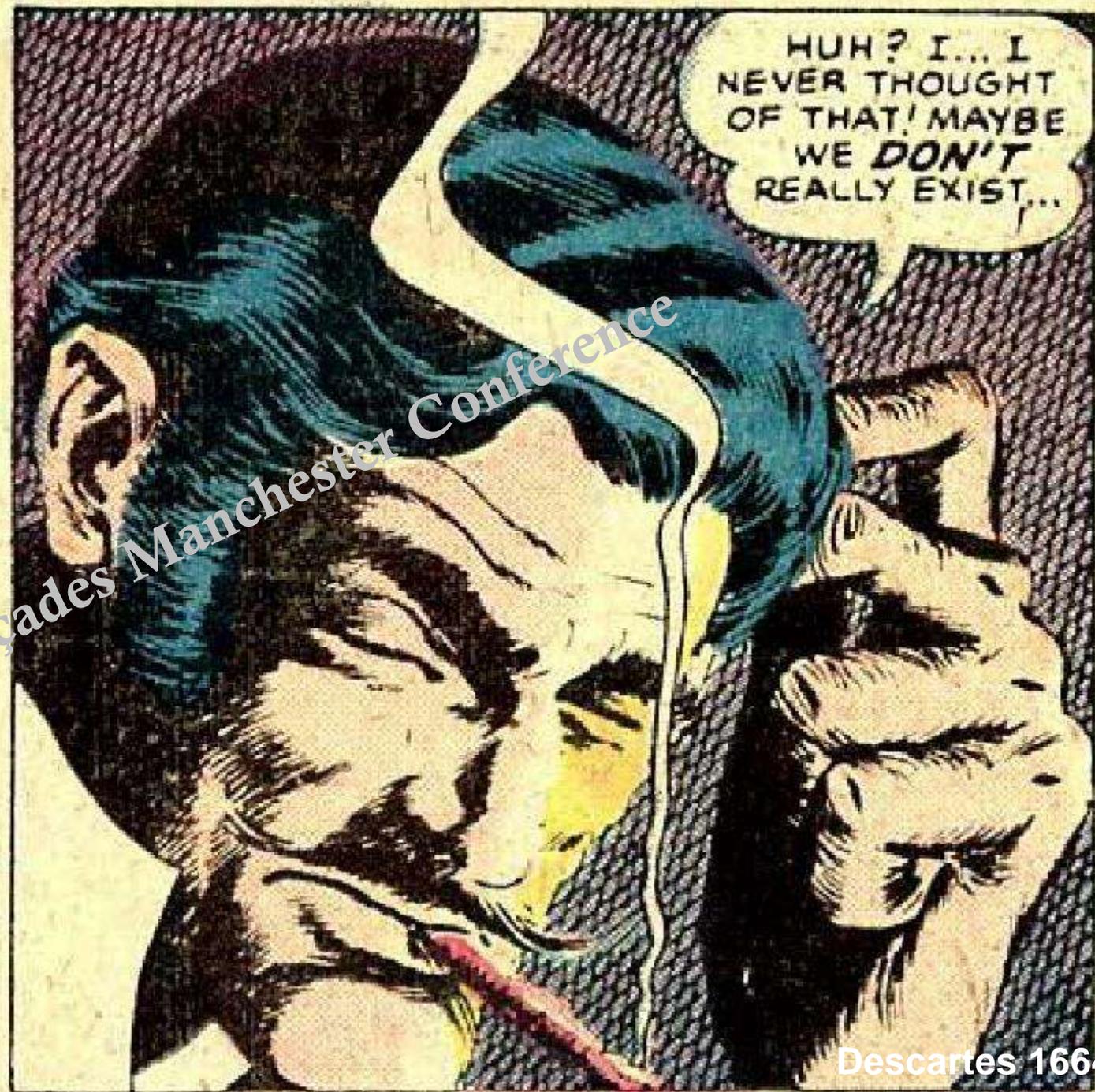
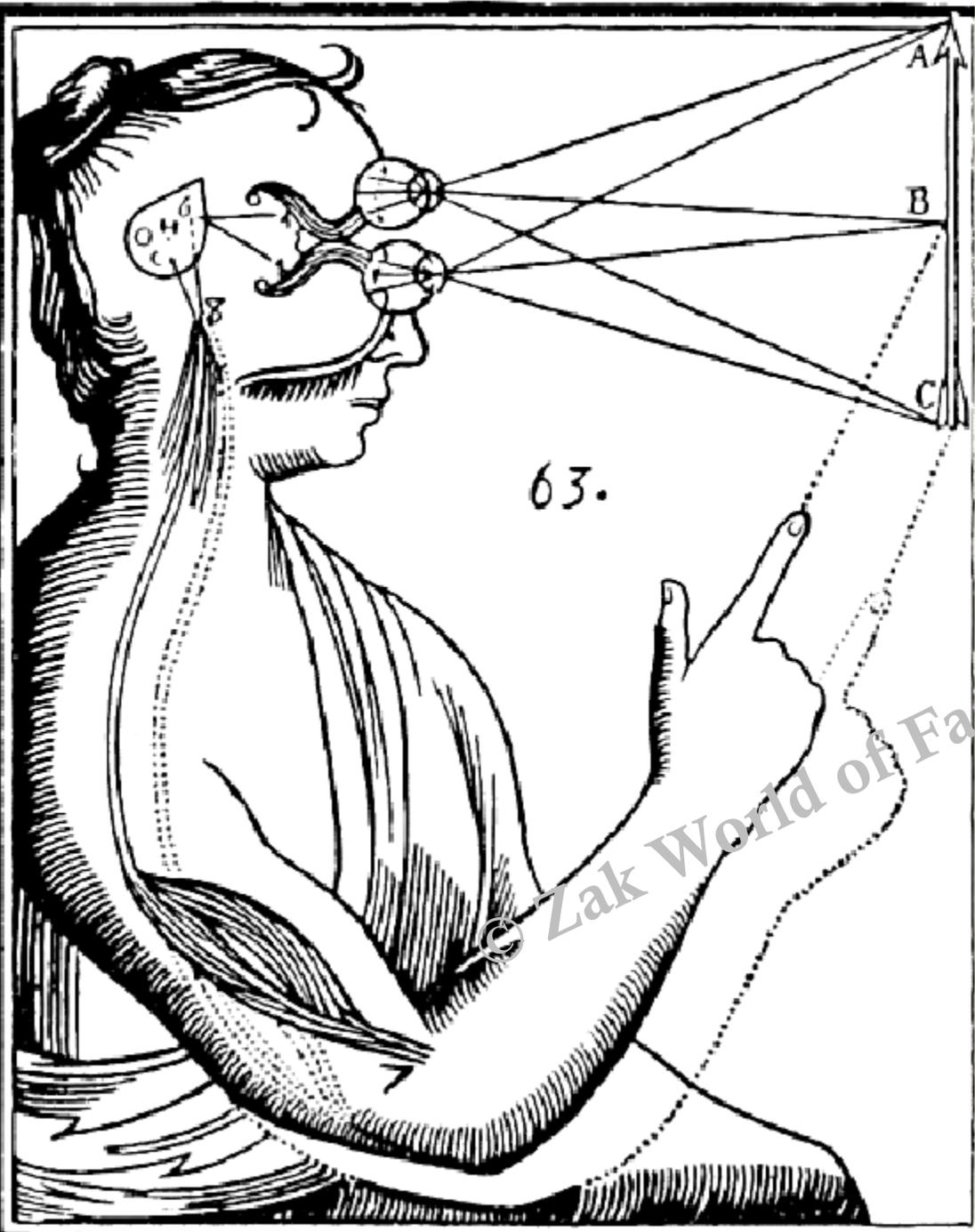
research

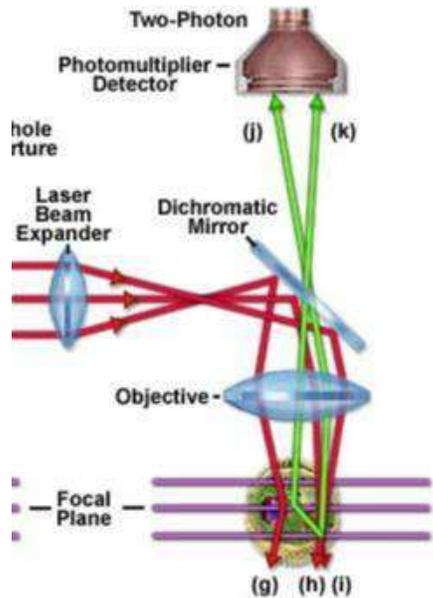
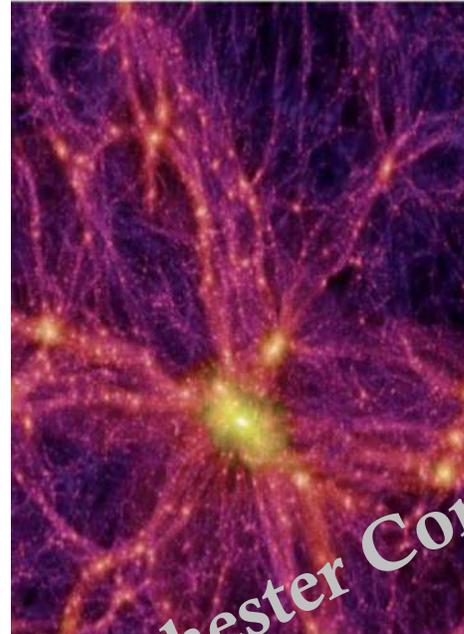
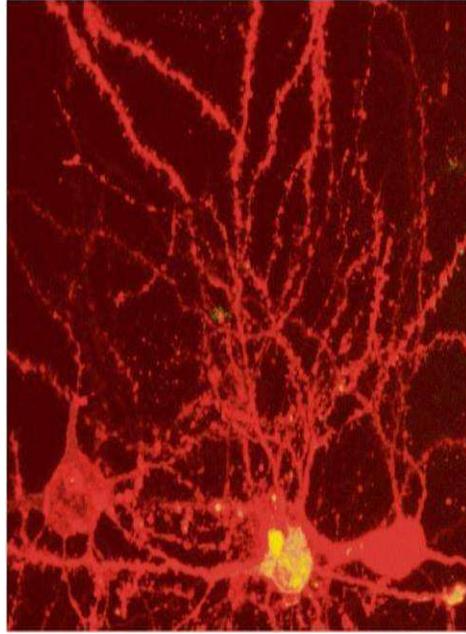
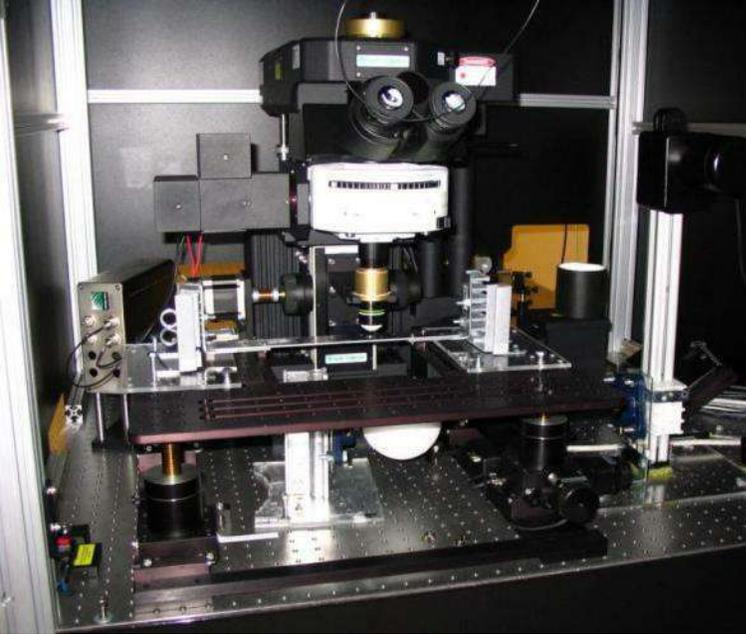
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**De humani corporis fabrica libri septem**



**Andreas Vesalius 1543**





**two-photon microscope**

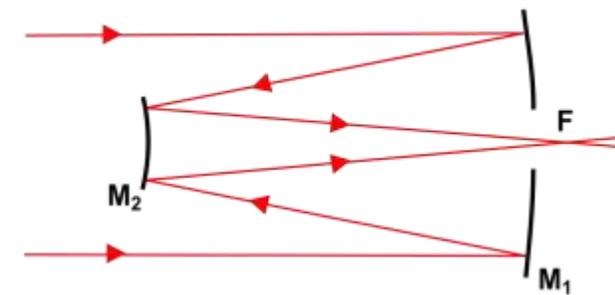
a micrometre across showing three neurons 2 red and one yellow

There are about **100 billion neurons** in the human brain Each connected to as many as 10,000 others giving a trillion connections

billions of light years across galaxies yellow, stars and dark matter

International group of astrophysicists simulation of our universe

There are about **10 billion galaxies** in the observable universe, an average of **100 billion stars /galaxy** = 1,000,000,000,000,000,000 ( billion trillion stars)



**ritchey-chretien telescope**

**Hubble telescope**



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Each neuron may be connected to up to 10,000 other neurons  
The average human brain has about 100 billion neurons : the same number as the average number of stars in a galaxy

inherited concepts – from DNA  
e.g. red green blue

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acquired concepts – from people and the environment  
e.g. fashion

**Only 10% of what your brain uses to see  
comes from your eyes.**

**90% comes from the brain itself!**

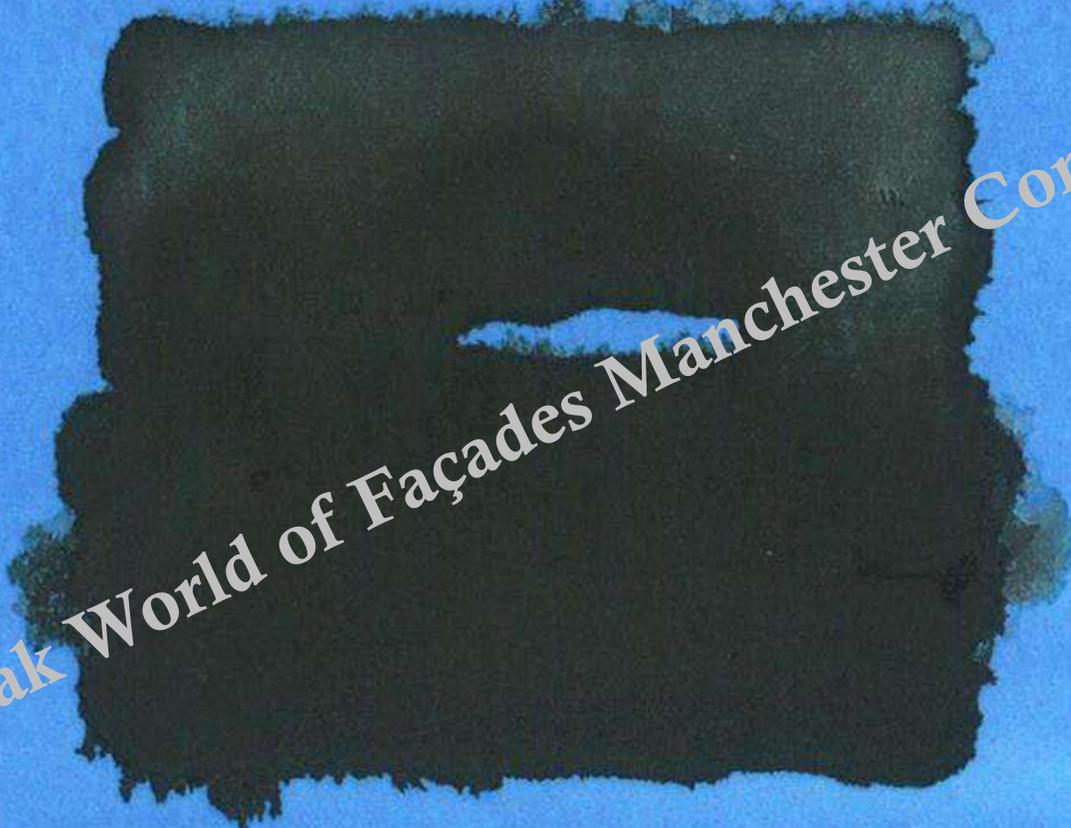
**Perception is not just through the eyes.**

**Our brain did not evolve to experience the world**

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spatial + organisational  
concept

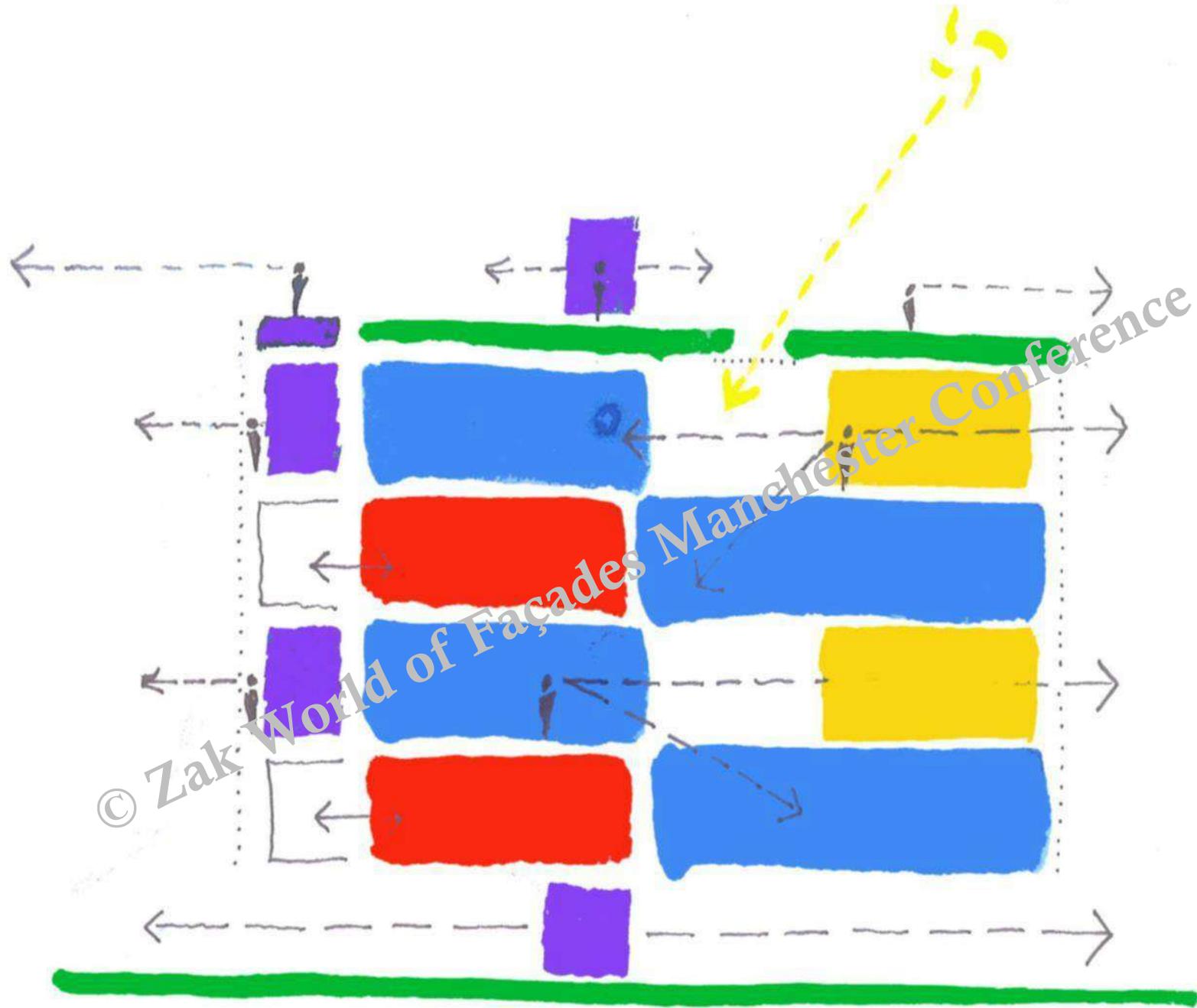
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flow and movement



visual connexity



entire building section relationships

architecture from  
the inside to outside

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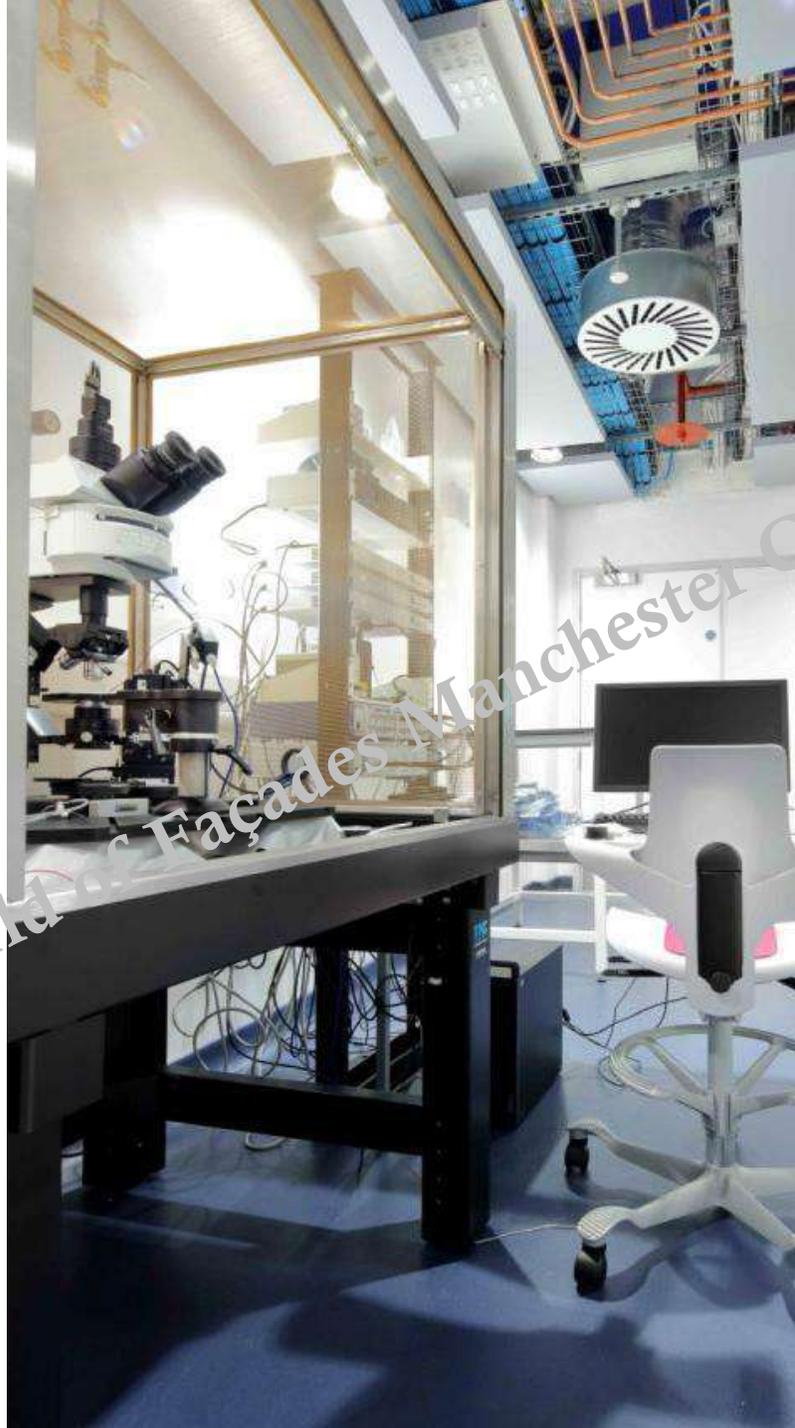
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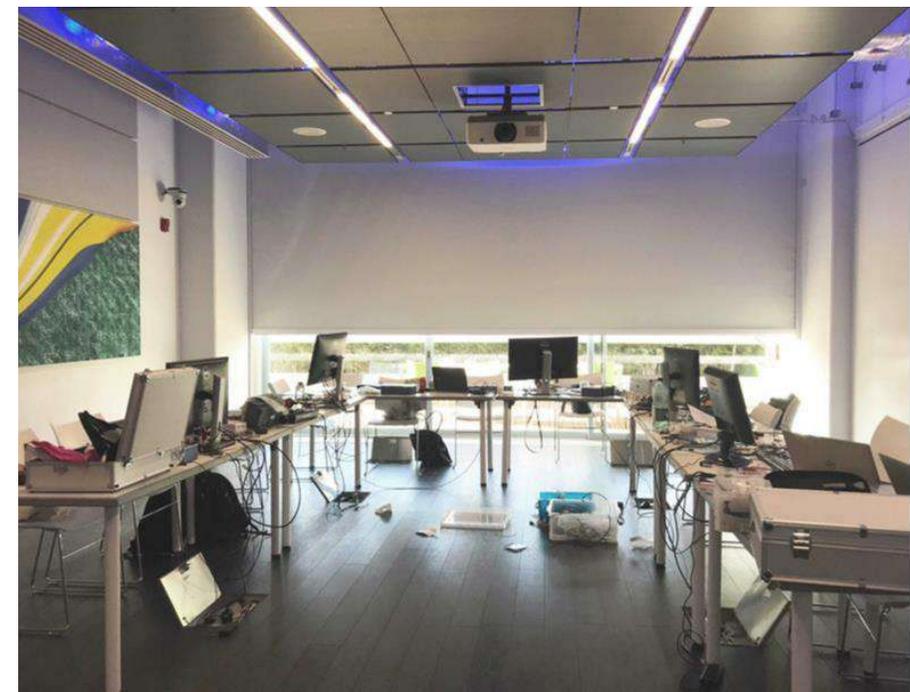
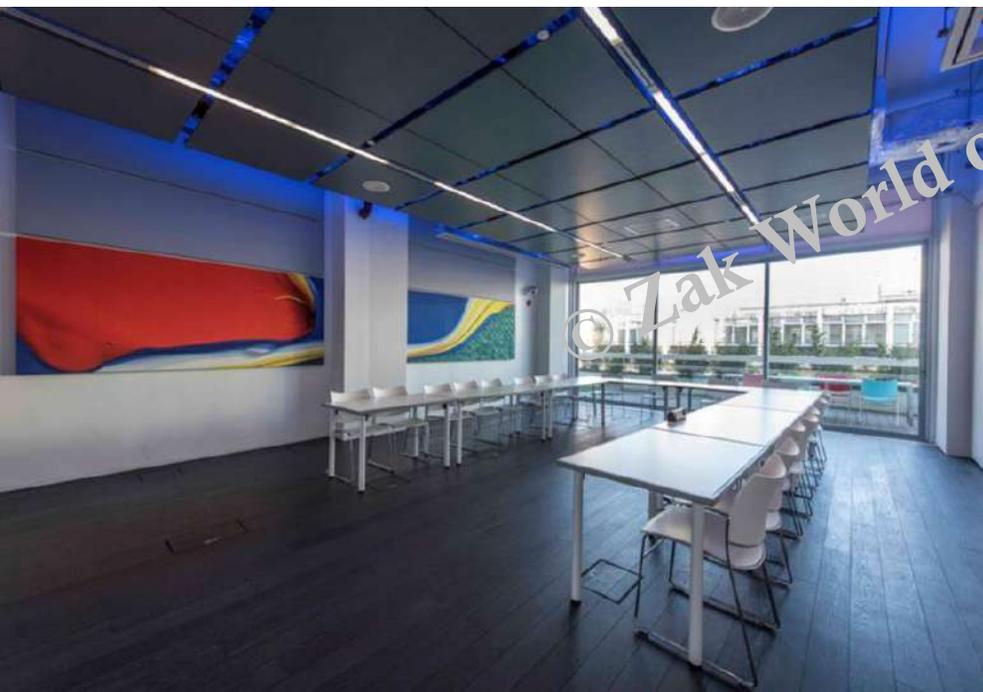


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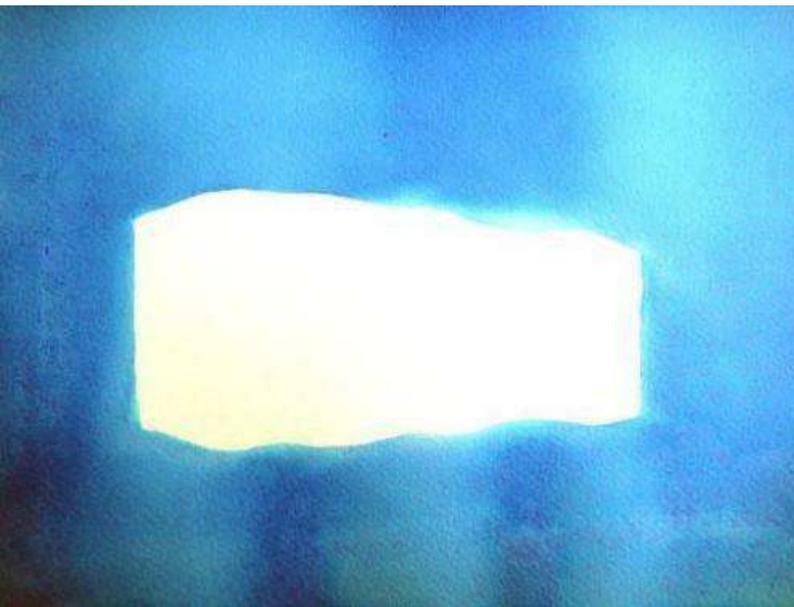




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concept of the external  
architectural envelope

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IR inking - ice block concept

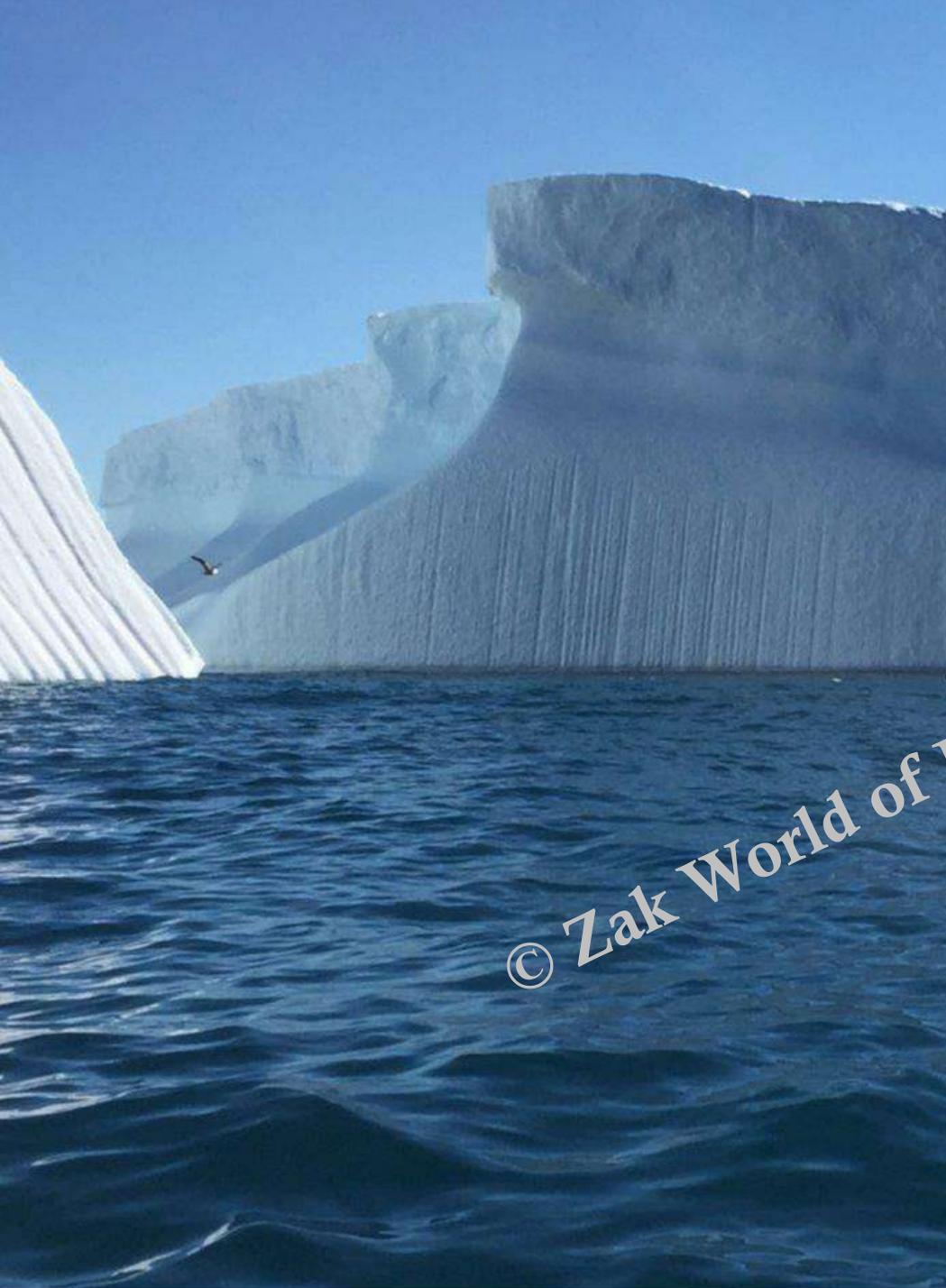
**Arctic ice**



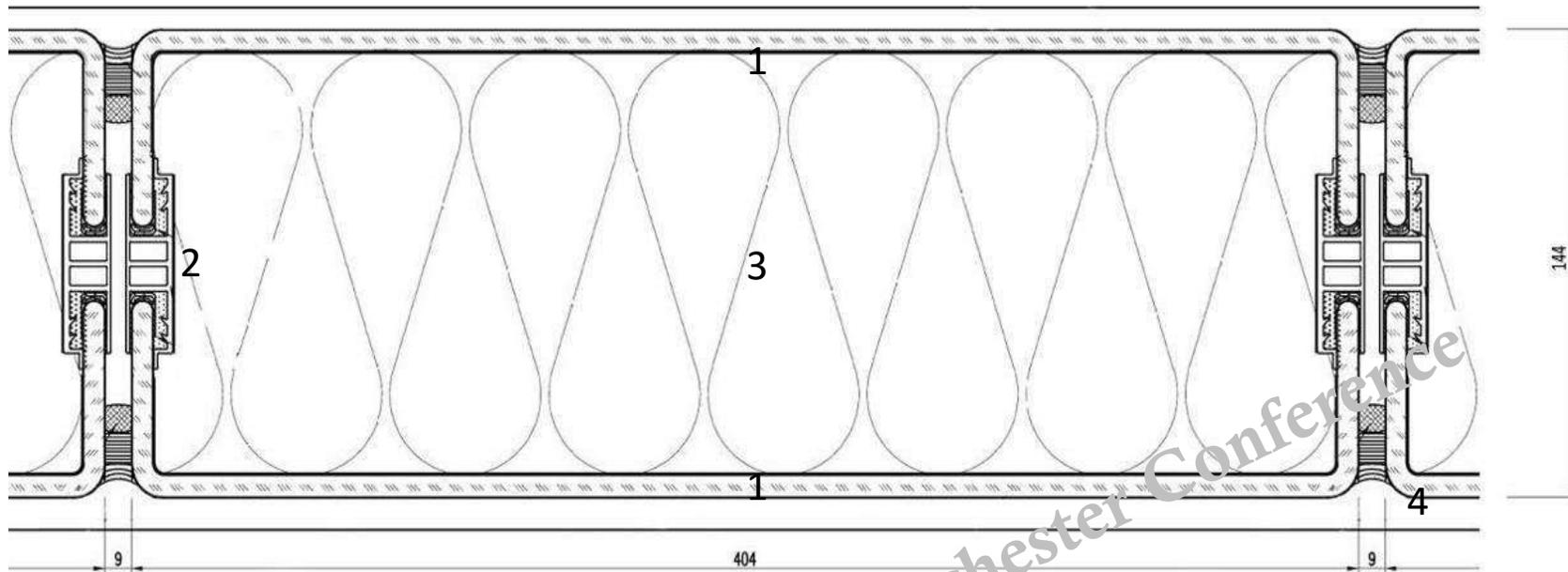
**ice flow - melt**



**Arctic sea**



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*Fig.15 - Plan of cast glass unit. Detail courtesy of author*

Ian Ritchie: International Patent Application No. PCT/GB2018/050356

1. Lamberts Linit 404mm wide 8mm thick low-iron toughened heat-soak tested cast glass with enamelled frit to inside face. 'Cor1' profile to outside face, and selected to reduce maintenance - cleaning requirements (the crest of the profile always remains clean while atmospheric pollution is driven by wind into the valley and rain cleans out the valley.) 'Solar' profile to inside face (chosen to allow scientists to use it as whiteboards).

2. Fibre-reinforced polyamide thermal extrusion.

Cast glass flange is bonded into place with Dow Corning 993 white structural silicone.

3. Wacotech TIMax GL translucent glass-fibre insulation

4. Nominal 9mm (variable geometry) weather silicone joints between cast glass assemblies. Joints can vary between 5mm and 25mm to enable curved geometry.



the public architecture

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# DISTORTION

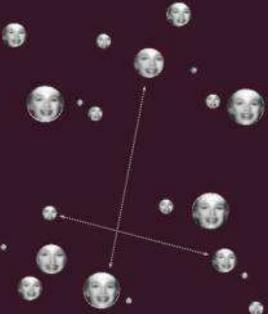


**perspective is everything**

Move around as you look at this exhibit. From one position, it looks abstract; but in the correct position, you see that it is a bicycle. Our visual system "interprets" the world based on prior experience. Here we see a bicycle even though many alternative interpretations are possible.

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# DECEPTION



**seeing frequencies**

Like sound, the visual world is composed of varying frequencies. At long distances, low-frequency features (broad shapes) can be resolved but high-frequency features (fine detail) cannot. At short distances, such fine details emerge and dominate our perception. The images above have been modified to contain a mix of low (Helmholtz) and high (Einstein) frequencies. As a result, these faces change identity as we move closer or farther away.

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# INVERSION



**face off**

When the features of a face are inverted, they appear different. This is because we have learned to see the right way up. Our visual system has mechanisms for distinguishing between faces (e.g., familiar face area in the brain). We almost always see faces the right way up, so those mechanisms in our brain work best when seeing faces normally.

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# ILLUSION

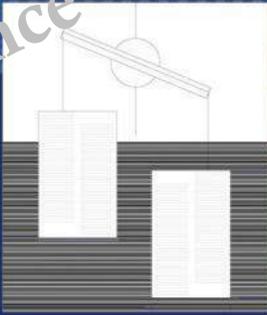


**what we expect**

Do these faces look convex (bulging) or concave? Our visual system has a strong bias toward perceiving convexity. This bias can overpower other depth cues, such as shading and shadows. The hollow faces appear to "follow" you when you move. This is also due to the invariance/interpretation of convexity for our brains... the only plausible explanation is that the face is rotating to follow you as you move.

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# PERCEPTION



**context matters**

The grey bars moving up and down are identical, but they appear to change in brightness as they move. Our perception of brightness is not absolute, but is strongly influenced by the surroundings. In this phenomenon, our perception of the grey bars changes when they are sandwiched between the white and the black bars.

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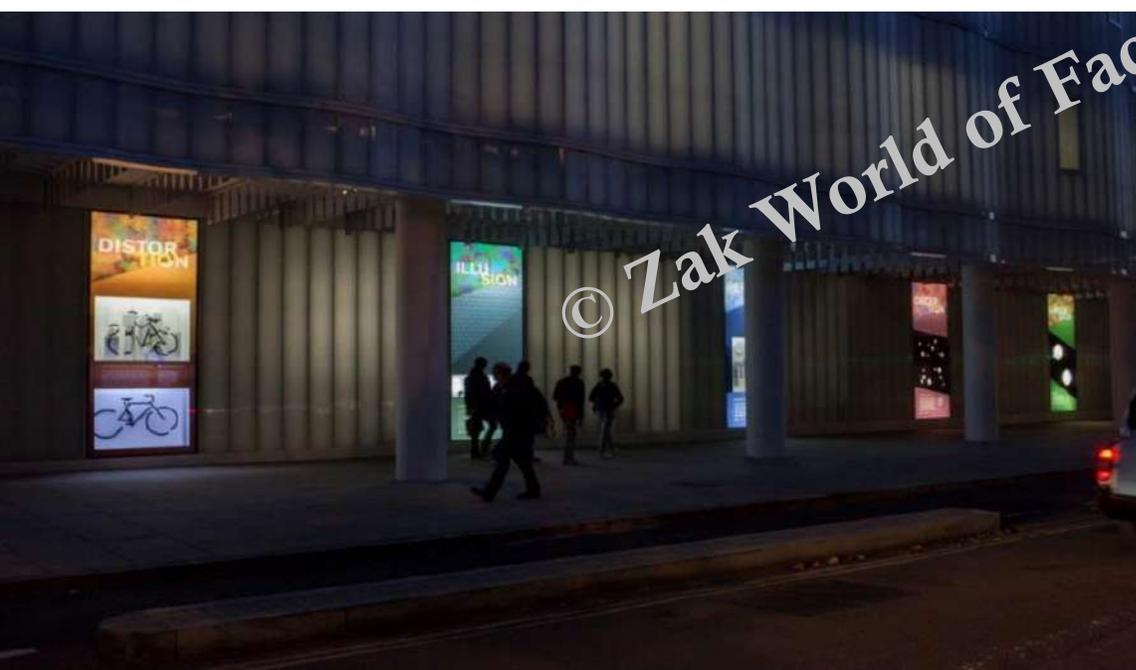


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NEW CAVENDISH  
STREET W1  
CITY OF MANCHESTER

FALSWAY HOUSE

268  
St. Andrew's St.



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Royal Academy of Music  
**London**

Susie Sainsbury Theatre

Angela Burgess Recital Hall

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**Project Site**

**Grade II\* Listed Building**

Royal Academy of Music  
- York Terrace East Building

*Regents Park  
Conservation Area*

**Grade II Listed Building**

Royal Academy of Music -  
Main Building

**Grade I Listed Building**

Royal Academy of Music -  
Museum- York Gate Building

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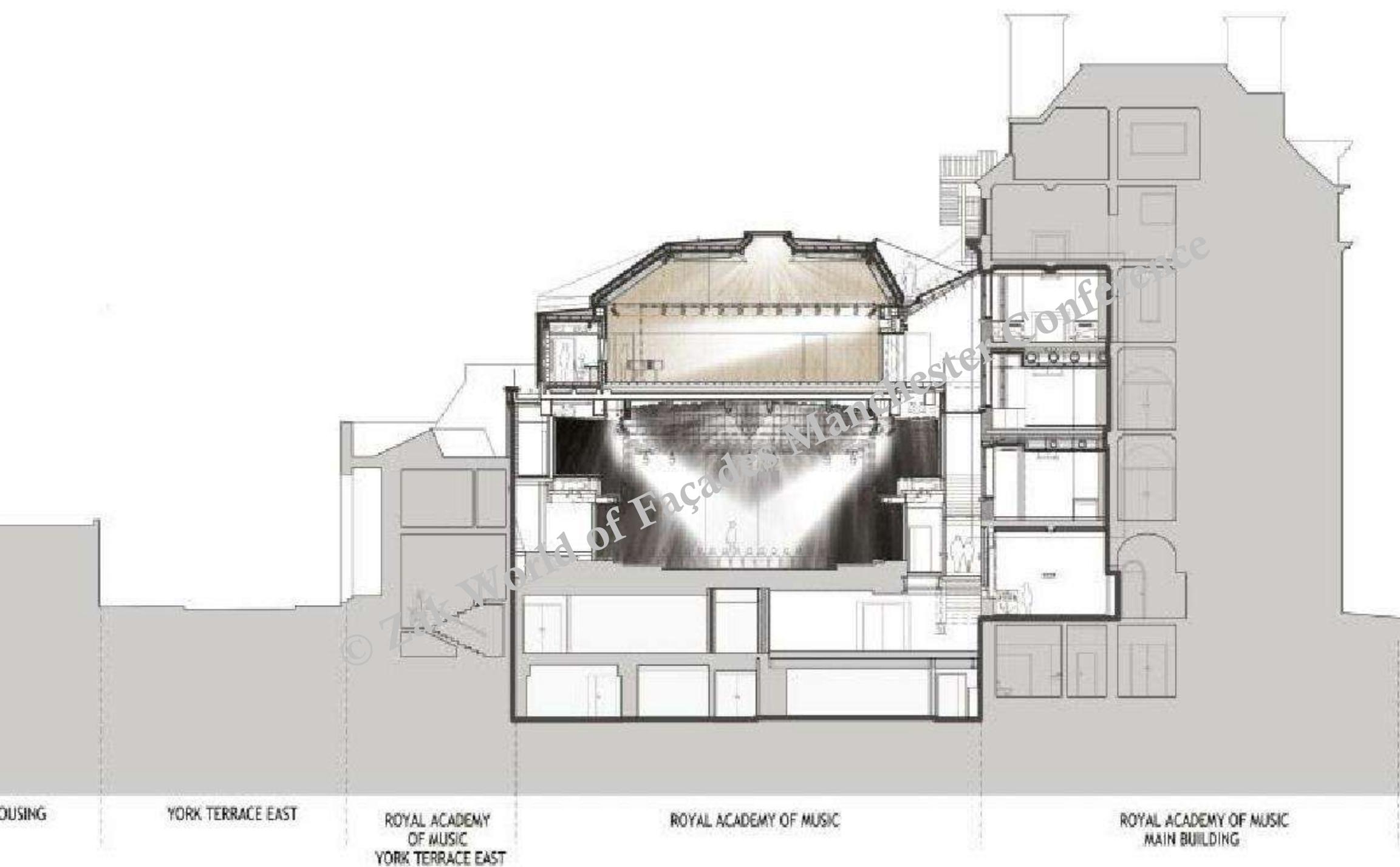


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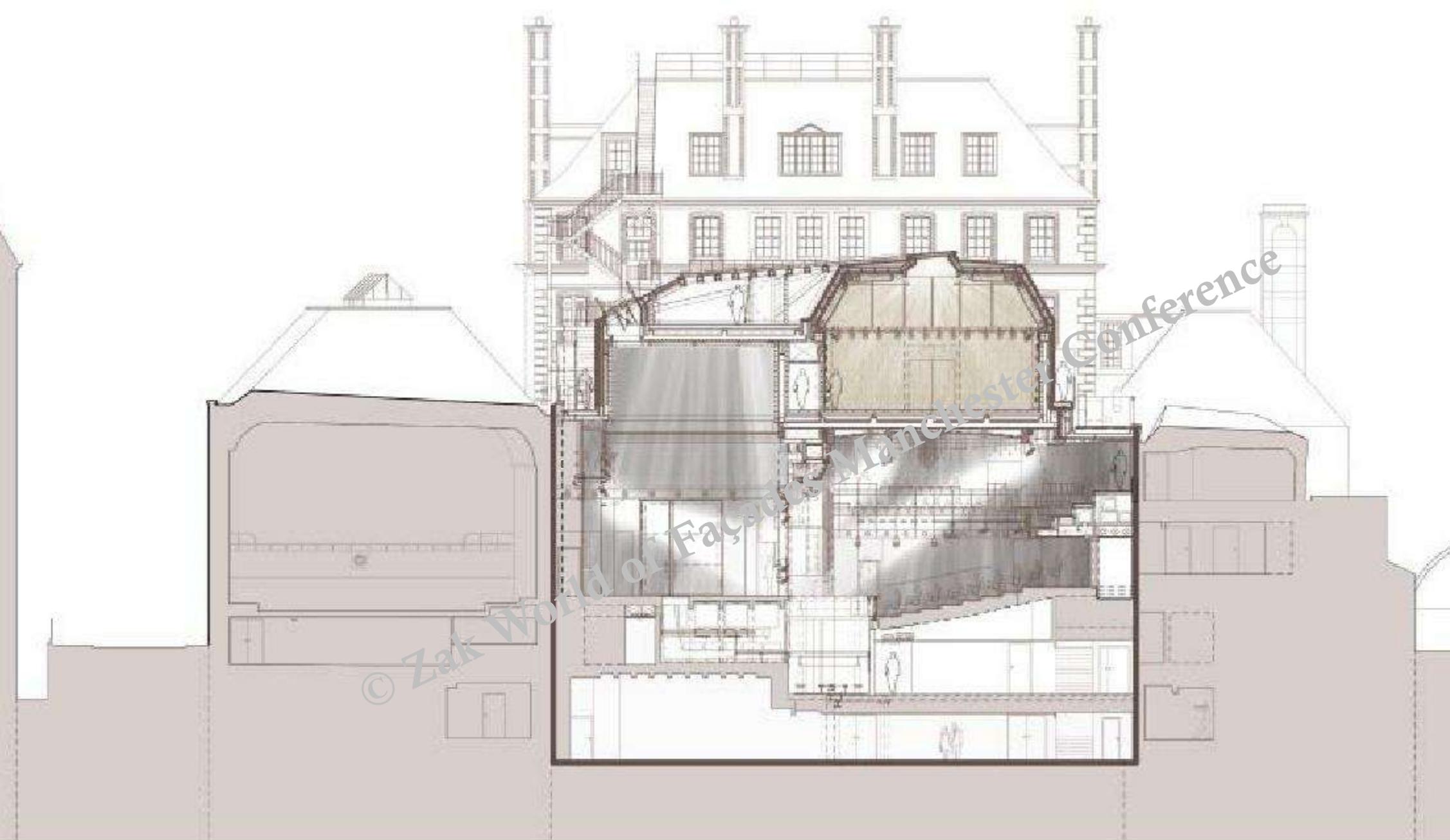
HOUSING

YORK TERRACE EAST

ROYAL ACADEMY  
OF MUSIC  
YORK TERRACE EAST

ROYAL ACADEMY OF MUSIC

ROYAL ACADEMY OF MUSIC  
MAIN BUILDING



MACFARREN PLACE

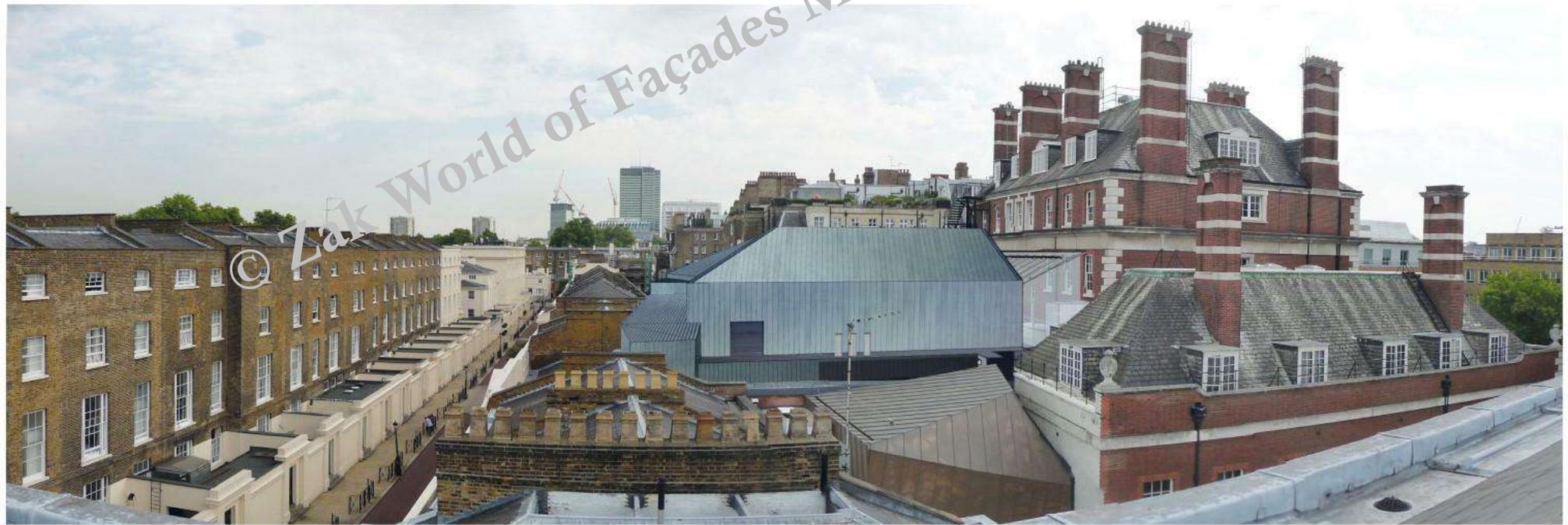
ROYAL ACADEMY OF MUSIC  
DUKES HALL

ROYAL ACADEMY OF MUSIC

ROYAL ACADEMY OF MUSIC  
VOID EXTENSION



Existing



Proposed



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ROYAL  
ACADEMY  
OF MUSIC

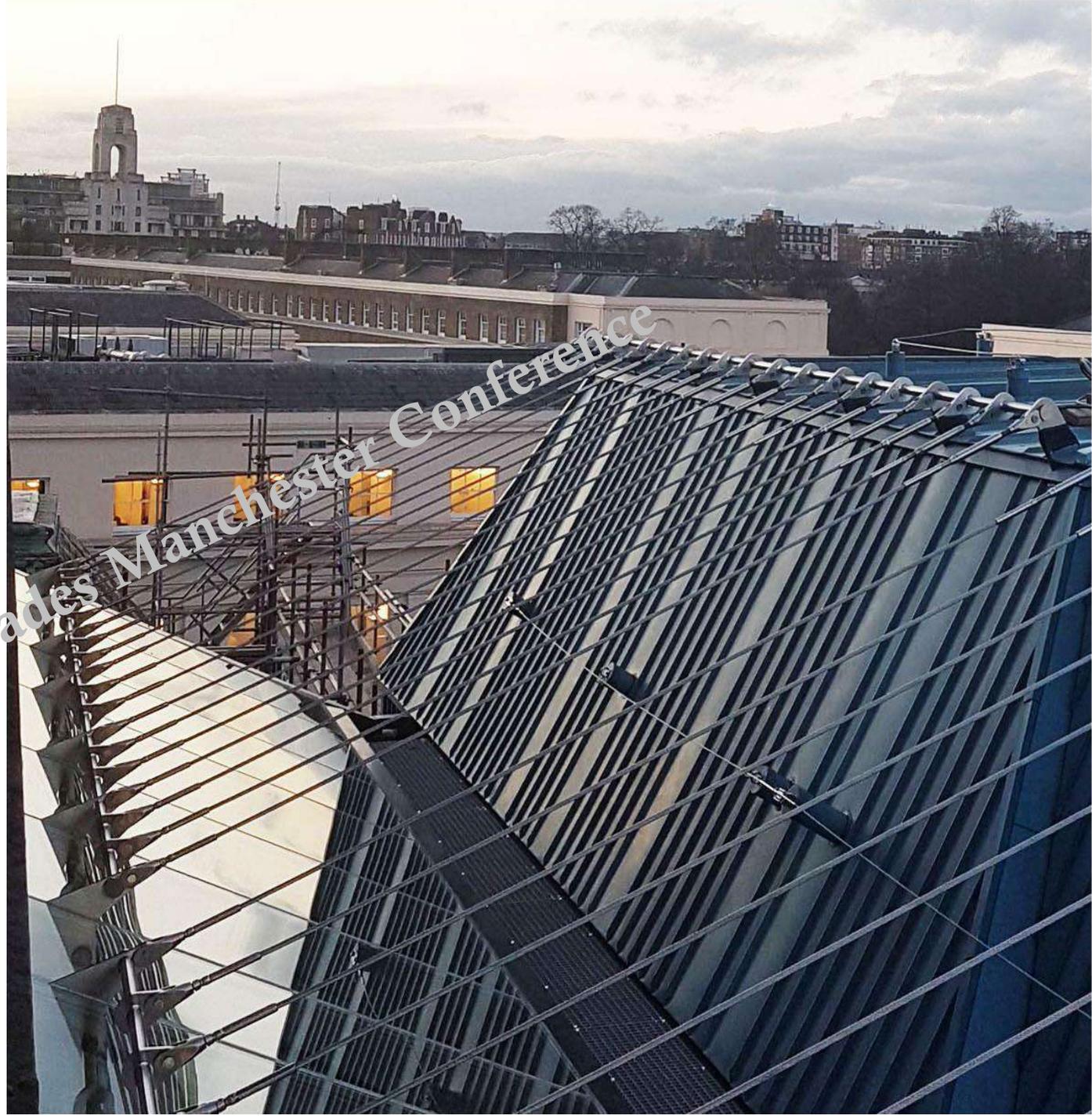
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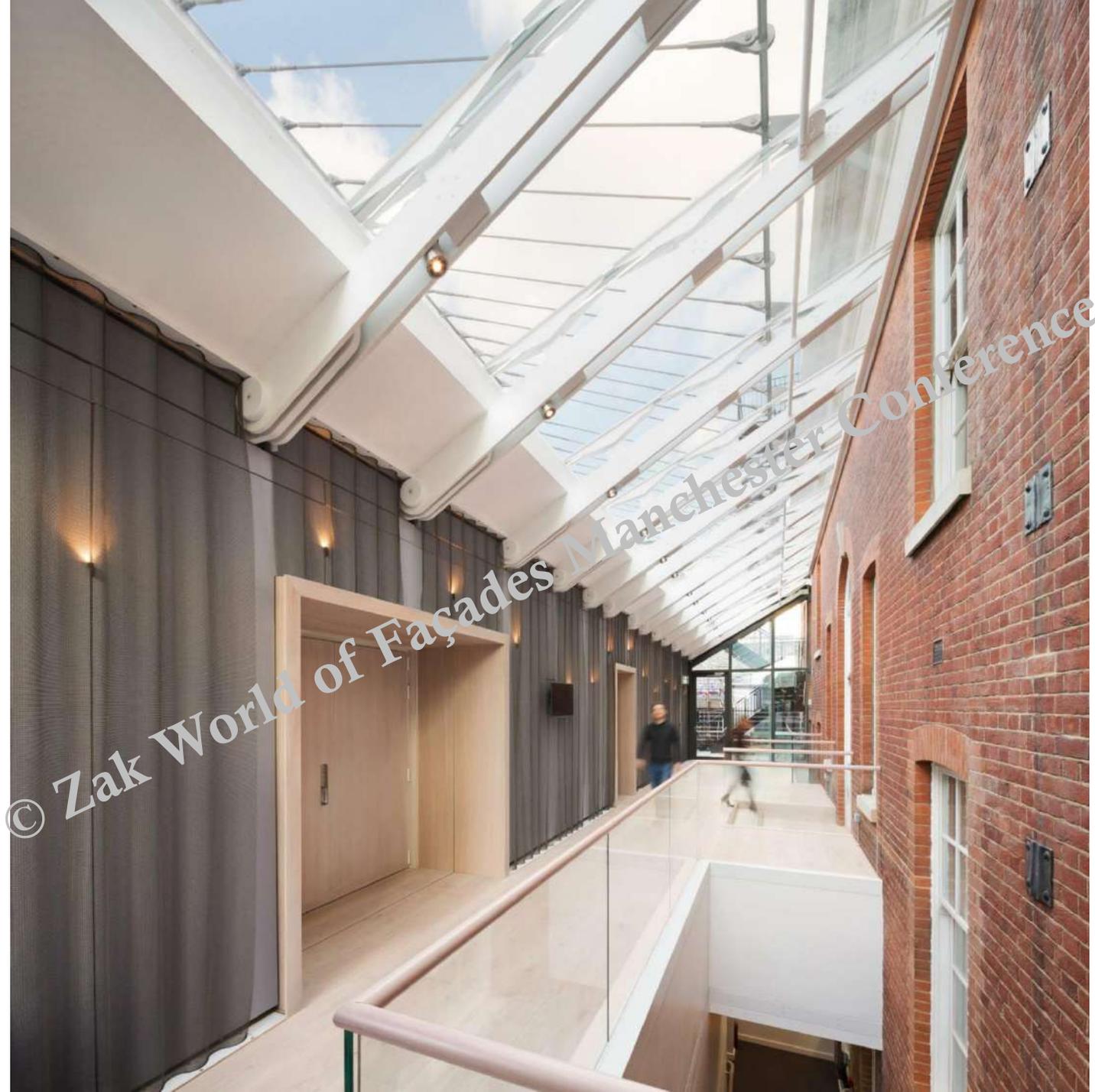


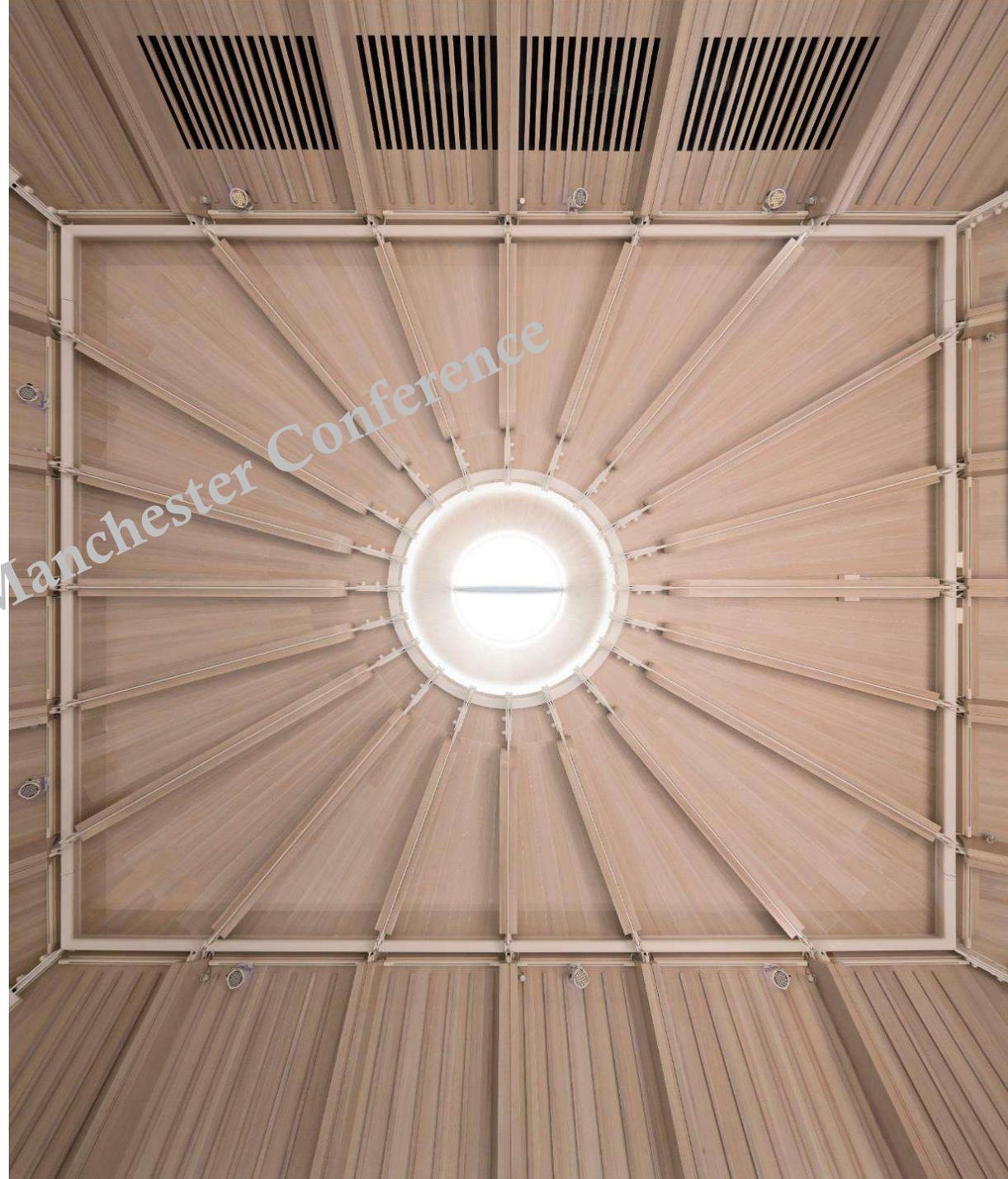




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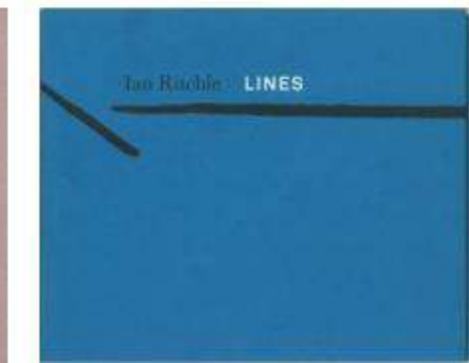
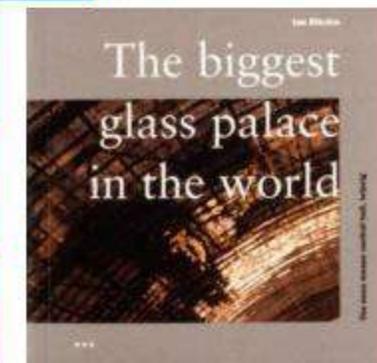
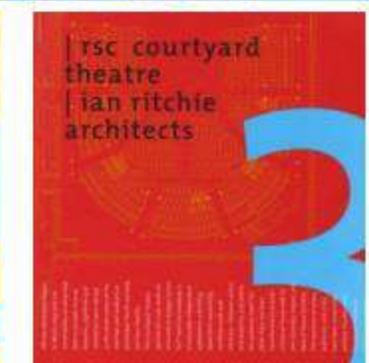
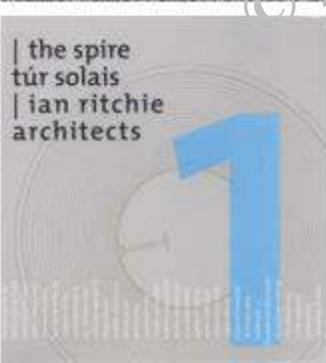
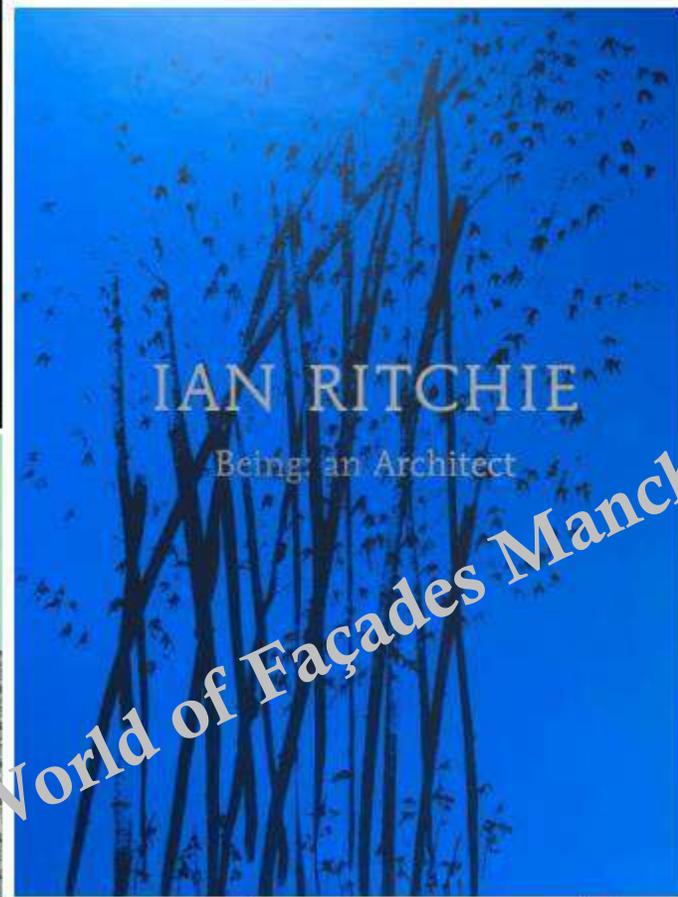
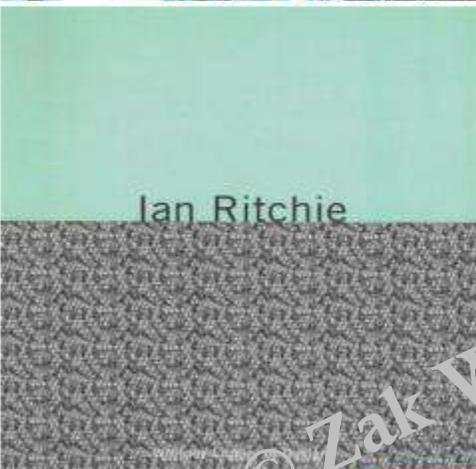
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beauty is non-linear



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beauty is non-linear



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books

**end**

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