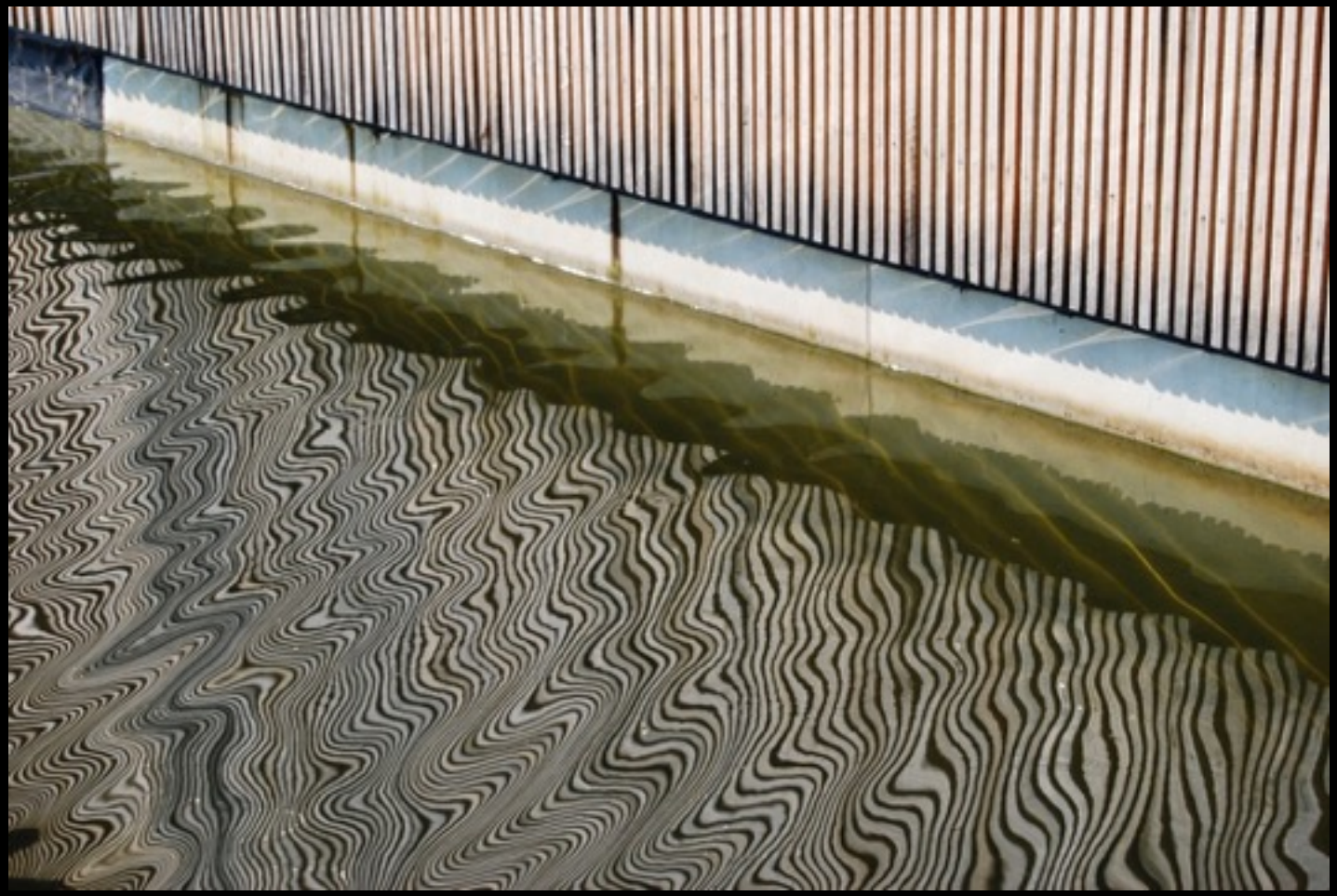
new forms of architecture: utilising bio-based materials

Peter Wilson, Director
Timber Design Initiatives Ltd

reflections on wood use



rethinking traditional models

untreated oak cladding & shingles

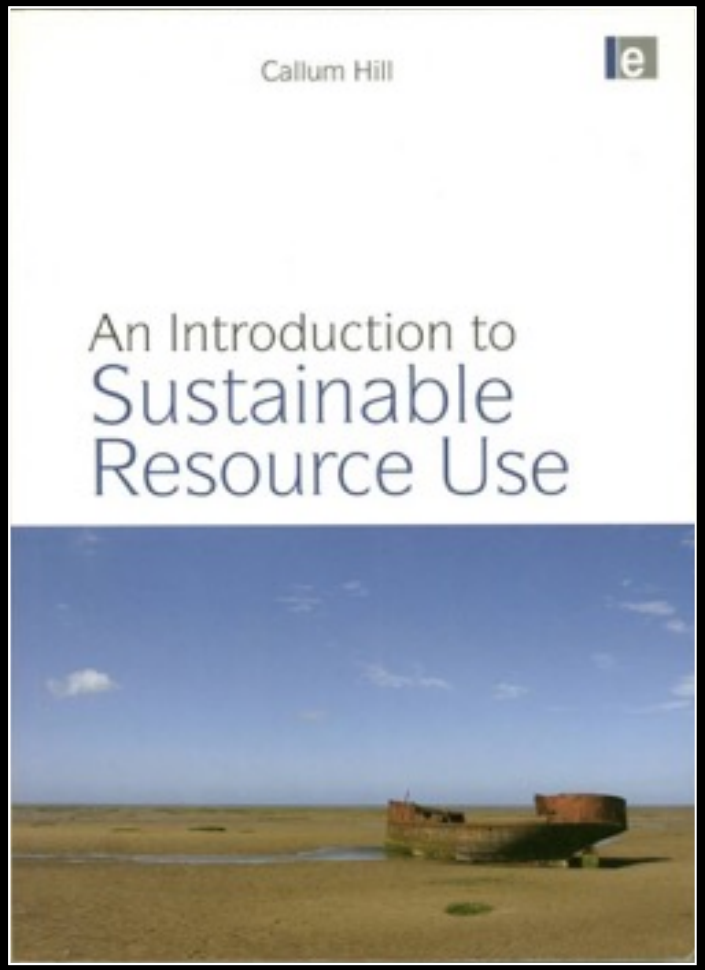
community of built forms
using natural materials

combined with
contemporary structural solutions

sustainability – but not as we know it

Victor Papanek, 1971

sustainability can mean many things



why wood, why now?

80% of the world's population of eight billion will live in urban situations by 2050

in the next decade 75 million multiple family housing units will be required in China alone to accommodate the approximately 300 million people expected to migrate to major urban & adjacent suburban areas

international concerns over rapidly accelerating climate change & the scale & nature of extraction processes demands a paradigm shift in the way we conceive buildings & cities

working with with the properties of wood

large spans from small sections

post-tensioned laminated timber
5 metre span

locally grown, rough sawn

increasingly large spans - 50 metres

local sourcing of materials

exterior oak from within windsor great park

internal larch lattice ceiling from within 600 metres

- 

the model D - zero carbon house

uk grown timber throughout

contemporary uses of green timber

prefabricated oak structure

supporting cross laminated timber roof

simple timber frame and cladding

all from siberia

economic use of material

oriented strand board used as internal finish

very low budget projects

osb feature walls of self-build house

simple industrial timber panels & sections

oak laminate facing to plywood panels

precision joinery

homogeneous, warmth of wood throughout

offsite manufacture

modern methods of construction (mmc)

prefabrication doesn't mean repetition

panelised solutions

standard timber frame technology

combined with parametric modelling

producing non-standard solutions

clt using uk grown timber

research, development & manufacture

structural testing

six species

initial application

shear walls in visitor centre

clt exposed to view

commonwealth games athletes' village 2014

dowel-lam (brettstapel)

dowel-lam at coed-y-brenin

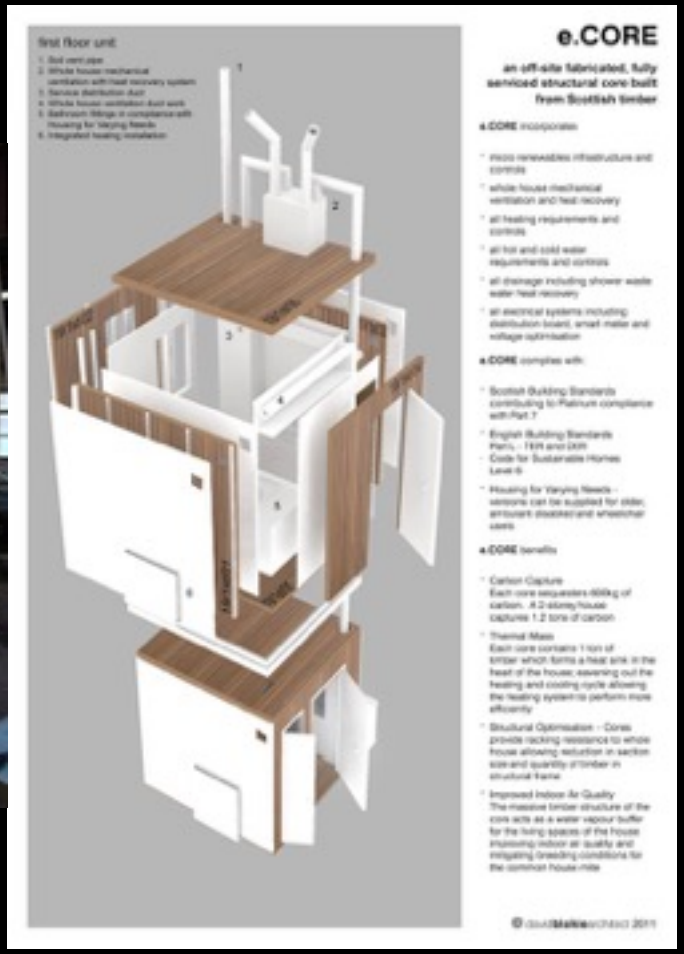
nail-lam (nailed stacked planks)

nail-lam manufacture

completed nail-lam panels

nail-lam exposed in home extension

nail-lam used in e-core service cores



K2 insulated wall panels

e-core & K2 - ongoing testing

Future Affordable, Fife Housing and Innovation Showcase

Future Affordable

modcell – glulam frames & straw

offsite frame assembly

packing the frames

the complete modcell panel

constructed into modular house

the bale house

the bale - or modcell - school

construction exposed

community projects
knowle west media centre

sponsor a modcell panel scheme

modcell schools

exposed modular design

lime render exterior

lilac housing
(low impact living affordable community)

sustainable communities

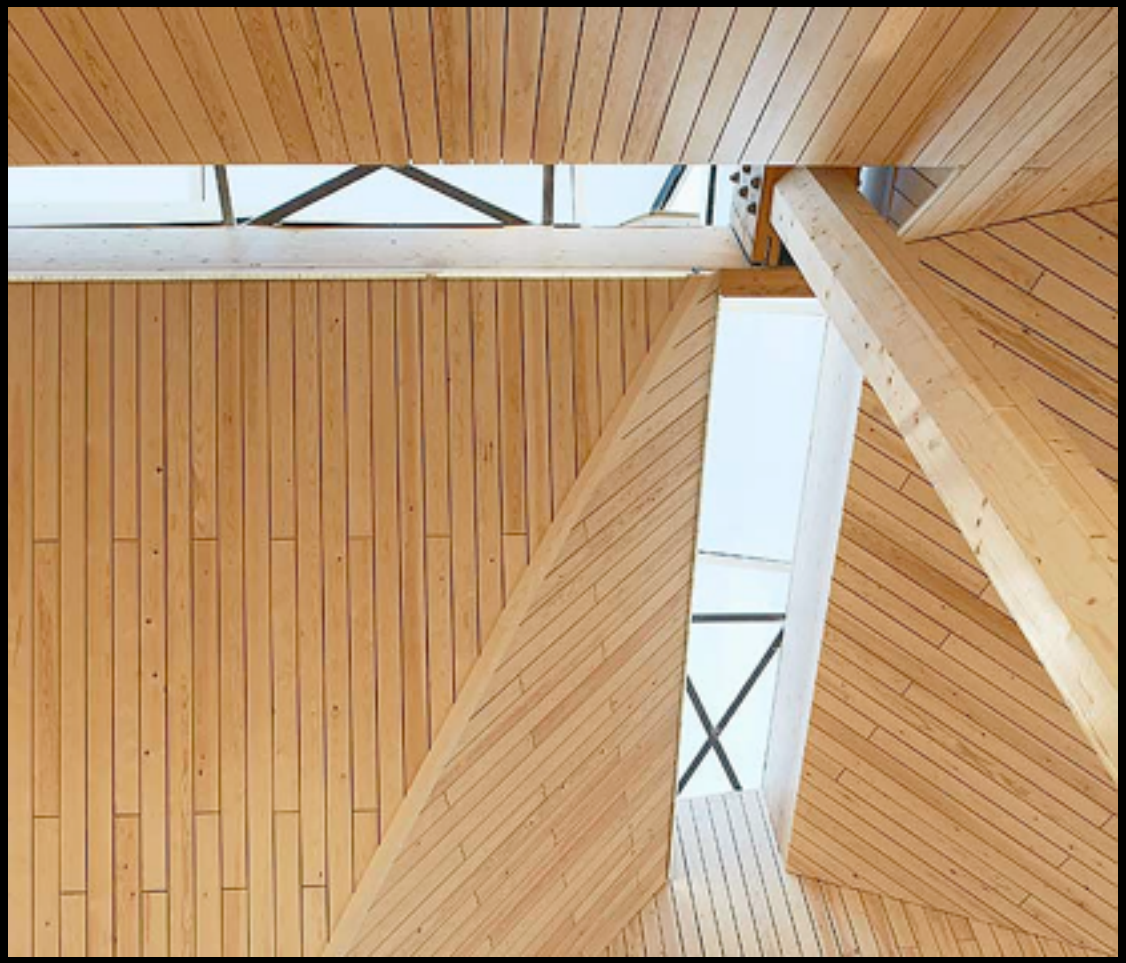
the mill house

the interior is all about natural wood

wood flooring forms the space

contemprary thatch at lake tåkern bird sanctuary

nature explicit - light, air & wood

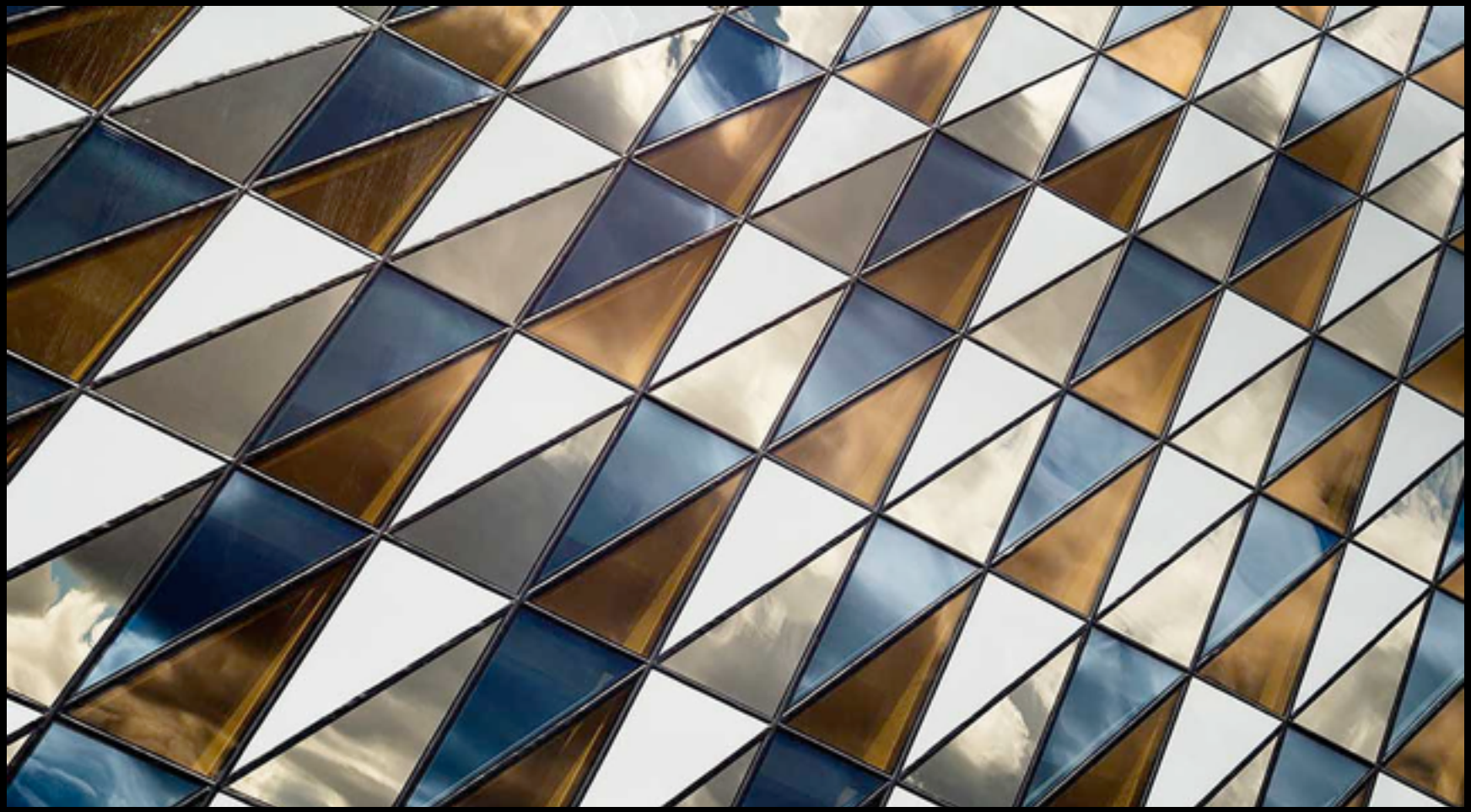


sculpted wood interior

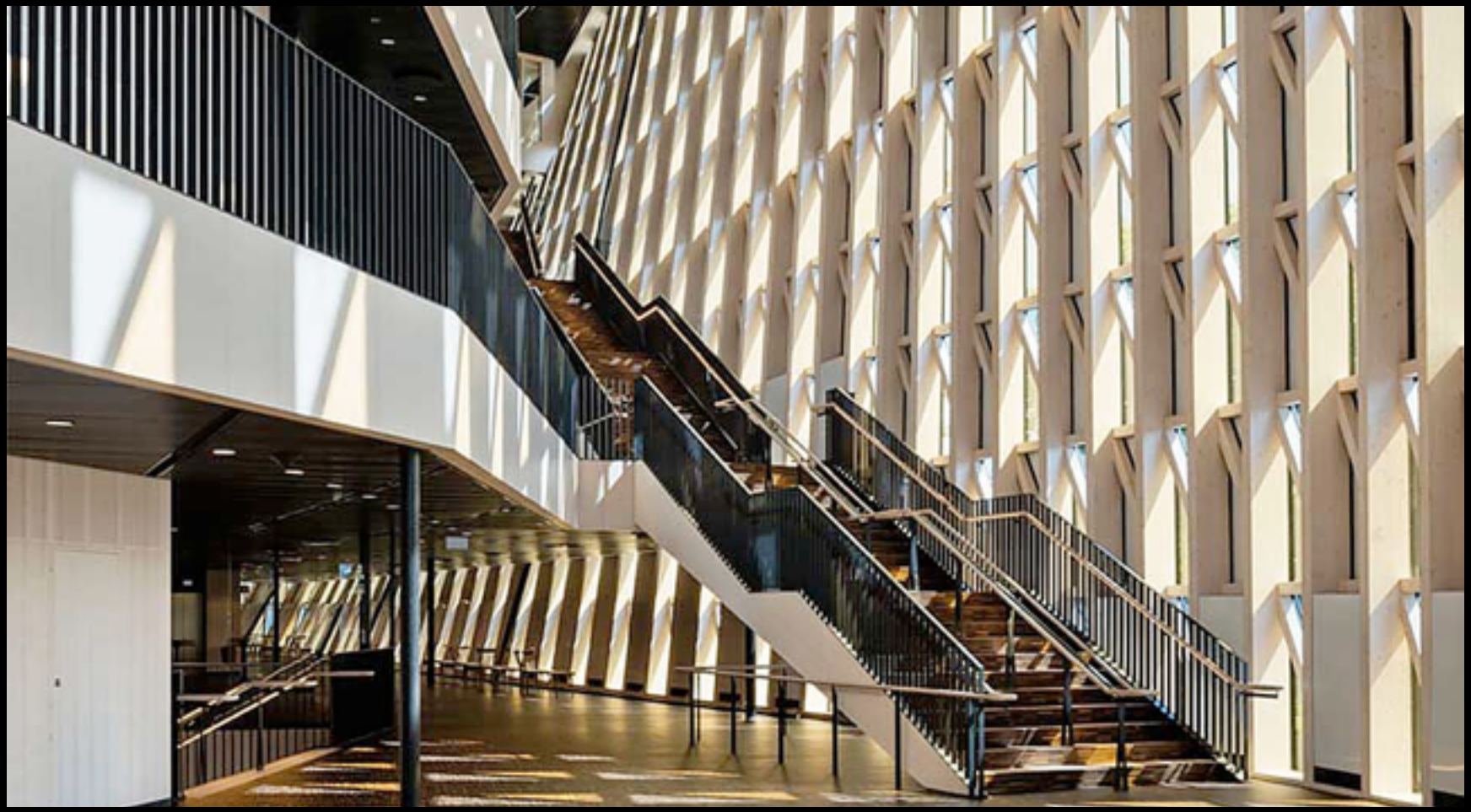
wood - par excellence

aula medica, solna

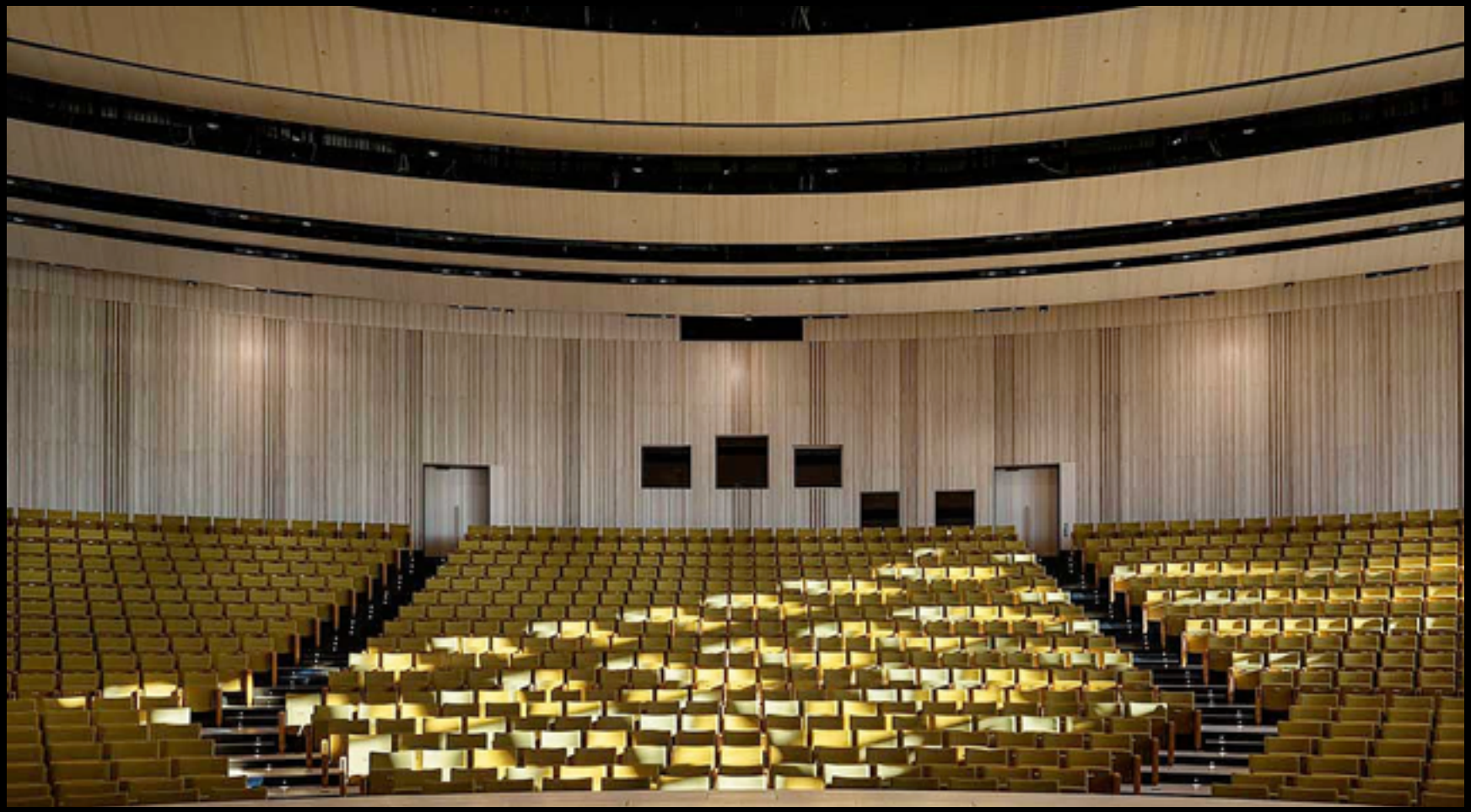
six types of glass



karolinska institutet



nobel prize laureates in medicine or physiology



1000 seat auditorium

spira, jönköping

arts centre

the interior is all about wood

new buildings forms

repeat elements

glulam is a major product

finding new structural & spatial solutions

hardwoods used to complement historic structure

commercial use of sustainable timber technology

BSkyB Believe in Better Building (BiBB)

glulam, clt & timber cassettes

delivering a healthy working environment

40 metre clt tower, portland, oregon

Lever Architecture

12 storey framework of clt & glulam

Lever Architecture

35 storey 'baobab' tower, paris

solid timber

excels in difficult conditions

cross laminated timber is increasingly common

now used in schools, housing, supermarkets

exhibitions offer opportunities for innovation

french pavilion, milan expo 2015

double curving, interlocking glulam

parametric modelling

prefabrication of many unique elements

precision + rapid erection & dismantling

An Ceann Mor

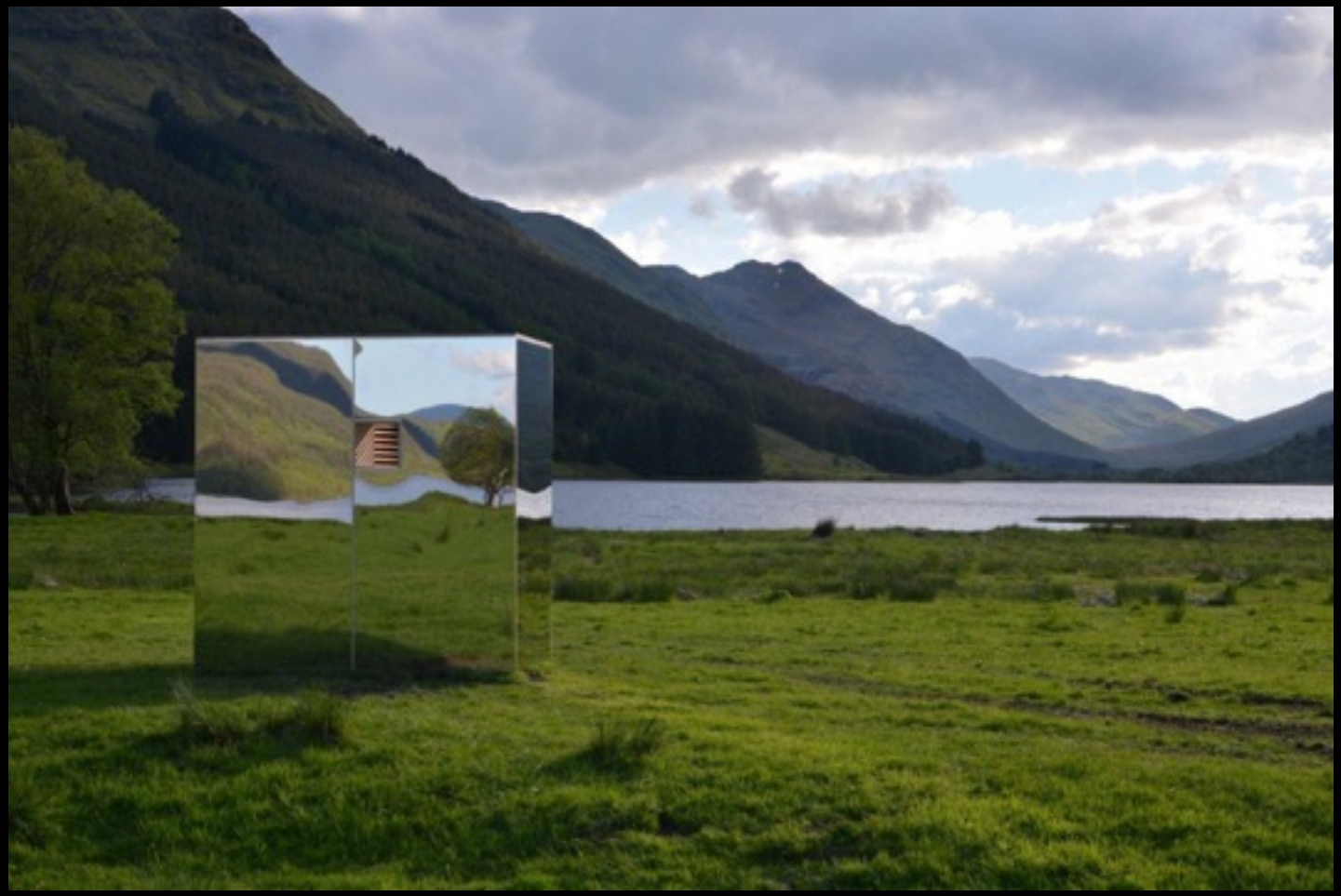
tourist routes

scenic locations

testing ideas and materials

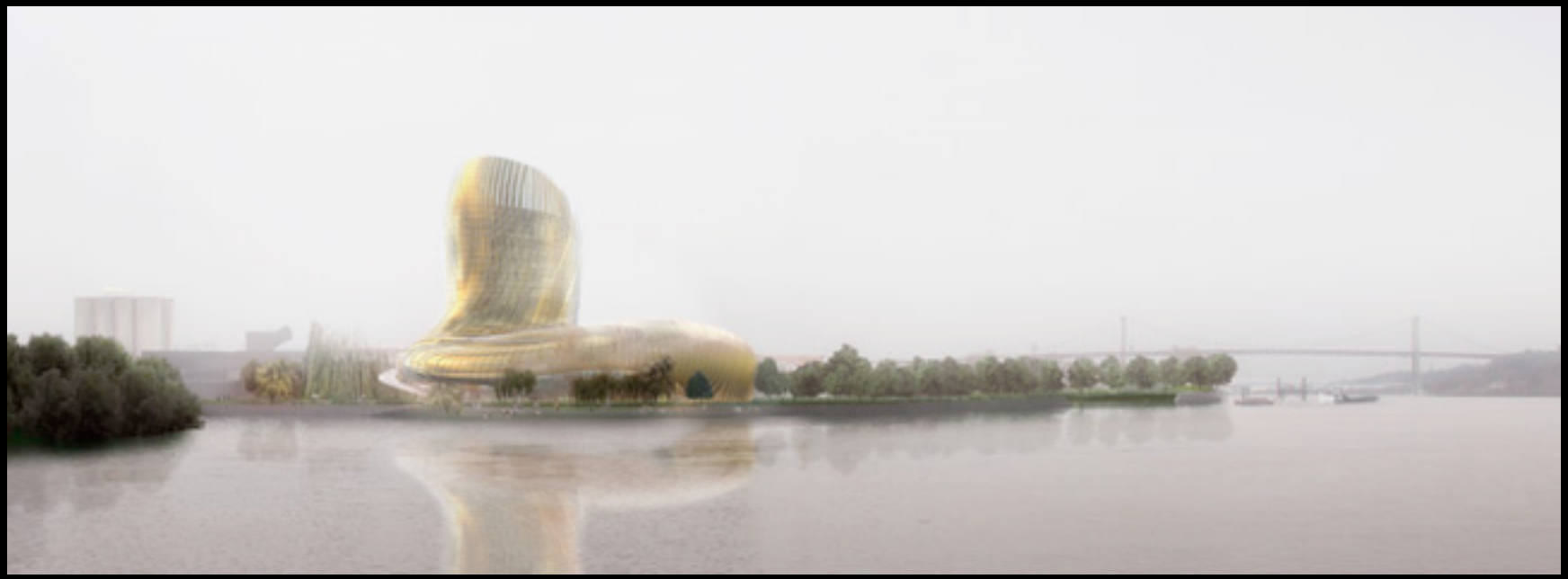
scottish wood, scottish landscape

balquhidder - student project



sitooterie

centre culturel et touristique du vin, bordeaux



auditorium – light, volume & acoustic design

the timber interior given cultural expression

autarkic (energy self sufficient) buildings

based on solid timber technology

modified wood offers new possibilities

exposure to elements - traditionally hardwoods

acetlyated glulam

used in netherlands to line canals

or to create sunken bridges

or even floating ones

fabricated in elegant shapes
that provide structural stiffness

new frontiers of design -
& maybe for health and safety too?

impregnation is not modification

nanotechnology applied to wood

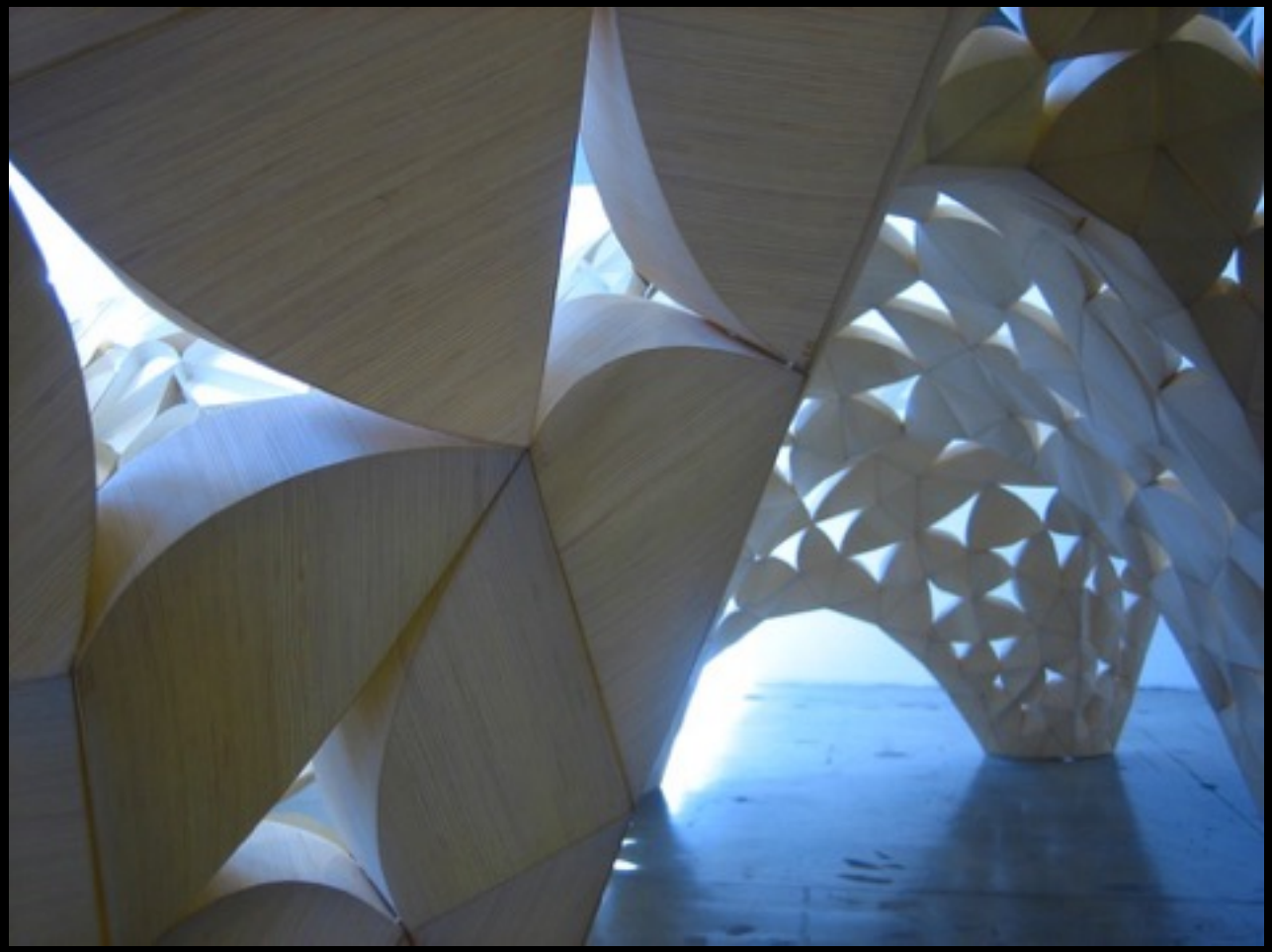
cnc machining to create new forms

double curved cladding using sapele faced plywood

standard ply sheets reconfigured by computer

ultra thin ply

formed into ultra strong structures



the future?

so much research, so much testing still to do

- *academia should be leading on innovation - who else will do it?*
  - *too much research operates in a vacuum -*
    research without dissemination is arcane
  - *we need to bring different disciplines together in joint research -*
    - *fire engineering, energy, acoustics/sound, harmonised design procedures, strength classes, moisture, etc*
    - *we need to rethink r&d alliances to make most effective use of available funds*
  - *we know what the research challenges are -*
    let's stop redesigning the wheel and get on with answering the big questions

muchas gracias!
thank you

Peter Wilson, Director
Timber Design Initiatives Ltd
+44 131 554 8643
timberdesigninitiatives@gmail.com